Technical Manual

DME 7.8

Group 0

Diagnosis

Table of Contents

0 Diagnosis

0 General

DME 7.8

INTRODUCTION

General

The target group of this manual is trained automotive workshop personnel who have successfully taken part in Porsche technical training on the systems concerned and possess the necessary theoretical and practical knowledge to be able to carry out work on complex systems.

The basic requirement of all DME work is awareness and observance of safety instructions and warnings; these can be found in the "Notes" on the following pages.

Note!

The following troubleshooting diagnosis is aimed exclusively at left-hand drive vehicles and describes only these vehicle types. In some cases, specified plugs and sockets may be assigned differently in right-hand drive vehicles, which can lead to incorrect interpretations during troubleshooting and to unforeseen accidents. Therefore, no work should be performed on right-hand drive vehicles without the correct wiring diagram and troubleshooting diagnosis description.

This OBDII Manual DME 7.8 applies to the following vehicles:

- 911 (996) with turbo engine as of model year 2001
- 911 (996FL) with aspirated engine as of model year 2002
- Boxster (9^86FL) with aspirated engine as of model year 2003

The manual describes the diagnosis and troubleshooting for the engine control module installed in Porsche sports cars (OBD = On-Board Diagnosis). Described are the naturally aspirated engine and Turbo OBD II versions (USA), which cover the full scope of diagnosis. This includes the EOBD (European OBD) and RoW (Rest of World) versions, which have been adapted to the respective laws and regulations from the point of view of diagnostics.

The main differences of versions OBD II and EOBD are the tank leak test legally required in den USA and the criteria for fault memory entry and activation of the CHECK ENGINE lamp (hereafter abbreviated CE), which is also designated as MIL (Malfunction Indication Light).

The following functions are guaranteed by the OBD II system:

- Detection of misfires

- Monitoring of catalytic converter efficiency
- Monitoring of tank ventilation system
- Monitoring of tank system for leaks
- Monitoring of secondary air injection
- Monitoring of adaptation limits (e.g. of oxygen sensor closed-loop control, boost pressure control)
- Monitoring of oxygen sensors
- Monitoring of thermostat and water temperature sensor
- Monitoring of positive crankcase ventilation (via oxygen control adaptation)
- Monitoring of Tiptronic transmission control unit
- Monitoring of emission-relevant sensors and actuators used in conjunction with DME (earlier OBD 1 scope)
- Activation of Check Engine lamp and fault storage
- Display of inspection readiness (readiness codes)
- Output of fault codes present
- Storage of defined operating parameters in the event of a fault (incl. freeze frame)
- Functional tests of OBD system (warm-up cycle, driving cycle)
- Communication with a standardised control module tester (scan tool) in the specified modes (see chapter "Fault output using a scan tool")
- Standardised output of operating data such as engine speed, temperature etc.

The digital engine control module DME 7.8

The DME 7.8 is a proven and highly reliable engine control module, which has been specially adapted to Porsche requirements.

In the event of an open circuit in the voltage supply 'terminal 30', the following values are deleted from the control module:

- All fault memory entries
- Stored freeze frames of the faults (for environmental conditions, see the next chapter)
- All adaptation values
- The learned values of the throttle adjustment unit
- Ready statuses of individual diagnosis routines (see next chapter)

Please note that programming the DME control module (e.g. reading in a new data record) also deletes the values referred to above.

Note on adaptation

The DME control module must perform a learning and adaptation routine for the throttle adjustment unit if:

- The power supply to the DME control module is interrupted
- The DME control module plugs are disconnected
- A new DME control module is installed
- The throttle adjustment unit is replaced
- The DME is programmed.

To do this:

1. Switch the ignition on for 1 minute without starting the engine. Do not actuate the accelerator pedal (for instance, make sure that there is not a carpet pressing on the pedal).
2. Switch off ignition for at least 10 seconds.

The following conditions must also be observed, otherwise learning is not possible:

- Vehicle is stationary
- Battery positive voltage between 10 V and 16 V
- Engine temperature between 5 °C and 100 °C
- Intake air temperature between 10 °C and 100 °C

Standard fault codes in accordance with ISO 15031

Diagnostic fault codes, which can be issued by the control module, are standardised in accordance with ISO 15031. This ISO standard is based on SAE J 2012.

The fault code (DTC = Diagnostic Trouble Code) is always a 5-character alphanumeric value, e.g. "P0100".

The first character of the code (a letter) identifies the system that set the code. In all, there are four system types:

- P for Powertrain (all OBD2 fault codes begin with this)
- C for Chassis
- B for Body
- U for future systems.

The P codes for powertrain are divided into two main categories in accordance with ISO 15031:

- Uniformly standardised codes: P0XXX and P2XXX; these are the same for all manufacturers
- Manufacturer codes: P1XXX and P3XXX; only the first three characters are standardised here (example: P13XX for ignition system diagnosis or misfire detection); the last two digits can be selected freely by the manufacturer.

Only the P codes are required for OBD II.

The standardised codes are subdivided as follows:

P0001 to P0299	Fuel and air proportioning
P03xx	Ignition system and misfire detection
P04xx	Additional exhaust regulations
P05xx	Speed and idle speed control
P06xx	Computer and output signals
P0700 to P0999	Transmission

P2000 to P2299	Fuel and air proportioning
P23XX	Ignition system and misfire detection
P24XX	Additional exhaust regulations
P25XX	Additional input signals
P26XX	Computer and output signals
P27XX	Transmission
P28XX	Reserved
P29XX	Fuel and air proportioning

Definition of terms

Warm-up cycle

Warm-up cycle means the warm-up phase of the engine. To satisfy the 'warm-up cycle' condition, the engine temperature must not exceed a certain value during starting (presently 44 °C). The operating phase of the engine must last long enough to achieve a certain temperature increase (presently 21 °K, although the temperature reached must be at least 54°C). The warm-up cycle condition is required in order to decrement the deletion counter for faults that are registered as "remedied" (on this see the paragraph 'Remedying faults').

Driving cycle

A driving cycle consists of the engine start, an arbitrary journey (with idling, part load, constant-speed driving and trailing throttle phase components) and the time after switching off the engine until a new start. For faults to be frozen/remedied, the driving cycle must also partly include the procedure of the respective diagnosis.

Ready status

The menu item "Ready status" displays whether the required fault checks of the OBD system have been performed since the last 'Clear fault memory' or 'Reset'. If a check is OK, testing for a Ready status once is sufficient; if the system is faulty, the Ready status is reached after testing twice.

The Ready status is important for example when testing the exhaust; it detects if the fault memory has been cleared before testing a faulty vehicle without remedying the cause(s) for the fault entry.

The Ready status is displayed for the following subsystems:

- Catalytic conversion
- Tank ventilation system
- Secondary air system
- Oxygen sensor
- Oxygen sensor heating

Once a subsystem has attained the Ready status, this is maintained until the next 'Clear fault memory'.

Note!

- *In some countries (currently USA, Canada), after intervention on the DME, it is necessary to reset the Ready status before delivering the vehicle to the customer.*
- *To do this, perform the short tests recommended in the 9588 Porsche System Tester II or a test drive to obtain the relevant diagnostic conditions (these can be found for each system at the beginning of the instructions for finding P codes in this manual).*
- *Please refer any questions on this to your importer.*

Freeze frames ('frozen fault boundary conditions' specified by the authorities)

Freeze frame data is standardised and records operating conditions in the event of a (first) fault. Freeze frames have different priorities.

This may be important in the case of output to a scan tool, as there may be only one freeze frame that can be displayed, although several faults are stored (misfires or fuel supply faults override the freeze frames of other faults).

Freeze frames can, for example, be examined in the "extended fault memory" of the 9588 Porsche System Tester II.

The control module must be able to output the following freeze frame data to a standard diagnostic unit (scan tool):

- Fault codes causing this freeze frame to be stored
- Engine load
- Engine speed
- Coolant temperature
- Oxygen control status (open or closed loop)
- Mixture adaptation values
- Fuel pressure (if available - not the case for DME 7.8)
- Intake pipe pressure (if available - in the case of DME 7.8 for turbo vehicles only)
- Vehicle speed

In the case of DME 7.8, a freeze frame is stored for each initial occurrence of a fault that contains all the actual values referred to above with the exception of fuel pressure. See also the next section.

Further environmental conditions

In addition with DME 7.8, for every occurrence of a fault, three further operating conditions (actual values at time of fault occurrence) as well as operating hours and total mileage since model year 2002 are also stored. There is a memory entry for the first occurrence of the fault (remains stored) and a further entry for each last occurrence of the fault (updated for each new occurrence). This data can provide reference points to the cause of the fault in difficult diagnoses and can only be viewed in the "extended fault memory" of the 9588 Porsche System Tester II. The list of possible environmental conditions partly covers more than one freeze frame so that important environmental conditions can also be stored after the first fault occurrence.

Fault persistence (confirmation of a suspected fault)

When a fault occurs for the first time during a diagnostic routine, it is stored as a suspected fault. At the same time a fault persistence counter is started with a certain value (e.g. 2). In the course of further diagnostic operations, if the fault is present in the same range window the counter is decremented by 1. If the persistence counter has the value 0, the fault is assessed as persistent and registered accordingly. If provided for by the fault category, the CE lamp is also activated.

Remedying faults (CE lamp OUT)

When a fault occurs for the first time during a diagnostic routine, it is stored as a suspected fault. In the subsequent driving cycle, the suspicion is either confirmed (fault recurs) or cancelled (fault does not recur, no indication on a scan tool). If the fault activates the CE lamp, a fault correction counter is started at the same time with a certain value (e.g. 5). In the course of further diagnostic routines, if the fault is not present in the same range window the correction counter is decremented by 1. If the correction counter has the value 0, the fault is assessed as remedied. If the fault activated the Check Engine warning light, this will be switched off if not prevented by any further fault. The fault remains in the fault memory for the time being and is only deleted after a number of further warm-up cycles (defined in the fault deletion counter) (workshop assistance if for example the tank cap is temporarily not correctly screwed in).

Fault deletion counter

A separate deletion counter is run for every fault detected. It contains the specified number of GO checks until deletion of the corresponding fault from the fault memory.

When a fault is first detected, the deletion counter is, for example, set to 80 (suspected fault).

If a non-persistent fault is detected as remedied, the deletion counter (only visible for the PST2) is set to 10 (workshop assistance if fault very sporadic).

Whenever a persistent fault is detected (= CE lamp ON), the deletion counter is set to 40, for example. This value is retained until the fault is detected as having been remedied.

The deletion counter is decremented by 1 after every warm-up cycle if the fault is non-persistent fault or detected as remedied. Confirmed faults not detected as remedied are not decremented in the deletion counter. If the deletion counter reaches the value 0, the fault is deleted from the memory.

Fault frequency counter

This counter shows how often a fault has recurred since its first occurrence. If the frequency value is 1, the fault has only occurred once. It can now be either "present" or "not present". Every time the fault status changes from "not present" to "present", the number in the frequency counter is increased by 1. A rather high value in the fault frequency counter may therefore indicate a loose contact. It should be noted that the environmental conditions apply only to the first and the last occurrence of each fault.

Warning notes

Warning notes

⚠ **Danger!**

- ***Danger of accident when operating test and diagnostic equipment (PST2, scan tool etc.) while the vehicle is in motion !***
- ***While the vehicle is in motion always get a second person to operate test and diagnostic equipment***
- ***This also applies to the "smaller valve lift" system check for the 'VarioCam Plus' adjustment***
- ***Many tests or system checks can impair the drivability of the vehicle, so only perform these in areas closed to road traffic!***

⚠ **Danger!**

- ***Gasoline is toxic!***
- ***Inhaling vapours can lead to irritation of the mucous membranes and eyes***
- ***It represents a serious risk to health when inhaled, touched or swallowed over longer periods***
- ***Wear a breathing mask with active charcoal filter; do not breathe in any fuel vapours***
- ***Wear protective gloves that are fuel-resistant***
- ***Only work on the fuel system in well-ventilated spaces***
- ***Before opening the fuel lines or fuel hoses, relieve the fuel pressure***

- ***Collect escaping fuel, absorb it if necessary with a suitable binding material and dispose of properly (special-category waste!)***
- ***Pay attention to cleanliness when working on the fuel system***

Danger!

- ***Danger of fire and explosion when handling gasoline***

- ***Keep clear of ignition sources***
- ***Do not smoke***
- ***Danger of fire due to naked flame and flying sparks, e.g. during welding or grinding work***
- ***Danger of fire due to escaping fuel (e.g. on hot engine components) and/or electrostatic charge***
- ***Make the vehicle safe, e.g. with a warning sign***
- ***Change any clothing soaked with fuel immediately***
- ***In case of fire, use CO_2 or dry powder fire extinguishers***

Warning!

- ***Risk of injury due to hot and/or rotating parts!***
- ***Never work on the engine when it is running or hot or on a hot exhaust system!***
- ***Danger of injury due to rotating fan! Fans can suddenly start if the air conditioning system is switched on or the engine compartment is hot. Never work in this area if the engine is running.***

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.***
- ***Observe the warnings in the body manual before carrying out welding on vehicles.***

Notes on troubleshooting

Working on the oxygen sensors

Note!

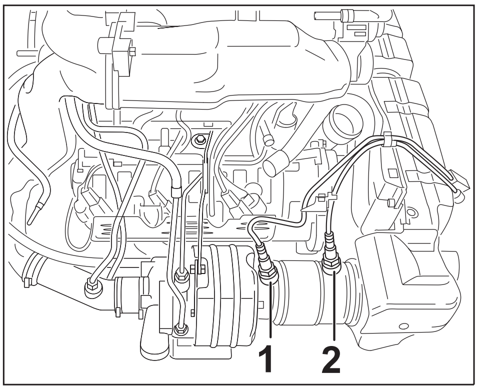
Oxygen sensors used with the DME 7.8

Component		Use	
Oxygen sensor	Number of pins	Before catalytic converter	After catalytic converter
LSU Wide band sensor	6	all models with turbo engine	/
LSF Jump sensor	4	all models with aspirated engine	all models

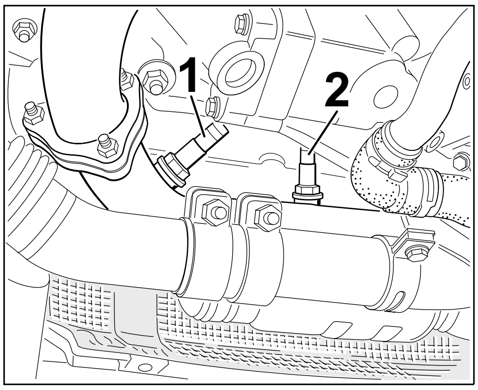
The LSU (Lambda sensor Universal) is able to determine the lambda value in a wide range window

The LSF (Lambda sensor Flat) is only able to determine lambdas greater or less than 1 (the rich/lean jump)

Arrangement of oxygen sensors for 996 Turbo ►



Arrangement of oxygen sensors for 996 aspirated engine ►



1 - Oxygen sensor in front of catalytic converter
2 - Oxygen sensor after catalytic converter

Note!

Do not interchange oxygen sensors before and after the catalytic converter, otherwise implausible error entries will arise. This information refers to the possibility of installing a sensor before the cat in the installation position of a sensor after the cat in the exhaust line. The plugs themselves are coded and cannot be interchanged.

Note!

Do not use contact spray on the plug connections of the oxygen sensor, otherwise irreparable damage will be caused to the lines (contamination of the oxygen sensor via the reference air duct).

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:

- Is the fault correction counter and perhaps the deletion counter decremented? This would provide information on a remedied fault (however achieved)
- Is the fault an old one? Read out the extended fault memory (operating time and mileage at last fault entry)
- Are the diagnostic conditions satisfied? If necessary, perform a short test or test drive
- Are officially approved plug connections and ground points of the affected current path OK?
- Set all wiring harnesses of the affected current path to a state that corresponds to driving by pulling and shaking them (loose contact)
- Condition/gas tightness of catalytic converter
- For the tank system: Condition/gas tightness of hoses and the tank cap, if applicable

Diagnostic conditions

Note!

Important! All unnecessary electrical loads must be switched off before the diagnosis. When working on the vehicle with the ignition switched on for fairly long periods (above approx. 15 minutes), a suitable battery charging unit must be connected.

Note!

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

1. Clear the fault memory after printing out or saving
2. Satisfy the requirements listed under 'Diagnostic conditions' or perform a short test with the 9588 Porsche System Tester II. It should be noted here that, owing to reset adaptation values (in particular for fuel supply and misfire detection), fault detection by the DME control module is only possible after a fairly long driving time. If may be necessary to observe the relevant adaptation values ("actual values") during a subsequent test drive to be able to identify any trend
3. Read out fault memory again.

Possible causes of fault

Note!

The 'possible causes of fault' that are responsible for the fault are listed here. Please note that in certain circumstances further faults may be stored in the fault memory after troubleshooting (e.g. if plugs are disconnected). After repairs, read out the fault memory of all control units and delete the faults appearing as a result of the troubleshooting and repairs.

DME faults

Note!

- *A faulty control module is extremely rare! Although in theory almost any fault can also be caused by a faulty control module, it has been shown in the past that, particularly in the case of DME control modules, even control modules sent in for checking were OK.*
- *At this point we again stress that before exchanging a DME control module (the final logical step at the end of unsuccessful troubleshooting), all other possible fault causes must be rigorously checked; if necessary, delete the fault entry and perform a test drive or short test.*
- *If other faults are entered, then remedy these first as instructed (An example: a fault in adjusting the inlet camshaft may under certain circumstances also lead to an oxygen sensor fault being output).*
- *Fault entries solely in connection with the troubleshooting, repair or programming of control units (e.g. CAN timeout faults) should be deleted.*

Diagnosis/troubleshooting

Note!

The fault memory Info key F8 *on 9588 Porsche System Tester II can be used to access the 'extended fault memory'. Besides the freeze frames and environmental conditions, this also includes information on the fault type*

Fault type

The following fault types are possible for the DME

- Above upper limit (Max)
- Below lower limit (Min)
- No signal/no communication (Sig)
- Signal implausible (Plaus)

Several fault types may be stored at the same time.

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!

- *Faults "not present": Where faults are entered but not actually present, after obtaining or adjusting the diagnostic conditions, wiring positions connected to moving parts on and in the vehicle must be checked systematically. Various statuses that can cause a fault to occur must be simulated with the aid of the wiring diagram. It should be noted that the 9588 Porsche System Tester II shows the current fault status only conditionally. The fault frequency counter gives information on operating time and mileage at last fault occurrence*
- *In difficult cases where faults are currently not present, it is recommended to clear the fault memory (after printing out) and to observe whether the fault is re-entered whilst simulating a loose contact.*

Note!

- *Visual inspection of plug connections: As part of troubleshooting, it must be ensured that the pins of affected plug connections, both on the wiring side and component side, are neither damaged nor corroded. Furthermore, the wiring and plugs must be checked for external damage (cracks, etc.) and proper contact (pins not bent, spread or pushed into the housing). Repair damaged or corroded pins if possible, otherwise replace them. Repair or replace damaged wires. If wiring to the oxygen sensors is damaged, always replace the complete sensor.*
- *Visual inspection of components: As part of troubleshooting, it must be ensured that there are no signs of visible damage (e.g. cracks, deformation or chafed areas) on the affected components and wiring harnesses. This is particularly important for components that cannot be tested with a multimeter, e.g. bar ignition modules, or components that can cause sporadic faults due to penetrating moisture.*

Note!

Battery voltage and signals: A battery voltage of between 11.4 and 14.5 V is generally required for diagnosis/troubleshooting. This must be checked and, if necessary, guaranteed by means of a battery charging unit.

Note!

Specified resistance values are based on an ambient temperature of 20°C unless otherwise stated.

End of troubleshooting (→ End)

→ End marks the end of the described diagnosis/troubleshooting in the troubleshooting tables. The procedure for repair can be taken from the relevant workshop manual for the particular repair group. After successful repair, the fault memory of the DME control module must be cleared and, if necessary, adaptation of the throttle adjustment unit performed, followed by a short test or test drive to achieve the diagnostic conditions for the particular fault. Afterwards the fault memory must be read out again. Depending on the country, Ready statuses must be generated.

DME 7.8

Data Output with the Porsche System Tester 2

DME

Main Menu

Note!

Online help can be called up with the F1 key.

- Identification
- Fault Memory
- Erase Fault Memory
- Actual Values
- Input Signals
- Ready Status
- Drive Links
- Drive Link Active
- Vehicle Data
- System Test
- Short Test
- Coding
- Control Module Programming

Identification

Control module identification data can be read out with this menu item.

The display shows:

- Diagnosis software number
- Porsche part number

Press F8 key.

The display shows:

- 1. block - vehicle identification number
- 2. block - control modules hardware number
- 3. block - control modules hardware version number
- 4. block - control modules software number
- 5. block - control modules software version number

- 6. block - control modules data version number
- 7. block - control modules ROM version number
- 8. block - control modules hardware number, unprogrammed

Fault Memory

The number of faults, the fault texts and the Porsche Diagnostic Trouble Code (DTC) are displayed in the Fault Memory menu item. In order to obtain additional information about a fault, select the fault item (reverse-video display) and press the double arrow key (>>) or the F8 key.

The following additional information on the fault is then displayed:

- Static or sporadic
- Present or not present
- Check Engine warning light switched on or off
- Fault type (e.g. above or below limit value). If several fault types occur (e.g. short to B+ or short to ground), then 1st state will display the fault type which was present first. The fault type which last occurred is stored under Last state.
- Frequency (how often did the fault occur)
- Fault erasing counter
- Fault time
- Which conditions must be fulfilled and how often, in order to switch the Check Engine warning light on or off
- 4 ambient conditions (e.g. ambient pressure, intake air temperature, engine temperature and operating hours counter)
- OBD fault code
- Freeze frame data
- Fault entry made by (e.g. own diagnosis or Tester)

Erase Fault Memory

Note!

The fault memory can be erased only if it has first been read out at least once. The entire fault memory is always erased. When the fault memory is erased, the adaptation values are also reset.

Actual Values

Values present at the moment of the test can be read out with this menu item.

It is possible to use a filter function to select certain actual values only. In this case, not all actual values are available for selection.

Press F5 key.

The following predetermined filters then appear:

- Engine values
- Oxygen sensing, bank 1
- Oxygen sensing, bank 2
- OBD II
- Misfire detection
- Knock control
- Throttle adjusting unit
- Analog/digital converter
- Charge pressure control

It is now possible to create your own filters in this menu item.

Press F5 key.

Mark the required actual values and press the double arrow key (>>). A field then appears where the name of the filter can be entered.

Enter the filter name and confirm.

The newly created filter then appears in the selection list in block capitals. Filters you have created can be deleted or changed.

The following values can be called up:

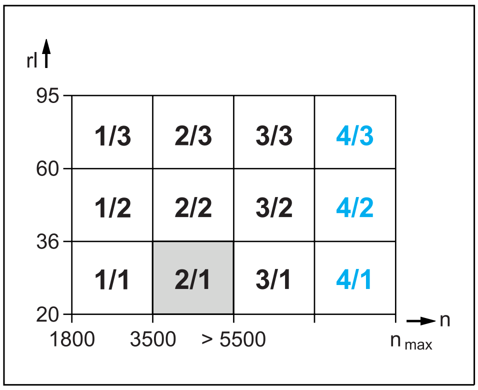
- Engine speed
- Engine load
- Actual engine torque
- Ambient pressure
- Mass air flow (HFM) [mass air flow without tank ventilation]
- Correction factor, height
- Power supply
- Intake air temperature
- Engine temperature
- Engine compartment temperature
- Oil temperature
- Exhaust temperature after TWC (three-way catalytic converter) [value calculated by ECM]
- Ignition angle

- Specified rpm
- Idle loss adaptation
- Injection time
- Camshaft position 1 deviation [adapted value - deviation from the required position]
- Camshaft position 2 deviation [adapted value - deviation from the required position]
- Actual angle for camshaft, bank 1 [the function of the VarioCam can be checked with the actual angle. VarioCam not activated - display approx. 0° crk; VarioCam activated - display approx. 30° crk]
- Actual angle for camshaft, bank 2 [the function of the VarioCam can be checked with the actual angle. VarioCam not activated - display approx. 0° crk; VarioCam activated - display approx. 30° crk]
- Mass air flow [mass air flow with tank ventilation]
- Loading of activated carbon filter [value range 0 to 30⇒ 0 - activated carbon filter empty 30 - activated carbon filter saturated]
- Outside temperature
- Oxygen sensing, bank 1
- Adaptation, range 1 (FRA) bank 2 [lower and upper load range - displays the value currently travelled]
- Adaptation, range 1 (RKAT) bank 1 [range close to idling]
- Fuel quantity, tank ventilation, bank 1 ?[deviation from the anticipatory control due to fuel tank ventilation]
- Resistance of oxygen sensor after catalytic converter, bank 1 [the resistance must amount to approx. 100 Ω after 3 to 4 minutes of travel. As the incrementation stands at 64 Ω (value increase 64 Ω), the Tester displays 64 or 128 Ω. However, if the display is in the kΩ-range (more than 1000 Ω), the heating of the oxygen sensor is faulty.]
- Oxygen sensor voltage after catalytic converter, bank 1
- Corrected sensor voltage ahead of catalytic converter, bank 1
- Oxygen sensing, bank 1
- Oxygen sensing delay, bank 1
- Oxygen required value, bank 1
- Sensor voltage ahead of catalytic converter, bank 1
- Dynamic value of the oxygen sensor, bank 1
- Number of dynamic measurements LSU, bank 1
- Oxygen sensing, bank 2

- Adaptation, range 2 (FRA) bank 2 [lower and upper load range - displays the value currently travelled]
- Adaptation, range 1 (RKAT) bank 2 [range close to idling]
- Fuel quantity, tank ventilation, bank 2 ?[deviation from the anticipatory control due to fuel tank ventilation]
- Resistance of oxygen sensor after catalytic converter, bank 2 [the resistance must amount to approx. 100 Ω after 3 to 4 minutes of travel. As the incrementation stands at 64 Ω (value increase 64 Ω), the Tester displays 64 or 128 Ω. However, if the display is in the kΩ-range (more than 1000 Ω), the heating of the oxygen sensor is faulty.]
- Oxygen sensor voltage after catalytic converter, bank 2
- Corrected sensor voltage ahead of catalytic converter, bank 2
- Oxygen sensing, bank 2
- Oxygen sensing delay, bank 2
- Oxygen required value, bank 2
- Sensor voltage ahead of catalytic converter, bank 2
- Dynamic value of the oxygen sensor, bank 2
- Number of dynamic measurements LSU, bank 2
- Charge pressure of sensor
- Required air content
- Required charge pressure
- Charge pressure control deviation
- Pulse/duty ratio, charge pressure control
- Charge pressure adaptation, range 0
- Charge pressure adaptation, range 1
- Charge pressure adaptation, range 2
- Charge pressure adaptation, range 3
- Charge pressure adaptation, range 4
- Correction factor LDR through charged air temperature
- Correction factor LDR through knock control
- Charge pressure limitation in case of failure of coolant system
- Charge pressure limitation in case of extreme exhaust temperatures
- Tank pressure difference
- Leakage volumetric flow
- Control deviation, tank diagnosis
- Mean amplitude after catalytic converter, bank 1

- Catalytic converter monitoring time, bank 1 [cumulated time in which the rpm/load range was reached for testing the catalytic converter]
- Mean amplitude after catalytic converter, bank 2
- Catalytic converter monitoring time, bank 2 [cumulated time in which the rpm/load range was reached for testing the catalytic converter]
- Period counter, bank 1 [monitoring of oxygen sensor aging - 16 periods are necessary for the OK measurement]
- Period counter, bank 2 [monitoring of oxygen sensor aging - 16 periods are necessary for the OK measurement]
- Distance since power failure
- Distance with Check Engine on
- Rough running reference [limit value for rough running, cylinders 1 to 6]
- State: adaptation 1 [the adaptation is reset to 0 after the battery has been disconnected. In order to carry out adaptation, the vehicle must be driven in overrun between 3.500 rpm and 1.800 rpm. 4 rpm ranges are displayed per load range (the fourth rpm range is not used). The ranges are bit coded and are given as a decimal number.

Figure 1



1 - rl - Load

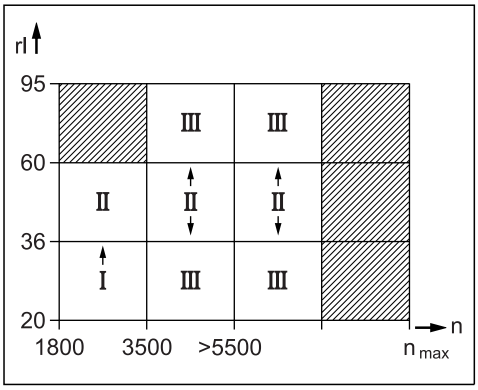
2 - n - Speed

3 - e.g. -2/1 means the second rpm range (field 2) of load range 1

1 = Field 1 has been adapted
2 = Field 2 has been adapted
3 = Fields 1 and 2 have been adapted
4 = Field 3 has been adapted
5 = Fields 1 and 3 have been adapted
6 = Fields 2 and 3 have been adapted
7 = Fields 1, 2 and 3 have been adapted

The fields have different priorities

Figure 2

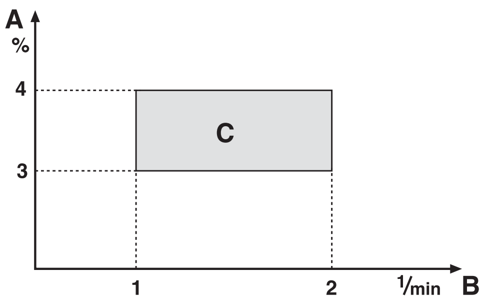


1 - Priority I - Field 1/1
2 - Priority II - Fields 1/2, 2/2 and 3/2
3 - Priority III - Fields 2/1, 2/3, 3/1 and 3/3

Fields following one another can be adapted within one rpm range if the fields with priority I and II have already been completely adapted, e.g. field 1/2 can be adapted after field 1/1. Field 1/3 is blocked.

- Status, adaptation 2 [range under positive load between approx. 40 % and approx. 60 %. See status, adaptation 1]
- Status, adaptation 3 [range under positive load between 60 % and approx. 95 %. See status, adaptation 1]
- Misfire counter, cylinder 1 [fault counter for exhaust-related faults. Counts the number of misfires.]
- Misfire counter, cylinder 6 [fault counter for exhaust-related faults. Counts the number of misfires.]
- Misfire counter, cylinder 2 [fault counter for exhaust-related faults. Counts the number of misfires.]
- Misfire counter, cylinder 4 [fault counter for exhaust-related faults. Counts the number of misfires.]
- Misfire counter, cylinder 3 [fault counter for exhaust-related faults. Counts the number of misfires.]
- Misfire counter, cylinder 5 [fault counter for exhaust-related faults. Counts the number of misfires.]
- Ignition counter, diagnosis [interval counter of exhaust-related faults - counts the ignitions if the diagnosis is active. Remains still when misfire detection is disabled. Counts from 0 to 3000.]

Figure 3



1 - A - Load
2 - B - Rpm
3 - C - Operating status (rpm/load range) with misfire
4 - 1 - Minimum speed of range with misfire operation, e.g. 3000 rpm
5 - 2 - Maximum speed of the range with misfire operation, e.g. 4000 rpm
6 - 3 - Minimum load of the range with misfire operation, e.g. 20 %
7 - 4 - Maximum load of the range with misfire operation, e.g. 50 %

- Range of misfires, minimum speed [see Figure 3.]

- Range of misfires, maximum speed [see Figure 3.]
- Range of misfires, minimum load [see Figure 3.]
- Range of misfires, maximum load [see Figure 3.]
- Rough running, cylinder 1
- Rough running, cylinder 6
- Rough running, cylinder 2
- Rough running, cylinder 4
- Rough running, cylinder 3
- Rough running, cylinder 5
- Cylinder 1 retardation [ignition angle retarded due to knocking combustion. Retardation in steps from 0.75° to a maximum of 15°]
- Cylinder 6 retardation [ignition angle retarded due to knocking combustion. Retardation in steps from 0.75° to a maximum of 15°]
- Cylinder 2 retardation [ignition angle retarded due to knocking combustion. Retardation in steps from 0.75° to a maximum of 15°]
- Cylinder 4 retardation [ignition angle retarded due to knocking combustion. Retardation in steps from 0.75° to a maximum of 15°]
- Cylinder 3 retardation [ignition angle retarded due to knocking combustion. Retardation in steps from 0.75° to a maximum of 15°]
- Cylinder 5 retardation [ignition angle retarded due to knocking combustion. Retardation in steps from 0.75° to a maximum of 15°]
- Safety retardation [ignition angle of all cylinders retarded in case of failure of camshaft position sensors or knock sensors. 0 - Retardation not active 1 - retardation active]
- Pedal value [display reads 100 % when accelerator is fully depressed, adjust if necessary, otherwise full power cannot be achieved.]
- Pedal encoder potentiometer 1
- Pedal encoder potentiometer 2
- Throttle valve angle, required
- Throttle actual value [display > 99 % with a pedal value of 100 %.]
- Throttle position sensor 1
- Throttle position sensor 2
- Target speed, cruise control

- Vehicle speed
- Throttle angle potentiometer 1
- Throttle angle potentiometer 2
- Mass air flow sensor [voltage value]
- Power supply
- Ambient pressure

Input Signals

Input signals of the DME can be read in by the Porsche System Tester 2 with this menu item. In this way, the function of the input signals can be assessed very quickly.

The following input signals can be read in:

- Full load detection
- Press accelerator idle detection
- Medium pressure switch
- A/C request
- Start enable switch
- Disturbance switch
- Stop light switch
- Brake switch
- Immobilizer
- Fuel reserve signal
- Cruise control readiness
- Clutch switch
- Cruise-control store/accelerate
- Cruise-control decelerate/resume

Ready Status

This menu item allows the interrogation of statuses (fulfilled/not fulfilled) of the DME. The following statuses can be checked:

- TWC conversion
- Fuel tank ventilation
- Secondary air system
- Oxygen sensors
- Oxygen sensor heating

To receive a ready message, allow the vehicle to warm up (engine temperature > 80 °C) and then activate all diagnostic routines which have not yet been carried out under the menu item "Short test."

Drive Links

Drive links (actuators) of the DME can be activated by the Porsche System Tester 2 with this menu item. This permits the electric function of the drive links to be assessed very quickly.

The following drive links can be activated:

- A/C compressor
- EVAP canister purge valve
- Engine compartment purge fan
- Secondary air pump
- Switch-over valve (secondary air)
- EVAP canister shutoff valve
- Frequency valve, boost pressure control
- Fan
- Fuel pump relay (fuel pump)
- Cooling water shutoff valve
- Overrun recirculating air valve
- Valve lift control, bank 1 and 2

Drive Link Active

With this menu item, drive links of the DME can be triggered by the Porsche System Tester 2 when the engine is running. This permits the function of the drive links to be assessed very quickly.

The following drive links can be activated:

- Cylinder 1 injection valve off
- Cylinder 2 injection valve off
- Cylinder 3 injection valve off
- Cylinder 4 injection valve off
- Cylinder 5 injection valve off
- Cylinder 6 injection valve off
- Valve lift control, bank 1 and 2
- Camshaft adjustment, bank 1
- Camshaft adjustment, bank 2

Vehicle Data

With this menu item, specific vehicle data can be read out with the Porsche System Tester 2.

The following vehicle data can be read out:

- Number of ignitions, range 1
- Number of ignitions, range 2
- Operating hours counter
- Vehicle Identification Number
- Classification number
- Order type
- Country code
- Engine type
- Engine number
- Transmission type
- Transmission number
- Radio/PCM code
- Body colour/convertible-top colour
- Interior equipment
- No. of programming operations
- Navigation system (code)
- Total distance covered
- M numbers
- Z numbers
- Exclusive numbers

System Test

With the system test, it is possible to detect faults in the valve lift control with both large lift and small lift.

The procedure is described under Troubleshooting.

Short Test

This menu item allows the checking of all diagnostic paths, i.e. the vehicle does not have to be driven in order to achieve a "trip".

In the Short Test menu item, diagnostic routines can be processed which would actually only be achieved while driving and, in some cases, only after a long period.

The following diagnostic routines can be activated with the Porsche System Tester 2:

- Constant oxygen sensing LSU
- Basic mixture adaptation
- Fuel tank ventilation
- Secondary air
- Oxygen sensor readiness behind catalytic converter
- Oxygen sensor ageing behind catalytic converter
- TWC conversion

Coding

Under this menu item, the DME control module can be coded for operation with cruise control (cruise control system).

Control Module Programming

Four sub-menus are offered with this menu item:

1. Read out control module (vehicle data)

The menu item 'Read out control module' can be used to read out data from the old control module, e.g. engine number, M numbers, etc., in order to adopt the data in a new control module.

Note!

Only one control module at a time can be read out in order then to adopt the data in a new control module during control module programming.

2. Program control module (new control module)

Note!

- *The DME programming code and immobilizer code are required to program control modules. These codes can be obtained from the Porsche IPAS system.*
- *All electrical consumers must be switched off for programming control modules.*
- *Switch heater to OFF.*
- *The vehicle battery must be fully charged.*

- Enter vehicle identification number and confirm.
- Enter and confirm 'new programming code'.

Note!

The new programming code must match the DME programming code from the IPAS, otherwise the control module can no longer be programmed later.

- Enter and confirm 'New immobilizer code'.

Note!

The new immobilizer code must match the immobilizer code from the IPAS, otherwise the control module can no longer be programmed later.

- Select data record.

Note!

- *If the data record OBD II was selected in the old control module, the tester automatically preselects "Data record OBDII".*
- *The selection must then simply be confirmed. Programming commences after this confirmation.*

- When programming is complete, switch off the ignition.
- Switch on the ignition.
- Switch off the tester.

Note!

In Tiptronic vehicles, the fault memory of the Tiptronic must be erased following the programming of a DME control module, as the fault "CAN timeout" is entered in the memory during programming.

3. Program map/data

The data record can be changed, e.g. from RoW to OBD II, with this menu item. Only the DME programming code is required.

4. Program immobilizer code

The immobilizer code is transferred to a new DME control module with this menu item.

Data output with a scan tool

The output of data relevant to OBD from the control modules was stipulated by law for the USA. It is described in SAE J 1979.

Data output is subdivided into different modes.

Mode 1

Output of:

- Input signals
- Output signals
- System status information
- Values calculated by the control module

Mode 2

Output of operating conditions (Freeze Frame), if a fault has been stored.

Mode 3

Output of stored faults.

Mode 4

Erase the fault memory.

Mode 5

Output of oxygen sensor data.

Mode 6

Output of test results of non-continuous tests.

Mode 7

Output of test results of continuous tests.

Output of suspected faults.

The data sets in the modes are referred to as Parameter Identification (PID).

After being stimulated by a generic scan tool, all systems relevant to OBD log on with their address. In vehicles with ME 7.8, this is the DME with the address $11 and in Tiptronic vehicles it is the transmission control module with the address $1A.

Note!

The $ symbol means that a hexadecimal number is involved.

When the control module provides data, it also states the mode, the PID number and the address of the control module.

For example:

Mode 41 PID $01 address $11

Engine control

Number of faults: 0

Check Engine: off

The output of data is carried out:

in Mode 1 with Mode 41,

in Mode 2 with Mode 42,

in Mode 3 with Mode 43, etc.

Mode 8

Activation of drive links (is not supported)

Mode 9

Output of vehicle information (as of model year 2002)

Mode 1

The following PIDs are supported:

$00 Supported PIDs

The PIDs supported in this mode are output.

PIDs 01 to 08

1	0	1	1	1	1	1	1	
7	6	5	4	3	2	1	0	Bit
01	02	03	04	05	06	07	08	PID

PIDs 09 to 10

1	0	0	1	1	1	1	1	
7	6	5	4	3	2	1	0	Bit
09	0A	0B	0C	0D	0E	0F	10	PID

PIDs 11 to 18

1	1	1	0	1	0	0	0	
7	6	5	4	3	2	1	0	Bit
11	12	13	14	15	16	17	18	PID

PIDs 19 to 20

1	0	0	1	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
19	1A	1B	1C	1D	1E	1F	20	PID

PIDs 21 to 28

0	0	0	0	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
21	22	23	24	25	26	27	28	PID

PIDs 29 to 30

0	0	0	0	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
29	2A	2B	2C	2D	2E	2F	30	PID

PIDs 31 to 38

0	0	0	1	0	0	0	1	
7	6	5	4	3	2	1	0	Bit
31	32	33	34	35	36	37	38	PID

0 - PID number not supported.

1 - PID number supported.

$01 Status of diagnostic system

The system status is output in a 4-byte word (Data A, B, C and D).

For example:

Data	A:	1000	0001
	B:	0000	0111
	C:	0110	1101
	D:	0110	1101

Data A

1	0	0	0	0	0	0	1	
7	6	5	4	3	2	1	0	Bit

Bits 0 to 6

Number of faults in binary format

Bit 7

0 - Check Engine MIL was not switched on by this control module.

1 - Check Engine MIL was switched on by this control module.

Data B

0	0	0	0	0	1	1	1	
7	6	5	4	3	2	1	0	Bit

Data byte B displays all the sub-systems which are monitored continuously, i.e. at least twice per second.

Bit 0	Misfire detection
Bit 1	Fuel system
Bit 2	Other components
Bit 3	Not used
Bit 4	Not used
Bit 5	Not used
Bit 6	Not used
Bit 7	Not used

0 - System not supported.

1 - System supported.

Data C

0	1	1	0	1	1	0	1	
7	6	5	4	3	2	1	0	Bit

Data byte C displays the sub-systems which are monitored at least once per driving cycle.

Bit 0	TWC
Bit 1	TWC heating
Bit 2	Fuel tank ventilation
Bit 3	Secondary air system
Bit 4	A/C system
Bit 5	Oxygen sensor
Bit 6	Oxygen sensor heating
Bit 7	Exhaust gas circulation

0 - Sub-system not available.

1 - Sub-system available.

Data D

0	1	1	0	1	1	0	1	
7	6	5	4	3	2	1	0	Bit

In data byte D, the readiness codes of the sub-systems from data byte C are displayed.

Bits 0 to 7

0 - Sub-system check completed or sub-system not installed.

1 - Sub-system check not yet complete.

Note!

- *After the fault memory has been erased, the bits of the installed sub-systems are set to 1.*
- *The bits are reset to 0:*
- in the case of a fault-free check after 1 driving cycle
- in the case of a detected fault after 2 driving cycles

$03 Status of injection system

Data	A:	0000	0010
	B:	0000	0010

Data A - Status for bank 1

Data B - Status for bank 2

0	0	0	0	0	0	1	0	
7	6	5	4	3	2	1	0	Bit

Bit 0 Open-loop control; the conditions for oxygen sensing are not yet fulfilled.

Bit 1 Closed-loop control; the signal from the oxygen sensor is used to control injection.

Bit 2 Open-loop control through conditions such as full load, etc.

Bit 3 Open-loop control due to fault in system.

Bit 4 Closed-loop control, but faults from at least one oxygen sensor.

Bits 5 to 7 not used.

Note!

Only one bit at a time can be set to 1 to indicate the status.

$04 Calculated load value

Output of calculated load as a percentage of the maximum load.

Display between 0% and 100%.

In the case of decimal output, conversion factor = 0.3921568

The decimal value displayed multiplied by 0.3921568 gives the load as a percentage.

$05 Engine coolant temperature

Output of the momentary engine coolant temperature.

Display between -40 °C and 215 °C.

In the case of decimal output, conversion factor = 1

Offset = -40 °C

Decimal value displayed multiplied by 1 minus 40 °C gives the coolant temperature.

$06 HO2S integrator, bank 1

Output of the control value FR of the oxygen sensor closed-loop control, bank 1.

Display: Lean to -100 %
Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$07 HO2S adaptation, bank 1

Output of the adaptation value FRA of the oxygen sensor closed-loop control, bank 1.

Display: Lean to -100 %
Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S adaptation value.

$08 HO2S integrator, bank 2

Output of the control value FR of the oxygen sensor closed-loop control, bank 2.

Display: Lean to -100 %
Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$09 HO2S adaptation, bank 2

Output of the adaptation value FRA of the oxygen sensor closed-loop control, bank 2.

Display: Lean to -100 %
Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S adaptation value.

$0C Engine speed

Output of the momentary engine speed.

Display of engine speed in rpm.

In the case of decimal output, conversion factor = 0.25

Decimal value displayed multiplied by 0.25 gives the engine speed.

$0D Vehicle speed

Output of the speed currently travelled.

Display of speed in $^{km}/_{h}$ up to a maximum of 255 $^{km}/_{h}$.

In the case of decimal output, conversion factor = 1

$0E Ignition timing, cylinder 1

Output of the ignition angle of cylinder 1.

Display:	After TDC up to -64° crk
	Before TDC up to 63.5° crk

° crk - degrees on crankshaft

In the case of decimal output, conversion factor = 0.5

Offset = -64 °crk

Decimal value displayed multiplied by 0.5 minus 64 °crk gives the ignition timing.

$0F Intake air temperature

Output of intake air temperature.

Display between -40 °C and 215 °C.

In the case of decimal output, conversion factor = 1

Offset = -40 °C

Decimal value displayed multiplied by 1 minus 40 °C gives the intake air temperature.

$10 Air mass

Output of the intake air mass.

Display between 0 and 655.35 $^{g}/_{s}$

$^{g}/_{s}$ - grams per second

In the case of decimal output, conversion factor = 0.01

Decimal value displayed multiplied by 0.01 gives the air mass.

$11 Throttle valve position

Output of the absolute throttle angle.

Display between 0% and 100%.

In the case of decimal output, conversion factor = 0.3921568

The decimal value displayed multiplied by 0.3921568 gives the throttle angle as a percentage.

$12 Status of secondary air system

Data A

0	0	0	0	0	1	0	0	
7	6	5	4	3	2	1	0	Bit

Bit 0	Secondary air is injected ahead of the TWC.
Bit 1	Not used
Bit 2	Secondary-air pump is switched off.

Bits 3 to 7 not used.

Note!

Only one bit at a time can be set to 1 to indicate the status.

$13 Number of oxygen sensors

Output of the number and location of oxygen sensors.

0	0	1	1	0	0	1	1	
7	6	5	4	3	2	1	0	Bit

Bit 0	Bank 1, sensor 1 (ahead of TWC, cylinders 1 - 3)
Bit 1	Bank 1, sensor 2 (after TWC, cylinders 1 - 3)
Bit 2	Bank 1, sensor 3 not installed
Bit 3	Bank 1, sensor 4 not installed
Bit 4	Bank 2, sensor 1 (ahead of TWC, cylinders 4 - 6)
Bit 5	Bank 2, sensor 2 (after TWC, cylinders 4 - 6)
Bit 6	Bank 2, sensor 3 not installed
Bit 7	Bank 2, sensor 4 not installed

0 – Sensor not available.

1 – Sensor available.

$15 Oxygen sensor signal, bank 1, sensor 2

Output of oxygen sensor voltage and associated oxygen sensor.

Display of sensor voltage between 0 V and 1.275 V and of the oxygen sensor in percent.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the voltage of oxygen sensor.

Note!

Since the sensor behind the catalytic converter is not included in the closed-loop control, no value for the oxygen sensor is displayed.

$19 Oxygen sensor signal, bank 2, sensor 2

Output of oxygen sensor voltage and associated oxygen sensor.

Display of sensor voltage between 0 V and 1.275 V and of the oxygen sensor in percent.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the voltage of oxygen sensor.

Note!

Since the sensor behind the catalytic converter is not included in the closed-loop control, no value for the oxygen sensor is displayed.

$1C OBD requirements

Output of system classification.

01	OBD II for California
02	OBD for EPA
03	OBD II for California and EPA
04	OBD I
05	Fulfills no OBD requirements
06	EOBD (European OBD)

$34 Oxygen sensing value (bank 1 - sensor 1)

Output of the oxygen sensing value

Display between 0 and 1.999.

In the case of decimal output, conversion factor = 0.0000305

Decimal value displayed multiplied by 0.0000305 gives the oxygen sensing value.

$34 Oxygen sensor current (bank 1 - sensor 1)

Output of the oxygen sensor current

Display between -128 mA and 127.996 mA.

In the case of decimal output, conversion factor = 0.00390625

Offset = -128 mA

Decimal value displayed multiplied by 0.00390625 minus 128 mA gives the oxygen sensor current.

$38 Oxygen sensing value (bank 2 - sensor 1)

Output of the oxygen sensing value

Display between 0 and 1.999.

In the case of decimal output, conversion factor = 0.0000305

Decimal value displayed multiplied by 0.0000305 gives the oxygen sensing value.

$38 Oxygen sensor current (bank 2 - sensor 1)

Output of the oxygen sensor current

Display between -128 mA and 127.996 mA.

In the case of decimal output, conversion factor = 0.00390625

Offset = -128 mA

Decimal value displayed multiplied by 0.00390625 minus 128 mA gives the oxygen sensor current.

Mode 2

In mode 2 the operating conditions (freeze frame data) at the time of fault entry are output. The operating conditions of the fault which occurred first are stored.

If a fuel system fault or misfiring fault occurs after this, the data of the fault which occurred first are overwritten.

The following PIDs are supported:

$00 Supported PIDs

The PIDs supported in this mode are output in a 4-byte word.

Data A

0	1	1	1	1	1	1	1	
7	6	5	4	3	2	1	0	Bit
01	02	03	04	05	06	07	08	PID

Data B

1	0	1	1	1	0	0	0	
7	6	5	4	3	2	1	0	Bit
09	0A	0B	0C	0D	0E	0F	10	PID

Data C

0	0	0	0	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
11	12	13	14	15	16	17	18	PID

Data D

0	0	0	0	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
19	1A	1B	1C	1D	1E	1F	20	PID

Note!

The Data A and B bytes indicate that PIDs 02, 03, 04, 05, 06, 07, 08, 09, 0B, 0C and 0D are supported.

$02 Fault code

The fault code which caused the storage of freeze frame data is displayed.

$03 Status of injection system

Data	A:	0000	0010
	B:	0000	0010

Data A - Status for bank 1

Data B - Status for bank 2

0	0	0	0	0	0	1	0	
7	6	5	4	3	2	1	0	Bit

Bit 0	Open-loop control; the conditions for oxygen sensing are not yet fulfilled.
Bit 1	Closed-loop control; the signal from the oxygen sensor is used to control injection.
Bit 2	Open-loop control through conditions such as full load, etc.
Bit 3	Open-loop control due to fault in system.
Bit 4	Closed-loop control, but faults from at least one oxygen sensor.

Bits 5 to 7 not used.

Note!

Only one bit at a time can be set to 1 to indicate the status.

$04 Calculated load value

Output of calculated load as a percentage of the maximum load.

Display between 0% and 100%.

In the case of decimal output, conversion factor = 0.3921568

The decimal value displayed multiplied by 0.3921568 gives the load as a percentage.

\$05 Engine coolant temperature

Output of the engine coolant temperature.

Display between -40 °C and 215 °C.

In the case of decimal output, conversion factor = 1

Offset = -40 °C

Decimal value displayed multiplied by 1 minus 40 °C gives the coolant temperature.

\$06 HO2S integrator, bank 1

Output of the control value FR of the oxygen sensor closed-loop control, bank 1.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

\$07 HO2S adaptation, bank 1

Output of the adaptation value FRA of the oxygen sensor closed-loop control, bank 1.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S adaptation value.

\$08 HO2S integrator, bank 2

Output of the control value FR of the oxygen sensor closed-loop control, bank 2.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$09 HO2S adaptation, bank 2

Output of the adaptation value FRA of the oxygen sensor closed-loop control, bank 2.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S adaptation value.

$0B Intake manifold pressure (absolute)

Output of the intake manifold pressure.

Display: 0 kPa to 255 kPa

In the case of decimal output, conversion factor = 1

$0C Engine speed

Output of the engine speed.

Display in rpm

In the case of decimal output, conversion factor = 0.25

Decimal value displayed multiplied by 0.25 gives the engine speed.

$0D Vehicle speed

Output of the speed.

In the case of decimal output, conversion factor = 1

Mode 3

Output of stored faults.

The fault codes of all shedded, officially relevant* faults are displayed in Mode 3.

*** Faults which switch on the Check Engine warning light**

Mode 4

In Mode 4, the fault memory can be erased.

Note!

- *The fault memories of all systems relevant to OBD are erased.*
- *If the fault memory is erased, Mode 5 and Mode 6 values are also reset. Furthermore, the adaptation values are neutralised.*

Mode 5

Output of oxygen sensor data.

The values of the last oxygen sensor test carried out (test identification TID) can be read out for every oxygen sensor with its nominal values.

For the oxygen sensors ahead of the TWC (bank 1/2, sensor 1), the following TIDs are supported:

$81 Oxygen sensing actual value

Output of the oxygen sensing actual value.

Display between 0 and 1.99.

In the case of decimal output, conversion factor = 0.00781

Decimal value displayed multiplied by 0.00781 gives the oxygen sensing actual value.

$82 Oxygen sensing nominal value

Output of the oxygen sensing nominal value.

Display between 0 and 1.99.

In the case of decimal output, conversion factor = 0.00781

Decimal value displayed multiplied by 0.00781 gives the oxygen sensing nominal value.

$83 Dynamic value of the oxygen sensor

Output of the dynamic value.

Display between 0 and 5.0.

In the case of decimal output, conversion factor = 0.0195

Decimal value displayed multiplied by 0.0195 gives the dynamic value.

$84 Oxygen sensing displacement

Oxygen sensing displacement (current share) due to pilot control.

Display between -0.05 and 0.05.

In the case of decimal output, conversion factor = 0.00039

Offset = -128

Decimal value displayed multiplied by 0.00039 minus 128 gives the oxygen sensing displacement.

For the oxygen sensors after the TWC (bank 1/2, sensor 2), the following TIDs are supported:

$01 Rich-lean threshold voltage

Programmed fixed value: e.g. 0.575 V.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the threshold voltage.

$02 Lean-rich threshold voltage

Programmed fixed value: e.g. 0.575 V.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the threshold voltage.

$07 Minimum voltage of oxygen sensor during the test

Minimum:	e.g. 0.000 V
Maximum:	e.g. 0.480 V
Test value:	e.g. 0.280 V

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the threshold voltage.

$08 Maximum voltage of oxygen sensor during the test

Minimum:	e.g. 0.480 V
Maximum:	e.g. 1.245 V
Test value:	e.g. 0.685 V

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the threshold voltage.

Mode 6

The test results of components or systems which are not continuously monitored are output in mode 6. At the same time, limit values are provided. The test results are referred to as TIDs (Test Identification). The components or systems are distinguished by CIDs (Component Identification).

The following components or systems are supported:

TID $01 Catalytic converter monitoring

The catalytic converters (bank 1/bank 2) are monitored individually and for the sum of the emissions. There are two threshold values for individual monitoring:

- AHKATMN for the OK detection and
- AHKATMX for the defect detection.

For the sum of the emissions, there is the AHKATSB threshold value. A number (ahkat) which is between 0 and 1 is used as a measure for the aging of the catalytic converters.

0 - good

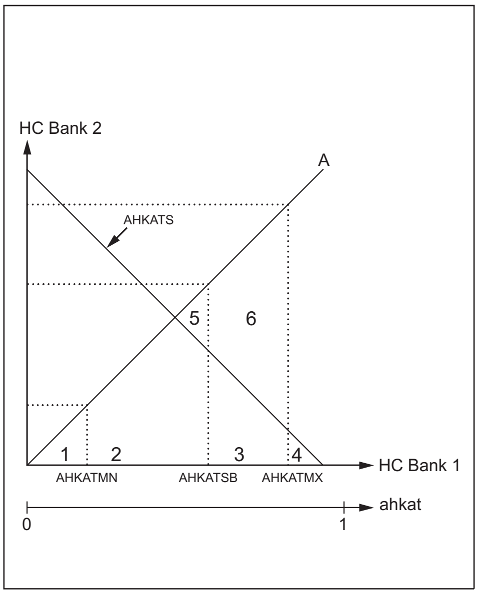
1 - poor

AHKATS-Sum total of ahkat + ahkat2

A - Symmetry line

HC - HC emissions

The cases for catalytic converter bank 1 are shown in the graphic. The same applies for bank 2.



1	TWC 1 OK
2	TWC 1 OK
3	TWC 1 OK
4	TWC 1 faulty (P0420)
5	TWCs 1 and 2 faulty (P0420 and P0430)
6	TWC 1 faulty (P0420)

In the case of the individual CIDs, the limit values (maximum) and the test value of the last test are output.

Maximum: fault, if the test value is greater than the limit value.

The following CIDs can be displayed:

$00 Test not yet carried out

$05 Conversion bank 1

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

$06 Conversion bank 2

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

Note!

CID $05 and $06 are displayed if the test was completed without faults. The values provide information as to how far the catalytic converters still are from the limit values.

$07 Checksum error, bank 1 and bank 2

DTC P0420 and P0430 in memory.

The values displayed can be multiplied by the factor 0.0078 to find the ahkat and ahkat2 or AHKATS values.

$08 Checksum range error, bank 1

DTC P0420 in memory.

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATSB values.

$09 Checksum range error, bank 2

DTC P0430 in memory.

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATSB values.

$0A Conversion, bank 1

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

$0B Conversion, bank 2

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

Note!

CID $0A and $0B are displayed if the function was carried out with the Porsche System Tester 2 in the Short test menu.

TID $03 Secondary air system

The following CIDs can be displayed:

$00 Test not yet carried out

$01 Secondary air system, bank 1

Relative secondary air mass

$04 Secondary air system, bank 2

Relative secondary air mass

Note!

- *The relative secondary air mass is the measured secondary air mass relative to the expected nominal value (optimal value) in this operating point. The optimal value is detected with a fault-less system. The nominal value is primarily dependent on exhaust backpressure, geographical altitude and voltage supply.*
- *A fault is present if the relative secondary air mass does not exceed the diagnosis threshold value.*
- *The values displayed can be multiplied by the factor 0.0078 to find the applied values.*

TID $05 Fuel tank ventilation system

For the fuel tank ventilation system, several tests are carried out consecutively but only one test value is output. This means that the subsequent test overwrites the preceding test value.

When all tests have been carried out, $0D (minor leak test) is displayed.

If a different CID is displayed, the test was interrupted - either because a fault was present or, for example, the EVAP canister was excessively loaded.

The following CIDs can be displayed:

- $00 Test not yet carried out
- $0A Canister purge valve (leaking)
- $0B Shut-off valve, EVAP canister (blocked)
- $0C Major leak (pressure increase)
- $0D Minor leak (leakage volumetric flow)
- $11 Shut-off valve, EVAP canister (pressure reduction)
- $12 Major leak (pressure sensor)
- $13 Major leak (pressure sensor)
- $14 Tank vent valve (constantly open)

Mode 7

The fault codes of all non-shedded, officially relevant* faults are displayed in Mode 7. This mode has the same structure as Mode 3.

*** Faults which switch on the Check Engine warning light**

Mode 9

The following vehicle information is displayed in Mode 9:

- Vehicle Identification Number
- Programme status (Calibration Identification Number)
- Control unit checksum (Calibration Verification Number)

Data output with a scan tool - 911 Carrera (996)

The output of data relevant to OBD from the control modules was stipulated by law for the USA. It is described in SAE J 1979.

Data output is subdivided into different modes.

Mode 1

Output of:

- Input signals
- Output signals
- System status information
- Values calculated by the control module

Mode 2

Output of operating conditions (Freeze Frame), if a fault has been stored.

Mode 3

Output of stored faults.

Mode 4

Erase the fault memory.

Mode 5

Output of oxygen sensor data.

Mode 6

Output of test results of non-continuous tests.

Mode 7

Output of test results of continuous tests.

Output of suspected faults.

The data sets in the modes are referred to as Parameter Identification (PID).

After being stimulated by a generic scan tool, all systems relevant to OBD log on with their address. In vehicles with ME 7.8, this is the DME with the address $11 and in Tiptronic vehicles it is the transmission control module with the address $1A.

Note!

The $ symbol means that a hexadecimal number is involved.

When the control module provides data, it also states the mode, the PID number and the address of the control module.

For example:

Mode 41 PID $01 address $11

Engine control

Number of faults: 0

Check Engine: off

The output of data is carried out:

in Mode 1 with Mode 41,

in Mode 2 with Mode 42,

in Mode 3 with Mode 43, etc.

Mode 8

Activation of drive links (is not supported)

Mode 9

Output of vehicle information (as of model year 2002)

Mode 1

The following PIDs are supported:

$00 Supported PIDs

The PIDs supported in this mode are output.

PIDs 01 to 08

1	0	1	1	1	1	1	1	
7	6	5	4	3	2	1	0	Bit
01	02	03	04	05	06	07	08	PID

PIDs 09 to 10

1	0	0	1	1	1	1	1	
7	6	5	4	3	2	1	0	Bit
09	0A	0B	0C	0D	0E	0F	10	PID

PIDs 11 to 18

1	1	1	1	1	0	0	1	
7	6	5	4	3	2	1	0	Bit
11	12	13	14	15	16	17	18	PID

PIDs 19 to 20

1	0	0	1	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
19	1A	1B	1C	1D	1E	1F	20	PID

PIDs 21 to 28

0	0	0	0	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
21	22	23	24	25	26	27	28	PID

PIDs 29 to 30

0	0	0	0	0	0	0	1	
7	6	5	4	3	2	1	0	Bit
29	2A	2B	2C	2D	2E	2F	30	PID

PIDs 31 to 38

1	1	0	0	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
31	32	33	34	35	36	37	38	PID

0 - PID number not supported.

1 - PID number supported.

$01 Status of diagnostic system

The system status is output in a 4-byte word (Data A, B, C and D).

For example:

Data	A:	1000	0001
	B:	0000	0111
	C:	0110	1101
	D:	0110	1101

Data A

1	0	0	0	0	0	0	1	
7	6	5	4	3	2	1	0	Bit

Bits 0 to 6

Number of faults in binary format

Bit 7

0 - Check Engine MIL was not switched on by this control module.

1 - Check Engine MIL was switched on by this control module.

Data B

0	0	0	0	0	1	1	1	
7	6	5	4	3	2	1	0	Bit

Data byte B displays all the sub-systems which are monitored continuously, i.e. at least twice per second.

Bit 0	Misfire detection
Bit 1	Fuel system
Bit 2	Other components
Bit 3	Not used
Bit 4	Not used
Bit 5	Not used
Bit 6	Not used
Bit 7	Not used

0 - System not supported.

1 - System supported.

Data C

0	1	1	0	1	1	0	1	
7	6	5	4	3	2	1	0	Bit

Data byte C displays the sub-systems which are monitored at least once per driving cycle.

Bit 0	TWC
Bit 1	TWC heating
Bit 2	Fuel tank ventilation
Bit 3	Secondary air system
Bit 4	A/C system
Bit 5	Oxygen sensor
Bit 6	Oxygen sensor heating
Bit 7	Exhaust gas circulation

0 - Sub-system not available.

1 - Sub-system available.

Data D

0	1	1	0	1	1	0	1	
7	6	5	4	3	2	1	0	Bit

In data byte D, the readiness codes of the sub-systems from data byte C are displayed.

Bits 0 to 7

0 - Sub-system check completed or sub-system not installed.

1 - Sub-system check not yet complete.

Note!

- *After the fault memory has been erased, the bits of the installed sub-systems are set to 1.*
- *The bits are reset to 0:*
- in the case of a fault-free check after 1 driving cycle
- in the case of a detected fault after 2 driving cycles

$03 Status of injection system

Data	A:	0000	0010
	B:	0000	0010

Data A - Status for bank 1

Data B - Status for bank 2

0	0	0	0	0	0	1	0	
7	6	5	4	3	2	1	0	Bit

Bit 0 Open-loop control; the conditions for oxygen sensing are not yet fulfilled.

Bit 1 Closed-loop control; the signal from the oxygen sensor is used to control injection.

Bit 2 Open-loop control through conditions such as full load, etc.

Bit 3 Open-loop control due to fault in system.

Bit 4 Closed-loop control, but faults from at least one oxygen sensor.

Bits 5 to 7 not used.

Note!

Only one bit at a time can be set to 1 to indicate the status.

$04 Calculated load value

Output of calculated load as a percentage of the maximum load.

Display between 0% and 100%.

In the case of decimal output, conversion factor = 0.3921568

The decimal value displayed multiplied by 0.3921568 gives the load as a percentage.

$05 Engine coolant temperature

Output of the momentary engine coolant temperature.

Display between -40 °C and 215 °C.

In the case of decimal output, conversion factor = 1

Offset = -40 °C

Decimal value displayed multiplied by 1 minus 40 °C gives the coolant temperature.

$06 HO2S integrator, bank 1

Output of the control value FR of the oxygen sensor closed-loop control, bank 1.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$07 HO2S adaptation, bank 1

Output of the adaptation value FRA of the oxygen sensor closed-loop control, bank 1.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S adaptation value.

$08 HO2S integrator, bank 2

Output of the control value FR of the oxygen sensor closed-loop control, bank 2.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$09 HO2S adaptation, bank 2

Output of the adaptation value FRA of the oxygen sensor closed-loop control, bank 2.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S adaptation value.

$0C Engine speed

Output of the momentary engine speed.

Display of engine speed in rpm.

In the case of decimal output, conversion factor = 0.25

Decimal value displayed multiplied by 0.25 gives the engine speed.

$0D Vehicle speed

Output of the speed currently travelled.

Display of speed in $^{km}/_{h}$ up to a maximum of 255 $^{km}/_{h}$.

In the case of decimal output, conversion factor = 1

$0E Ignition timing, cylinder 1

Output of the ignition angle of cylinder 1.

Display:	After TDC up to -64° crk
	Before TDC up to 63.5° crk

° crk - degrees on crankshaft

In the case of decimal output, conversion factor = 0.5

Offset = -64 °crk

Decimal value displayed multiplied by 0.5 minus 64 °crk gives the ignition timing.

$0F Intake air temperature

Output of intake air temperature.

Display between -40 °C and 215 °C.

In the case of decimal output, conversion factor = 1

Offset = -40 °C

Decimal value displayed multiplied by 1 minus 40 °C gives the intake air temperature.

$10 Air mass

Output of the intake air mass.

Display between 0 and 655.35 $^{g}/_{s}$

$^{g}/_{s}$ - grams per second

In the case of decimal output, conversion factor = 0.01

Decimal value displayed multiplied by 0.01 gives the air mass.

$11 Throttle valve position

Output of the absolute throttle angle.

Display between 0% and 100%.

In the case of decimal output, conversion factor = 0.3921568

The decimal value displayed multiplied by 0.3921568 gives the throttle angle as a percentage.

$12 Status of secondary air system

Data A

0	0	0	0	0	1	0	0	
7	6	5	4	3	2	1	0	Bit

Bit 0	Secondary air is injected ahead of the TWC.
Bit 1	Not used
Bit 2	Secondary-air pump is switched off.

Bits 3 to 7 not used.

Note!

Only one bit at a time can be set to 1 to indicate the status.

$13 Number of oxygen sensors

Output of the number and location of oxygen sensors.

0	0	1	1	0	0	1	1	
7	6	5	4	3	2	1	0	Bit

Bit 0	Bank 1, sensor 1 (ahead of TWC, cylinders 1 - 3)
Bit 1	Bank 1, sensor 2 (after TWC, cylinders 1 - 3)
Bit 2	Bank 1, sensor 3 not installed
Bit 3	Bank 1, sensor 4 not installed
Bit 4	Bank 2, sensor 1 (ahead of TWC, cylinders 4 - 6)
Bit 5	Bank 2, sensor 2 (after TWC, cylinders 4 - 6)
Bit 6	Bank 2, sensor 3 not installed
Bit 7	Bank 2, sensor 4 not installed

0 – Sensor not available.

1 – Sensor available.

$14 Oxygen sensor signal, bank 1, sensor 1

Output of oxygen sensor voltage and associated oxygen sensor.

Display of sensor voltage between 0 V and 1.275 V and of the oxygen sensor in percent.

In the case of decimal output, conversion factor = 0.005 (voltage of oxygen sensor)

Decimal value displayed multiplied by 0.005 gives the voltage of oxygen sensor.

Oxygen sensor display:

Lean to -100 %

Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$15 Oxygen sensor signal, bank 1, sensor 2

Output of oxygen sensor voltage and associated oxygen sensor.

Display of sensor voltage between 0 V and 1.275 V and of the oxygen sensor in percent.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the voltage of oxygen sensor.

Note!

Since the sensor behind the catalytic converter is not included in the closed-loop control, no value for the oxygen sensor is displayed.

$18 Oxygen sensor signal, bank 2, sensor 1

Output of oxygen sensor voltage and associated oxygen sensor.

Display of sensor voltage between 0 V and 1.275 V and of the oxygen sensor in percent.

In the case of decimal output, conversion factor = 0.005 (voltage of oxygen sensor)

Decimal value displayed multiplied by 0.005 gives the voltage of oxygen sensor.

Oxygen sensor display:

Lean to -100 %

Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$19 Oxygen sensor signal, bank 2, sensor 2

Display of oxygen sensor voltage and associated oxygen sensor.

Display of sensor voltage between 0 V and 1.275 V and of the oxygen sensor in percent.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the voltage of oxygen sensor.

Note!

Since the sensor behind the catalytic converter is not included in the closed-loop control, no value for the oxygen sensor is displayed.

$1C OBD requirements

Output of system classification.

01	OBD II for California
02	OBD for EPA
03	OBD II for California and EPA
04	OBD I
05	Fulfills no OBD requirements
06	EOBD (European OBD)

Mode 2

In mode 2 the operating conditions (freeze frame data) at the time of fault entry are output. The operating conditions of the fault which occurred first are stored.

If a fuel system fault or misfiring fault occurs after this, the data of the fault which occurred first are overwritten.

The following PIDs are supported:

$00 Supported PIDs

The PIDs supported in this mode are output in a 4-byte word.

Data A

0	1	1	1	1	1	1	1	
7	6	5	4	3	2	1	0	Bit
01	02	03	04	05	06	07	08	PID

Data B

1	0	1	1	1	0	0	0	
7	6	5	4	3	2	1	0	Bit
09	0A	0B	0C	0D	0E	0F	10	PID

Data C

0	0	0	0	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
11	12	13	14	15	16	17	18	PID

Data D

0	0	0	0	0	0	0	0	
7	6	5	4	3	2	1	0	Bit
19	1A	1B	1C	1D	1E	1F	20	PID

Note!

The Data A and B bytes indicate that PIDs 02, 03, 04, 05, 06, 07, 08, 09, 0B, 0C and 0D are supported.

$02 Diagnostic Trouble Code

The Diagnostic Trouble Code which caused the storage of freeze frame data is displayed.

$03 Status of injection system

Data	A:	0000	0010
	B:	0000	0010

Data A - Status for bank 1

Data B - Status for bank 2

0	0	0	0	0	0	1	0	
7	6	5	4	3	2	1	0	Bit

Bit 0	Open-loop control; the conditions for oxygen sensing are not yet fulfilled.
Bit 1	Closed-loop control; the signal from the oxygen sensor is used to control injection.
Bit 2	Open-loop control through conditions such as full load, etc.
Bit 3	Open-loop control due to fault in system.
Bit 4	Closed-loop control, but faults from at least one oxygen sensor.

Bits 5 to 7 not used.

Note!

Only one bit at a time can be set to 1 to indicate the status.

$04 Calculated load value

Output of calculated load as a percentage of the maximum load.

Display between 0% and 100%.

In the case of decimal output, conversion factor = 0.3921568

The decimal value displayed multiplied by 0.3921568 gives the load as a percentage.

$05 Engine coolant temperature

Output of the engine coolant temperature.

Display between -40 °C and 215 °C.

In the case of decimal output, conversion factor = 1

Offset = -40 °C

Decimal value displayed multiplied by 1 minus 40 °C gives the coolant temperature.

$06 HO2S integrator, bank 1

Output of the control value FR of the oxygen sensor closed-loop control, bank 1.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$07 HO2S adaptation, bank 1

Output of the adaptation value FRA of the oxygen sensor closed-loop control, bank 1.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S adaptation value.

$08 HO2S integrator, bank 2

Output of the control value FR of the oxygen sensor closed-loop control, bank 2.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S integrator.

$09 HO2S adaptation, bank 2

Output of the adaptation value FRA of the oxygen sensor closed-loop control, bank 2.

Display:	Lean to -100 %
	Rich to 99.22 %

In the case of decimal output, conversion factor = 0.78125

Offset = -100 %

Decimal value displayed multiplied by 0.78125 minus 100% gives the HO2S adaptation value.

$0B Intake manifold pressure (absolute)

Output of the intake manifold pressure.

Display:	0 kPa to 255 kPa

In the case of decimal output, conversion factor = 1

$0C Engine speed

Output of the engine speed.

Display in rpm

In the case of decimal output, conversion factor = 0.25

Decimal value displayed multiplied by 0.25 gives the engine speed.

$0D Vehicle speed

Output of the speed.

In the case of decimal output, conversion factor = 1

Mode 3

Output of stored faults.

The Diagnostic Trouble Codes of all shedded, officially relevant* faults are displayed in Mode 3.

*** Faults which switch on the Check Engine warning light**

Mode 4

In Mode 4, the fault memory can be erased.

Note!

- *The fault memories of all systems relevant to OBD are erased.*
- *If the fault memory is erased, Mode 5 and Mode 6 values are also reset. Furthermore, the adaptation values are neutralised.*

Mode 5

Output of oxygen sensor data.

The values of the last oxygen sensor test carried out (test identification TID) can be read out for every oxygen sensor with its nominal values.

$01 Rich-lean threshold voltage

Programmed fixed value: e.g. 0.430 V.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the threshold voltage.

$02 Lean-rich threshold voltage

Programmed fixed value: e.g. 0.430 V.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the threshold voltage.

$07 Minimum voltage of oxygen sensor during the test

Minimum:	e.g. 0.000 V.
Maximum:	e.g. 0.385 V.
Test value:	e.g. 0.180 V.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the voltage of oxygen sensor.

$08 Maximum voltage of oxygen sensor during the test

Minimum:	e.g. 0.480 V.
Maximum:	e.g. 0.960 V.
Test value:	e.g. 0.855 V.

In the case of decimal output, conversion factor = 0.005

Decimal value displayed multiplied by 0.005 gives the voltage of oxygen sensor.

$09 Time between two transitions

Minimum:	e.g. 0.00 s
Maximum:	e.g. 1.52 s
Test value:	e.g. 0.40 s

In the case of decimal output, conversion factor = 0.04

Decimal value displayed multiplied by 0.04 gives the time.

$30 Shift in oxygen sensor characteristic towards rich

Minimum:	e.g. 0.00 s
Maximum:	e.g. 1.20 s
Test value:	e.g. 0.12 s

In the case of decimal output, conversion factor = 0.04

Decimal value displayed multiplied by 0.04 gives the time.

$31 Shift in oxygen sensor characteristic towards lean

Minimum:	e.g. 0.00 s
Maximum:	e.g. 1.20 s
Test value:	e.g. 0.00 s

In the case of decimal output, conversion factor = 0.04

Decimal value displayed multiplied by 0.04 gives the time.

$32 Averaged period

Minimum:	e.g. 0.00 s
Maximum:	e.g. 3.00 s
Test value:	e.g. 0.40 s

In the case of decimal output, conversion factor = 0.04

Decimal value displayed multiplied by 0.04 gives the time.

Mode 6

The test results of components or systems which are not continuously monitored are output in mode 6. At the same time, limit values are provided. The test results are referred to as TIDs (Test Identification). The components or systems are distinguished by CIDs (Component Identification).

The following components or systems are supported:

TID $01 Catalytic converter monitoring

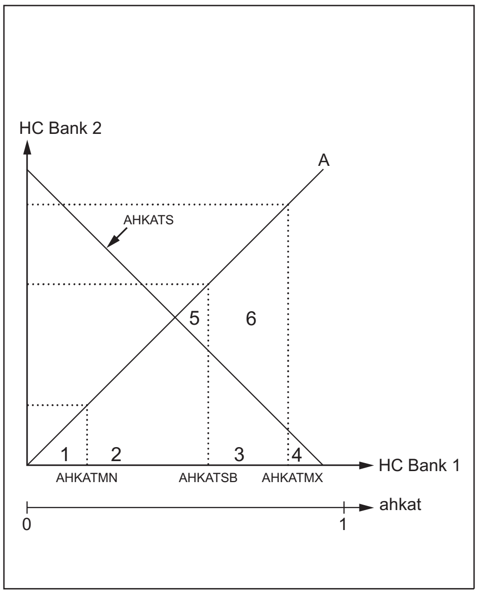
The catalytic converters (bank 1/bank 2) are monitored individually and for the sum of the emissions. There are two threshold values for individual monitoring:

- AHKATMN for the OK detection and
- AHKATMX for the defect detection.

For the sum of the emissions, there is the AHKATSB threshold value. A number (ahkat) which is between 0 and 1 is used as a measure for the aging of the catalytic converters.

0 - good

1 - poor



AHKATS-Sum total of ahkat + ahkat2

A - Symmetry line

HC - HC emissions

The cases for catalytic converter bank 1 are shown in the graphic. The same applies for bank 2.

1	TWC 1 OK
2	TWC 1 OK
3	TWC 1 OK
4	TWC 1 faulty (P0420)
5	TWCs 1 and 2 faulty (P0420 and P0430)
6	TWC 1 faulty (P0420)

In the case of the individual CIDs, the limit values (maximum) and the test value of the last test are output.

Maximum: fault, if the test value is greater than the limit value.

The following CIDs can be displayed:

$00 Test not yet carried out

$05 Conversion bank 1

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

$06 Conversion bank 2

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

Note!

CID $05 and $06 are displayed if the test was completed without faults. The values provide information as to how far the catalytic converters still are from the limit values.

$07 Checksum error, bank 1 and bank 2

DTC P0420 and P0430 in memory.

The values displayed can be multiplied by the factor 0.0078 to find the ahkat and ahkat2 or AHKATS values.

$08 Checksum range error, bank 1

DTC P0420 in memory.

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

$09 Checksum range error, bank 2

DTC P0430 in memory.

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

$0A Conversion, bank 1

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

$0B Conversion, bank 2

The values displayed can be multiplied by the factor 0.0039 to find the ahkat or AHKATMX values.

Note!

CID $0A and $0B are displayed if the function was carried out with the Porsche System Tester 2 in the Short test menu.

TID $03 Secondary air system

The following CIDs can be displayed:

$00 Test not yet carried out

$01 Secondary air system, bank 1

Relative secondary air mass

$04 Secondary air system, bank 2

Relative secondary air mass

Note!

- *The relative secondary air mass is the measured secondary air mass relative to the expected nominal value (optimal value) in this operating point. The optimal value is detected with a fault-less system. The nominal value is primarily dependent on exhaust backpressure, geographical altitude and voltage supply.*
- *A fault is present if the relative secondary air mass does not exceed the diagnosis threshold value.*
- *The values displayed can be multiplied by the factor 0.0078 to find the applied values.*

TID $05 Fuel tank ventilation system

For the fuel tank ventilation system, several tests are carried out consecutively but only one test value is output. This means that the subsequent test overwrites the preceding test value.

When all tests have been carried out, $0D (micro-leak test) is displayed.

If a different CID is displayed, the test was interrupted - either because a fault was present or, for example, the EVAP canister was excessively loaded.

In the case of decimal output the conversion factor = 0.00003876

The following CIDs can be displayed:

- $00 Test not yet carried out
- $0A Canister purge valve (leaking)
- $0B Shut-off valve, EVAP canister (blocked)
- $0C Major leak (pressure increase)
- $0D Minor leak (leakage volumetric flow)
- $0E Micro leak
- $11 Shut-off valve, EVAP canister (pressure reduction)
- $12 Major leak (pressure sensor)
- $13 Major leak (pressure sensor)
- $14 Tank vent valve (constantly open)

TID $09 coolant thermostat

Output of engine temperature

Display between -48 °C and 143.25 °C

In the case of decimal output, conversion factor = 1

Offset = -48 °C

Decimal value displayed multiplied by 0.75 minus 48 °C gives the coolant temperature.

Mode 7

The Diagnostic Trouble Codes of all non-shedded, officially relevant* faults are displayed in Mode 7. This mode has the same structure as Mode 3.

*** Faults which switch on the Check Engine warning light**

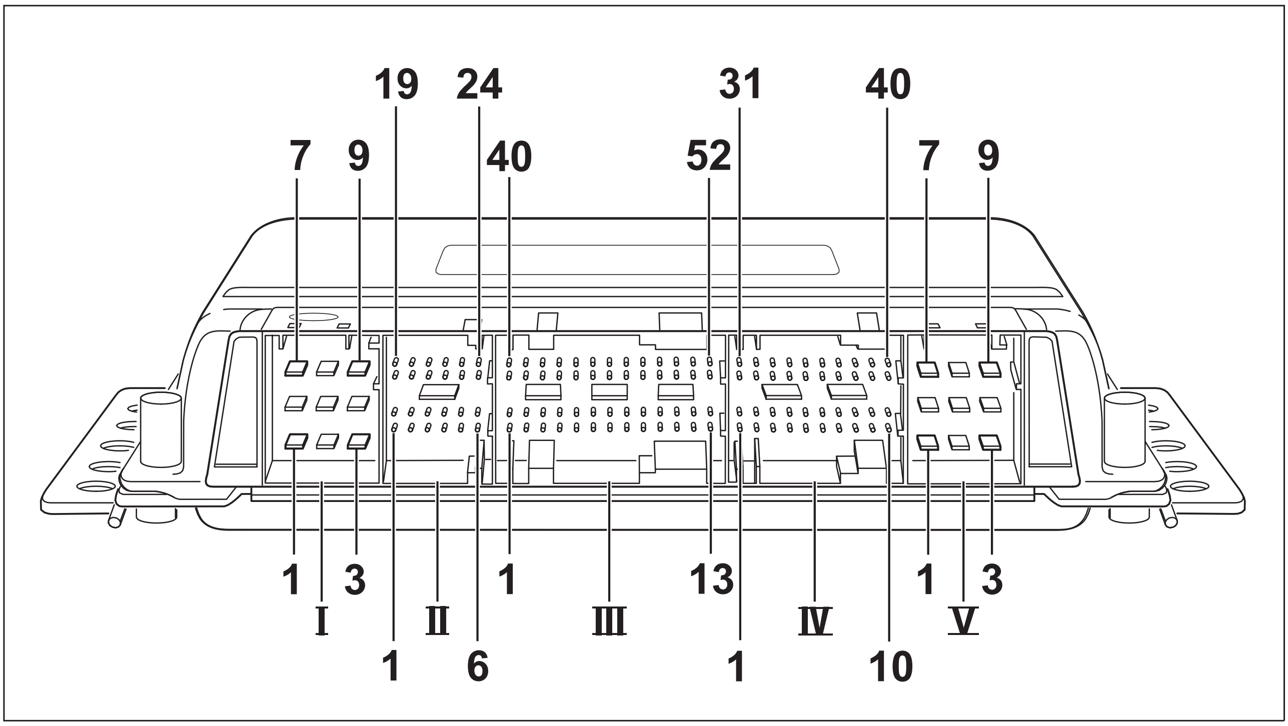
Mode 9

The following vehicle information is displayed in Mode 9:

- Vehicle Identification Number
- Programme status (Calibration Identification Number)
- Control unit checksum (Calibration Verification Number)

Connector assignment

DME control module connector assignment



I - Connector I, 9-pole

II - Connector II, 24-pole

III - Connector III, 52-pole

IV - Connector IV, 40-pole

V - Connector IV, 9-pole

Connector I, 9-pole

Pin	Designation	Pin	Designation
1	Terminal 15	6	Ground, output stages
2	Terminal 30	7	Throttle motor actuator
3	W-wire	8	DME relay terminal 87
4	Ground, electronics	9	Throttle motor actuator
5	Ground, fuel injectors		

Connector II, 24-pole

Pin	Designation	Pin	Designation
1	Oxygen sensor heating 2 after catalytic converter	13	Oxygen sensor heating 2 ahead of catalytic converter
2	Pump current regulator of oxygen sensor 1 ahead of catalytic converter	14	Signal, oxygen sensor 2 after catalytic converter
3	CAN low (Tiptronic)	15	Signal, oxygen sensor 1 ahead of TWC
4	CAN high (Tiptronic)	16	Signal, oxygen sensor 2 ahead of catalytic converter
5	Pump current regulator of oxygen sensor 1 ahead of catalytic converter	17	Signal, oxygen sensor 1 after catalytic converter
6	Pump current regulator of oxygen sensor 1 ahead of catalytic converter	18	not assigned
7	Oxygen sensor heating 1 after catalytic converter	19	Oxygen sensor heating 1 ahead of catalytic converter
8	Ground, oxygen sensor 2 after catalytic converter	20	not assigned
9	Ground, oxygen sensor 1 after catalytic converter	21	Engine compartment temperature sensor
10	Ground, oxygen sensor 2 after catalytic converter	22	5 V supply for mass air flow sensor
11	Ground, oxygen sensor 1 after catalytic converter	23	not assigned
12	not assigned	24	Pump current regulator of oxygen sensor 2 ahead of catalytic converter

Connector III, 52-pole

Pin	Designation	Pin	Designation
1	Valve lift control, cylinder 1 - 3	27	Fuel injector, cylinder 4
2	Fuel injector, cylinder 5	28	Fuel injector, cylinder 6
3	EVAP canister purge valve (closed without flow)	29	not assigned
4	Frequency valve, charge pressure	30	not assigned
5	Oil temperature sensor	31	not assigned
6	not assigned	32	Ground
7	5 V supply for camshaft position? sensor and differential pressure sensor	33	not assigned
8	Signal, throttle position sensor 2	34	Intake air temperature sensor
9	Ground, mass air flow sensor	35	not assigned
10	5 V supply for throttle actuation	36	Input, knock sensor 2

Connector III, 52-pole

Pin	Designation	Pin	Designation
11	Triggering of secondary air pump relay (terminal 85)	37	Gound, knock sensor 2
12	Signal, camshaft position sensor 1	38	not assigned
13	Start enable, Tiptronic (P + N)	39	Charge pressure sensor
14	Secondary air valve	40	Fuel injector, cylinder 2
15	Fuel injector, cylinder 3	41	Fuel injector, cylinder 1
16	Overrun recirculating air valve	42	not assigned
17	Ground, sensors	43	not assigned
18	Signal, camshaft position sensor 2	44	not assigned
19	Charge control	45	Signal A, speed sensor
20	not assigned	46	
21	not assigned	47	not assigned
22	Engine coolant temperature sensor	48	not assigned
23	Signal, mass air flow sensor	49	Signal B, speed sensor
24	Signal, throttle position sensor 1	50	Gound, knock sensor 1
25	Ground, throttle position sensors 1 + 2	51	not assigned
26	Valve lift control, cylinder 4 - 6	52	Speed signal from ABS control module

Connector IV, 40-pole

Pin	Designation	Pin	Designation
1	Interlock clutch switch	21	Signal, differential pressure sensor
2	not assigned	22	not assigned
3	not assigned	23	not assigned
4	Coolant fan, stage 1	24	Automatic I/M test
5	not assigned	25	Triggering of engine compartment fan relay (terminal 85)
6	not assigned	26	Triggering of DME relay (terminal 85)
7	Ground, pedal sensor 1	27	Triggering of A/C compressor fan relay (terminal 85)
8	Signal, pedal sensor 1	28	not assigned
9	5 V supply, pedal sensor 1	29	Knocking signal
10	Triggering of fuel pump relay (terminal 85)	30	EVAP canister shutoff valve
11	not assigned	31	Coolant fan, stage 3
12	Ground, pedal sensor 2	32	not assigned
13	Signal, pedal sensor 2	33	Manual transmission start enable

Connector IV, 40-pole

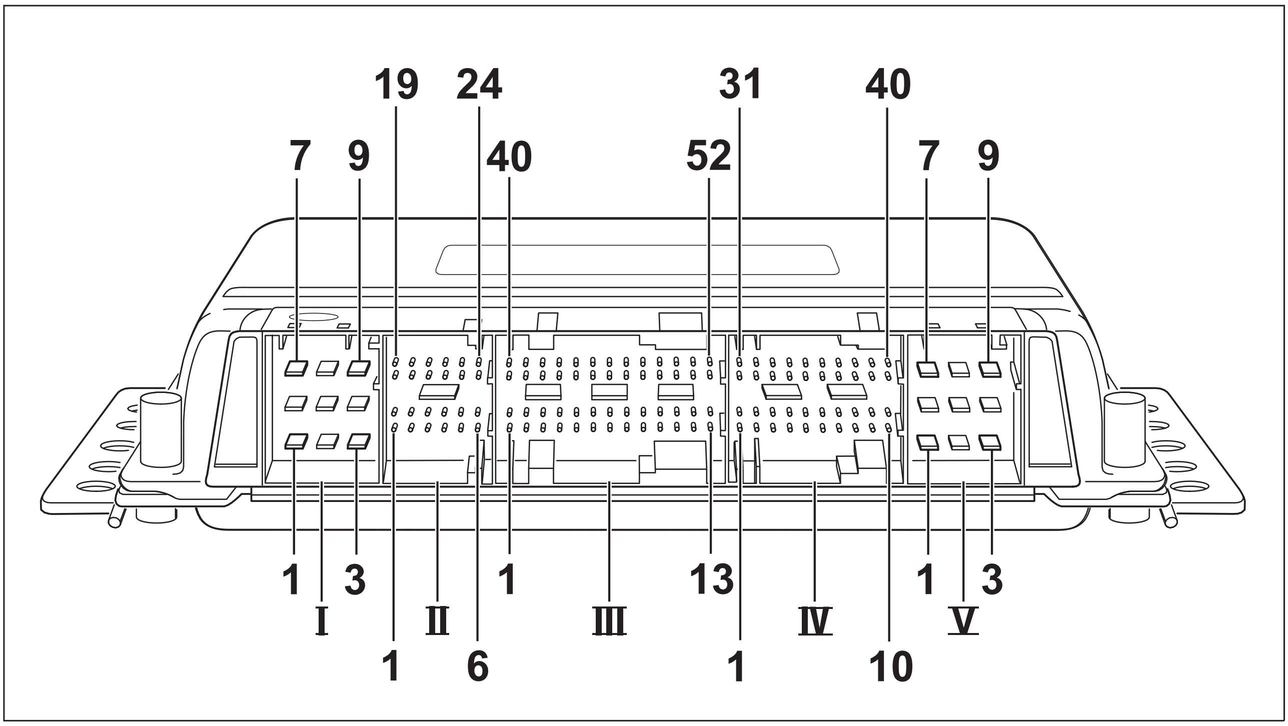
Pin	Designation	Pin	Designation
14	5 V supply, pedal sensor 2	34	Air conditioning medium pressure switch
15	Ground, differential pressure sensor	35	not assigned
16	Crash signal (airbag)	36	CAN high (PSM and instrument cluster)
17	Speed signal output	37	CAN low (PSM and instrument cluster)
18	not assigned	38	not assigned
19	not assigned	39	not assigned
20	Coolant fan, stage 2	40	Tiptronic coolant shutoff valve

Connector V, 9-pole

Pin	Designation	Pin	Designation
1	Ignition coil, cylinder 6	6	Ignition coil, cylinder 1
2	Ignition coil, cylinder 4	7	Camshaft adjustment, bank 1
3	Ignition coil, cylinder 2	8	Camshaft adjustment, bank 2
4	Ignition coil, cylinder 5	9	Ignition coil, cylinder 3
5	Ground		

Connector assignment - 911 Carrera (996)

DME control module connector assignment



I - Connector I, 9-pole
II - Connector II, 24-pole
III - Connector III, 52-pole
IV - Connector IV, 40-pole
V - Connector IV, 9-pole

Connector I, 9-pole

Pin	Designation	Pin	Designation
1	Terminal 15	6	Ground, output stages
2	Terminal 30	7	Throttle motor actuator
3	W-wire	8	DME relay terminal 87
4	Ground, electronics	9	Throttle motor actuator
5	Ground, fuel injectors		

Connector II, 24-pole

Pin	Designation	Pin	Designation
1	Oxygen sensor heating 2 after catalytic converter	13	Oxygen sensor heating 2 ahead of catalytic converter
2	not assigned	14	Signal, oxygen sensor 2 after catalytic converter
3	CAN low (Tiptronic)	15	Signal, oxygen sensor 1 ahead of TWC
4	CAN high (Tiptronic)	16	Signal, oxygen sensor 2 ahead of catalytic converter
5	not assigned	17	Signal, oxygen sensor 1 after catalytic converter
6	not assigned	18	not assigned
7	Oxygen sensor heating 1 after catalytic converter	19	Oxygen sensor heating 1 ahead of catalytic converter
8	Ground, oxygen sensor 2 after catalytic converter	20	not assigned
9	Ground, oxygen sensor 1 after catalytic converter	21	Engine compartment temperature sensor
10	Ground, oxygen sensor 2 after catalytic converter	22	5 V supply for mass air flow sensor
11	Ground, oxygen sensor 1 after catalytic converter	23	not assigned
12	not assigned	24	not assigned

Connector III, 52-pole

Pin	Designation	Pin	Designation
1	Valve lift control, cylinder 1 - 3	27	Fuel injector, cylinder 4
2	Fuel injector, cylinder 5	28	Fuel injector, cylinder 6
3	EVAP canister purge valve (closed without flow)	29	not assigned
4	not assigned	30	not assigned
5	Oil temperature sensor	31	not assigned
6	not assigned	32	Ground/shield, speed sensor
7	5 V supply for camshaft position sensor and differential pressure sensor	33	not assigned
8	Signal, throttle position sensor 2	34	Intake air temperature sensor
9	Ground, mass air flow sensor	35	not assigned
10	5 V supply for throttle actuation	36	Input, knock sensor 2
11	Triggering of secondary air pump relay (terminal 85)	37	Gound, knock sensor 2

Connector III, 52-pole

Pin	Designation	Pin	Designation
12	Signal, camshaft position sensor 1	38	not assigned
13	Start enable, Tiptronic (P + N)	39	not assigned
14	Secondary air valve	40	Fuel injector, cylinder 2
15	Fuel injector, cylinder 3	41	Fuel injector, cylinder 1
16	Fuel pump control module	42	not assigned
17	Ground, sensors	43	not assigned
18	Signal, camshaft position sensor 2	44	not assigned
19	not assigned	45	Signal, speed sensor
20	not assigned	46	Ground, speed sensor
21	not assigned	47	not assigned
22	Engine coolant temperature sensor	48	not assigned
23	Signal, mass air flow sensor	49	Signal, knock sensor 1
24	Signal, throttle position sensor 1	50	Gound, knock sensor 1
25	Ground, throttle position sensors 1 + 2	51	not assigned
26	Valve lift control, cylinder 4 - 6	52	Speed signal from ABS control module

Connector IV, 40-pole

Pin	Designation	Pin	Designation
1	Interlock clutch switch	21	Signal, differential pressure sensor
2	not assigned	22	not assigned
3	not assigned	23	not assigned
4	Coolant fan, stage 1	24	Automatic I/M test
5	not assigned	25	Triggering of engine compartment fan relay (terminal 85)
6	not assigned	26	Triggering of DME relay (terminal 85)
7	Ground, pedal sensor 1	27	Triggering of A/C compressor fan relay (terminal 85)
8	Signal, pedal sensor 1	28	not assigned
9	5 V supply, pedal sensor 1	29	not assigned
10	Triggering of fuel pump relay (terminal 85)	30	EVAP canister shutoff valve
11	not assigned	31	not assigned
12	Ground, pedal sensor 2	32	not assigned
13	Signal, pedal sensor 2	33	Manual transmission start enable
14	5 V supply, pedal sensor 2	34	Air conditioning medium pressure switch

Connector IV, 40-pole

Pin	Designation	Pin	Designation
15	Ground, differential pressure sensor	35	not assigned
16	Crash signal (airbag)	36	CAN high (PSM and instrument cluster)
17	Speed signal output	37	CAN low (PSM and instrument cluster)
18	not assigned	38	not assigned
19	not assigned	39	not assigned
20	Coolant fan, stage 2	40	Tiptronic coolant shutoff valve

Connector V, 9-pole

Pin	Designation	Pin	Designation
1	Ignition coil, cylinder 6	6	Ignition coil, cylinder 1
2	Ignition coil, cylinder 4	7	Camshaft adjustment, bank 1
3	Ignition coil, cylinder 2	8	Camshaft adjustment, bank 2
4	Ignition coil, cylinder 5	9	Ignition coil, cylinder 3
5	Ground		

Engine specifications

911 Turbo (996)

Engine

Engine type		M 96/70
Number of cylinders		6
Bore	mm	100
Stroke	mm	76.4
Displacement	cm^3	3,600
Compression ratio		9.4 : 1
Max. engine power		
as per 80/1269/EWG	kW (HP)	309 (421)
at engine speed	rpm	6,000
Max. torque		
as per 80/1269/EWG	Nm (ftlb.)	560 (414)
at engine speed	rpm	4,600
Max. litre output		
as per 80/1269/EWG	kW/l (HP/l)	85.8 (116.6)
Engine speed limitation		
by		E-gas, ignition control
at	rpm	6,750
Engine idle speed		
Manual transmission	rpm	740 +/- 40
Tiptronic	rpm	740 +/- 40

Engine design

Type	6-cylinder aluminium opposed-cylinder engine, water-cooled, bi-turbo
Valve arrangement	2 intake, 2 exhaust, suspended in parallel V arrangement
Valve control	Via flat-base tappets
Valve clearance	Hydraulic valve clearance compensation

Valve timing with 1 mm valve lift and zero clearance, basic inlet camshaft setting early		
Inlet opens Inlet closes Exhaust opens Exhaust closes		10° before TDC 20° after BDC 41° before BDC 9° before TDC

Engine cooling

Type		Liquid cooling, three radiators (Tiptronic additional radiator) two electric fans, three-stage control

Engine lubrication

Type		Dry sump lubrication with separate tank
Oil cooling		Via oil-water heat exchanger
Oil pressure	rpm	Approx. 6.5 bar at 90 °C
Oil consumption		Up to 1.0 l/1,000 km

Emission control

EURO III		Stereo oxygen sensor closed-loop control and 3-way catalytic converter system with one 2-stage catalytic converter each on the left and right, secondary-air system and European OBD
USA LEV		Stereo oxygen sensor closed-loop control and 3-way catalytic converter system with one 2-stage catalytic converter each on the left and right, secondary-air system and OBD II and ORVR

Fuel system

Fuel injection		ME 7.8 (digital engine electronics) Triggering of injection sequential
Fuel supply		1 electrical internal gear pump with 2 additional sucking jet pumps

Required fuel

Fuel quality (RON)	98 unleaded

Electrical system

Nominal voltage	V	12
Battery capacity	Ah	80
Generator output	W	1,680 (three-phase generator)
Ignition		DME with stationary high-voltage distribution and cylinder-selective knock control
Firing order		1 - 6 - 2 - 4 - 3 - 5
Ignition angle control		Via DME
Spark plugs		Bosch FR5 LDC Beru 14 FR 5 LDU
Electrode gap	mm	1.6 +/- 0.2

Load values of the 911 Turbo (996)

	Mass air flow ML in $^{kg}/_{h}$	CLV in %
Idle speed	16 - 20	1.45 - 1.82
No load, n=3,000 rpm	60 - 80	5.45 - 7.27

CLV = ML/MLMAX * 100, with MLMAX = 1100 $^{kg}/_{h}$

Test conditions

- Engine temperature higher than 90 °C
- Ambient temperature 20 °C
- No loads switched on

Engine specifications

911 Carrera (996)

Engine

Engine type		M 96/03
Number of cylinders		6
Bore	mm	96
Stroke	mm	82.8
Displacement	cm^3	3,596
Compression ratio		11.3 : 1
Max. engine power		
as per 80/1269/EWG	kW (HP)	235 (320)
at engine speed	rpm	6,800
Max. torque		
as per 80/1269/EWG	Nm (ftlb.)	370 (274)
at engine speed	rpm	4,250
Max. litre output		
as per 80/1269/EWG	kW/l (HP/l)	65.4 (88.9)
Engine speed limitation		
by		E-gas, fuel cutoff
at	rpm	7,300
Engine idle speed	rpm	670 +/- 40 without air conditioning

Engine design

Type		6-cylinder aluminium opposed-cylinder engine, water-cooled
Valve arrangement		2 intake, 2 exhaust, suspended in parallel V arrangement
Valve control	Inlet	via switchable flat-base tappets
	Exhaust	via flat-base tappets
Valve clearance		Hydraulic valve clearance compensation
Valve timing in late position with 1 mm valve lift and zero clearance		

	large valve	small valve lift
Inlet opens	9° after TDC	39° after TDC
Inlet closes	61° after BDC	19° after BDC
Exhaust opens	50° before BDC	
Exhaust closes	4° before TDC	

Engine cooling

Type		Liquid cooling, two radiators (Tiptronic additional radiator) two electric fans, two-stage control

Engine lubrication

Type		integrated dry sump lubrication
Oil cooling		via oil-water heat exchanger
Oil pressure	n=5,000 rpm	Approx. 6.5 bar at 90 °C
Oil consumption		Up to 0.5 l/1,000 km

Emission control

EURO II		Oxygen sensing with 2 sensors before the catalytic converter, 3-way catalytic converter system with one TWC each on the left and the right (RoW)
EURO III		Additional secondary air system and sensing after the TWC (4 sensors) European OBD
USA LEV	OBD II + ORVR	Oxygen sensing and sensing after the TWC (4 sensors), 3-way catalytic converter system with one cascade catalytic converter each on the left and right (with two metal carriers), secondary-air system, OBD II and ORVR

Fuel system

Fuel injection		ME 7.8 (digital engine electronics) Triggering of injection sequential
Fuel supply		1 electric pump, non-return

Required fuel

Fuel quality (RON)	98 unleaded

Electrical system

Nominal voltage	V	12
Battery capacity	Ah	80
Generator output	W	1,680 (three-phase generator)
Ignition		DME, single-spark coil, cylinder-selective knock control
Firing order		1 - 6 - 2 - 4 - 3 - 5
Ignition angle control		Via DME
Spark plugs		Bosch FGR 6 KQC Beru? 14-FGR 6 KQU
Electrode gap	mm	1.6 +/- 0.2

911 Carrera (996) load values

	Mass air flow ML in $^{kg}/_{h}$	CLV in %
Idle speed	15 - 20	1.74 - 2.33
No load, n=3,000 rpm	50 - 70	5.81 - 8.14

CLV = ML/MLMAX * 100, with MLMAX = 860 $^{kg}/_{h}$

Test conditions

- Engine temperature higher than 90 °C
- Ambient temperature 20 °C
- No loads switched on
- Vehicle adapted

Control module function

CONTROL UNIT PROGRAMMING

Four sub-menus are offered with this menu item:

1. Read out control unit (vehicle data)

- The menu item "Read out control unit" can be used to read out data from the old control module, e.g.engine number, M numbers etc., in order to adopt the data in a new control module.

Note!

Only one control module at a time can be read out in order to then adopt the data in a new control module during control module programming.

Note!

The DME programming code and immobilizer code are required to program control modules. These codes can be obtained from the Porsche IPAS system. All electrical consumers must be switched off for programming control modules. Switch heater to OFF. The vehicle battery must be fully charged.

2. Program control unit (new control unit)

- Enter vehicle identification number and confirm.
- Enter and confirm new programming code.

Note!

The new programming code must match the DME programming code from the IPAS, otherwise the control module can no longer be programmed later.

- Enter and confirm new immobilizer code.

Note!

The new immobilizer code must match the immobilizer code from the IPAS, otherwise the control module can no longer be programmed later.

- Select data record.
- When programming is complete, switch off the ignition.
- Switch on the ignition.
- Switch off the tester.

Note!

In Tiptronic vehicles, the fault memory of the Tiptronic must be erased following the programming of a DME control module, as the fault "CAN timeout" is entered in the memory during programming.

3. Program map/data

- The data record can be changed, e.g. from RoW to OBD II, with this menu item. Only the DME programming code is required.

4. Program immobilizer code

- The immobilizer code is transferred to a new DME control module with this menu item.

Data record M150 must be programmed for the following countries:

- Russia
- Cyprus
- Brazil
- Equador
- Middle East (for all connected markets)
- Costa Rica
- Venezuela
- Columbia
- Peru
- Mexico
- China

Fault overview of 911 (996) Turbo model year 2001 only

Note!

- *Please note: This fault code overview only applies to the 911 (996) Turbo model year 2001.*
- *For the Turbo as of model year 2002, some fault codes have been renamed in order to implement the changed standards of the Californian environmental agency.*
- *The model year allocation refers to the program and data status in the DME control module.*

- To be certain that a fault is no longer present after a repair or clearing of the fault memory, a short test or test drive should be carried out. This is the only way of ensuring that all diagnosis routines of the DME control module have been performed.
- In the case of Tiptronic faults, the fault memory of the Tiptronic must also be read out for diagnosis/troubleshooting.
- After a repair, the fault memory must always be cleared.

Fault type 1:	Signal implausible/implausible operating range/malfunction
Fault type 2:	Open circuit/no signal
Fault type 3:	Ground short/below lower limit/lean limit
Fault type 4:	Short circuit to B+ /above upper limit/rich limit

*:	In the case of misfire faults, the fault types have a different meaning.
Fault type 1:	Emission-related fault after starting
Fault type 3:	Emission-related fault during journey
Fault type 4:	Fault damaging to catalytic converter

**:	In the case of oxygen sensor faults, the fault types have a different meaning.
Fault type 1:	All electrical faults (open circuit, short circuit to B+ or ground) cause this fault output
Fault type 2:	Interference from the oxygen sensor heater in the sensor signal
Fault type 3:	Oxygen sensor aging fault, sensor dynamic response
Fault type 4:	Oxygen sensor aging fault, sensor contamination and shift of characteristic

CE	Check Engine warning light
0	Function switched off
1	CE flashes, fault damaging to catalytic converter
2	CE ON, emission-related fault
3	CE ON after two driving cycles
6	CE OFF, fault not emission-related
7	Fault caused by short test
11	Fuel supply fault, CE ON after two driving cycles, higher freeze frame priority
30	CE ON after three driving cycles
31	CE ON after three driving cycles with misfires
33	Fuel supply fault, CE ON after three driving cycles, higher freeze frame priority

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/ EU3/ M150**
Hot film mass air flow meter			P0102	P0103	3/6/6
Ambient pressure sensor			P0107	P0108	3/6/6
Air intake temperature sensor			P0112	P0113	3/6/6
Engine temperature sensor	P0115	P0117	P0117	P0118	3/6/6
Throttle	P0121				6/6/6
Oxygen sensor in front of catalytic converter, bank 1	P0130**	P0134**	P0133**	P0132**	3/30/6
Oxygen sensor after catalytic converter, bank 1	P0136	P0140		P0138	3/6/6
Oxygen sensor aging after catalytic converter, bank 1			P0139	P0139	3/6/6
Oxygen sensor heater after catalytic converter, bank 1		P0141	P0141	P0141	3/6/6
Oxygen sensor in front of catalytic converter Bank 2	P0150**	P0154**	P0153**	P0152**	3/30/6

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/ EU3/ M150
Oxygen sensor after catalytic converter, bank 2	P0156	P0160		P0158	3/6/6
Oxygen sensor aging after catalytic converter, bank 2			P0159	P0159	3/6/6
Oxygen sensor heater after catalytic converter, bank 2		P0161	P0161	P0161	3/6/6
Oil temperature sensor			P0197	P0198	6/6/6
Pressure sensor, boost			P0237	P0238	6/6/6
Misfire detection (total)	P0300*		P0300*	P0300*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 1	P0301*		P0301*	P0301*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 2	P0302*		P0302*	P0302*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 3	P0303*		P0303*	P0303*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 4	P0304*		P0304*	P0304*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 5	P0305*		P0305*	P0305*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 6	P0306*		P0306*	P0306*	1 - 2/1 - 31/1 - 31
Knock sensor 1			P0327	P0328	6/6/6
Knock sensor 2			P0332	P0333	6/6/6
Engine speed sensor signal		P0336			3/6/6
Hall sensor 1	P0341	P0344	P0342	P0343	3/6/6
Secondary air system Bank 1	P0410				3/6/0
Electric switch-over valve		P0413	P0414	P0414	3/6/0
Secondary air pump		P0418	P0418	P0418	3/6/0
Catalytic conversion Bank 1				P0420	3/30/0
Catalytic conversion Bank 2				P0430	3/30/0

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/ EU3/ M150
Fuel tank ventilation system (DTESK)				P0440	3/-/-
Fuel tank ventilation system (DTEV)				P0441	-/6/6
Fuel tank ventilation system (fine leak)			P0442		3/0/0
Tank vent valve		P0444	P0445	P0445	3/30/6
Activated charcoal filter shutoff valve (function)			P0446		3/0/0
Activated charcoal filter shutoff valve (driver)		P0447	P0448	P0448	3/0/0
Pressure sensor, tank	P0450		P0452	P0453	3/0/0
Fuel tank ventilation system (big leak)	P0455		P0455		3/0/0
Driver for blower 1		P0480	P0480	P0480	6/6/6
Driver for blower 2		P0481	P0481	P0481	6/6/6
Driver for blower 3		P0482	P0482	P0482	6/6/6
Vehicle speed		P0501			3/6/6
Idle speed control at the stop			P0506	P0507	3/6/6
Supply voltage	P0560		P0562	P0563	3/6/3
CAN timeout Tiptronic		P0600			3/6/6
EEPROM fault	P0603	P0603	P0603	P0603	6/30/6
Control module faulty (RAM)	P0604				3/30/6
Control module faulty (ROM)	P0605				3/30/6
Check Engine lamp, open circuit (via CAN)		P0650			6/6/6
Tiptronic (CAN transfer box setting implausible)	P0700				3/6/6

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/ EU3/ M150**
Tiptronic (Gear implausible/transmission slips)	P0701				3/6/6
Tiptronic control unit faulty	P0702				3/6/6
Tiptronic (Selector lever position implausible)	P0706				3/32/6
Tiptronic (Supply voltage of speed sensors)	P0715				3/6/6
Tiptronic (CAN: wheel speed rear right)	P0720				3/6/6
Tiptronic (Gear comparison negative)	P0730				3/6/6
Tiptronic (Converter lockup clutch)	P0740				6/6/6
Tiptronic (Converter lockup solenoid valve)	P0743				3/6/6
Tiptronic (Control solenoid valve, modulating pressure)	P0748				3/6/6
Tiptronic (Solenoid valve, 1-2/4-5 gearshift)	P0753				3/6/6
Tiptronic (Solenoid valve, 2-3 gearshift)	P0758				3/6/6
Tiptronic (Solenoid valve3-4 gearshift)	P0763				3/ 6/ 6
Input values, cylinder fill measurement			P1101	P1101	3/6/6
Oxygen sensors interchanged in front of catalytic converter	P1110				3/30/6
LSU heater, load interruption	P1114				3/6/6

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/ EU3/ M150
Oxygen sensor heater in front of catalytic converter, bank 1	P1115	P1115	P1115	P1115	3/30/6
LSU heater, bank 2 Load interruption	P1116				3/6/6
Oxygen sensor heater after catalytic converter, bank 1	P1117				3/6/0
Oxygen sensor heater after catalytic converter, bank 2	P1118				3/6/0
Oxygen sensor heater in front of catalytic converter, bank 2	P1119	P1119	P1119	P1119	3/30/6
Throttle potentiometer 1	P1121		P1121	P1121	6/6/6
Throttle potentiometer 2	P1122		P1122	P1122	6/6/6
Fuel pump relay driver		P1124	P1124	P1124	6/6/6
Oxygen sensor closed-loop control adaptation upper load range, bank 1			P1125	P1125	11/33/6
Oxygen sensor closed-loop control adaptation lower load range, bank 1			P1126	P1126	11/33/6
Oxygen control deviation by short test, bank 1			P1127	P1127	7/7/7
Oxygen sensor closed-loop control adaptation Idle speed range, bank 1			P1128	P1128	11/33/6
Oxygen sensor closed-loop control adaptation Idle speed range, bank 2			P1130	P1130	11/33/6
Oxygen sensor closed-loop control upper load range, bank 2			P1132	P1132	11/33/6

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/ EU3/ M150**
Oxygen sensor closed-loop control lower load range, bank 2			P1133	P1133	11/33/6
Oxygen control deviation by short test, bank 2			P1134	P1134	7/7/7
Pressure comparison Boost pressure v. ambient	P1136				6/6/6
Clutch switch	P1137				6/6/6
Engine compartment temperature sensor			P1157	P1158	6/6/6
Injection valve of cylinder 1		P1237	P1225	P1213	3/30/6
Injection valve of cylinder 6		P1238	P1226	P1214	3/30/6
Injection valve of cylinder 2		P1239	P1227	P1215	3/30/6
Injection valve of cylinder 4		P1240	P1228	P1216	3/30/6
Injection valve of cylinder 3		P1241	P1229	P1217	3/30/6
Injection valve of cylinder 5		P1242	P1230	P1218	3/30/6
Accelerator pedal	P1219				6/6/6
Boost pressure control			P1249	P1249	6/6/6
Boost pressure characteristic, Above Upper Limit				P1255	6/6/6
Signal from airbag	P1265				6/6/6
Function monitoring Fuel cutoff	P1266				3/30/6
Position of camshaft relative to crankshaft, bank 2			P1324	P1324	3/6/6
Camshaft adjustment Bank 2	P1325		P1325	P1325	3/6/6
Position of camshaft relative to crankshaft, bank 1			P1340	P1340	3/6/6

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/ EU3/ M150
Camshaft adjustment Bank 1	P1341		P1341	P1341	3/6/6
Camshaft adjustment bank 1 driver		P1342	P1342	P1342	3/6/6
Camshaft adjustment bank 2 driver		P1343	P1343	P1343	3/6/6
Valve lift control driver Bank 1		P1344	P1344	P1344	3/6/6
Valve lift control driver Bank 2		P1345	P1345	P1345	3/6/6
Valve lift control parity check error	P1350		P1350	P1350	6/6/6
Valve lift control, cylinder 1	P1351		P1351	P1351	6/6/6
Valve lift control, cylinder 6	P1352		P1352	P1352	6/6/6
Valve lift control, cylinder 2	P1353		P1353	P1353	6/6/6
Valve lift control, cylinder 4	P1354		P1354	P1354	6/6/6
Valve lift control, cylinder 3	P1355		P1355	P1355	6/6/6
Valve lift control, cylinder 5	P1356		P1356	P1356	6/6/6
Knock control zero test	P1384				6/6/6
Knock control offset	P1385				6/6/6
Knock control test pulse	P1386				6/6/6
Hall sensor 2	P1397		P1397	P1397	3/6/6
Secondary air system Bank 2	P1411				3/6/0
Air conditioning compressor control		P1455	P1457	P1456	6/6/6
Throttle adjusting unit Driver	P1501				3/30/6
Throttle adjusting unit Spring check				P1502	3/30/6
Throttle adjusting unit Positional deviation	P1503				3/30/6

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/ EU3/ M150**
Throttle adjusting unit Emergency air position	P1504				6/6/6
Throttle adjusting unit Control range		P1505	P1505	P1505	3/30/6
Throttle adjusting unit Lower mechanical stop	P1506				3/30/6
Throttle adjusting unit Amplifier balance	P1507				6/30/6
Function monitoring Torque comparison	P1508				3/6/6
Torque limitation				P1509	6/6/6
Throttle adjusting unit Replacement detection without adaptation	P1510				6/30/6
Throttle adjustment unit Abortion of test through violation of environmental condition			P1511	P1511	3/6/30
Ambient temperature (from instrument cluster via CAN)	P1512				6/6/6
Throttle adjusting unit Spring test opening			P1513	P1513	3/30/6
Throttle adjusting unit Relearn lower mechanical stop	P1514				6/30/6
Boost pressure control valve Driver		P1548	P1547	P1546	6/6/6
Immobilizer	P1570	P1571			6/6/6
Stop light switch	P1574				6/6/6
Cruise control standby light via CAN		P1576			6/6/6
Accelerator pedal Potentiometer 1	P1577		P1577	P1577	6/6/6
Accelerator pedal Potentiometer 2	P1578		P1578	P1578	6/6/6
Reference mark sensor	P1579				3/6/6
CAN timeout PSM		P1600			3/6/6

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/ EU3/ M150**
CAN timeout Instrument cluster	P1601	P1601			6/6/6
Coolant shutoff valve		P1656	P1656	P1656	6/6/6
Driver for ambient air valve		P1657	P1657	P1657	6/6/6
Control module faulty (watchdog: Reset)	P1671				3/30/6
Driver for engine compartment purge fan		P1674	P1674	P1674	6/6/6
Engine scavenge blower fault				P1675	6/6/6
Tiptronic (Supply voltage of valves or selector lever)	P1702				3/6/6
Tiptronic (Control solenoid valve, shifting pressure)	P1748				3/6/6

Fault overview of 911 Carrera (996) as of model year '02

Note!

- *This fault code overview is for the 911 (996) Carrera as of model year 2002 and the Boxster (986) as of model year 2003.*
- *The turbo versions for model year 2001 and as of model year 2002 have separate fault code tables which differ in some respects from this table.*

- To be certain that a fault is no longer present after a repair or clearing of the fault memory, a short test or test drive should be carried out. This is the only way of ensuring that all diagnosis routines of the DME control module have been performed.
- For Boxster (986) Tiptronic vehicles, the fault memory of the Tiptronic control unit must also be read out, because switching on of the Check Engine warning light may also have been initiated by the Tiptronic.
- After a repair, the fault memory must always be cleared.

Fault type 1:	Signal implausible/implausible operating range/malfunction
Fault type 2:	Open circuit/no signal
Fault type 3:	Ground short/below lower limit/lean limit
Fault type 4:	Short circuit to B+ /above upper limit/rich limit

*:	In the case of misfire faults, the fault types have a different meaning.
Fault type 1:	Emission-related fault after starting
Fault type 3:	Emission-related fault during journey
Fault type 4:	Fault damaging to catalytic converter

CE	Check Engine warning light
0	Function switched off
1	CE flashes, fault damaging to catalytic converter
2	CE ON, emission-related fault
3	CE ON after two driving cycles
4	CE ON after five seconds
5	CE OFF, fault output on scan tool

6	CE OFF, fault not emission-related
7	Fault caused by short test
11	Fuel supply fault, CE ON after two driving cycles, higher freeze frame priority
30	CE ON after three driving cycles
31	CE ON after three driving cycles with misfires
32	CE OFF, fault output on scan tool after three driving cycles
33	Fuel supply fault, CE ON after three driving cycles, higher freeze frame priority

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/EU3/ EU2**
Position of camshaft relative to crankshaft, bank 1			P0011	P0012	3/32/32
Position of camshaft relative to crankshaft, bank 2			P0021	P0022	3/32/32
Valve lift control driver Bank 1		P0026	P0026	P0026	3/30/32
Valve lift control driver Bank 2		P0028	P0028	P0028	3/30/32
Oxygen sensor heater in front of catalytic converter, bank 1		P0030	P0031	P0032	3/30/0
Oxygen sensor heater after catalytic converter, bank 1		P0036	P0037	P0038	3/6/0
Oxygen sensor heater in front of catalytic converter, bank 2		P0050	P0051	P0052	3/30/0
Oxygen sensor heater after catalytic converter, bank 2		P0056	P0057	P0058	3/6/0
Ambient temperature (from instrument cluster via CAN)	P0071				6/6/6
Hot film mass air flow meter			P0102	P0103	3/32/32
Air intake temperature sensor			P0112	P0113	3/32/32
Engine temperature sensor	P0116	P0125	P0117	P0118	3/32/32
Accelerator pedal Potentiometer 1	P0121		P0122	P0123	5/32/32
Blocked thermostat	P0128				3/32/32
Oxygen sensor in front of catalytic converter, bank 1	P0130	P0134	P0131	P0132	3/30/6
Oxygen sensor aging period, bank 1				P0133	3/30/6
Oxygen sensor heater in front of catalytic converter, bank 1	P0135				

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/EU3/ EU2**
Oxygen sensor aging after catalytic converter, bank 1			P0139	P0136	3/30/0
Oxygen sensor after catalytic converter, bank 1		P0140	P0137	P0138	3/30/0
Oxygen sensor heater after catalytic converter, bank 1	P0141				3/30/0
Oxygen sensor in front of catalytic converter Bank 2	P0150	P0154	P0151	P0152	3/30/6
Oxygen sensor aging period, bank 2				P0153	3/30/6
Oxygen sensor heater in front of catalytic converter, bank 2	P0155				
Oxygen sensor aging after catalytic converter, bank 2			P0159	P0156	3/30/0
Oxygen sensor after catalytic converter, bank 2		P0160	P0157	P0158	3/30/0
Oxygen sensor heater after catalytic converter, bank 2	P0161				3/30/0
Oxygen sensor closed-loop control adaptation Idle speed range, bank 1			P0172	P0171	11/33/6
Oxygen sensor closed-loop control adaptation Idle speed range, bank 2			P0175	P0174	11/33/6
Oil temperature sensor			P0197	P0198	6/6/6
Injection valve of cylinder 1		P0201	P0261	P0262	3/30/32
Injection valve of cylinder 2		P0202	P0264	P0265	3/30/32
Injection valve of cylinder 3		P0203	P0267	P0268	3/30/32
Injection valve of cylinder 4		P0204	P0270	P0271	3/30/32
Injection valve of cylinder 5		P0205	P0273	P0274	3/30/32
Injection valve of cylinder 6		P0206	P0276	P0277	3/30/32
Accelerator pedal Potentiometer 2	P0221		P0222	P0223	5/32/32
Fuel pump relay driver		P0230	P0230	P0230	6/6/6
Misfire detection (total)	P0300*		P0300*	P0300*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 1	P0301*		P0301*	P0301*	1 - 2/1 - 31/1 - 31

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/EU3/ EU2
Misfire detection Cylinder 2	P0302*		P0302*	P0302*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 3	P0303*		P0303*	P0303*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 4	P0304*		P0304*	P0304*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 5	P0305*		P0305*	P0305*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 6	P0306*		P0306*	P0306*	1 - 2/1 - 31/1 - 31
Knock control zero test	P0324				5/6/6
Knock sensor 1			P0327	P0328	5/6/6
Knock sensor 2			P0332	P0333	5/6/6
Engine speed sensor signal		P0335			3/32/32
Reference mark sensor	P0336				3/32/6
Hall sensor 1	P0341	P0344	P0342	P0343	3/32/32
Hall sensor 2	P0346	P0349	P0347	P0348	3/32/32
Electric switch-over valve		P0413	P0414	P0414	3/32/0
Secondary air pump		P0418	P0418	P0418	3/32/0
Catalytic conversion Bank 1				P0420	3/30/0
Catalytic conversion Bank 2				P0430	3/30/0
Fuel tank ventilation system (DTESK)				P0440	3/0/0
Fuel tank ventilation system (DTEV)			P0441	P0441	0/32/32
Fuel tank ventilation system (fine leak)			P0442		3/0/0
Tank vent valve		P0444	P0445	P0445	3/30/32
Activated charcoal filter shutoff valve (function)			P0446		3/0/0
Activated charcoal filter shutoff valve (driver)		P0447	P0448	P0448	3/0/0
Fuel tank ventilation system (big leak)	P0450		P0455		3/0/0
Pressure sensor tank	P0451		P0452	P0453	3/0/0

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/EU3/ EU2
Fuel tank ventilation system (small leak)			P0456		3/0/0
Driver for blower 1		P0480	P0480	P0480	6/6/6
Driver for blower 2		P0481	P0481	P0481	6/6/6
Secondary air system Bank 1			P0491		3/32/0
Secondary air system Bank 2			P0492		3/32/0
Vehicle speed		P0503			3/6/6
Idle speed control at the stop			P0506	P0507	3/32/32
Immobilizer	P0513	P0513			6/6/6
Supply voltage	P0560		P0562	P0563	3/6/6
Stop light switch	P0571				6/6/6
CAN timeout Tiptronic		P0600			3/32/6
DME relay/control module faulty (watchdog: Reset)	P0601				6/6/6
EEPROM fault	P0603	P0603	P0603	P0603	6/6/6
Control module faulty (RAM)	P0604				5/32/32
Control module faulty (ROM)	P0605				5/32/32
Control module faulty (watchdog: Reset)	P0607				5/32/32
Throttle adjusting unit Positional deviation	P0638				4/4/4
Air conditioning compressor control		P0645	P0646	P0674	6/6/6
Check Engine lamp, open circuit (via CAN)		P0650			5/32/32
Electric switch-over valve for intake pipe switching		P0660	P0661	P0662	6/6/6
Tiptronic (CAN transfer box setting implausible)	P0700				3/32/6
Tiptronic (Gear implausible/transmission slips)	P0701				3/32/6
Tiptronic control unit faulty	P0702				3/32/6

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/EU3/ EU2
Tiptronic (Supply voltage of speed sensors)	P0715				3/32/6
Tiptronic (CAN: wheel speed rear right)	P0720				3/32/6
Tiptronic (Gear comparison negative)	P0730				3/32/6
Tiptronic (Converter lockup clutch)	P0740				6/32/6
Tiptronic (Converter lockup clutch solenoid valve)	P0743				3/32/6
Tiptronic (Control solenoid valve, modulating pressure)	P0748				3/32/6
Tiptronic (Solenoid valve, 1-2/4-5 gearshift)	P0753				3/32/6
Tiptronic (Solenoid valve, 2-3 gearshift)	P0758				3/32/6
Tiptronic (Solenoid valve3-4 gearshift)	P0763				3/32/6
Tiptronic (Control solenoid valve, shifting pressure)	P0778				3/32/6
Clutch switch	P0830				6/6/6
Input values, cylinder fill measurement			P1101	P1109	6/6/6
Ambient pressure sensor			P1103	P1102	3/32/32
Oxygen sensor closed-loop control adaptation upper load range, bank 1			P1105	P1125	11/33/32
Oxygen sensor closed-loop control upper load range, bank 2			P1106	P1132	11/33/32
Oxygen sensor closed-loop control adaptation lower load range, bank 1			P1107	P1126	11/33/32
Oxygen sensor closed-loop control lower load range, bank 2			P1108	P1133	11/33/32
Throttle	P1120				5/32/32
Throttle potentiometer 1	P1121		P1139	P1138	5/32/32
Throttle potentiometer 2	P1122		P1141	P1140	5/32/32

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/EU3/ EU2
Oxygen control deviation by short test, bank 1			P1127	P1142	7/7/7
Oxygen control deviation by short test, bank 2			P1134	P1143	7/7/7
Engine compartment temperature sensor			P1157	P1158	6/6/6
Oxygen sensor after catalytic converter, bank 1	P1159				
Oxygen sensor after catalytic converter, bank 2	P1160				
Signal from airbag	P1265				6/6/6
Function monitoring Fuel cutoff	P1266				4/4/4
Inlet camshaft, bank 2	P1325				5/32/32
Inlet camshaft driver		P1328	P2088	P2089	3/30/32
Inlet camshaft driver, bank 2		P1331	P2092	P2093	3/30/32
Inlet camshaft	P1341				5/32/32
Valve lift control parity check error	P1350		P1374	P1371	6/6/6
Valve lift control, cylinder 1			P1351	P1359	6/6/6
Valve lift control, cylinder 6			P1352	P1360	6/6/6
Valve lift control, cylinder 2			P1353	P1361	6/6/6
Valve lift control, cylinder 4			P1354	P1362	6/6/6
Valve lift control, cylinder 3			P1355	P1363	6/6/6
Valve lift control, cylinder 5			P1356	P1364	6/6/6
Knock control offset	P1385				5/6/6
Knock control test pulse	P1386				5/6/6
Throttle adjusting unit Driver	P1501				4/4/4
Throttle adjusting unit Spring check				P1502	4/4/4
Throttle adjusting unit Emergency air position	P1504				6/6/6
Throttle adjusting unit Control range		P1505	P1518	P1516	4/4/4
Throttle adjusting unit Lower mechanical stop	P1506				4/4/4
Throttle adjusting unit Amplifier balance	P1507				6/6/6

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/EU3/ EU2
Function monitoring Torque comparison	P1508				4/4/4
Torque limitation				P1509	5/32/32
Throttle adjusting unit Replacement detection without adaptation	P1510				4/4/4
Throttle adjustment unit Abortion of test through violation of environmental condition			P1511	P1517	6/6/6
Throttle adjusting unit Spring test opening			P1513	P1515	4/4/4
Throttle adjusting unit Relearn lower mechanical stop	P1514				6/6/6
Pedal value sensor movement	P1575				6/6/6
Cruise control standby light via CAN		P1576			6/6/6
CAN timeout PSM		P1600			6/6/6
CAN timeout Instrument cluster	P1602	P1601			6/6/6
Coolant shutoff valve		P1656	P1655	P1654	6/6/6
Driver for engine compartment purge fan		P1674	P1677	P1676	6/6/6
Engine scavenge blower fault				P1675	6/6/6
Tiptronic (Supply voltage of valves or selector lever)	P1702				3/32/6
Oxygen sensor aging delay time, bank 1			P2097	P2096	3/30/0
Oxygen sensor aging delay time, bank 2			P2099	P2098	3/30/0
Accelerator pedal	P2135				5/32/32

Fault overview of 911 Turbo (996) and GT 2 as of model year '02

Note!

- *Please note: This fault code overview only applies to the 911 (996) Turbo and GT2 as of model year 2002.*
- *For the Turbo up to and including model year 2001, there are separate fault code tables, which differ in some respects from this table. Some fault codes have been renamed in order to implement the changed standards of the Californian environmental agency.*
- *The model year allocation refers to the program and data status in the DME control module.*

- To be certain that a fault is no longer present after a repair or clearing of the fault memory, a short test or test drive should be carried out. This is the only way of ensuring that all diagnosis routines of the DME control module have been performed.
- In the case of Tiptronic faults, the fault memory of the Tiptronic must also be read out for diagnosis/troubleshooting.
- After a repair, the fault memory must always be cleared.

Fault type 1:	Signal implausible/implausible operating range/malfunction
Fault type 2:	Open circuit/no signal
Fault type 3:	Ground short/below lower limit/lean limit
Fault type 4:	Short circuit to B+ /above upper limit/rich limit

*:	In the case of misfire faults, the fault types have a different meaning.
Fault type 1:	Emission-related fault after starting
Fault type 3:	Emission-related fault during journey
Fault type 4:	Fault damaging to catalytic converter

**:	In the case of oxygen sensor faults, the fault types have a different meaning.
Fault type 1:	All electrical faults (open circuit, short circuit to B+ or ground) cause this fault output
Fault type 2:	Interference from the oxygen sensor heater in the sensor signal
Fault type 3:	Oxygen sensor aging fault, sensor dynamic response
Fault type 4:	Oxygen sensor aging fault, sensor contamination and shift of characteristic

CE	Check Engine warning light
0	Function switched off
1	CE flashes, fault damaging to catalytic converter
2	CE ON, emission-related fault
3	CE ON after two driving cycles
4	CE ON after five seconds
5	CE OFF, fault output on Scan Tool
6	CE OFF, fault not emission-related
7	Fault caused by short test
11	Fuel supply fault, CE ON after two driving cycles, higher freeze frame priority
30	CE ON after three driving cycles
31	CE ON after three driving cycles with misfires
32	CE OFF, fault output on Scan Tool after three driving cycles
33	Fuel supply fault, CE ON after three driving cycles, higher freeze frame priority

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/EU3/ EU2**
Position of camshaft relative to crankshaft, bank 1			P0011	P0012	3/32/32
Inlet camshaft driver		P0013	P0013	P0013	3/32/32
Position of camshaft relative to crankshaft, bank 2			P0021	P0022	3/32/32
Inlet camshaft driver, bank 2		P0023	P0023	P0023	3/32/32
Valve lift control driver Bank 1	P0026		P0026	P0026	3/30/32
Valve lift control driver Bank 2	P0028		P0028	P0028	3/30/32
Oxygen sensor heater in front of catalytic converter, bank 1		P0030	P0031	P0032	3/30/0
Oxygen sensor heater after cata-lytic converter, bank 1		P0036	P0037	P0038	3/30/0
Oxygen sensors interchanged in front of catalytic converter	P0040				
Boost pressure control valve Driver		P0045	P0047	P0048	5/32/32
Oxygen sensor heater in front of catalytic converter, bank 2		P0050	P0051	P0052	3/30/0

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/EU3/ EU2**
Oxygen sensor heater after catalytic converter, bank 2		P0056	P0057	P0058	3/30/0
Ambient temperature (from instrument cluster via CAN)	P0071				6/6/6
Hot film mass air flow meter			P0102	P0103	3/32/32
Air intake temperature sensor			P0112	P0113	3/32/32
Engine temperature sensor	P0116	P0125	P0117	P0118	3/32/32
Accelerator pedal Potentiometer 1	P0121		P0122	P0123	5/32/32
Blocked thermostat	P0128				3/32/32
Ambient pressure sensor			P0129		3/32/32
Oxygen sensor in front of catalytic converter, bank 1	P0130**		P0133**		3/30/6
Oxygen sensor heater in front of catalytic converter, bank 1	P0135				3/30/0
Oxygen sensor aging after catalytic converter, bank 1			P0136	P0136	3/30/0
Oxygen sensor after catalytic converter, bank 1		P0140	P0137	P0138	3/30/6
Oxygen sensor heater after catalytic converter	P0141				3/6/0
Oxygen sensor in front of catalytic converter Bank 2	P0150**		P0153**		3/30/6
Oxygen sensor heater in front of catalytic converter, bank 2	P0155				3/30/0
Oxygen sensor aging after catalytic converter, bank 2			P0156	P0156	3/30/0
Oxygen sensor after catalytic converter, bank 2		P0160	P0157	P0158	3/30/6
Oxygen sensor heater after catalytic converter, bank 2	P0161				3/6/0
Oxygen sensor closed-loop control adaptation Idle speed range, bank 1			P0172	P0171	11/33/6
Oxygen sensor closed-loop control adaptation Idle speed range, bank 2			P0175	P0174	11/33/6
Oil temperature sensor			P0197	P0198	6/6/6
Injection valve of cylinder 1		P0201	P0261	P0262	3/30/32

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/EU3/ EU2
Injection valve of cylinder 2		P0202	P0264	P0265	3/30/32
Injection valve of cylinder 3		P0203	P0267	P0268	3/30/32
Injection valve of cylinder 4		P0204	P0270	P0271	3/30/32
Injection valve of cylinder 5		P0205	P0273	P0274	3/30/32
Injection valve of cylinder 6		P0206	P0276	P0277	3/30/32
Accelerator pedal Potentiometer 2	P0221		P0222	P0223	5/32/32
Fuel pump relay driver		P0230	P0230	P0230	6/6/6
Boost pressure characteristic, Above Upper Limit				P0234	5/32/32
Pressure sensor, boost			P0237	P0238	5/32/32
Misfire detection (total)	P0300*		P0300*	P0300*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 1	P0301*		P0301*	P0301*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 2	P0302*		P0302*	P0302*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 3	P0303*		P0303*	P0303*	1 - 2/ 1 - 31/ 1 - 31
Misfire detection Cylinder 4	P0304*		P0304*	P0304*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 5	P0305*		P0305*	P0305*	1 - 2/1 - 31/1 - 31
Misfire detection Cylinder 6	P0306*		P0306*	P0306*	1 - 2/1 - 31/1 - 31
Knock control zero test	P0324				5/6/6
Knock sensor 1			P0327	P0328	5/6/6
Knock sensor 2			P0332	P0333	5/6/6
Engine speed sensor signal		P0335			3/32/32
Reference mark sensor	P0336				3/32/6
Hall sensor 1	P0341	P0344	P0342	P0343	3/ 32/ 32
Hall sensor 2	P0346	P0349	P0347	P0348	3/32/32
Electric switch-over valve		P0413	P0414	P0414	3/32/0
Secondary air pump		P0418	P0418	P0418	3/32/0
Catalytic conversion Bank 1				P0420	3/30/0
Catalytic conversion Bank 2				P0430	3/30/0

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/EU3/ EU2**
Fuel tank ventilation system (DTESK)				P0440	3/0/0
Fuel tank ventilation system (DTEV)			P0441	P0441	0/32/32
Fuel tank ventilation system (fine leak)			P0442		3/0/0
Tank vent valve		P0444	P0445	P0445	3/30/32
Activated charcoal filter shutoff valve (function)			P0446		3/0/0
Activated charcoal filter shutoff valve (driver)		P0447	P0448	P0448	3/0/0
Fuel tank ventilation system (big leak)	P0450		P0455		3/0/0
Pressure sensor tank	P0451				3/0/0
Fuel tank ventilation system (small leak)			P0456		3/0/0
Driver for blower 1		P0480	P0480	P0480	6/6/6
Driver for blower 2		P0481	P0481	P0481	6/6/6
Driver for blower 3		P0482	P0482	P0482	6/6/6
Secondary air system Bank 1			P0491		3/32/0
Secondary air system Bank 2			P0492		3/32/0
Vehicle speed		P0501			3/6/6
Idle speed control at the stop			P0506	P0507	3/32/32
Immobilizer	P0513	P0513			6/6/6
Supply voltage	P0560		P0562	P0563	3/6/6
Stop light switch	P0571				6/6/6
CAN timeout Tiptronic		P0600			3/32/6
DME relay/control module faulty (watchdog: Reset)	P0601				6/6/6
EEPROM fault	P0603	P0603	P0603	P0603	6/6/6
Control module faulty (RAM)	P0604				5/32/32
Control module faulty (ROM)	P0605				5/32/32

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/EU3/ EU2
Control module faulty (watchdog: Reset)	P0607				5/32/32
Throttle adjusting unit Positional deviation	P0638				4/4/4
Air conditioning compressor control		P0645	P0646	P0674	6/6/6
Check Engine lamp, open circuit (via CAN)		P0650			5/32/32
Tiptronic (CAN transfer box setting implausible)	P0700				3/32/6
Tiptronic (Gear implausible/transmission slips)	P0701				3/32/6
Tiptronic control unit faulty	P0702				3/32/6
Tiptronic (Selector lever position implausible)	P0706				3/32/6
Transmission oil temperature GT 2			P0712	P0713	6/6/6
Tiptronic (Supply voltage of speed sensors)	P0715				3/32/6
Tiptronic (CAN: wheel speed rear right)	P0720				3/32/6
Tiptronic (Gear comparison negative)	P0730				3/32/6
Tiptronic (Converter lockup clutch)	P0740				6/32/6
Tiptronic (Converter lockup solenoid valve)	P0743				3/32/6
Tiptronic (Control solenoid valve, modulating pressure)	P0748				3/32/6
Tiptronic (Solenoid valve, 1-2/4-5 gearshift)	P0753				3/32/6
Tiptronic (Solenoid valve, 2-3 gearshift)	P0758				3/32/6
Tiptronic (Solenoid valve3-4 gearshift)	P0763				3/32/6

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/EU3/ EU2**
Tiptronic (Control solenoid valve, shifting pressure)	P0778				3/32/6
Clutch switch	P0830				6/6/6
Input values, cylinder fill measurement			P1101	P1109	3/6/6
Ambient pressure sensor				P1102	3/32/32
Oxygen sensor closed-loop control adaptation upper load range, bank 1			P1105	P1125	11/33/32
Oxygen sensor closed-loop control upper load range, bank 2			P1106	P1132	11/33/32
Oxygen sensor closed-loop control adaptation lower load range, bank 1			P1107	P1126	11/33/32
Oxygen sensor closed-loop control lower load range, bank 2			P1108	P1133	11/33/32
Throttle	P1120				5/32/32
Throttle potentiometer 1	P1121		P1139	P1138	5/32/32
Throttle potentiometer 2	P1122		P1141	P1140	5/32/32
Oxygen control deviation by short test, bank 1			P1127	P1142	7/7/7
Oxygen control deviation by short test, bank 2			P1134	P1143	7/7/7
Pressure comparison Boost pressure v. ambient	P1136				5/32/32
Oxygen sensor in front of catalytic converter, bank 1		P1146**		P1145**	3/ 30/ 6
Engine compartment temperature sensor			P1157	P1158	6/6/6
Boost pressure control			P1249	P1250	5/32/32
Oxygen sensor in front of catalytic converter Bank 2		P1156**		P1155**	3/30/6
Signal from airbag	P1265				6/6/6
Function monitoring Fuel cutoff	P1266				4/4/4
Camshaft adjustment Bank 2	P1325		P1358	P1357	3/32/32
Camshaft adjustment Bank 1	P1341		P1349	P1348	3/32/32

Fault text	Fault type 1 (Plaus)	Fault type 2 (Sig)	Fault type 3 (Min)	Fault type 4 (Max)	CE USA/EU3/ EU2
Valve lift control parity check error	P1350		P1374	P1371	6/6/6
Valve lift control, cylinder 1			P1351	P1359	6/6/6
Valve lift control, cylinder 6			P1352	P1360	6/6/6
Valve lift control, cylinder 2			P1353	P1361	6/6/6
Valve lift control, cylinder 4			P1354	P1362	6/6/6
Valve lift control, cylinder 3			P1355	P1363	6/6/6
Valve lift control, cylinder 5			P1356	P1364	6/6/6
Knock control offset	P1385				5/6/6
Knock control test pulse	P1386				5/6/6
Throttle adjusting unit Driver	P1501				4/4/4
Throttle adjusting unit Spring check				P1502	4/4/4
Throttle adjusting unit Emergency air position	P1504				6/6/6
Throttle adjusting unit Control range		P1505	P1518	P1516	4/4/4
Throttle adjusting unit Lower mechanical stop	P1506				4/4/4
Throttle adjusting unit Amplifier balance	P1507				6/6/6
Function monitoring Torque comparison	P1508				4/4/4
Torque limitation				P1509	5/32/32
Throttle adjusting unit Replacement detection without adaptation	P1510				4/4/4
Throttle adjustment unit Abortion of test through violation of environmental condition			P1511	P1517	6/6/6
Throttle adjusting unit Spring test opening			P1513	P1515	4/4/4
Throttle adjusting unit Relearn lower mechanical stop	P1514				6/6/6
Pedal value sensor movement	P1575				6/6/6
Cruise control standby light via CAN		P1576			6/6/6
CAN timeout PSM		P1600			6/6/6

Fault text	**Fault type 1 (Plaus)**	**Fault type 2 (Sig)**	**Fault type 3 (Min)**	**Fault type 4 (Max)**	**CE USA/EU3/ EU2**
CAN timeout Instrument cluster	P1602	P1601			6/6/6
Coolant shutoff valve		P1656	P1655	P1654	5/32/6
Driver for ambient air valve		P1657	P1659	P1658	6/6/6
Driver for engine compartment purge fan		P1674	P1677	P1676	6/6/6
Engine scavenge blower fault				P1675	6/6/6
Tiptronic (Supply voltage of valves or selector lever)	P1702				3/32/6
Accelerator pedal	P2135				5/32/32

P0011

Position of Camshaft in Relation to Crankshaft, Bank 1 – Below Limit

Diagnosis conditions

- Idle speed
- Reference mark recognized
- Engine speed between 600 rpm and 1200 rpm.
- Engine temperature greater than 40 °C
- No fault in camshaft position sensors
- Reference mark OK
- No fault in camshaft adjustment
- No fault in engine temperature
- No fault in camshaft adjustment output stage

Possible fault cause

- ♦ Allocation of camshaft to inlet camshaft incorrect

Affected terminals

-

Diagnosis/Troubleshooting

Note!

This fault is stored if the engine was disassembled and the allocation of the camshaft to the inlet camshaft was incorrectly set.

Work instruction			Display OK	If not OK
1	Set camshafts	♦ To adjust the camshafts, please refer to the 911 Turbo (996) or 911 Carrera (996) Technical Manual.		

P0012

Position of Camshaft in Relation to Crankshaft, Bank 1 – Above Limit

Diagnosis conditions

- Idle speed
- Reference mark recognized
- Engine speed between 600 rpm and 1200 rpm.
- Engine temperature greater than 40 °C
- No fault in camshaft position sensors
- Reference mark OK
- No fault in camshaft adjustment
- No fault in engine temperature
- No fault in camshaft adjustment output stage

Possible fault cause

- ♦ Solenoid hydraulic valve camshaft adjustment faulty
- ♦ Allocation of camshaft to inlet camshaft incorrect

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

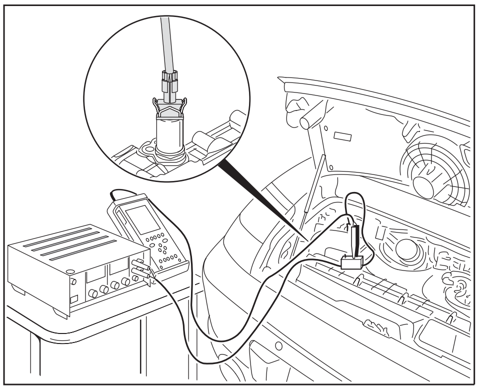
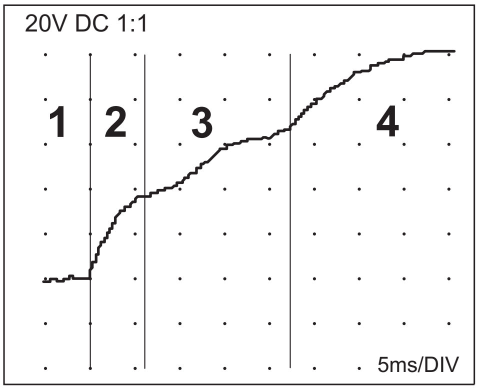


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



Work instruction			Display OK	If not OK
2	Set camshafts	♦ To adjust the camshafts, please refer to the 911 Turbo (996) or 911 Carrera (996) Technical Manual.		

P0013

Camshaft Adjustment, Bank 1 Output Stage - Open Circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

V/7

Diagnosis/Troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 14

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between V/7 and solenoid hydraulic valve connector pin 2.	0 - 5 Ω	
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition. ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery voltage.	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pin 1 and 2	8 - 12 Ω at 20° C.	

Camshaft Adjustment, Bank 1 Output Stage - Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short to ground triggering wire
- Solenoid hydraulic valve faulty

Affected terminals

V/7

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between V/7 and ground	$\infty\ \Omega$	
2	Replace solenoid hydraulic valve			

Camshaft Adjustment, Bank 1 Output Stage - Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to B+ triggering wire

Affected terminals

V/7

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check triggering wire for short circuit to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition. ♦ Measure voltage between V/7 and ground	0 V.	Repair wiring harness.

P0021

Position of Camshaft in Relation to Crankshaft, Bank 2 – Below Limit

Diagnosis conditions

- Idle speed
- Reference mark recognized
- Engine speed between 600 rpm and 1200 rpm.
- Engine temperature greater than 40 °C
- No fault in camshaft position sensors
- Reference mark OK
- No fault in camshaft adjustment
- No fault in engine temperature
- No fault in camshaft adjustment output stage

Possible fault cause

- ♦ Allocation of camshaft to inlet camshaft incorrect

Affected terminals

-

Diagnosis/Troubleshooting

Note!

This fault is stored if the engine was disassembled and the allocation of the camshaft to the inlet camshaft was incorrectly set.

Work instruction			**Display OK**	**If not OK**
1	Set camshafts	♦ To adjust the camshafts, please refer to the 911 Turbo (996) or 911 Carrera (996) Technical Manual.		

P0022

Position of Camshaft in Relation to Crankshaft, Bank 2 – Above Limit

Diagnosis conditions

- Idle speed
- Reference mark recognized
- Engine speed between 600 rpm and 1200 rpm.
- Engine temperature greater than 40 °C
- No fault in camshaft position sensors
- No fault with reference mark
- No fault in camshaft adjustment
- No fault in engine temperature
- No fault in camshaft adjustment output stage

Possible fault cause

- ♦ Solenoid hydraulic valve camshaft adjustment faulty
- ♦ Allocation of camshaft to inlet camshaft incorrect

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

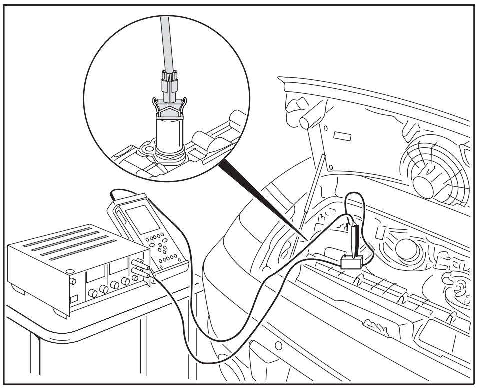
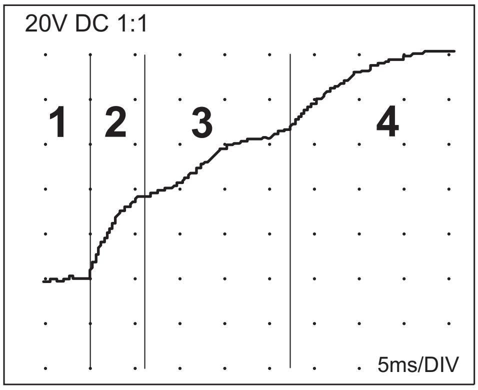


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



Work instruction			Display OK	If not OK
2	Set camshafts	♦ To adjust the camshafts, please refer to the 911 Turbo (996) or 911 Carrera (996) Technical Manual.		

P0023

Camshaft Adjustment, Bank 2 Output Stage - Open Circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

V/8

Diagnosis/Troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 15

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between V/8 and solenoid hydraulic valve connector pin 2.	0 - 5 Ω	
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition. ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery voltage.	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pin 1 and 2	8 - 12 Ω at 20° C.	

Camshaft Adjustment, Bank 2 Output Stage - Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short to ground triggering wire
- Solenoid hydraulic valve faulty

Affected terminals

V/8

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between V/8 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

Camshaft Adjustment, Bank 2 Output Stage - Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to B+ triggering wire

Affected terminals

V/8

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check triggering wire for short circuit to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition. ♦ Measure voltage between V/8 and ground	0 V.	Repair wiring harness.

P0026

Valve lift control, bank 1 output stage - open circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

III/1

Diagnosis/troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/2 pin 8

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between III/1 and solenoid hydraulic valve connector pin 2	0 - 5 Ω	Repair wiring harness
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition. ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery positive voltage	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pin 1 and 2	11 - 15 Ω at 20° C.	Replace solenoid hydraulic valve

Valve lift control, bank 1, output stage - below limit

Diagnosis conditions

- Engine running

Possible fault cause

- Triggering wire short to ground
- Solenoid hydraulic valve faulty

Affected terminals

III/1

Diagnosis/troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/2 pin 8

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between III/1 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

Valve lift control, bank 1, output stage - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Triggering wire short to B+

Affected terminals

III/1

Diagnosis/troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/2 pin 8

Work instruction			**Display OK**	**If not OK**
1	Check triggering wire for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition. ♦ Measure voltage between III/1 and ground	0 V	Repair wiring harness

P0028

Valve lift control, bank 2 output stage - open circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

III/26

Diagnosis/troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 11

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between III/26 and solenoid hydraulic valve connector pin 2	0 - 5 Ω	Repair wiring harness
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition. ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery voltage	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pins 1 and 2	11 - 15 Ω at 20° C.	Replace solenoid hydraulic valve

Valve lift control, bank 2, output stage - below limit

Diagnosis conditions

- Engine running

Possible fault cause

- Triggering wire short to ground
- Solenoid hydraulic valve faulty

Affected terminals

III/26

Diagnosis/troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 11

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between III/26 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

Valve lift control, bank 2, output stage - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Triggering wire short to B+

Affected terminals

III/26

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Diagnosis/troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 11

Work instruction			Display OK	If not OK
1	Check triggering wire for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition. ♦ Measure voltage between III/26 and ground	0 V	Repair wiring harness

P0030

HO2S Heater Control Circuit

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines

Diagnosis/troubleshooting - all turbo models

Diagnostic conditions

- Battery voltage between 9.5 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible cause of fault

- Open circuit

Affected terminals

DME control module, connector II, pin 19 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection of all affected plug connections	⇒ Step 2	Repair or replace faulty component → End
2	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Check resistance between pins 3 and 4 towards the oxygen sensor	2.5 to 4 Ω at 20°C ⇒ Step 3	Replace oxygen sensor → End

Work instruction			Display OK	If not OK
3	Check voltage supply	♦ Switch on the ignition ♦ Measure voltage between pin 3 of oxygen sensor jack towards the DME control module and ground	Battery positive voltage ⇒ Step 4	Repair voltage supply (wiring, jumper plugs...) → End
4	Check triggering wire	♦ Check resistance between pin 4 and pin II/19	<2 Ω	Repair faulty wiring → End

Diagnosis/troubleshooting - all naturally-aspirated models

Diagnostic conditions

- Engine running

Possible cause of fault

- Resistance of oxygen sensor heating too high
- Open circuit
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module, connector II, pin 19 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			**Display OK**	**If not OK**
1	Evaluate fault memory	♦ Check whether only this fault or faults on other oxygen sensors have been recorded	Only this fault was recorded ⇒ Step 2	There are open circuits in other oxygen sensor heating units Boxster ⇒ Step 1a 996 naturally-aspirated ⇒ Step 1b
1 a	Boxster	Repair faulty wiring between relay carrier 2, relay 2 and oxygen sensor jack pin 1; correct cause of damage, if necessary. Observe current distributors VS 22 and VS 42 → End		
1 b	996 naturally-aspirated	Remove jumper plug BS 21/1 from relay carrier 2 connector, relay position 6 and repair according to findings → End		
2	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Visual inspection ♦ Measure resistance between pins 1 and 2 of oxygen sensor connection	8 to 11 Ω at 20°C ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check voltage supply	♦ Switch on the ignition ♦ Measure voltage between oxygen sensor jack, pin 1 and ground ♦ Switch off ignition	Battery positive voltage ⇒ Step 4	Repair voltage supply (wiring, jumper plugs, if necessary...) → End
4	Check triggering wire	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Measure resistance between adapter pin II/19 and pin 2 of oxygen sensor jack	< 2 Ω ⇒ Step 5	Repair faulty wiring, correct cause of damage if necessary → End
5	Check whether additional faults have been recorded		⇒ Step 6	Correct faults in accordance with instructions → End
6	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0031

HO2S Heater Control Circuit Low

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible cause of fault

- Short circuit to ground in triggering wire
- Corrosion in connector, e.g. caused by moisture in the connector, etc.
- Oxygen sensor faulty
- DME control module faulty

Affected pins

DME control module connector II, pin 19 and oxygen sensor connector ahead of catalytic converter, bank 1, pin 4

Diagnosis/troubleshooting - all turbo models

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating for short circuit to ground in casing	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Visual inspection Measure resistance between pin 4 of oxygen sensor connector and: ♦ Casing of oxygen sensor ♦ Pin 1 ♦ Pin 2 ♦ Pin 5	∞ Ω ⇒ Step 2	Oxygen sensor faulty ⇒ Replace oxygen sensor → End
2	Check triggering wire of oxygen sensor heating	♦ Remove connector II from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Measure resistance between DME control module connector II, pin 19 and ground	∞ Ω ⇒ Step 3	Repair triggering wire; correct cause of damage, if necessary → End
3	Check whether additional faults have been recorded		⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

Diagnosis/troubleshooting - all naturally-aspirated models

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Engine running

Possible cause of fault

- ♦ Short circuit to ground in triggering wire
- ♦ Corrosion in connector
- ♦ Oxygen sensor faulty
- ♦ DME control module faulty

Affected terminals

DME control module, connector II, pin 19 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Check visually for loose contacts and corrosion	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check resistance of oxygen sensor heating	♦ Measure resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check oxygen sensor for short circuit to ground	Measure resistance between oxygen sensor connector: ♦ Pin 2 and pin 3 ♦ Pin 2 and oxygen sensor casing	∞ Ω ⇒ Step 4	Replace oxygen sensor; correct cause of damage, if necessary → End
4	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for loose contacts and corrosion	⇒ Step 5	Replace faulty component; correct cause of damage, if necessary → End
5	Check triggering wire	♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/19 and pin II/9 ♦ Pin II/19 and ground	∞ Ω ⇒ Step 6	Repair wiring; correct cause of damage, if necessary → End
6	Check whether additional faults have been recorded		⇒ Step 7	Correct faults in accordance with instructions → End
7	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0032

HO2S Heater Control Circuit High

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible cause of fault

- ♦ Short circuit to B+ in triggering wire

Affected terminals

DME control module, connector II, pin 19 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Check resistance between pins 3 and 4 towards the oxygen sensor	2.5 Ω to 4.0 Ω at 20°C	Replace oxygen sensor → End
		♦ Check resistance between pin 4 and the oxygen sensor casing ♦ Check resistance between pin 1 and pin 4 ♦ Check resistance between pin 2 and pin 4 ♦ Check resistance between pin 5 and pin 4 ♦ Check resistance between pin 6 and pin 4	∞ Ω	
2	Check wiring	♦ Switch on the ignition ♦ Measure voltage between pin 4 and vehicle ground towards DME control module	0 V	Repair wiring harness → End

Diagnosis/troubleshooting - all naturally-aspirated models

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Engine running

Possible cause of fault

- ♦ Short circuit to B+ in triggering wire
- ♦ Oxygen sensor faulty
- ♦ DME control module faulty

Affected terminals

DME control module, connector II, pin 19 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Visual inspection ♦ Measure oxygen sensor heating resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 2	Replace oxygen sensor; correct cause of damage, if necessary → End
2	Check triggering wire	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between adapter pin II/19 and ground ♦ Switch off ignition	0 V ⇒ Step 3	Repair faulty wiring; correct cause of damage, if neces-sary → End
3	Check whether additional faults have been recorded		⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduc-tion!	

P0036

HO2S Heater Control Circuit

Diagnosis/troubleshooting

Diagnostic conditions

- Engine running

Possible cause of fault

- ♦ Open circuit
- ♦ Oxygen sensor faulty
- ♦ DME control module faulty

Affected terminals

DME control module, connector II, pin 7 and oxygen sensor jack after catalytic converter, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Evaluate fault memory	♦ Check whether only this fault or faults on other oxygen sensors have been recorded	Only this fault was recorded ⇒ Step 2	There are open circuits in other oxygen sensor heating units Boxster ⇒ Step 1a 996 naturally-aspirated ⇒ Step 1b
1 a	Boxster	Repair faulty wiring between relay carrier 2, relay 2 and oxygen sensor jack pin 1; correct cause of damage, if necessary. Observe current distributors VS 22 and VS 42 → End		
1 b	996 naturally-aspirated	Remove jumper plug BS 21/1 from relay carrier 2 connector, relay position 6 and repair according to findings → End		

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>2</td><td>Check oxygen sensor heating</td><td>♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1
♦ Visual inspection
♦ Measure resistance between pins 1 and 2 of oxygen sensor connector</td><td>8 to 11 Ω at 20°C
⇒ Step 3</td><td>Replace oxygen sensor; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>3</td><td>Check voltage supply</td><td>♦ Switch on the ignition
♦ Measure voltage between oxygen sensor jack, pin 1 and ground
♦ Switch off ignition</td><td>Battery positive voltage
⇒ Step 4</td><td>Repair voltage supply (wiring, jumper plugs, if necessary...)
→ End</td></tr>
<tr><td>4</td><td>Check triggering wire</td><td>♦ Remove connector from DME control module
♦ Visual inspection
♦ Connect 134-pin test adapter No. 9637
♦ Measure resistance between adapter pin II/7 and pin 2 of oxygen sensor jack</td><td>< 2 Ω
⇒ Step 5</td><td>Repair faulty wiring; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>5</td><td colspan="2">Check whether additional faults have been recorded</td><td>⇒ Step 6</td><td>Correct faults in accordance with instructions
→ End</td></tr>
<tr><td>6</td><td colspan="2">Replace DME control module</td><td colspan="2">To do this, please observe the notes on possible causes of faults in the introduction!</td></tr>
</table>

P0037

HO2S Heater Control Circuit Low

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Engine running

Possible cause of fault

- Short circuit to ground in triggering wire
- Corrosion in connector
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module, connector II, pin 7 and oxygen sensor jack after catalytic converter, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1 ♦ Check visually for loose contacts and corrosion	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check resistance of oxygen sensor heating	♦ Measure resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check oxygen sensor for short circuit to ground	Measure resistance between oxygen sensor connector: ♦ Pin 2 and pin 3 ♦ Pin 2 and oxygen sensor casing	∞ Ω ⇒ Step 4	Replace oxygen sensor; correct cause of damage, if necessary → End

Work instruction			Display OK	If not OK
4	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for loose contacts and corrosion	⇒ Step 5	Replace faulty component; correct cause of damage, if necessary → End
5	Check triggering wire	♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/7 and pin II/11 ♦ Pin II/7 and ground	∞ Ω ⇒ Step 6	Repair wiring; correct cause of damage, if necessary → End
6	Check whether additional faults have been recorded		⇒ Step 7	Correct faults in accordance with instructions → End
7	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0038

HO2S Heater Control Circuit High

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Engine running

Possible cause of fault

- Short circuit to B+ in triggering wire
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module, connector II, pin 7 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1 ♦ Visual inspection ♦ Measure oxygen sensor heating resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 2	Replace oxygen sensor; correct cause of damage, if necessary → End
2	Check triggering wire	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between adapter pin II/7 and ground ♦ Switch off ignition	0 V ⇒ Step 3	Repair faulty wiring; correct cause of damage, if necessary → End

Work instruction		Display OK	If not OK
3	Check whether additional faults have been recorded	⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module	To do this, please observe the notes on possible causes of faults in the introduction!	

P0040

Oxygen sensor ahead of catalytic converter – signal implausible (only Turbo)

Diagnosis conditions

- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds
- Oxygen sensing system active

Possible fault cause

- Oxygen sensors ahead of catalytic converter exchanged
- Line polarity reversal in wiring harness
- Simultaneous occurance of leaking fuel injector on the one bank and leaking intake distributor on the other bank

Affected terminals

DME control module connector II, pins 2, 5, 6, 9, 10, 15, 16, 24 and oxygen sensor jacks ahead of catalytic converter, pins 1, 2, 5 and 6

Diagnosis/troubleshooting

Note!

- *Diagnosis detects oxygen sensor - regulators running contrary to the adaptation limitation.*
- *For example: The regulator for bank 1 detects an excessively rich mixture and wants to make it leaner. At the same time, the regulator on bank 2 detects an excessively lean mixture and wants to make it richer. If the oxygen sensors or their signal wires have been exchanged, the detected bank 1 continues to make the mixture richer and bank 2 continues to make the mixture leaner. Only when both oxygen sensors remain on the opposing stops for a certain period of time will this fault be recorded.*

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check that oxygen sensors are allocated correctly	♦ Check if the oxygen sensors were exchanged due to incorrect installation of or tampering with the wiring harness	⇒ Step 2	Install the oxygen sensors correctly, eliminate cause of damage if necessary → End
2	Check oxygen sensor wiring harness ahead of catalytic converter, bank 1	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Visual inspection ♦ Remove control module connector B ♦ Visual inspection Check following wiring for continuity ♦ Oxygen sensor connector ahead of catalytic converter pin 1 and DME control module connector B pin 15 ♦ Oxygen sensor connector ahead of catalytic converter pin 5 and DME control module connector B pin 9 ♦ Oxygen sensor connector ahead of catalytic converter pin 2 and DME control module connector B pin 2 ♦ Oxygen sensor connector ahead of catalytic converter pin 6 and DME control module connector B pin 5	$< 2\ \Omega$ ⇒ Step 4	Continue with finding damage ⇒ Step 3 → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td>Check oxygen sensor wiring harness ahead of catalytic converter, bank 2</td><td>♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2
♦ Visual inspection
Check following wiring for continuity
♦ Oxygen sensor connector ahead of catalytic converter pin 1 and DME control module connector B pin 16
♦ Oxygen sensor connector ahead of catalytic converter pin 5 and DME control module connector B pin 10
♦ Oxygen sensor connector ahead of catalytic converter pin 2 and DME control module connector B pin 6
♦ Oxygen sensor connector ahead of catalytic converter pin 6 and DME control module connector B pin 24</td><td>< 2 Ω
⇒ Step 4</td><td>Using the findings from Step 2, repair or replace wiring harness
→ End</td></tr>
<tr><td>4</td><td>Check engine</td><td>After reading out the oxygen sensor values, search for a leaking fuel injector on the bank with the lean threshold and search for false air on the bank with the rich threshold.</td><td colspan="2">Repair according to findings</td></tr>
</table>

P0045

Charge Pressure Control Valve Output Stage - Open Circuit

Diagnosis conditions

- Ignition on

Possible fault cause

- Charge pressure control valve (coil) open circuit
- Open circuit in wiring

Affected terminals

III/4

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check charge pressure control valve.	♦ Measure resistance at the charge pressure control valve.	20 - 26 Ω at 20 °C.	
2	Check wiring harness for open circuit.	♦ Connect special tool to wiring harness (DME control module plug). ♦ Remove connector of charge pressure control valve. ♦ Measure resistance between special tool 9637 pin III/4 and charge pressure control valve plug pin 2.	0 - 5 Ω	Repair wiring harness → End.

P0047

Charge Pressure Control Valve Output Stage - Below Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- ♦ Short circuit to ground

Affected terminals

III/4

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of charge pressure control valve. ♦ Measure resistance between special tool 9637 pin III/4 and ground.	∞ Ω	Repair wiring harness.

P0048

Charge Pressure Control Valve Output Stage - Above Limit

Diagnosis conditions

- Charge pressure control active

Possible fault cause

- Charge pressure control valve (coil) short circuit
- Short circuit to B+

Affected terminals

III/4

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check charge pressure control valve.	♦ Measure resistance at the charge pressure control valve.	20 - 26 Ω at 20 °C.	
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of charge pressure control valve. ♦ Ignition on ♦ Measure voltage between special tool 9637 pin III/4 and ground.	0 V.	Repair wiring harness.

P0050

HO2S Heater Control Circuit

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines

Diagnosis/troubleshooting - all turbo models

Diagnostic conditions

- Battery voltage between 9.5 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible cause of fault

- ♦ Open circuit

Affected terminals

DME control module, connector II, pin 13 and oxygen sensor jack ahead of catalytic converter, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection of all affected plug connections	⇒ Step 2	Repair or replace faulty component → End
2	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Check resistance between pins 3 and 4 towards the oxygen sensor	2.5 to 4 Ω at 20°C ⇒ Step 3	Replace oxygen sensor → End

Work instruction			Display OK	If not OK
3	Check voltage supply	♦ Switch on the ignition ♦ Measure voltage between pin 3 of oxygen sensor jack towards the DME control module and ground	Battery positive voltage ⇒ Step 4	Repair voltage supply (wiring, jumper plugs...) → End
4	Check triggering wire	♦ Check resistance between pin 4 and pin II/13	<2 Ω	Repair faulty wiring → End

Diagnosis/troubleshooting - all naturally-aspirated models

Diagnostic conditions

- Engine running

Possible cause of fault

- Resistance of oxygen sensor heating too high
- Open circuit
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module, connector II, pin 13 and oxygen sensor jack ahead of catalytic converter, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

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<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td>Evaluate fault memory</td><td>♦ Check whether only this fault or faults on other oxygen sensors have been recorded</td><td>Only this fault was recorded
⇒ Step 2</td><td>There are open circuits in other oxygen sensor heating units
Boxster ⇒ Step 1a⇒
996 naturally-aspirated ⇒ Step 1b</td></tr>
<tr><td>1 a</td><td>Boxster</td><td colspan="3">Repair faulty wiring between relay carrier 2, relay 2 and oxygen sensor jack pin 1; correct cause of damage, if necessary.
Observe current distributors VS 22 and VS 42
→ End</td></tr>
<tr><td>1 b</td><td>996 naturally-aspirated</td><td colspan="3">Remove jumper plug BS 21/1 from relay carrier 2 connector, relay position 6 and repair according to findings
→ End</td></tr>
<tr><td>2</td><td>Check oxygen sensor heating</td><td>♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2
♦ Visual inspection
♦ Measure resistance between pins 1 and 2 of oxygen sensor connector</td><td>8 to 11 Ω at 20°C
⇒ Step 3</td><td>Replace oxygen sensor; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>3</td><td>Check voltage supply</td><td>♦ Switch on the ignition
♦ Measure voltage between oxygen sensor jack, pin 1 and ground
♦ Switch off ignition</td><td>Battery positive voltage
⇒ Step 4</td><td>Repair voltage supply (wiring, jumper plugs, if necessary...)
→ End</td></tr>
<tr><td>4</td><td>Check triggering wire</td><td>♦ Remove connector from DME control module
♦ Visual inspection
♦ Connect 134-pin test adapter No. 9637
♦ Measure resistance between adapter pin II/13 and pin 2 of oxygen sensor jack</td><td>< 2 Ω
⇒ Step 5</td><td>Repair faulty wiring; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>5</td><td colspan="2">Check whether additional faults have been recorded</td><td>⇒ Step 6</td><td>Correct faults in accordance with instructions
→ End</td></tr>
<tr><td>6</td><td colspan="2">Replace DME control module</td><td colspan="2">To do this, please observe the notes on possible causes of faults in the introduction!</td></tr>
</table>

P0051

HO2S Heater Control Circuit Low

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible cause of fault

- Short circuit to ground in triggering wire
- Corrosion in connector, e.g. caused by moisture in the connector, etc.
- Oxygen sensor faulty
- DME control module faulty

Affected pins

DME control module connector II, pin 13 and oxygen sensor connector ahead of catalytic converter, bank 2, pin 4

Diagnosis/troubleshooting - all turbo models

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating for short circuit to ground in casing	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Visual inspection Measure resistance between pin 4 of oxygen sensor connector and: ♦ Casing of oxygen sensor ♦ Pin 1 ♦ Pin 2 ♦ Pin 5	$\infty\ \Omega$ ⇒ Step 2	Oxygen sensor faulty ⇒ Replace oxygen sensor → End
2	Check triggering wire of oxygen sensor heating	♦ Remove connector II from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Measure resistance between DME control module connector II, pin 13 and ground	$\infty\ \Omega$ ⇒ Step 3	Repair triggering wire; correct cause of damage, if necessary → End
3	Check whether additional faults have been recorded		⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

Diagnosis/troubleshooting - all naturally-aspirated models

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Engine running

Possible cause of fault

♦ Short circuit to ground in triggering wire
♦ Corrosion in connector
♦ Oxygen sensor faulty
♦ DME control module faulty

Affected terminals

DME control module, connector II, pin 13 and oxygen sensor jack ahead of catalytic converter, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor plug connection	◆ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ◆ Check visually for loose contacts and corrosion	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check resistance of oxygen sensor heating	◆ Measure resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check oxygen sensor for short circuit to ground	Measure resistance between oxygen sensor connector: ◆ Pin 2 and pin 3 ◆ Pin 2 and oxygen sensor casing	∞ Ω ⇒ Step 4	Replace oxygen sensor; correct cause of damage, if necessary → End
4	Check DME control module plug connection	◆ Remove connector from DME control module ◆ Check visually for loose contacts and corrosion	⇒ Step 5	Replace faulty component; correct cause of damage, if necessary → End
5	Check triggering wire	◆ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ◆ Pin II/13 and pin II/10 ◆ Pin II/13 and ground	∞ Ω ⇒ Step 6	Repair wiring; correct cause of damage, if necessary → End
6	Check whether additional faults have been recorded		⇒ Step 7	Correct faults in accordance with instructions → End
7	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0052

HO2S Heater Control Circuit High

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible cause of fault

- ♦ Short circuit to B+ in triggering wire

Affected terminals

DME control module, connector II, pin 13 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Check resistance between pins 3 and 4 towards the oxygen sensor	2.5 Ω to 4.0 Ω at 20°C	Replace oxygen sensor → End
		♦ Check resistance between pin 4 and the oxygen sensor casing ♦ Check resistance between pin 1 and pin 4 ♦ Check resistance between pin 2 and pin 4 ♦ Check resistance between pin 5 and pin 4 ♦ Check resistance between pin 6 and pin 4	∞ Ω	
2	Check wiring	♦ Switch on the ignition ♦ Measure voltage between pin 4 and vehicle ground towards DME control module	0 V	Repair wiring harness → End

Diagnosis/troubleshooting - all naturally-aspirated models

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Engine running

Possible cause of fault

- Short circuit to B+ in triggering wire
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module, connector II, pin 13 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Visual inspection ♦ Measure oxygen sensor heating resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 2	Replace oxygen sensor; correct cause of damage, if necessary → End
2	Check triggering wire	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between adapter pin II/13 and ground ♦ Switch off ignition	0 V ⇒ Step 3	Repair faulty wiring; correct cause of damage, if neces-sary → End
3	Check whether additional faults have been recorded		⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduc-tion!	

P0056

HO2S Heater Control Circuit

Diagnosis/troubleshooting

Diagnostic conditions

- Engine running

Possible cause of fault

- Open circuit
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module, connector II, pin 1 and oxygen sensor jack after catalytic converter, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Evaluate fault memory	♦ Check whether only this fault or faults on other oxygen sensors have been recorded	Only this fault was recorded ⇒ Step 2	There are open circuits in other oxygen sensor heating units Boxster ⇒ Step 1a 996 naturally-aspirated ⇒ Step 1b
1 a	Boxster	Repair faulty wiring between relay carrier 2, relay 2 and oxygen sensor jack pin 1; correct cause of damage, if necessary. Observe current distributors VS 22 and VS 42 → End		
1 b	996 naturally-aspirated	Remove jumper plug BS 21/1 from relay carrier 2 connector, relay position 6 and repair according to findings → End		

Work instruction			Display OK	If not OK
2	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Visual inspection ♦ Measure resistance between pins 1 and 2 of oxygen sensor connector	8 to 11 Ω at 20°C ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check voltage supply	♦ Switch on the ignition ♦ Measure voltage between oxygen sensor jack, pin 1 and ground ♦ Switch off ignition	Battery positive voltage ⇒ Step 4	Repair voltage supply (wiring, jumper plugs, if necessary...) → End
4	Check triggering wire	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Measure resistance between adapter pin II/1 and pin 2 of oxygen sensor jack	< 2 Ω ⇒ Step 5	Repair faulty wiring; correct cause of damage, if necessary → End
5	Check whether additional faults have been recorded		⇒ Step 6	Correct faults in accordance with instructions → End
6	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0057

HO2S Heater Control Circuit Low

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Engine running

Possible cause of fault

- Short circuit to ground in triggering wire
- Corrosion in connector
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module, connector II, pin 1 and oxygen sensor jack after catalytic converter, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Check visually for loose contacts and corrosion	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check resistance of oxygen sensor heating	♦ Measure resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check oxygen sensor for short circuit to ground	Measure resistance between oxygen sensor connector: ♦ Pin 2 and pin 3 ♦ Pin 2 and oxygen sensor casing	∞ Ω ⇒ Step 4	Replace oxygen sensor; correct cause of damage, if necessary → End

Work instruction			Display OK	If not OK
4	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for loose contacts and corrosion	⇒ Step 5	Replace faulty component; correct cause of damage, if necessary → End
5	Check triggering wire	♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/1 and pin II/8 ♦ Pin II/1 and ground	$\infty\ \Omega$ ⇒ Step 6	Repair wiring; correct cause of damage, if necessary → End
6	Check whether additional faults have been recorded		⇒ Step 7	Correct faults in accordance with instructions → End
7	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0058

HO2S Heater Control Circuit High

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Engine running

Possible cause of fault

- ♦ Short circuit to B+ in triggering wire
- ♦ Oxygen sensor faulty
- ♦ DME control module faulty

Affected terminals

DME control module, connector II, pin 1 and oxygen sensor jack ahead of catalytic converter, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Visual inspection ♦ Measure oxygen sensor heating resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 2	Replace oxygen sensor; correct cause of damage, if necessary → End
2	Check triggering wire	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between adapter pin II/1 and ground ♦ Switch off ignition	0 V ⇒ Step 3	Repair faulty wiring; correct cause of damage, if necessary → End

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Work instruction		Display OK	If not OK
3	Check whether additional faults have been recorded	⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module	To do this, please observe the notes on possible causes of faults in the introduction!	

P0071

Ambient Temperature (via CAN from instrument cluster) - Signal Implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- Instrument cluster

Affected terminals

Diagnosis/Troubleshooting

Note!

With an outside temperature of less than or equal to -40° C, this fault is stored because no lower temperatures can be displayed in the instrument cluster. In this case, a fault status is not present.

Work instruction			**Display OK**	**If not OK**
1	Replace instrument cluster.			

P0102

115 Mass air flow sensor – below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 8 V

Possible fault cause

- Open circuit
- Short circuit to ground
- Mass air flow sensor faulty

Note!

In the case of a fault, the PSM is switched off.

Affected terminals

Terminal III/23

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from MAF sensor to DME control module for continuity.	♦ Remove connector of MAF sensor ♦ Connect special tool 9637 to wiring harness (DME control module connector). ♦ Measure resistance between special tool 9637 Pin III/23 and MAF sensor plug Pin 5	0 - 5 Ω ⇒ Step 2	Repair wiring harness → End
2	Check wiring from MAF sensor to DME control module for short to ground	♦ Remove connector of MAF sensor ♦ Connect special tool 9637 to wiring harness (DME control module connector). ♦ Measure resistance between special tool 9637 Pin III/23 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Check signal from MAF sensor	♦ Check voltage signal from MAF sensor with 'Ignition on' (with Porsche System Tester 2 in the 'Actual values/mass air flow' menu, or with a voltmeter and special tool 9637). ♦ Start the engine	0.9 to 1.1 V 1.2 to 1.5 V (at idle speed) → End	Replace MAF sensor ⇒ Step 4
4	Clean air cleaner and replace filter element	♦ Clean pure air side of air cleaner (extract dirt, do not blow out with compressed air with mass air flow sensor installed) ♦ Replace filter element	→ End	

P0103

115 Mass Air Flow Sensor - Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 8 V

Possible fault cause

- ♦ Intake air system on pressure side (between turbocharger and engine) leaks
- ♦ Short circuit to B+
- ♦ Mass air flow sensor faulty
- ♦ Throttle jacking unit faulty

Note!

In the case of a fault, the PSM is switched off.

Affected terminals

Terminal III/23

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check intake air system for leaks.		⇒ Step 2.	Repair intake air system → End.
2	Check wiring from MAF sensor to DME control module for short to B+.	♦ Remove connector of MAF sensor. ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure voltage between special tool 9637 pin III/23 and ground. ♦ Switch on the ignition.	0 V ⇒ Step 3.	
3	Check signal from MAF sensor.	♦ Check voltage signal from MAF sensor with 'Ignition on' (with Porsche System Tester 2 in the 'Actual values/mass air flow' menu, or with a voltmeter and special tool 9637).	0.9 to 1.1 V.	Replace MAF sensor ⇒ Step 5.

Work instruction			Display OK	If not OK
		♦ Start the engine.	1.2 to 1.5 V (at idle speed) ⇒ Step 4.	
4	Check and clean throttle jacking unit.	♦ Read out throttle actual value at idling speed (engine at operating temperature, air conditioning switched off).	Less than 4 % → End.	Clean throttle jacking unit → End.
5	Clean air cleaner and replace filter element.	♦ Clean pure air side of air cleaner (extract dirt, do not blow out with compressed air with mass air flow sensor installed). ♦ Replace filter element.		

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P0107

299 Ambient Pressure Sensor - Below Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- DME control module

Affected terminals

-

Diagnosis/troubleshooting

Note!

If no fault is present, erase the fault memory.

Work instruction			Display OK	If not OK
1	Replace DME control module			
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory		

DME 7.8

P0108

299 Ambient Pressure Sensor - Above Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- DME control module

Affected terminals

-

Diagnosis/troubleshooting

Note!

If no fault is present, erase the fault memory.

Work instruction			Display OK	If not OK
1	Replace DME control module			
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory		

P0112

124 Intake air temperature - below limit

Diagnosis conditions

- Idle speed
- Time elapsed after engine start-up greater than 5 minutes

Possible fault cause

- Temperature sensor faulty
- Short circuit to B+
- Open circuit

Note!

A substitute value (approx. 60 °C) is used in the event of a fault.

Affected terminals

Terminal III/34

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check temperature sensor	♦ Remove plug of temperature sensor ♦ Measure resistance between temperature sensor Pin 1 and Pin 2	2.3 - 2.7 kΩ (at 20 °C) ⇒ Step 2	Replace temperature sensor → End

Work instruction			Display OK	If not OK
2	Check wiring from DME control module to temperature sensor for continuity	♦ Remove plug of temperature sensor ♦ Connect special tool 9637 to wiring harness (DME control module connector). ♦ Measure resistance between special tool 9637 Pin III/34 and temperature sensor plug Pin 2	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End
3	Check wiring from DME control module to temperature sensor for short to B+	♦ Remove plug of temperature sensor ♦ Connect special tool 9637 to wiring harness (DME control module connector). ♦ Switch on the ignition ♦ Measure voltage between special tool 9637 Pin III/34 and ground	0 V → End	Repair wiring harness → End

P0113

124 Intake air temperature sensor - above limit

Diagnosis conditions

- Idle speed
- Time elapsed after engine start-up greater than 2 seconds

Possible fault cause

- Short circuit to ground

Note!

A substitute value (approx. 60 °C) is used in the event of a fault.

Affected terminals

Terminal III/34

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module to temperature sensor for short to ground	♦ Remove plug of temperature sensor ♦ Connect special tool 9637 to wiring harness (DME control module connector). ♦ Measure resistance between special tool 9637 Pin III/34 and ground	∞ Ω → End	Repair wiring harness → End

P0115

123 Engine temperature - signal implausible

Diagnosis conditions

- A temperature model is formed. If the measured temperature deviates too much from the calculated temperature, a fault is detected.

Note!

A thermostat which is constantly open can cause the fault P0115.

Possible fault cause

- Thermostat (permanently open)
- Open coolant shutoff valve (only Tiptronic vehicles)
- Wiring
- Temperature sensor faulty
- DME control module faulty

Affected terminals

Terminal III/22 and III/17

Resistance values

0 °C	5.0 - 7.0 kΩ
20 °C	2.0 - 3.0 kΩ
60 °C	0.4 - 0.8 kΩ

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Check thermostat	⇒ Step 2	Replace thermostat → End
2	Check coolant shutoff valve in Tiptronic vehicles	⇒ Step 3	Replace coolant shutoff valve in Tiptronic vehicles → End

Work instruction			Display OK	If not OK
3	Check temperature sensor	♦ Remove plug connection in engine compartment ♦ Measure resistance between temperature sensor Pin 1 and Pin 4	Approx. 2 - 3 kΩ ⇒ Step 4	Replace temperature sensor → End
4	Check output voltage of DME control module	♦ Connect special tool 9637. Do not connect connector III of vehicle wiring harness. ♦ Measure voltage between Pin III/22 and III/17 ♦ Ignition on	Approx. 5 V → End	⇒ Step 5
5	Check wiring from DME control module to temperature sensor for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug of temperature sensor ♦ Measure resistance between special tool 9637 Pin III/17 and temperature sensor plug connection Pin 4 ♦ Measure resistance between special tool 9637 Pin III/22 and temperature sensor plug connection Pin 1	0 - 5 Ω ⇒ Step 6	Repair wiring harness → End
6	Check wiring from DME control module to temperature sensor for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug of temperature sensor ♦ Measure resistance between special tool 9637 Pin III/22 and ground	∞ Ω ⇒ Step 7	Repair wiring harness → End
7	Check wiring from DME control module to temperature sensor for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug of temperature sensor ♦ Measure voltage between Pin III/22 and ground	Approx. 5 V ⇒ Step 8	Repair wiring harness → End
8	Replace DME control module		⇒ Step 9	→ End
9	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute. Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory	→ End	→ End

P0116

Engine Temperature – Signal Implausible

Diagnosis conditions

- A temperature model is formed. If the measured temperature deviates too much from the calculated temperature, a fault is detected.

Note!

A thermostat which is constantly open can cause the fault P0115.

Possible fault cause

- Thermostat (permanently open)
- Open coolant shutoff valve (only Tiptronic vehicles)
- Wiring
- Temperature sensor faulty
- DME control module faulty

Affected terminals

Terminal III/22 and III/17

Resistance values

0 °C	5.0 -7.0 kΩ
20 °C	2.0 - 3.0 kΩ
60 °C	0.4 -0.8 kΩ

Diagnosis/Troubleshooting

Work instruction		Display OK	If not OK
1	Check thermostat	⇒ Step 2.	Replace thermostat → End
2	Check coolant shutoff valve in Tiptronic vehicles	⇒ Step 3.	Replace coolant shutoff valve in Tip-tronic vehicles → End

Work instruction			Display OK	If not OK
3	Check temperature sensor.	♦ Remove plug connection in engine compartment ♦ Measure resistance between temperature sensor Pin 1 and Pin 4	Approx. 2 - 3 kΩ ⇒ Step 4	Replace temperature sensor → End
4	Check output voltage of DME control module	♦ Connect special tool 9637. Do not connect connector III of vehicle wiring harness. ♦ Measure voltage between Pin III/22 and III/17 ♦ Ignition on	Approx. 5 V → End	⇒ Step 5.
5	Check wiring from DME control module to temperature sensor for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug of temperature sensor. ♦ Measure resistance between special tool 9637 Pin III/17 and temperature sensor plug connection Pin 4 ♦ Measure resistance between special tool 9637 Pin III/22 and temperature sensor plug connection Pin 1	0 - 5 Ω ⇒ Step 6.	Repair wiring harness → End.
6	Check wiring from DME control module to temperature sensor for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug of temperature sensor. ♦ Measure resistance between special tool 9637 pin III/22 and ground.	∞ Ω ⇒ Step 7.	Repair wiring harness → End
7	Check wiring from DME control module to temperature sensor for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug of temperature sensor. ♦ Measure voltage between Pin III/22 and ground.	Approx. 5 V ⇒ Step 8	Repair wiring harness → End.
8	Replace DME control module.		⇒ Step 9.	→ End.
9	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

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P0117

123 Engine temperature - open circuit, below limit

Diagnosis conditions

- A fault is recorded after a debounce time of 0.4 seconds if an engine temperature of less than -45 °C is measured.

Possible fault cause

- Wiring
- Temperature sensor faulty
- DME control module faulty

Affected terminals

Terminal III/22 and III/17

Resistance values

0 °C	5.0 - 7.0 kΩ
20 °C	2.0 - 3.0 kΩ
60 °C	0.4 - 0.8 kΩ

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check temperature sensor	♦ Remove plug connection in engine compartment ♦ Measure resistance between temperature sensor Pin 1 and Pin 4	Approx. 2 - 3 kΩ ⇒ Step 2	Replace temperature sensor → End
2	Check output voltage of DME control module	♦ Connect special tool 9637. Do not connect connector III of vehicle wiring harness. ♦ Measure voltage between Pin III/22 and III/17 ♦ Ignition on	Approx. 5 V → End	⇒ Step 3

Work instruction			Display OK	If not OK
3	Check wiring from DME control module to temperature sensor for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug of temperature sensor ♦ Measure resistance between special tool 9637 Pin III/17 and temperature sensor plug connection Pin 4 ♦ Measure resistance between special tool 9637 Pin III/22 and temperature sensor plug connection Pin 1	0 - 5 Ω ⇒ Step 4	Repair wiring harness → End
4	Check wiring from DME control module for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug of temperature sensor ♦ Measure voltage between Pin III/22 and ground ♦ Switch on the ignition	Approx. 5 V ⇒ Step 5	Repair wiring harness → End
5	Replace DME control module		⇒ Step 6	→ End
6	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute. Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory	→ End	→ End

P0118

123 Engine temperature - above limit

Diagnosis conditions

- A fault is recorded after a debounce time of 0.4 seconds if an engine temperature of more than 140°C is measured.

Possible fault cause

- Wiring
- Temperature sensor faulty
- DME control module faulty

Affected terminals

Terminal III/22 and III/17

Resistance values

0 °C	5.0 - 7.0 kΩ
20 °C	2.0 - 3.0 kΩ
60 °C	0.4 - 0.8 kΩ

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check temperature sensor	♦ Remove plug connection in engine compartment ♦ Measure resistance between temperature sensor Pin 1 and Pin 4	Approx. 2 - 3 kΩ ⇒ Step 1	Replace temperature sensor → End
2	Check output voltage of DME control module	♦ Connect special tool 9637. Do not connect connector III of vehicle wiring harness. ♦ Measure voltage between Pin III/22 and III/17 ♦ Ignition on	Approx. 5 V → End	⇒ Step 3

Work instruction			Display OK	If not OK
3	Check wiring from DME control module to temperature sensor for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug of temperature sensor ♦ Measure resistance between special tool 9637 Pin III/17 and temperature sensor plug connection Pin 4 ♦ Measure resistance between special tool 9637 Pin III/22 and temperature sensor plug connection Pin 1	0 - 5 Ω ⇒ Step 4	Repair wiring harness → End
4	Check wiring from DME control module to temperature sensor for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug of temperature sensor ♦ Measure resistance between special tool 9637 Pin III/22 and ground	∞ Ω ⇒ Step 5	Repair wiring harness → End
5	Replace DME control module		⇒ Step 6	→ End
6	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute. Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory	→ End	→ End

P0121

117 Throttle valve - signal implausible

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit or short circuit in the wiring
- Throttle position sensor faulty
- DME control module faulty

Affected terminals

Terminal I/7, I/9, III/8, III/10, III/24 and III/25

Note!

- *Fault P0121 only appears in conjunction with fault P1121 or P1122.*
- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The opening angle of the throttle valve is limited to 30 %.*
- *The dynamic of the throttle valve is restricted.*

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check voltage supply to throttle motor actuator	♦ Connect special tool 9637 ♦ Connect motor tester (oscillo-scope) to Pin I/7 and Pin I/9 ♦ Use special input ♦ Switch on the ignition	See Figure 1	⇒ Step 5
		♦ Fully depress accelerator pedal	See Figure 2 ⇒ Step 2	

Figure 1:

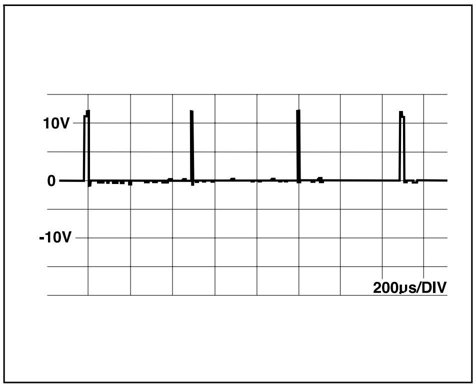
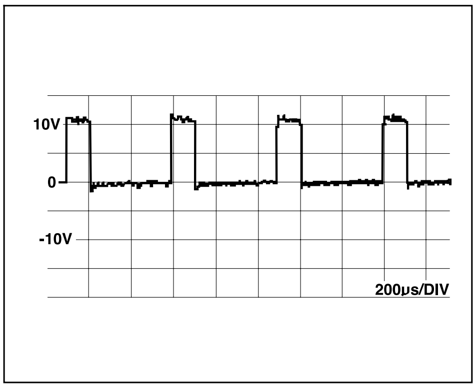


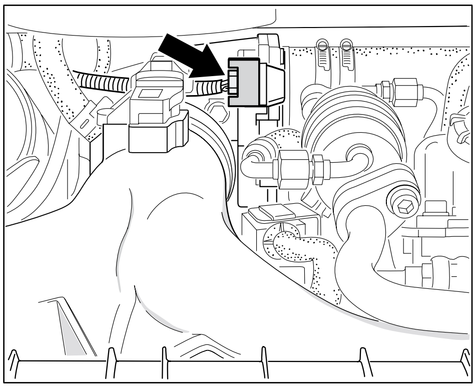
Figure 2:



Work instruction			**Display OK**	**If not OK**
2	Check TP voltage supply.	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure voltage between Pin III/ 10 and Pin III/25 ♦ Switch on the ignition	Approx. 5 V ⇒ Step 3	⇒ Step 4
3	Check voltage values of throttle position sensors.	♦ Connect special tool 9637 ♦ Switch on the ignition		
		♦ Measure voltage between Pin III/ 24 and Pin III/25	Approx. 0.7 - 0.9 V	Replace throttle part → End
		♦ Fully depress accelerator pedal	Approx. 4.1 - 4.5 V	
		♦ Measure voltage between Pin III/ 8 and Pin III/25	Approx. 4.0 - 4.4 V	
		♦ Fully depress accelerator pedal	Approx. 0.5 V → End	
4	Check wiring from throttle part to DME control module for continuity or short circuit to B+ and ground	♦ Separate disconnection point to throttle part ♦ Connect special tool 9637 to wiring harness (DME control module plug)		

Work instruction			Display OK	If not OK
		♦ Measure resistance between disconnection point Pin 1 and special tool 9637 Pin I/9	0 - 5 Ω	Repair wiring harness ⇒ End
		♦ Measure resistance between disconnection point Pin 2 and special tool 9637 Pin III/25	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 3 and special tool 9637 Pin III/10	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and special tool 9637 Pin I/7	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 5 and special tool 9637 Pin III/8	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 6 and special tool 9637 Pin III/24	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and ground	∞ Ω	
		♦ Measure resistance between disconnection point Pin 5 and ground	∞ Ω	
		♦ Measure resistance between disconnection point Pin 6 and ground	∞ Ω	
		♦ Switch on the ignition ♦ Measure voltage between disconnection point Pin 4 and ground	0 V	
		♦ Measure voltage between disconnection point Pin 5 and ground	0 V	
		♦ Measure voltage between disconnection point Pin 6 and ground	0 V ⇒ Step 5	

Disconnection point throttle part:



Note!

The wires to the throttle part are routed via connector X 59/2.

Work instruction			Display OK	If not OK
5	Replace DME control module		⇒ Step 6	
6	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P0121

Accelerator Pedal Potentiometer 1 – Signal Implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery positive voltage greater than 7 V

Possible fault cause

- Pedal sensor

Affected terminals

-

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/Troubleshooting

Work instruction		Display OK	If not OK
1	Replace pedal sensor	→ End.	→ End.

P0122

Accelerator Pedal Potentiometer 1 – Below Limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to ground
- Pedal sensor

Affected terminals

Terminal IV/8

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, Pin IV/8, to pedal sensor, Pin 2, for short circuit to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool Pin IV/8 and ground	∞ Ω ⇒ Step 2.	Repair wiring harness → End.
2	Replace pedal sensor		→ End.	→ End.

DME 7.8

P0123

Accelerator Pedal Potentiometer 1 – Above Limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to B+
- Pedal sensor

Affected terminals

Terminal IV/8

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check wiring from DME control module IV/8 to pedal sensor, Pin 2, for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Switch on the ignition. ♦ Measure voltage between special tool Pin IV/8 and ground	0 V ⇒ Step 2.	Repair wiring harness → End.
2	Replace pedal sensor		→ End.	→ End.

P0125

Engine Temperature - Open Circuit

Diagnosis conditions

- A fault is recorded after a debounce time of 0.4 seconds if an engine temperature of less than -45 °C is measured.

Possible fault cause

- Wiring
- Temperature sensor faulty
- DME control module faulty

Affected terminals

Terminal III/22 and III/17

Resistance values

0 °C	5.0 -7.0 kΩ
20 °C	2.0 -3.0 kΩ
60 °C	0,4 -0,8 kΩ

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check temperature sensor.	♦ Remove plug connection in engine compartment ♦ Measure resistance between temperature sensor Pin 1 and Pin 4	Approx. 2 - 3 kΩ ⇒ Step 2	Replace temperature sensor → End
2	Check output voltage of DME control module	♦ Connect special tool 9637. Do not connect connector III of vehicle wiring harness. ♦ Measure voltage between Pin III/22 and III/17 ♦ Ignition on	Approx. 5 V → End	⇒ Step 3.

Work instruction			Display OK	If not OK
3	Check wiring from DME control module to temperature sensor for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug of temperature sensor. ♦ Measure resistance between special tool 9637 Pin III/17 and temperature sensor plug connection Pin 4 ♦ Measure resistance between special tool 9637 Pin III/22 and temperature sensor plug connection Pin 1	0 - 5 Ω ⇒ Step 4.	Repair wiring harness → End.
4	Check wiring from DME control module for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug of temperature sensor. ♦ Measure voltage between pin III/22 and ground. ♦ Switch on the ignition.	Approx. 5 V ⇒ Step 5	Repair wiring harness → End.
5	Replace DME control module.		⇒ Step 6.	→ End.
6	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

Printed in Germany – 6, 2002

P0128

Blocked Thermostat - Signal Implausible

Diagnosis conditions

- Engine starting temperature between -10° C and +45° C
- Idle speed

Possible fault cause

Note!

- *Fault P0128 is only stored in conjunction with fault P0116 (Engine temperature).*
- *If the coolant shutoff valve or the transmission oil temperature sensor are stored, remedy the fault first.*

- Open coolant control
- Open coolant shutoff valve

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check engine temperature sensor.	♦ see P0115 or P0116		
2	Check coolant control			
3	Check coolant shutoff valve.			

P0129

Ambient Pressure Sensor – Below Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- DME control module

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If no fault is present, erase the fault memory.

Work instruction			**Display OK**	**If not OK**
1	Replace DME control module.			
2	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.		

P0130

O2 Sensor Circuit

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Note!

The DTC (diagnostic trouble code) covers all electrical faults here.

Diagnostic conditions

- Engine temperature greater than 60°C
- 3 minutes idle speed, then 30 seconds increased idle speed

Possible cause of fault

- Short circuit to B+
- Short circuit to ground
- Open circuit
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 9 and oxygen sensor jack, bank 1, pin 5

DME control module connector II, pin 15 and oxygen sensor jack, bank 1, pin 1

DME control module connector II, pin 2 and pin 5

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check reference voltage on component	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Visual inspection ♦ Switch on the ignition ♦ Measure voltage between pins 1 and 5 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV Oxygen sensor faulty ⇒ Replace oxygen sensor → End	⇒ Step 2
2	Check reference voltage on control module	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between test adapter pin II/9 and pin II/15	Approx. 450 mV ⇒ Step 3	⇒ Step 6
3	Check wiring for short circuit to B+	Measure voltage between test adapter: ♦ Pin II/9 and ground ♦ Pin II/15 and ground ♦ Pin II/2 and ground ♦ Pin II/5 and ground ♦ Switch off ignition	0 V ⇒ Step 4	Repair wiring; correct cause of damage, if necessary → End
4	Check wiring for short circuit to ground	Measure resistance between test adapter: ♦ Pin II/9 and ground ♦ Pin II/15 and ground ♦ Pin II/2 and ground ♦ Pin II/5 and ground	∞ Ω ⇒ Step 5	Repair wiring; correct cause of damage, if necessary → End

Work instruction			Display OK	If not OK
5	Check wiring for open circuit	Measure resistance between test adapter: ♦ Pin II/9 and pin 5 of oxygen sensor jack ♦ Pin II/15 and pin 1 of oxygen sensor jack ♦ Pin II/2 and pin 2 of oxygen sensor jack ♦ Pin II/5 and pin 6 of oxygen sensor jack	$< 2\ \Omega$ ⇒ Step 6	Repair wiring; correct cause of damage, if necessary → End
6	Check whether additional faults have been recorded		⇒ Step 7	Correct faults in accordance with instructions → End
7	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

Diagnosis/troubleshooting - all naturally-aspirated models

Note!

The DTC relates only to implausible signals here.

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Oxygen sensor heating switched on for at least 60 seconds
- Exhaust temperature less than 800°C

Possible cause of fault

- High-resistance short circuit to B+ in signal wire
- Heater coupling
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 9 and oxygen sensor jack, bank 1, pin 3

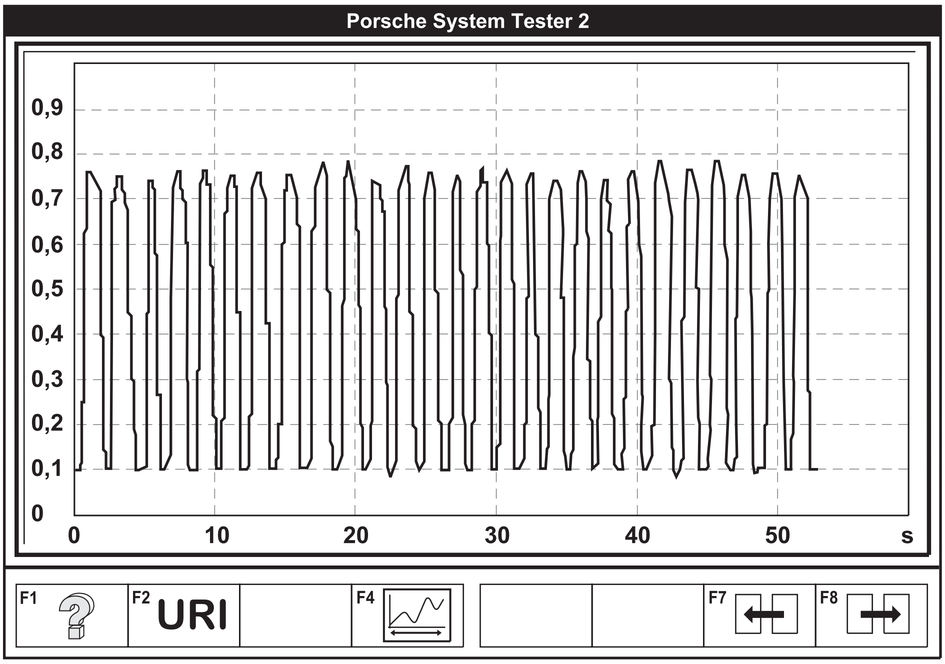
DME control module connector II, pin 15 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using [F5] ♦ Select 'Oxygen sensing, bank 1' ♦ Highlight 'U Oxygen sensor ahead of TWC, bank 1' using the [>] key ♦ Call up 'Data logger' using [F3] ♦ Compare the signal with the graph shown below	♦ If fault appears as "not present" in the "extended fault memory", erase the fault memory (healed reference air contamination) ♦ If fault appears as "present" in the "extended fault memory" ⇒ Step 7	⇒ Step 2



Work instruction			Display OK	If not OK
2	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Check visually for corrosion and loose contacts	⇒ Step 3	Replace faulty component; correct cause of damage, if necessary → End
3	Check oxygen sensor for internal short circuit	Measure resistance between oxygen sensor: ♦ Pin 4 and pin 2 ♦ Pin 4 and pin 3 ♦ Pin 4 and oxygen sensor casing ♦ Pin 3 and pin 2	∞ Ω ⇒ Step 4	Replace oxygen sensor; correct cause of damage, if necessary → End
4	Check plug connection between DME control module and oxygen sensor wires	♦ Remove connector from DME control module ♦ Check visually for corrosion and loose contacts	⇒ Step 5	Replace faulty component; correct cause of damage, if necessary → End

Work instruction			Display OK	If not OK
5	Check for short circuits in wiring between DME control module and oxygen sensor jack	♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter pins: ♦ II/9 and pin II/15 ♦ II/9 and pin II/19 ♦ II/15 and pin II/19 ♦ II/15 and ground	∞ Ω ⇒ Step 6	Repair faulty wiring; correct cause of damage, if necessary → End
6	Check wiring for short circuit to B+	♦ Switch on the ignition Measure voltage between adapter pins: ♦ II/9 and ground ♦ II/15 and ground	0 V ⇒ Step 7	Repair faulty wiring; correct cause of damage, if necessary → End
7	Check whether additional faults have been recorded		⇒ Step 8	Correct faults in accordance with instructions → End
8	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0131

O2 Sensor Circuit Low Voltage

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Oxygen sensing system active
- No secondary air
- No diagnosis of secondary air system
- No fuel tank ventilation

Possible cause of fault

- Short circuit to ground in signal wire
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 9 and oxygen sensor jack, bank 1, pin 3

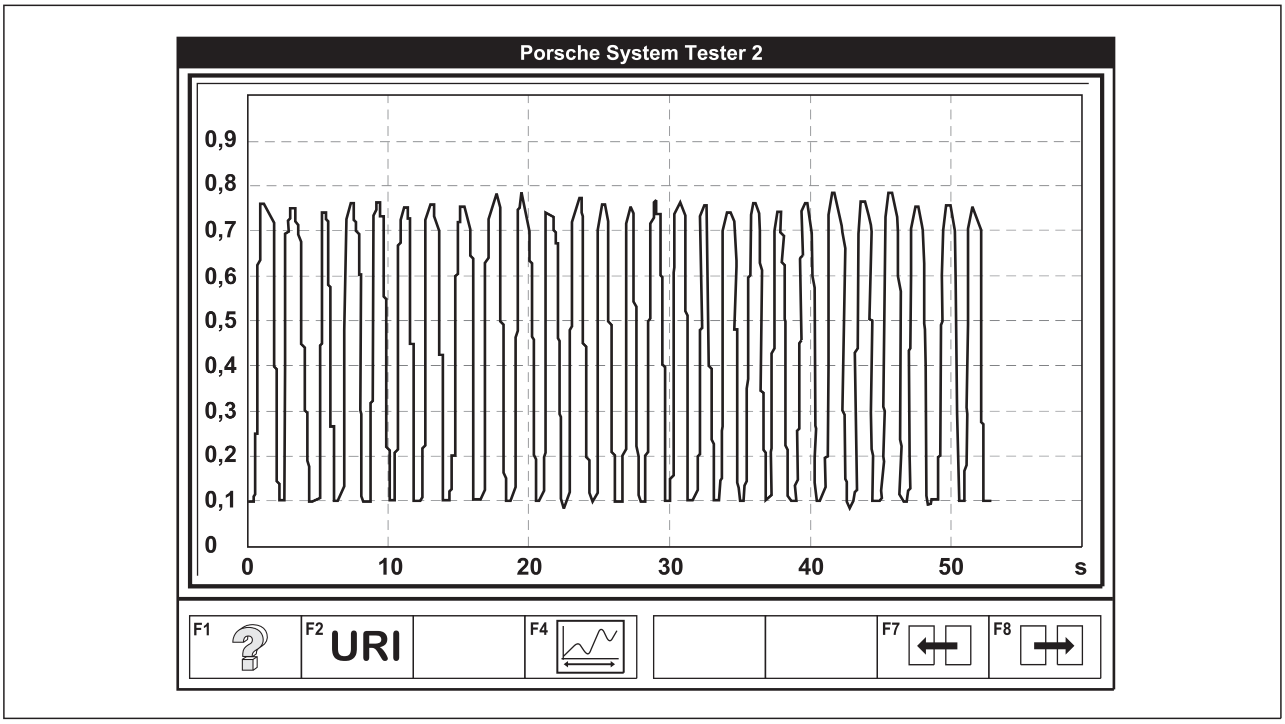
DME control module connector II, pin 15 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using F5 ♦ Select 'Oxygen sensing, bank 1' ♦ Highlight 'U Oxygen sensor ahead of TWC, bank 1' using the > key ♦ Call up 'Data logger' using F3 ♦ Compare the signal with the graph shown below	⇒ Step 4	⇒ Step 2



<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>2</td><td>Check oxygen sensor for internal short circuit</td><td>♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1
♦ Visual inspection
Measure resistance between oxygen sensor:
♦ Pin 4 and pin 3
♦ Pin 4 and pin 2
♦ Pin 4 and oxygen sensor casing</td><td>∞ Ω
⇒ Step 3</td><td>Replace oxygen sensor; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>3</td><td>Check for short circuits in wiring between DME control module and oxygen sensor jack</td><td>♦ Remove connector from DME control module
♦ Visual inspection
♦ Connect 134-pin test adapter No. 9637
Measure resistance between adapter:
♦ Pin II/9 and pin II/15
♦ Pin II/15 and ground</td><td>∞ Ω
⇒ Step 4</td><td>Repair faulty wiring; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>4</td><td colspan="2">Check whether additional faults have been recorded</td><td>⇒ Step 5</td><td>Correct faults in accordance with instructions
→ End</td></tr>
<tr><td>5</td><td colspan="2">Replace DME control module</td><td colspan="2">To do this, please observe the notes on possible causes of faults in the introduction!</td></tr>
</table>

P0132

O2 Sensor Circuit High Voltage

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Note!

The DTC here also covers the possibility of a mechanical malfunction in the valve drive.

Diagnostic conditions

Note!

It takes a very long time (several driving cycles) to detect a fault.

Possible cause of fault

- Valve lift fault
- False air on the oxygen sensor after catalytic converter
- Oxygen sensor faulty

Affected terminals

-

Note!

- *As this fault can be caused by a faulty flat-base tappet, a system test for a small lift has to be performed initially. The fault can occur sporadically; the test should therefore be performed at least three times when the engine is at operating temperature.*
- *First indication of a valve lift fault can be provided by the adaptation values at idle speed (RKAT) and in the lower part load (FRAU) if they differ by more than 10 %.*

Perform system test for small lift

⚠ **Warning!**

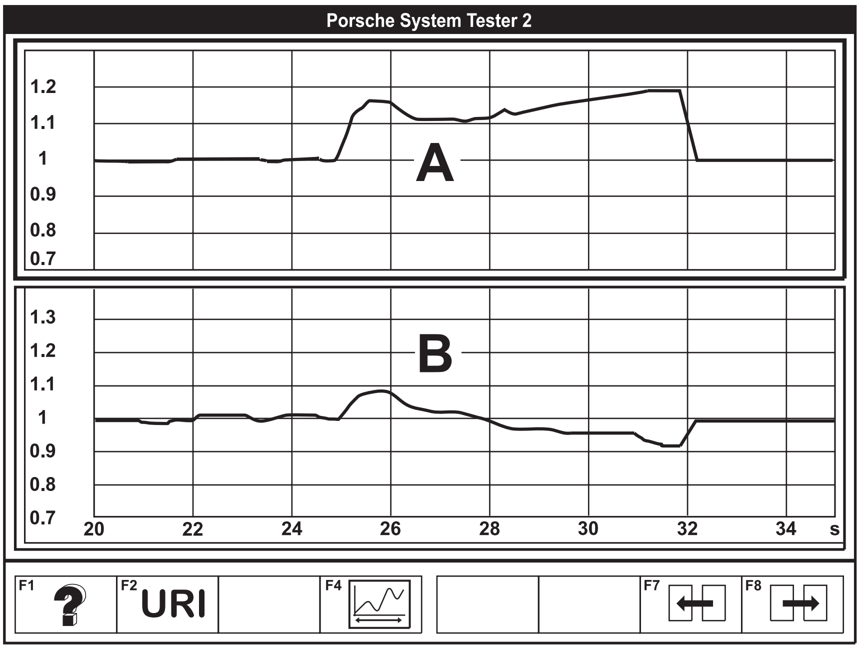
The test is carried out while driving. Get a second person to operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture (F_R > 1) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select System test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the F8 key immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4000 rpm) appears.

At speeds above 4000 rpm, misfires may be stored. Erase the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check exhaust system for leaks			Repair exhaust system → End
2	Replace oxygen sensor			

Diagnosis/troubleshooting - all naturally-aspirated models

Note!

The DTC only covers electrical faults here.

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Exhaust temperature less than 800°C
- Oxygen sensor heating switched on for at least 120 seconds

Note!

DTC P0132 is stored by the DME control module when the sensor voltage is continuously above 1.5 V for more than 5 seconds

Possible cause of fault

- Short circuit to B+ in signal wire
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 9 and oxygen sensor jack, bank 1, pin 3

DME control module connector II, pin 15 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

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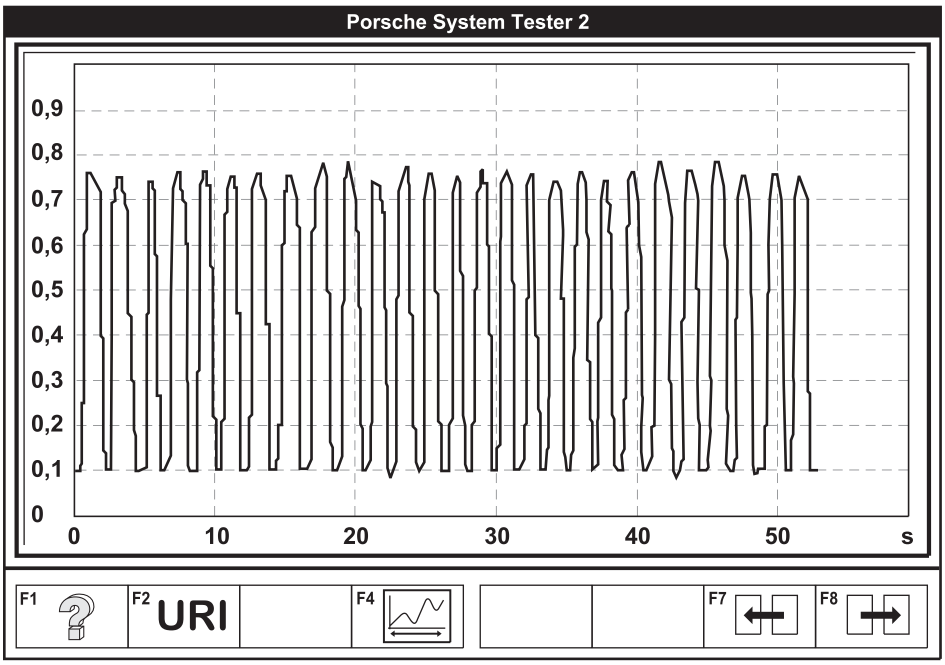
Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using [F5] ♦ Select 'Oxygen sensing, bank 1' ♦ Highlight 'U Oxygen sensor ahead of TWC, bank 1' using the [>] key ♦ Call up 'Data logger' using [F3] ♦ Compare the signal with the graph shown below	⇒ Step 4	⇒ Step 2



Work instruction			Display OK	If not OK
2	Check oxygen sensor for internal short circuit	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Visual inspection Measure resistance between oxygen sensor connector ♦ Pin 1 and pin 4 ♦ Pin 1 and pin 3	∞ Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check for short circuit to B+ in wiring between DME control module and oxygen sensor jack	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition Measure voltage between adapter: ♦ Pin II/9 and ground ♦ Pin II/15 and ground ♦ Switch off ignition	0 V ⇒ Step 4	Repair faulty wiring; correct cause of damage, if necessary → End
4	Check whether additional faults have been recorded		⇒ Step 5	Correct faults in accordance with instructions → End
5	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0133

10 Oxygen Sensor Ahead of TWC, Bank 1 – Below Limit

Diagnosis conditions

- Vehicle at operating temperature, after this 3 minutes idle speed, then approx. 30 seconds increased idle speed.

Possible fault cause

- Oxygen sensor is dynamically inert

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensors.

Work instruction			Display OK	If not OK
1	Replace oxygen sensor			

Note!

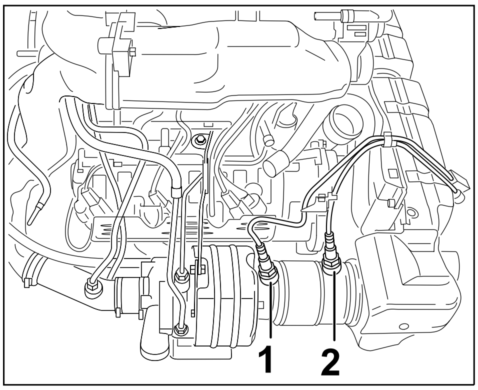
Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter

►



P0134

O2 Sensor Circuit No Activity Detected

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Note!

The DTC here covers the coupling of oxygen sensor heating into the sensor signal.

Diagnostic conditions

- Vehicle at operating temperature, then 3 minutes idle speed followed by 30 seconds increased idle speed

Possible cause of fault

- ♦ Short circuit in oxygen sensor wiring
- ♦ Oxygen sensor faulty (heater coupling or heating)
- ♦ DME control module faulty

Affected terminals

DME control module connector II, pin 9 and oxygen sensor connector after catalytic converter, bank 1, pin 5

DME control module connector II, pin 15 and oxygen sensor connector after catalytic converter, bank 1, pin 1

Diagnosis/troubleshooting - all turbo models

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Visual inspection Measure resistance between oxygen sensor connector: ♦ Pin 1 and pin 4 ♦ Pin 4 and pin 5	∞ Ω ⇒ Step 2	Oxygen sensor faulty ⇒ Replace oxygen sensor → End
2	Check wiring harness between DME control module and oxygen sensor jack	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/9 and pin II/19 ♦ Pin II/15 and pin II/19	∞ Ω ⇒ Step 3	Repair wiring; correct cause of damage, if necessary → End
3	Check whether additional faults have been recorded		⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

Diagnosis/troubleshooting - all naturally-aspirated models

Note!

The DTC covers electrical open circuits here.

Diagnostic conditions

- Exhaust temperature between 400°C and 800°C
- Battery positive voltage between 10 V and 16 V
- Oxygen sensor heating switched on for at least 120 seconds

Possible cause of fault

- Loose contact in connector
- Open circuit in the oxygen sensor signal wire
- Open circuit in the oxygen sensor ground wire
- Oxygen sensor faulty (also heating)
- DME control module faulty

Affected terminals

DME control module connector II, pin 9 and oxygen sensor jack, bank 1, pin 3

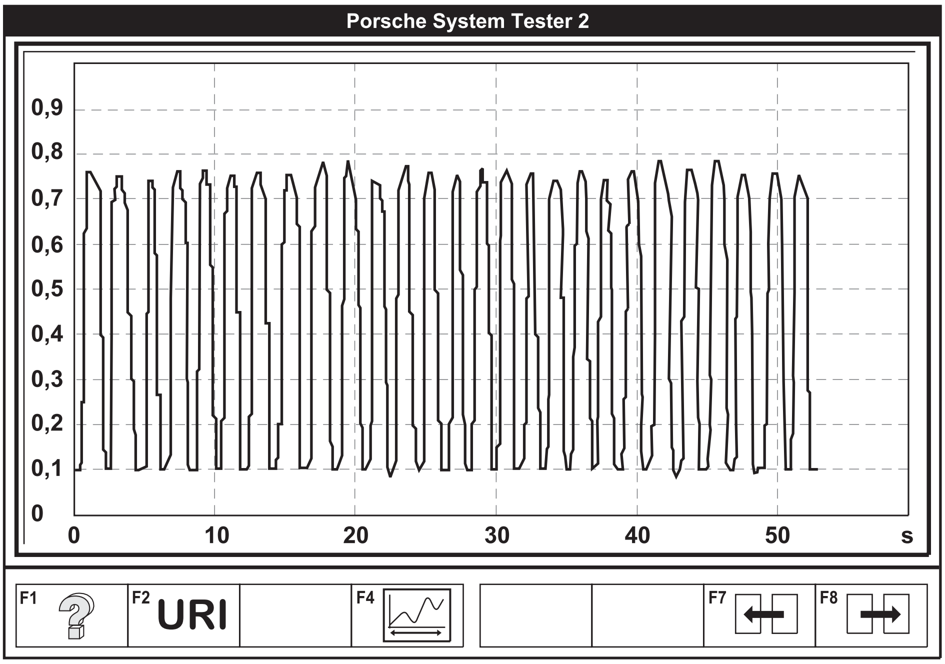
DME control module connector II, pin 15 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using F5 ♦ Select 'Oxygen sensing, bank 1' ♦ Highlight 'U Oxygen sensor ahead of TWC, bank 1' using the > key ♦ Call up 'Data logger' using F3 ♦ Compare the signal with the graph shown below	⇒ Step 7	⇒ Step 2



Work instruction			Display OK	If not OK
2	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 1 ♦ Check visually for corrosion and loose contacts	⇒ Step 3	Replace faulty component; correct cause of damage, if necessary → End
3	Check oxygen sensor heating	Measure resistance between pins 1 and 2 of oxygen sensor connector	8 to 11 Ω ⇒ Step 4	Replace oxygen sensor → End
4	Check reference voltage on the oxygen sensor	♦ Switch on the ignition ♦ Measure voltage between pins 3 and 4 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV ⇒ Oxygen sensor faulty → Replace oxygen sensor	⇒ Step 5
5	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for corrosion and loose contacts	⇒ Step 6	Replace faulty component; correct cause of damage, if necessary → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>6</td><td>Check reference voltage on DME control module</td><td>♦ Connect 134-pin test adapter No. 9637
♦ Switch on the ignition
♦ Measure voltage between pins 3 and 4 of the oxygen sensor jack
♦ Switch off ignition</td><td>Approx. 450 mV
⇒ Step 7</td><td>⇒ Step 8</td></tr>
<tr><td>7</td><td>Check for open circuit in wiring between DME control module and oxygen sensor jack</td><td>Measure resistance between:
♦ Adapter pin II/9 and pin 3 of oxygen sensor jack
♦ Adapter pin II/15 and pin 4 of oxygen sensor jack</td><td>< 2 Ω
⇒ Sporadic fault; localise the fault as far as possible and then correct it; correct cause of damage, if necessary
→ End</td><td>Repair faulty wiring; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>8</td><td colspan="2">Check whether additional faults have been recorded</td><td>⇒ Step 9</td><td>Correct faults in accordance with instructions
→ End</td></tr>
<tr><td>9</td><td colspan="2">Replace DME control module</td><td colspan="2">To do this, please observe the notes on possible causes of faults in the introduction!</td></tr>
</table>

P0135

O2 Sensor Heater Circuit

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Note!

This fault can be detected in two different operating states. To find out whether the fault was recorded under load or with inertia fuel shutoff, refer to the "extended fault memory".

Diagnostic conditions for fault detection under load

- Mass air flow above 16 $^{kg}/_{h}$
- No other oxygen sensor faults
- Battery positive voltage between 10 V and 16 V

Diagnostic conditions for fault detection with inertia fuel shutoff

- Exhaust temperature above 250°C
- Battery positive voltage greater than 10 V
- Time elapsed after start-up greater than 60 seconds
- No oxygen sensor faults
- Inertia fuel shutoff for more than 4 seconds

Possible cause of fault

- Open circuit
- Oxygen sensor faulty (heating)
- DME control module faulty

Affected terminals

DME control module, connector II, pin 19 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector ahead of catalytic converter Bank 1 ♦ Check resistance between pins 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20°C	Replace oxygen sensor
3	Check voltage supply for oxygen sensor heating	♦ Start the engine ♦ Measure voltage between pin 3 towards the DME control module and ground	Battery positive voltage ⇒ Step 4	⇒ Repair voltage supply
4	Check wiring	♦ Check resistance between pin 4 and pin II/19	<2 Ω	⇒ Repair wiring
5	Check oxygen sensor	♦ Check resistance between pin 4 and the oxygen sensor casing ♦ Check resistance between pin 1 and the oxygen sensor casing ♦ Check resistance between pin 2 and the oxygen sensor casing ♦ Check resistance between pin 5 and the oxygen sensor casing ♦ Check resistance between pin 6 and the oxygen sensor casing	∞ Ω If fault was recorded during inertia fuel shutoff ⇒ Check engine oil consumption	Replace oxygen sensor

Diagnosis/troubleshooting - all naturally-aspirated models

Diagnostic conditions

- Exhaust temperature between 250°C and 550°C
- No other oxygen sensor faults
- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 200 seconds

Possible cause of fault

- High resistance in connector or triggering wire

Affected terminals

DME control module, connector II, pin 19 and oxygen sensor jack ahead of catalytic converter, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor plug connection	♦ Remove oxygen sensor connector ♦ Check visually for loose contacts and corrosion	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check resistance of oxygen sensor heating	♦ Measure resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for loose contacts and corrosion	⇒ Step 4	Replace faulty component; correct cause of damage, if necessary → End
4	Check triggering wire	♦ Connect 134-pin test adapter No. 9637 ♦ Measure resistance between adapter pin II/19 and pin 2 of oxygen sensor jack	< 2 Ω ⇒ Step 5	Repair faulty wiring; correct cause of damage, if necessary → End
5	Check whether additional faults have been recorded		⇒ Step 6	Correct faults in accordance with instructions → End
6	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0136

Note!

- *Signal implausible: Turbo models up to model year 01 only*
- *Below limit: Turbo only*
- *Above limit: All models*

O2 Sensor Circuit

Diagnostic conditions

- Exhaust temperature between 250°C and 750°C
- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 200 seconds
- No secondary air
- No diagnosis of secondary air system
- No fuel tank ventilation
- No diagnosis of fuel tank ventilation system
- No other oxygen sensor faults

Possible cause of fault

- Short circuit to ground in signal wire
- Intercore short circuit

Affected terminals

DME control module connector II, pin 11 and oxygen sensor jack, bank 1, pin 3

DME control module connector II, pin 17 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check wiring harness	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1 ♦ Visual inspection ♦ Switch on the ignition ♦ Measure voltage between pins 4 and 3 towards the control module	Approx. 450 mV ⇒ Step 3	⇒ Step 2
2		♦ Remove DME control module connector ♦ Measure resistance at pin 4 and ground towards the control module ♦ Measure resistance at pin 4 and pin 3 towards the control module	∞ Ω	Repair wiring harness
3	Check oxygen sensor	♦ Measure resistance at pins 2 and 3 ♦ Measure resistance at pins 2 and 4 ♦ Measure resistance at pin 3 and ground ♦ Measure resistance at pin 4 and ground ♦ Measure resistance at pins 3 and 4	∞ Ω	Replace oxygen sensor

O2 Sensor Circuit Slow Response

Diagnostic conditions

- Air mass between 25 $^{kg}/_{h}$ and 120 $^{kg}/_{h}$
- Oxygen sensing after catalytic converter is active
- Basic adaptation has reached steady condition
- No secondary air diagnosis
- No fuel tank ventilation diagnosis
- EVAP canister not highly loaded
- No other oxygen sensor faults

Possible cause of fault

♦ Oxygen sensor faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			**Display OK**	**If not OK**
1	Erase fault memory, then road test vehicle or perform short test	♦ Erase fault memory ♦ Heat the oxygen sensors (road test car under load, run engine without load at high rpm) ♦ Road test vehicle or perform short test, ensuring that the diagnostic conditions are met	⇒ Step 2	
2	Read out the fault memory		No fault stored → End	Replace oxygen sensor

P0137

O2 Sensor Circuit Low Voltage

Diagnostic conditions

- Exhaust temperature between 250°C and 750°C
- Time elapsed after engine start-up greater than 200 seconds
- Battery positive voltage between 10 V and 16 V
- Oxygen sensing system active
- No other oxygen sensor faults
- No secondary air
- No diagnosis of secondary air system
- No fuel tank ventilation
- No diagnosis of fuel tank ventilation system

Possible cause of fault

- Short circuit to ground in signal wire
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 11 and oxygen sensor jack, bank 1, pin 3

DME control module connector II, pin 17 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check voltage supply	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1 ♦ Visual inspection ♦ Measure voltage between pins 4 and 3 towards the control module	Approx. 450 mV ⇒ Step 2	⇒ Step 3
2	Check oxygen sensor for internal short circuit	Measure resistance between oxygen sensor: ♦ Pin 4 and pin 3 ♦ Pin 2 and pin 3 ♦ Pin 2 and pin 4 ♦ Pin 4 and oxygen sensor casing	∞ Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check for short circuit in wiring between DME control module and oxygen sensor jack	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/11 and pin II/17 ♦ Pin II/17 and ground	∞ Ω ⇒ Step 4	Repair faulty wiring; correct cause of damage, if necessary → End
4	Check whether additional faults have been recorded		⇒ Step 5	Correct faults in accordance with instructions → End
5	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0138

O2 Sensor Circuit High Voltage

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Exhaust temperature less than 800°C
- Oxygen sensor heating switched on for at least 120 seconds

Possible cause of fault

- Short circuit to B+ in signal wire
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 11 and oxygen sensor jack, bank 1, pin 3

DME control module connector II, pin 17 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td>Check voltage supply</td><td>♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1
♦ Visual inspection
♦ Measure voltage between pins 4 and 3 towards the control module</td><td>Approx. 450 mV
⇒ Step 2</td><td>⇒ Step 3</td></tr>
<tr><td>2</td><td>Check oxygen sensor for internal short circuit</td><td>Measure resistance between oxygen sensor connector
♦ Pin 1 and pin 4
♦ Pin 1 and pin 3</td><td>∞ Ω
⇒ Step 3</td><td>Replace oxygen sensor; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>3</td><td>Check for short circuit to B+ in wiring between DME control module and oxygen sensor jack</td><td>♦ Remove connector from DME control module
♦ Visual inspection
♦ Connect 134-pin test adapter No. 9637
♦ Switch on the ignition
Measure voltage between adapter:
♦ Pin II/11 and ground
♦ Pin II/17 and ground
♦ Switch off ignition</td><td>0 V
⇒ Step 4</td><td>Repair faulty wiring; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>4</td><td colspan="2">Check whether additional faults have been recorded</td><td>⇒ Step 5</td><td>Correct faults in accordance with instructions
→ End</td></tr>
<tr><td>5</td><td colspan="2">Replace DME control module</td><td colspan="2">To do this, please observe the notes on possible causes of faults in the introduction!</td></tr>
</table>

P0139

O2 Sensor Circuit Slow Response

Diagnostic conditions

- Air mass between 25 $^{kg}/_{h}$ and 120 $^{kg}/_{h}$
- Oxygen sensing after catalytic converter is active
- Basic adaptation has reached steady condition
- No secondary air diagnosis
- No fuel tank ventilation diagnosis
- EVAP canister not highly loaded
- No other oxygen sensor faults

Possible cause of fault

- ♦ Oxygen sensor faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Erase fault memory, then road test vehicle or perform short test	♦ Erase fault memory ♦ Heat the oxygen sensors (road test car under load, run engine without load at high rpm) ♦ Road test vehicle or perform short test, ensuring that the diagnostic conditions are met	⇒ Step 2	
2	Read out the fault memory		No fault stored → End	Replace oxygen sensor

P0140

O2 Sensor Circuit No Activity Detected

Diagnostic conditions

- Exhaust temperature between 250°C and 750°C
- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 200 seconds
- Oxygen sensor heating switched on for at least 120 seconds

Possible cause of fault

- Loose contact or corrosion in connector
- Open circuit in the oxygen sensor signal wire
- Open circuit in the oxygen sensor ground wire
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module connector II, pin 11 and oxygen sensor jack, bank 1, pin 3

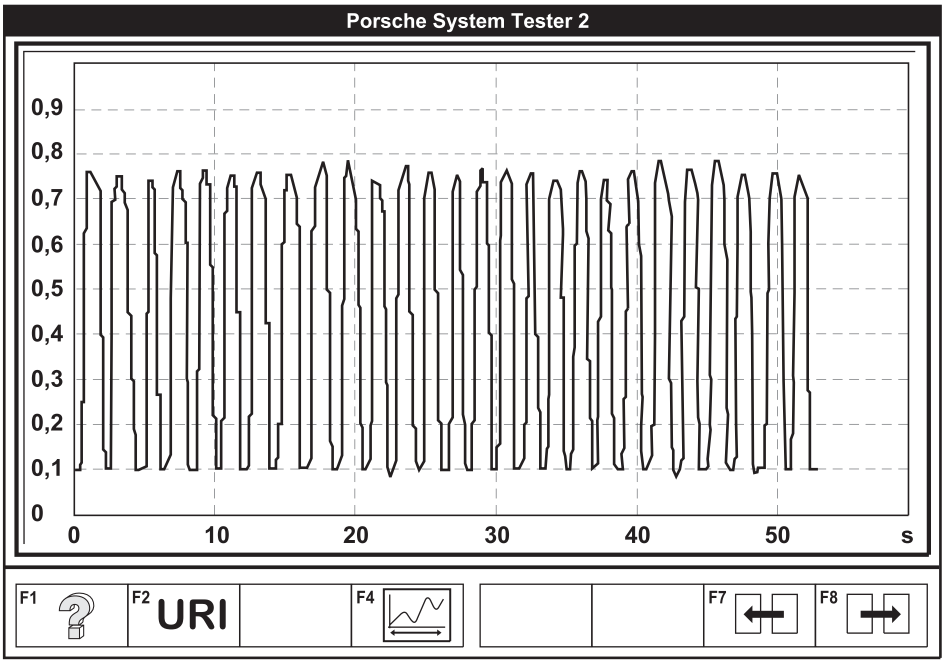
DME control module connector II, pin 17 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using [F5] ♦ Select 'Oxygen sensing, bank 1' ♦ Highlight 'U Oxygen sensor after TWC, bank 1' using the [>] key ♦ Call up 'Data logger' using [F3] ♦ Compare the signal with the graph shown below	⇒ Step 7	⇒ Step 2



Work instruction			Display OK	If not OK
2	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1 ♦ Check visually for corrosion and loose contacts	⇒ Step 3	Replace faulty component; correct cause of damage, if necessary → End
3	Check oxygen sensor heating	Measure resistance between pins 1 and 2 of oxygen sensor connector	8 to 11 Ω ⇒ Step 4	→ Replace oxygen sensor
4	Check reference voltage on the oxygen sensor	♦ Switch on the ignition ♦ Measure voltage between pins 3 and 4 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV ⇒ Oxygen sensor faulty	⇒ Step 5
5	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for corrosion and loose contacts	⇒ Step 6	Replace faulty component; correct cause of damage, if necessary → End
6	Check reference voltage on DME control module	♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between pins 3 and 4 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV ⇒ Step 7	⇒ Step 8
7	Check for open circuit in wiring between DME control module and oxygen sensor jack	Measure resistance between: ♦ Adapter pin II/11 and pin 3 of oxygen sensor jack ♦ Adapter pin II/17 and pin 4 of oxygen sensor jack	< 2 Ω ⇒ Sporadic fault; localise the fault as far as possible and then correct it; correct cause of damage, if necessary → End	Repair faulty wiring; correct cause of damage, if necessary → End
8	Check whether additional faults have been recorded		⇒ Step 9	Correct faults in accordance with instructions → End
9	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0141

O2 Sensor Heater Circuit

Signal implausible

Diagnostic conditions

- Exhaust temperature between 300°C and 600°C
- Battery positive voltage between 10 V and 16 V

Possible cause of fault

- Corrosion in connector
- Oxygen sensor faulty

Affected terminals

DME control module connector II, pin 7 and oxygen sensor jack, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td>Check connector for corrosion</td><td>♦ Visual inspection of all affected plug connections</td><td>⇒ Step 2</td><td>Replace faulty component; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>2</td><td>Check oxygen sensor heating</td><td>♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1
♦ Check resistance between pins 1 and 2 towards the oxygen sensor</td><td>8 to 11 Ω at 20°C
⇒ Step 3</td><td rowspan="2">Replace oxygen sensor
→ End</td></tr>
<tr><td>3</td><td>Check oxygen sensor</td><td>♦ Check resistance between pin 1 and the oxygen sensor casing
♦ Check resistance between pins 1 and 3</td><td>∞ Ω</td></tr>
</table>

Open circuit

Diagnostic conditions

- Engine running

Possible cause of fault

- Resistance of oxygen sensor heating too high
- Open circuit

Affected terminals

DME control module connector II, pin 7 and oxygen sensor jack, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1 ♦ Visual inspection ♦ Check resistance between pins 1 and 2 towards the oxygen sensor	8 to 11 Ω at 20°C	Replace oxygen sensor
2	Check B+ supply	♦ Switch on the ignition ♦ Measure voltage at pin 1 towards the DME control module and ground	Battery positive voltage	Repair wiring harness
3	Check connection to ground	♦ Check wire from pin 2 to DME control module pin II/7 for continuity	< 2 Ω	

Below limit

Diagnostic conditions

- Engine running

Possible cause of fault

- Short circuit to ground in triggering wire
- Corrosion in connector
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module connector II, pin 7 and oxygen sensor jack, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1 ♦ Check visually for loose contacts and corrosion	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check resistance of oxygen sensor heating	♦ Measure resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check oxygen sensor for short circuit to ground	Measure resistance between oxygen sensor connector: ♦ Pin 2 and pin 3 ♦ Pin 2 and oxygen sensor casing	∞ Ω ⇒ Step 4	Replace oxygen sensor; correct cause of damage, if necessary → End
4	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for loose contacts and corrosion	⇒ Step 5	Replace faulty component; correct cause of damage, if necessary → End
5	Check triggering wire	♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/7 and pin II/11 ♦ Pin II/7 and ground	∞ Ω ⇒ Step 6	Repair wiring; correct cause of damage, if necessary → End

Work instruction		Display OK	If not OK
6	Check whether additional faults have been recorded	⇒ Step 7	Correct faults in accordance with instructions → End
7	Replace DME control module	To do this, please observe the notes on possible causes of faults in the introduction!	

Above limit

Diagnostic conditions

- Engine running

Possible cause of fault

- Oxygen sensor faulty (heating)
- Short circuit to B+
- DME control module faulty

Affected terminals

DME control module connector II, pin 7 and oxygen sensor jack, bank 1, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

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Work instruction			Display OK	If not OK
1	Check oxygen sensor	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 1 ♦ Visual inspection ♦ Measure oxygen sensor heating resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 2	Replace oxygen sensor; correct cause of damage, if necessary → End
2	Check triggering wire	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between adapter pin II/7 and ground ♦ Switch off ignition	0 V ⇒ Step 3	Repair faulty wiring; correct cause of damage, if necessary → End
3	Check whether additional faults have been recorded		⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0150

O2 Sensor Circuit

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Note!

The DTC (diagnostic trouble code) covers all electrical faults here.

Diagnostic conditions

- Engine temperature greater than 60°C
- 3 minutes idle speed, then 30 seconds increased idle speed

Possible cause of fault

- Short circuit to B+
- Short circuit to ground
- Open circuit
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 10 and oxygen sensor jack, bank 2, pin 5

DME control module connector II, pin 16 and oxygen sensor jack, bank 2, pin 1

DME control module connector II, pin 6 and pin 24

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check reference voltage on component	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Visual inspection ♦ Switch on the ignition ♦ Measure voltage between pins 1 and 5 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV Oxygen sensor faulty ⇒ Replace oxygen sensor → End	⇒ Step 2
2	Check reference voltage on control module	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between test adapter pin II/10 and pin II/16	Approx. 450 mV ⇒ Step 3	⇒ Step 6
3	Check wiring for short circuit to B+	Measure voltage between test adapter: ♦ Pin II/10 and ground ♦ Pin II/16 and ground ♦ Pin II/6 and ground ♦ Pin II/24 and ground ♦ Switch off ignition	0 V ⇒ Step 4	Repair wiring; correct cause of damage, if necessary → End
4	Check wiring for short circuit to ground	Measure resistance between test adapter: ♦ Pin II/10 and ground ♦ Pin II/16 and ground ♦ Pin II/6 and ground ♦ Pin II/24 and ground	∞ Ω ⇒ Step 5	Repair wiring; correct cause of damage, if necessary → End

Work instruction			Display OK	If not OK
5	Check wiring for open circuit	Measure resistance between test adapter: ♦ Pin II/10 and pin 5 of oxygen sensor jack ♦ Pin II/16 and pin 1 of oxygen sensor jack ♦ Pin II/6 and pin 2 of oxygen sensor jack ♦ Pin II/24 and pin 6 of oxygen sensor jack	< 2 Ω ⇒ Step 6	Repair wiring; correct cause of damage, if necessary → End
6	Check whether additional faults have been recorded		⇒ Step 7	Correct faults in accordance with instructions → End
7	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

Diagnosis/troubleshooting - all naturally-aspirated models

Note!

The DTC relates only to implausible signals here.

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Oxygen sensor heating switched on for at least 60 seconds
- Exhaust temperature less than 800°C

Possible cause of fault

- High-resistance short circuit to B+ in signal wire
- Heater coupling
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 10 and oxygen sensor jack, bank 2, pin 3

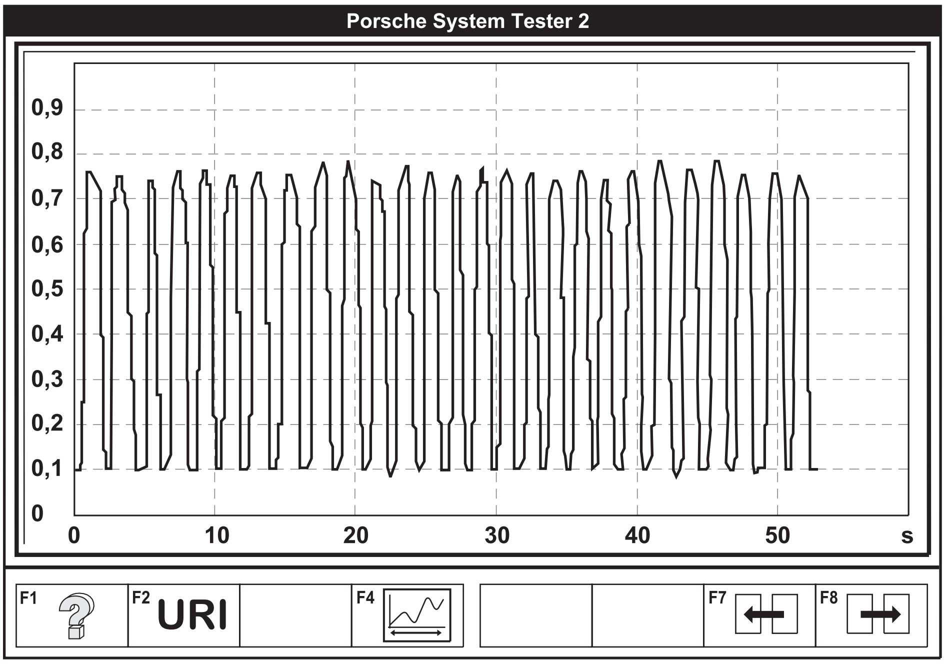
DME control module connector II, pin 16 and oxygen sensor jack, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using F5 ♦ Select 'Oxygen sensing, bank 2' ♦ Highlight 'U Oxygen sensor ahead of TWC, bank 2' using the > key ♦ Call up 'Data logger' using F3 ♦ Compare the signal with the graph shown below	♦ If fault appears as "not present" in the "extended fault memory", erase the fault memory (healed reference air contamination) ♦ If fault appears as "present" in the "extended fault memory" ⇒ Step 7	⇒ Step 2



Work instruction			Display OK	If not OK
2	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Check visually for corrosion and loose contacts	⇒ Step 3	Replace faulty component; correct cause of damage, if necessary → End
3	Check oxygen sensor for internal short circuit	Measure resistance between oxygen sensor: ♦ Pin 4 and pin 2 ♦ Pin 4 and pin 3 ♦ Pin 4 and oxygen sensor casing ♦ Pin 3 and pin 2	∞ Ω ⇒ Step 4	Replace oxygen sensor; correct cause of damage, if necessary → End
4	Check plug connection between DME control module and oxygen sensor wires	♦ Remove connector from DME control module ♦ Check visually for corrosion and loose contacts	⇒ Step 5	Replace faulty component; correct cause of damage, if necessary → End

Work instruction			Display OK	If not OK
5	Check for short circuit in wiring between DME control module and oxygen sensor jack	♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter pins: ♦ II/10 and pin II/16 ♦ II/10 and pin II/13 ♦ II/16 and pin II/13 ♦ II/16 and ground	∞ Ω ⇒ Step 6	Repair faulty wiring; correct cause of damage, if necessary → End
6	Check wiring for short circuit to B+	♦ Switch on the ignition Measure voltage between adapter pins: ♦ II/10 and ground ♦ II/16 and ground	0 V ⇒ Step 7	Repair faulty wiring; correct cause of damage, if necessary → End
7	Check whether additional faults have been recorded		⇒ Step 8	Correct faults in accordance with instructions → End
8	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0151

O2 Sensor Circuit Low Voltage

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Oxygen sensing system active
- No secondary air
- No diagnosis of secondary air system
- No fuel tank ventilation

Possible cause of fault

- Short circuit to ground in signal wire
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 10 and oxygen sensor jack, bank 2, pin 3

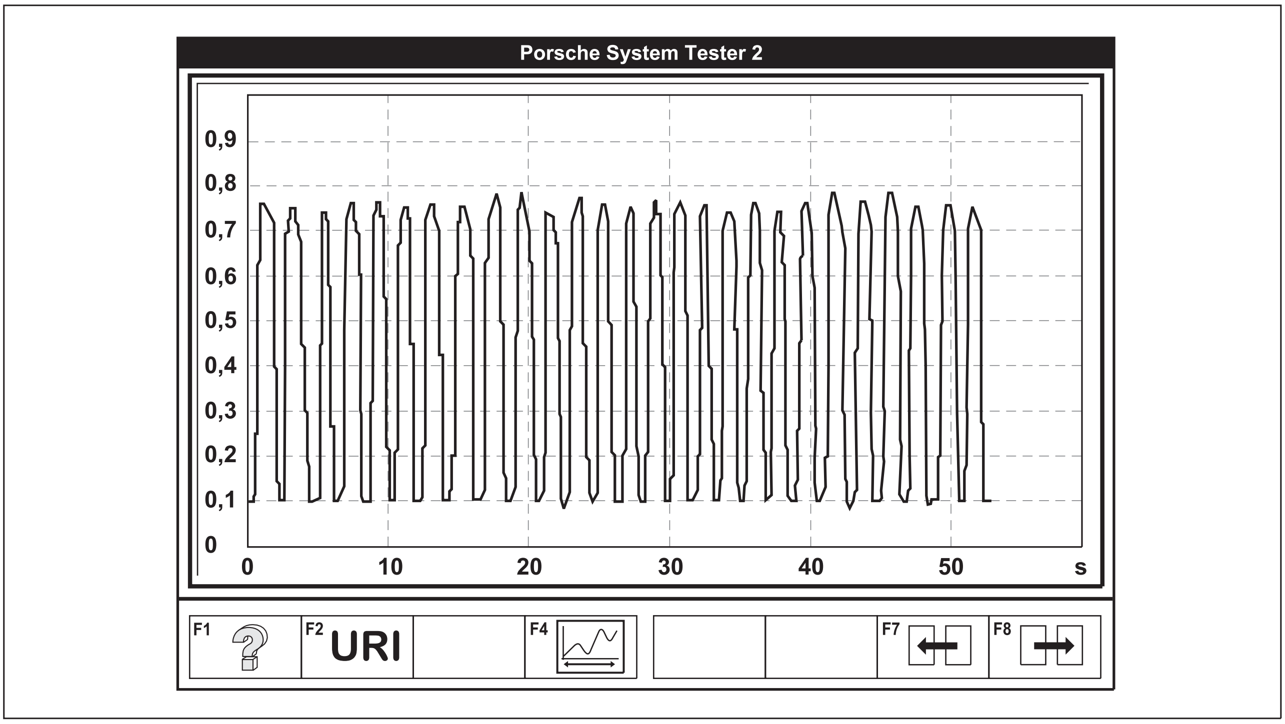
DME control module connector II, pin 16 and oxygen sensor jack, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using F5 ♦ Select 'Oxygen sensing, bank 2' ♦ Highlight 'U Oxygen sensor ahead of TWC, bank 2' using the > key ♦ Call up 'Data logger' using F3 ♦ Compare the signal with the graph shown below	⇒ Step 4	⇒ Step 2



	Work instruction		Display OK	If not OK
2	Check oxygen sensor for internal short circuit	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Visual inspection Measure resistance between oxygen sensor: ♦ Pin 4 and pin 3 ♦ Pin 4 and pin 2 ♦ Pin 4 and oxygen sensor casing	∞ Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check for short circuit in wiring between DME control module and oxygen sensor jack	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/10 and pin II/16 ♦ Pin II/16 and ground	∞ Ω ⇒ Step 4	Repair faulty wiring; correct cause of damage, if necessary → End
4	Check whether additional faults have been recorded		⇒ Step 5	Correct faults in accordance with instructions → End
5	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0152

O2 Sensor Circuit High Voltage

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Note!

The DTC here also covers the possibility of a mechanical malfunction in the valve drive.

Diagnostic conditions

Note!

It takes a very long time (several driving cycles) to detect a fault.

Possible cause of fault

- Valve lift fault
- False air on the oxygen sensor after catalytic converter
- Oxygen sensor faulty

Affected terminals

-

Note!

- *As this fault can be caused by a faulty flat-base tappet, a system test for a small lift has to be performed initially. The fault can occur sporadically; the test should therefore be performed at least three times when the engine is at operating temperature.*
- *First indication of a valve lift fault can be provided by the adaptation values at idle speed (RKAT) and in the lower part load (FRAU) if they differ by more than 10 %.*

Perform system test for small lift

⚠ **Warning!**

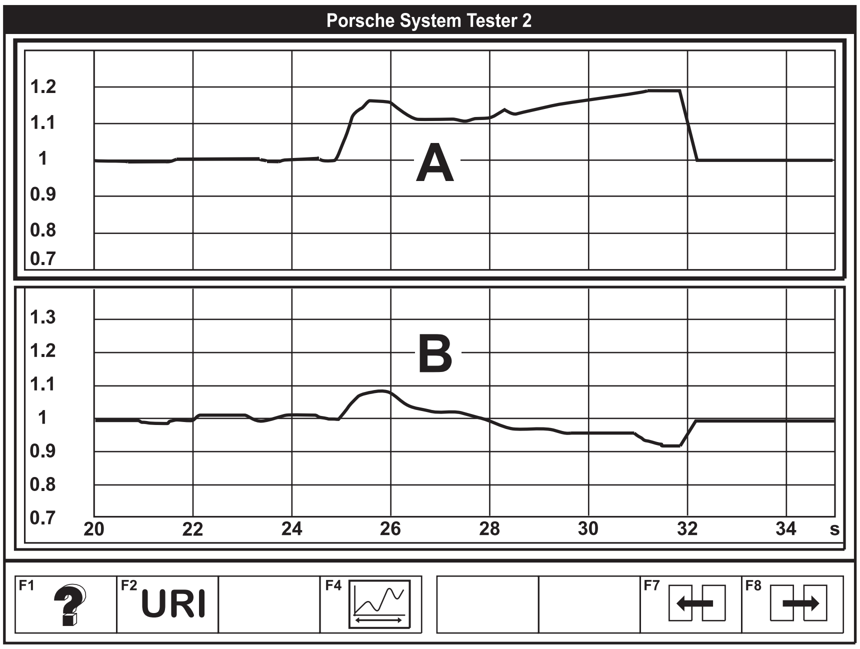
The test is carried out while driving. Get a second person to operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture (F_R > 1) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select System test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the F8 key immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4000 rpm) appears.

At speeds above 4000 rpm, misfires may be stored. Erase the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check exhaust system for leaks			Repair exhaust system → End
2	Replace oxygen sensor			

Diagnosis/troubleshooting - all naturally-aspirated models

Note!

The DTC only covers electrical faults here.

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Exhaust temperature less than 800°C
- Oxygen sensor heating switched on for at least 120 seconds

Note!

DTC P0132 is stored by the DME control module when the sensor voltage is continuously above 1.5 V for more than 5 seconds

Possible cause of fault

- Short circuit to B+ in signal wire
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 10 and oxygen sensor jack, bank 2, pin 3

DME control module connector II, pin 16 and oxygen sensor jack, bank 2, pin 4

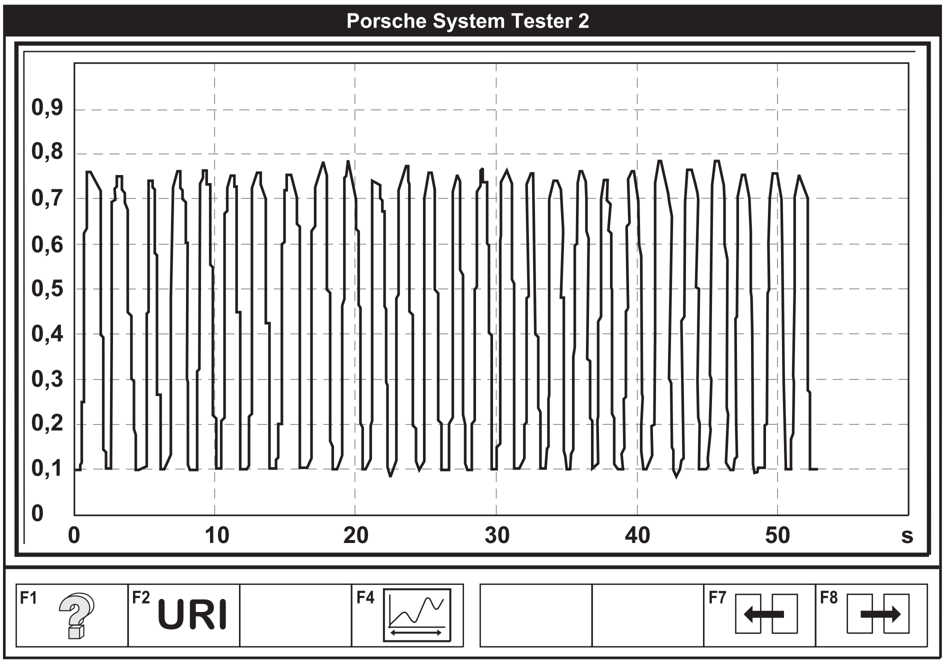
Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Printed in Germany – 12, 2003

Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using F5 ♦ Select 'Oxygen sensing, bank 2' ♦ Highlight 'U Oxygen sensor ahead of TWC, bank 2' using the > key ♦ Call up 'Data logger' using F3 ♦ Compare the signal with the graph shown below	⇒ Step 4	⇒ Step 2



Work instruction			Display OK	If not OK
2	Check oxygen sensor for internal short circuit	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Visual inspection Measure resistance between oxygen sensor connector ♦ Pin 1 and pin 4 ♦ Pin 1 and pin 3	∞ Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check for short circuit to B+ in wiring between DME control module and oxygen sensor jack	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition Measure voltage between adapter: ♦ Pin II/10 and ground ♦ Pin II/16 and ground ♦ Switch off ignition	0 V ⇒ Step 4	Repair faulty wiring; correct cause of damage, if necessary → End
4	Check whether additional faults have been recorded		⇒ Step 5	Correct faults in accordance with instructions → End
5	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0153

18 Oxygen Sensor Ahead of TWC, Bank 2 – Below Limit

Diagnosis conditions

- Vehicle at operating temperature, after this 3 minutes idle speed, then approx. 30 seconds increased idle speed.

Possible fault cause

- Oxygen sensor is dynamically inert

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensors.

Work instruction			Display OK	If not OK
1	Check exhaust system for leaks			Repair exhaust system → End
2	Replace oxygen sensor			

Note!

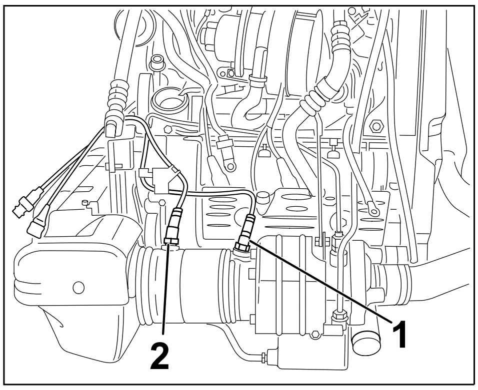
Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter

►



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P0153

O2 Sensor Circuit Slow Response

Diagnostic conditions

- Engine speed between 1000 rpm and 3000 rpm
- Engine load (relative air charge) between 12 % and 70 %
- Calculated TWC temperature greater than 350°C
- Oxygen sensing system active

Possible cause of fault

- ♦ Oxygen sensor is dynamically inert

Affected terminals

II/10 and II/16

Diagnosis/troubleshooting

Note!

Do not use contact spray on the plug connections to the oxygen sensor.

Work instruction			**Display OK**	**If not OK**
1	Read out the fault memory	♦ If there are additional faults in the memory, correct these first		
2	Read out period for sensor signal bank 2 with scan tool in Mode 5 or PST 2		Less than 3 seconds	Replace oxygen sensor

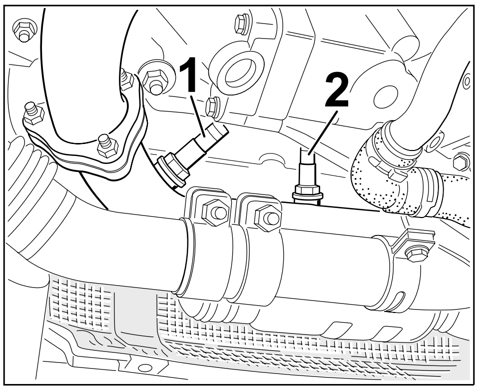
Note!

Do not confuse oxygen sensor ahead of catalytic converter and oxygen sensor after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter



P0154

O2 Sensor Circuit No Activity Detected

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Note!

The DTC here covers the coupling of oxygen sensor heating into the sensor signal.

Diagnostic conditions

- Vehicle at operating temperature, then 3 minutes idle speed followed by 30 seconds increased idle speed

Possible cause of fault

- Short circuit in oxygen sensor wiring
- Oxygen sensor faulty (heater coupling or heating)
- DME control module faulty

Affected terminals

DME control module connector II, pin 10 and oxygen sensor connector ahead of catalytic converter, bank 2, pin 5

DME control module connector II, pin 16 and oxygen sensor connector ahead of catalytic converter, bank 2, pin 1

Diagnosis/troubleshooting - all turbo models

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Visual inspection Measure resistance between oxygen sensor connector: ♦ Pin 1 and pin 4 ♦ Pin 4 and pin 5	∞ Ω ⇒ Step 2	Oxygen sensor faulty ⇒ Replace oxygen sensor → End
2	Check wiring harness between DME control module and oxygen sensor jack	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/10 and pin II/13 ♦ Pin II/16 and pin II/13	∞ Ω ⇒ Step 3	Repair wiring; correct cause of damage, if necessary → End
3	Check whether additional faults have been recorded		⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

Diagnosis/troubleshooting - all naturally-aspirated models

Note!

The DTC covers electrical open circuits here.

Diagnostic conditions

- Exhaust temperature between 400°C and 800°C
- Battery positive voltage between 10 V and 16 V
- Oxygen sensor heating switched on for at least 120 seconds

Possible cause of fault

- Loose contact in connector
- Open circuit in the oxygen sensor signal wire
- Open circuit in the oxygen sensor ground wire
- Oxygen sensor faulty (also heating)
- DME control module faulty

Affected terminals

DME control module connector II, pin 10 and oxygen sensor jack, bank 2, pin 3

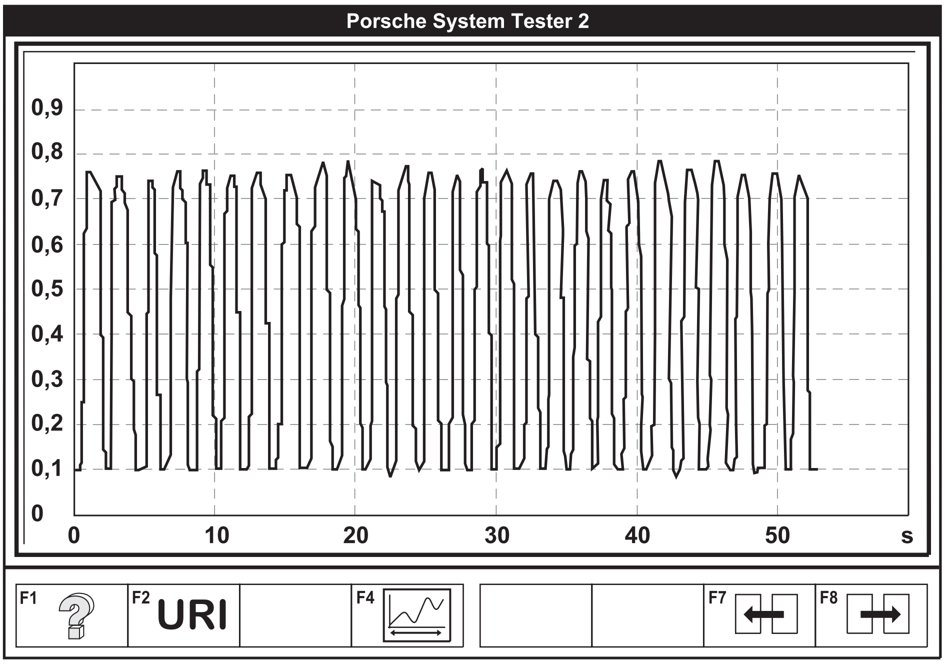
DME control module connector II, pin 16 and oxygen sensor jack, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			**Display OK**	**If not OK**
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using [F5] ♦ Select 'Oxygen sensing, bank 2' ♦ Highlight 'U Oxygen sensor ahead of TWC, bank 2' using the [>] key ♦ Call up 'Data logger' using [F3] ♦ Compare the signal with the graph shown below	⇒ Step 7	⇒ Step 2



Work instruction			Display OK	If not OK
2	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection ahead of catalytic converter, bank 2 ♦ Check visually for corrosion and loose contacts	⇒ Step 3	Replace faulty component; correct cause of damage, if necessary → End
3	Check oxygen sensor heating	Measure resistance between pins 1 and 2 of oxygen sensor connector	8 to 11 Ω ⇒ Step 4	Replace oxygen sensor → End
4	Check reference voltage on the oxygen sensor	♦ Switch on the ignition ♦ Measure voltage between pins 3 and 4 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV ⇒ Oxygen sensor faulty → Replace oxygen sensor	⇒ Step 5
5	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for corrosion and loose contacts	⇒ Step 6	Replace faulty component; correct cause of damage, if necessary → End

Work instruction			Display OK	If not OK
6	Check reference voltage on DME control module	♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between pins 3 and 4 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV ⇒ Step 7	⇒ Step 8
7	Check for open circuit in wiring between DME control module and oxygen sensor jack	Measure resistance between: ♦ Adapter pin II/10 and pin 3 of oxygen sensor jack ♦ Adapter pin II/16 and pin 4 of oxygen sensor jack	< 2 Ω ⇒ Sporadic fault; localise the fault as far as possible and then correct it; correct cause of damage, if necessary → End	Repair faulty wiring; correct cause of damage, if necessary → End
8	Check whether additional faults have been recorded		⇒ Step 9	Correct faults in accordance with instructions → End
9	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0155

O2 Sensor Heater Circuit

Note!

The diagnosis for this fault is different for models with turbo engines and models with naturally-aspirated engines.

Diagnosis/troubleshooting - all turbo models

Note!

This fault can be detected in two different operating states. To find out whether the fault was recorded under load or with inertia fuel shutoff, refer to the "extended fault memory".

Diagnostic conditions for fault detection under load

- Mass air flow above 16 $^{kg}/_{h}$
- No other oxygen sensor faults
- Battery positive voltage between 10 V and 16 V

Diagnostic conditions for fault detection with inertia fuel shutoff

- Exhaust temperature above 250°C
- Battery positive voltage greater than 10 V
- Time elapsed after start-up greater than 60 seconds
- No oxygen sensor faults
- Inertia fuel shutoff for more than 4 seconds

Possible cause of fault

- ♦ Open circuit
- ♦ Oxygen sensor faulty (heating)
- ♦ DME control module faulty

Affected terminals

DME control module, connector II, pin 13 and oxygen sensor jack ahead of catalytic converter, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector ahead of catalytic converter, bank 2 ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20°C	Replace oxygen sensor
3	Check voltage supply for oxygen sensor heating	♦ Start the engine ♦ Measure voltage between pin 3 towards the DME control module and ground	Battery positive voltage ⇒ Step 4	⇒ Repair voltage supply
4	Check wiring	♦ Check resistance between pin 4 and pin II/13	<2Ω	⇒ Repair wiring
5	Check oxygen sensor	♦ Check resistance between pin 4 and the oxygen sensor casing ♦ Check resistance between pin 1 and the oxygen sensor casing ♦ Check resistance between pin 2 and the oxygen sensor casing ♦ Check resistance between pin 5 and the oxygen sensor casing ♦ Check resistance between pin 6 and the oxygen sensor casing	∞ Ω If fault was recorded during inertia fuel shutoff ⇒ Check engine oil consumption	Replace oxygen sensor

Diagnosis/troubleshooting - all naturally-aspirated models

Diagnostic conditions

- Exhaust temperature between 250°C and 550°C
- No other oxygen sensor faults
- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 200 seconds

Possible cause of fault

- High resistance in connector or triggering wire

Affected terminals

DME control module, connector II, pin 13 and oxygen sensor jack ahead of catalytic converter, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection ♦ Check visually for loose contacts and corrosion	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check resistance of oxygen sensor heating	♦ Measure resistance between pins 1 and 2 of oxygen sensor connector	$8\ \Omega$ to $11\ \Omega$ ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for loose contacts and corrosion	⇒ Step 4	Replace faulty component; correct cause of damage, if necessary → End
4	Check triggering wire	♦ Connect 134-pin test adapter No. 9637 ♦ Measure resistance between adapter pin II/13 and pin 2 of oxygen sensor jack	$< 2\ \Omega$ ⇒ Step 5	Repair faulty wiring; correct cause of damage, if necessary → End
5	Check whether additional faults have been recorded		⇒ Step 6	Correct faults in accordance with instructions → End
6	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0156

Note!

- *Signal implausible: Turbo models up to model year 01 only*
- *Below limit: Turbo only*
- *Above limit: All models*

02 Sensor Circuit

Diagnostic conditions

- Exhaust temperature between 250°C and 750°C
- Battery voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 200 seconds
- No secondary air
- No diagnosis of secondary air system
- No fuel tank ventilation
- No diagnosis of fuel tank ventilation system
- No other oxygen sensor faults

Possible cause of fault

- Short circuit to ground in signal wire
- Intercore short circuit

Affected terminals

DME control module connector II, pin 8 and oxygen sensor jack, bank 1, pin 3

DME control module connector II, pin 14 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check wiring harness	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Visual inspection ♦ Switch on the ignition ♦ Measure voltage between pins 4 and 3 towards the control module	Approx. 450 mV ⇒ Step 3	⇒ Step 2
2		♦ Remove DME control module connector ♦ Measure resistance at pin 4 and ground towards the control module ♦ Measure resistance at pin 4 and pin 3 towards the control module	∞ Ω	Repair wiring harness
3	Check oxygen sensor	♦ Measure resistance at pins 2 and 3 ♦ Measure resistance at pins 2 and 4 ♦ Measure resistance at pin 3 and ground ♦ Measure resistance at pin 4 and ground ♦ Measure resistance at pins 3 and 4	∞ Ω	Replace oxygen sensor

O2 Sensor Circuit Slow Response

Diagnostic conditions

- Air mass between 25 $^{kg}/_{h}$ and 120 $^{kg}/_{h}$
- Oxygen sensing after catalytic converter is active
- Basic adaptation has reached steady condition
- No secondary air diagnosis
- No fuel tank ventilation diagnosis
- EVAP canister not highly loaded
- No other oxygen sensor faults

Possible cause of fault

♦ Oxygen sensor faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Erase fault memory, then road test vehicle or perform short test	♦ Erase fault memory ♦ Heat the oxygen sensors (road test car under load, run engine without load at high rpm) ♦ Road test vehicle or perform short test, ensuring that the diagnostic conditions are met	⇒ Step 2	
2	Read out the fault memory		No fault stored → End	Replace oxygen sensor

P0157

O2 Sensor Circuit Low voltage

Diagnostic conditions

- Exhaust temperature between 250°C and 750°C
- Time elapsed after engine start-up greater than 200 seconds
- Battery positive voltage between 10 V and 16 V
- Oxygen sensing system active
- No other oxygen sensor faults
- No secondary air
- No diagnosis of secondary air system
- No fuel tank ventilation
- No diagnosis of fuel tank ventilation system

Possible cause of fault

- Short circuit to ground in signal wire
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 8 and oxygen sensor jack, bank 2, pin 3

DME control module connector II, pin 14 and oxygen sensor jack, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check voltage supply	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Visual inspection ♦ Measure voltage between pins 4 and 3 towards the control module	Approx. 450 mV ⇒ Step 2	⇒ Step 3
2	Check oxygen sensor for internal short circuit	Measure resistance between oxygen sensor: ♦ Pin 4 and pin 3 ♦ Pin 2 and pin 3 ♦ Pin 2 and pin 4 ♦ Pin 4 and oxygen sensor casing	∞ Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check for short circuit in wiring between DME control module and oxygen sensor jack	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/8 and pin II/14 ♦ Pin II/14 and ground	∞ Ω ⇒ Step 4	Repair faulty wiring; correct cause of damage, if necessary → End
4	Check whether additional faults have been recorded		⇒ Step 5	Correct faults in accordance with instructions → End
5	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0158

O2 Sensor Circuit High Voltage

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Exhaust temperature less than 800°C
- Oxygen sensor heating switched on for at least 120 seconds

Possible cause of fault

- Short circuit to B+ in signal wire
- Oxygen sensor faulty
- Control module faulty

Affected pins

DME control module connector II, pin 8 and oxygen sensor jack, bank 2, pin 3

DME control module connector II, pin 14 and oxygen sensor jack, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td>Check voltage supply</td><td>♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2
♦ Visual inspection
♦ Measure voltage between pins 4 and 3 towards the control module</td><td>Approx. 450 mV
⇒ Step 2</td><td>⇒ Step 3</td></tr>
<tr><td>2</td><td>Check oxygen sensor for internal short circuit</td><td>♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2
♦ Visual inspection
Measure resistance between oxygen sensor connector
♦ Pin 1 and pin 4
♦ Pin 1 and pin 3</td><td>∞ Ω
⇒ Step 3</td><td>Replace oxygen sensor; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>3</td><td>Check for short circuit to B+ in wiring between DME control module and oxygen sensor jack</td><td>♦ Remove connector from DME control module
♦ Visual inspection
♦ Connect 134-pin test adapter No. 9637
♦ Switch on the ignition
Measure voltage between adapter:
♦ Pin II/8 and ground
♦ Pin II/14 and ground
♦ Switch off ignition</td><td>0 V
⇒ Step 4</td><td>Repair faulty wiring; correct cause of damage, if necessary
→ End</td></tr>
<tr><td>4</td><td colspan="2">Check whether additional faults have been recorded</td><td>⇒ Step 5</td><td>Correct faults in accordance with instructions
→ End</td></tr>
<tr><td>5</td><td colspan="2">Replace DME control module</td><td colspan="2">To do this, please observe the notes on possible causes of faults in the introduction!</td></tr>
</table>

P0159

O2 Sensor Circuit Slow Response

Diagnostic conditions

- Air mass between 25 $^{kg}/_{h}$ and 120 $^{kg}/_{h}$
- Oxygen sensing after catalytic converter is active
- Basic adaptation has reached steady condition
- No secondary air diagnosis
- No fuel tank ventilation diagnosis
- EVAP canister not highly loaded
- No other oxygen sensor faults

Possible cause of fault

- ♦ Oxygen sensor faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Erase fault memory, then road test vehicle or perform short test	♦ Erase fault memory ♦ Heat the oxygen sensors (road test car under load, run engine without load at high rpm) ♦ Road test vehicle or perform short test, ensuring that the diagnostic conditions are met	⇒ Step 2	
2	Read out the fault memory		No fault stored → End	Replace oxygen sensor

P0160

O2 Sensor Circuit No Activity Detected

Diagnostic conditions

- Exhaust temperature between 250°C and 750°C
- Battery positive voltage between 10 V and 16 V
- Time elapsed after engine start-up greater than 200 seconds
- Oxygen sensor heating switched on for at least 120 seconds

Possible cause of fault

- ♦ Loose contact or corrosion in connector
- ♦ Open circuit in the oxygen sensor signal wire
- ♦ Open circuit in the oxygen sensor ground wire
- ♦ Oxygen sensor faulty
- ♦ DME control module faulty

Affected terminals

DME control module connector II, pin 8 and oxygen sensor jack, bank 2, pin 3

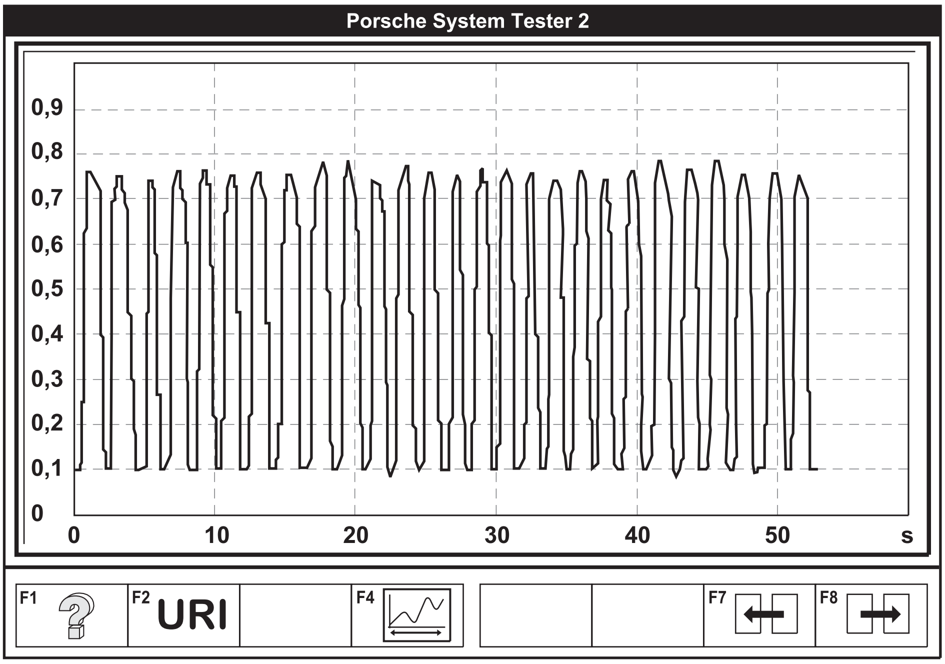
DME control module connector II, pin 14 and oxygen sensor jack, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor signal using data logger	♦ Connect Porsche System Tester II No. 9588 ♦ Start the engine Complete the following steps on the PST II ♦ Select 'DME' ♦ Select 'Actual values' ♦ Select 'Filter' using F5 ♦ Select 'Oxygen sensing, bank 2' ♦ Highlight 'U Oxygen sensor after TWC, bank 2' using the > key ♦ Call up 'Data logger' using F3 ♦ Compare the signal with the graph shown below	⇒ Step 7	⇒ Step 2



Work instruction			Display OK	If not OK
2	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Check visually for corrosion and loose contacts	⇒ Step 3	Replace faulty component; correct cause of damage, if necessary → End
3	Check oxygen sensor heating	Measure resistance between pins 1 and 2 of oxygen sensor connector	8 to 11 Ω ⇒ Step 4	→ Replace oxygen sensor
4	Check reference voltage on the oxygen sensor	♦ Switch on the ignition ♦ Measure voltage between pins 3 and 4 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV ⇒ Oxygen sensor faulty → Replace oxygen sensor	⇒ Step 5
5	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for corrosion and loose contacts	⇒ Step 6	Replace faulty component; correct cause of damage, if necessary → End
6	Check reference voltage on DME control module	♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between pins 3 and 4 of the oxygen sensor jack ♦ Switch off ignition	Approx. 450 mV ⇒ Step 7	⇒ Step 8
7	Check for open circuit in wiring between DME control module and oxygen sensor jack	Measure resistance between: ♦ Adapter pin II/8 and pin 3 of oxygen sensor jack ♦ Adapter pin II/14 and pin 4 of oxygen sensor jack	< 2 Ω ⇒ Sporadic fault; localise the fault as far as possible and then correct it; correct cause of damage, if necessary → End	Repair faulty wiring; correct cause of damage, if necessary → End
8	Check whether additional faults have been recorded		⇒ Step 9	Correct faults in accordance with instructions → End
9	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0161

O2 Sensor Heater Circuit

Signal implausible

Diagnostic conditions

- Exhaust temperature between 300°C and 600°C
- Battery positive voltage between 10 V and 16 V

Possible cause of fault

- Corrosion in connector
- Oxygen sensor faulty

Affected terminals

DME control module connector II, pin 1 and oxygen sensor jack, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection of all affected plug connections	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Check resistance between pins 1 and 2 towards the oxygen sensor	8 to 11 Ω at 20°C ⇒ Step 3	Replace oxygen sensor → End
3	Check oxygen sensor	♦ Check resistance between pin 1 and the oxygen sensor casing ♦ Check resistance between pins 1 and 3	∞ Ω	

Open circuit

Diagnostic conditions

- Engine running

Possible cause of fault

- Resistance of oxygen sensor heating too high
- Open circuit

Affected terminals

DME control module connector II, pin 1 and oxygen sensor jack, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Visual inspection ♦ Check resistance between pins 1 and 2 towards the oxygen sensor	8 to 11 Ω at 20°C	Replace oxygen sensor
2	Check B+ supply	♦ Switch on the ignition ♦ Measure voltage at pin 1 towards the DME control module and ground	Battery positive voltage	Repair wiring harness
3	Check connection to ground	♦ Check wire from pin 2 to DME control module pin II/1 for continuity	< 2 Ω	

Below limit

Diagnostic conditions

- Engine running

Possible cause of fault

- Short circuit to ground in triggering wire
- Corrosion in connector
- Oxygen sensor faulty
- DME control module faulty

Affected terminals

DME control module connector II, pin 1 and oxygen sensor jack, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor plug connection	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Check visually for loose contacts and corrosion	⇒ Step 2	Replace faulty component; correct cause of damage, if necessary → End
2	Check resistance of oxygen sensor heating	♦ Measure resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 3	Replace oxygen sensor; correct cause of damage, if necessary → End
3	Check oxygen sensor for short circuit to ground	Measure resistance between oxygen sensor connector: ♦ Pin 2 and pin 3 ♦ Pin 2 and oxygen sensor casing	∞ Ω ⇒ Step 4	Replace oxygen sensor; correct cause of damage, if necessary → End
4	Check DME control module plug connection	♦ Remove connector from DME control module ♦ Check visually for loose contacts and corrosion	⇒ Step 5	Replace faulty component; correct cause of damage, if necessary → End
5	Check triggering wire	♦ Connect 134-pin test adapter No. 9637 Measure resistance between adapter: ♦ Pin II/1 and pin II/8 ♦ Pin II/1 and ground	∞ Ω ⇒ Step 6	Repair wiring; correct cause of damage, if necessary → End

Work instruction		Display OK	If not OK
6	Check whether additional faults have been recorded	⇒ Step 7	Correct faults in accordance with instructions → End
7	Replace DME control module	To do this, please observe the notes on possible causes of faults in the introduction!	

Above limit

Diagnostic conditions

- Engine running

Possible cause of fault

- Oxygen sensor faulty (heating)
- Short circuit to B+
- DME control module faulty

Affected terminals

DME control module connector II, pin 1 and oxygen sensor jack, bank 2, pin 2

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction			Display OK	If not OK
1	Check oxygen sensor	♦ Disconnect oxygen sensor plug connection after catalytic converter, bank 2 ♦ Visual inspection ♦ Measure oxygen sensor heating resistance between pins 1 and 2 of oxygen sensor connector	8 Ω to 11 Ω ⇒ Step 2	Replace oxygen sensor; correct cause of damage, if necessary → End
2	Check triggering wire	♦ Remove connector from DME control module ♦ Visual inspection ♦ Connect 134-pin test adapter No. 9637 ♦ Switch on the ignition ♦ Measure voltage between adapter pin II/1 and ground ♦ Switch off ignition	0 V ⇒ Step 3	Repair faulty wiring; correct cause of damage, if necessary → End
3	Check whether additional faults have been recorded		⇒ Step 4	Correct faults in accordance with instructions → End
4	Replace DME control module		To do this, please observe the notes on possible causes of faults in the introduction!	

P0171

Oxygen Sensing Adaptation, Idle Range, Bank 1 – Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- Incorrect signal from MAF sensor
- Intake air system leaking
- Fuel pressure too low
- Volume supply of fuel pump too low
- Fuel injectors fouled
- PCV valve leaks
- Cap of oil filler neck not closed correctly or seal is damaged

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- *Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.*
- *Contrary adaptation values in connection with misfiring point to incorrectly adjusted control times⇒check control times and adjust if necessary.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			Display OK	If not OK
1	Close cap of oil filler neck properly or replace the seal			

Work instruction			Display OK	If not OK
2	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
3	Check exhaust system for leaks			
4	Check for air leaks in intake air system			
5	Check PCV valve for leaks			
6	Check fuel pressure			
7	Check volume supply of fuel pump			
8	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P0172

Oxygen Sensing Adaptation, Idle Range, Bank 1 – Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- Incorrect signal from MAF sensor
- Fuel pressure too high
- Fuel injector leaking
- EVAP canister purge valve open

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- *If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- *Contrary adaptation values in connection with misfiring point to incorrectly adjusted control times⇒check control times and adjust if necessary.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine. ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0.5 bar after 10 minutes	
5	Check fuel injectors for leaks			

P0174

Oxygen Sensing Adaptation, Idle Range, Bank 2 – Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Intake air system leaking
- ♦ Fuel pressure too low
- ♦ Volume supply of fuel pump too low
- ♦ Fuel injectors fouled
- ♦ PCV valve leaks
- ♦ Cap of oil filler neck not closed correctly or seal is damaged

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- ♦ *Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.*
- ♦ *Contrary adaptation values in connection with misfiring point to incorrectly adjusted control times⇒check control times and adjust if necessary.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Close cap of oil filler neck properly or replace the seal			

Work instruction			Display OK	If not OK
2	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
3	Check exhaust system for leaks			
4	Check for air leaks in intake air system			
5	Check PCV valve for leaks			
6	Check fuel pressure			
7	Check volume supply of fuel pump			
8	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P0175

Oxygen Sensing Adaptation, Idle Range, Bank 2 – Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking
- ♦ EVAP canister purge valve open

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- ♦ *If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- ♦ *Contrary adaptation values in connection with misfiring point to incorrectly adjusted control times⇒check control times and adjust if necessary.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine. ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0.5 bar after 10 minutes	
5	Check fuel injectors for leaks			

P0197

125 Oil temperature sensor - below limit

Diagnosis conditions

- Idle speed
- Time elapsed after engine start-up greater than 5 minutes

Possible fault cause

- Temperature sensor faulty
- Wiring harness
- DME control module faulty

Affected terminals

Terminal III/5 and III/17

Resistance values

60 °C	2.8 - 3.5 kΩ
90 °C	1.0 - 1.3 kΩ
120 °C	0.4 - 0.6 kΩ

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check temperature sensor	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between Pin III/17 and Pin III/5	2.8 - 3.5 kΩ (at 60 °C) ⇒ Step 2	Replace temperature sensor → End
2	Check wiring from DME control module to temperature sensor for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug connection of temperature sensor ♦ Measure resistance between special tool 9637 Pin III/17 and temperature sensor plug Pin 2 ♦ Measure resistance between special tool 9637 Pin III/5 and temperature sensor plug Pin 1	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End
3	Check wiring from DME control module to temperature sensor for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug connection of temperature sensor ♦ Measure resistance between Pin III/5 and ground	∞ Ω ⇒ Step 4	Repair wiring harness → End
4	Replace DME control module		⇒ Step 5	
5	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P0198

125 Oil temperature sensor - above limit

Diagnosis conditions

- Idle speed
- Time elapsed after engine start-up greater than 5 minutes

Possible fault cause

- Temperature sensor faulty
- Wiring harness
- DME control module faulty

Affected terminals

Terminal III/5 and III/17

Resistance values

60 °C	2.8 - 3.5 kΩ
90 °C	1.0 - 1.3 kΩ
120 °C	0.4 - 0.6 kΩ

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check temperature sensor	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between Pin III/17 and Pin III/5	2.8 - 3.5 kΩ (at 60 °C) ⇒ Step 2	Replace temperature sensor → End
2	Check wiring from DME control module to temperature sensor for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove plug connection of temperature sensor ♦ Switch on the ignition ♦ Measure voltage between Pin III/5 and ground	0 V ⇒ Step 3	Repair wiring harness → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 4</td></tr>
<tr><td>4</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

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P0201

Fuel Injector, Cylinder 1 – Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/41

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 1 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for open circuit.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/41 and fuel injector plug pin 2	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0202

Fuel Injector, Cylinder 2 – Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/40

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 2 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for open circuit.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/40 and fuel injector plug pin 2	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0203

Fuel Injector, Cylinder 3 – Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/15

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 3 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for open circuit.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/15 and fuel injector plug pin 2	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0204

Fuel Injector, Cylinder 4 – Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/27

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 4 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for open circuit.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/27 and fuel injector plug pin 2	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0205

Fuel Injector, Cylinder 5 – Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/2

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check fuel injector	♦ Remove connector of fuel injector 5 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for open circuit.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/2 and fuel injector plug pin 2	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0206

Fuel Injector, Cylinder 6 – Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/28

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 6 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for open circuit.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/28 and fuel injector plug pin 2	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0221

Accelerator Pedal Potentiometer 2 – Signal Implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery positive voltage greater than 7 V

Possible fault cause

- Pedal sensor

Affected terminals

-

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/Troubleshooting

Work instruction		**Display OK**	**If not OK**
1	Replace pedal sensor	→ End.	→ End.

P0222

Accelerator Pedal Potentiometer 2 – Below Limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to ground
- Pedal sensor

Affected terminals

Terminal IV/13

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check wiring from DME control module, Pin IV/ 13, to pedal sensor, Pin 2, for short circuit to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool Pin IV/13 and ground	∞ Ω ⇒ Step 2.	Repair wiring harness → End.
2	Replace pedal sensor		→ End.	→ End.

P0223

Accelerator pedal potentiometer 2 – above limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to B+ in signal wire
- Pedal sensor faulty

Affected terminals

Terminal IV/13

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module IV/13 to pedal sensor, pin 2, for short circuit to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Switch on the ignition ♦ Measure voltage between special tool pin IV/13 and ground	0 V ⇒ Step 2	Repair wiring harness → End.
2	Replace pedal sensor		→ End	

P0230

Fuel Pump Relay Output Stage – Open Circuit

Diagnosis conditions

- Engine started

Note!

The triggering wire for the fuel pump relay, terminal 85, is monitored.

Possible fault cause

- Fuel pump relay
- Open circuit
- DME control module

Affected terminals

Terminal IV/10

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel pump relay	♦ Remove fuel pump relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace fuel pump relay → End
2	Check wiring from DME control module, Pin IV/10, to fuel pump relay for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove fuel pump relay ♦ Measure resistance between special tool 9637, Pin IV/10, and fuel pump relay slot, Pin 6 (terminal 85)	0 - 5 Ω ⇒ Step 3.	Check plug connection X 2/3 and wiring harness → End
3	Replace DME control module.		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

Fuel Pump Relay Output Stage – Below Limit

Diagnosis conditions

- Engine started

Note!

The triggering wire for the fuel pump relay, terminal 85, is monitored.

Possible fault cause

- Fuel pump relay
- Short circuit to ground
- DME control module

Affected terminals

Terminal IV/10

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel pump relay	♦ Remove fuel pump relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace fuel pump relay → End
2	Check wiring from DME control module, Pin IV/10, to fuel pump relay for short circuit to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove fuel pump relay ♦ Measure resistance between special tool 9637 Pin IV/10 and ground	∞ Ω ⇒ Step 3.	Repair wiring harness → End.
3	Replace DME control module.		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

Fuel Pump Relay Output Stage – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Note!

The triggering wire for the fuel pump relay, terminal 85, is monitored.

Possible fault cause

- Fuel pump relay
- Short circuit to B+
- DME control module

Affected terminals

Terminal IV/10

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel pump relay	♦ Remove fuel pump relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace fuel pump relay → End
2	Check wiring from DME control module, Pin IV/10, to fuel pump relay for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove fuel pump relay ♦ Measure voltage between special tool Pin IV/10 and ground ♦ Ignition on	0 V ⇒ Step 3.	Repair wiring harness → End.
3	Replace DME control module.		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0234

Boost Pressure Characteristic, Upper Value Exceeded - Above Limit

Diagnosis conditions

- Charge pressure control active

Possible fault cause

- Leakage at pressure hoses from frequency valve to the bypass flaps
- Frequency valve faulty
- Vacuum modulators for bypass flaps leaking
- Bypass flaps incorrectly adjusted

Affected terminals

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check frequency valve			Replace frequency valve
2	Check pressure hoses for leaks			Replace pressure hoses or eliminate leaks
3	Check vacuum modulators for bypass flaps for leaks			Replace vacuum modulators
4	Check adjustment of bypass flaps			Adjust bypass flaps

DME 7.8

P0237

353 Pressure Sensor - Below Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- Short circuit to ground
- Pressure sensor faulty

Affected terminals

III/39

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from pressure sensor to DME control module for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector from pressure sensor. ♦ Measure resistance between special tool 9637 pin III/39 and ground.	$\infty\ \Omega$	
2	Replace pressure sensor.			

P0238

353 Pressure Sensor - Above Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- Short circuit to B+
- Open circuit
- Pressure sensor faulty

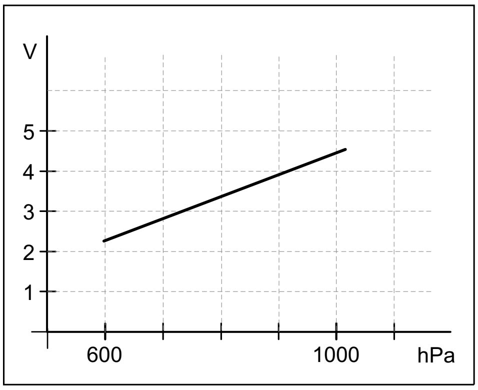
Affected terminals

III/39

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from pressure sensor to DME control module for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of pressure sensor. ♦ Switch on the ignition. ♦ Measure voltage between pin III/39 and ground.	0 V.	Repair wiring harness.
2	Check wiring from pressure sensor to DME control module for continuity.	♦ Check wire from charge pressure sensor plug pin 4 to DME control module pin III/39 for continuity.	0 - 5 Ω	
3	Check pressure sensor voltage.	♦ Connect special tool 9637. ♦ Switch on the ignition. ♦ Measure voltage between special tool 9637 pin III/39 and ground. ♦ Or read out voltage value with the PST2.	Depending on ambient pressure: See Figure 1.	Replace pressure sensor.

Figure 1:



P0261

Fuel Injector, Cylinder 1 – Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to ground in wiring
- DME control module

Affected terminals

Terminal III/41

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 1 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/41 and ground.	∞ Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0262

Fuel Injector, Cylinder 1 – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) short circuit
- Short circuit to B+ in wiring
- DME control module

Affected terminals

Terminal III/41

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 1 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/41 and ground. ♦ Ignition on	0 V ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0264

Fuel Injector, Cylinder 2 – Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to ground in wiring
- DME control module

Affected terminals

Terminal III/40

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 2 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/28 and ground.	∞ Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0265

Fuel Injector, Cylinder 2 – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Fuel injector (coil) short circuit
- ♦ Short circuit to B+ in wiring
- ♦ DME control module

Affected terminals

Terminal III/40

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check fuel injector	♦ Remove connector of fuel injector 2 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/40 and ground. ♦ Ignition on	0 V ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0267

Fuel Injector, Cylinder 3 – Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to ground in wiring
- DME control module

Affected terminals

Terminal III/15

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 3 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/15 and ground.	∞ Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0268

Fuel Injector, Cylinder 3 – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) short circuit
- Short circuit to B+ in wiring
- DME control module

Affected terminals

Terminal III/15

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 3 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/15 and ground. ♦ Ignition on	0 V ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0270

Fuel Injector, Cylinder 4 – Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Short circuit to ground in wiring
- ♦ DME control module

Affected terminals

Terminal III/27

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 4 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/27 and ground.	∞ Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0271

Fuel Injector, Cylinder 4 – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Fuel injector (coil) short circuit
- ♦ Short circuit to B+ in wiring
- ♦ DME control module

Affected terminals

Terminal III/27

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check fuel injector	♦ Remove connector of fuel injector 4 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/27 and ground. ♦ Ignition on	0 V ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0273

Fuel Injector, Cylinder 5 – Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Short circuit to ground in wiring
- ♦ DME control module

Affected terminals

Terminal III/2

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 5 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/2 and ground.	∞ Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0274

Fuel Injector, Cylinder 5 – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) short circuit
- Short circuit to B+ in wiring
- DME control module

Affected terminals

Terminal III/2

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 5 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/2 and ground. ♦ Ignition on	0 V ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0276

Fuel Injector, Cylinder 6 – Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Short circuit to ground in wiring
- ♦ DME control module

Affected terminals

Terminal III/28

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 6 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/28 and ground.	∞ Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0277

Fuel Injector, Cylinder 6 – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Fuel injector (coil) short circuit
- ♦ Short circuit to B+ in wiring
- ♦ DME control module

Affected terminals

Terminal III/28

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check fuel injector	♦ Remove connector of fuel injector 6 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2.	Replace fuel injector → End
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/28 and ground. ♦ Ignition on	0 V ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0300

507 Misfire detection (sum total)

Diagnosis conditions

- A cycle of 1,000 crankshaft revolutions is evaluated (for misfire damaging to the TWC, 200 crankshaft revolutions). The misfire rates are compared with a threshold value. If the misfire rate is greater than the threshold value, a fault is recorded in the memory.
- The Check Engine Malfunction Indicator Lamp (MIL) is switched on and stays on when the misfire rate lies above the threshold value at which the emission limit values are exceeded during two consecutive driving cycles (in the case of EOBD 3 driving cycles).
- If the misfire rate may lead to permanent damage to the TWC, the Check Engine MIL flashes. If the misfire rate is no longer reached during the first journey, the MIL goes out. If the rate is reached during the next journey, the MIL flashes. If this misfire rate is subsequently no longer reached, the MIL changes to a continuous light.

Note!

- *When using a block heater (for heating coolant), start and driving off difficulties or misfiring can occur if the block heater was connected for less than 4 hours.*
- *When the fuel tank is driven to empty, misfiring can occur. For this reason the fuel level in the tank is also stored in the memory when misfiring occurs. If the tank was nearly empty, there was probably no fault. Erase fault memory and road test vehicle.*
- *In the event of a short circuit to B+ or ground in the oxygen sensors ahead of the TWC, the mixture becomes too lean or too rich. This can cause misfiring. If, in addition, an oxygen sensor signal fault ahead of the TWC is stored in memory, first correct this fault and then road test the vehicle.*

Possible fault cause

- Fault in ignition system
- Fault in injection system
- Flat-base tappets (valve lift fault)
- Mixture too rich
- Mixture too lean

- Mechanical causes:

Valve lifter chattering

This is caused by dirt in the valve lifter.

When the Check Engine MIL lights up, a chattering valve lifter may also occur for a certain time. The DME control module registers (sporadic) misfiring at one or more cylinders. The mixture adaptation values are normal.

Remedy:

1 - Remove lifter bores, check for damage and blow out oil passages.

2 - Replace all valve lifters.

3 - During the test drive, listen for valve lifter noises.

Camshaft control times adjusted

The camshaft control times have changed. No chattering noises occur. The DME control module indicates misfiring for the entire cylinder bank 1 or 2. The mixture adaptation values in the idle speed range differ in bank 1 and bank 2, the mixture adaptation values in the upper and lower load ranges are generally normal.

Remedy:

1 - Carry out raw emission measurement:

1. Reset mixture adaptation values (disconnect battery)
2. Disconnect oxygen sensors

If the difference between bank 1 and bank 2 is greater than approx. 0.8 %, then

1 - Set the camshaft control times again.

2 - Road test vehicle. The mixture adaptation values must be normal.

VarioCam does not switch over completely

The VarioCam does not switch over completely from power to torque valve timing.

An indication of this problem is misfiring detected by the DME control module in the range of 1200 - 1500 rpm occurring in an entire bank.

The mixture adaptation values are normal.

Remedy:

1 - Replace VarioCam.

2 - Road test vehicle.

Other possible fault causes

- worn camshafts
- leaking valves
- faulty piston rings

If opposing cylinders have misfiring, the cause could be the sensor wheel.

If valve lift faults are suspected, perform the system test for large lift and the system test for small lift with the Porsche System Tester 2.

Note!

If the battery was disconnected, at least range 1 of sensor wheel adaptation must be adapted before troubleshooting is carried out; see actual values explanation.

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If there is a lot of oil in the engine, check that the oil filler tube and cap are tight.

Work instruction		**Display OK**	**If not OK**
1	Check for air leaks in intake air system	⇒ Step 2.	Repair intake air system → End.
2	Carry out pressure loss test	⇒ Step 3.	Repair engine → End
3	Check spark plugs. Specified spark plugs: Electrode gap: 1.6 mm ± 0.2 mm. Check appearance of spark plugs	⇒ Step 4.	Replace faulty spark plug(s). → End
4	Check spark plug connectors	Approx. 2 kΩ ⇒ Step 5	Replace faulty spark plug connectors. → End

Work instruction			Display OK	If not OK
5	Check ignition coil(s)	♦ Measure resistance between Pin 1 and Pin 15	0,3 to 0,7 Ω (at 20 °C) ⇒ Step 6.	Replace ignition coil(s) → End
6	Check all connectors for secure fastening and corrosion		⇒ Step 7.	Clean plug connections and connect securely. → End
7	Check fuel pressure	♦ Undo and remove the closure cap of the fuel collection pipe test connection (A/F 13 mm) ♦ Connect pressure gauge (special tool P 378a) to connecting line (special tool 9559) and connect to test connection. ♦ Actuate fuel pump, either with the Porsche System Tester or via a fuel pump relay without tester ♦ Nominal test value, stationary engine ♦ Nominal test value, engine idling	3,8 ± 0.2 bar 3,3 ± 0.2 bar ⇒ Step 9	⇒ Step 8.

Note!

The seal or sealing ring in the brass closure cap is not exchangeable. It must therefore be used only once.

Tightening torque of new brass closure cap 2.5 ± 0.5 Nm (2.0 ± 0.5 ftlb.)

Work instruction			Display OK	If not OK
8	Check volume supply of fuel pump. (Fuel filter and electrical supply OK)	♦ Relieve pressure in fuel tank by opening tank cap. ♦ Connect Porsche System Tester 2 ♦ Remove complete air filter system ♦ Detach fuel return line (A/F 17 mm) from the engine compartment (left), taking care to hold it fast (A/F 17 mm). ♦ Collect residual fuel ♦ Observe safety regulations ♦ Connect fuel hose (shop-made, approx. 1.5 metres long) to the fitting and hold in a measuring container ♦ Actuate fuel pump with the Porsche System Tester 2 and allow fuel to flow into the measuring container for 30 seconds ♦ Volume supply must be at least 850 cm^3/ 30 s, i.e. after 30 seconds at least 850 cm^3 of fuel must be in the measuring container.	→ End.	

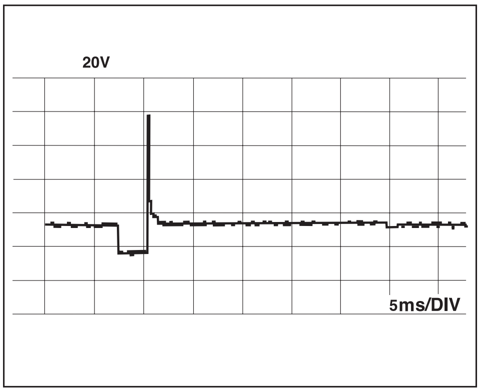
Note!

It is essential to observe safety regulations for handling fuel.

Work instruction			Display OK	If not OK
9	Check triggering of fuel injectors	♦ The fuel injectors can be individually suppressed with the Porsche System Tester 2 in the menu 'Drive link active'	The engine idle speed decreases if triggering is OK	Check triggering ⇒ Step 9a
9a	B+ supply	♦ Remove connector of fuel injector to be checked ♦ Measure voltage between valve plug contact Pin 1 and ground ♦ Switch on the ignition.	> 11 V ⇒ Step 9b	Check wiring according to wiring diagram for continuity or short circuit → End
9b	Coil resistance of fuel injectors	♦ Remove connector of fuel injector to be checked ♦ Measure resistance between the terminals of the fuel injector	11 - 13 Ω ⇒ Step 9c	

Work instruction			Display OK	If not OK
9c	Injection output stage (negative supply)	♦ Connect special tool V.A.G 1315 A/1 between fuel injector and connector ♦ Connect engine tester according to manufacturer's instructions. Connect cable for special input to special tool ♦ Start the engine.	See Figure ⇒ Step 9d	
9d	♦ Perform system test for large lift		→ End.	

Figure:



Warning!

Tester cables must not be connected to ground.

Note!

If the engine does not start, or if the idling speed drops, replace tester cable connected to special tool.

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

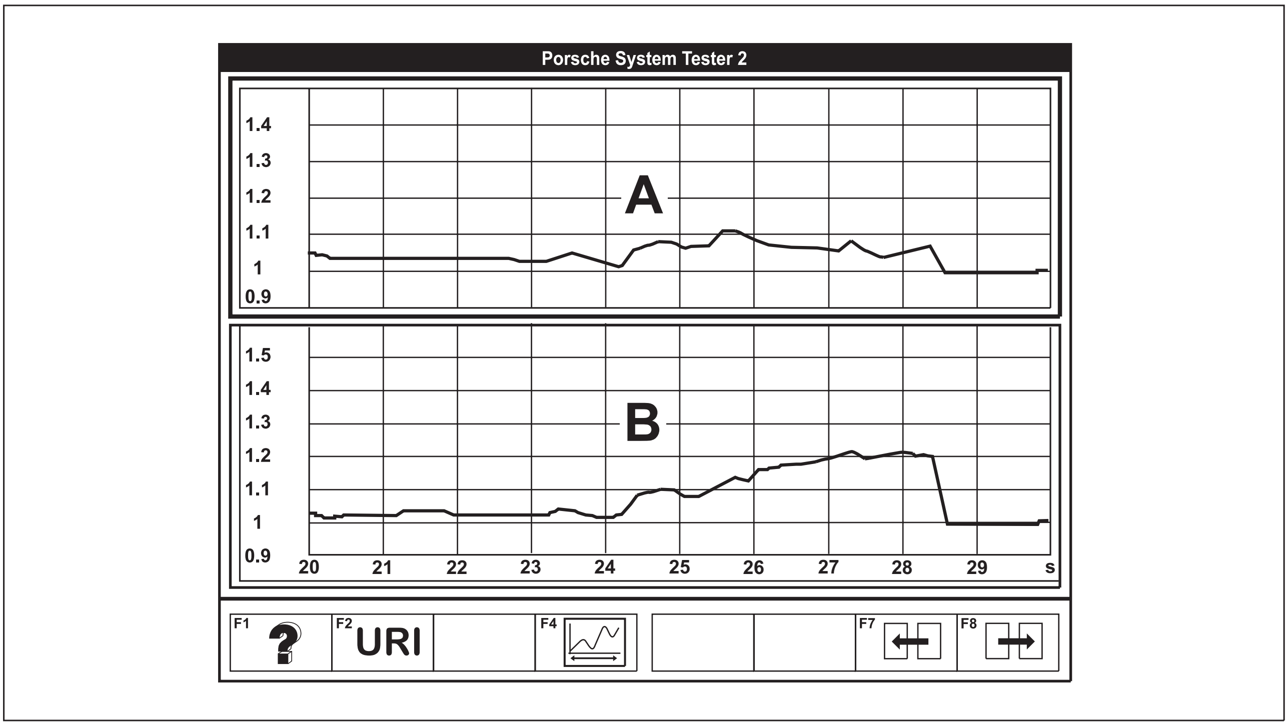
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Continue by performing the system test for small lift

Perform system test for small lift

Warning!

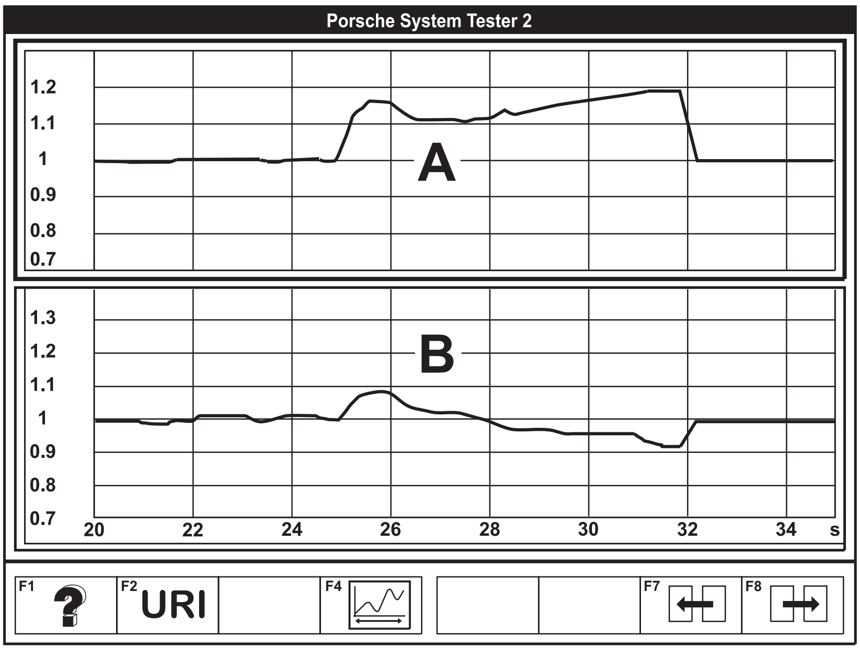
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type "below limit" is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key [F8] immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

End

P0301

508 Misfire, cylinder 1

Diagnosis conditions

- A cycle of 1,000 crankshaft revolutions is evaluated (for misfire damaging to the TWC, 200 crankshaft revolutions). The misfire rates are compared with a threshold value. If the misfire rate is greater than the threshold value, a fault is recorded in the memory.
- The Check Engine Malfunction Indicator Lamp (MIL) is switched on and stays on when the misfire rate lies above the threshold value at which the emission limit values are exceeded during two consecutive driving cycles (in the case of EOBD 3 driving cycles).
- If the misfire rate may lead to permanent damage to the TWC, the Check Engine MIL flashes. If the misfire rate is no longer reached during the first journey, the MIL goes out. If the rate is reached during the next journey, the MIL flashes. If this misfire rate is subsequently no longer reached, the MIL changes to a continuous light.

Note!

- *When using a block heater (for heating coolant), start and driving off difficulties can occur or misfiring if the block heater was connected for less than 4 hours.*
- *When the fuel tank is driven to empty, misfiring can occur. For this reason the fuel level in the tank is also stored in the memory when misfiring occurs. If the tank was nearly empty, there was probably no fault. Erase fault memory and road test vehicle.*
- *In the event of a short circuit to B+ or ground in the oxygen sensors ahead of the TWC, the mixture becomes too lean or too rich. This can cause misfiring. If, in addition, an oxygen sensor signal fault ahead of the TWC is stored in memory, first correct this fault and then road test the vehicle.*

Possible fault cause

- Fault in ignition system
- Fault in injection system
- Flat-base tappets (valve lift fault)
- Mixture too rich
- Mixture too lean

- Mechanical causes:

Valve lifter chattering

This is caused by dirt in the valve lifter.

When the Check Engine MIL lights up, a chattering valve lifter may also occur for a certain time. The DME control module registers (sporadic) misfiring at one or more cylinders. The mixture adaptation values are normal.

Remedy:

1 - Remove lifter bores, check for damage and blow out oil passages.

2 - Replace all valve lifters.

3 - During the test drive, listen for valve lifter noises.

Camshaft control times adjusted

The camshaft control times have changed. No chattering noises occur. The DME control module indicates misfiring for the entire cylinder bank 1 or 2. The mixture adaptation values in the idle speed range differ in bank 1 and bank 2, the mixture adaptation values in the upper and lower load ranges are generally normal.

Remedy:

1 - Carry out raw emission measurement:

1. Reset mixture adaptation values (disconnect battery)
2. Disconnect oxygen sensors

If the difference between bank 1 and bank 2 is greater than approx. 0.8 %, then

1 - Set the camshaft control times again.

2 - Road test vehicle. The mixture adaptation values must be normal.

VarioCam does not switch over completely

The VarioCam does not switch over completely from power to torque valve timing.

An indication of this problem is misfiring detected by the DME control module in the range of 1200 - 1500 rpm occurring in an entire bank.

The mixture adaptation values are normal.

Remedy:

1 - Replace VarioCam.

2 - Road test vehicle.

Other possible fault causes

- worn camshafts
- leaking valves
- faulty piston rings

If opposing cylinders have misfiring, the cause could be the sensor wheel.

If valve lift faults are suspected, perform the system test for large lift and the system test for small lift with the Porsche System Tester 2.

Note!

If the battery was disconnected, at least range 1 of sensor wheel adaptation must be adapted before troubleshooting is carried out; see actual values explanation.

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If there is a lot of oil in the engine, check that the oil filler tube and cap are tight.

Work instruction		**Display OK**	**If not OK**
1	Check for air leaks in intake air system	⇒ Step 2.	Repair intake air system → End.
2	Carry out pressure loss test	⇒ Step 3.	Repair engine → End
3	Check spark plugs. Specified spark plugs: Electrode gap: 1.6 mm ± 0.2 mm. Check appearance of spark plugs	⇒ Step 4.	Replace faulty spark plug(s). → End
4	Check spark plug connectors	Approx. 2 kΩ ⇒ Step 5	Replace faulty spark plug connectors. → End

Work instruction			Display OK	If not OK
5	Check ignition coil(s)	♦ Measure resistance between Pin 1 and Pin 15	0,3 to 0,7 Ω (at 20 °C) ⇒ Step 6.	Replace ignition coil(s) → End
6	Check all connectors for secure fastening and corrosion		⇒ Step 7.	Clean plug connections and connect securely. → End
7	Check fuel pressure	♦ Undo and remove the closure cap of the fuel collection pipe test connection (A/F 13 mm) ♦ Connect pressure gauge (special tool P 378a) to connecting line (special tool 9559) and connect to test connection. ♦ Actuate fuel pump, either with the Porsche System Tester or via a fuel pump relay without tester		⇒ Step 8.
		♦ Nominal test value, stationary engine	3,8 ± 0.2 bar	
		♦ Nominal test value, engine idling	3,3 ± 0.2 bar ⇒ Step 9	

Note!

The seal or sealing ring in the brass closure cap is not exchangeable. It must therefore be used only once.

Tightening torque of new brass closure cap 2.5 ± 0.5 Nm (2.0 ± 0.5 ftlb.)

Work instruction			Display OK	If not OK
8	Check volume supply of fuel pump. (Fuel filter and electrical supply OK)	♦ Relieve pressure in fuel tank by opening tank cap. ♦ Connect Porsche System Tester 2 ♦ Remove complete air filter system ♦ Detach fuel return line (A/F 17 mm) from the engine compartment (left), taking care to hold it fast (A/F 17 mm). ♦ Collect residual fuel ♦ Observe safety regulations ♦ Connect fuel hose (shop-made, approx. 1.5 metres long) to the fitting and hold in a measuring container ♦ Actuate fuel pump with the Porsche System Tester 2 and allow fuel to flow into the measuring container for 30 seconds ♦ Volume supply must be at least 850 cm^3/ 30 s, i.e. after 30 seconds at least 850 cm^3 of fuel must be in the measuring container.	→ End.	

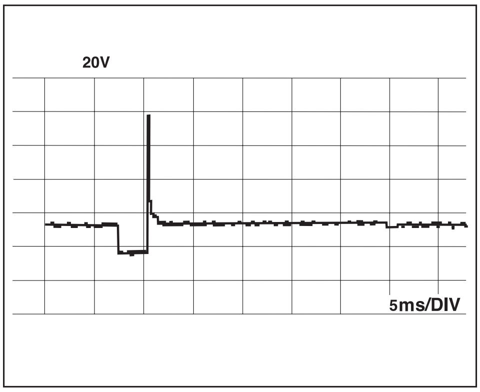
Note!

It is essential to observe safety regulations for handling fuel.

Work instruction			Display OK	If not OK
9	Check triggering of fuel injectors	♦ The fuel injectors can be individually suppressed with the Porsche System Tester 2 in the menu 'Drive link active'	The engine idle speed decreases if triggering is OK	Check triggering ⇒ Step 9a
9a	B+ supply	♦ Remove connector of fuel injector to be checked ♦ Measure voltage between valve plug contact Pin 1 and ground ♦ Switch on the ignition.	> 11 V ⇒ Step 9b	Check wiring according to wiring diagram for continuity or short circuit → End
9b	Coil resistance of fuel injectors	♦ Remove connector of fuel injector to be checked ♦ Measure resistance between the terminals of the fuel injector	11 - 13 Ω ⇒ Step 9c	

Work instruction			Display OK	If not OK
9c	Injection output stage (negative supply)	♦ Connect special tool V.A.G 1315 A/1 between fuel injector and connector ♦ Connect engine tester according to manufacturer's instructions. Connect cable for special input to special tool ♦ Start the engine.	See Figure ⇒ Step 9d	
9d	♦ Perform system test for large lift		→ End.	

Figure:



Warning!

Tester cables must not be connected to ground.

Note!

If the engine does not start, or if the idling speed drops, replace tester cable connected to special tool.

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

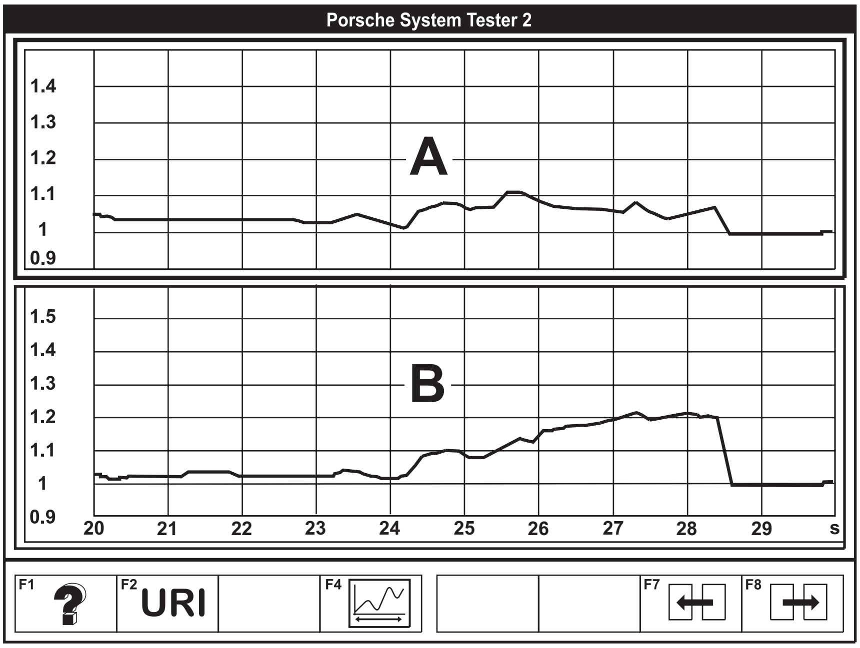
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Continue by performing the system test for small lift

Perform system test for small lift

Warning!

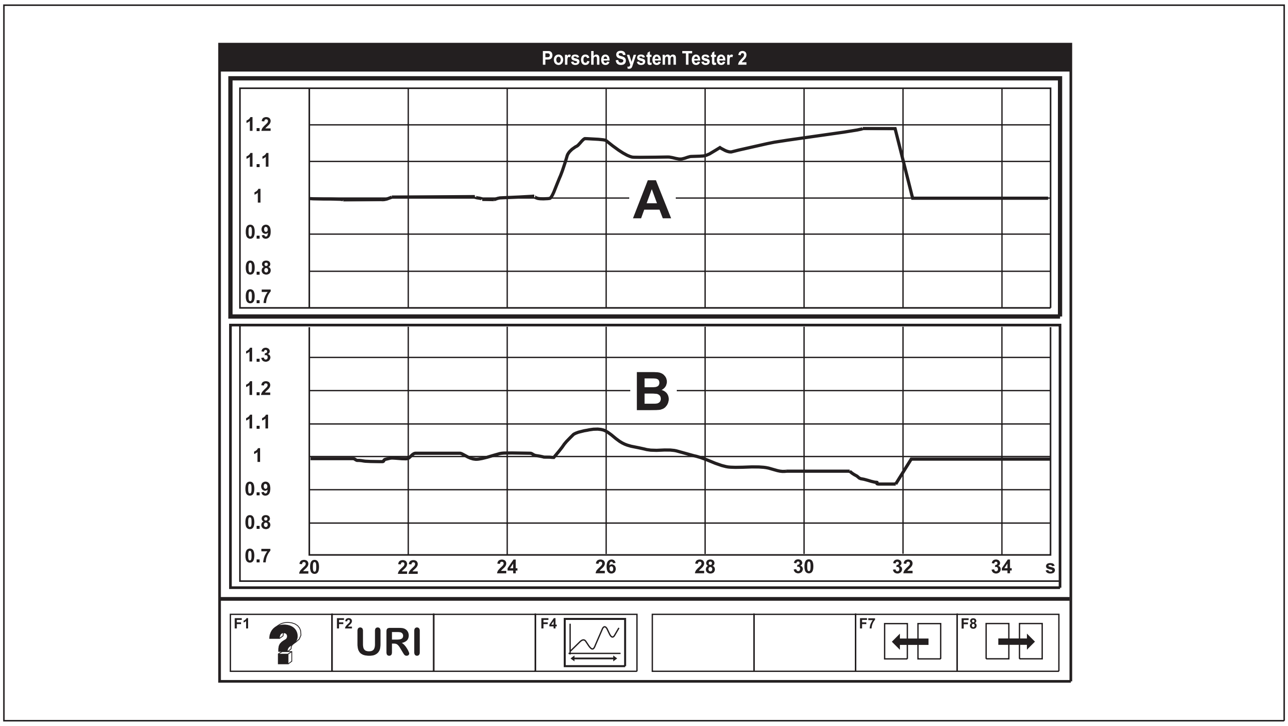
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type "below limit" is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key [F8] immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

End

P0302

509 Misfire, cylinder 2

Diagnosis conditions

- A cycle of 1,000 crankshaft revolutions is evaluated (for misfire damaging to the TWC, 200 crankshaft revolutions). The misfire rates are compared with a threshold value. If the misfire rate is greater than the threshold value, a fault is recorded in the memory.
- The Check Engine Malfunction Indicator Lamp (MIL) is switched on and stays on when the misfire rate lies above the threshold value at which the emission limit values are exceeded during two consecutive driving cycles (in the case of EOBD 3 driving cycles).
- If the misfire rate may lead to permanent damage to the TWC, the Check Engine MIL flashes. If the misfire rate is no longer reached during the first journey, the MIL goes out. If the rate is reached during the next journey, the MIL flashes. If this misfire rate is subsequently no longer reached, the MIL changes to a continuous light.

Note!

- *When using a block heater (for heating coolant), start and driving off difficulties or misfiring can occur if the block heater was connected for less than 4 hours.*
- *When the fuel tank is driven to empty, misfiring can occur. For this reason the fuel level in the tank is also stored in the memory when misfiring occurs. If the tank was nearly empty, there was probably no fault. Erase fault memory and road test vehicle.*
- *In the event of a short circuit to B+ or ground in the oxygen sensors ahead of the TWC, the mixture becomes too lean or too rich. This can cause misfiring. If, in addition, an oxygen sensor signal fault ahead of the TWC is stored in memory, first correct this fault and then road test the vehicle.*

Possible fault cause

- Fault in ignition system
- Fault in injection system
- Flat-base tappets (valve lift fault)
- Mixture too rich
- Mixture too lean

- Mechanical causes:

Valve lifter chattering

This is caused by dirt in the valve lifter.

When the Check Engine MIL lights up, a chattering valve lifter may also occur for a certain time. The DME control module registers (sporadic) misfiring at one or more cylinders. The mixture adaptation values are normal.

Remedy:

1 - Remove lifter bores, check for damage and blow out oil passages.

2 - Replace all valve lifters.

3 - During the test drive, listen for valve lifter noises.

Camshaft control times adjusted

The camshaft control times have changed. No chattering noises occur. The DME control module indicates misfiring for the entire cylinder bank 1 or 2. The mixture adaptation values in the idle speed range differ in bank 1 and bank 2, the mixture adaptation values in the upper and lower load ranges are generally normal.

Remedy:

1 - Carry out raw emission measurement:

1. Reset mixture adaptation values (disconnect battery)
2. Disconnect oxygen sensors

If the difference between bank 1 and bank 2 is greater than approx. 0.8 %, then

1 - Set the camshaft control times again.

2 - Road test vehicle. The mixture adaptation values must be normal.

VarioCam does not switch over completely

The VarioCam does not switch over completely from power to torque valve timing.

An indication of this problem is misfiring detected by the DME control module in the range of 1200 - 1500 rpm occurring in an entire bank.

The mixture adaptation values are normal.

Remedy:

1 - Replace VarioCam.

2 - Road test vehicle.

Other possible fault causes

- worn camshafts
- leaking valves
- faulty piston rings

If opposing cylinders have misfiring, the cause could be the sensor wheel.

If valve lift faults are suspected, perform the system test for large lift and the system test for small lift with the Porsche System Tester 2.

Note!

If the battery was disconnected, at least range 1 of sensor wheel adaptation must be adapted before troubleshooting is carried out; see actual values explanation.

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If there is a lot of oil in the engine, check that the oil filler tube and cap are tight.

Work instruction		Display OK	If not OK
1	Check for air leaks in intake air system	⇒ Step 2.	Repair intake air system → End.
2	Carry out pressure loss test	⇒ Step 3.	Repair engine → End
3	Check spark plugs. Specified spark plugs: Electrode gap: 1.6 mm ± 0.2 mm. Check appearance of spark plugs	⇒ Step 4.	Replace faulty spark plug(s). → End
4	Check spark plug connectors	Approx. 2 kΩ ⇒ Step 5	Replace faulty spark plug connectors. → End

Work instruction			Display OK	If not OK
5	Check ignition coil(s)	♦ Measure resistance between Pin 1 and Pin 15	0,3 to 0,7 Ω (at 20 °C) ⇒ Step 6.	Replace ignition coil(s) → End
6	Check all connectors for secure fastening and corrosion		⇒ Step 7.	Clean plug connections and connect securely. → End
7	Check fuel pressure	♦ Undo and remove the closure cap of the fuel collection pipe test connection (A/F 13 mm) ♦ Connect pressure gauge (special tool P 378a) to connecting line (special tool 9559) and connect to test connection. ♦ Actuate fuel pump, either with the Porsche System Tester or via a fuel pump relay without tester ♦ Nominal test value, stationary engine ♦ Nominal test value, engine idling	3,8 ± 0.2 bar 3,3 ± 0.2 bar ⇒ Step 9	⇒ Step 8.

Note!

The seal or sealing ring in the brass closure cap is not exchangeable. It must therefore be used only once.

Tightening torque of new brass closure cap 2.5 ± 0.5 Nm (2.0 ± 0.5 ftlb.)

Work instruction			Display OK	If not OK
8	Check volume supply of fuel pump. (Fuel filter and electrical supply OK)	♦ Relieve pressure in fuel tank by opening tank cap. ♦ Connect Porsche System Tester 2 ♦ Remove complete air filter system ♦ Detach fuel return line (A/F 17 mm) from the engine compartment (left), taking care to hold it fast (A/F 17 mm). ♦ Collect residual fuel ♦ Observe safety regulations ♦ Connect fuel hose (shop-made, approx. 1.5 metres long) to the fitting and hold in a measuring container ♦ Actuate fuel pump with the Porsche System Tester 2 and allow fuel to flow into the measuring container for 30 seconds ♦ Volume supply must be at least 850 cm^3/ 30 s, i.e. after 30 seconds at least 850 cm^3 of fuel must be in the measuring container.	→ End.	

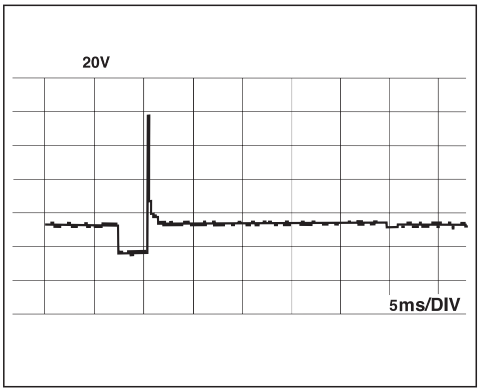
Note!

It is essential to observe safety regulations for handling fuel.

Work instruction			Display OK	If not OK
9	Check triggering of fuel injectors	♦ The fuel injectors can be individually suppressed with the Porsche System Tester 2 in the menu 'Drive link active'	The engine idle speed decreases if triggering is OK	Check triggering ⇒ Step 9a
9a	B+ supply	♦ Remove connector of fuel injector to be checked ♦ Measure voltage between valve plug contact Pin 1 and ground ♦ Switch on the ignition.	> 11 V ⇒ Step 9b	Check wiring according to wiring diagram for continuity or short circuit → End
9b	Coil resistance of fuel injectors	♦ Remove connector of fuel injector to be checked ♦ Measure resistance between the terminals of the fuel injector	11 - 13 Ω ⇒ Step 9c	

Work instruction			Display OK	If not OK
9c	Injection output stage (negative supply)	♦ Connect special tool V.A.G 1315 A/1 between fuel injector and connector ♦ Connect engine tester according to manufacturer's instructions. Connect cable for special input to special tool ♦ Start the engine.	See Figure ⇒ Step 9d	
9d	♦ Perform system test for large lift		→ End.	

Figure:



Warning!

Tester cables must not be connected to ground.

Note!

If the engine does not start, or if the idling speed drops, replace tester cable connected to special tool.

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

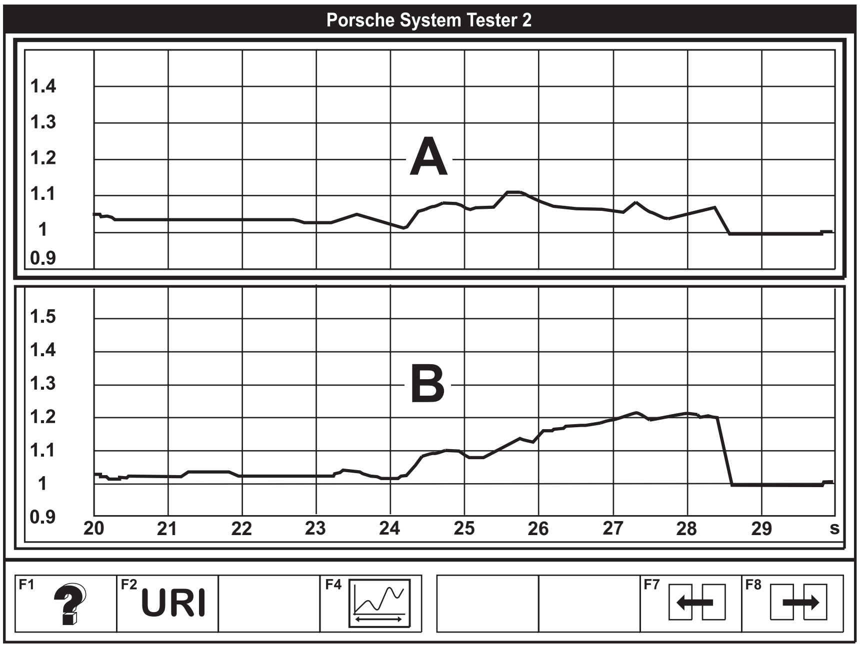
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Continue by performing the system test for small lift

Perform system test for small lift

⚠ **Warning!**

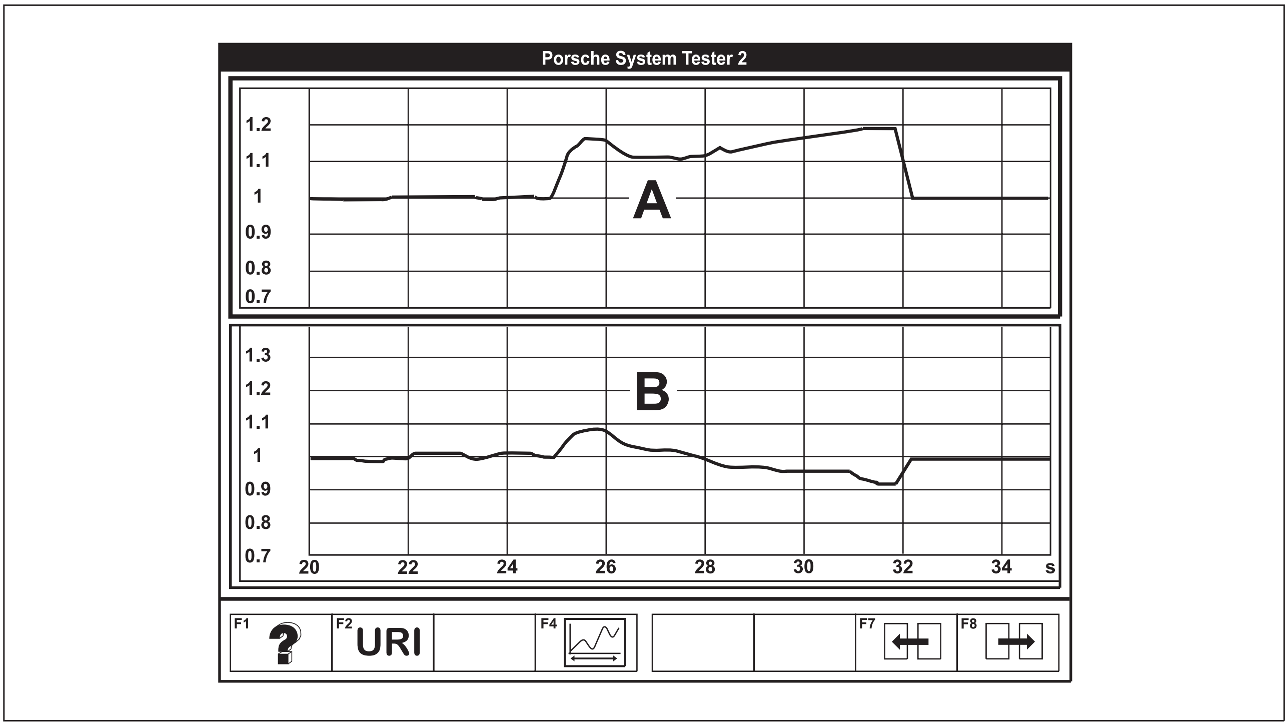
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type "below limit" is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

End

P0303

510 Misfire, cylinder 3

Diagnosis conditions

- A cycle of 1,000 crankshaft revolutions is evaluated (for misfire damaging to the TWC, 200 crankshaft revolutions). The misfire rates are compared with a threshold value. If the misfire rate is greater than the threshold value, a fault is recorded in the memory.
- The Check Engine Malfunction Indicator Lamp (MIL) is switched on and stays on when the misfire rate lies above the threshold value at which the emission limit values are exceeded during two consecutive driving cycles (in the case of EOBD 3 driving cycles).
- If the misfire rate may lead to permanent damage to the TWC, the Check Engine MIL flashes. If the misfire rate is no longer reached during the first journey, the MIL goes out. If the rate is reached during the next journey, the MIL flashes. If this misfire rate is subsequently no longer reached, the MIL changes to a continuous light.

Note!

- *When using a block heater (for heating coolant), start and driving off difficulties or misfiring can occur if the block heater was connected for less than 4 hours.*
- *When the fuel tank is driven to empty, misfiring can occur. For this reason the fuel level in the tank is also stored in the memory when misfiring occurs. If the tank was nearly empty, there was probably no fault. Erase fault memory and road test vehicle.*
- *In the event of a short circuit to B+ or ground in the oxygen sensors ahead of the TWC, the mixture becomes too lean or too rich. This can cause misfiring. If, in addition, an oxygen sensor signal fault ahead of the TWC is stored in memory, first correct this fault and then road test the vehicle.*

Possible fault cause

- Fault in ignition system
- Fault in injection system
- Flat-base tappets (valve lift fault)
- Mixture too rich
- Mixture too lean

- Mechanical causes:

Valve lifter chattering

This is caused by dirt in the valve lifter.

When the Check Engine MIL lights up, a chattering valve lifter may also occur for a certain time. The DME control module registers (sporadic) misfiring at one or more cylinders. The mixture adaptation values are normal.

Remedy:

1 - Remove lifter bores, check for damage and blow out oil passages.

2 - Replace all valve lifters.

3 - During the test drive, listen for valve lifter noises.

Camshaft control times adjusted

The camshaft control times have changed. No chattering noises occur. The DME control module indicates misfiring for the entire cylinder bank 1 or 2. The mixture adaptation values in the idle speed range differ in bank 1 and bank 2, the mixture adaptation values in the upper and lower load ranges are generally normal.

Remedy:

1 - Carry out raw emission measurement:

1. Reset mixture adaptation values (disconnect battery)
2. Disconnect oxygen sensors

If the difference between bank 1 and bank 2 is greater than approx. 0.8 %, then

1 - Set the camshaft control times again.

2 - Road test vehicle. The mixture adaptation values must be normal.

VarioCam does not switch over completely

The VarioCam does not switch over completely from power to torque valve timing.

An indication of this problem is misfiring detected by the DME control module in the range of 1200 - 1500 rpm occurring in an entire bank.

The mixture adaptation values are normal.

Remedy:

1 - Replace VarioCam.

2 - Road test vehicle.

Other possible fault causes

- worn camshafts
- leaking valves
- faulty piston rings

If opposing cylinders have misfiring, the cause could be the sensor wheel.

If valve lift faults are suspected, perform the system test for large lift and the system test for small lift with the Porsche System Tester 2.

Note!

If the battery was disconnected, at least range 1 of sensor wheel adaptation must be adapted before troubleshooting is carried out; see actual values explanation.

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If there is a lot of oil in the engine, check that the oil filler tube and cap are tight.

Work instruction		**Display OK**	**If not OK**
1	Check for air leaks in intake air system	⇒ Step 2.	Repair intake air system → End.
2	Carry out pressure loss test	⇒ Step 3.	Repair engine → End
3	Check spark plugs. Specified spark plugs: Electrode gap: 1.6 mm ± 0.2 mm. Check appearance of spark plugs	⇒ Step 4.	Replace faulty spark plug(s). → End
4	Check spark plug connectors	Approx. 2 kΩ ⇒ Step 5	Replace faulty spark plug connectors. → End

Work instruction			Display OK	If not OK
5	Check ignition coil(s)	♦ Measure resistance between Pin 1 and Pin 15	0,3 to 0,7 Ω (at 20 °C) ⇒ Step 6.	Replace ignition coil(s) → End
6	Check all connectors for secure fastening and corrosion		⇒ Step 7.	Clean plug connections and connect securely. → End
7	Check fuel pressure	♦ Undo and remove the closure cap of the fuel collection pipe test connection (A/F 13 mm) ♦ Connect pressure gauge (special tool P 378a) to connecting line (special tool 9559) and connect to test connection. ♦ Actuate fuel pump, either with the Porsche System Tester or via a fuel pump relay without tester		⇒ Step 8.
		♦ Nominal test value, stationary engine	3,8 ± 0.2 bar	
		♦ Nominal test value, engine idling	3,3 ± 0.2 bar ⇒ Step 9	

Note!

The seal or sealing ring in the brass closure cap is not exchangeable. It must therefore be used only once.

Tightening torque of new brass closure cap 2.5 ± 0.5 Nm (2.0 ± 0.5 ftlb.)

Work instruction			Display OK	If not OK
8	Check volume supply of fuel pump. (Fuel filter and electrical supply OK)	♦ Relieve pressure in fuel tank by opening tank cap. ♦ Connect Porsche System Tester 2 ♦ Remove complete air filter system ♦ Detach fuel return line (A/F 17 mm) from the engine compartment (left), taking care to hold it fast (A/F 17 mm). ♦ Collect residual fuel ♦ Observe safety regulations ♦ Connect fuel hose (shop-made, approx. 1.5 metres long) to the fitting and hold in a measuring container ♦ Actuate fuel pump with the Porsche System Tester 2 and allow fuel to flow into the measuring container for 30 seconds ♦ Volume supply must be at least 850 cm^3/ 30 s, i.e. after 30 seconds at least 850 cm^3 of fuel must be in the measuring container.	→ End.	

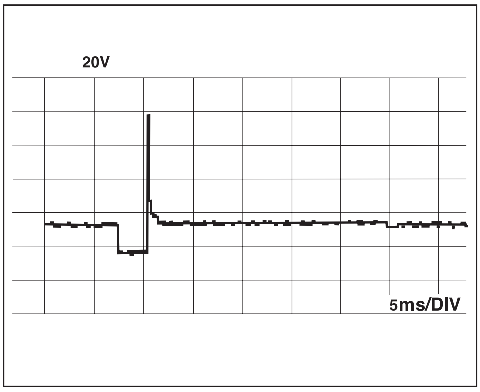
Note!

It is essential to observe safety regulations for handling fuel.

Work instruction			Display OK	If not OK
9	Check triggering of fuel injectors	♦ The fuel injectors can be individually suppressed with the Porsche System Tester 2 in the menu 'Drive link active'	The engine idle speed decreases if triggering is OK	Check triggering ⇒ Step 9a
9a	B+ supply	♦ Remove connector of fuel injector to be checked ♦ Measure voltage between valve plug contact Pin 1 and ground ♦ Switch on the ignition.	> 11 V ⇒ Step 9b	Check wiring according to wiring diagram for continuity or short circuit → End
9b	Coil resistance of fuel injectors	♦ Remove connector of fuel injector to be checked ♦ Measure resistance between the terminals of the fuel injector	11 - 13 Ω ⇒ Step 9c	

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>9c</td><td>Injection output stage (negative supply)</td><td>♦ Connect special tool V.A.G 1315 A/1 between fuel injector and connector
♦ Connect engine tester according to manufacturer's instructions. Connect cable for special input to special tool
♦ Start the engine.</td><td>See Figure
⇒ Step 9d</td><td></td></tr>
<tr><td>9d</td><td colspan="2">♦ Perform system test for large lift</td><td colspan="2">→ End.</td></tr>
</table>

Figure:



Warning!

Tester cables must not be connected to ground.

Note!

If the engine does not start, or if the idling speed drops, replace tester cable connected to special tool.

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

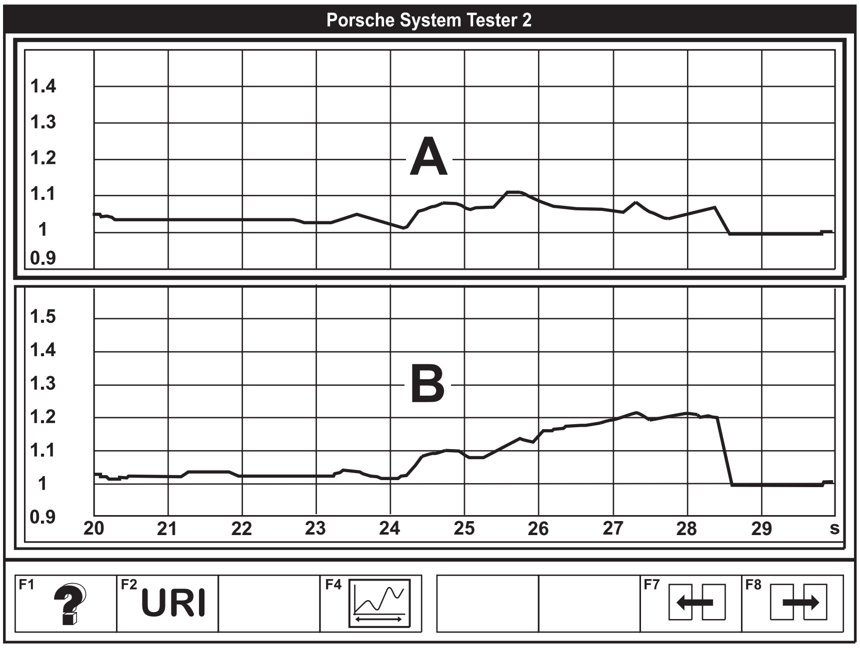
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Continue by performing the system test for small lift

Perform system test for small lift

Warning!

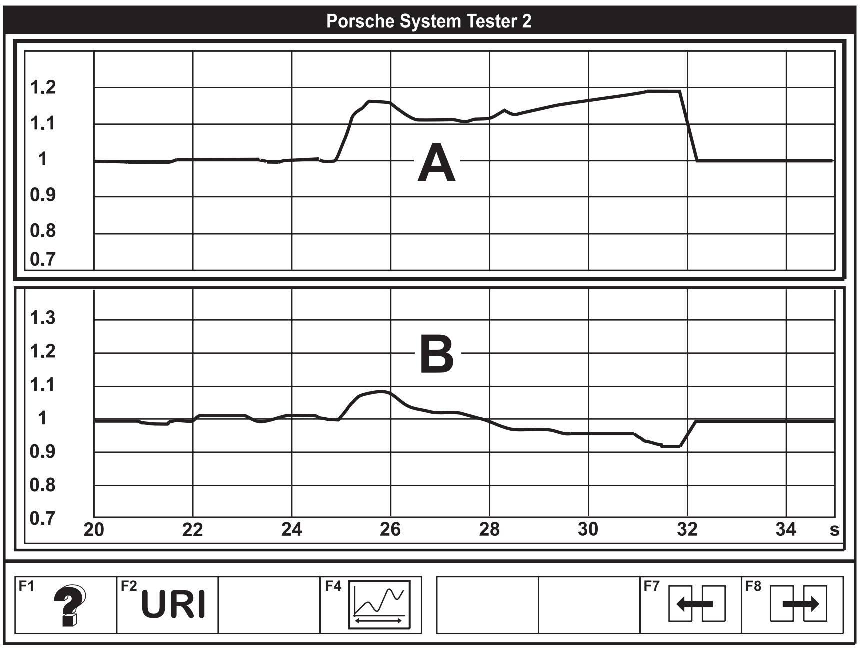
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type "below limit" is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture (F_R > 1) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 **immediately before acceleration with wide-open throttle.**

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

End

P0304

511 Misfire, cylinder 4

Diagnosis conditions

- A cycle of 1,000 crankshaft revolutions is evaluated (for misfire damaging to the TWC, 200 crankshaft revolutions). The misfire rates are compared with a threshold value. If the misfire rate is greater than the threshold value, a fault is recorded in the memory.
- The Check Engine Malfunction Indicator Lamp (MIL) is switched on and stays on when the misfire rate lies above the threshold value at which the emission limit values are exceeded during two consecutive driving cycles (in the case of EOBD 3 driving cycles).
- If the misfire rate may lead to permanent damage to the TWC, the Check Engine MIL flashes. If the misfire rate is no longer reached during the first journey, the MIL goes out. If the rate is reached during the next journey, the MIL flashes. If this misfire rate is subsequently no longer reached, the MIL changes to a continuous light.

Note!

- *When using a block heater (for heating coolant), start and driving off difficulties or misfiring can occur if the block heater was connected for less than 4 hours.*
- *When the fuel tank is driven to empty, misfiring can occur. For this reason the fuel level in the tank is also stored in the memory when misfiring occurs. If the tank was nearly empty, there was probably no fault. Erase fault memory and road test vehicle.*
- *In the event of a short circuit to B+ or ground in the oxygen sensors ahead of the TWC, the mixture becomes too lean or too rich. This can cause misfiring. If, in addition, an oxygen sensor signal fault ahead of the TWC is stored in memory, first correct this fault and then road test the vehicle.*

Possible fault cause

- Fault in ignition system
- Fault in injection system
- Flat-base tappets (valve lift fault)
- Mixture too rich
- Mixture too lean

- Mechanical causes:

Valve lifter chattering

This is caused by dirt in the valve lifter.

When the Check Engine MIL lights up, a chattering valve lifter may also occur for a certain time. The DME control module registers (sporadic) misfiring at one or more cylinders. The mixture adaptation values are normal.

Remedy:

1 - Remove lifter bores, check for damage and blow out oil passages.

2 - Replace all valve lifters.

3 - During the test drive, listen for valve lifter noises.

Camshaft control times adjusted

The camshaft control times have changed. No chattering noises occur. The DME control module indicates misfiring for the entire cylinder bank 1 or 2. The mixture adaptation values in the idle speed range differ in bank 1 and bank 2, the mixture adaptation values in the upper and lower load ranges are generally normal.

Remedy:

1 - Carry out raw emission measurement:

1. Reset mixture adaptation values (disconnect battery)
2. Disconnect oxygen sensors

If the difference between bank 1 and bank 2 is greater than approx. 0.8 %, then

1 - Set the camshaft control times again.

2 - Road test vehicle. The mixture adaptation values must be normal.

VarioCam does not switch over completely

The VarioCam does not switch over completely from power to torque valve timing.

An indication of this problem is misfiring detected by the DME control module in the range of 1200 - 1500 rpm occurring in an entire bank.

The mixture adaptation values are normal.

Remedy:

1 - Replace VarioCam.

2 - Road test vehicle.

Other possible fault causes

- worn camshafts
- leaking valves
- faulty piston rings

If opposing cylinders have misfiring, the cause could be the sensor wheel.

If valve lift faults are suspected, perform the system test for large lift and the system test for small lift with the Porsche System Tester 2.

Note!

If the battery was disconnected, at least range 1 of sensor wheel adaptation must be adapted before troubleshooting is carried out; see actual values explanation.

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If there is a lot of oil in the engine, check that the oil filler tube and cap are tight.

Work instruction		**Display OK**	**If not OK**
1	Check for air leaks in intake air system	⇒ Step 2.	Repair intake air system → End.
2	Carry out pressure loss test	⇒ Step 3.	Repair engine → End
3	Check spark plugs. Specified spark plugs: Electrode gap: 1.6 mm ± 0.2 mm. Check appearance of spark plugs	⇒ Step 4.	Replace faulty spark plug(s). → End
4	Check spark plug connectors	Approx. 2 kΩ ⇒ Step 5	Replace faulty spark plug connectors. → End

Work instruction			Display OK	If not OK
5	Check ignition coil(s)	♦ Measure resistance between Pin 1 and Pin 15	0,3 to 0,7 Ω (at 20 °C) ⇒ Step 6.	Replace ignition coil(s) → End
6	Check all connectors for secure fastening and corrosion		⇒ Step 7.	Clean plug connections and connect securely. → End
7	Check fuel pressure	♦ Undo and remove the closure cap of the fuel collection pipe test connection (A/F 13 mm)		⇒ Step 8.
		♦ Connect pressure gauge (special tool P 378a) to connecting line (special tool 9559) and connect to test connection.		
		♦ Actuate fuel pump, either with the Porsche System Tester or via a fuel pump relay without tester		
		♦ Nominal test value, stationary engine	3,8 ± 0.2 bar	
		♦ Nominal test value, engine idling	3,3 ± 0.2 bar ⇒ Step 9	

Note!

The seal or sealing ring in the brass closure cap is not exchangeable. It must therefore be used only once.

Tightening torque of new brass closure cap 2.5 ± 0.5 Nm (2.0 ± 0.5 ftlb.)

Work instruction			Display OK	If not OK
8	Check volume supply of fuel pump. (Fuel filter and electrical supply OK)	♦ Relieve pressure in fuel tank by opening tank cap. ♦ Connect Porsche System Tester 2 ♦ Remove complete air filter system ♦ Detach fuel return line (A/F 17 mm) from the engine compartment (left), taking care to hold it fast (A/F 17 mm). ♦ Collect residual fuel ♦ Observe safety regulations ♦ Connect fuel hose (shop-made, approx. 1.5 metres long) to the fitting and hold in a measuring container ♦ Actuate fuel pump with the Porsche System Tester 2 and allow fuel to flow into the measuring container for 30 seconds ♦ Volume supply must be at least 850 cm^3/ 30 s, i.e. after 30 seconds at least 850 cm^3 of fuel must be in the measuring container.	→ End.	

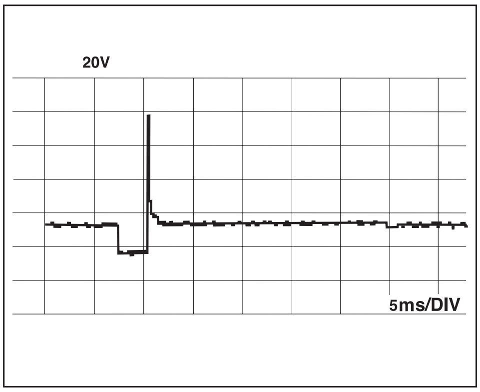
Note!

It is essential to observe safety regulations for handling fuel.

Work instruction			Display OK	If not OK
9	Check triggering of fuel injectors	♦ The fuel injectors can be individually suppressed with the Porsche System Tester 2 in the menu 'Drive link active'	The engine idle speed decreases if triggering is OK	Check triggering ⇒ Step 9a
9a	B+ supply	♦ Remove connector of fuel injector to be checked ♦ Measure voltage between valve plug contact Pin 1 and ground ♦ Switch on the ignition.	> 11 V ⇒ Step 9b	Check wiring according to wiring diagram for continuity or short circuit → End
9b	Coil resistance of fuel injectors	♦ Remove connector of fuel injector to be checked ♦ Measure resistance between the terminals of the fuel injector	11 - 13 Ω ⇒ Step 9c	

Work instruction			Display OK	If not OK
9c	Injection output stage (negative supply)	♦ Connect special tool V.A.G 1315 A/1 between fuel injector and connector ♦ Connect engine tester according to manufacturer's instructions. Connect cable for special input to special tool ♦ Start the engine.	See Figure ⇒ Step 9d	
9d	♦ Perform system test for large lift		→ End.	

Figure:



Warning!

Tester cables must not be connected to ground.

Note!

If the engine does not start, or if the idling speed drops, replace tester cable connected to special tool.

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

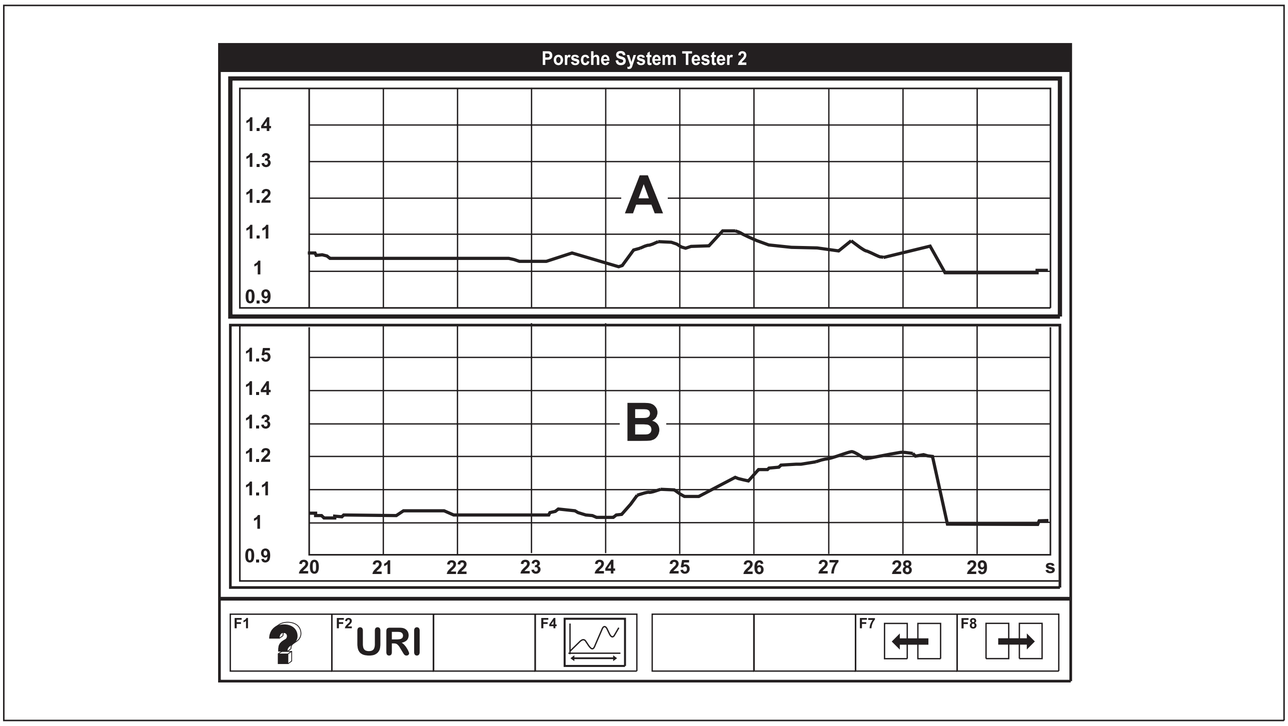
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Continue by performing the system test for small lift

Perform system test for small lift

Warning!

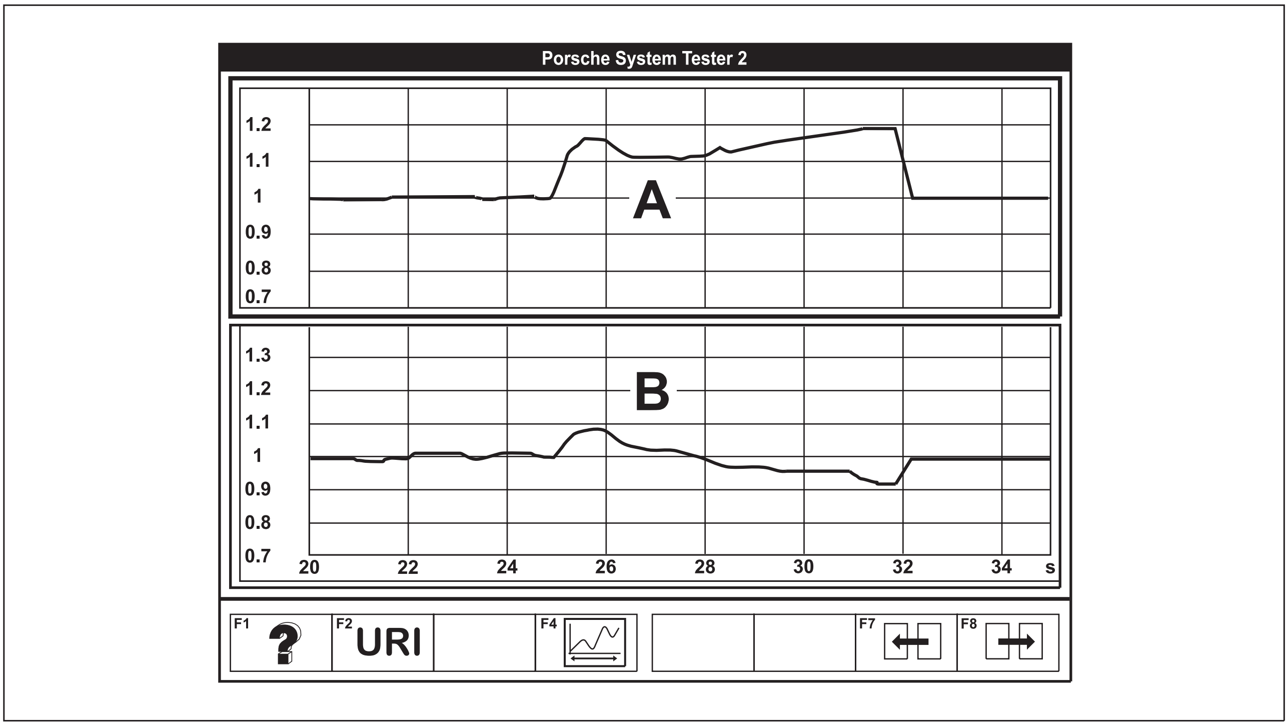
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type "below limit" is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

End

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P0305

512 Misfire, cylinder 5

Diagnosis conditions

- A cycle of 1,000 crankshaft revolutions is evaluated (for misfire damaging to the TWC, 200 crankshaft revolutions). The misfire rates are compared with a threshold value. If the misfire rate is greater than the threshold value, a fault is recorded in the memory.
- The Check Engine Malfunction Indicator Lamp (MIL) is switched on and stays on when the misfire rate lies above the threshold value at which the emission limit values are exceeded during two consecutive driving cycles (in the case of EOBD 3 driving cycles).
- If the misfire rate may lead to permanent damage to the TWC, the Check Engine MIL flashes. If the misfire rate is no longer reached during the first journey, the MIL goes out. If the rate is reached during the next journey, the MIL flashes. If this misfire rate is subsequently no longer reached, the MIL changes to a continuous light.

Note!

- *When using a block heater (for heating coolant), start and driving off difficulties or misfiring can occur if the block heater was connected for less than 4 hours.*
- *When the fuel tank is driven to empty, misfiring can occur. For this reason the fuel level in the tank is also stored in the memory when misfiring occurs. If the tank was nearly empty, there was probably no fault. Erase fault memory and road test vehicle.*
- *In the event of a short circuit to B+ or ground in the oxygen sensors ahead of the TWC, the mixture becomes too lean or too rich. This can cause misfiring. If, in addition, an oxygen sensor signal fault ahead of the TWC is stored in memory, first correct this fault and then road test the vehicle.*

Possible fault cause

- Fault in ignition system
- Fault in injection system
- Flat-base tappets (valve lift fault)
- Mixture too rich
- Mixture too lean

- Mechanical causes:

Valve lifter chattering

This is caused by dirt in the valve lifter.

When the Check Engine MIL lights up, a chattering valve lifter may also occur for a certain time. The DME control module registers (sporadic) misfiring at one or more cylinders. The mixture adaptation values are normal.

Remedy:

1 - Remove lifter bores, check for damage and blow out oil passages.

2 - Replace all valve lifters.

3 - During the test drive, listen for valve lifter noises.

Camshaft control times adjusted

The camshaft control times have changed. No chattering noises occur. The DME control module indicates misfiring for the entire cylinder bank 1 or 2. The mixture adaptation values in the idle speed range differ in bank 1 and bank 2, the mixture adaptation values in the upper and lower load ranges are generally normal.

Remedy:

1 - Carry out raw emission measurement:

1. Reset mixture adaptation values (disconnect battery)
2. Disconnect oxygen sensors

If the difference between bank 1 and bank 2 is greater than approx. 0.8 %, then

1 - Set the camshaft control times again.

2 - Road test vehicle. The mixture adaptation values must be normal.

VarioCam does not switch over completely

The VarioCam does not switch over completely from power to torque valve timing.

An indication of this problem is misfiring detected by the DME control module in the range of 1200 - 1500 rpm occurring in an entire bank.

The mixture adaptation values are normal.

Remedy:

1 - Replace VarioCam.

2 - Road test vehicle.

Other possible fault causes

- worn camshafts
- leaking valves
- faulty piston rings

If opposing cylinders have misfiring, the cause could be the sensor wheel.

If valve lift faults are suspected, perform the system test for large lift and the system test for small lift with the Porsche System Tester 2.

Note!

If the battery was disconnected, at least range 1 of sensor wheel adaptation must be adapted before troubleshooting is carried out; see actual values explanation.

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If there is a lot of oil in the engine, check that the oil filler tube and cap are tight.

Work instruction		Display OK	If not OK
1	Check for air leaks in intake air system	⇒ Step 2.	Repair intake air system → End.
2	Carry out pressure loss test	⇒ Step 3.	Repair engine → End
3	Check spark plugs. Specified spark plugs: Electrode gap: 1.6 mm ± 0.2 mm. Check appearance of spark plugs	⇒ Step 4.	Replace faulty spark plug(s). → End
4	Check spark plug connectors	Approx. 2 kΩ ⇒ Step 5	Replace faulty spark plug connectors. → End

Work instruction			Display OK	If not OK
5	Check ignition coil(s)	♦ Measure resistance between Pin 1 and Pin 15	0,3 to 0,7 Ω (at 20 °C) ⇒ Step 6.	Replace ignition coil(s) → End
6	Check all connectors for secure fastening and corrosion		⇒ Step 7.	Clean plug connections and connect securely. → End
7	Check fuel pressure	♦ Undo and remove the closure cap of the fuel collection pipe test connection (A/F 13 mm) ♦ Connect pressure gauge (special tool P 378a) to connecting line (special tool 9559) and connect to test connection. ♦ Actuate fuel pump, either with the Porsche System Tester or via a fuel pump relay without tester		⇒ Step 8.
		♦ Nominal test value, stationary engine	3,8 ± 0.2 bar	
		♦ Nominal test value, engine idling	3,3 ± 0.2 bar ⇒ Step 9	

Note!

The seal or sealing ring in the brass closure cap is not exchangeable. It must therefore be used only once.

Tightening torque of new brass closure cap 2.5 ± 0.5 Nm (2.0 ± 0.5 ftlb.)

Work instruction			Display OK	If not OK
8	Check volume supply of fuel pump. (Fuel filter and electrical supply OK)	♦ Relieve pressure in fuel tank by opening tank cap. ♦ Connect Porsche System Tester 2 ♦ Remove complete air filter system ♦ Detach fuel return line (A/F 17 mm) from the engine compartment (left), taking care to hold it fast (A/F 17 mm). ♦ Collect residual fuel ♦ Observe safety regulations ♦ Connect fuel hose (shop-made, approx. 1.5 metres long) to the fitting and hold in a measuring container ♦ Actuate fuel pump with the Porsche System Tester 2 and allow fuel to flow into the measuring container for 30 seconds ♦ Volume supply must be at least 850 cm^3/ 30 s, i.e. after 30 seconds at least 850 cm^3 of fuel must be in the measuring container.	→ End.	

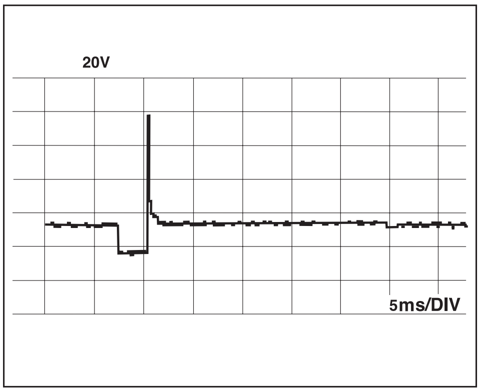
Note!

It is essential to observe safety regulations for handling fuel.

Work instruction			Display OK	If not OK
9	Check triggering of fuel injectors	♦ The fuel injectors can be individually suppressed with the Porsche System Tester 2 in the menu 'Drive link active'	The engine idle speed decreases if triggering is OK	Check triggering ⇒ Step 9a
9a	B+ supply	♦ Remove connector of fuel injector to be checked ♦ Measure voltage between valve plug contact Pin 1 and ground ♦ Switch on the ignition.	> 11 V ⇒ Step 9b	Check wiring according to wiring diagram for continuity or short circuit → End
9b	Coil resistance of fuel injectors	♦ Remove connector of fuel injector to be checked ♦ Measure resistance between the terminals of the fuel injector	11 - 13 Ω ⇒ Step 9c	

Work instruction			Display OK	If not OK
9c	Injection output stage (negative supply)	♦ Connect special tool V.A.G 1315 A/1 between fuel injector and connector ♦ Connect engine tester according to manufacturer's instructions. Connect cable for special input to special tool ♦ Start the engine.	See Figure ⇒ Step 9d	
9d	♦ Perform system test for large lift		→ End.	

Figure:



Warning!

Tester cables must not be connected to ground.

Note!

If the engine does not start, or if the idling speed drops, replace tester cable connected to special tool.

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

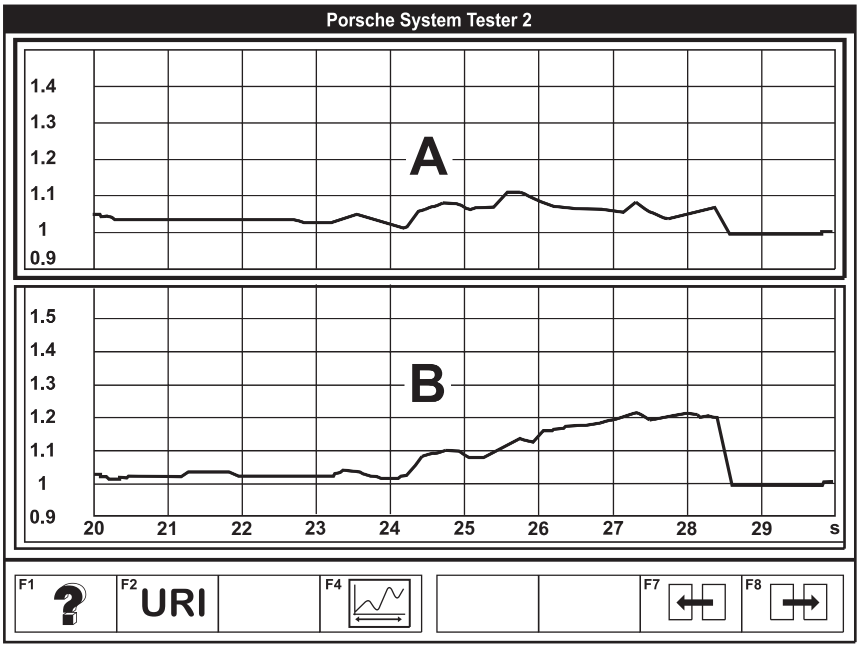
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Continue by performing the system test for small lift

Perform system test for small lift

Warning!

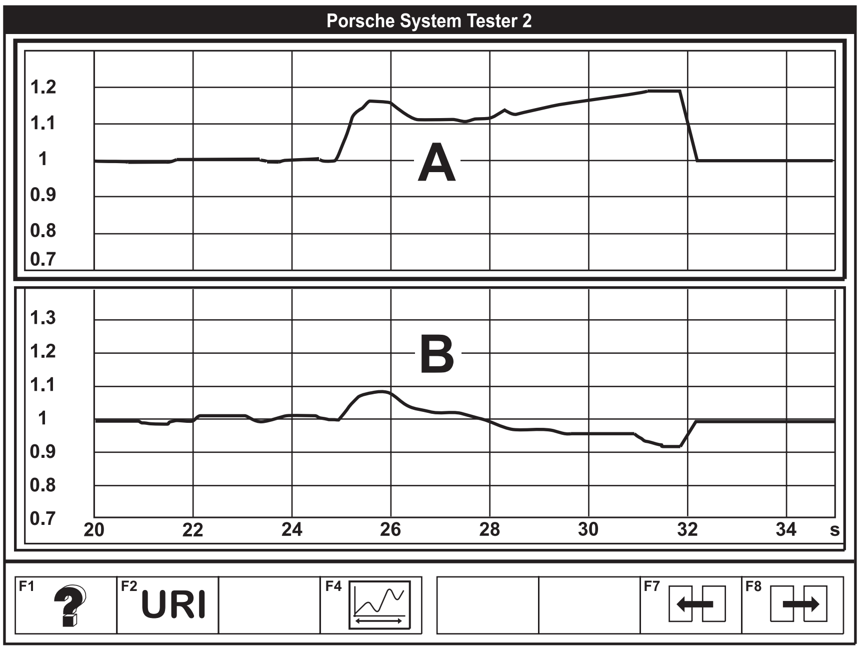
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type "below limit" is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

End

P0306

513 Misfire, cylinder 6

Diagnosis conditions

- A cycle of 1,000 crankshaft revolutions is evaluated (for misfire damaging to the TWC, 200 crankshaft revolutions). The misfire rates are compared with a threshold value. If the misfire rate is greater than the threshold value, a fault is recorded in the memory.
- The Check Engine Malfunction Indicator Lamp (MIL) is switched on and stays on when the misfire rate lies above the threshold value at which the emission limit values are exceeded during two consecutive driving cycles (in the case of EOBD 3 driving cycles).
- If the misfire rate may lead to permanent damage to the TWC, the Check Engine MIL flashes. If this misfire rate is subsequently no longer reached, the MIL changes to a continuous light.

Note!

- *When using a block heater (for heating coolant), start and driving off difficulties can occur or misfiring if the block heater was connected for less than 4 hours.*
- *When the fuel tank is driven to empty, misfiring can occur. For this reason the fuel level in the tank is also stored in the memory when misfiring occurs. If the tank was nearly empty, there was probably no fault. Erase fault memory and road test vehicle.*
- *In the event of a short circuit to B+ or ground in the oxygen sensors ahead of the TWC, the mixture becomes too lean or too rich. This can cause misfiring. If, in addition, an oxygen sensor signal fault ahead of the TWC is stored in memory, first correct this fault and then road test the vehicle.*

Possible fault cause

- Fault in ignition system
- Fault in injection system
- Flat-base tappets (valve lift fault)
- Mixture too rich
- Mixture too lean
- Mechanical causes:

Valve lifter chattering

This is caused by dirt in the valve lifter.

When the Check Engine MIL lights up, a chattering valve lifter may also occur for a certain time. The DME control module registers (sporadic) misfiring at one or more cylinders. The mixture adaptation values are normal.

Remedy:

1 - Remove lifter bores, check for damage and blow out oil passages.

2 - Replace all valve lifters.

3 - During the test drive, listen for valve lifter noises.

Camshaft control badly adjusted

The camshaft control has changed. No chattering noises occur. The DME control module indicates misfiring for the entire cylinder bank 1 or 2. The mixture adaptation values in the idle speed range differ in bank 1 and bank 2, the mixture adaptation values in the upper and lower load ranges are generally normal.

Remedy:

1 - Carry out raw emission measurement:

1. Reset mixture adaptation values (disconnect battery)
2. Disconnect oxygen sensors

If the difference between bank 1 and bank 2 is greater than approx. 0.8 %, then

1 - Reset camshaft control.

2 - Road test vehicle. The mixture adaptation values must be normal.

VarioCam does not switch over completely

The VarioCam does not switch over completely from power to torque valve timing.

An indication of this problem is misfiring detected by the DME control module in the range of 1200 - 1500 rpm occurring in an entire bank.

The mixture adaptation values are normal.

Remedy:

1 - Replace VarioCam.

2 - Road test vehicle.

Other possible fault causes

- worn camshafts
- leaking valves
- faulty piston rings

If opposing cylinders have misfiring, the cause could be the sensor wheel.

If valve lift faults are suspected, perform the system test for large lift and the system test for small lift with the Porsche System Tester 2.

Note!

If the battery was disconnected, at least range 1 must be adapted before troubleshooting is carried out.

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If there is a lot of oil in the engine, check that the oil filler tube and cap are tight.

Work instruction			**Display OK**	**If not OK**
1	Check for air leaks in intake air system		⇒ Step 2.	Repair intake air system → End.
2	Carry out pressure loss test		⇒ Step 3.	Repair engine → End
3	Check spark plugs. Specified spark plugs: Electrode gap: 1.6 mm ± 0.2 mm. Check appearance of spark plugs		⇒ Step 4.	Replace faulty spark plug(s). → End
4	Check spark plug connectors		Approx. 2 kΩ ⇒ Step 5	Replace faulty spark plug connectors. → End
5	Check ignition coil(s)	♦ Measure resistance between Pin 1 and Pin 15	0,3 to 0,7 Ω (at 20 °C) ⇒ Step 6.	Replace ignition coil(s) → End

Work instruction			Display OK	If not OK
6	Check all connectors for secure fastening and corrosion		⇒ Step 7.	Clean plug connections and connect securely. → End
7	Check fuel pressure	♦ Undo and remove the closure cap of the fuel collection pipe test connection (A/F 13 mm) ♦ Connect pressure gauge (special tool P 378a) to connecting line (special tool 9559) and connect to test connection. ♦ Actuate fuel pump, either with the Porsche System Tester or via a fuel pump relay without tester		⇒ Step 8.
		♦ Nominal test value, stationary engine	3,8 ± 0.2 bar	
		♦ Nominal test value, engine idling	3,3 ± 0.2 bar ⇒ Step 9	

Note!

The seal or sealing ring in the brass closure cap is not exchangeable. It must therefore be used only once.

Tightening torque of new brass closure cap 2.5 ± 0.5 Nm (2.0 ± 0.5 ftlb.)

Work instruction			Display OK	If not OK
8	Check volume supply of fuel pump. (Fuel filter and electrical supply OK)	♦ Relieve pressure in fuel tank by opening tank cap. ♦ Connect Porsche System Tester 2 ♦ Remove complete air filter system ♦ Detach fuel return line (A/F 17 mm) from the engine compartment (left), taking care to hold it fast (A/F 17 mm). ♦ Collect residual fuel ♦ Observe safety regulations ♦ Connect fuel hose (shop-made, approx. 1.5 metres long) to the fitting and hold in a measuring container ♦ Actuate fuel pump with the Porsche System Tester 2 and allow fuel to flow into the measuring container for 30 seconds ♦ Volume supply must be at least 850 cm^3/ 30 s, i.e. after 30 seconds at least 850 cm^3 of fuel must be in the measuring container.	→ End.	

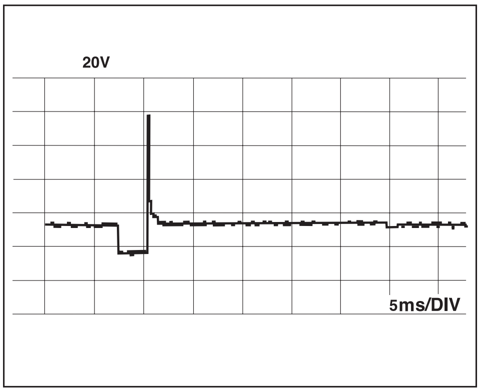
Note!

It is essential to observe safety regulations for handling fuel.

Work instruction			Display OK	If not OK
9	Check triggering of fuel injectors	♦ The fuel injectors can be individually suppressed with the Porsche System Tester 2 in the menu 'Drive link active'	The engine idle speed decreases if triggering is OK	Check triggering ⇒ Step 9a
9a	B+ supply	♦ Remove connector of fuel injector to be checked ♦ Measure voltage between valve plug contact Pin 1 and ground ♦ Switch on the ignition.	> 11 V ⇒ Step 9b	Check wiring according to wiring diagram for continuity or short circuit → End
9b	Coil resistance of fuel injectors	♦ Remove connector of fuel injector to be checked ♦ Measure resistance between the terminals of the fuel injector	11 - 13 Ω ⇒ Step 9c	

Work instruction			Display OK	If not OK
9c	Injection output stage (negative supply)	♦ Connect special tool V.A.G 1315 A/1 between fuel injector and connector ♦ Connect engine tester according to manufacturer's instructions. Connect cable for special input to special tool ♦ Start the engine.	See Figure ⇒ Step 9d	
9d	♦ Perform system test for large lift		→ End.	

Figure:



Warning!

Tester cables must not be connected to ground.

Note!

If the engine does not start, or if the idling speed drops, replace tester cable connected to special tool.

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

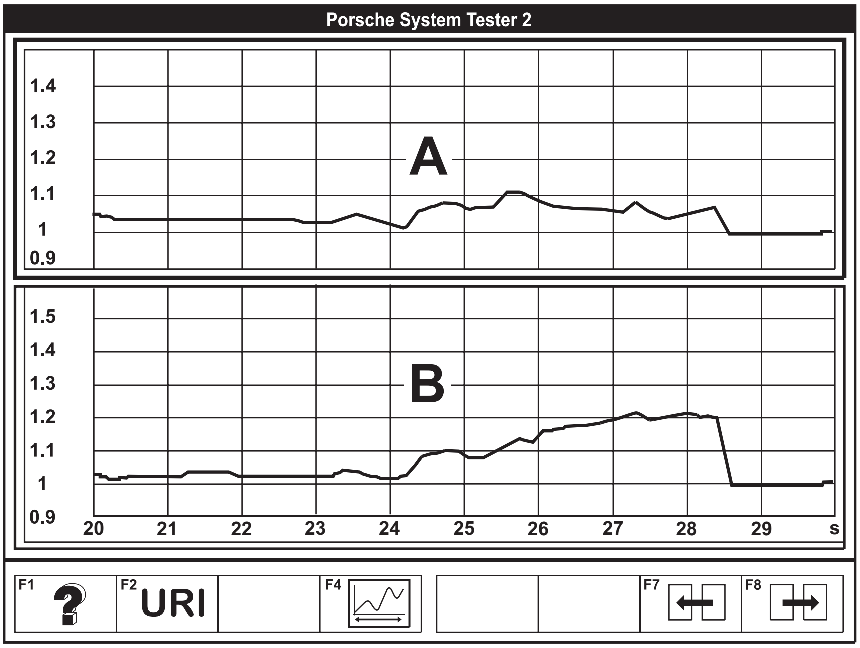
System test for large lift means that faults are detected if a valve does not switch to large lift (fault type: above limit).

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

As a rule, only the cylinder bank with the faulty valve can be detected. Therefore in the case of a fault, the flat-base tappets of the inlet valves of the entire cylinder bank must be replaced.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Continue by performing the system test for small lift

Perform system test for small lift

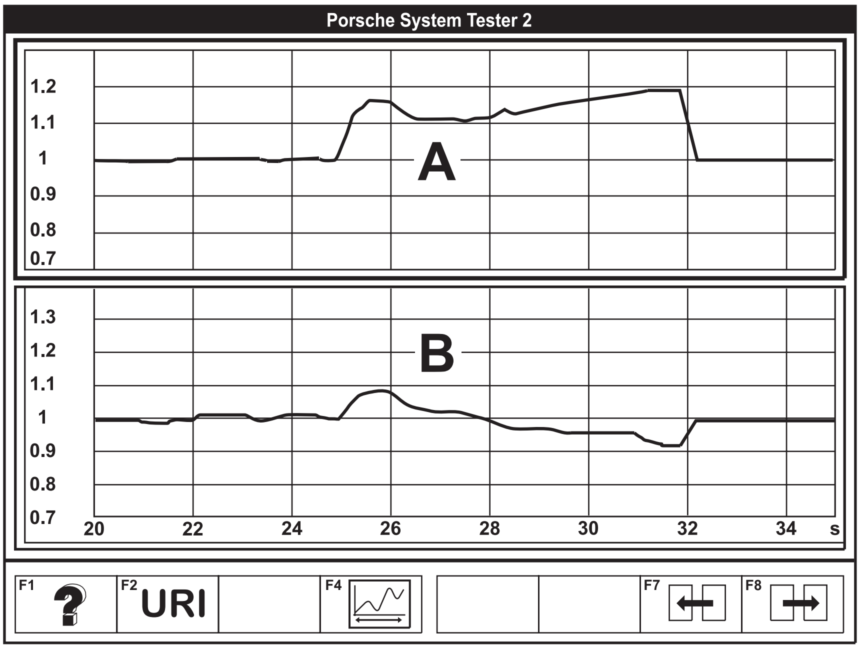
Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

System test for small lift means that faults are detected if a valve remains jammed at large lift (fault type: below limit).

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty. As a rule, only the cylinder bank with the faulty valve can be detected. Therefore in the case of a fault, the flat-base tappets of the inlet valves of the entire cylinder bank must be replaced.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

End

P0324

Knock Control Zero Test - Signal Implausible

Diagnosis conditions

- Engine speed less than 5600 rpm
- Knock control active
- Engine load greater than 45 %

Possible fault cause

- ♦ DME control module

Note!

When a fault is stored, the ignition angle is retarded for all cylinders in the range in which knock control is active.

Affected terminals

-

Diagnosis/Troubleshooting

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 2.</td></tr>
<tr><td>2</td><td>Perform adaptation.</td><td>♦ Switch on the ignition.
♦ Wait one minute.
♦ Do not press the accelerator.
♦ Switch off the ignition for at least 10 seconds.
♦ Read out the fault memory.</td><td colspan="2">→ End.</td></tr>
</table>

P0327

210 Knock sensor 1 - below limit

Diagnosis conditions

- Engine speed more than 3600 rpm
- Engine load greater than 45 %

Possible fault cause

- Break in wiring or short to ground
- Contact corrosion on the connector
- Knock sensor loose
- Short circuit to B+
- Knock sensor

Note!

- *When a fault is stored, the ignition angle is retarded for all cylinders in the range in which knock control is active.*
- *Knock control adaptation is inactive.*
- *If knock control becomes active here, this may indicate engine damage (increased noise level)*

Affected terminals

Terminal III/49 and III/50

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Check plug connection of knock sensor 1	⇒ Step 2	Connect plug connection → End
2	Check plug-in contacts of connector for corrosion	⇒ Step 3	Clean plug-in contacts, replace if necessary. → End
3	Check mounting of knock sensor. Tightening torque: 20 ± 2 Nm (15 ± 1.5 ftlb.)	⇒ Step 4	Mount knock sensor correctly. → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Check wiring from DME control module, Pins III/ 49 and III/50 to knock sensor 1 for continuity</td><td>♦ Remove connector of knock sensor 1</td><td></td><td rowspan="4">Repair wiring harness
→ End</td></tr>
<tr><td>♦ Connect special tool 9637 to wiring harness (DME control module plug)</td><td></td></tr>
<tr><td>♦ Measure resistance between special tool 9637 Pin III/49 and knock sensor plug connection Pin 1</td><td>0 - 5 Ω</td></tr>
<tr><td>♦ Measure resistance between special tool 9637 Pin III/50 and knock sensor plug connection Pin 2</td><td>0 - 5 Ω
⇒ Step 5</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Check wiring from DME control module, Pin III/49, to knock sensor 1 for short to ground</td><td>♦ Remove connector of knock sensor 1</td><td rowspan="3">∞ Ω
⇒ Step 6</td><td rowspan="3">Repair wiring harness
→ End</td></tr>
<tr><td>♦ Connect special tool 9637 to wiring harness (DME control module plug)</td></tr>
<tr><td>♦ Measure resistance between special tool 9637 Pin III/49 and ground</td></tr>
<tr><td>6</td><td colspan="2">Replace knock sensor 1</td><td colspan="2">→ End</td></tr>
</table>

P0328

210 Knock sensor 1 - above limit

Diagnosis conditions

- Engine speed more than 3600 rpm
- Engine load greater than 45 %

Possible fault cause

- Short circuit to B+
- Contact corrosion on the connector
- Knock sensor loose
- Short circuit to B+
- Knock sensor

Note!

- *When a fault is stored, the ignition angle is retarded for all cylinders in the range in which knock control is active.*
- *Knock control adaptation is inactive.*
- *If knock control becomes active here, this may indicate engine damage (increased noise level)*

Affected terminals

Terminal III/49 and III/50

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Check plug connection of knock sensor 1	⇒ Step 2	Connect plug connection → End
2	Check plug-in contacts of connector for corrosion	⇒ Step 3	Clean plug-in contacts, replace if necessary. → End
3	Check mounting of knock sensor. Tightening torque: 20 ± 2 Nm (15 ± 1.5 ftlb.)	⇒ Step 4	Mount knock sensor correctly. → End

Work instruction			Display OK	If not OK
4	Check wiring from DME control module, Pins III/49 and III/50 to knock sensor 1 for continuity	♦ Remove connector of knock sensor 1 ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin III/49 and knock sensor plug connection Pin 1 ♦ Measure resistance between special tool 9637 Pin III/50 and knock sensor plug connection Pin 2	 0 - 5 Ω 0 - 5 Ω ⇒ Step 5	Repair wiring harness → End
5	Check wiring from DME control module, Pin III/49, to knock sensor 1 for short to B+	♦ Remove connector of knock sensor 1 ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Switch on the ignition ♦ Measure voltage between special tool 9637 Pin III/49 and ground	0 V ⇒ Step 6	Repair wiring harness → End
6	Replace knock sensor 1		→ End	

2872 P0328
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P0332

211 Knock sensor 2 - below limit

Diagnosis conditions

- Engine speed more than 3600 rpm
- Engine load greater than 45 %

Possible fault cause

- Break in wiring or short to ground
- Contact corrosion on the connector
- Knock sensor loose
- Short circuit to B+
- Knock sensor

Note!

- *When a fault is stored, the ignition angle is retarded for all cylinders in the range in which knock control is active.*
- *Knock control adaptation is inactive.*
- *If knock control becomes active here, this may indicate engine damage (increased noise level)*

Affected terminals

Terminal III/36 and III/37

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Check plug connection of knock sensor 2	⇒ Step 2	Connect plug connection → End
2	Check plug-in contacts of connector for corrosion	⇒ Step 3	Clean plug-in contacts, replace if necessary. → End
3	Check mounting of knock sensor. Tightening torque: 20 ± 2 Nm (15 ± 1.5 ftlb.)	⇒ Step 4	Mount knock sensor correctly. → End

Work instruction			Display OK	If not OK
4	Check wiring from DME control module, Pins III/36 and III/37 to knock sensor 2 for continuity	♦ Remove connector of knock sensor 2 ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin III/36 and knock sensor plug connection Pin 2 ♦ Measure resistance between special tool 9637 Pin III/37 and knock sensor plug connection Pin 2	0 - 5 Ω 0 - 5 Ω ⇒ Step 5	Repair wiring harness → End
5	Check wiring from DME control module, Pin III/36, to knock sensor 2 for short to ground	♦ Remove connector of knock sensor 2 ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin III/36 and ground	∞ Ω ⇒ Step 6	Repair wiring harness → End
6	Replace knock sensor 2		→ End	

P0333

211 Knock sensor 2 - above limit

Diagnosis conditions

- Engine speed more than 3600 rpm
- Engine load greater than 45 %

Possible fault cause

- Short circuit to B+
- Contact corrosion on the connector
- Knock sensor loose
- Short circuit to B+
- Knock sensor

Note!

- *When a fault is stored, the ignition angle is retarded for all cylinders in the range in which knock control is active.*
- *Knock control adaptation is inactive.*
- *If knock control becomes active here, this may indicate engine damage (increased noise level)*

Affected terminals

Terminal III/36 and III/37

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Check plug connection of knock sensor 2	⇒ Step 2	Connect plug connection → End
2	Check plug-in contacts of connector for corrosion	⇒ Step 3	Clean plug-in contacts, replace if necessary. → End
3	Check mounting of knock sensor. Tightening torque: 20 ± 2 Nm (15 ± 1.5 ftlb.)	⇒ Step 4	Mount knock sensor correctly. → End

Work instruction			Display OK	If not OK
4	Check wiring from DME control module, Pins III/ 36 and III/37 to knock sensor 2 for continuity	♦ Remove connector of knock sensor 2 ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin III/36 and knock sensor plug connection Pin 1 ♦ Measure resistance between special tool 9637 Pin III/37 and knock sensor plug connection Pin 2	0 - 5 Ω 0 - 5 Ω ⇒ Step 5	Repair wiring harness → End
5	Check wiring from DME control module, Pin III/36, to knock sensor 2 for short to B+	♦ Remove connector of knock sensor 2 ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Switch on the ignition ♦ Measure voltage between special tool 9637 Pin III/38 and ground	0 V ⇒ Step 6	Repair wiring harness → End
6	Replace knock sensor 2		→ End	

P0335

Engine Speed Sensor Signal – Open Circuit

Diagnosis conditions

- Engine running

Possible fault cause

- ◆ Corrosion in the connector
- ◆ Open circuit or short circuit in the wiring harness
- ◆ Rpm/crankshaft position sensor faulty.
- ◆ DME control module faulty

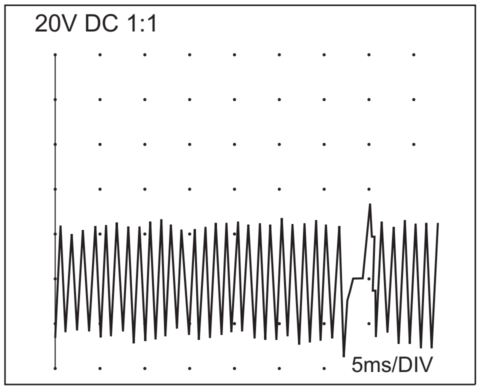
Affected terminals

III/32, III/45 and III/46

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Remove connector.			
2	Check connector for corrosion.			Clean contacts.
3	Check rpm/crankshaft position sensor.	◆ Measure resistance between pins 1 and 2.	0.8 - 1.0 kΩ at 20 °C.	Replace rpm/crankshaft position sensor.
		◆ Measure resistance between pins 1 and 3.	∞ Ω	
4	Check signal with engine tester.	◆ Connect special tool 9637. ◆ Connect engine tester. Use special input, connect positive cable to pin III/32, negative cable to pin III/46 ◆ Start engine or crank engine with starter motor.	The following display should appear on the oscilloscope.	

Figure:



Work instruction			Display OK	If not OK
5	Check wiring from rpm/ crankshaft position sensor to DME control module for open circuit and short circuit	♦ Connect special tool 9637 to wiring harness ♦ Remove connector of rpm/ crankshaft position sensor ♦ Measure resistance between special tool 9637 pin III/32 and plug connection pin 1 ♦ Measure resistance between special tool 9637 pin III/46 and plug connection pin 2 ♦ Measure resistance between ohmmeter on special tool 9637 pin III/45 and plug connection pin 3	0 - 5 Ω	
		♦ Measure resistance between special tool 9637 pin III/32 and ground. ♦ Measure resistance between pin III/46 and ground	∞ Ω	

P0336

110 Engine Speed Sensor Signal - Open Circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Corrosion in the connector
- Open circuit or short circuit in the wiring harness
- Rpm/crankshaft position sensor faulty.
- DME control module faulty

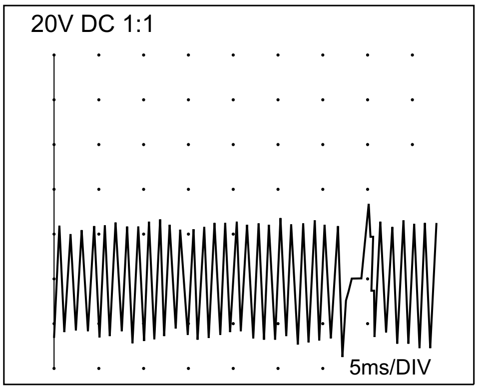
Affected terminals

III/32, III/45 and III/46

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Remove connector			
2	Check for corrosion			Clean contacts
3	Check rpm/crankshaft position sensor	♦ Measure resistance between pins 1 and 2	0.8 - 1.0 kΩ at 20 °C	Replace rpm/crankshaft position sensor
		♦ Measure resistance between pins 1 and 3	∞ Ω	
4	Check signal with engine tester	♦ Connect special tool 9637 ♦ Connect engine tester. Use special input, connect positive cable to pin III/32, negative cable to pin III/46 ♦ Start engine or crank engine with starter motor	The following display should appear on the oscilloscope	

Figure:



Work instruction			Display OK	If not OK
5	Check wiring from rpm/ crankshaft position sensor to DME control module for open circuit and short circuit	♦ Connect special tool 9637 to wiring harness ♦ Remove connector of rpm/ crankshaft position sensor ♦ Measure resistance between special tool 9637 pin III/32 and plug connection pin 1 ♦ Measure resistance between special tool 9637 pin III/46 and plug connection pin 2 ♦ Measure resistance between ohmmeter on special tool 9637 pin III/45 and plug connection pin 3	0 - 5 Ω	
		♦ Measure resistance between special tool 9637 pin III/32 and ground. ♦ Measure resistance between pin III/46 and ground	∞ Ω	

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P0336

Crankshaft Position Sensor, Signal Implausible

Diagnosis conditions

- Engine running

Possible fault cause

- Corrosion in the connector
- Loose contact

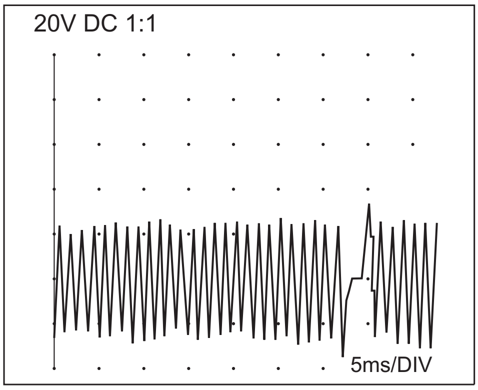
Affected terminals

III/32, III/45 and III/46

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Remove connector.			
2	Check connector for corrosion.	♦ Visual inspection.		Clean contacts.
3	Check rpm/crankshaft position sensor.	♦ Measure resistance between pins 1 and 2.	0.8 - 1.0 kΩ at 20 °C.	Replace rpm/crankshaft position sensor.
		♦ Measure resistance between pins 1 and 3.	∞ Ω	
4	Check signal with engine tester.	♦ Connect special tool 9637. ♦ Connect engine tester. Use special input, connect positive cable to pin III/32, negative cable to pin III/46 ♦ Start engine or crank engine with starter motor.	The following display should appear on the oscilloscope.	

Figure:



p0336a

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P0341

112 Camshaft position sensor 1 - signal implausible

Diagnosis conditions

- Engine running

Possible fault cause

- Loose contact
- Camshaft position sensor

Note!

- *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- *For safety reasons, the ignition timing is retarded.*

Affected terminals

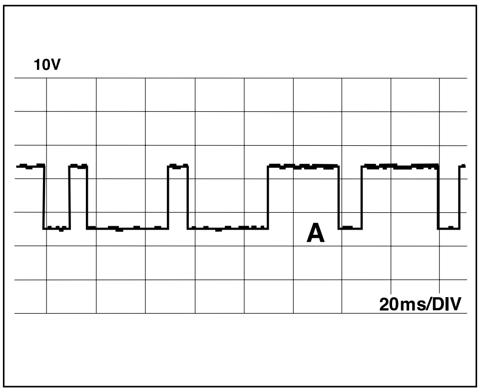
Terminals III/7, III/12 and III/17

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check CMP voltage supply	♦ Remove connector of CMP sensor 1 ♦ Switch on the ignition ♦ Measure voltage between Pin 1 and Pin 3	Approx. 5 V ⇒ Step 5	⇒ Step 2
2	Check power supply wiring for continuity	♦ Remove connector of CMP sensor 1 ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin III/7 and CMP sensor 1 plug Pin 3 ♦ Measure resistance between special tool 9637 Pin III/17 and CMP sensor 1 plug Pin 1	0 - 5 Ω ⇒ Step 3	
3	Replace DME control module		⇒ Step 4	

Work instruction			Display OK	If not OK
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	
5	Check CMP sensor signal	♦ Connect special tool 9637 ♦ Connect engine tester; use special input ♦ Positive cable to Pin III/12 ♦ Negative cable to Pin III/17 ♦ Start the engine	See Figure 1 ⇒ Step 6	Replace CMP sensor → End

Figure 1:



Work instruction			**Display OK**	**If not OK**
6	Check signal wire from DME control module, Pin III/12, to CMP sensor	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of CMP sensor 1 ♦ Measure resistance between special tool 9637 Pin III/12 and CMP sensor 1 plug Pin 2	0 - 5 Ω → End	Repair wiring harness → End

P0342

112 Camshaft position sensor 1 - below limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to ground

Note!

- *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- *For safety reasons, the ignition timing is retarded.*

Affected terminals

Terminal III/12

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire from DME control module, Pin III/12, to CMP sensor for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of CMP sensor 1 ♦ Measure resistance between special tool 9637 Pin III/12 and ground	∞ Ω → End	Repair wiring harness → End

P0343

112 Camshaft position sensor 1 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to B+

Note!

- *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- *For safety reasons, the ignition timing is retarded.*

Affected terminals

Terminal III/12

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire from DME control module, Pin III/12, to CMP sensor for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of CMP sensor 1 ♦ Switch on the ignition ♦ Measure voltage between special tool 9637 Pin III/12 and ground	0 V → End	Repair wiring harness → End

P0344

Camshaft position sensor 1 - open circuit

Diagnosis conditions

- Engine running
- No other camshaft position sensor faults stored in memory (P0341; P0342; P0343)

Possible fault cause

- Camshaft rotor (phase sensor wheel) damaged

Affected terminals

-

Diagnosis/troubleshooting

Note!

The 'No signal' comes because the DME expects a camshaft position sensor signal, but this does not appear because of damage to the camshaft rotor (phase sensor wheel)

Work instruction		Display OK	If not OK
1	Check for further fault entries for camshaft position sensor 1	No further entries ⇒ Step 2	Rectify other camshaft position sensor faults (P0341; P0342; P0343) according to instructions → End
2	Check camshaft rotor for damage	See HBT Group 1 Engine	

P0346

Camshaft Position Sensor 2 - Signal Implausible

Diagnosis conditions

- Engine running

Possible fault cause

- Loose contact
- Camshaft position sensor

Note!

- *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- *For safety reasons, the ignition timing is retarded.*

Affected terminals

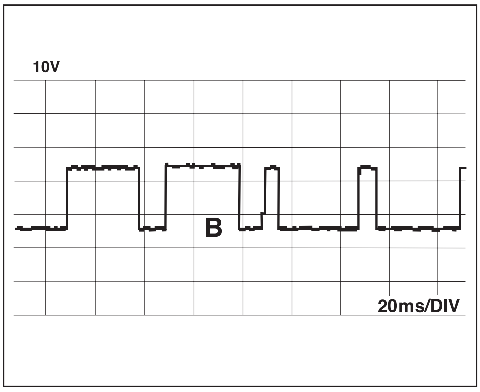
Terminals III/7, III/17 and III/18

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check CMP sensor voltage supply	♦ Remove connector of CMP sensor 2 ♦ Switch on the ignition. ♦ Measure voltage between Pin 1 and Pin 3	Approx. 5 V ⇒ Step 5	⇒ Step 2.
2	Check power supply wiring for continuity.	♦ Remove connector of CMP sensor 2 ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool 9637 Pin III/7 and CMP sensor 2 plug Pin 3 ♦ Measure resistance between special tool 9637 Pin III/17 and CMP sensor plug 2 Pin 1	0 - 5 Ω ⇒ Step 3.	
3	Replace DME control module		⇒ Step 4.	

Work instruction			Display OK	If not OK
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	
5	Check CMP sensor signal	♦ Connect special tool 9637. ♦ Connect engine tester; use special input ♦ Positive cable to Pin III/18 ♦ Negative cable to Pin III/17 ♦ Start the engine.	See Figure 1 ⇒ Step 6	Replace CMP sensor → End

Figure 1:



Work instruction			**Display OK**	**If not OK**
6	Check signal wire from DME control module, Pin III/18, to CMP sensor	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of CMP sensor 2 ♦ Measure resistance between special tool 9637 Pin III/18 and CMP sensor 21 plug Pin 2	0 - 5 Ω → End.	Repair wiring harness → End.

P0347

Camshaft Position Sensor 2 – Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to ground

Note!

- *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- *For safety reasons, the ignition timing is retarded.*

Affected terminals

Terminal III/18

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire from DME control module, Pin III/18, to CMP sensor for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of CMP sensor 2 ♦ Measure resistance between special tool 9637 pin III/18 and ground.	∞ Ω → End.	Repair wiring harness → End.

P0348

Camshaft Position Sensor 2 – Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to B+

Note!

- *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- *For safety reasons, the ignition timing is retarded.*

Affected terminals

Terminal III/18

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire from DME control module, Pin III/18, to CMP sensor for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of CMP sensor 2 ♦ Switch on the ignition. ♦ Measure voltage between special tool 9637 pin III/18 and ground.	0 V → End.	Repair wiring harness → End.

P0349

Camshaft position sensor 2 - open circuit

Diagnosis conditions

- Engine running
- No other camshaft position sensor faults stored in memory (P0346; P0347; P0348)

Possible fault cause

- ♦ Camshaft rotor (phase sensor wheel) damaged

Affected terminals

-

Diagnosis/troubleshooting

Note!

The 'No signal' comes because the DME expects a camshaft position sensor signal, but this does not appear due to damage to the camshaft rotor (phase sensor wheel)

Work instruction		Display OK	If not OK
1	Check for further fault entries for camshaft position sensor 2	No further entries ⇒ Step 2	Rectify other camshaft position sensor faults (P0346; P0347; P0348) according to instructions → End
2	Check camshaft rotor for damage	See HBT Group 1 Engine	

P0410

80 Secondary Air Injection System, Bank 1 – Below Limit

Diagnosis conditions

- Intake air temperature 4.5 - 60 °C
- Engine temperature 4.5 - 102 °C
- Mass air flow 36 - 150 $^{kg}/_{h}$
- Engine starting temperature less than 42 °C
- Altitude correction factor greater than 0.75
- Oxygen sensors 1 and 2 ahead of TWC are ready for operation
- The secondary air injection pump is switched on
- Diagnosis has not yet taken place during this cycle

Possible fault cause

- ♦ Secondary air injection pump is not triggered
- ♦ Secondary air injection pump does not work
- ♦ Air supply lines restricted
- ♦ Electric change-over valve does not function
- ♦ Air change-over valve does not function
- ♦ Vacuum system leaking

Affected terminals

III/11 and III/14

Diagnosis/troubleshooting

Note!

Secondary air diagnosis can be activated with the Porsche System Tester 2 in the "Short test" menu.

Work instruction			**Display OK**	**If not OK**
1	Activate secondary air pump.	♦ Remove relay of secondary air injection pump. ♦ Jumper terminals 30 and 87. ♦ The secondary air pump must be running (audible function). – or ♦ Connect and switch on Porsche System Tester 2. ♦ Select DME. ♦ Call up "Drive links" menu. ♦ Select "Secondary air pump". ♦ Activate secondary air pump (audible function).	⇒ Step 3	⇒ Step 2
2	Check triggering of secondary air pump	♦ Check fuse (Maxi Fuse) of AIR pump (on relay carrier 2). ♦ Remove relay of AIR pump (on relay carrier 2). ♦ Measure voltage between pin 3 and ground ♦ Push relay back on.	Battery positive voltage	Check wire from pin 2 to DME control module pin III/11 for continuity.
		♦ Remove connector of AIR pump. ♦ Measure voltage at pin 1 and pin 2	Battery positive voltage	
3	Check vacuum system for leaks			Seal vacuum system
4	Check electric change-over valve	♦ Remove two-pole connector of electric change-over valve. ♦ Trigger AIR pump with Porsche System Tester 2. ♦ Measure voltage at pin 1 and pin 2	Battery positive voltage	
		♦ Remove vacuum hose of electric change-over valve with the engine running.	Vacuum must be present	

Work instruction			Display OK	If not OK
5	Check air change-over valve	♦ Run engine briefly to produce vacuum. ♦ Activate secondary air pump. ♦ Remove vacuum hose of air change-over valve.	Vacuum must be present	
		♦ After activation, check air change-over valve for continuity		
6	Check air supply lines for blockage			

P0413

85 Electric change-over valve - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- ♦ Wiring harness
- ♦ Electric change-over valve
- ♦ DME control module faulty

Note!

The triggering wire for the electric change-over valve is monitored.

Affected terminals

Terminal III/14

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check voltage supply for electric change-over valve	♦ Remove connector of electric change-over valve ♦ Measure voltage between electric change-over valve Pin 1 and ground ♦ Switch on the ignition	> 11 V ⇒ Step 2	Repair voltage supply → End
2	Check electric change-over valve	♦ Remove connector of electric change-over valve ♦ Measure resistance at electric change-over valve between Pin 1 and Pin 2	30 Ω at 20 °C ⇒ Step 3	Replace electric change-over valve → End
3	Check wire from DME control module, Pin III/14, to electric change-over valve for continuity	♦ Remove connector of electric change-over valve ♦ Measure resistance between DME control module Pin III/14 and electric change-over valve plug Pin 2	0 - 5 Ω ⇒ Step 4	Repair wiring harness → End

Work instruction			Display OK	If not OK
4	Replace DME control module		⇒ Step 5	
5	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute. Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

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P0414

85 Electric change-over valve - below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- ♦ Short circuit to ground

Note!

The triggering wire for the electric change-over valve is monitored.

Affected terminals

Terminal III/14

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wire from DME control module, Pin III/14, to electric change-over valve for short circuit to ground	♦ Remove connector of electric change-over valve ♦ Measure resistance between DME control module Pin III/14 and electric change-over valve plug Pin 2	∞ Ω → End	Repair wiring harness → End

85 Electric change-over valve - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- ♦ Short circuit to B+

Note!

The triggering wire for the electric change-over valve is monitored.

Affected terminals

Terminal III/14

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wire from DME control module, Pin III/14, to electric change-over valve for short circuit to B+	♦ Remove connector of electric change-over valve ♦ Measure voltage between DME control module Pin III/14 and electric change-over valve plug Pin 2	0 V → End	Repair wiring harness → End

P0418

84 Secondary air injection pump - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Wiring harness
- Relay faulty
- DME control module faulty

Affected terminals

Terminal III/11

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check voltage supply for relay of secondary air injection pump, terminal 86	♦ Remove relay of secondary air injection pump ♦ Measure voltage between Pin 7 and ground ♦ Switch on the ignition	> 11 V ⇒ Step 2	Repair voltage supply → End
2	Check relay for secondary air injection pump	♦ Remove relay for secondary air injection pump ♦ Measure resistance between relay Pin 85 and Pin 86	Approx. 70 Ω (at 25 °C)	Replace relay → End
3	Check wiring from DME control module, Pin III/11, to relay of secondary air injection pump for continuity	♦ Remove connector of electric change-over valve ♦ Measure resistance between DME control module Pin III/11 and relay of secondary air injection pump	0 - 5 Ω ⇒ Step 4	Repair wiring harness → End
4	Replace DME control module		⇒ Step 5	
5	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

84 Secondary air injection pump - below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Short circuit to ground

Affected terminals

Terminal III/11

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, Pin III/11, to relay of secondary air injection pump Pin 85 for short to ground	♦ Remove relay for secondary air injection pump ♦ Measure voltage between DME control module Pin III/11 and B+ ♦ Switch on the ignition	0 V → End	Repair wiring harness → End

84 Secondary air injection pump - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Short circuit to B+

Affected terminals

Terminal III/11

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, Pin III/11, to relay of secondary air injection pump Pin 85 for short to B+	♦ Remove relay for secondary air injection pump ♦ Measure voltage between DME control module Pin III/11 and ground	0 V → End	Repair wiring harness → End

P0420

40 TWC conversion, bank 1 - above limit

Diagnosis conditions

- TWC temperature 420 - 600 °C
- 85 seconds within rpm/load range (cumulative)
- EVAP canister burden < 8
- Speed 1280 - 2440 rpm
- 20 - 40 % engine load (relative air charge)
- Oxygen sensing ahead of TWC is active
- Oxygen sensing after TWC ready for operation
- Engine starting temperature > - 20 °C
- No faults in memory

Possible fault cause

- ♦ Oxygen sensor ahead of and after TWC exchanged
- ♦ Valve lift fault
- ♦ Aged oxygen sensor after TWC
- ♦ TWC faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

If an ageing oxygen sensor is recorded in conjunction with a fault in the TWC, a check must be performed with a new oxygen sensor to see whether a TWC fault is still indicated.

Work instruction			Display OK	If not OK
1	Check whether the oxygen sensors ahead of and after the TWC have been exchanged			

Work instruction			Display OK	If not OK
2	Perform system test for small lift	See below		
3	Replace TWC			

Perform system test for small lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.

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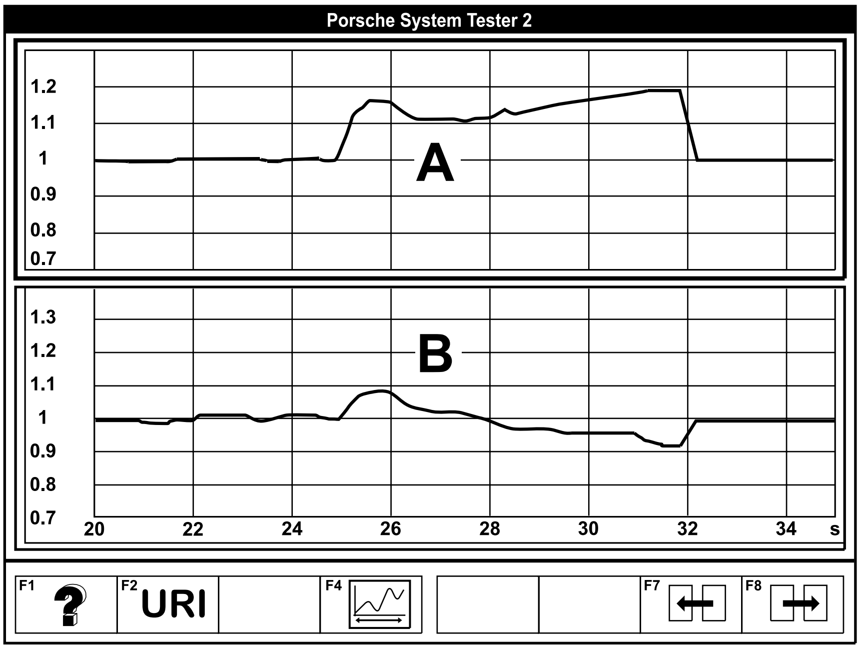


A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

P0430

45 TWC Conversion, Bank 2 - Above Limit

Diagnosis conditions

- TWC temperature 420 - 600 °C
- 85 seconds within rpm/load range (cumulative)
- EVAP canister burden < 8
- Speed 1280 - 2440 rpm
- 20 - 40 % engine load (relative air charge)
- Oxygen sensing ahead of TWC is active
- Oxygen sensing after TWC ready for operation
- Engine starting temperature > - 20 °C
- No faults in memory

Possible fault cause

- ♦ Oxygen sensor ahead of and after TWC exchanged
- ♦ Valve lift fault
- ♦ Aged oxygen sensor after TWC
- ♦ TWC faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

If an ageing oxygen sensor is recorded in conjunction with a fault in the TWC, a check must be performed with a new oxygen sensor to see whether a TWC fault is still indicated.

Work instruction			Display OK	If not OK
1	Check whether the oxygen sensors ahead of and after the TWC have been exchanged			

Work instruction			Display OK	If not OK
2	Perform system test for small lift	See below		
3	Replace TWC			

Perform system test for small lift

Warning!

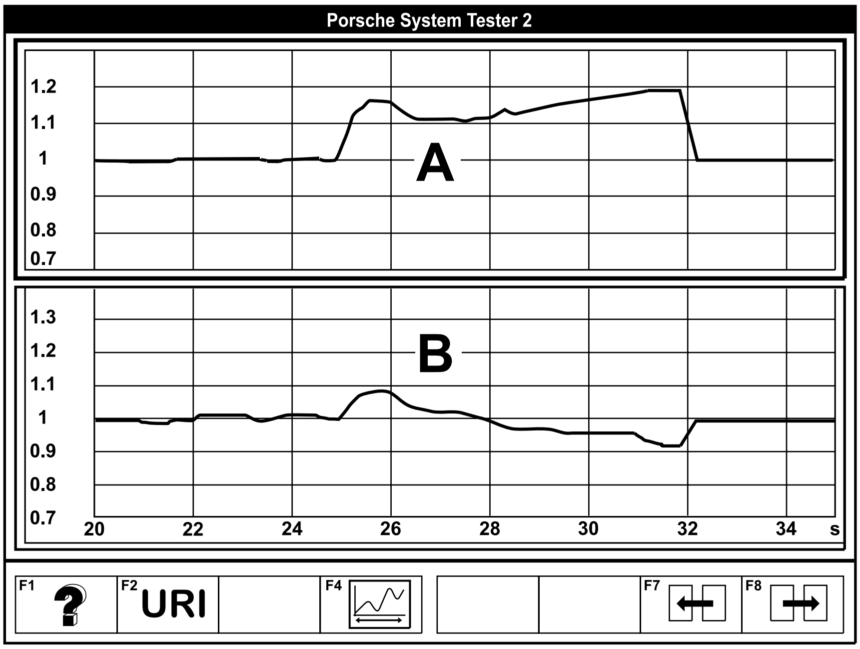
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type "below limit" is recorded.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

P0440

93 Fuel Tank Ventilation System (DTESK) - Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Engine running
- Vehicle speed = 0 km/h
- Intake air temperature between 5 °C and 60 °C
- Altitude correction factor greater than 0.75
- Battery positive voltage greater than 11 V
- Engine load less than 30%
- EVAP canister burden less than 3
- Time elapsed after engine start-up greater than 990 seconds or mixture adaptation completed
- No other faults in memory

Possible fault cause

- ♦ Tank cap seal
- ♦ One or several leaks in fuel tank ventilation system

Affected terminals

-

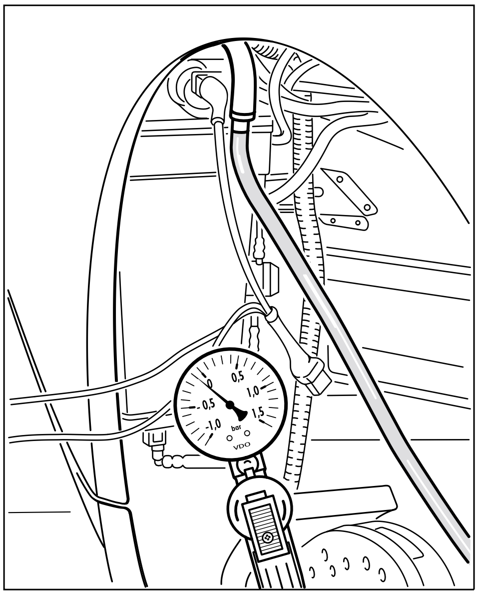
Diagnosis/troubleshooting

Note!

- *Fuel tank ventilation diagnosis is initiated with the Porsche System Tester 2 in the "Short test" menu. This reduces the time elapsed after engine start-up to 30 seconds.*
- *The EVAP canister purge valve is very sensitive to contamination. If the lines to the EVAP canister have to be detached, the outside of the canister must be cleaned beforehand.*

Work instruction			**Display OK**	**If not OK**
1	Check shutoff valve for leaks	♦ Remove front right-hand wheel housing liner ♦ Detach connector of shutoff valve ♦ Detach ventilation line of shutoff valve ♦ Connect shutoff valve to the battery or a separate power supply unit via special tool V.A.G.1315A/1. ♦ Do not actuate the shutoff valve for more than 5 minutes (overload) ♦ Connect special tool 9160/1 to EVAP canister ♦ Using special tool 9160/1, generate a vacuum of 100 mbar (0.1 bar)		Replace shutoff valve

Figure:



Note!

- *Do not produce a vacuum of more than 100 mbar, as otherwise the vacuum will cause the shutoff valve to open.*
- *If no vacuum can be built up, replace the shutoff valve.*
- *Coat the sealing ring of the new shutoff valve with tyre fitting lubricant prior to installation.*
- *The shutoff valve can only be installed in one position: with the electrical connection facing upwards.*

Work instruction			**Display OK**	**If not OK**
2	Check tank system for leaks	♦ Check the tank system for leaks using an HC tester. To do so, hold the connecting hose of the HC tester in the spot to be tested. In the case of a leak, the display of the HC tester increases to above 1000 ppm. Values below 50 ppm indicate no leaks. ♦ To test the ventilation lines, guide the connecting hose slowly along them. ♦ Check the following locations 1. Tank cap 2. Line connections to EVAP canister 3. EVAP canister 4. Line connections to fuel tank sender unit 5. Pressure sensor 6. Opening of fuel filler neck into tank 7. Line connection of EVAP canister purge valve 8. Ventilation lines		

Note!

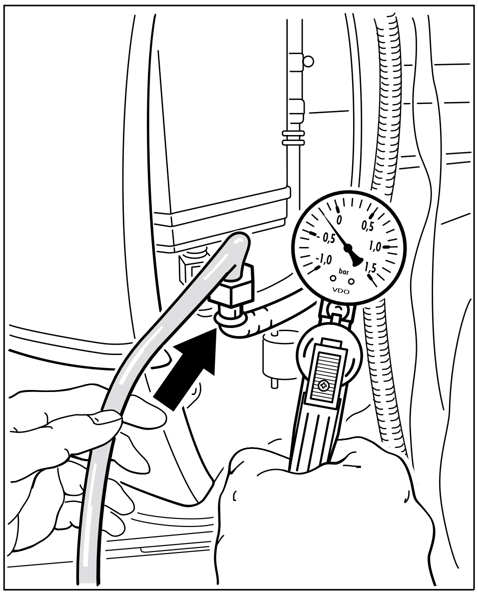
If no leaks are found, a gauge pressure of max. 100 mbar (0.1 bar) can be generated at the EVAP canister at the connection to the tank using special tool 9160/1, in order to increase the escape of fuel vapours.

Note!

Before detaching the ventilation lines from the EVAP canister, clean the area around the connections. Dirt must not be allowed to get into the connectors.

Work instruction			**Display OK**	**If not OK**
3	Check EVAP canister purge valve for leaks	♦ Detach the ventilation line to the EVAP canister purge valve from the EVAP canister (protective cap) ♦ With special tool 9160/1, generate a vacuum of 200 mbar (0.2 bar)		If no vacuum can be built up, replace the EVAP canister purge valve

Figure:



P0441

93 Fuel Tank Ventilation System - Above Limit

Diagnosis conditions

- Engine idling
- Vehicle speed = 0 km/h
- Oxygen sensing system active
- No secondary air diagnosis
- No other faults in memory

Possible fault cause

- ♦ EVAP canister purge valve incorrectly installed
- ♦ EVAP canister purge valve faulty
- ♦ Blocked purge air line
- ♦ EVAP canister purge valve leaking
- ♦ Leaking line between EVAP canister and air intake system

Affected terminals

-

Diagnosis/troubleshooting

Note!

Fuel tank ventilation diagnosis is initiated with the Porsche System Tester 2 in the "Short test" menu. This reduces the time elapsed after engine start-up to 30 seconds.

Work instruction			Display OK	If not OK
1	Check installation position of EVAP canister purge valve	Flow through the EVAP canister purge valve is possible in one direction only. The flow direction is indicated by an arrow on the EVAP canister purge valve. The arrow must point towards the intake manifold.		
2	Check triggering of EVAP canister purge valve.	♦ Connect Porsche System Tester 2 ♦ In the "Drive links" menu, select EVAP canister purge valve.	The EVAP canister purge valve must switch audibly.	

Work instruction			Display OK	If not OK
3	Check voltage supply and wiring.	♦ Remove connector of EVAP canister purge valve ♦ Switch on the ignition ♦ Measure voltage between pin 1 and ground	Battery positive voltage	
		♦ Connect special tool 9637 to wiring harness ♦ Measure resistance at pin III/3 and EVAP canister purge valve connector, pin 2	0 - 5 Ω	
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0.5 bar after 10 minutes	
5	Check hose line between EVAP canister purge valve and air intake system	♦ Undo hose at intake system ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0.5 bar after 10 minutes	

P0442

97 Fuel Tank Ventilation System (Micro-leak) - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Engine running
- Vehicle speed = 0 km/h
- Intake air temperature between 5 °C and 60 °C
- Altitude correction factor greater than 0.75
- Battery positive voltage greater than 11 V
- Engine load less than 30%
- EVAP canister burden less than 3
- Time elapsed after engine start-up greater than 990 seconds or mixture adaptation completed
- No other faults in memory

Possible fault cause

- ♦ Tank cap seal
- ♦ One or several leaks in fuel tank ventilation system

Affected terminals

-

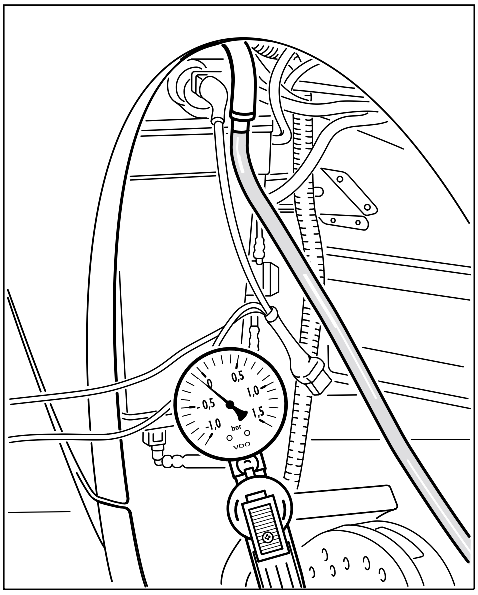
Diagnosis/troubleshooting

Note!

- *Fuel tank ventilation diagnosis is initiated with the Porsche System Tester 2 in the "Short test" menu. This reduces the time elapsed after engine start-up to 30 seconds.*
- *The EVAP canister purge valve is very sensitive to contamination. If the lines to the EVAP canister have to be detached, the outside of the canister must be cleaned beforehand.*

Work instruction			**Display OK**	**If not OK**
1	Check shutoff valve for leaks	♦ Remove front right-hand wheel housing liner ♦ Detach connector of shutoff valve ♦ Detach ventilation line of shutoff valve ♦ Connect shutoff valve to the battery or a separate power supply unit via special tool V.A.G.1315A/1. ♦ Do not actuate the shutoff valve for more than 5 minutes (overload) ♦ Connect special tool 9160/1 to EVAP canister ♦ Using special tool 9160/1, generate a vacuum of 100 mbar (0.1 bar)		Replace shutoff valve

Figure: ►



Note!

- *Do not produce a vacuum of more than 100 mbar, as otherwise the vacuum will cause the shutoff valve to open.*
- *If no vacuum can be built up, replace the shutoff valve.*
- *Coat the sealing ring of the new shutoff valve with tyre fitting lubricant prior to installation.*
- *The shutoff valve can only be installed in one position: with the electrical connection facing upwards.*

Work instruction			**Display OK**	**If not OK**
2	Check tank system for leaks	♦ Check the tank system for leaks using an HC tester. To do so, hold the connecting hose of the HC tester in the spot to be tested. In the case of a leak, the display of the HC tester increases to above 1000 ppm. Values below 50 ppm indicate no leaks. ♦ To test the ventilation lines, guide the connecting hose slowly along them. ♦ Check the following locations 1. Tank cap 2. Line connections to EVAP canister 3. EVAP canister 4. Line connections to fuel tank sender unit 5. Pressure sensor 6. Opening of fuel filler neck into tank 7. Line connection of EVAP canister purge valve 8. Ventilation lines		

Note!

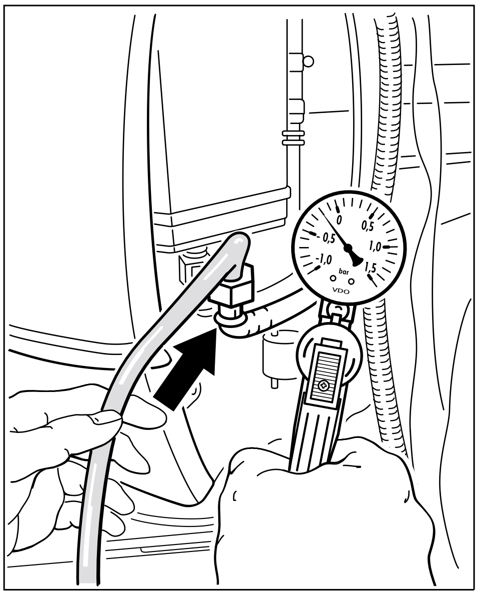
If no leaks are found, a gauge pressure of max. 100 mbar (0.1 bar) can be generated at the EVAP canister at the connection to the tank using special tool 9160/1, in order to increase the escape of fuel vapours.

Note!

Before detaching the ventilation lines from the EVAP canister, clean the area around the connections. Dirt must not be allowed to get into the connectors.

Work instruction			**Display OK**	**If not OK**
3	Check EVAP canister purge valve for leaks	♦ Detach the ventilation line to the EVAP canister purge valve from the EVAP canister (protective cap) ♦ With special tool 9160/1, generate a vacuum of 200 mbar (0.2 bar)		If no vacuum can be built up, replace the EVAP canister purge valve

Figure:



P0444

98 EVAP canister purge valve - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Wiring harness
- EVAP canister purge valve
- DME control module

Affected terminals

Terminal III/3

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check voltage supply for EVAP canister purge valve	♦ Remove connector of EVAP canister purge valve ♦ Measure voltage between EVAP canister purge valve plug Pin 1 and ground ♦ Switch on the ignition	> 11 V ⇒ Step 2	Repair voltage supply → End
2	Check EVAP canister purge valve	♦ Remove connector of EVAP canister purge valve ♦ Measure resistance between EVAP canister purge valve Pin 1 and Pin 2	26 ± 4 Ω (at 20 °C) ⇒ Step 3	Check EVAP canister purge valve → End
3	Check triggering wire for EVAP canister purge valve	♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between EVAP canister purge valve Pin 2 and special tool 9637 Pin III/3	0 - 5 Ω ⇒ Step 4	Repair wiring harness → End

Work instruction			Display OK	If not OK
4	Replace DME control module		⇒ Step 5	
5	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P0445

98 EVAP canister purge valve - short circuit to B+

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Wiring harness
- DME control module faulty

Affected terminals

Terminal III/3 and IV/26

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for EVAP canister purge valve for short circuit to B+	♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure voltage between special tool 9637 Pin III/3 and ground ♦ Switch on the ignition	0 V ⇒ Step 2	Repair wiring harness → End
2	Replace DME control module		⇒ Step 3	
3	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

98 EVAP canister purge valve - short to ground

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Wiring harness
- DME control module faulty

Affected terminals

Terminal III/3

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for EVAP canister purge valve for short circuit to ground	♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin III/3 and ground	∞ Ω ⇒ Step 2	Repair wiring harness → End
2	Replace DME control module		⇒ Step 3	
3	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P0446

EVAP canister shutoff valve (function) - below limit

Diagnosis conditions

- Oxygen sensing system active
- No secondary air diagnosis
- Engine running
- Vehicle speed = 0 $^{km}/_{h}$
- Intake air temperature between 5 °C and 50 °C
- Engine starting temperature between 5 °C and 55 °C
- Battery positive voltage greater than 11 V
- Engine load less than 30%
- EVAP canister burden less than 3
- Altitude correction factor greater than 0.75
- Time elapsed after engine start-up > 990 seconds (16.5 minutes) or mixture adaptation completed
- No fault for throttle position sensor, idle air control, vehicle speed, EVAP canister purge valve, mass air flow sensor, voltage supply, pressure sensor, shutoff valve or engine temperature in memory

Note!

Fuel tank ventilation diagnosis is initiated with the Porsche System Tester 2 in the "Short test" menu. This reduces the time elapsed after engine start-up to 30 seconds.

Possible fault cause

- Purge air line blocked
- EVAP canister purge valve sticks in the opened position (this causes continuous vacuum to go from the intake manifold to the tank system)
- EVAP canister shutoff valve is blocked/sticks in the opened position
- Flow resistance of EVAP canister too high (filter deformed/ blocked)
- Pressure sensor connected incorrectly (polarity reversal)

Affected terminals

-

Diagnosis/troubleshooting

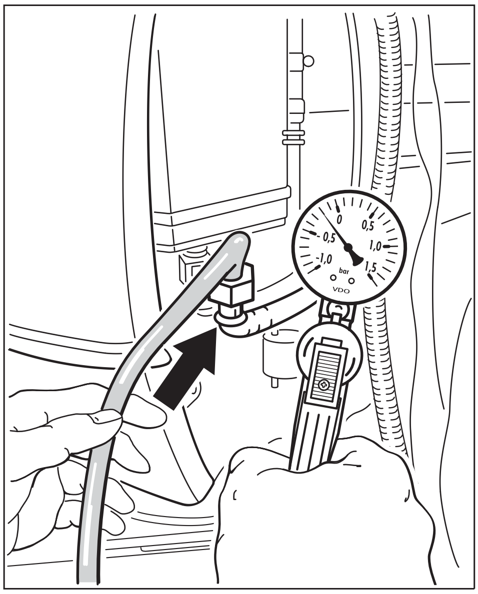
Note!

♦

♦ *The EVAP canister purge valve is very sensitive to contamination. If the lines to the EVAP canister have to be detached, the outside of the canister must be cleaned beforehand.*

Work instruction			Display OK	If not OK
1	Check purge air line for blockage	♦ Remove front right-hand wheel housing liner. ♦ Detach purge air line (connection faces up) from EVAP canister. ♦ Blow through purge air line with compressed air.	Line was clear ⇒ Step 2	Clean line → End
2	Check EVAP canister purge valve for leaks	♦ Detach the ventilation line to the EVAP canister purge valve from the EVAP canister (protective cap) ♦ With special tool 9160/1, generate a vacuum of 200 mbar (0.2 bar)	Valve completely closed ⇒ Step 3	EVAP canister purge valve stays open Replace valve → End

Figure: Connecting special tool 9160/1 ►



Work instruction			Display OK	If not OK
3	Check EVAP canister shut-off valve	♦ Remove EVAP canister shutoff valve ♦ Check if valve without flow is also completely opened	Valve completely opened ⇒ Step 4	Valve stays closed ⇒ Replace valve → End
4	Check correct connection of pressure sensor	♦ Get vehicle ready for operation ♦ Erase fault memory ♦ Unscrew tank cap ♦ Perform fuel tank leak test using Porsche System Tester 2	A "major leak" is detected ⇒ Step 5	Fault "P0446" is recorded again, (i.e. polarity reversal of pressure sensor) ⇒ Connect pressure sensor correctly → End
5	Check EVAP canister	♦ Check canister for 'blockage' (with compressed air)	Canister is not 'blocked' ⇒ Step 6	Canister is 'blocked' ⇒ Replace EVAP canister → End
6	Check vehicle history (previous repairs)	♦ Was the EVAP canister already replaced (earlier) for this vehicle?	YES: ⇒ Replace EVAP canister shutoff valve → End	NO: ⇒ Clean EVAP canister shutoff valve and erase the fault memory → End

P0447

96 EVAP canister shutoff valve (output stage) - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Fuel tank ventilation active

Possible fault cause

- Wiring harness
- Shutoff valve faulty
- DME control module faulty

Note!

Fuel tank ventilation can be activated with the Porsche System Tester 2 in the 'Short test' menu.

Affected terminals

Terminal IV/30

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check voltage supply for shutoff valve	♦ Remove front right-hand wheel housing liner ♦ Remove connector of shutoff valve ♦ Measure voltage between shutoff valve plug Pin 2 and ground ♦ Switch on the ignition	> 11 V ⇒ Step 2	Repair voltage supply → End

Work instruction			Display OK	If not OK
2	Check shutoff valve	♦ Remove front right-hand wheel housing liner ♦ Remove connector of shutoff valve ♦ Measure resistance between shutoff valve Pin 1 and Pin 2	22 - 26 Ω (at 20 °C) ⇒ Step 3	Replace shutoff valve → End
3	Check triggering wire for shutoff valve for continuity	♦ Remove front right-hand wheel housing liner ♦ Remove connector of shutoff valve ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between shutoff valve Pin 1 and special tool 9637 plug IV Pin 30	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

Note!

The wire is routed via connector X 2/5, Pin 6.

Work instruction			Display OK	If not OK
4	Replace DME control module		⇒ Step 4	
5	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

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P0448

96 EVAP canister shutoff valve (output stage) - over limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Fuel tank ventilation active

Possible fault cause

- ♦ Wiring harness
- ♦ DME control module faulty

Note!

Fuel tank ventilation can be activated with the Porsche System Tester 2 in the 'Short test' menu.

Affected terminals

Terminal IV/30

Diagnosis/troubleshooting

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td>Check triggering wire for shutoff valve for short to B+</td><td>♦ Remove front right-hand wheel housing liner
♦ Remove connector of shutoff valve
♦ Remove DME control module connector
♦ Measure voltage between shut-off valve plug Pin 1 and ground
♦ Switch on the ignition</td><td>0 V
⇒ Step 2</td><td>Repair wiring harness
→ End</td></tr>
<tr><td>2</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 3</td></tr>
<tr><td>3</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

96 EVAP canister shutoff valve (output stage) - under limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Fuel tank ventilation active

Possible fault cause

- ♦ Wiring harness
- ♦ DME control module faulty

Note!

Fuel tank ventilation can be activated with the Porsche System Tester 2 in the 'Short test' menu.

Affected terminals

Terminal IV/30

Diagnosis/troubleshooting

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td>Check triggering wire for shutoff valve for short to ground</td><td>♦ Remove front right-hand wheel housing liner
♦ Remove connector of shutoff valve
♦ Remove DME control module connector
♦ Measure resistance between shutoff valve plug Pin 1 and ground
♦ Switch on the ignition</td><td>$\infty\ \Omega$
⇒ Step 2</td><td>Repair wiring harness
→ End</td></tr>
<tr><td>2</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 3</td></tr>
<tr><td>3</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

P0450

99 Tank pressure sensor - signal implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- ♦ Pressure sensor

Affected terminals

-

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Replace pressure sensor	→ End	

P0450

Fuel Tank Ventilation System (Major Leak) – Signal Implausible

Diagnosis conditions

- Oxygen sensing system active
- No secondary air diagnosis
- Engine running
- Vehicle speed = 0 km/h
- Intake air temperature between 4.5 °C and 60 °C
- Battery positive voltage greater than 11 V
- Engine load less than 30%
- EVAP canister burden less than 3
- Altitude correction factor greater than 0.75
- Time elapsed after engine start-up > 990 seconds or mixture adaptation completed
- No faults in memory

Possible fault cause

- Pressure sensor

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Fuel tank ventilation diagnosis is initiated with the Porsche System Tester 2 in the "Short test" menu. This reduces the time elapsed after engine start-up to 30 seconds.

Work instruction			Display OK	If not OK
1	Replace pressure sensor.			

P0451

Tank Pressure Sensor – Signal Implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- Pressure sensor

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction		Display OK	If not OK
1	Replace pressure sensor	→ End.	

P0452

99 Tank pressure sensor - below limit

Diagnosis conditions

- Ignition on

Possible fault cause

- Short circuit to ground

Affected terminals

Terminal IV/21

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from pressure sensor to DME control module for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of pressure sensor ♦ Measure resistance between special tool 9637 Pin IV/21 and ground	$\infty\ \Omega$ → End	Repair wiring harness → End

P0453

99 Tank pressure sensor - above limit

Diagnosis conditions

- Ignition on

Possible fault cause

- Short circuit to B+

Affected terminals

Terminal IV/21

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from pressure sensor to DME control module for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of pressure sensor ♦ Measure voltage between special tool Pin IV/21 and ground	0 V → End	Repair wiring harness → End

P0455

94 Fuel Tank Ventilation System (Major Leak) - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- No secondary air diagnosis
- Engine running
- Vehicle speed = 0 $^{km}/_{h}$
- Intake air temperature between 4.5 °C and 60 °C
- Battery positive voltage greater than 11 V
- Engine load less than 30%
- EVAP canister burden less than 3
- Altitude correction factor greater than 0.75
- Time elapsed after engine start-up > 990 seconds or mixture adaptation completed
- No faults in memory

Possible fault cause

- ♦ Tank cap missing
- ♦ Tank cap seal
- ♦ Ventilation lines detached from EVAP canister
- ♦ Ventilation line detached from tank
- ♦ Ventilation line detached from fuel tank vent
- ♦ Break in ventilation lines

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *Fuel tank ventilation diagnosis is initiated with the Porsche System Tester 2 in the "Short test" menu. This reduces the time elapsed after engine start-up to 30 seconds.*
- *A frozen EVAP canister shutoff valve can lead to this fault.*

Work instruction			**Display OK**	**If not OK**
1	Check tank cap and seal	♦ Check whether the tank cap is present. ♦ Check whether the tank cap is correctly screwed on. ♦ Check whether the seal is damaged.		
2	Check ventilation lines on EVAP canister	♦ Remove front right-hand wheel housing liner. ♦ Check whether ventilation lines are attached to the EVAP canister.		
3	Check ventilation line on tank	♦ Remove battery. ♦ Remove battery cover. ♦ Check whether ventilation line is attached to the fuel tank sender unit.		
4	Check ventilation line on tank vent	♦ Check whether ventilation line is attached to the EVAP canister purge valve.		
5	Check ventilation lines	♦ Check whether ventilation lines are: ♦ cracked ♦ broken ♦ interrupted		
6	Check EVAP canister purge valve	♦ Remove front right-hand wheel housing liner. ♦ Clean EVAP canister in the vicinity of the ventilation lines. ♦ Detach the ventilation line to the EVAP canister purge valve at the EVAP canister (connection with protective cap). ♦ With special tool 9160/1, generate a vacuum of 200 mbar (0.2 bar). If no vacuum can be built up, replace the EVAP canister purge valve.		

94 Fuel Tank Ventilation System (Major Leak) - Signal Implausible

Diagnosis conditions

- Oxygen sensing system active
- No secondary air diagnosis
- Engine running
- Vehicle speed = 0 $^{km}/_{h}$
- Intake air temperature between 4.5 °C and 60 °C
- Battery positive voltage greater than 11 V
- Engine load less than 30%
- EVAP canister burden less than 3
- Altitude correction factor greater than 0.75
- Time elapsed after engine start-up > 990 seconds or mixture adaptation completed
- No faults in memory

Possible fault cause

- Pressure sensor

Affected terminals

\-

Diagnosis/troubleshooting

Note!

Fuel tank ventilation diagnosis is initiated with the Porsche System Tester 2 in the "Short test" menu. This reduces the time elapsed after engine start-up to 30 seconds.

Work instruction			Display OK	If not OK
1	Replace pressure sensor			

P0456

Fuel Tank Ventilation System (Minor leak) - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Engine running
- Vehicle speed = 0 km/h
- Intake air temperature between 5 °C and 60 °C
- Altitude correction factor greater than 0.75
- Battery positive voltage greater than 11 V
- Engine load less than 30%
- EVAP canister burden less than 3
- Time elapsed after engine start-up greater than 990 seconds or mixture adaptation completed
- No other faults in memory

Possible fault cause

- ♦ Tank cap seal
- ♦ One or several leaks in fuel tank ventilation system

Affected terminals

-

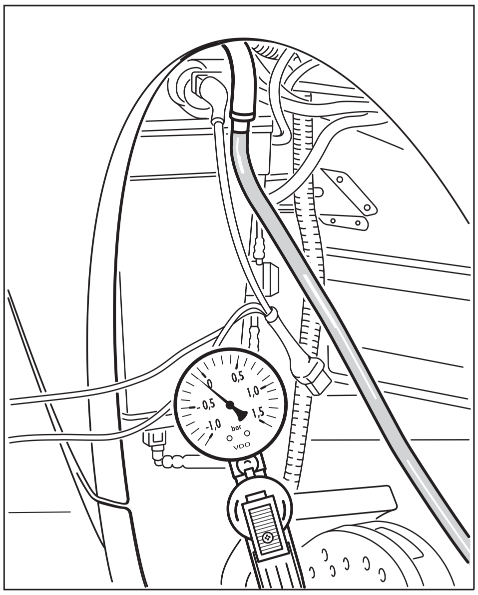
Diagnosis/Troubleshooting

Note!

- *Fuel tank ventilation diagnosis is initiated with the Porsche System Tester 2 in the "Short test" menu. This reduces the time elapsed after engine start-up to 30 seconds.*
- *The EVAP canister purge valve is very sensitive to contamination. If the lines to the EVAP canister have to be detached, the outside of the canister must be cleaned beforehand.*

Work instruction			Display OK	If not OK
1	Check shutoff valve for leaks	♦ Remove front right-hand wheel housing liner ♦ Detach connector of shutoff valve ♦ Detach ventilation line of shutoff valve ♦ Connect shutoff valve to the battery or a separate power supply unit via special tool V.A.G.1315A/1. ♦ Do not actuate the shutoff valve for more than 5 minutes (overload) ♦ Connect special tool 9160/1 to EVAP canister ♦ Using special tool 9160/1, generate a vacuum of 100 mbar (0.1 bar)		Replace shutoff valve

Figure: ►



Note!

- *Do not produce a vacuum of more than 100 mbar, as otherwise the vacuum will cause the shutoff valve to open.*
- *If no vacuum can be built up, replace the shutoff valve.*
- *Coat the sealing ring of the new shutoff valve with tyre fitting lubricant prior to installation.*
- *The shutoff valve can only be installed in one position: with the electrical connection facing upwards.*

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>2</td><td>Check tank system for leaks</td><td>♦ Check the tank system for leaks using an HC tester. To do so, hold the connecting hose of the HC tester in the spot to be tested. In the case of a leak, the display of the HC tester increases to above 1000 ppm. Values below 50 ppm indicate no leaks.
♦ To test the ventilation lines, guide the connecting hose slowly along them.
♦ Check the following locations
1. Tank cap
2. Line connections to EVAP canister
3. EVAP canister
4. Line connections to fuel tank sender unit
5. Pressure sensor
6. Opening of fuel filler neck into tank
7. Line connection of EVAP canister purge valve
8. Ventilation lines</td><td></td><td></td></tr>
</table>

Note!

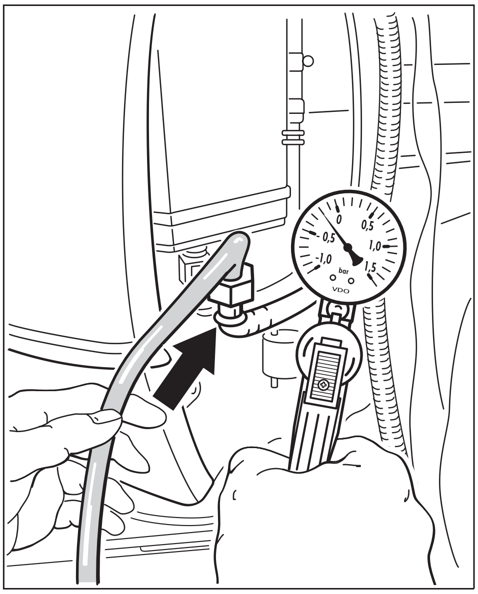
If no leaks are found, a gauge pressure of max. 100 mbar (0.1 bar) can be generated at the EVAP canister at the connection to the tank using special tool 9160/1, in order to increase the escape of fuel vapours.

Note!

Before detaching the ventilation lines from the EVAP canister, clean the area around the connections. Dirt must not be allowed to get into the connectors.

Work instruction			Display OK	If not OK
3	Check EVAP canister purge valve for leaks	♦ Detach the ventilation line to the EVAP canister purge valve from the EVAP canister (protective cap) ♦ With special tool 9160/1, generate a vacuum of 200 mbar (0.2 bar)		If no vacuum can be built up, replace the EVAP canister purge valve

Figure:



DME 7.8

P0480

494 Fan output stage 1 - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Intake air temperature greater than 9 °C
- Air conditioning switched on and off once

Note!

The triggering wire for relays stage 1, terminal 85, is monitored

Possible fault cause

- Open circuit
- Relay faulty
- DME control module faulty

Affected terminals

Terminal IV/4

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 4, to relays for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 1 of coolant fan 1 ♦ Remove relay stage 2 of coolant fan 1 ♦ Measure resistance between special tool 9637 plug IV Pin 4 and relay slot of coolant fan 1 plug Pin 2	0 - 5 Ω	Repair wiring harness → End

Work instruction			Display OK	If not OK
		♦ Measure resistance between special tool 9637 plug IV Pin 4 and relay slot of coolant fan 2 plug Pin 2	0 - 5 Ω ⇒ Step 3	Check plug connection X 2/3, Pin 21, and check wiring harness for chafing and pinching damage
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

494 Fan output stage 1 - below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Intake air temperature greater than 9 °C
- Air conditioning switched on and off once

Note!

The triggering wire for relays stage 1, terminal 85, is monitored

Possible fault cause

- Short circuit to ground
- Relay faulty
- DME control module faulty

Affected terminals

Terminal IV/4

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Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 4, to relays for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 1 of coolant fan 1 ♦ Remove relay stage 2 of coolant fan 1 ♦ Measure resistance between special tool 9637 plug IV Pin 4 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

494 Fan output stage 1 - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Intake air temperature greater than 9 °C
- Air conditioning switched on and off once

Note!

The triggering wire for relays stage 1, terminal 85, is monitored

Possible fault cause

- Short circuit to B+
- Relay faulty
- DME control module faulty

Affected terminals

Terminal IV/4

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 4, to relays for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 1 of coolant fan 1 ♦ Remove relay stage 2 of coolant fan 1 ♦ Measure voltage between special tool 9637 plug IV Pin 4 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

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P0481

495 Fan output stage 2 - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Medium pressure switch (air conditioning) active or engine temperature greater than 105 °C
- Air conditioning switched on and off once

Note!

The triggering wire for relays stage 2, terminal 85, is monitored

Possible fault cause

- ♦ Open circuit
- ♦ Relay faulty
- ♦ DME control module faulty

Affected terminals

Terminal IV/20

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 20, to relays for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 2 of coolant fan 1 ♦ Remove relay stage 2 of coolant fan 2 ♦ Measure resistance between special tool 9637 plug IV Pin 20 and relay slot of coolant fan 1 plug Pin 2	0 - 5 Ω	Repair wiring harness → End

Work instruction			Display OK	If not OK
		♦ Measure resistance between special tool 9637 plug IV Pin 20 and relay slot of coolant fan 2 plug Pin 2	0 - 5 Ω ⇒ Step 3	Check plug connection X 2/3, Pin 22, and check wiring harness for chafing and pinching damage
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

495 Fan output stage 2 - below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Medium pressure switch (air conditioning) active or engine temperature greater than 105 °C
- Air conditioning switched on and off once

Note!

The triggering wire for relays stage 2, terminal 85, is monitored

Possible fault cause

- ♦ Short circuit to ground
- ♦ Relay faulty
- ♦ DME control module faulty

Affected terminals

Terminal IV/20

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 20, to relays for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 2 of coolant fan 1 ♦ Remove relay stage 2 of coolant fan 2 ♦ Measure resistance between special tool 9637 plug IV Pin 20 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

495 Fan output stage 2 - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Medium pressure switch (air conditioning) active or engine temperature greater than 105 °C
- Air conditioning switched on and off once

Note!

The triggering wire for relays stage 2, terminal 85, is monitored

Possible fault cause

♦ Short circuit to B+

♦ Relay faulty

♦ DME control module faulty

Affected terminals

Terminal IV/20

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 20, to relays for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 2 of coolant fan 1 ♦ Remove relay stage 2 of coolant fan 2 ♦ Measure voltage between special tool 9637 plug IV Pin 20 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

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P0482

591 Fan output stage 3 - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Engine temperature greater than 108 °C
- Vehicle speed greater than 25 $^{km}/_{h}$ (15 mph)
- Engine speed more than 1000 rpm

Note!

The triggering wire for relays stage 3, terminal 85, is monitored.

Possible fault cause

- Open circuit
- Relay faulty
- DME control module faulty

Affected terminals

Terminal IV/31

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 31, to relays for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 3 of coolant fan 1 ♦ Remove relay stage 3 of coolant fan 2 ♦ Measure resistance between special tool 9637 plug IV Pin 31 and relay slot of coolant fan 1 plug Pin 2	0 - 5 Ω	Repair wiring harness → End

Work instruction			Display OK	If not OK
		♦ Measure resistance between special tool 9637 plug IV Pin 31 and relay slot of coolant fan 2 plug Pin 2	0 - 5 Ω ⇒ Step 3	Check plug connection X 2/3, Pin 12, and check wiring harness for chafing and pinching damage
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

591 Fan output stage 3 - below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Engine temperature greater than 108 °C
- Vehicle speed greater than 25 $^{km}/_{h}$ (15 mph)
- Engine speed more than 1000 rpm

Note!

The triggering wire for relays stage 3, terminal 85, is monitored.

Possible fault cause

- ♦ Short circuit to ground
- ♦ Relay faulty
- ♦ DME control module faulty

Affected terminals

Terminal IV/31

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 31, to relays for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 3 of coolant fan 1 ♦ Remove relay stage 3 of coolant fan 2 ♦ Measure resistance between special tool 9637 plug IV Pin 31 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

591 Fan output stage 3 - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Engine temperature greater than 108 °C
- Vehicle speed greater than 25 km/h (15 mph)
- Engine speed more than 1000 rpm

Note!

The triggering wire for relays stage 3, terminal 85, is monitored.

Possible fault cause

- ♦ Short circuit to B+
- ♦ Relay faulty
- ♦ DME control module faulty

Affected terminals

Terminal IV/31

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check both relays	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module, plug IV Pin 20, to relays for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay stage 3 of coolant fan 1 ♦ Remove relay stage 3 of coolant fan 2 ♦ Measure voltage between special tool 9637 plug IV Pin 31 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P0491

Secondary Air Injection System, Bank 1 – Below Limit

Diagnosis conditions

- Intake air temperature 4.5 - 60 °C
- Engine temperature 4.5 - 102 °C
- Mass air flow 36 - 150 kg/h
- Engine starting temperature less than 42 °C
- Altitude correction factor greater than 0.75
- Oxygen sensors 1 and 2 ahead of TWC are ready for operation
- The secondary air injection pump is switched on
- Diagnosis has not yet taken place during this cycle

Possible fault cause

- Secondary air injection pump is not triggered
- Secondary air injection pump does not work
- Air supply lines restricted
- Electric change-over valve does not function
- Air change-over valve does not function
- Vacuum system leaking

Affected terminals

III/11 and III/14

Diagnosis/Troubleshooting

Note!

Secondary air diagnosis can be activated with the Porsche System Tester 2 in the "Short test" menu.

Work instruction			**Display OK**	**If not OK**
1	Activate secondary air pump	♦ Remove relay of secondary air injection pump. ♦ Jumper terminals 30 and 87. ♦ The secondary air pump must be running (audible function). – or ♦ Connect and switch on Porsche System Tester 2. ♦ Select DME. ♦ Call up "Drive links" menu. ♦ Select "Secondary air pump". ♦ Activate secondary air pump (audible function).	⇒ Step 3.	⇒ Step 2.
2	Check triggering of secondary air pump	♦ Check fuse (Maxi Fuse) of AIR pump (on relay carrier 2). ♦ Remove relay of AIR pump (on relay carrier 2). ♦ Measure voltage between pin 3 and ground ♦ Push relay back on.	Battery voltage.	Check wire from pin 2 to DME control module pin III/11 for continuity.
		♦ Remove connector of AIR pump. ♦ Measure voltage at pin 1 and pin 2	Battery voltage.	
3	Check vacuum system for leaks			Seal vacuum system
4	Check electric change-over valve	♦ Remove two-pole connector of electric change-over valve. ♦ Trigger AIR pump with Porsche System Tester 2. ♦ Measure voltage at pin 1 and pin 2	Battery voltage.	
		♦ Remove vacuum hose of electric change-over valve with the engine running.	Vacuum must be present	

2665 P0491
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Work instruction			Display OK	If not OK
5	Check air change-over valve	♦ Run engine briefly to produce vacuum. ♦ Activate secondary air pump. ♦ Remove vacuum hose of air change-over valve.	Vacuum must be present	
		♦ After activation, check air change-over valve for continuity		
6	Check air supply lines for blockage			

P0492

Secondary Air Injection System, Bank 2 – Below Limit

Diagnosis conditions

- Intake air temperature 4.5 - 60 °C
- Engine temperature 4.5 - 102 °C
- Mass air flow 36 - 150 kg/h
- Engine starting temperature less than 42 °C
- Altitude correction factor greater than 0.75
- Oxygen sensors 1 and 2 ahead of TWC are ready for operation
- The secondary air injection pump is switched on
- Diagnosis has not yet taken place during this cycle

Possible fault cause

- Secondary air injection pump is not triggered
- Secondary air injection pump does not work
- Air supply lines restricted
- Electric change-over valve does not function
- Air change-over valve does not function
- Vacuum system leaking

Affected terminals

III/11 and III/14

Diagnosis/Troubleshooting

Note!

Secondary air diagnosis can be activated with the Porsche System Tester 2 in the "Short test" menu.

Work instruction			Display OK	If not OK
1	Activate secondary air pump	♦ Remove relay of secondary air injection pump. ♦ Jumper terminals 30 and 87. ♦ The secondary air pump must be running (audible function). – or ♦ Connect and switch on Porsche System Tester 2. ♦ Select DME. ♦ Call up "Drive links" menu. ♦ Select "Secondary air pump". ♦ Activate secondary air pump (audible function).	⇒ Step 3.	⇒ Step 2.
2	Check triggering of secondary air pump	♦ Check fuse (Maxi Fuse) of AIR pump (on relay carrier 2). ♦ Remove relay of AIR pump (on relay carrier 2). ♦ Measure voltage between pin 3 and ground ♦ Push relay back on.	Battery voltage.	Check wire from pin 2 to DME control module pin III/11 for continuity.
		♦ Remove connector of AIR pump. ♦ Measure voltage at pin 1 and pin 2	Battery voltage.	
3	Check vacuum system for leaks			Seal vacuum system
4	Check electric change-over valve	♦ Remove two-pole connector of electric change-over valve. ♦ Trigger AIR pump with Porsche System Tester 2. ♦ Measure voltage at pin 1 and pin 2	Battery voltage.	
		♦ Remove vacuum hose of electric change-over valve with the engine running.	Vacuum must be present	

Work instruction			Display OK	If not OK
5	Check air change-over valve	♦ Run engine briefly to produce vacuum. ♦ Activate secondary air pump. ♦ Remove vacuum hose of air change-over valve.	Vacuum must be present	
		♦ After activation, check air change-over valve for continuity		
6	Check air supply lines for blockage			

P0501

120 Vehicle speed - open circuit

Diagnosis conditions

- Inertia fuel shutoff
- Engine temperature greater than 30 °C
- Engine speed between 1,480 rpm and 2,520 rpm.

Possible fault cause

- Open circuit or short circuit in wire from rear right wheel speed sensor to ABS control module
- Rear right wheel speed sensor faulty
- Pulse wheel for speed sensor damaged or contaminated with brake dust
- Open circuit or short circuit in wire from ABS control module? to DME control module
- ABS control module faulty
- DME control module faulty

Affected terminals

III/52

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Read PSM control module fault memory.		No fault in memory.	If a rear right wheel speed sensor fault is stored, remedy the fault according to PSM Trouble-shooting.

Work instruction			Display OK	If not OK
2	Check wiring from ABS control module pin 19 to DME control module pin III/52 for continuity or short to B+ or minus.			Repair wiring harness.
3	Check speed signal with Porsche System Tester 2.	♦ Connect and switch on Porsche System Tester 2. ♦ Select the vehicle type 911 (996) and system ABS (PSM) menu 'Actual values, Rear right wheel speed sensor'. ♦ Raise vehicle at rear right. ♦ By hand, turn rear right wheel in driving direction.	The speed must be displayed on the tester.	

P0506

32 Idle air control at stop - below limit

Diagnosis conditions

- Start-up ended
- Speed = 0 km/h
- Throttle valve in idle position
- Engine temperature > 60 °C
- Intake air temperature > -10 °C
- No fuel tank ventilation or tank ventilation diagnosis
- No secondary air diagnosis
- Altitude correction factor > 0.75
- No faults in speed signal, throttle position sensor, engine temperature, EVAP canister purge valve or tank ventilation system

Possible fault cause

- ♦ Throttle is jammed

Affected terminals

-

Diagnosis/troubleshooting

Note!

If faults are stored for the throttle jacking device, eliminate these faults first.

Work instruction			Display OK	If not OK
1	Replace throttle part			
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute. Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory		

DME 7.8

Printed in Germany, 2000

P0507

32 Idle air control at stop - above limit

Diagnosis conditions

- Start-up ended
- Speed = 0 km/h
- Throttle valve in idle position
- Engine temperature > 60 °C
- Intake air temperature > -10 °C
- No fuel tank ventilation or tank ventilation diagnosis
- No secondary air diagnosis
- Altitude correction factor > 0.75
- No faults in speed signal, throttle position sensor, engine temperature, EVAP canister purge valve or tank ventilation system

Possible fault cause

- ♦ Throttle is jammed
- ♦ Leaks in intake air system

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check for air leaks in intake air system		→ End	→ Step 2
2	Replace throttle part			
3	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute. Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory		

P0513

Immobilizer – Signal Implausible

Diagnosis conditions

- Start condition
- Motronic reset

Possible fault cause

- Open circuit in wiring between DME control module and alarm system
- Short circuit to ground or short circuit to B+
- Alarm system control module faulty

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check signal wire for continuity	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool 9637 Pin I/3 and alarm system control module plug Pin I/23	0 - 5 Ω ⇒ Step 3.	⇒ Step 2.
2	Remove connector X 2/3	♦ Measure resistance between plug connection X 2/3 bushing 6 and special tool 9637 Pin I/3 ♦ Measure resistance between plug connection X 2/3 Pin 6 and alarm system control module plug I Pin 23	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Check signal wire for short circuit to ground	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool 9637 Pin I/3 and ground	∞ Ω ⇒ Step 4.	Repair wiring harness → End.
4	Check signal wire for short circuit to B+	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure voltage between special tool 9637 Pin I/3 and ground	0 V ⇒ Step 4.	Repair wiring harness → End.
5	Replace alarm system control module.		→ End.	→ End.

Immobilizer - Open Circuit

Diagnosis conditions

- Start condition
- Motronic reset

Possible fault cause

- ♦ Open circuit in wiring between DME control module and alarm system
- ♦ Short circuit to ground or short circuit to B+
- ♦ Alarm system control module faulty

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire for continuity	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool 9637 Pin I/3 and alarm system control module plug Pin I/23	0 - 5 Ω ⇒ Step 3.	⇒ Step 2.
2	Remove connector X 2/3	♦ Measure resistance between plug connection X 2/3 bushing 6 and special tool 9637 Pin I/3 ♦ Measure resistance between plug connection X 2/3 Pin 6 and alarm system control module plug I Pin 23	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.
3	Check signal wire for short circuit to ground	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool 9637 Pin I/3 and ground	∞ Ω ⇒ Step 4.	Repair wiring harness → End.
4	Check signal wire for short circuit to B+	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure voltage between special tool 9637 Pin I/3 and ground	0 V ⇒ Step 4.	Repair wiring harness → End.
5	Replace alarm system control module.		→ End.	→ End.

P0560

107 Voltage supply - signal implausible

Diagnosis conditions

- Vehicle speed greater than 0 km/h (0 mph)
- No fault in vehicle speed
- Time elapsed after start-up 60 sec.

Possible fault cause

- DME control module

Affected terminals

Terminal II/2

Diagnosis/troubleshooting

Note!

In case of a fault, a replacement value of 14.06 V is used.

Work instruction			Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P0562

107 Voltage supply - below limit

Diagnosis conditions

- Vehicle speed greater than 0 $^{km}/_{h}$ (0 mph)
- No fault in vehicle speed
- Time elapsed after start-up 60 sec.

Possible fault cause

- ♦ Battery
- ♦ Contact resistance

Affected terminals

Terminal II/2

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check battery		⇒ Step 2	Replace battery → End
2	Check wire, terminal 30, for contact resistance	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure voltage between special tool 9637 Pin I/2 and ground	> 11 V ⇒ Step 4	⇒ Step 3
3		♦ Check wire from special tool 9637, Pin I/2, to pin side of connector X 2/3, Pin 2, for continuity ♦ Check connector for corrosion	0 - 5 Ω ⇒ Step 4	
4		♦ Check wire from connector X 2/3, sleeve side, to current distributor fuse C 1 for continuity	0 - 5Ω ⇒ Step 5	Remedy contact resistance → End
5	Check voltage regulator and alternator		→ End	

P0563

Voltage supply - above limit

Diagnosis conditions

- Vehicle speed greater than 0 $^{km}/_{h}$ (0 mph)
- No fault in vehicle speed
- Time elapsed after start-up 60 sec.

Possible fault cause

- Voltage regulator faulty (overvoltage)

Affected terminals

Terminal II/2

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Check voltage regulator	→ End	Replace voltage regulator → End

P0571

Stop Light Switch – Signal Implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- Stop light switch
- Wiring harness

Note!

The DME control module receives the signals from the stop light switches via CAN bus.

Affected terminals

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check stop light switch	♦ Remove stop light switch ♦ Measure resistance between Pin 1 and Pin 4 ♦ Actuate stop light switch ♦ Measure resistance between Pin 1 and Pin 2 ♦ Actuate stop light switch ♦ Install stop light switch	0 - 5 Ω ∞ Ω ∞ Ω 0 - 5 Ω ⇒ Step 2.	Replace stop light switch → End
2	Check wiring from PSM control module to stop light switch 1 for short circuit to B+	♦ Remove PSM control module connector ♦ Measure voltage between Pin 32 and ground ♦ Switch on the ignition. ♦ Actuate brake	0 V. Battery voltage ⇒ Step 3	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Check wiring from PSM control module to stop light switch 2 for short circuit to B+	♦ Remove PSM control module connector ♦ Measure voltage between Pin 37 and ground ♦ Switch on the ignition. ♦ Actuate brake	Battery voltage. 0 V → End.	Repair wiring harness → End.

P0600

236 CAN timeout Tiptronic - open circuit

Diagnosis conditions

- Vehicle with Tiptronic transmission
- Battery voltage greater than 10 V
- Ignition on

Possible fault cause

- Wiring harness
- Tiptronic control module not connected
- Tiptronic control module faulty

Note!

- *If all CAN bus faults are stored, there must be a short circuit in the CAN bus wiring.*
- *If one CAN bus fault is stored, the cruise control system is out of order.*
- *CAN bus faults may be caused by a control module reset. The fault is then indicated as "Not present".*

Affected terminals

Terminal II/3 and II/4

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check whether connector of Tiptronic control module is plugged in.		⇒ Step 2	
2	Check CAN bus from DME control module to Tiptronic control module for continuity	♦ Remove DME control module connector ♦ Remove Tiptronic control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 plug II Pin 3 and Tiptronic control module plug Pin 85	0 - 5 Ω	Repair wiring harness → End

Work instruction			Display OK	If not OK
		♦ Measure resistance between special tool 9637 plug II Pin 4 and Tiptronic control module plug Pin 86	0 - 5 Ω ⇒ Step 3	
3	Check CAN bus from DME control module to Tiptronic control module for short to ground	♦ Remove DME control module connector ♦ Remove Tiptronic control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 plug II Pin 3 and ground ♦ Measure resistance between special tool 9637 plug II Pin 4 and ground	⇒ Step 4 ∞ Ω ∞ Ω ⇒ Step 4	Repair wiring harness → End
4	Check CAN bus from DME control module to Tiptronic control module for short to B+	♦ Remove DME control module connector ♦ Remove Tiptronic control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure voltage between special tool 9637 plug II Pin 3 and ground ♦ Switch on the ignition ♦ Measure voltage between special tool 9637 plug II Pin 4 and ground ♦ Switch on the ignition	⇒ Step 5 0 V 0 V ⇒ Step 5	Repair wiring harness → End
5	Check CAN bus from DME control module to Tiptronic control module for short circuit	♦ Remove DME control module connector ♦ Remove Tiptronic control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 plug II Pin 3 and plug II Pin 4	∞ Ω → End	Repair wiring harness → End

P0601

DME relay/control module faulty (computer monitoring: reset) – signal implausible

Diagnosis conditions

- Time elapsed after engine start-up greater than 10 seconds

Possible fault cause

- Undervoltage
- DME relay faulty
- DME control module faulty (checksum error caused by tampering with data record)

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check voltage supply, terminal 15	♦ Measure voltage between pin I/1 and ground.	> 11 V	Check voltage supply and repair if necessary → End
2	Check DME relay	♦ Switch on the ignition ♦ Measure voltage between pin I/8 and ground	Battery positive voltage	Check triggering of DME relay Repair wiring or replace DME relay → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation.	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P0603

105 EEPROM Faulty

Diagnosis conditions

- Ignition on

Possible fault cause

- ♦ DME control module faulty

Affected terminals

\-

Diagnosis/troubleshooting

Note!

If no fault is present, erase the fault memory.

	Work instruction		Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P0604

406 Control module faulty (RAM) - signal implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- DME control module faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

If no fault is present, delete the fault memory.

Work instruction			Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P0605

405 Control module faulty (ROM) - signal implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- DME control module faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

If no fault is present, delete the fault memory.

Work instruction			Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P0607

Control Module Faulty (Computer Monitoring: Reset) – Signal Implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- ♦ Undervoltage
- ♦ DME control module faulty

This fault may be entered if the control module has been operated with undervoltage.

Affected terminals

I/1

Diagnosis/Troubleshooting

Note!

If no fault is present, erase the fault memory.

Work instruction			Display OK	If not OK
1	Check voltage supply, terminal 15	♦ Measure voltage between pin I/1 and ground.	> 11 V ⇒ Step 2	
2	Replace DME control module.		⇒ Step 3.	
3	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

P0638

Throttle Jacking Unit, Position Error – Signal Implausible

Diagnosis conditions

- Driving with changing pedal position

Possible fault cause

- Short circuit in wiring harness
- Sluggish throttle

Affected terminals

Terminal I/9 and I/7

Note!

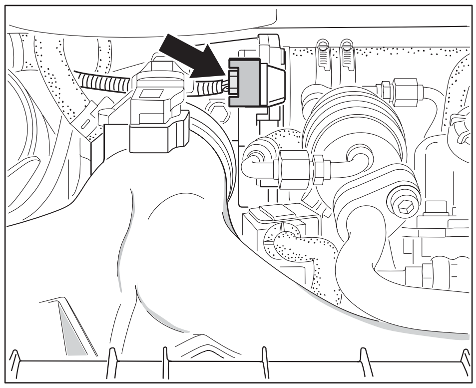
The vehicle is in emergency function mode, i.e. the engine is turning at approx. 1200 rpm.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module pin I/7 to the throttle jacking unit for short circuit to B+.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/7 and ground. ♦ Switch on the ignition.	Low battery voltage ⇒ Step 2.	Repair wiring harness → End.
2	Check wiring from DME control module pin I/9 to the throttle jacking unit for short circuit to B+.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/9 and ground. ♦ Switch on the ignition.	Low battery voltage ⇒ Step 3.	Repair wiring harness → End.
3	Check wiring from DME control module pin I/7 to the throttle part for short circuit to ground.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/7 and pin I/2.	0 V ⇒ Step 4.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
4	Check wiring from DME control module pin I/9 to the throttle part for short circuit to ground.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/9 and pin I/2.	0 V ⇒ Step 5.	Repair wiring harness → End.
5	Check wiring from DME control module, pin I/7, for short circuit to wire, pin I/9.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of throttle part. ♦ Measure resistance between pin I/7 and pin I/9.	∞ Ω ⇒ Step 6.	Repair wiring harness → End.

Remove connector of throttle part: ►



Work instruction			**Display OK**	**If not OK**
6	Check resistance of motor actuator in throttle part.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between pin I/7 and pin I/9.	1,2 - 1,6 Ω (at 20 °C) ⇒ Step 7.	Replace throttle part ⇒ Step 8.
7	Replace DME control module.		⇒ Step 8.	
8	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

P0645

A/C Compressor Control – Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V
- Air conditioning on

Possible fault cause

- ♦ A/C relay
- ♦ Open circuit in wiring

Affected terminals

Terminal IV/27

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check A/C relay	♦ Remove A/C relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace A/C relay → End
2	Check control wire for A/C relay, Pin 2 (terminal 85), for open circuit	♦ Remove A/C relay ♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool 9637 Pin IV/27 and A/C relay plug Pin 2	0 - 5 Ω → End.	Repair wiring harness → End.

P0646

A/C Compressor Control – Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V
- Air conditioning on

Possible fault cause

- Short circuit to ground in wiring

Affected terminals

Terminal IV/27

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check control wire for A/C relay, Pin 2 (terminal 85), for short circuit to ground	♦ Remove A/C relay ♦ Remove DME control module connector ♦ Measure resistance between Pin 2 (terminal 85) and ground	∞ Ω → End.	Repair wiring harness → End.

P0650

661 MIL Lamp (via CAN) - Open Circuit

Diagnosis conditions

- Ignition on

Possible fault cause

- Instrument cluster

Affected terminals

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Replace instrument clus-ter			

P0674

A/C Compressor Control – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V
- Air conditioning on

Possible fault cause

- Short circuit to B+ in wiring

Affected terminals

Terminal IV/27

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check control wire for A/C relay, Pin 2 (terminal 85), for short circuit to B+	♦ Remove A/C relay ♦ Remove DME control module connector ♦ Measure voltage between A/C relay Pin 2 and ground ♦ Ignition on	0 V → End.	Repair wiring harness → End.

P0700

Tiptronic (CAN transfer box setting implausible) or (Transmission oil temperature above maximum value)

Note!

In the case of some models, the fault text "CAN transfer box setting implausible" may be output. The correct fault text however is "Transmission oil temperature above maximum value".

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0700	48	Transmission oil temperature Above maximum value	Fault memory entry and request for torque reduction

P0701

Tiptronic (Gear implausible/transmission slips)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0701	15	Overspeed n2 or n3	Power transmission interrupted
	49	Engine overspeed	Power transmission interrupted
	50	Inadmissible transmission ratio	Power transmission interrupted
	51	Transmission slips or gear implausible	Control unit switches into third gear

P0702

Tiptronic (Control unit faulty)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0702	56	Control unit fault - encoding error (EEP-ROM: Version invalid)	Control unit in limp home mode, minimum cycle initiated
	57	Control unit faulty (clock)	Control unit in limp home mode, CAN Off
	58	Control unit fault (test of internal watchdog)	Control unit in limp home mode, minimum cycle initiated
	59	Control unit fault (test of external watchdog)	Control unit in limp home mode, minimum cycle initiated
	62	Control unit faulty (RAM)	Control unit in limp home mode, minimum cycle initiated, CAN Off
	63	Control unit faulty (ROM)	Control unit in limp home mode, minimum cycle initiated, CAN Off
	64	Control unit faulty (EEPROM function critical)	Control unit in limp home mode, minimum cycle initiated

P0706

Tiptronic (Selector lever switch implausible)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0706	17	Selector lever switch implausible	Control unit in limp-home mode

P0712

Transmission Oil Temperature - Below Limit

Diagnosis conditions

- Idle speed

Possible fault cause

- Temperature sensor faulty
- Wiring harness
- DME control module faulty

Affected terminals

Terminal II/23 and IV/11

Resistance values

60 °C	2.8 -3.5 kΩ
90 °C	1.0 -1.3 kΩ
120 °C	0.4 -0.6 kΩ

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check temperature sensor	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between Pin II/23 and Pin IV/11	2.8 - 3.5 kΩ (at 60 °C) ⇒ Step 2	Replace temperature sensor → End
2	Check wiring from DME control module to temperature sensor for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug connection of temperature sensor ♦ Measure resistance between special tool 9637 Pin II/23 and temperature sensor plug Pin 2 ♦ Measure resistance between special tool 9637 Pin IV/11 and temperature sensor plug Pin 1	0 - 5 Ω ⇒ Step 3.	Note The lines are routed via the transmission plug connection Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Check wiring from DME control module to temperature sensor for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug connection of temperature sensor ♦ Measure resistance between Pin IV/11 and ground	$\infty\ \Omega$ ⇒ Step 4.	Repair wiring harness → End.
4	Replace DME control module		⇒ Step 5.	
5	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0713

Transmission Oil Temperature - Above Limit

Diagnosis conditions

- Idle speed

Possible fault cause

- Temperature sensor faulty
- Wiring harness
- DME control module faulty

Affected terminals

Terminal II/23 and IV/11

Resistance values

60 °C	2.8 -3.5 kΩ
90 °C	1.0 -1.3 kΩ
120 °C	0.4 -0.6 kΩ

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check temperature sensor.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between Pin II/23 and Pin IV/11	2.8 - 3.5 kΩ (at 60 °C) ⇒ Step 2	Replace temperature sensor → End
2	Check wiring from DME control module to temperature sensor for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug connection of temperature sensor ♦ Switch on the ignition. ♦ Measure voltage between pin IV/11 and ground.	0 V ⇒ Step 3.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module.		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P0715

Tiptronic (Supply voltage of speed sensors)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0715	11	Supply voltage of speed sensors (outside tolerance)	Control unit in limp-home mode, minimum cycle initiated
	12	Speed sensor n2 (or sensor supply interrupted)	Control unit in limp-home mode
	13	Speed sensor n3	Control unit in limp-home mode
	14	Speed comparison n2 with n3 implausible	Control unit in limp-home mode

P0720

Tiptronic (CAN: wheel speed rear right)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0720	22	CAN: wheel speed rear right from PSM implausible	Substitute value wheel speed rear left; if more than one fault from Group 22, 23, 24, 25 appears, then control unit is in limp-home mode
	23	CAN: wheel speed rear left from PSM implausible	Substitute value wheel speed rear left; if more than one fault from Group 22, 23, 24, 25 appears, then control unit is in limp-home mode
	38	CAN: PSM communication disturbed	Control unit in limp-home mode

P0730

Tiptronic (Gear comparison negative)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0730	55	Gear comparison negative (repeatedly)	Control unit in limp-home mode, minimum cycle initiated

P0740

Tiptronic (Converter lockup clutch)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0740	53	Converter lockup clutch excessive power consumption	Converter lockup clutch open

P0743

Tiptronic (Converter lockup clutch solenoid valve)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0743	5	Converter lockup solenoid valve	Control unit in limp-home mode, minimum cycle initiated

P0748

Tiptronic (Control solenoid valve, modulating pressure)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0748	6	Control solenoid valve, modulating pressure	Control unit in limp-home mode, minimum cycle initiated

P0753

Tiptronic (Solenoid valve, 1-2/4-5 gearshift)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0753	2	Solenoid valve, 1-2/4-5 gearshift	Control unit in limp-home mode, minimum cycle initiated

P0758

Tiptronic (Solenoid valve, 2-3 gearshift)

Diagnostic conditions

- Ignition on

Possible cause of fault

- ♦ The Tiptronic control unit has detected a malfunction.

Note!

- ♦ *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- ♦ *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- ♦ *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- ♦ *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0758	3	Solenoid valve, 2-3 gearshift	Control unit in limp-home mode, minimum cycle initiated

P0763

Tiptronic (Solenoid valve, 3-4 gearshift)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0763	4	Solenoid valve, 3-4 gearshift	Control unit in limp-home mode, minimum cycle initiated

P0778

Tiptronic (Control solenoid valve, shifting pressure)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P0778	7	Control solenoid valve, shifting pressure	Control unit in limp-home mode, minimum cycle initiated

P0830

Clutch Switch – Signal Implausible

Diagnosis conditions

- Speed greater than 50 km/h
- Time between two clutch engagement processes more than 5 sec
- Number of gearshifts more than 5

Possible fault cause

- Fuse faulty
- Clutch switch
- Short circuit to B+
- Open circuit

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- *The clutch switch is linked to the instrument cluster. The DME control module receives information from the instrument cluster via the CAN bus.*
- *If a clutch switch fault is stored, the cruise control system is out of order.*

Work instruction			**Display OK**	**If not OK**
1	Check fuse B 7.			
2	Check clutch switch.	♦ Clutch switch opens when actuated.		
3	Check wiring.	♦ Check the wiring from the clutch switch to the instrument cluster pin III/19 for short to B+. ♦ Check the wiring from the clutch switch to the instrument cluster pin III/19 for continuity.		

DME 7.8

P1101

(Input variables, charge measurement - below limit)

Input variables, charge measurement - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Heavily soiled throttle
- Throttle adjusting unit faulty
- Mass air flow sensor faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

In case of a defect in the MAF sensor, this fault must also be stored in the fault memory.

Work instruction			Display OK	If not OK
1	Check throttle adjusting unit for dirt (visual inspection)		⇒ Step 2	Clean throttle adjusting unit, replace if necessary → End
2	Check voltage signal of MAF sensor	♦ Ignition on ♦ Measure voltage between special tool 9637 pin III/23 and ground. ♦ In the Porsche System Tester 2, select the menu point "Actual values/mass air flow sensor"	0.9 to 1.1 V	Replace mass air flow sensor → End
		♦ Start the engine	1.2 to 1.5 V at idle speed	Replace mass air flow sensor → End

P1102

Ambient Pressure Sensor – Above Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- DME control module

Affected terminals

-

Diagnosis/Troubleshooting

Note!

If no fault is present, erase the fault memory.

Work instruction			**Display OK**	**If not OK**
1	Replace DME control module.			
2	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.		

P1105

Oxygen Sensing Adaptation, Upper Load Range, Bank 1 – Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C
- Mass air flow greater than 180 $^{kg}/_{h}$

Possible fault cause

- Incorrect signal from MAF sensor
- Fuel pressure too high
- Fuel injector leaking
- EVAP canister purge valve open

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- *If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine.	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0.5 bar after 10 minutes	
5	Check fuel injectors for leaks			

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P1106

Oxygen Sensing Adaptation, Upper Load Range, Bank 2 – Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C
- Mass air flow greater than 180 $^{kg}/_{h}$

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking
- ♦ EVAP canister purge valve open

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- ♦ *If DTC P0445 (EVAP canister purge valve - short to ground) is stored in the memory, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
2	Check fuel pressure			

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td rowspan="2">Check fuel pressure regulator, vacuum connection and fuel return line</td><td>◆ Remove vacuum hose from fuel pressure regulator
◆ Connect special tool 9103/2 to vacuum hose
◆ Start the engine.</td><td>0.4 - 0.6 bar</td><td>Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.</td></tr>
<tr><td></td><td>◆ Check housing of fuel pressure regulator for damage and deformation</td><td></td><td>Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased</td></tr>
<tr><td>4</td><td>Check EVAP canister purge valve</td><td>◆ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve
◆ Remove connector of EVAP canister purge valve
◆ Connect special tool 9160/1 to EVAP canister purge valve
◆ Generate vacuum of approx. 0.7 bar</td><td>The vacuum must not fall below 0.5 bar after 10 minutes</td><td></td></tr>
<tr><td>5</td><td>Check fuel injector for leaks</td><td></td><td></td><td></td></tr>
</table>

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P1107

Oxygen Sensing Adaptation, Lower Load Range, Bank 1 – Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- ♦ *If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine.	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check fuel injectors for leaks			

P1108

Oxygen Sensing Adaptation, Lower Load Range, Bank 2 – Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- ♦ *If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine.	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check fuel injectors for leaks			

P1109

Input variables, charge measurement - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Heavily soiled throttle
- Throttle adjusting unit faulty
- Mass air flow sensor faulty

Affected terminals

-

Diagnosis/troubleshooting

Note!

In case of a defect in the MAF sensor, this fault must also be stored in the fault memory.

	Work instruction		**Display OK**	**If not OK**
1	Check throttle adjusting unit for dirt (visual inspection)		⇒ Step 2	Clean throttle adjusting unit, replace if necessary → End
2	Check voltage signal of MAF sensor	♦ Ignition on ♦ Measure voltage between special tool 9637 pin III/23 and ground. ♦ In the Porsche System Tester 2, select the menu point "Actual values/mass air flow sensor"	0.9 to 1.1 V	Replace mass air flow sensor → End
		♦ Start the engine	1.2 to 1.5 V at idle speed	Replace mass air flow sensor → End

P1110

294 Oxygen Sensors Exchanged Ahead of TWC

Diagnosis conditions

- Engine at operating temperature
- Oxygen sensing system active

Possible fault cause

- Wiring harness

Affected terminals

II/15 and II/16

Diagnosis/Troubleshooting

Note!

When the oxygen sensors are exchanged, then the oxygen sensors run contrary to the adaptation limitation.

Work instruction			Display OK	If not OK
1	Check wiring harness	♦ Measure resistance between oxygen sensor connector 1 pin 1 and DME control module connector pin II/15	0 - 5 Ω	Repair wiring harness
2		♦ Measure resistance between oxygen sensor connector 2 pin 1 and DME control module connector pin II/16	0 - 5 Ω	Repair wiring harness

P1114

723 Heating LSU, Inertia Fuel Shutoff - Signal Implausible

Diagnosis conditions

- Exhaust temperature above 250 °C
- Battery positive voltage greater than 9.5 V
- Time elapsed after start-up greater than 60 seconds
- No faults of the oxygen sensor
- Inertia fuel shutoff greater than 4 seconds

Possible fault cause

- ♦ Open circuit
- ♦ Oxygen sensor
- ♦ DME control module

Affected terminals

II/19

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector Bank 1 ahead of catalytic converter ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor

Work instruction			Display OK	If not OK
3	Check B+ supply for oxygen sensor heating	♦ Start the engine ♦ Measure voltage between pin 3 towards the DME control module and ground	Battery positive voltage	
4	Check wiring	♦ Check resistance between pin 4 and pin II/19	0 - 5 Ω	
5	Check oxygen sensor	♦ Check resistance between pin 4 and the oxygen sensor housing ♦ Check resistance between pin 1 and the oxygen sensor housing ♦ Check resistance between pin 2 and the oxygen sensor housing ♦ Check resistance between pin 5 and the oxygen sensor housing ♦ Check resistance between pin 6 and the oxygen sensor housing	∞ Ω	Replace oxygen sensor

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

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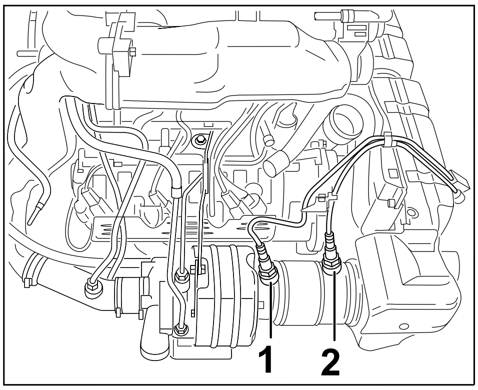
Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter

►



DME 7.8

P1115

13 Oxygen Sensor Ahead of TWC, Bank 1 – Signal Implausible

Diagnosis conditions

- Mass air flow above 32 $^{kg}/_{h}$
- No other oxygen sensor faults
- Battery voltage between 9.5 V and 16 V

Possible fault cause

- Open circuit
- Oxygen sensor heating faulty
- DME control module

Affected terminals

II/19

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector ahead of catalytic converter Bank 1 ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor

Work instruction			Display OK	If not OK
3	Check B+ supply for oxygen sensor heating	♦ Start the engine ♦ Measure voltage between pin 3 towards the DME control module and ground	Battery positive voltage	
4	Check wiring	♦ Check resistance between pin 4 and pin II/19	0 - 5 Ω	
5	Check oxygen sensor	♦ Check resistance between pin 4 and the oxygen sensor housing ♦ Check resistance between pin 1 and the oxygen sensor housing ♦ Check resistance between pin 2 and the oxygen sensor housing ♦ Check resistance between pin 5 and the oxygen sensor housing ♦ Check resistance between pin 6 and the oxygen sensor housing	∞ Ω	Replace oxygen sensor

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

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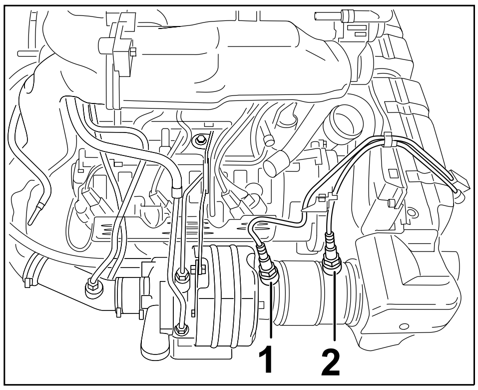
Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter



13 Oxygen Sensor Heating Ahead of TWC, Bank 1 – Open Circuit

Diagnosis conditions

- Battery voltage between 9.5 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible fault cause

- Open circuit

Affected terminals

II/19

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector Bank 1 ahead of catalytic converter ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor

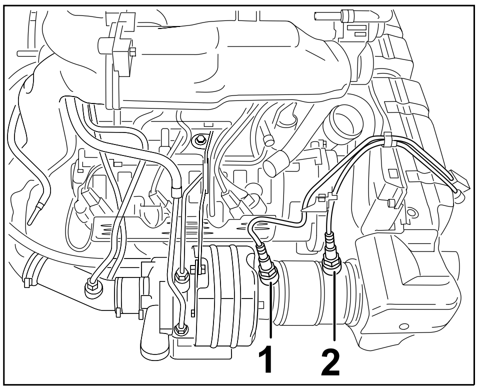
Work instruction			Display OK	If not OK
3	Check B+ supply for oxygen sensor heating	♦ Start the engine ♦ Measure voltage between pin 3 towards the DME control module and ground	Battery positive voltage	
4	Check wiring	♦ Check resistance between pin 4 and pin II/19	0 - 5 Ω	

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter



13 Oxygen Sensor Ahead of TWC, Bank 1 – Below Limit

Diagnosis conditions

- Battery voltage between 9.5 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible fault cause

- Short circuit to ground

Affected terminals

II/19

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating	♦ Remove oxygen sensor connector Bank 1 ahead of catalytic converter ♦ Check resistance between pin 3 and 4 towards the oxygen sensor ♦	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor
2		♦ Check resistance between pin 4 and the oxygen sensor housing	∞ Ω	
3	Check wiring	♦ Check resistance between pin 4 and vehicle ground towards DME control module	∞ Ω	Repair wiring harness

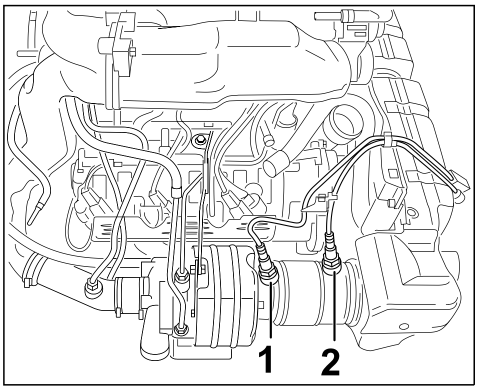
Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter

►



13 Oxygen Sensor Heating Ahead of TWC, Bank 1 – Above Limit

Diagnosis conditions

- Battery voltage between 9.5 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible fault cause

♦ Short circuit to B+

Affected terminals

II/19

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating	♦ Remove oxygen sensor connector Bank 1 ahead of catalytic converter ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor
		♦ Check resistance between pin 4 and the oxygen sensor housing ♦ Check resistance between pin 1 and pin 4 ♦ Check resistance between pin 2 and pin 4 ♦ Check resistance between pin 5 and pin 4 ♦ Check resistance between pin 6 and pin 4	∞ Ω	
2	Check wiring	♦ Switch on the ignition ♦ Measure voltage between pin 4 and vehicle ground towards DME control module	0 V	Repair wiring harness

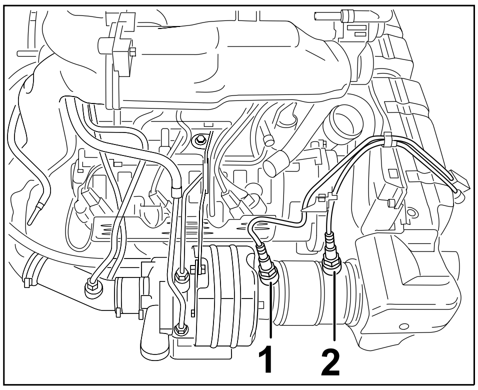
Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter



P1116

724 Heating LSU Bank 2, Inertia Fuel Shutoff - Signal Implausible

Diagnosis conditions

- Exhaust temperature above 250 °C
- Battery positive voltage greater than 9.5 V
- Time elapsed after start-up greater than 60 seconds
- No faults of the oxygen sensor
- Inertia fuel shutoff greater than 4 seconds

Possible fault cause

- Open circuit
- Oxygen sensor
- DME control module

Affected terminals

II/13

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector Bank 2 ahead of catalytic converter ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor

Work instruction			Display OK	If not OK
3	Check B+ supply for oxy-gen sensor heating	♦ Start the engine ♦ Measure voltage between pin 3 towards the DME control module and ground	Battery positive volt-age	
4	Check wiring	♦ Check resistance between pin 4 and pin II/13	0 - 5 Ω	
5	Check oxygen sensor	♦ Check resistance between pin 4 and the oxygen sensor housing ♦ Check resistance between pin 1 and the oxygen sensor housing ♦ Check resistance between pin 2 and the oxygen sensor housing ♦ Check resistance between pin 5 and the oxygen sensor housing ♦ Check resistance between pin 6 and the oxygen sensor housing	∞ Ω	Replace oxygen sensor

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

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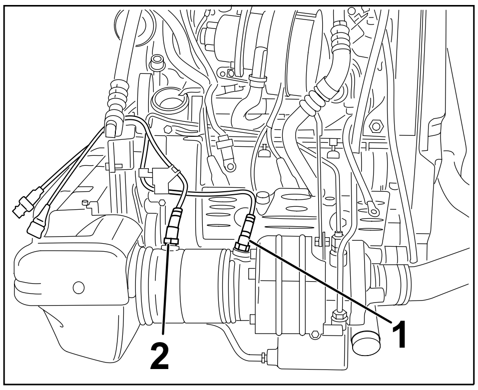
Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter

►



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P1117

14 Oxygen Sensor Heating After TWC, Bank 1 – Signal Implausible

Diagnosis conditions

- Exhaust temperature between 300 °C and 600 °C
- Battery voltage between 9.5 V and 16 V

Possible fault cause

- Corrosion in connector
- Oxygen sensor

Affected terminals

II/7

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td>Check connector for corrosion</td><td>♦ Visual inspection</td><td></td><td></td></tr>
<tr><td>2</td><td>Check oxygen sensor heating</td><td>♦ Remove oxygen sensor connector after catalytic converter Bank 1
♦ Check resistance between pin 1 and 2 towards the oxygen sensor</td><td>9 to 10 Ω at 20 °C</td><td rowspan="2">Replace oxygen sensor</td></tr>
<tr><td>3</td><td>Check oxygen sensor</td><td>♦ Check resistance between pin 1 and the oxygen sensor housing
♦ Check resistance between pin 1 and 3</td><td>∞ Ω</td></tr>
</table>

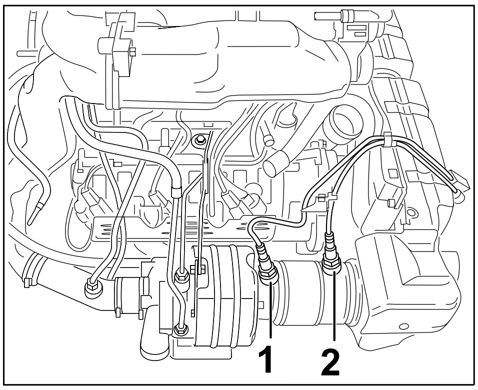
Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter



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P1118

4 Oxygen Sensor Heating After TWC, Bank 2 – Signal Implausible

Diagnosis conditions

- Exhaust temperature between 300 °C and 600 °C
- Battery voltage between 9.5 V and 16 V

Possible fault cause

- Corrosion in connector
- Oxygen sensor

Affected terminals

II/1

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

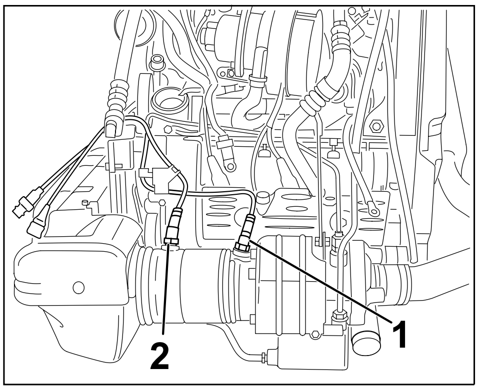
Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector after catalytic converter Bank 2 ♦ Check resistance between pin 1 and 2 towards the oxygen sensor	9 to 10 Ω at 20 °C	Replace oxygen sensor
3	Check oxygen sensor	♦ Check resistance between pin 1 and the oxygen sensor housing ♦ Check resistance between pin 1 and 3	∞ Ω	

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter



P1119

5 Oxygen Sensor Heating Ahead of TWC, Bank 2 – Signal Implausible

Diagnosis conditions

- Mass air flow above 32 $^{kg}/_{h}$
- No other oxygen sensor faults
- Battery voltage between 9.5 V and 16 V

Possible fault cause

- Open circuit
- Oxygen sensor heating faulty
- DME control module

Affected terminals

II/13

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector ahead of catalytic converter Bank 2 ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor

Work instruction			Display OK	If not OK
3	Check B+ supply for oxy-gen sensor heating	♦ Start the engine ♦ Measure voltage between pin 3 towards the DME control module and ground	Battery positive volt-age	
4	Check wiring	♦ Check resistance between pin 4 and pin II/19	0 - 5 Ω	
5	Check oxygen sensor	♦ Check resistance between pin 4 and the oxygen sensor housing ♦ Check resistance between pin 1 and the oxygen sensor housing ♦ Check resistance between pin 2 and the oxygen sensor housing ♦ Check resistance between pin 5 and the oxygen sensor housing ♦ Check resistance between pin 6 and the oxygen sensor housing	∞ Ω	Replace oxygen sensor

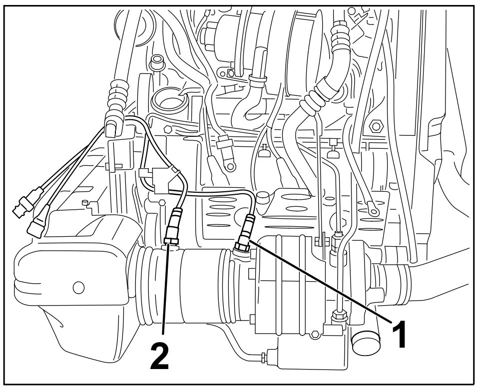
Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter

►



5 Oxygen Sensor Heating Ahead of TWC, Bank 2 – Open Circuit

Diagnosis conditions

- Battery voltage between 9.5 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible fault cause

- Open circuit

Affected terminals

II/13

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check connector for corrosion	♦ Visual inspection		
2	Check oxygen sensor heating	♦ Remove oxygen sensor connector Bank 2 ahead of catalytic converter ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor

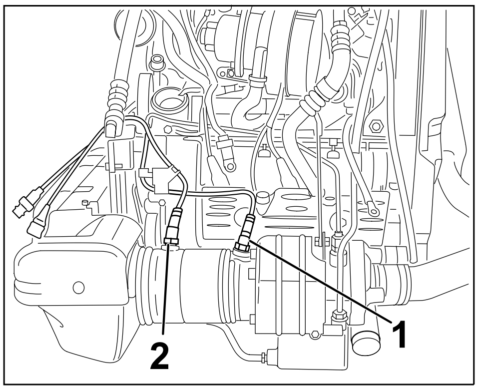
Work instruction			Display OK	If not OK
3	Check B+ supply for oxygen sensor heating	♦ Start the engine ♦ Measure voltage between pin 3 towards the DME control module and ground	Battery positive voltage	
4	Check wiring	♦ Check resistance between pin 4 and pin II/19	0 - 5 Ω	

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter



5 Oxygen Sensor Heating Ahead of TWC, Bank 2 – Below Limit

Diagnosis conditions

- Battery voltage between 9.5 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible fault cause

- Short circuit to ground

Affected terminals

II/13

Diagnosis/Troubleshooting

Note!

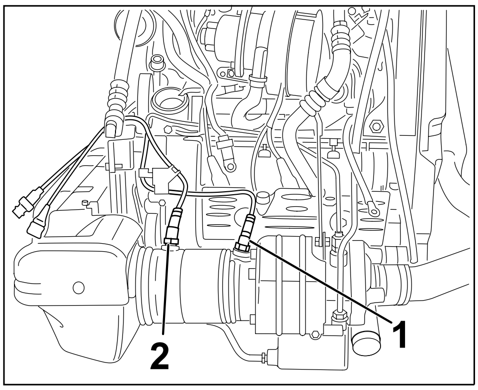
Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Check oxygen sensor heating	♦ Remove oxygen sensor connector Bank 2 ahead of catalytic converter ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor
2		♦ Check resistance between pin 4 and the oxygen sensor housing	∞ Ω	
3	Check wiring	♦ Check resistance between pin 4 and vehicle ground towards DME control module	∞ Ω	Repair wiring harness

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter ►



1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter

5 Oxygen Sensor Heating Ahead of TWC, Bank 2 – Above Limit

Diagnosis conditions

- Battery voltage between 9.5 V and 16 V
- Time elapsed after engine start-up greater than 10 seconds

Possible fault cause

- Short circuit to B+

Affected terminals

II/13

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

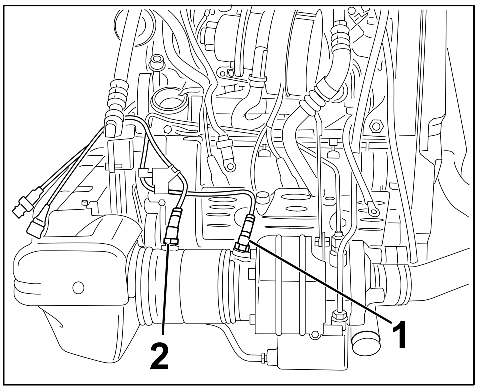
Work instruction			Display OK	If not OK
1	Check oxygen sensor heating	♦ Remove oxygen sensor connector Bank 2 ahead of catalytic converter ♦ Check resistance between pin 3 and 4 towards the oxygen sensor	3.0 to 3.5 Ω at 20 °C	Replace oxygen sensor
		♦ Check resistance between pin 4 and the oxygen sensor housing ♦ Check resistance between pin 1 and pin 4 ♦ Check resistance between pin 2 and pin 4 ♦ Check resistance between pin 5 and pin 4 ♦ Check resistance between pin 6 and pin 4	∞ Ω	
2	Check wiring	♦ Switch on the ignition ♦ Measure voltage between pin 4 and vehicle ground towards DME control module	0 V	Repair wiring harness

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter



P1120

Throttle Valve – Signal Implausible

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit or short circuit in the wiring
- Throttle position sensor faulty
- DME control module faulty

Affected terminals

Terminal I/7, I/9, III/8, III/10, III/24 and III/25

Note!

- *Fault P01120 only appears in conjunction with fault P1121 or P1122.*
- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The opening angle of the throttle valve is limited to 30 %.*
- *The dynamic of the throttle valve is restricted.*

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check voltage supply to throttle motor actuator	♦ Connect special tool 9637. ♦ Connect motor tester (oscillo-scope) to Pin I/7 and Pin I/9 ♦ Use special input ♦ Switch on the ignition.	See Figure 1.	⇒ Step 5.
		♦ Fully depress accelerator pedal	See Figure 2 ⇒ Step 2	

Figure 1:

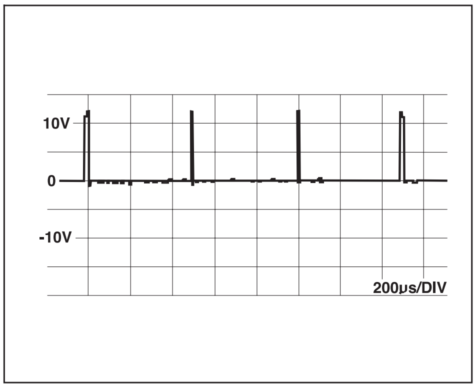
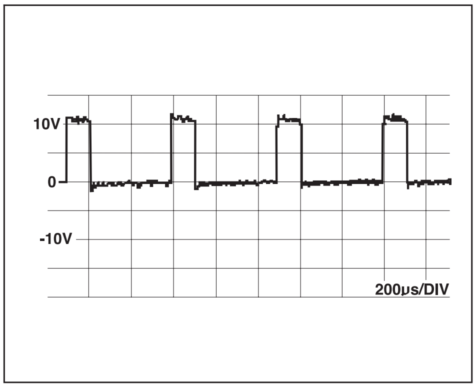


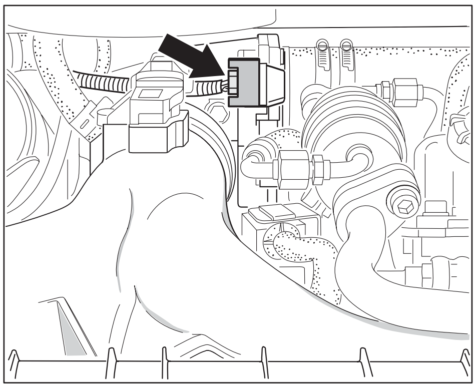
Figure 2:



Work instruction			Display OK	If not OK
2	Check TP voltage supply.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure voltage between Pin III/ 10 and Pin III/25 ♦ Switch on the ignition.	Approx. 5 V	
3	Check voltage values of throttle position sensors.	♦ Connect special tool 9637. ♦ Switch on the ignition. ♦ Measure voltage between Pin III/ 24 and Pin III/25 ♦ Fully depress accelerator pedal ♦ Measure voltage between Pin III/ 8 and Pin III/25	 Approx. 0.7 -0.9 V Approx. 4.1 -4.5 V Approx. 4.0 -4.4 V	 Replace throttle part
		♦ Fully depress accelerator pedal	Approx. 0.5 - 0.8 V	
4	Check wiring from throttle part to DME control module for continuity or short circuit to B+ and ground	♦ Separate disconnection point to throttle part ♦ Connect special tool 9637 to wiring harness (DME control module plug).		

Work instruction			Display OK	If not OK
		♦ Measure resistance between disconnection point Pin 1 and special tool 9637 Pin I/9	0 - 5 Ω	Repair wiring harness.
		♦ Measure resistance between disconnection point Pin 2 and special tool 9637 Pin III/25	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 3 and special tool 9637 Pin III/10	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and special tool 9637 Pin I/7	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 5 and special tool 9637 Pin III/8	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 6 and special tool 9637 Pin III/24	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and ground	∞ Ω	
		♦ Measure resistance between disconnection point Pin 5 and ground	∞ Ω	
		♦ Measure resistance between disconnection point Pin 6 and ground	∞ Ω	
		♦ Switch on the ignition. ♦ Measure voltage between disconnection point Pin 4 and ground	0 V.	
		♦ Measure voltage between disconnection point Pin 5 and ground	0 V.	
		♦ Measure voltage between disconnection point Pin 6 and ground	0 V.	

Disconnection point throttle part:



Note!

The wires to the throttle part are routed via connector X 59/2.

Work instruction			Display OK	If not OK
5	Replace DME control module.			
6	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.		

P1121

430 Throttle position sensor 1 - signal implausible

430 Throttle position sensor 1 - below limit

430 Throttle position sensor 1 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in wiring
- Short circuit in wiring
- Throttle position sensor faulty
- DME control module faulty

Affected terminals

Terminal I/7, I/9, III/10, III/24 and III/25

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check voltage supply to throttle motor actuator	♦ Connect special tool 9637 ♦ Connect motor tester (oscillo-scope) to Pin I/7 and Pin I/9 ♦ Use special input ♦ Switch on the ignition ♦ See Figure 1	See Figure 1	⇒ Step 5
		♦ Fully depress accelerator pedal	See Figure 2 ⇒ Step 2	

Figure 1:

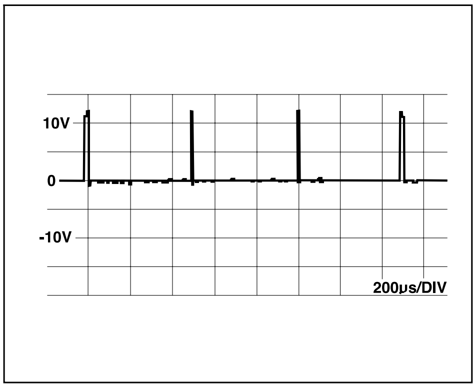
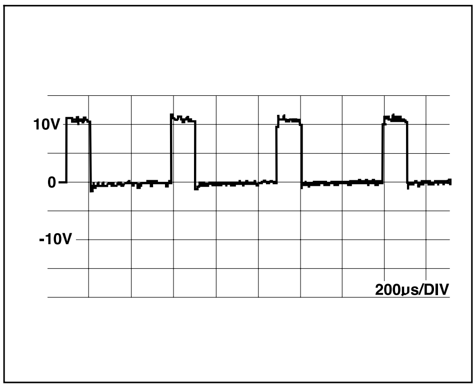


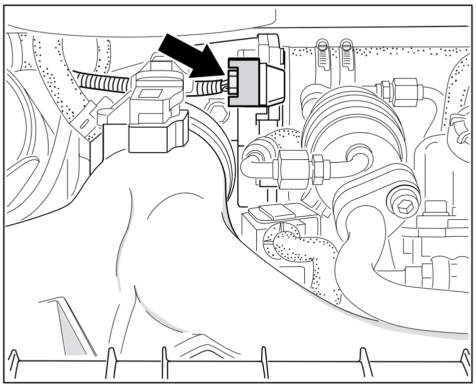
Figure 2:



Work instruction			Display OK	If not OK
2	Check TP sensor voltage supply	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Switch on the ignition ♦ Measure voltage between Pin III/ 10 and Pin III/25	Approx. 5 V ⇒ Step 3	⇒ Step 4
3	Check voltage values of throttle position sensor 1	♦ Connect special tool 9637 ♦ Switch on the ignition ♦ Measure voltage between Pin III/ 24 and Pin III/25 ♦ Fully depress accelerator pedal ♦ Measure voltage between Pin III/ 24 and Pin III/25	 Approx. 0.7 - 0.9 V Approx. 4.1 - 4.5 V	Replace throttle part ⇒ Step 6
4	Check wiring from throttle part to DME control module for continuity or short circuit to B+ and ground	♦ Separate disconnection point to throttle part. ♦ Connect special tool 9637 to wiring harness (DME control module plug)		Repair wiring harness → End

Work instruction			Display OK	If not OK
		♦ Measure resistance between disconnection point Pin 1 and special tool 9637 Pin I/9	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 2 and special tool 9637 Pin III/25	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 3 and special tool 9637 Pin III/10	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and special tool 9637 Pin I/7	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 6 and special tool 9637 Pin III/24	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and ground	∞ Ω	
		♦ Measure resistance between disconnection point Pin 6 and ground	∞ Ω	
		♦ Switch on the ignition ♦ Measure voltage between disconnection point Pin 4 and ground	0 V	
		♦ Switch on the ignition ♦ Measure voltage between disconnection point Pin 6 and ground	0 V ⇒ Step 5	

Disconnection point throttle part:



Note!

The wires to the throttle part are routed via connector X 59/2.

Work instruction			Display OK	If not OK
5	Replace DME control module		⇒ Step 6	
6	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1122

431 Throttle position sensor 2 - signal implausible

431 Throttle position sensor 2 - below limit

431 Throttle position sensor 2 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in wiring
- Short circuit in wiring
- Throttle position sensor faulty
- DME control module faulty

Affected terminals

Terminal I/7, I/9, III/10, III/24 and III/25

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check voltage supply to throttle motor actuator	♦ Connect special tool 9637 ♦ Connect motor tester (oscillo-scope) to Pin I/7 and Pin I/9 ♦ Use special input ♦ Switch on the ignition ♦ Fully depress accelerator pedal	See Figure 1 See Figure 2 ⇒ Step 2	⇒ Step 5

Figure 1:

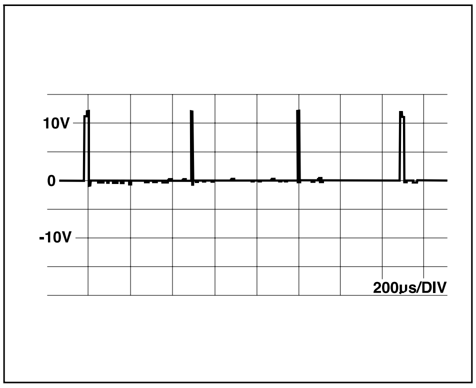
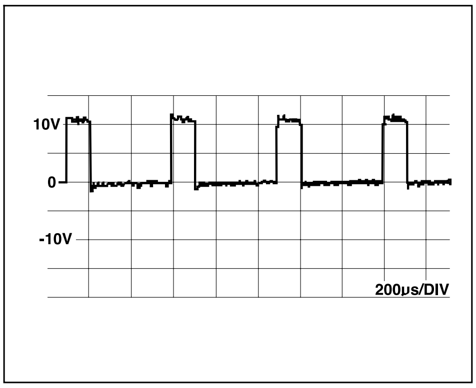


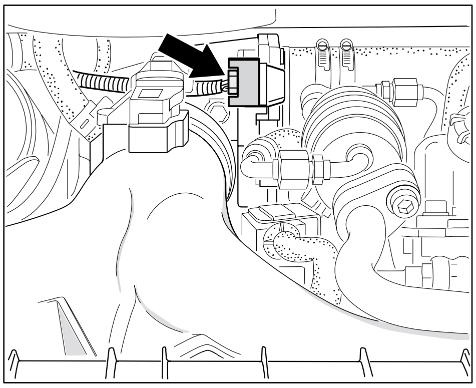
Figure 2:



Work instruction			Display OK	If not OK
2	Check TP sensor voltage supply	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Switch on the ignition ♦ Measure voltage between Pin III/10 and Pin III/25	Approx. 5 V ⇒ Step 3	⇒ Step 4
3	Check voltage values of throttle position sensor 2	♦ Connect special tool 9637 ♦ Switch on the ignition ♦ Measure voltage between Pin III/8 and Pin III/25 ♦ Fully depress accelerator pedal ♦ Measure voltage between Pin III/8 and Pin III/25	 Approx. 4.0 - 4.4 V Approx. 0.5 - 0.8 V	Replace throttle part ⇒ Step 6
4	Check wiring from throttle part to DME control module for continuity or short circuit to B+ and ground	♦ Separate disconnection point to throttle part. ♦ Connect special tool 9637 to wiring harness (DME control module plug)		Repair wiring harness → End

Work instruction			Display OK	If not OK
		♦ Measure resistance between disconnection point Pin 1 and special tool 9637 Pin I/9	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 2 and special tool 9637 Pin III/25	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 3 and special tool 9637 Pin III/10	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and special tool 9637 Pin I/7	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 5 and special tool 9637 Pin III/8	0 - 5 Ω	
		♦ Measure resistance between Pin 4 and ground	∞ Ω	
		♦ Measure resistance between disconnection point Pin 5 and ground	∞ Ω	
		♦ Switch on the ignition ♦ Measure voltage between disconnection point Pin 4 and ground	0 V	
		♦ Switch on the ignition ♦ Measure voltage between disconnection point Pin 5 and ground	0 V ⇒ Step 5	

Disconnection point throttle part:

► 

Note!

The wires to the throttle part are routed via connector X 59/2.

Work instruction			Display OK	If not OK
5	Replace DME control module		⇒ Step 6	
6	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1124

167 Fuel pump relay output stage - below limit

Diagnosis conditions

- Engine started

Note!

The triggering wire for the fuel pump relay, terminal 85, is monitored.

Possible fault cause

- Fuel pump relay
- Short circuit to ground
- DME control module

Affected terminals

Terminal IV/10

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel pump relay	♦ Remove fuel pump relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace fuel pump relay → End
2	Check wiring from DME control module, Pin IV/10, to fuel pump relay for short circuit to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove fuel pump relay ♦ Measure resistance between special tool 9637 Pin IV/10 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

167 Fuel pump relay output stage - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Note!

The triggering wire for the fuel pump relay, terminal 85, is monitored.

Possible fault cause

- Fuel pump relay
- Short circuit to B+
- DME control module

Affected terminals

Terminal IV/10

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel pump relay	♦ Remove fuel pump relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace fuel pump relay → End
2	Check wiring from DME control module, Pin IV/10, to fuel pump relay for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove fuel pump relay ♦ Measure voltage between special tool Pin IV/10 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

167 Fuel pump relay output stage - open circuit

Diagnosis conditions

- Engine started

Note!

The triggering wire for the fuel pump relay, terminal 85, is monitored.

Possible fault cause

- Fuel pump relay
- Open circuit
- DME control module

Affected terminals

Terminal IV/10

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel pump relay	♦ Remove fuel pump relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace fuel pump relay → End
2	Check wiring from DME control module, Pin IV/10, to fuel pump relay for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove fuel pump relay ♦ Measure resistance between special tool 9637, Pin IV/10, and fuel pump relay slot, Pin 6 (terminal 85)	0 - 5 Ω ⇒ Step 3	Check plug connection X 2/3 and woring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1125

357 Oxygen Sensing Adaptation, Upper Load Range, Bank 1 - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C
- Mass air flow greater than 180 $^{kg}/_{h}$

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking
- ♦ EVAP canister purge valve open

Affected terminals

-

Diagnosis/troubleshooting

Note!

- ♦ *If DTC P0445 (EVAP canister purge valve - short to ground) is stored in the memory, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0 bar after 10 minutes	
5	Check fuel injectors for leaks			

357 Oxygen Sensing Adaptation, Upper Load Range, Bank 1 - Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C
- Mass air flow greater than 180 $^{kg}/_{h}$

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Intake air system leaking
- ♦ Fuel pressure too low
- ♦ Volume supply of fuel pump too low
- ♦ Fuel injectors fouled

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.*
- *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			Display OK	If not OK
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check exhaust system for leaks			
3	Check for air leaks in intake air system			
4	Check fuel pressure			
5	Check volume supply of fuel pump			
6	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P1126

356 Oxygen Sensing Adaptation, Lower Load Range, Bank 1 - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking

Affected terminals

-

Diagnosis/troubleshooting

Note!

- ♦ *If DTC P0445 (EVAP canister purge valve - short to ground) is stored in the memory, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			Display OK	If not OK
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check fuel injectors for leaks			

356 Oxygen Sensing Adaptation, Lower Load Range, Bank 1 - Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Intake air system leaking
- ♦ Fuel pressure too low
- ♦ Volume supply of fuel pump too low
- ♦ Fuel injectors fouled

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			Display OK	If not OK
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check exhaust system for leaks			
3	Check for air leaks in intake air system			
4	Check fuel pressure			
5	Check volume supply of fuel pump			
6	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P1127

418 Oxygen Sensing Error by means of Short Test, Bank 1 - Below Limit

Diagnosis conditions

- Mixture adaptation performed with the Porsche System Tester 2

Possible fault cause

- Incorrect signal from MAF sensor
- Fuel pressure too high
- Fuel injector leaking
- EVAP canister purge valve open

Affected terminals

-

Diagnosis/troubleshooting

Note!

If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.

Work instruction			Display OK	If not OK
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check fuel pressure			

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td rowspan="2">Check fuel pressure regulator, vacuum connection and fuel return line</td><td>♦ Remove vacuum hose from fuel pressure regulator
♦ Connect special tool 9103/2 to vacuum hose
♦ Start the engine
♦</td><td>0.4 - 0.6 bar</td><td>Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.</td></tr>
<tr><td></td><td>♦ Check housing of fuel pressure regulator for damage and deformation</td><td></td><td>Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased</td></tr>
<tr><td>4</td><td>Check EVAP canister purge valve</td><td>♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve
♦ Remove connector of EVAP canister purge valve
♦ Connect special tool 9160/1 to EVAP canister purge valve
♦ Generate vacuum of approx. 0.7 bar</td><td>The vacuum must not fall below 0.5 bar after 10 minutes</td><td></td></tr>
<tr><td>5</td><td>Check fuel injectors for leaks</td><td></td><td></td><td></td></tr>
</table>

418 Oxygen Sensing Error by means of Short Test, Bank 1 - Above Limit

Diagnosis conditions

- Mixture adaptation performed with the Porsche System Tester 2

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Intake air system leaking
- ♦ Fuel pressure too low
- ♦ Volume supply of fuel pump too low
- ♦ Fuel injectors fouled

Affected terminals

-

Diagnosis/troubleshooting

Note!

Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check exhaust system for leaks			
3	Check for air leaks in intake air system			
4	Check fuel pressure			
5	Check volume supply of fuel pump			
6	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P1128

360 Oxygen Sensing Adaptation, Idle Range, Bank 1 - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- Incorrect signal from MAF sensor
- Fuel pressure too high
- Fuel injector leaking
- EVAP canister purge valve open

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- *If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- *Contrary adaptation values in connection with misfiring point to incorrectly adjusted control times⇒check control times and adjust if necessary.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Check signal from MAF sensor.</td><td>♦ Connect special tool 9637.
♦ Measure voltage at pin III/23 and ground
♦ Switch on the ignition.</td><td>0.9 to 1.1 V.</td><td rowspan="2">Replace MAF sensor</td></tr>
<tr><td>♦ Start the engine.</td><td>Approx. 1,4 V</td></tr>
<tr><td>2</td><td>Check fuel pressure</td><td></td><td></td><td></td></tr>
</table>

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine. ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0 bar after 10 minutes	
5	Check fuel injectors for leaks			

360 Oxygen Sensing Adaptation, Idle Range, Bank 1 - Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- Incorrect signal from MAF sensor
- Intake air system leaking
- Fuel pressure too low
- Volume supply of fuel pump too low
- Fuel injectors fouled

- PCV valve leaks
- Cap of oil filler neck not closed correctly or seal is damaged

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- *Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.*
- *Contrary adaptation values in connection with misfiring point to incorrectly adjusted control times⇒check control times and adjust if necessary.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Close cap of oil filler neck properly or replace the seal			
2	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1,4 V	
3	Check exhaust system for leaks			
4	Check for air leaks in intake air system			
5	Check PCV valve for leaks			
6	Check fuel pressure			
7	Check volume supply of fuel pump			
8	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

DME 7.8

P1130

361 Oxygen Sensing Adaptation, Idle Range, Bank 2 - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking
- ♦ EVAP canister purge valve open

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- ♦ *If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- ♦ *Contrary adaptation values in connection with misfiring point to incorrectly adjusted control times⇒check control times and adjust if necessary.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1,4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine. ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0.5 bar after 10 minutes	
5	Check fuel injectors for leaks			

361 Oxygen Sensing Adaptation, Idle Range, Bank 2 - Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Intake air system leaking
- ♦ Fuel pressure too low
- ♦ Volume supply of fuel pump too low
- ♦ Fuel injectors fouled

- PCV valve leaks
- Cap of oil filler neck not closed correctly or seal is damaged

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- *Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.*
- *Contrary adaptation values in connection with misfiring point to incorrectly adjusted control times⇒check control times and adjust if necessary.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Close cap of oil filler neck properly or replace the seal			
2	Check signal from MAF sensor.	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1,4 V	
3	Check exhaust system for leaks			
4	Check for air leaks in intake air system			
5	Check PCV valve for leaks			
6	Check fuel pressure			
7	Check volume supply of fuel pump			
8	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P1132

359 Oxygen Sensing Adaptation, Upper Load Range, Bank 2 - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C
- Mass air flow greater than 180 $^{kg}/_{h}$

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking
- ♦ EVAP canister purge valve open

Affected terminals

-

Diagnosis/troubleshooting

Note!

- ♦ *If DTC P0445 (EVAP canister purge valve - short to ground) is stored in the memory, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0 bar after 10 minutes	
5	Check fuel injector for leaks			

357 Oxygen Sensing Adaptation, Upper Load Range, Bank 1 - Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C
- Mass air flow greater than 180 $^{kg}/_{h}$

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Intake air system leaking
- ♦ Fuel pressure too low
- ♦ Volume supply of fuel pump too low
- ♦ Fuel injectors fouled

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.*
- *For vehicles in the USA, the upper load range will probably not be reached. The only case in which a fault could be stored is during driving while towing a trailer or caravan on a hill.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check exhaust system for leaks			
3	Check for air leaks in intake air system			
4	Check fuel pressure			
5	Check volume supply of fuel pump			
6	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦		

P1133

358 Oxygen Sensing Adaptation, Lower Load Range, Bank 2 - Below Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Fuel pressure too high
- ♦ Fuel injector leaking

Affected terminals

\-

Diagnosis/troubleshooting

Note!

- ♦ *If DTC P0445 (EVAP canister purge valve - short to ground) is stored in the memory, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.*
- ♦ *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			Display OK	If not OK
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check fuel pressure			

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check fuel injectors for leaks			

358 Oxygen Sensing Adaptation, Lower Load Range, Bank 2 - Above Limit

Diagnosis conditions

- Oxygen sensing system active
- Time elapsed after engine start-up: 250 to 350 seconds (USA)
- Time elapsed after engine start-up: 302 to 402 seconds (RoW)
- Engine temperature greater than 60 °C

Possible fault cause

- Incorrect signal from MAF sensor
- Intake air system leaking
- Fuel pressure too low
- Volume supply of fuel pump too low
- Fuel injectors fouled

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.*
- *If the fuel tank reserve light is switched on, no fault is entered.*

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check exhaust system for leaks			
3	Check for air leaks in intake air system			
4	Check fuel pressure			
5	Check volume supply of fuel pump			
6	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P1134

419 Oxygen Sensing Error by means of Short Test, Bank 2 - Below Limit

Diagnosis conditions

- Mixture adaptation performed with the Porsche System Tester 2

Possible fault cause

- Incorrect signal from MAF sensor
- Fuel pressure too high
- Fuel injector leaking
- EVAP canister purge valve open

Affected terminals

-

Diagnosis/troubleshooting

Note!

If DTC P0445 (fuel tank vent valve - short to ground) is stored, correct this fault first. An open EVAP canister purge valve can lead to the lean threshold being reached.

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Check signal from MAF sensor</td><td>♦ Connect special tool 9637
♦ Measure voltage at pin III/23 and ground
♦ Switch on the ignition</td><td>0.9 to 1.1 V</td><td rowspan="2">Replace MAF sensor</td></tr>
<tr><td>♦ Start the engine</td><td>approx. 1.4 V</td></tr>
<tr><td>2</td><td>Check fuel pressure</td><td></td><td></td><td></td></tr>
</table>

Work instruction			Display OK	If not OK
3	Check fuel pressure regulator, vacuum connection and fuel return line	♦ Remove vacuum hose from fuel pressure regulator ♦ Connect special tool 9103/2 to vacuum hose ♦ Start the engine ♦	0.4 - 0.6 bar	Check the intake air system for leaks and check vacuum line to fuel pressure regulator for restrictions.
		♦ Check housing of fuel pressure regulator for damage and deformation		Replace the fuel pressure regulator if it is damaged with the result that the spring pre-tensioning is increased
4	Check EVAP canister purge valve	♦ Disconnect hose from EVAP canister purge valve to intake system at EVAP canister purge valve ♦ Remove connector of EVAP canister purge valve ♦ Connect special tool 9160/1 to EVAP canister purge valve ♦ Generate vacuum of approx. 0.7 bar	The vacuum must not fall below 0 bar after 10 minutes	
5	Check fuel injectors for leaks			

419 Oxygen Sensing Error by means of Short Test, Bank 2 - Above Limit

Diagnosis conditions

- Mixture adaptation performed with the Porsche System Tester 2

Possible fault cause

- ♦ Incorrect signal from MAF sensor
- ♦ Intake air system leaking
- ♦ Fuel pressure too low
- ♦ Volume supply of fuel pump too low
- ♦ Fuel injectors fouled

Affected terminals

-

Diagnosis/troubleshooting

Note!

Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.

Work instruction			**Display OK**	**If not OK**
1	Check signal from MAF sensor	♦ Connect special tool 9637 ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition	0.9 to 1.1 V	Replace MAF sensor
		♦ Start the engine	approx. 1.4 V	
2	Check exhaust system for leaks			
3	Check for air leaks in intake air system			
4	Check fuel pressure			
5	Check volume supply of fuel pump			
6	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P1136

Pressure sensors signal comparison charge pressure / ambient pressure - signal implausible

Diagnosis conditions

- Engine running

Possible fault cause

- Boost pressure sensor faulty
- DME control unit faulty (ambient pressure sensor)

Affected terminals

III/39

Diagnosis/troubleshooting

Note!

The pressure sensor for the ambient air pressure is installed in the DME control module.

Work instruction			Display OK	If not OK
1	Evaluate fault memory	♦ Evaluate fault memory ♦ Check whether the faults 'P0237' or 'P0238' have been recorded	Only fault 'P1136' has been recorded ⇒ Step 2	Either fault 'P0237' or fault 'P0238' is present ⇒ Work through faults according to instructions (wiring fault) → End

Work instruction			Display OK	If not OK
2	Check sensors	♦ Switch on the ignition ♦ With the 9588 Porsche System Tester II, read out the actual value of the boost pressure sensor ♦ Compare this value with the display value of a calibrated barometer	The values match ⇒ Step 3	The value of the boost pressure sensor does not match that of the barometer ⇒ Replace boost pressure sensor → End
3		♦ With the 9588 Porsche System Tester II, read out the actual value of the ambient pressure sensor ♦ Compare this value with the display value of a calibrated barometer	The values match ⇒ Delete fault memory → End	The value of the ambient pressure sensor does not match that of the barometer ⇒ Replace engine control module → End

P1137

446 Clutch Switch - Signal Implausible

Diagnosis conditions

- Speed greater than 50 km/h
- Time between two clutch engagement processes more than 5 sec
- Number of gearshifts more than 5

Possible fault cause

- Fuse faulty
- Clutch switch
- Short circuit to B+
- Open circuit

Affected terminals

-

Diagnosis/Troubleshooting

Note!

- *The clutch switch is linked to the instrument cluster. The DME control module receives information from the instrument cluster via the CAN bus.*
- *If a clutch switch fault is stored, the cruise control system is out of order.*

Work instruction			Display OK	If not OK
1	Check fuse B 7.			
2	Check clutch switch.	♦ Clutch switch opens when actuated.		
3	Check wiring.	♦ Check the wiring from the clutch switch to the instrument cluster pin III/19 for short to B+. ♦ Check the wiring from the clutch switch to the instrument cluster pin III/19 for continuity.		

P1138

Throttle Position Sensor 1 – Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit in wiring
- Throttle position sensor faulty
- DME control module faulty

Affected terminals

Terminal I/7, I/9, III/10, III/24 and III/25

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check voltage supply to throttle motor actuator	♦ Connect special tool 9637. ♦ Connect motor tester (oscillo-scope) to Pin I/7 and Pin I/9 ♦ Use special input ♦ Switch on the ignition. ♦ See Figure 1. ♦ Fully depress accelerator pedal	See Figure 1. See Figure 2 ⇒ Step 2	⇒ Step 5.

Figure 1:

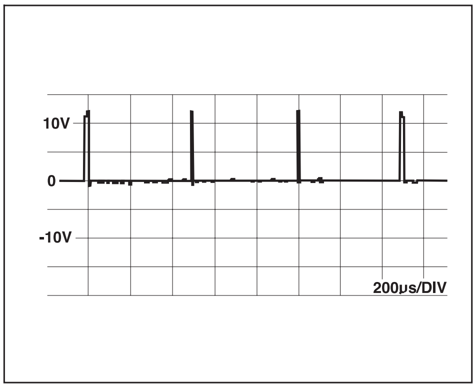
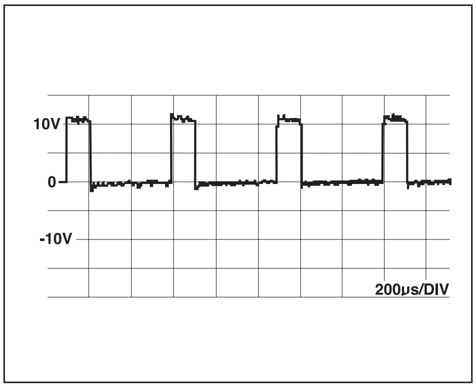


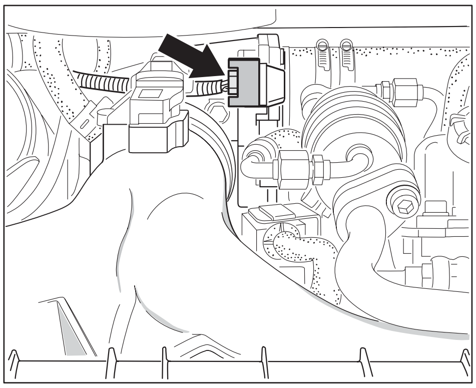
Figure 2:



Work instruction			Display OK	If not OK
2	Check TP sensor voltage supply	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Switch on the ignition. ♦ Measure voltage between Pin III/10 and Pin III/25	Approx. 5 V ⇒ Step 3	⇒ Step 4.
3	Check voltage values of throttle position sensor 1	♦ Connect special tool 9637. ♦ Switch on the ignition. ♦ Measure voltage between Pin III/24 and Pin III/25 ♦ Fully depress accelerator pedal ♦ Measure voltage between Pin III/24 and Pin III/25	 Approx. 0.7 -0.9 V Approx. 4.1 -4.5 V	Replace throttle part ⇒ Step 6.
4	Check wiring from throttle part to DME control module for continuity or short circuit to B+	♦ Separate disconnection point to throttle part. ♦ Connect special tool 9637 to wiring harness (DME control module plug).		Repair wiring harness → End.

Work instruction			Display OK	If not OK
		♦ Measure resistance between disconnection point Pin 1 and special tool 9637 Pin I/9	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 2 and special tool 9637 Pin III/25	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 3 and special tool 9637 Pin III/10	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and special tool 9637 Pin I/7	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 6 and special tool 9637 Pin III/24	0 - 5 Ω	
		♦ Switch on the ignition. ♦ Measure voltage between disconnection point Pin 4 and ground	0 V.	
		♦ Switch on the ignition. ♦ Measure voltage between disconnection point Pin 6 and ground	0 V ⇒ Step 5.	

Disconnection point throttle part:



Note!

The wires to the throttle part are routed via connector X 59/2.

Work instruction			Display OK	If not OK
5	Replace DME control module.		⇒ Step 6.	
6	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

P1139

Throttle Position Sensor 1 – Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit in wiring
- Throttle position sensor faulty
- DME control module faulty

Affected terminals

Terminal I/7, I/9, III/10, III/24 and III/25

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check voltage supply to throttle motor actuator	♦ Connect special tool 9637. ♦ Connect motor tester (oscilloscope) to Pin I/7 and Pin I/9 ♦ Use special input ♦ Switch on the ignition. ♦ See Figure 1.	See Figure 1.	⇒ Step 5.
		♦ Fully depress accelerator pedal	See Figure 2 ⇒ Step 2	

Figure 1:

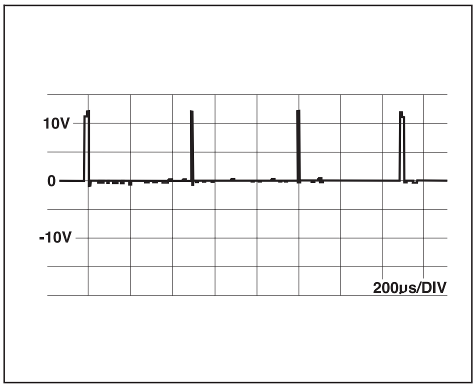
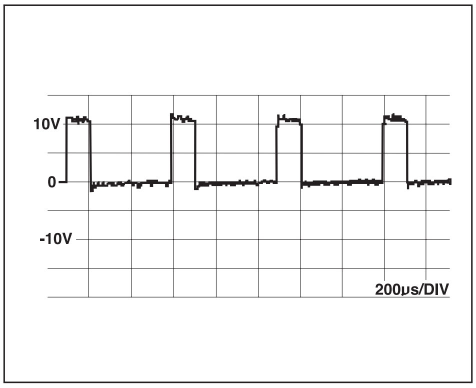


Figure 2:

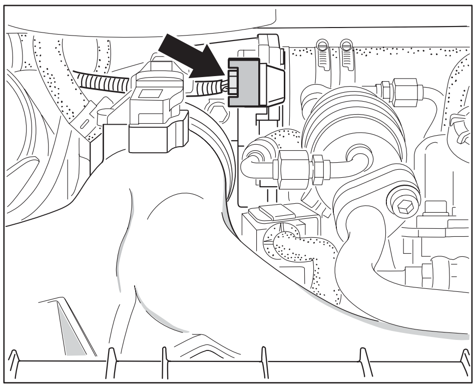


Work instruction			Display OK	If not OK
2	Check TP sensor voltage supply	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Switch on the ignition. ♦ Measure voltage between Pin III/10 and Pin III/25	Approx. 5 V ⇒ Step 3	⇒ Step 4.
3	Check voltage values of throttle position sensor 1	♦ Connect special tool 9637. ♦ Switch on the ignition. ♦ Measure voltage between Pin III/24 and Pin III/25 ♦ Fully depress accelerator pedal ♦ Measure voltage between Pin III/24 and Pin III/25	 Approx. 0.7 -0.9 V Approx. 4.1 -4.5 V	Replace throttle part ⇒ Step 6.
4	Check wiring from throttle part to DME control module for short to ground.	♦ Separate disconnection point to throttle part. ♦ Connect special tool 9637 to wiring harness (DME control module plug).		Repair wiring harness → End.

Work instruction			Display OK	If not OK
		♦ Measure resistance between disconnection point Pin 1 and special tool 9637 Pin I/9	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 2 and special tool 9637 Pin III/25	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 3 and special tool 9637 Pin III/10	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and special tool 9637 Pin I/7	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 6 and special tool 9637 Pin III/24	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and ground	∞ Ω	
		♦ Measure resistance between disconnection point Pin 6 and ground	∞ Ω	

Disconnection point throttle part:

►



Note!

The wires to the throttle part are routed via connector X 59/2.

Work instruction			Display OK	If not OK
5	Replace DME control module.		⇒ Step 6.	
6	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

P1140

Throttle Position Sensor 2 – Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- ♦ Short circuit in wiring
- ♦ Throttle position sensor faulty
- ♦ DME control module faulty

Affected terminals

Terminal I/7, I/9, III/8, III/10 and III/25

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check voltage supply to throttle motor actuator	♦ Connect special tool 9637. ♦ Connect motor tester (oscillo-scope) to Pin I/7 and Pin I/9 ♦ Use special input ♦ Switch on the ignition. ♦ Fully depress accelerator pedal	See Figure 1. See Figure 2 ⇒ Step 2	⇒ Step 5.

Figure 1:

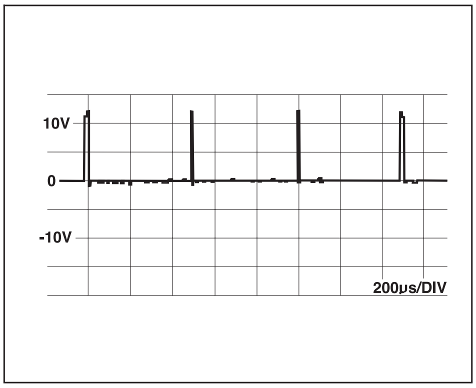
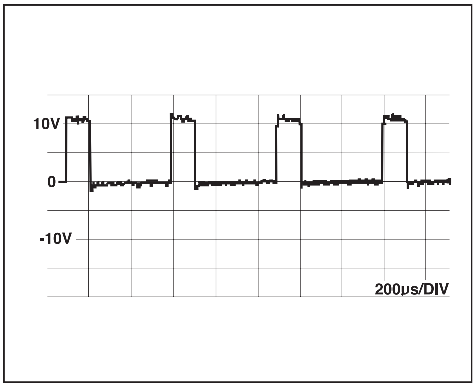


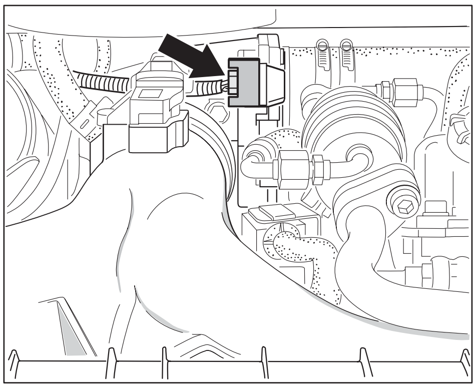
Figure 2:



Work instruction			Display OK	If not OK
2	Check TP sensor voltage supply	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Switch on the ignition. ♦ Measure voltage between Pin III/10 and Pin III/25	Approx. 5 V ⇒ Step 3	⇒ Step 4.
3	Check voltage values of throttle position sensor 2	♦ Connect special tool 9637. ♦ Switch on the ignition. ♦ Measure voltage between Pin III/8 and Pin III/25 ♦ Fully depress accelerator pedal ♦ Measure voltage between Pin III/8 and Pin III/25	Approx. 4.0 -4.4 V Approx. 0.5 -0.8 V	Replace throttle part ⇒ Step 6.
4	Check wiring from throttle part to DME control module for continuity or short circuit to B+	♦ Separate disconnection point to throttle part. ♦ Connect special tool 9637 to wiring harness (DME control module plug).		Repair wiring harness → End.

Work instruction			Display OK	If not OK
		◆ Measure resistance between disconnection point Pin 1 and special tool 9637 Pin I/9	0 - 5 Ω	
		◆ Measure resistance between disconnection point Pin 2 and special tool 9637 Pin III/25	0 - 5 Ω	
		◆ Measure resistance between disconnection point Pin 3 and special tool 9637 Pin III/10	0 - 5 Ω	
		◆ Measure resistance between disconnection point Pin 4 and special tool 9637 Pin I/7	0 - 5 Ω	
		◆ Measure resistance between disconnection point Pin 5 and special tool 9637 Pin III/8	0 - 5 Ω	
		◆ Switch on the ignition. ◆ Measure voltage between dis-connection point Pin 4 and ground	0 V.	
		◆ Switch on the ignition. ◆ Measure voltage between dis-connection point Pin 5 and ground	0 V ⇒ Step 5.	

Disconnection point throttle part: ►



Note!

The wires to the throttle part are routed via connector X 59/2.

Work instruction			Display OK	If not OK
5	Replace DME control module.		⇒ Step 6.	
6	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

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P1141

Throttle Position Sensor 2 – Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit in wiring
- Throttle position sensor faulty
- DME control module faulty

Affected terminals

Terminal I/7, I/9, III/8, III/10 and III/25

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check voltage supply to throttle motor actuator	♦ Connect special tool 9637. ♦ Connect motor tester (oscillo-scope) to Pin I/7 and Pin I/9 ♦ Use special input ♦ Switch on the ignition. ♦ Fully depress accelerator pedal	See Figure 1. See Figure 2 ⇒ Step 2	⇒ Step 5.

Figure 1:

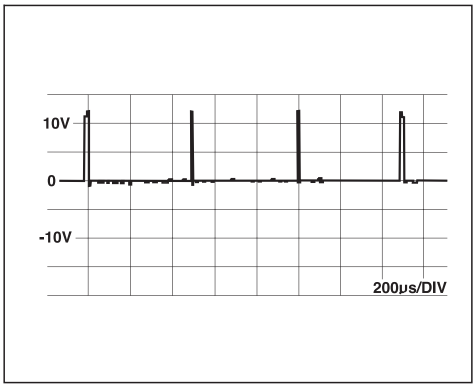
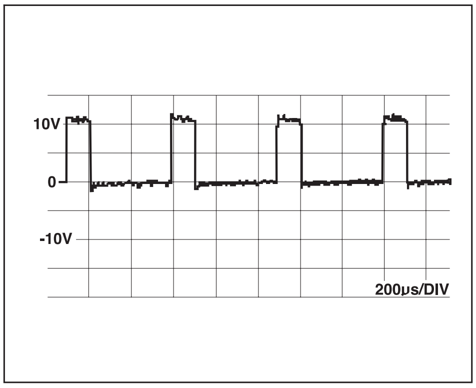


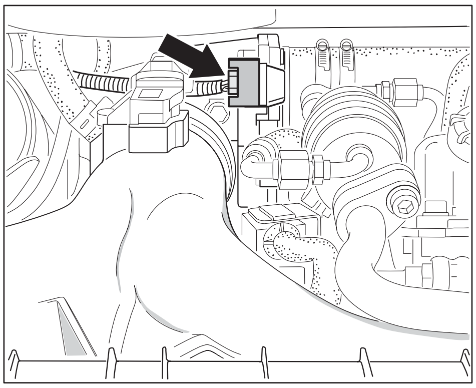
Figure 2:



Work instruction			**Display OK**	**If not OK**
2	Check TP sensor voltage supply	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Switch on the ignition. ♦ Measure voltage between Pin III/ 10 and Pin III/25	Approx. 5 V ⇒ Step 3	⇒ Step 4.
3	Check voltage values of throttle position sensor 2	♦ Connect special tool 9637. ♦ Switch on the ignition. ♦ Measure voltage between Pin III/ 8 and Pin III/25 ♦ Fully depress accelerator pedal ♦ Measure voltage between Pin III/ 8 and Pin III/25	 Approx. 4.0 -4.4 V Approx. 0.5 - 0.8 V	Replace throttle part ⇒ Step 6.
4	Check wiring from throttle part to DME control module for continuity or short circuit to B+	♦ Separate disconnection point to throttle part. ♦ Connect special tool 9637 to wiring harness (DME control module plug).		Repair wiring harness → End.

Work instruction			**Display OK**	**If not OK**
		♦ Measure resistance between disconnection point Pin 1 and special tool 9637 Pin I/9	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 2 and special tool 9637 Pin III/25	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 3 and special tool 9637 Pin III/10	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 4 and special tool 9637 Pin I/7	0 - 5 Ω	
		♦ Measure resistance between disconnection point Pin 5 and special tool 9637 Pin III/8	0 - 5 Ω	
		♦ Measure resistance between Pin 4 and ground	∞ Ω	
		♦ Measure resistance between disconnection point Pin 5 and ground	∞ Ω	

Disconnection point throttle part:

► 

Note!

The wires to the throttle part are routed via connector X 59/2.

Work instruction			Display OK	If not OK
5	Replace DME control module.		⇒ Step 6.	
6	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

P1142

Oxygen Sensing Error by means of Short Test, Bank 1 – Above Limit

Diagnosis conditions

- Mixture adaptation performed with the Porsche System Tester 2

Possible fault cause

- Incorrect signal from MAF sensor
- Intake air system leaking
- Fuel pressure too low
- Volume supply of fuel pump too low
- Fuel injectors fouled

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Check signal from MAF sensor.</td><td>♦ Connect special tool 9637.
♦ Measure voltage at pin III/23 and ground
♦ Switch on the ignition.</td><td>0.9 to 1.1 V.</td><td rowspan="2">Replace MAF sensor</td></tr>
<tr><td>♦ Start the engine.</td><td>Approx. 1.4 V</td></tr>
<tr><td>2</td><td>Check exhaust system for leaks</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>Check for air leaks in intake air system</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>Check fuel pressure</td><td></td><td></td><td></td></tr>
</table>

Work instruction			Display OK	If not OK
5	Check volume supply of fuel pump			
6	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P1143

Oxygen Sensing Error by means of Short Test, Bank 2 – Above Limit

Diagnosis conditions

- Mixture adaptation performed with the Porsche System Tester 2

Possible fault cause

- Incorrect signal from MAF sensor
- Intake air system leaking
- Fuel pressure too low
- Volume supply of fuel pump too low
- Fuel injectors fouled

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Air leaks ahead of the oxygen sensors can lead to a fault in adaptation ⇒Check exhaust system for leaks.

Work instruction			Display OK	If not OK
1	Check signal from mass air flow sensor	♦ Connect special tool 9637. ♦ Measure voltage at pin III/23 and ground ♦ Switch on the ignition.	0.9 to 1.1 V.	Replace MAF sensor
		♦ Start the engine.	Approx. 1.4 V	
2	Check exhaust system for leaks			
3	Check for air leaks in intake air system			
4	Check fuel pressure			

Work instruction			Display OK	If not OK
5	Check volume supply of fuel pump			
6	Fuel injectors fouled	♦ If preceding Check Points were negative, the fuel injectors may be fouled ♦ Clean fuel injectors (ultrasonic cleaning device) or replace them		

P1145

Oxygen Sensor Ahead of TWC, Bank 1 – Above Limit

Diagnosis conditions

Note!

A lot of time is required (several days) until a fault is detected.

Possible fault cause

- Valve lift fault
- False air on the oxygen sensor after TWC
- Oxygen sensor

Affected terminals

-

Note!

- *As this fault can be caused by a faulty flat-base tappet, a system test for a small lift has to be performed initially. The fault can occur sporadically; the test should therefore be performed at least three times when the engine is at operating temperature.*
- *First indication of a valve lift fault can be provided by the adaptation values at idle speed (RKAT) and in the lower part load (FRAU) if they differ by more than 10 %.*

Perform system test for small lift

Warning!

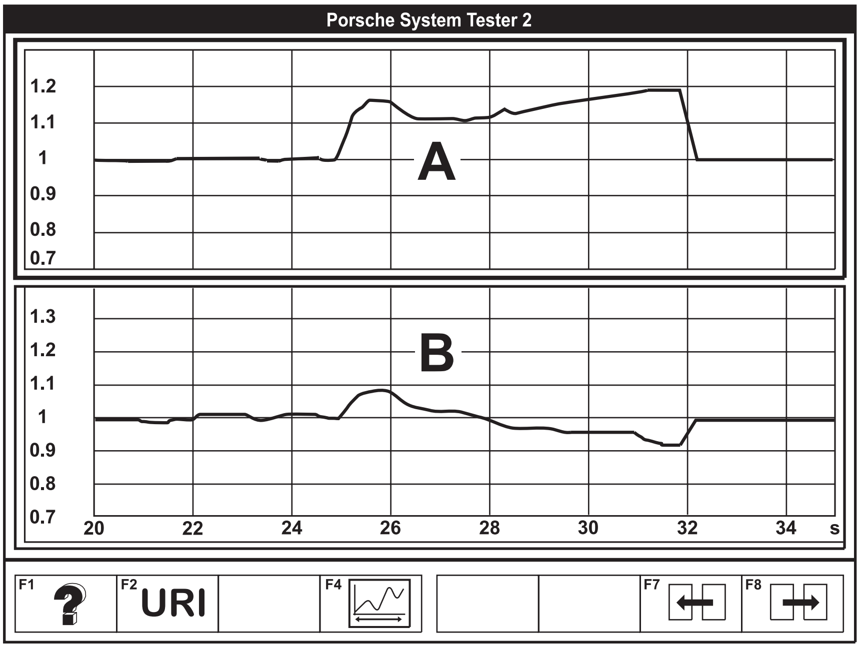
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture (F_R > 1) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4000 rpm) appears.

At speeds above 4000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Diagnosis/Troubleshooting

Note!

- *Do not use contact spray on the connectors to oxygen sensor.*
- *If other faults (fuel supply) are stored in the memory, rectify these first.*

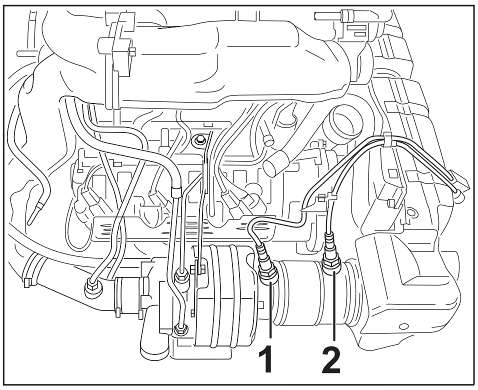
Work instruction			Display OK	If not OK
1	Check exhaust system for leaks			Repair exhaust system → End
2	Replace oxygen sensor			

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter



P1146

Oxygen Sensor Ahead of TWC, Bank 1 – Open Circuit

Diagnosis conditions

- Vehicle at operating temperature, after this 3 minutes idle speed, then approx. 30 seconds increased idle speed.

Possible fault cause

- Oxygen sensors (heating connection)

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

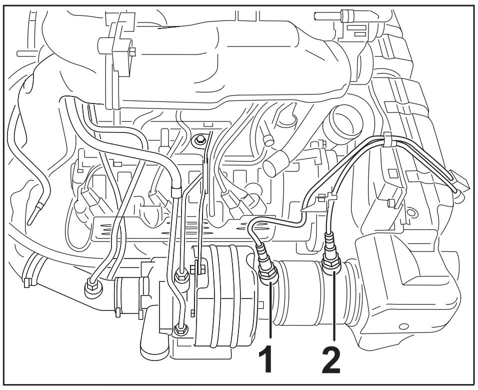
Work instruction			**Display OK**	**If not OK**
1	Replace oxygen sensor			

Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter



P1155

Oxygen Sensor Ahead of TWC, Bank 2 – Above Limit

Diagnosis conditions

Note!

A lot of time is required (several days) until a fault is detected.

Possible fault cause

- Valve lift fault
- False air on the oxygen sensor after TWC
- Oxygen sensor

Affected terminals

-

Note!

- *As this fault can be caused by a faulty flat-base tappet, a system test for a small lift has to be performed initially. The fault can occur sporadically; the test should therefore be performed at least three times when the engine is at operating temperature.*
- *First indication of a valve lift fault can be provided by the adaptation values at idle speed (RKAT) and in the lower part load (FRAU) if they differ by more than 10 %.*

Perform system test for small lift

Warning!

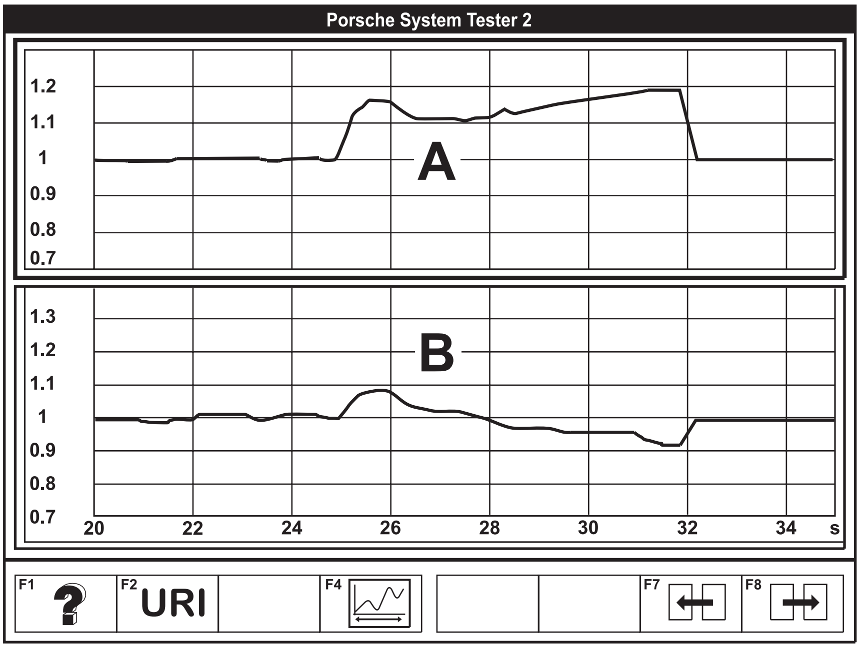
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection.

Several cylinders may be stored as faulty, although only one valve on one cylinder is faulty.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensing, bank 1

B - Oxygen sensing, bank 2

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If "Request small lift" appears, the valves remain at small lift, i.e. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis completed" (max. 4000 rpm) appears.

At speeds above 4000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensors during acceleration with wide-open throttle or to record their behaviour with the data logger.*

Diagnosis/Troubleshooting

Note!

- *Do not use contact spray on the connectors to oxygen sensor.*
- *If other faults (fuel supply) are stored in the memory, rectify these first.*

Work instruction			**Display OK**	**If not OK**
1	Check exhaust system for leaks			Repair exhaust system → End
2	Replace oxygen sensor			

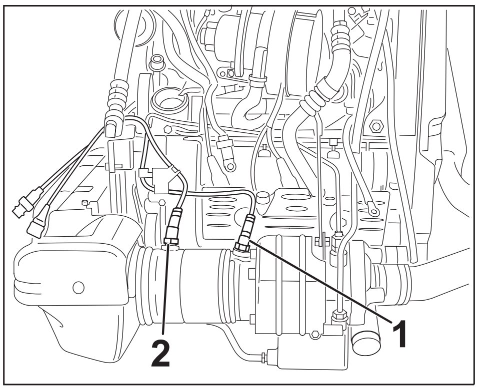
Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter



P1156

Oxygen Sensor Ahead of TWC, Bank 2 – Open Circuit

Diagnosis conditions

- Vehicle at operating temperature, after this 3 minutes idle speed, then approx. 30 seconds increased idle speed.

Possible fault cause

- Oxygen sensors (heating connection)

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Replace oxygen sensor			

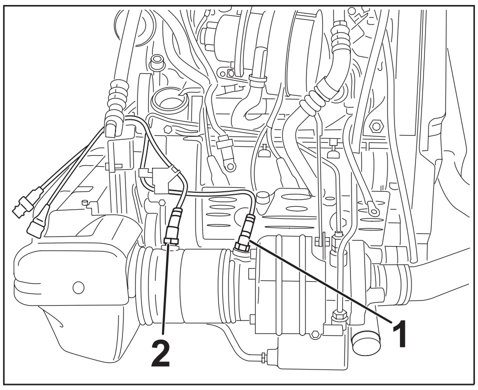
Note!

Do not exchange oxygen sensors ahead of catalytic converter and after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter
2 - Oxygen sensor after catalytic converter

►



P1157

30 Engine Compartment Temperature Sensor - Below Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- Temperature sensor
- Short circuit to ground

Affected terminals

II/21

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check temperature sensor.	♦ Remove plug of temperature sensor. ♦ Measure resistance between temperature sensor pin 1 and pin 2.	Approx. 2.2 - 2.6 kΩ at 20° C	Replace temperature sensor.
2	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug of temperature sensor. ♦ Measure resistance between special tool 9637 pin II/21 and ground.	∞ Ω	Repair wiring harness.

P1158

30 Engine Compartment Temperature Sensor - Above Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- Temperature sensor
- Short circuit to B+

Affected terminals

II/21

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check temperature sensor.	♦ Remove plug of temperature sensor. ♦ Measure resistance between temperature sensor pin 1 and pin 2.	Approx. 2.2 - 2.6 kΩ at 20° C	Replace temperature sensor.
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug of temperature sensor. ♦ Measure voltage between special tool 9637 pin II/21 and ground. ♦ Switch on the ignition.	0 V	Repair wiring harness.

P1159

O2 Sensor Circuit

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Oxygen sensor heating switched on for at least 120 seconds
- Exhaust temperature between 200°C and 800°C

Possible cause of fault

- Oxygen sensor faulty

Affected pins

DME control module connector II, pin 11 and oxygen sensor jack, bank 1, pin 3

DME control module connector II, pin 17 and oxygen sensor jack, bank 1, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction		Display OK	If not OK
1	Replace oxygen sensor	→ End	

P1160

O2 Sensor Circuit

Diagnostic conditions

- Battery positive voltage between 10 V and 16 V
- Oxygen sensor heating switched on for at least 120 seconds
- Exhaust temperature between 200°C and 800°C

Possible cause of fault

- Oxygen sensor faulty

Affected pins

DME control module connector II, pin 8 and oxygen sensor jack, bank 2, pin 3

DME control module connector II, pin 14 and oxygen sensor jack, bank 2, pin 4

Diagnosis/troubleshooting

Note!

Do not use contact spray on the oxygen sensor plug connections as this may cause irreparable damage to the wiring (contamination of the oxygen sensor via the reference air channel).

Work instruction		Display OK	If not OK
1	Replace oxygen sensor	→ End	

P1213

150 Fuel Injector, Cylinder 1 - Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) short circuit
- Short circuit to B+ in wiring
- DME control module

Affected terminals

Terminal III/41

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 1 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/41 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

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P1214

151 Fuel Injector, Cylinder 6 - Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Fuel injector (coil) short circuit
- ♦ Short circuit to B+ in wiring
- ♦ DME control module

Affected terminals

Terminal III/28

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 6 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/28 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 4</td></tr>
<tr><td>4</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

P1215

152 Fuel Injector, Cylinder 2 - Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) short circuit
- Short circuit to B+ in wiring
- DME control module

Affected terminals

Terminal III/40

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 2 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/40 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1216

153 Fuel Injector, Cylinder 4 - Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Fuel injector (coil) short circuit
- ♦ Short circuit to B+ in wiring
- ♦ DME control module

Affected terminals

Terminal III/27

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 4 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/27 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 4</td></tr>
<tr><td>4</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

P1217

154 Fuel injector, cylinder 3 - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) short circuit
- Short circuit to B+ in wiring
- DME control module

Affected terminals

Terminal III/15

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 3 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 Pin III/15 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

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P1218

155 Fuel Injector, Cylinder 5 - Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Fuel injector (coil) short circuit
- ♦ Short circuit to B+ in wiring
- ♦ DME control module

Affected terminals

Terminal III/2

Note!

Short to B+ causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 5 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure voltage between special tool 9637 pin III/2 and ground ♦ Ignition on	0 V ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1219

256 Accelerator pedal - signal implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery voltage greater than 7 V

Possible fault cause

- Pedal sensor

Affected terminals

-

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*
- *The fault code only appears together with P1577 or P1578.*
- *The pedal value is reset to zero by actuating the brake.*

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Replace pedal sensor	→ End	

P1225

150 Fuel Injector, Cylinder 1 - Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to ground in wiring
- DME control module

Affected terminals

Terminal III/41

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 1 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/41 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			**Display OK**	**If not OK**
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1226

151 Fuel Injector, Cylinder 6 - Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to ground in wiring
- DME control module

Affected terminals

Terminal III/28

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 6 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/28 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 4</td></tr>
<tr><td>4</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

P1227

152 Fuel injector, cylinder 2 - below limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Short circuit to ground in wiring
- ♦ DME control module

Affected terminals

Terminal III/40

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 2 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 Pin III/40 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1228

153 Fuel Injector, Cylinder 4 - Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to ground in wiring
- DME control module

Affected terminals

Terminal III/27

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 4 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/27 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1229

154 Fuel injector, cylinder 3 - below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Short circuit to ground in wiring
- DME control module

Affected terminals

Terminal III/15

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 3 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 Pin III/15 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 4</td></tr>
<tr><td>4</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

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P1230

155 Fuel Injector, Cylinder 5 - Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Short circuit to ground in wiring
- ♦ DME control module

Affected terminals

Terminal III/2

Note!

Short to ground causes the fuel injector to be permanently open.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 5 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/2 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1237

150 Fuel Injector, Cylinder 1 - Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/41

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 1 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for open circuit	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/41 and fuel injector plug pin 2	 0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

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P1238

151 Fuel Injector, Cylinder 6 - Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/28

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 6 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for open circuit	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/28 and fuel injector plug pin 2	 0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

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P1239

152 Fuel Injector, Cylinder 2 - Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/40

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 2 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for open circuit	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/40 and fuel injector plug pin 2	 0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1240

153 Fuel Injector, Cylinder 4 - Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- ♦ Fuel injector (coil) open circuit
- ♦ Open circuit in wiring
- ♦ DME control module

Affected terminals

Terminal III/27

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 4 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for open circuit	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/27 and fuel injector plug pin 2	 0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 4</td></tr>
<tr><td>4</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

P1241

154 Fuel injector, cylinder 3 - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/15

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 3 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for open circuit	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 Pin III/15 and fuel injector plug Pin 2	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>3</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 4</td></tr>
<tr><td>4</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

P1242

155 Fuel Injector, Cylinder 5 - Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Fuel injector (coil) open circuit
- Open circuit in wiring
- DME control module

Affected terminals

Terminal III/2

Note!

Open circuit causes the fuel injector to be continually closed.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check fuel injector	♦ Remove connector of fuel injector 5 ♦ Connect special tool V.A.G. 1315 A/1 ♦ Measure resistance at special tool V.A.G. 1315 A/1	11 - 13 Ω (at 20 °C) ⇒ Step 2	Replace fuel injector → End
2	Check wiring harness for open circuit	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of fuel injector ♦ Measure resistance between special tool 9637 pin III/2 and fuel injector plug pin 2	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1249

231 Boost Pressure Control Deviation - Above/Below Limit

Diagnosis conditions

- Boost pressure control active (operating condition close to full load)
- No faults in mixture adapation, pressure sensor, ambient pressure sensor, frequency valve

Possible fault cause

- Air cleaner clogged
- Hose line from air cleaner to turbocharger kinked
- Leakage on fresh-gas side
- Leakage at exhaust-gas side
- Hoses on frequency valve leaking
- Bypass flaps incorrectly adjusted
- Turbocharger faulty

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check frequency valve			Replace frequency valve
2	Check for air leaks in intake air system			Repair intake air system
3	Check pressure hoses on frequency valve for leaks			Replace pressure hoses or eliminate leaks
4	Check exhaust system for leaks			Repair exhaust system
5	Check adjustment of bypass flaps			Adjust bypass flaps
6	Check whether turbocharger compressor shaft can rotate freely			Replace the turbocharger

P1250

Boost Pressure Control Deviation - Above Limit

Diagnosis conditions

- Boost pressure control active (operating condition close to full load)
- No faults in mixture adapation, pressure sensor, ambient pressure sensor, frequency valve

Possible fault cause

- Bypass flaps incorrectly adjusted
- Turbocharger faulty

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check adjustment of bypass flaps			Adjust bypass flaps
2	Check whether turbocharger compressor shaft can rotate freely			Replace the turbocharger

P1255

230 Boost Pressure Characteristic, Upper Value Exceeded - Above Limit

Diagnosis conditions

- Boost pressure control active

Possible fault cause

- Leakage at pressure hoses from frequency valve to the bypass flaps
- Frequency valve faulty
- Vacuum modulators for bypass flaps leaking
- Bypass flaps incorrectly adjusted

Affected terminals

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check frequency valve			Replace frequency valve
2	Check pressure hoses for leaks			Replace pressure hoses or eliminate leaks
3	Check vacuum modulators for bypass flaps for leaks			Replace vacuum modulators
4	Check adjustment of bypass flaps			Adjust bypass flaps

P1265

301 Airbag signal - signal implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- Airbag control module
- Open circuit
- Short circuit to ground

Affected terminals

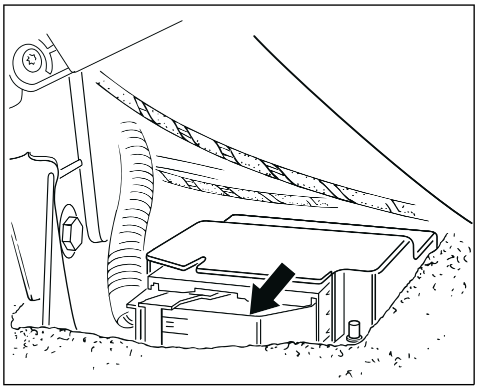
Terminal 34 and IV/16

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from airbag control module to DME control module for conti-nuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of airbag control module ♦ Measure resistance between special tool 9637 Pin IV/16 and airbag plug Pin 34	0 - 5 Ω ⇒ Step 2	Check disconnec-tion point X2/5 or check wiring har-ness for chafing and pinching damage → End

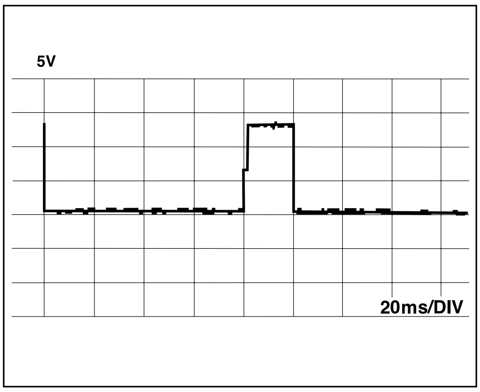
Airbag control module:

►



Work instruction			Display OK	If not OK
2	Check wiring from airbag control module to DME control module for short circuit to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of airbag control module ♦ Measure resistance between special tool 9637 Pin IV/16 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End
3	Check signal from airbag control module	♦ Connect special tool 9637 ♦ Connect engine tester (oscilloscope) to Pin IV/16 and ground ♦ Use special input ♦ Ignition on	⇒ Step 4	Replace airbag control module →

Oscilloscope display:



Work instruction		Display OK	If not OK
4	Erase fault memory	→ End	→ End

P1266

409 Fuel shutoff function monitor - signal implausible

Diagnosis conditions

- Engine speed > 1,120 rpm

Possible fault cause

- DME control module faulty

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1324

325 Position of Camshaft in Relation to Crankshaft, Bank 2 – Below Limit

Diagnosis conditions

- Idle speed
- Reference mark recognized
- Engine speed between 600 rpm and 1.200 rpm.
- Engine temperature greater than 40 °C
- No fault in camshaft position sensors
- Reference mark OK
- No fault in camshaft adjustment
- No fault in engine temperature
- No fault in camshaft adjustment output stage

Possible fault cause

- ♦ Allocation of camshaft to inlet camshaft incorrect

Affected terminals

-

Diagnosis/Troubleshooting

Note!

This fault is stored if the engine was disassembled and the allocation of the camshaft to the inlet camshaft was incorrectly set.

Work instruction			**Display OK**	**If not OK**
1	Set camshafts	♦ To adjust the camshafts, please refer to the 911 Turbo (996) Technical Manual.		

325 Position of Camshaft in Relation to Crankshaft, Bank 2 – Above Limit

Diagnosis conditions

- Idle speed
- Reference mark recognized
- Engine speed between 600 rpm and 1.200 rpm.
- Engine temperature greater than 40 °C
- No fault in camshaft position sensors
- Reference mark OK
- No fault in camshaft adjustment
- No fault in engine temperature
- No fault in camshaft adjustment output stage

Possible fault cause

- ♦ Solenoid hydraulic valve camshaft adjustment faulty
- ♦ Allocation of camshaft to inlet camshaft incorrect

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect sscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

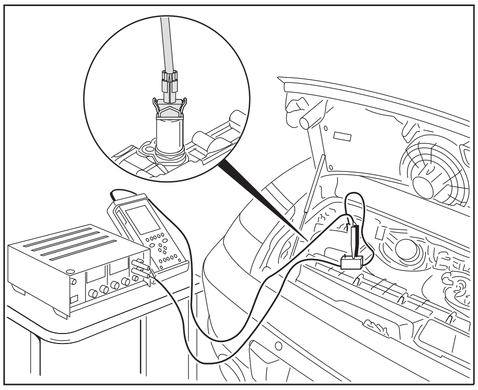
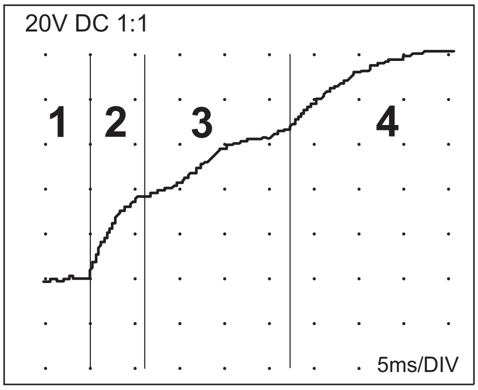


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



Work instruction			**Display OK**	**If not OK**
2	Set camshafts	♦ To adjust the camshafts, please refer to the 911 Turbo (996) Technical Manual.		

P1325

178 Camshaft Adjustment, Bank 2 – Signal Implausible

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6.760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Camshaft does not reach early or late position

- Dirt in system
- Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check solenoid hydraulic valve camshaft adjustment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

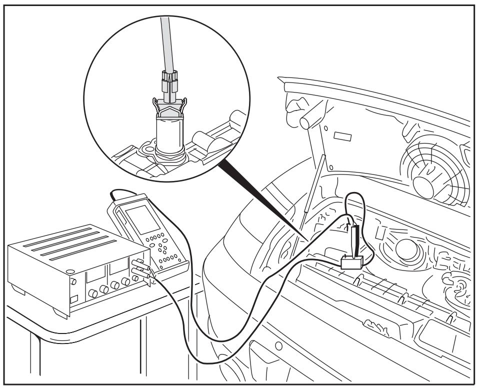
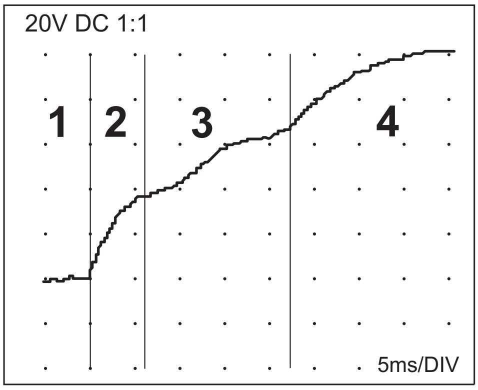


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



178 Camshaft Adjustment, Bank 2 – Below Limit

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6.760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Solenoid hydraulic valve is triggered, camshaft does not switch into early position

- Dirt in system
- Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjust- ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

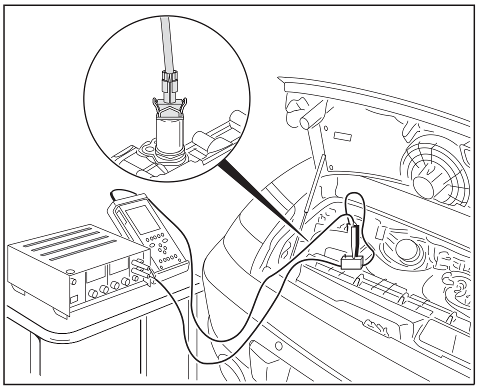
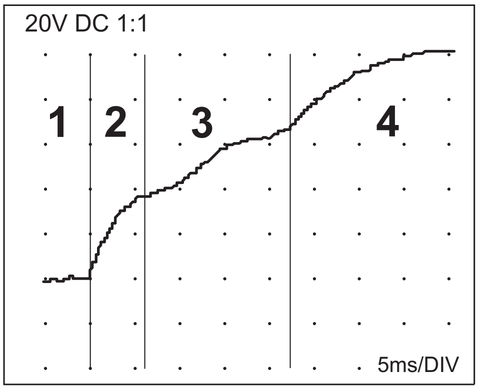


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



178 Camshaft Adjustment, Bank 2 – Above Limit

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6.760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Solenoid hydraulic valve is not triggered, camshaft does not switch into late position

- Dirt in system
- Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

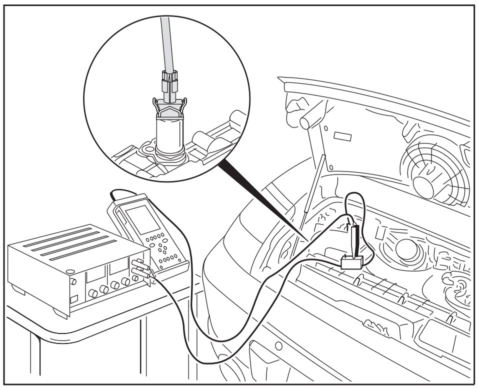
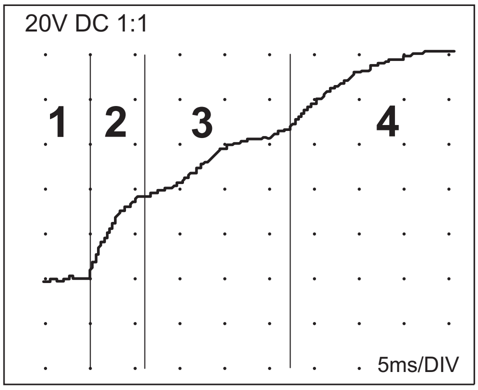


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



P1328

Inlet camshaft output stage – open circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

V/7

Diagnosis/troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 14

Work instruction			**Display OK**	**If not OK**
1	Check triggering wire for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between V/7 and solenoid hydraulic valve connector pin 2	0 - 5 Ω	
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery positive voltage	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pins 1 and 2	8 - 12 Ω at 20° C	

P1331

Inlet camshaft output stage, bank 2 - open circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

V/8

Diagnosis/troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 15

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between V/8 and solenoid hydraulic valve connector pin 2	0 - 5 Ω	
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector on the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery positive voltage	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pins 1 and 2	8 - 12 Ω at 20° C	

P1340

322 Position of Camshaft in Relation to Crankshaft, Bank 1 – Below Limit

Diagnosis conditions

- Idle speed
- Reference mark recognized
- Engine speed between 600 rpm and 1.200 rpm.
- Engine temperature greater than 40 °C
- No fault in camshaft position sensors
- Reference mark OK
- No fault in camshaft adjustment
- No fault in engine temperature
- No fault in camshaft adjustment output stage

Possible fault cause

- ♦ Allocation of camshaft to inlet camshaft incorrect

Affected terminals

-

Diagnosis/Troubleshooting

Note!

This fault is stored if the engine was disassembled and the allocation of the camshaft to the inlet camshaft was incorrectly set.

Work instruction			**Display OK**	**If not OK**
1	Set camshafts	♦ To adjust the camshafts, please refer to the 911 Turbo (996) Technical Manual.		

322 Position of Camshaft in Relation to Crankshaft, Bank 1 – Above Limit

Diagnosis conditions

- Idle speed
- Reference mark recognized
- Engine speed between 600 rpm and 1.200 rpm.
- Engine temperature greater than 40 °C
- No fault in camshaft position sensors
- Reference mark OK
- No fault in camshaft adjustment
- No fault in engine temperature
- No fault in camshaft adjustment output stage

Possible fault cause

- ♦ Solenoid hydraulic valve camshaft adjustment faulty
- ♦ Allocation of camshaft to inlet camshaft incorrect

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

►

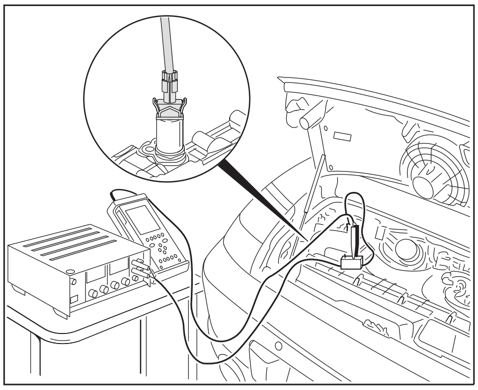
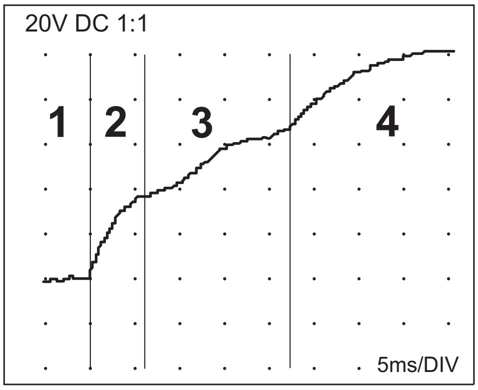


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil

►



Work instruction			Display OK	If not OK
2	Set camshafts	♦ To adjust the camshafts, please refer to the 911 Turbo (996) Technical Manual.		

P1341

174 Camshaft Adjustment, Bank 1 – Signal Implausible

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6.760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Camshaft does not reach early or late position

- Dirt in system
- Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjustment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

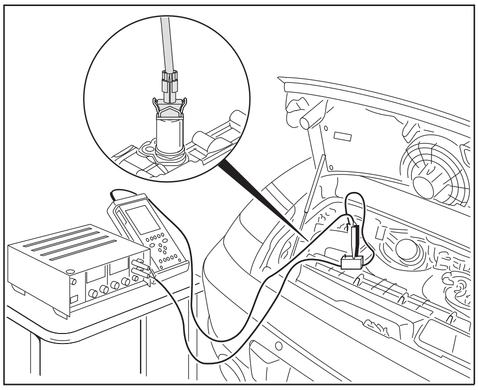
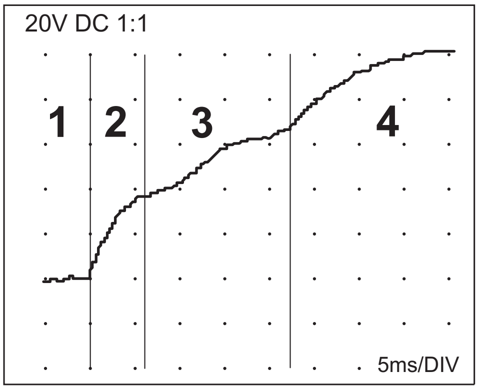


Figure 2:



1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil

174 Camshaft Adjustment, Bank 1 – Below Limit

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6.760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Solenoid hydraulic valve is triggered, camshaft does not switch into early position

- Dirt in system
- Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjustment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

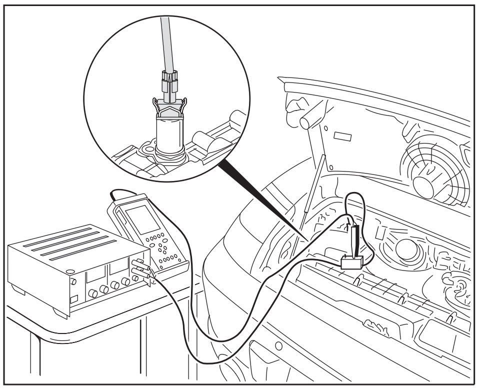
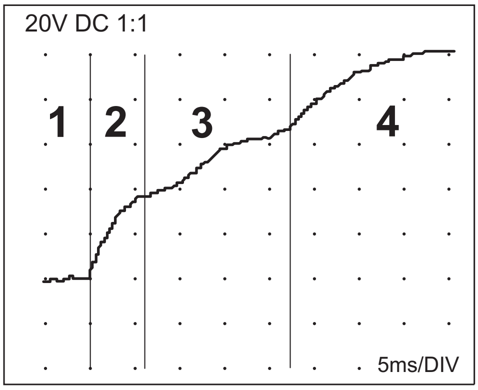


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



174 Camshaft Adjustment, Bank 1 – Above Limit

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6.760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Solenoid hydraulic valve is not triggered, camshaft does not switch into late position

- Dirt in system
- Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check solenoid hydraulic valve camshaft adjustment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

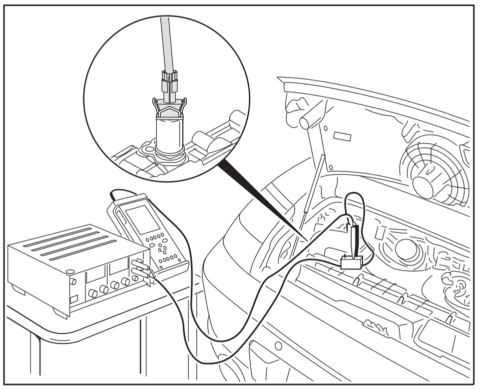
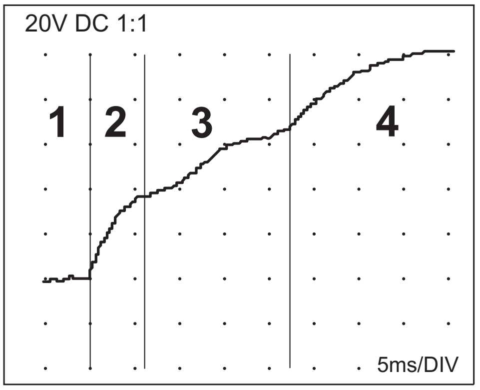


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



P1342

189 Camshaft Adjustment, Bank 1 Output Stage - Open Circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

V/7

Diagnosis/Troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 14

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Measure resistance between V/7 and solenoid hydraulic valve connector pin 2.	0 - 5 Ω	
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector of the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery positive voltage	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pin 1 and 2	8 - 12 Ω at 20° C	

189 Camshaft Adjustment, Bank 1 Output Stage - Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short to ground triggering wire
- Solenoid hydraulic valve faulty

Affected terminals

V/7

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Measure resistance between V/7 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

189 Camshaft Adjustment, Bank 1 Output Stage - Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to B+ triggering wire

Affected terminals

V/7

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check triggering wire for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage between V/7 and ground	0 V	Repair wiring harness

P1343

149 Camshaft Adjustment, Bank 2 Output Stage - Open Circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

V/8

Diagnosis/Troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/1 pin 15

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Measure resistance between V/8 and solenoid hydraulic valve connector pin 2.	0 - 5 Ω	
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector of the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery positive voltage	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pin 1 and 2	8 - 12 Ω at 20° C	

149 Camshaft Adjustment, Bank 2 Output Stage - Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short to ground triggering wire
- Solenoid hydraulic valve faulty

Affected terminals

V/8

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Measure resistance between V/8 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

149 Camshaft Adjustment, Bank 2 Output Stage - Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to B+ triggering wire

Affected terminals

V/8

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage between V/8 and ground	0 V	Repair wiring harness

P1344

579 Valve Lift Control, Bank 1, Output Stage - Open Circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

III/1

Diagnosis/Troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/3 pin 4

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Measure resistance between III/1 and solenoid hydraulic valve connector pin 2.	0 - 5 Ω	
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector of the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery positive voltage	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pin 1 and 2	8 - 12 Ω at 20° C	

579 Valve Lift Control, Bank 1, Output Stage - Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short to ground triggering wire
- Solenoid hydraulic valve faulty

Affected terminals

III/1

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Measure resistance between III/1 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

579 Valve Lift Control, Bank 1, Output Stage - Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to B+ triggering wire

Affected terminals

III/1

Printed in Germany – 2, 2000

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage between III/1 and ground	0 V	Repair wiring harness

P1345

580 Valve Lift Control, Bank 2, Output Stage - Open Circuit

Diagnosis conditions

- Engine running

Possible fault cause

- Open circuit in triggering wire
- Open circuit in B+ supply
- Solenoid hydraulic valve faulty

Affected terminals

III/26

Diagnosis/Troubleshooting

Note!

The wiring for the solenoid hydraulic valve is routed via the connector X 59/3 pin 5

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Measure resistance between III/26 and solenoid hydraulic valve connector pin 2	0 - 5 Ω	
2	Check B+ supply for solenoid hydraulic valve	♦ Remove connector of the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage of solenoid hydraulic valve connector pin 1 and ground	Battery positive voltage	
3	Check resistance of solenoid hydraulic valve	♦ Measure resistance of solenoid hydraulic valve between pin 1 and 2	8 - 12 Ω at 20° C	

580 Valve Lift Control, Bank 2, Output Stage - Below Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short to ground triggering wire
- Solenoid hydraulic valve faulty

Affected terminals

III/26

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Measure resistance between III/26 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

580 Valve Lift Control, Bank 2, Output Stage - Above Limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to B+ triggering wire

Affected terminals

III/26

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short circuit to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of the solenoid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage between III/26 and ground	0 V	Repair wiring harness

P1348

Camshaft Adjustment, Bank 1 – Above Limit

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6.760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Solenoid hydraulic valve is not triggered, camshaft does not switch into late position

- Dirt in system
- Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

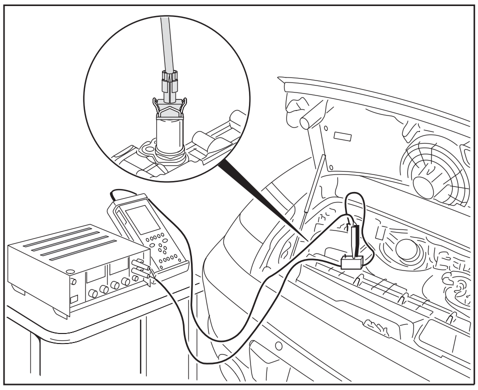
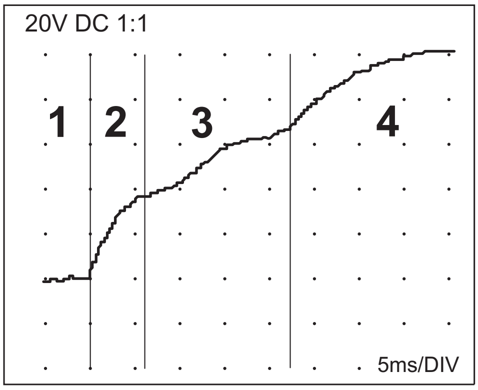


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



P1349

Camshaft Adjustment, Bank 1 – Below Limit

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Solenoid hydraulic valve is triggered, camshaft does not switch into early position

- ♦ Dirt in system
- ♦ Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

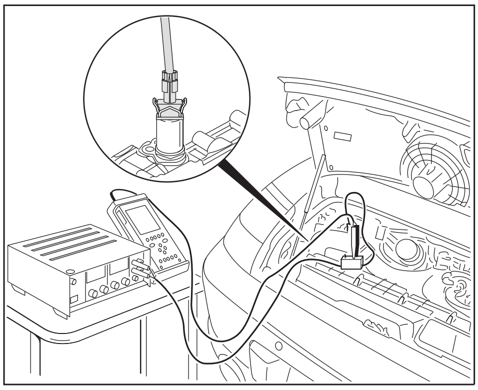
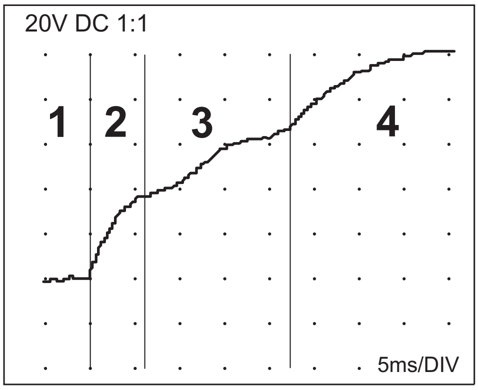


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil



P1350

637 Valve lift control checksum error - above limit

Diagnosis conditions

- Speed between 5,280 and 6,520 rpm
- Load between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- ♦ A valve does not switch to large lift
- ♦ Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

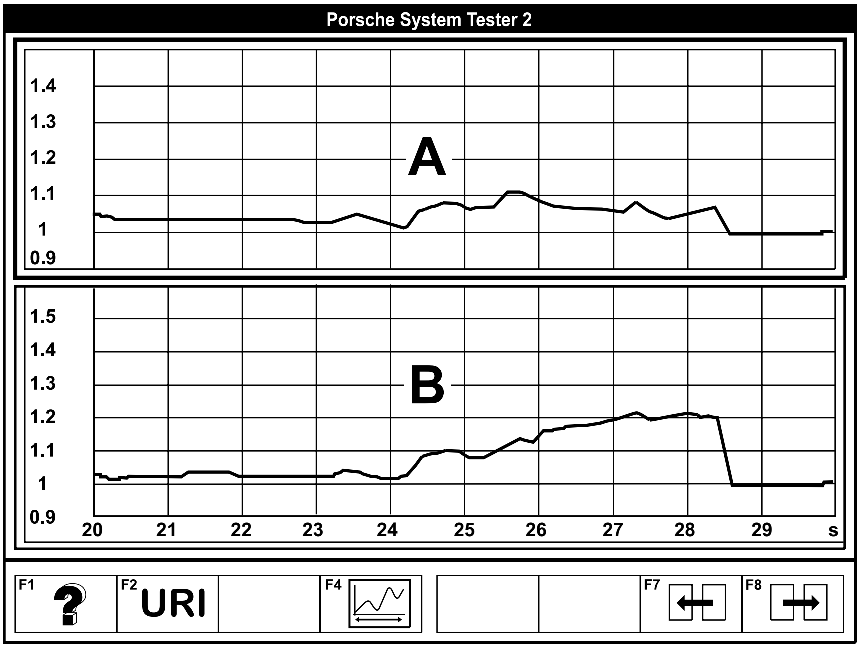
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank does not change the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 %, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

637 Valve lift control checksum error - below limit

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm
- Load between 45 and 70 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Warning!

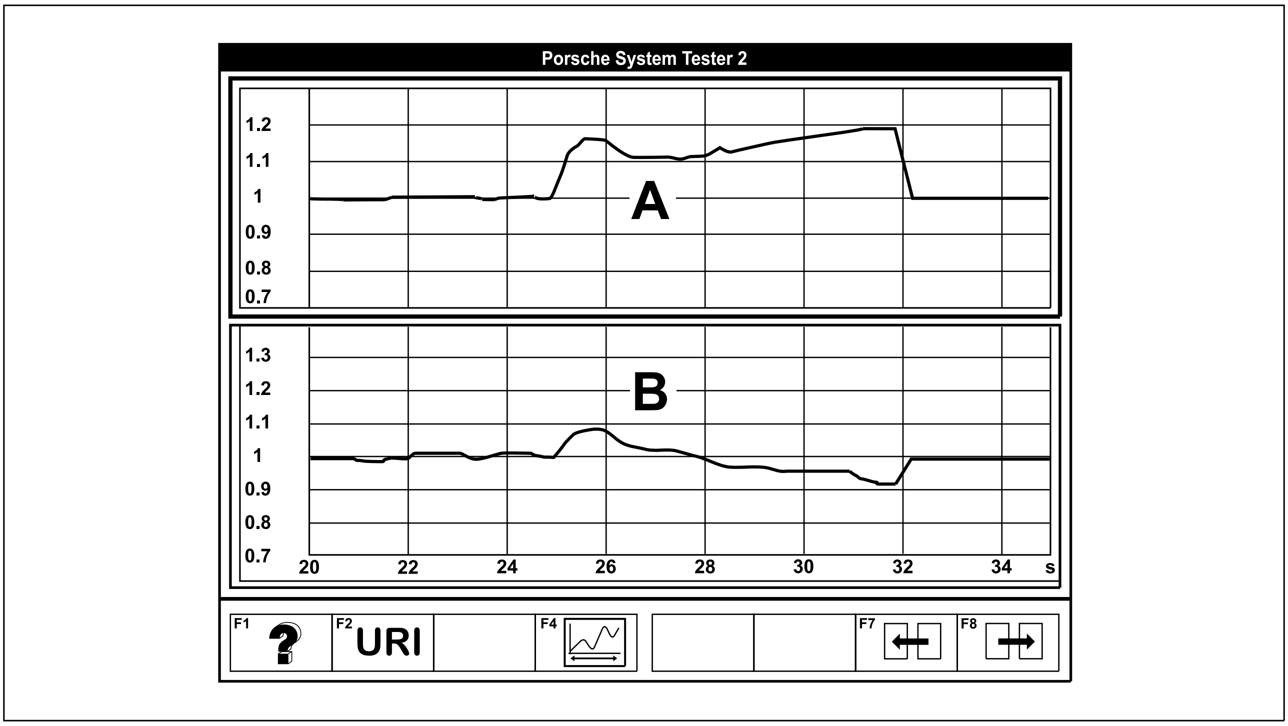
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

If misfires are stored, perform the system test again.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

637 Valve lift control checksum error - signal implausible

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm and between 5,280 and 6,520 rpm
- Load between 45 and 70 % and between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

and

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

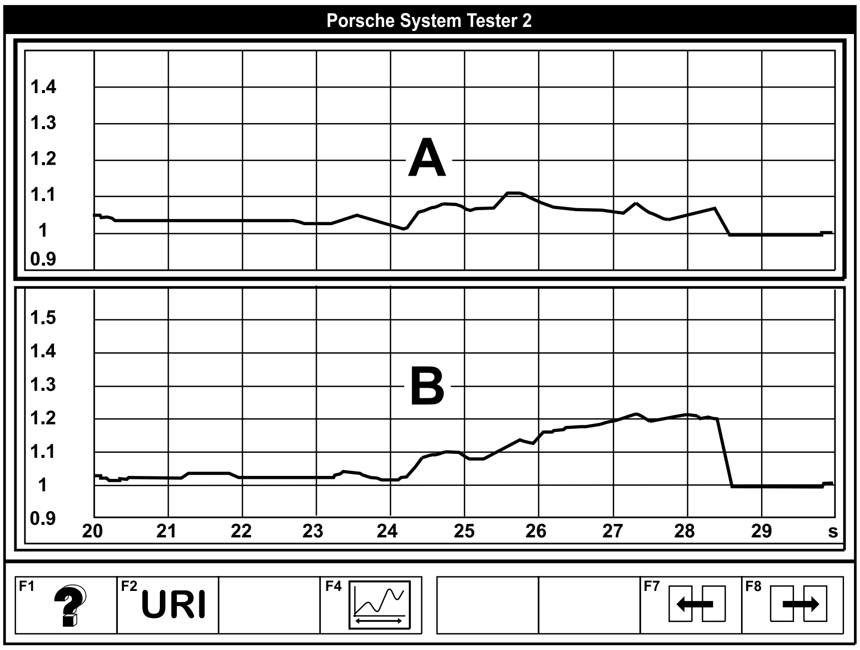
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank does not change the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 %, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

Perform system test for small lift

Warning!

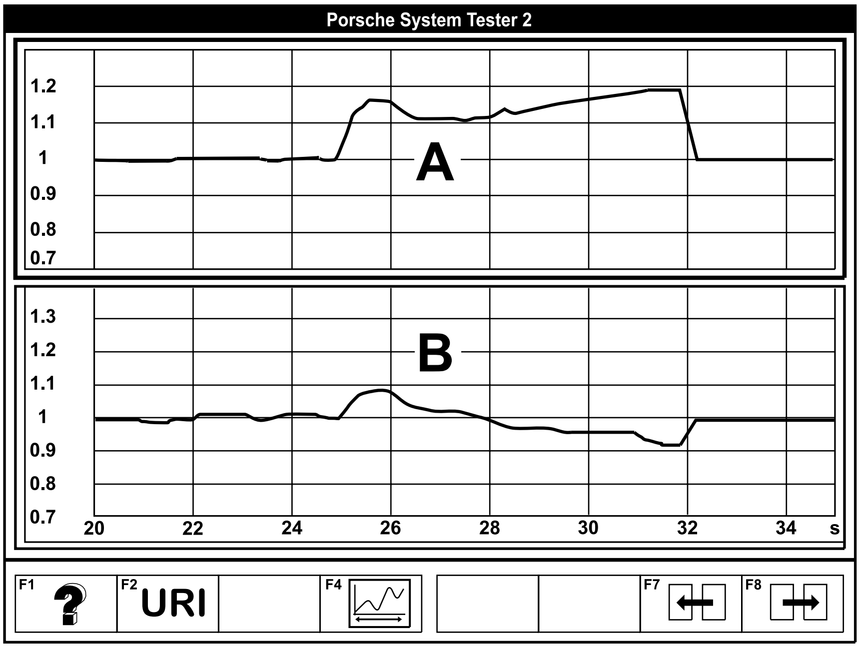
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

If misfires are stored, perform the system test again.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

P1350 - 911 Carrera

Valve lift control checksum error - signal implausible

Diagnosis conditions

- Engine idle and acceleration with wide-open throttle

Possible fault cause

- In large lift, a valve stays at small lift, and in small lift, a valve stays at large lift
- In large lift, several valves (different cylinders) stay at small lift, and in small lift, several valves stay at large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Note!

The test is carried out at standstill with the engine running

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Increase the engine speed to 2,000 rpm and hold for 30 seconds.
2. Then press the F8 key.
3. Increase the engine speed to 3,000 rpm and hold for 30 seconds.
4. Operate the engine for 30 seconds at engine idle speed.

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

1 - Select system test.

2 - Select "Request large lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Carry out acceleration with wide-open throttle in 2nd gear up to 7,000 rpm. Test in manual range for Tiptronic vehicles

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1351

627 Valve lift control, cylinder 1 - above limit

Diagnosis conditions

- Speed between 5,280 and 6,520 rpm
- Load between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- ♦ A valve does not switch to large lift
- ♦ Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

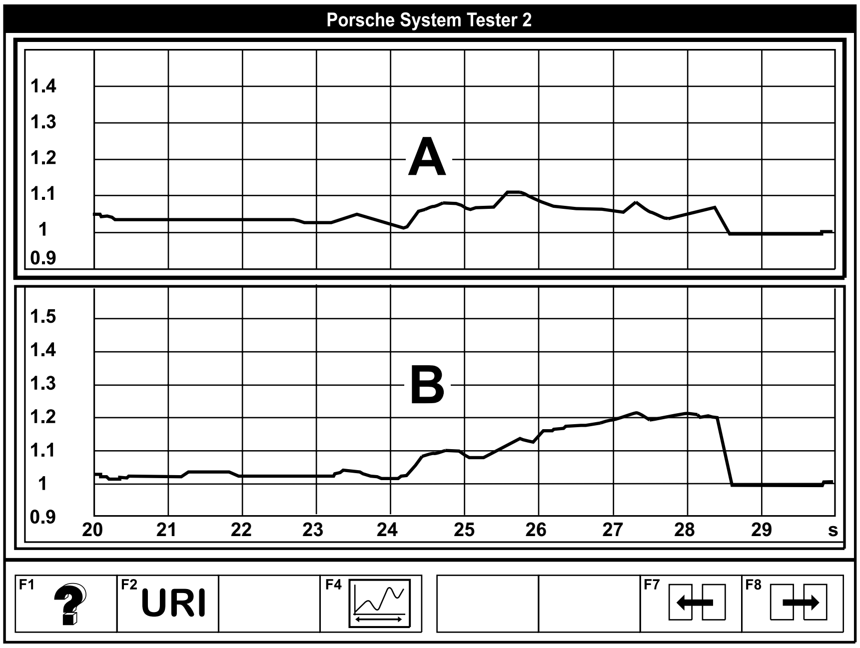
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

627 Valve lift control, cylinder 1 - below limit

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm
- Load between 45 and 70 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Warning!

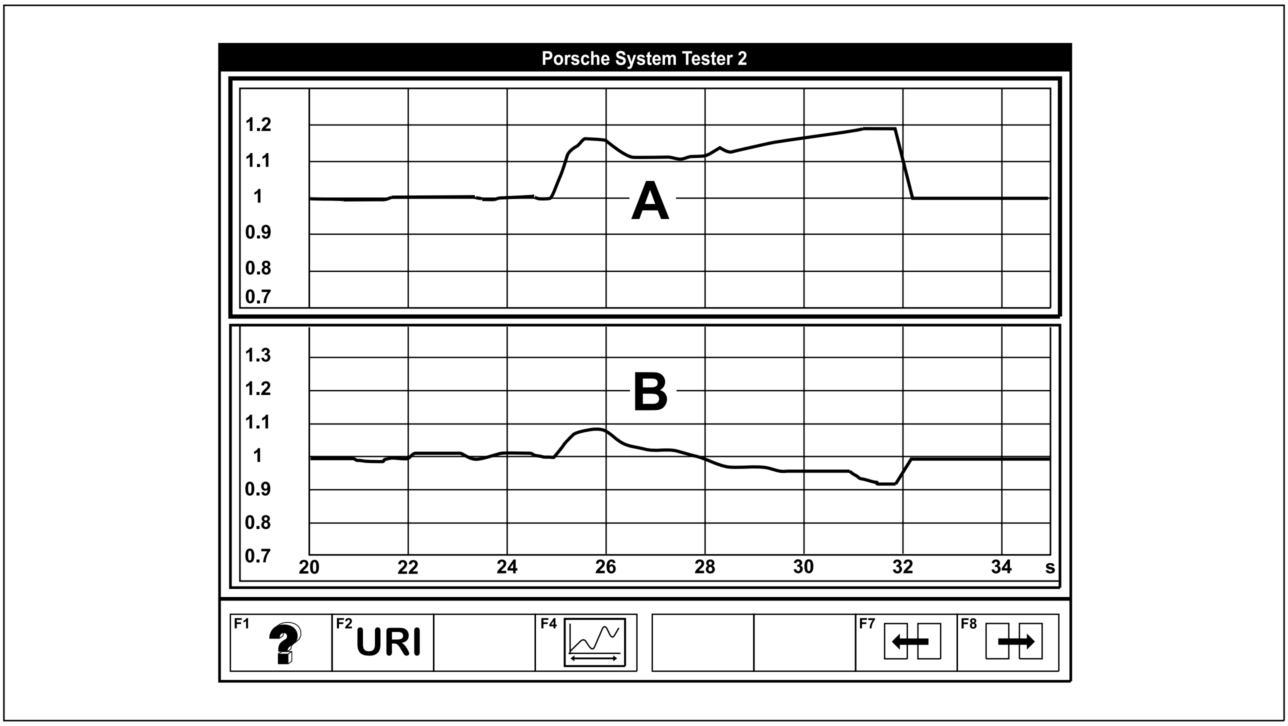
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture (F_R > 1) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

627 Valve lift control, cylinder 1 - signal implausible

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm and between 5,280 and 6,520 rpm
- Load between 45 and 70 % and between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

and

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

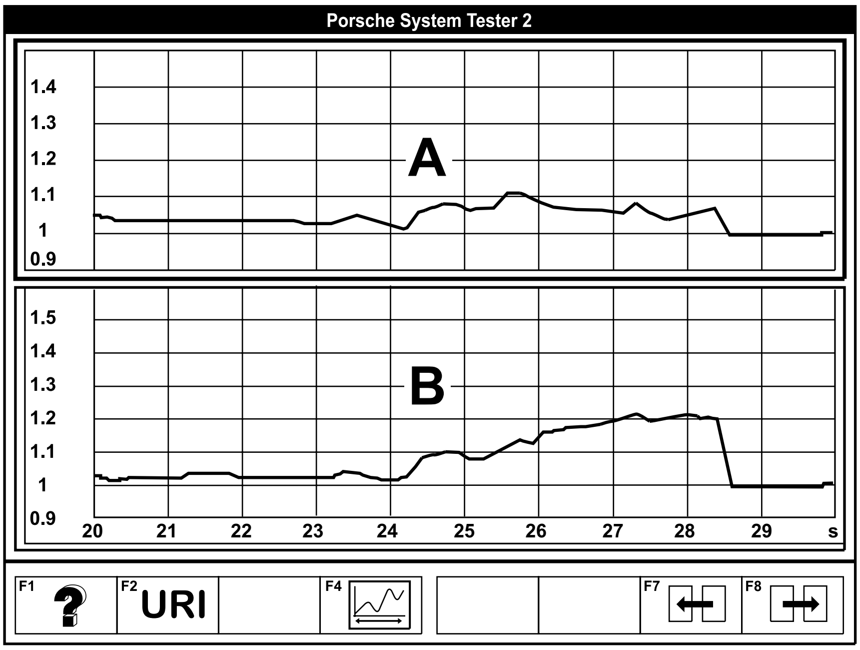
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

Perform system test for small lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

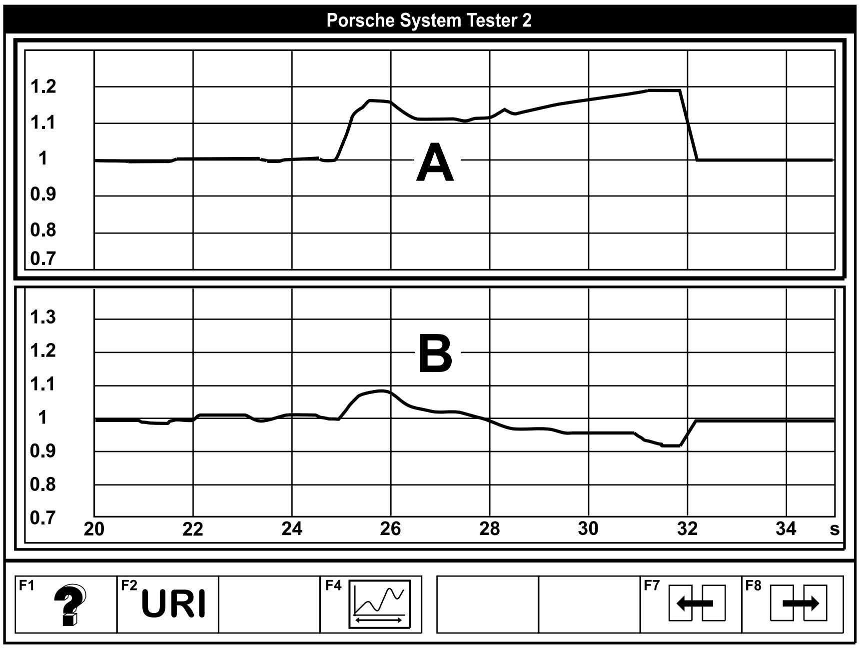
During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during

acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

P1351 - 911 Carrera

Valve lift control, cylinder 1 - below limit

Diagnosis conditions

- Acceleration with wide-open throttle

Possible fault cause

- A valve stays at small lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

1 - Select system test.

2 - Select "Request large lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Carry out acceleration with wide-open throttle in 2nd gear up to 7,000 rpm. Test in manual range for Tiptronic vehicles

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1352

628 Valve lift control, cylinder 6 - above limit

Diagnosis conditions

- Speed between 5,280 and 6,520 rpm
- Load between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

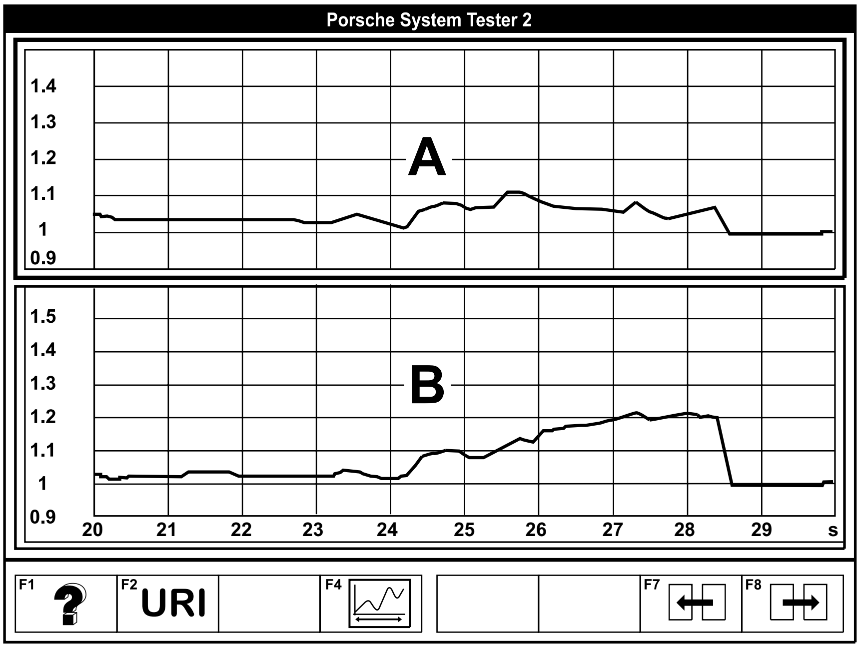
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type ’over limit’ is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key `F8` immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

628 Valve lift control, cylinder 6 - below limit

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm
- Load between 45 and 70 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Warning!

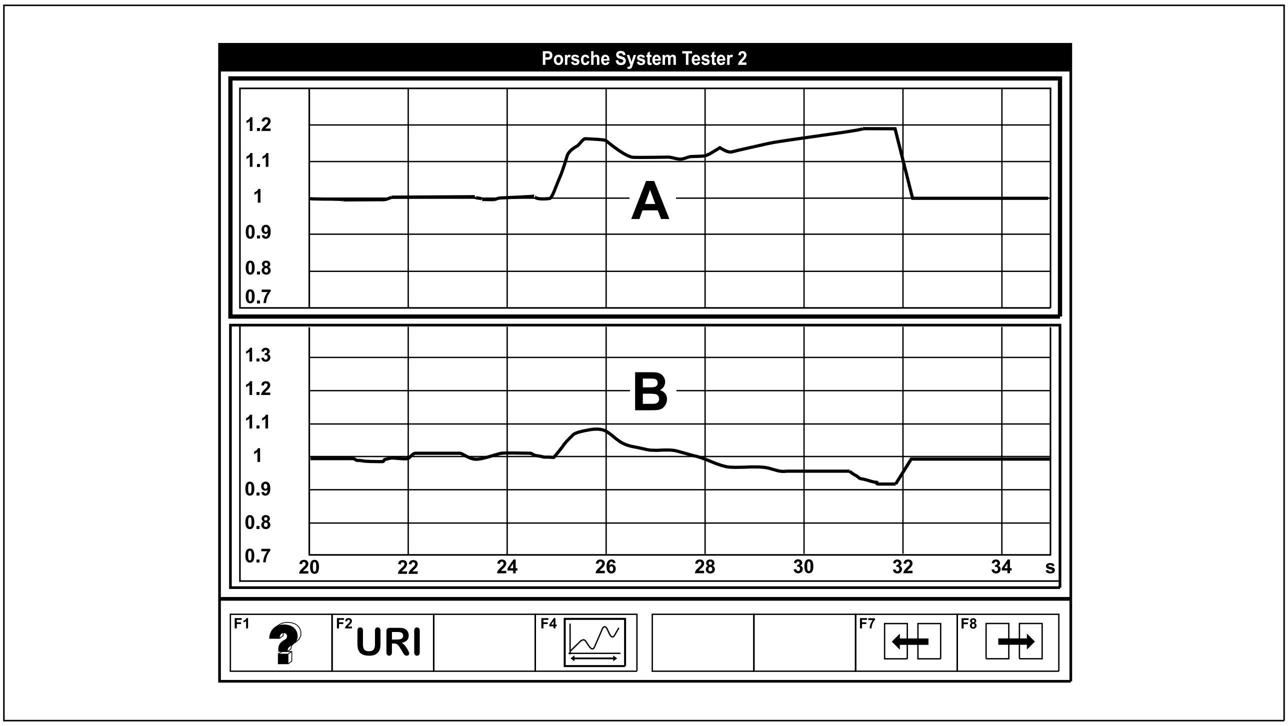
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type ’under limit’ is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

628 Valve lift control, cylinder 6 - signal implausible

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm and between 5,280 and 6,520 rpm
- Load between 45 and 70 % and between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

and

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

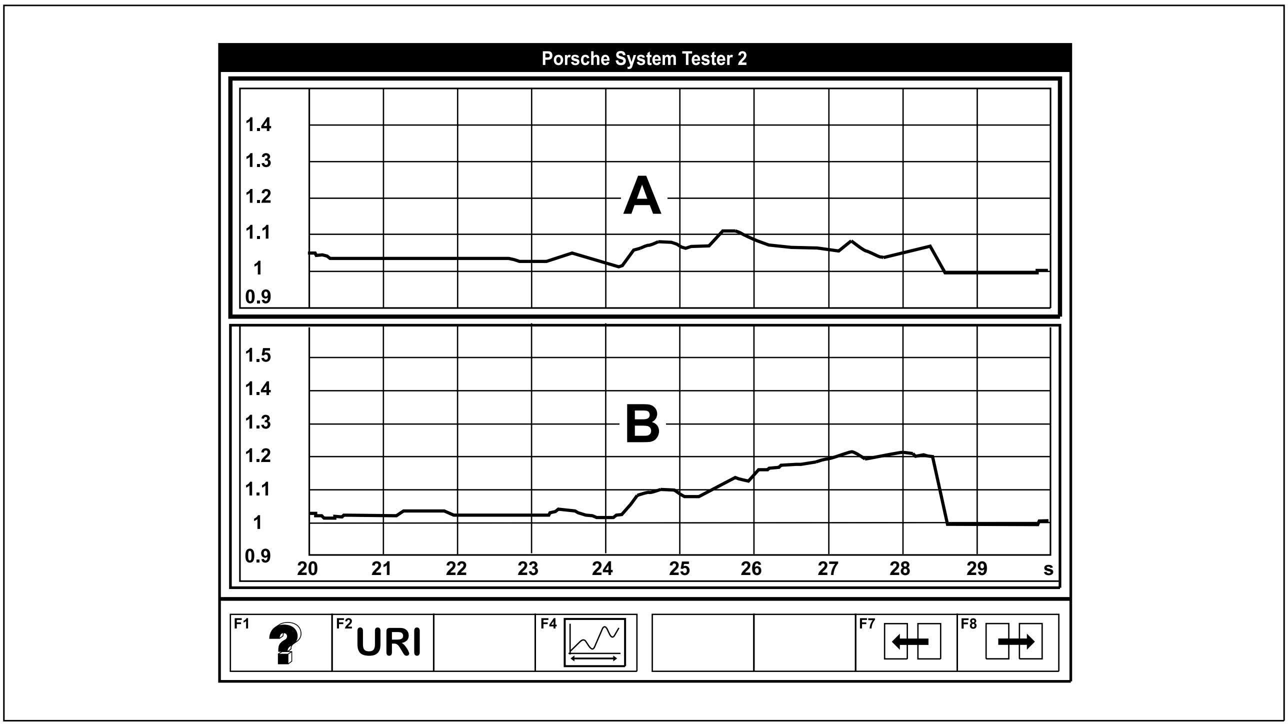
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select ’Request large lift’.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key `F8` immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

Perform system test for small lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

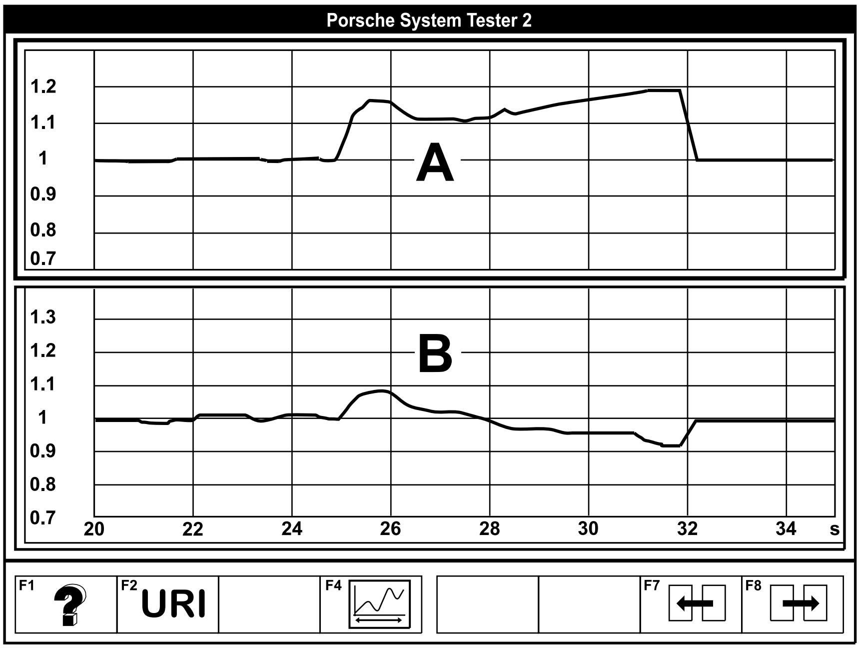
During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type ’under limit’ is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during

acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

P1352 - 911 Carrera

Valve lift control, cylinder 6 - below limit

Diagnosis conditions

- Acceleration with wide-open throttle

Possible fault cause

- A valve stays at small lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

1 - Select system test.

2 - Select "Request large lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Carry out acceleration with wide-open throttle in 2nd gear up to 7,000 rpm. Test in manual range for Tiptronic vehicles

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1353

629 Valve lift control, cylinder 2 - above limit

Diagnosis conditions

- Speed between 5,280 and 6,520 rpm
- Load between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- ♦ A valve does not switch to large lift
- ♦ Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

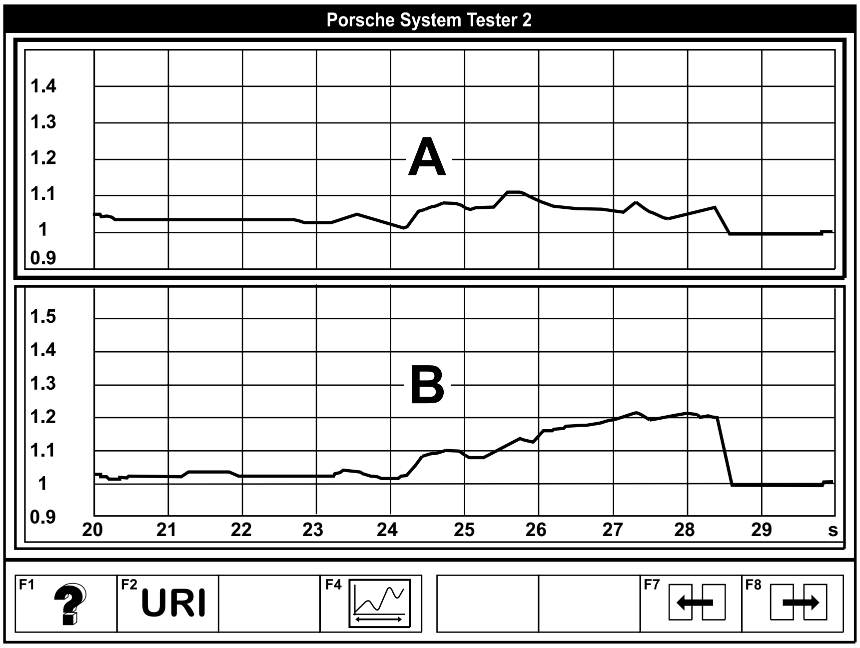
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

629 Valve lift control, cylinder 2 - below limit

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm
- Load between 45 and 70 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Warning!

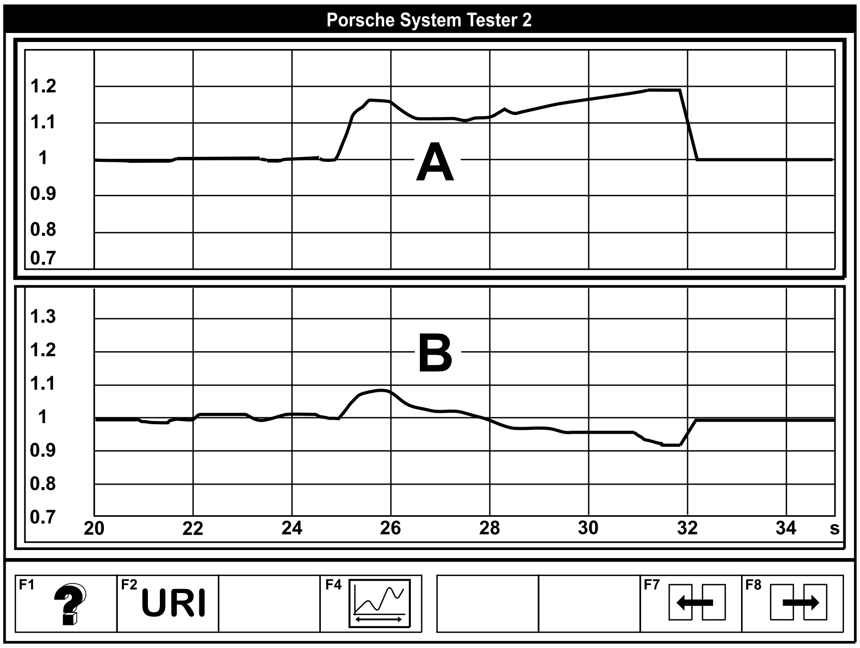
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

629 Valve lift control, cylinder 2 - signal implausible

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm and between 5,280 and 6,520 rpm
- Load between 45 and 70 % and between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

and

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

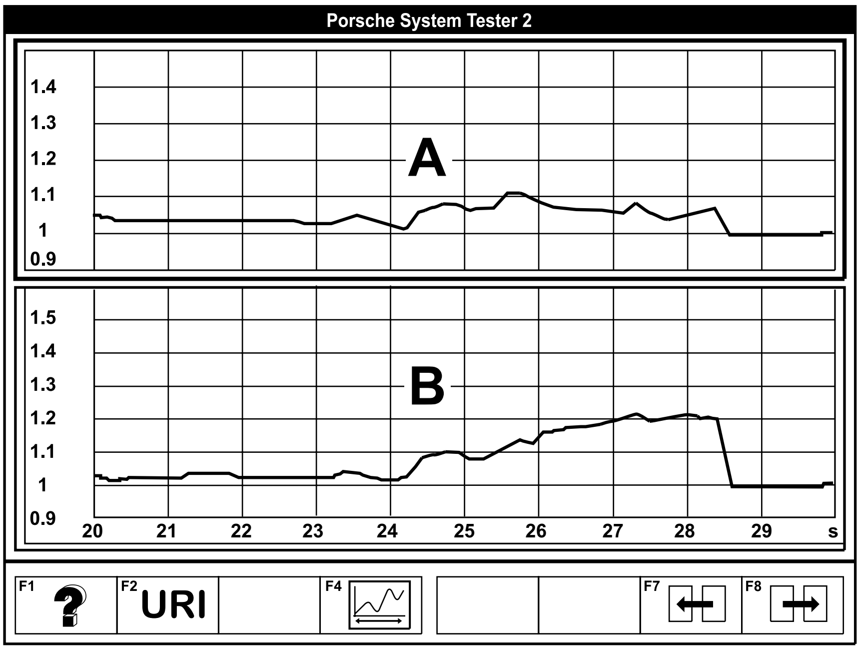
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

Perform system test for small lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

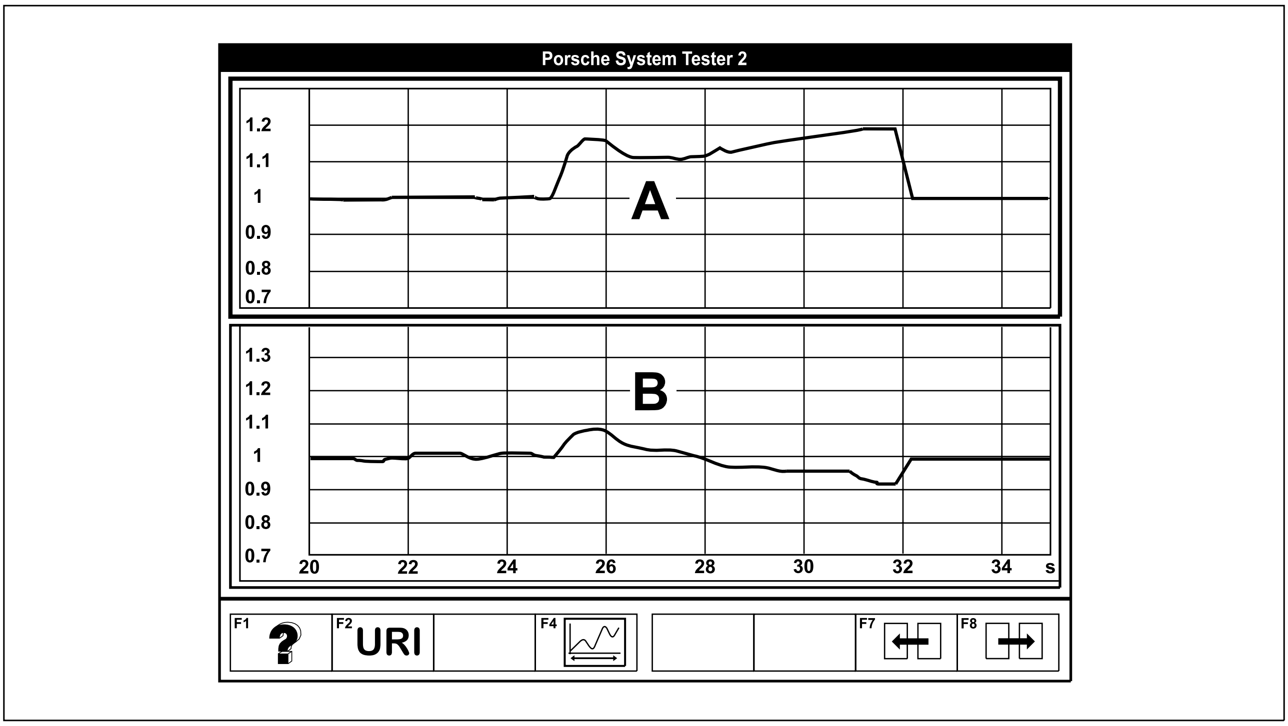
During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during

acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

P1353 - 911 Carrera

Valve lift control, cylinder 2 - below limit

Diagnosis conditions

- Acceleration with wide-open throttle

Possible fault cause

- A valve stays at small lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

1 - Select system test.

2 - Select "Request large lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Carry out acceleration with wide-open throttle in 2nd gear up to 7,000 rpm. Test in manual range for Tiptronic vehicles

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1354

630 Valve lift control, cylinder 4 - above limit

Diagnosis conditions

- Speed between 5,280 and 6,520 rpm
- Load between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

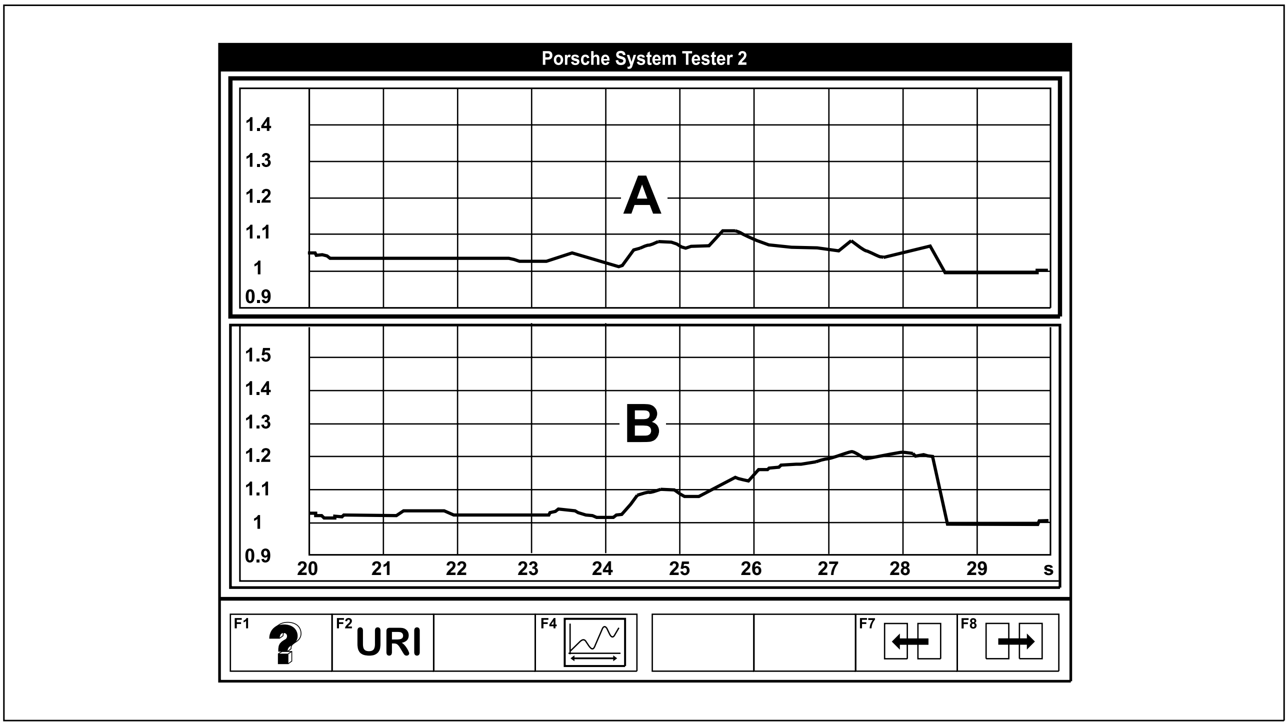
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

630 Valve lift control, cylinder 4 - below limit

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm
- Load between 45 and 70 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Warning!

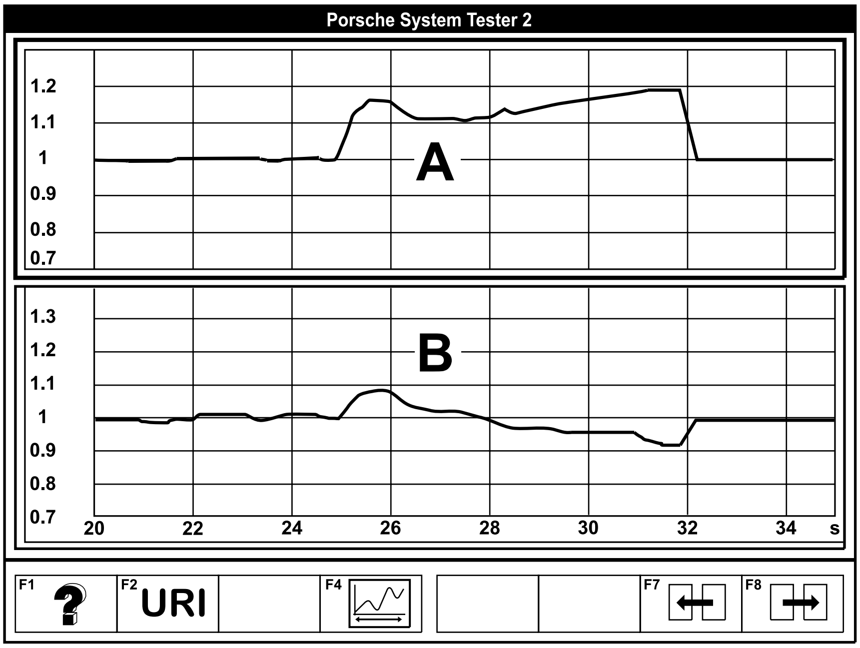
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

630 Valve lift control, cylinder 4 - signal implausible

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm and between 5,280 and 6,520 rpm
- Load between 45 and 70 % and between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

and

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

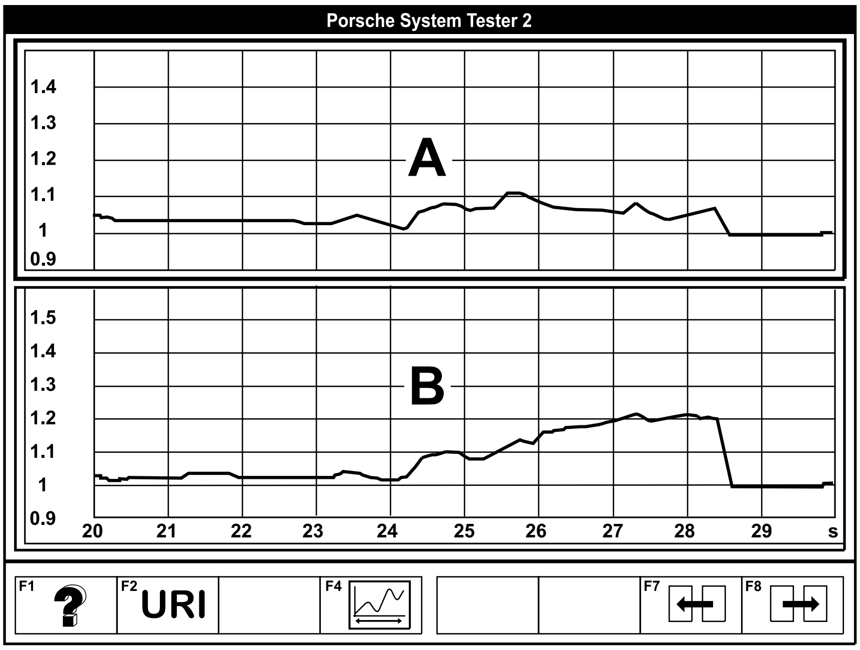
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

Perform system test for small lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

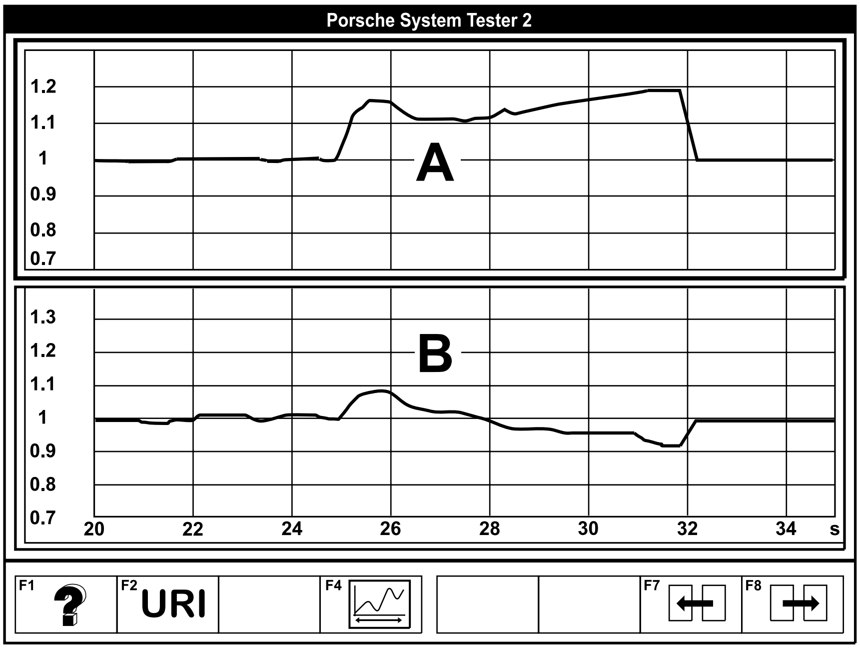
During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during

acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

P1354 - 911 Carrera

Valve lift control, cylinder 4 - below limit

Diagnosis conditions

- Acceleration with wide-open throttle

Possible fault cause

- A valve stays at small lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

1 - Select system test.

2 - Select "Request large lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Carry out acceleration with wide-open throttle in 2nd gear up to 7,000 rpm. Test in manual range for Tiptronic vehicles

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1355

631 Valve lift control, cylinder 3 - above limit

Diagnosis conditions

- Speed between 5,280 and 6,520 rpm
- Load between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- ♦ A valve does not switch to large lift
- ♦ Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

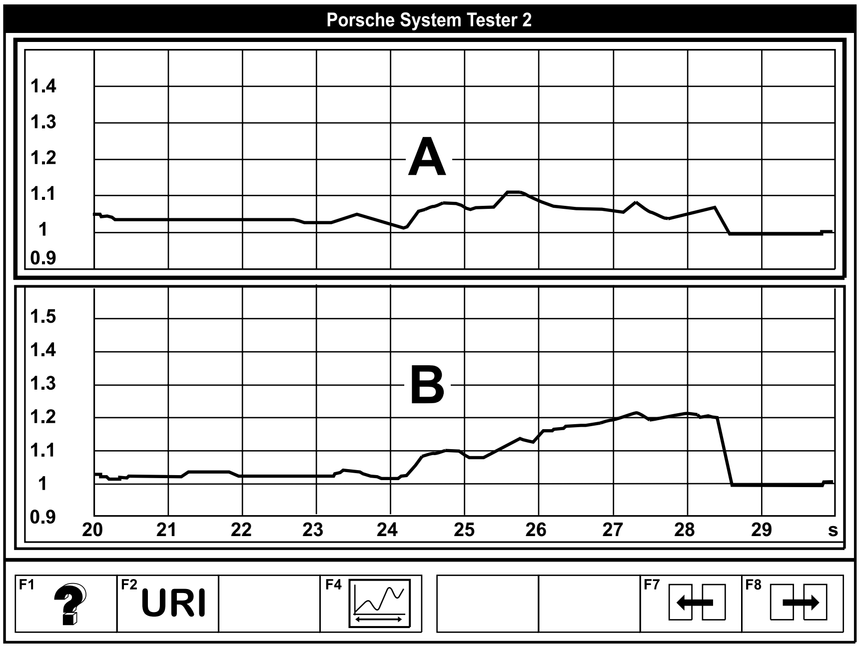
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

631 Valve lift control, cylinder 3 - below limit

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm
- Load between 45 and 70 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Warning!

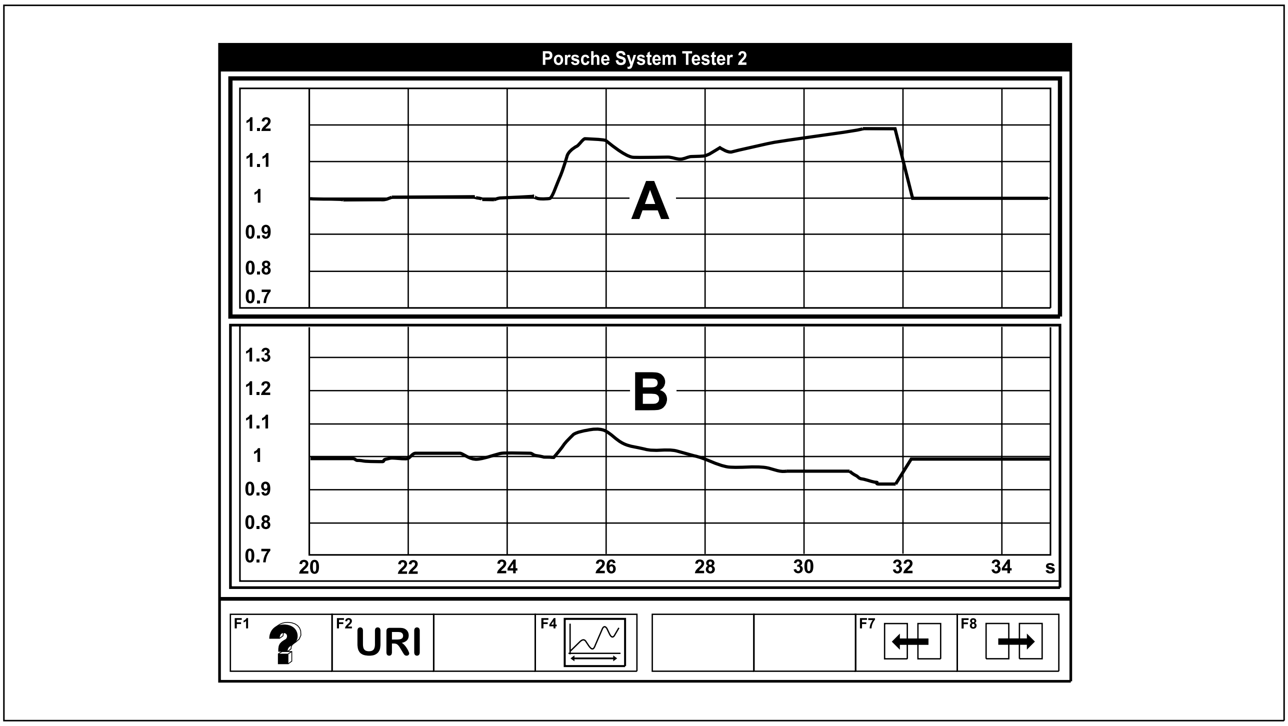
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

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4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

631 Valve lift control, cylinder 3 - signal implausible

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm and between 5,280 and 6,520 rpm
- Load between 45 and 70 % and between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

and

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

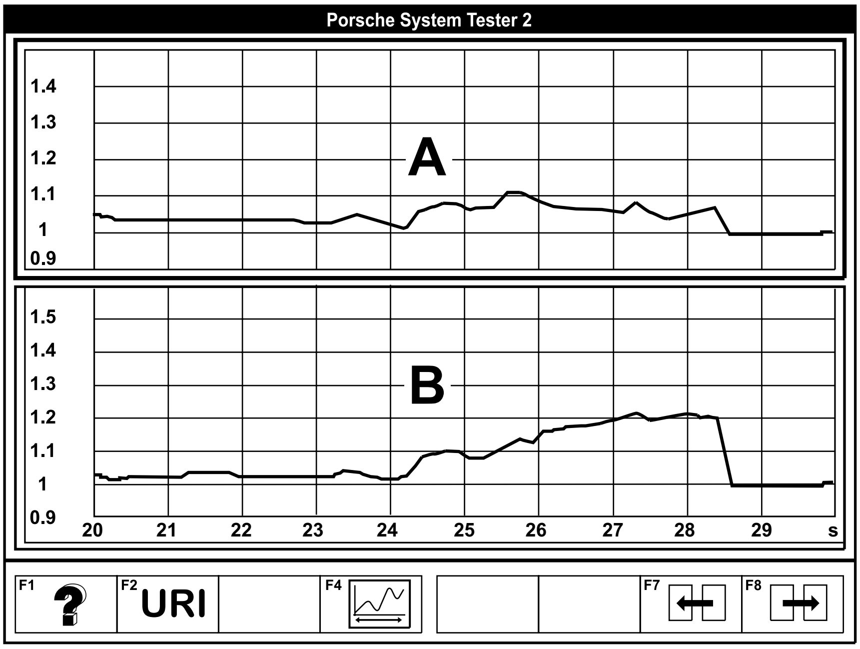
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key [F8] immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

Perform system test for small lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

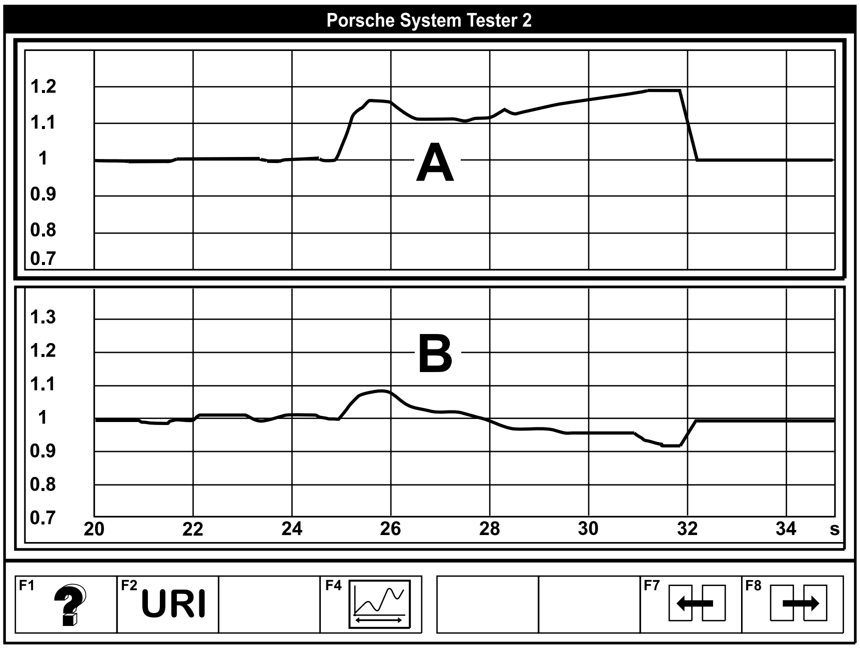
During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during

acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

P1355 - 911 Carrera

Valve lift control, cylinder 3 - below limit

Diagnosis conditions

- Acceleration with wide-open throttle

Possible fault cause

- A valve stays at small lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

1 - Select system test.

2 - Select "Request large lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Carry out acceleration with wide-open throttle in 2nd gear up to 7,000 rpm. Test in manual range for Tiptronic vehicles

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1356

632 Valve lift control, cylinder 5 - above limit

Diagnosis conditions

- Speed between 5,280 and 6,520 rpm
- Load between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- ♦ A valve does not switch to large lift
- ♦ Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

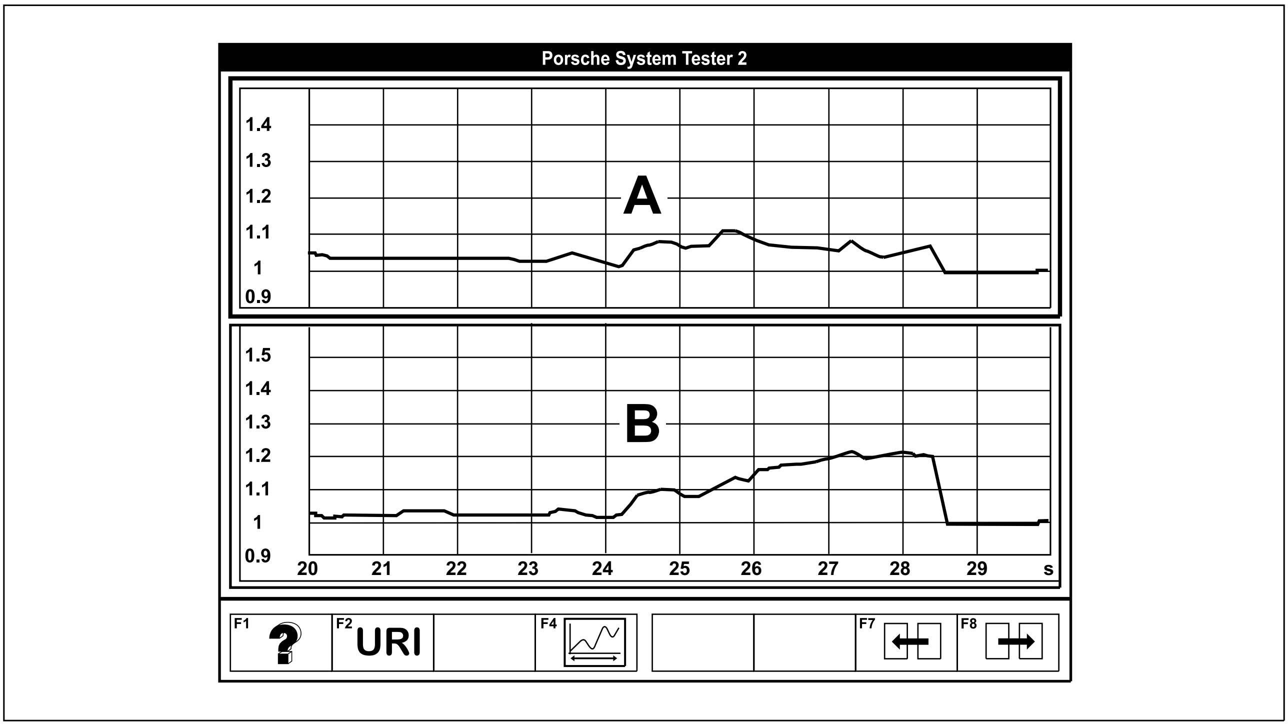
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

632 Valve lift control, cylinder 5 - below limit

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm
- Load between 45 and 70 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Warning!

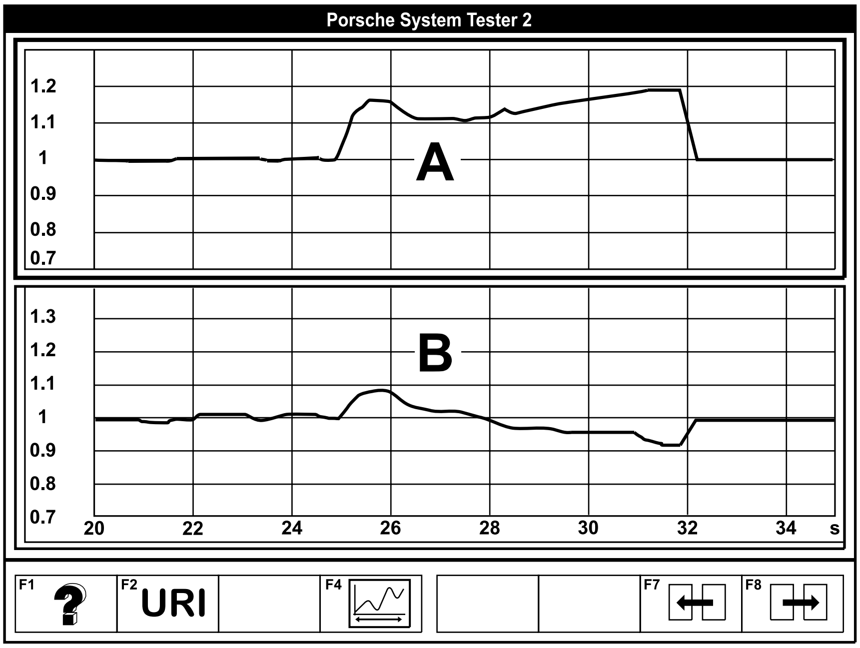
Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture (F_R > 1) during acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

632 Valve lift control, cylinder 5 - signal implausible

Diagnosis conditions

- Speed between 2,000 and 3,320 rpm and between 5,280 and 6,520 rpm
- Load between 45 and 70 % and between 125 and 190 %
- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

and

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

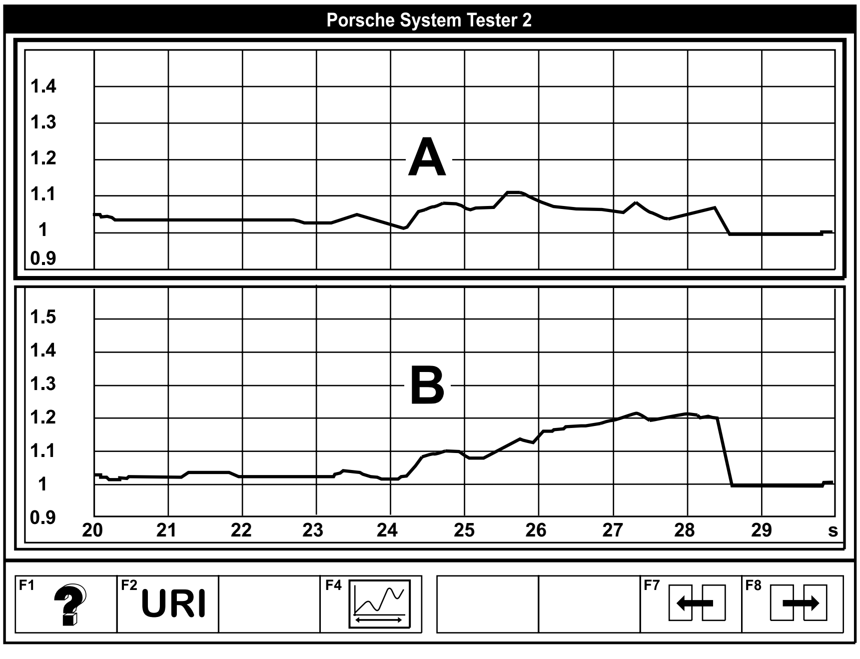
During the system test for large lift, the valves remain at large lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to large lift, the fault type 'over limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank hardly changes the mixture at all given acceleration with wide-open throttle (F_R at 1) and enriches the mixture in the opposite cylinder bank ($F_R > 1$)⇒ see drawing below. Given a difference between F_{R1} and F_{R2} of more than 8 % during acceleration with wide-open throttle, a fault is certainly present.

If the difference is less than 4 %, 1 valve may be faulty on both cylinder banks. In this case, all flat-base tappets of the inlet valves must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request large lift'.

If "Valve diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key `F8` immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" appears.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*
- *If misfires are stored, see Troubleshooting misfires.*

Perform system test for small lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

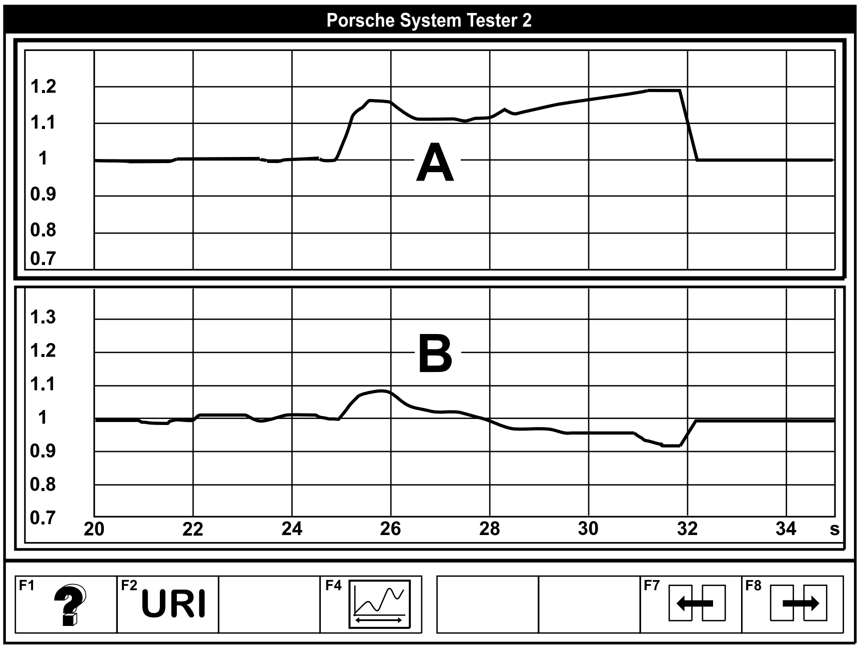
During the system test for small lift, the valves remain at small lift, regardless of the type of driving. Faulty switching conditions can be detected by rough running, just like with misfire detection. If a valve is not switched to small lift, the fault type 'under limit' is recorded.

Several cylinders may be stored as faulty, although only 1 valve on one cylinder is faulty.

In order to guarantee safety during repairs, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

A faulty flat-base tappet can be detected because the oxygen sensor F_R for this cylinder bank enriches the mixture ($F_R > 1$) during

acceleration with wide-open throttle ⇒ see drawing below. Difference from the other oxygen sensor > approx. 15 %. In the case of a fault, the flat-base tappets of the inlet valves for the entire cylinder bank must be replaced.



A - Oxygen sensor, bank 1

B - Oxygen sensor, bank 2

1 - Select system test.

2 - Select 'Request small lift'.

If "Valve lift diagnosis not ready" appears, a fault may have been stored.

1. Erase the fault memory.

3 - Activate the system test with the key F8 immediately before acceleration with wide-open throttle.

The message "Drive link active" then appears.

Note!

If 'Request small lift' appears, the valves remain at small lift, ie. the performance is reduced dramatically.

4 - Perform acceleration with wide-open throttle in 2nd gear, until "Valve lift diagnosis complete" (max. 4,000 rpm) appears.

At speeds above 4,000 rpm, misfires may be stored. Delete the fault memory and repeat the test.

Note!

- *If a fault is detected, it is only recorded in the fault memory after 6,000 ignitions (at idling speed approx. 3 minutes waiting time).*
- *It is important to observe the oxygen sensor during acceleration with wide-open throttle or to record its behaviour with the data logger.*

P1356 - 911 Carrera

Valve lift control, cylinder 5 - below limit

Diagnosis conditions

- Acceleration with wide-open throttle

Possible fault cause

- A valve stays at small lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

⚠ **Warning!**

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

1 - Select system test.

2 - Select "Request large lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Carry out acceleration with wide-open throttle in 2nd gear up to 7,000 rpm. Test in manual range for Tiptronic vehicles

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1357

Camshaft Adjustment, Bank 2– Above Limit

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Solenoid hydraulic valve is not triggered, camshaft does not switch into late position

- ♦ Dirt in system
- ♦ Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

►

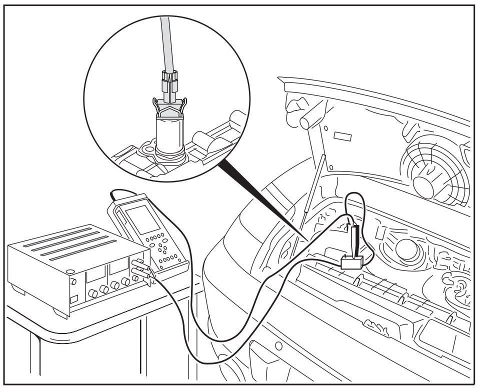
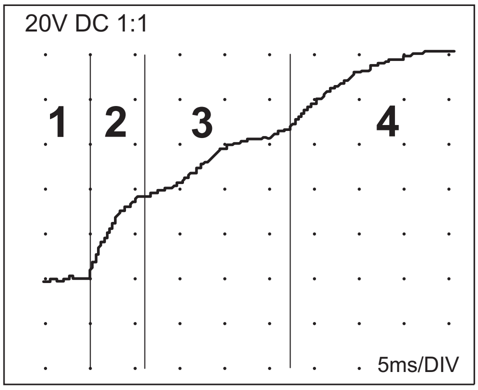


Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil

►



P1358

Camshaft Adjustment, Bank 2– Below Limit

Diagnosis conditions

- Time elapsed after start-up greater than 5 seconds
- Engine temperature greater than -10 °C
- Engine speed between 680 rpm and 6760 rpm
- No fault in camshaft adjustment output stage
- Reference mark OK
- No fault in camshaft position sensors
- No fault in engine temperature

Possible fault cause

Note!

Solenoid hydraulic valve is triggered, camshaft does not switch into early position

- ♦ Dirt in system
- ♦ Solenoid hydraulic valve mechanically blocked

Affected terminals

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check solenoid hydraulic valve camshaft adjust-ment	♦ Remove connector on solenoid hydraulic valve ♦ Connect special tool 9675 to the solenoid hydraulic valve and to a power supply. ♦ Connect oscilloscope or engine tester to the special tool 9675 ♦ Set 12 V ♦ See Figure 1. ♦ Set switch on special tool 9675 to 1	See Figure 2 ⇒ Step 2	Replace solenoid hydraulic valve →End

Figure 1:

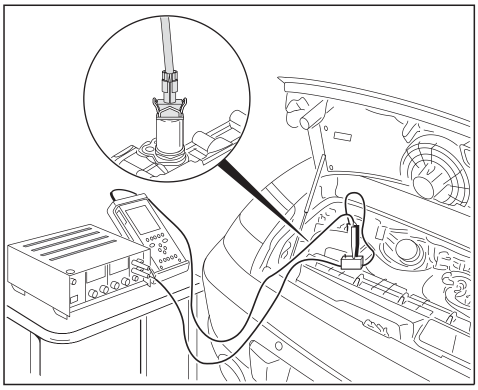
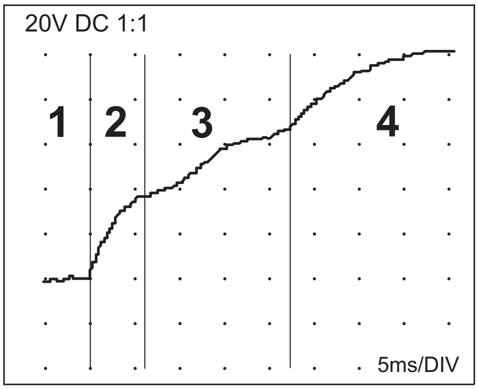
► 

Figure 2:

1 - Voltage not applied yet, valve in output state
2 - Exponential voltage increase, magnetic field is built up, increase of the spring preload force
3 - Valve starts to move, spring force increases, valve reaches end position
4 - Exponential voltage increase, current limitation through self-induction of the coil

► 

P1359 - 911 Carrera

Valve lift control, cylinder 1 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Note!

The test is carried out at standstill with the engine running

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Increase the engine speed to 2,000 rpm and hold for 30 seconds.
2. Then press the F8 key.
3. Increase the engine speed to 3,000 rpm and hold for 30 seconds.
4. Operate the engine for 30 seconds at engine idle speed.

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1360 - 911 Carrera

Valve lift control, cylinder 6 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Note!

The test is carried out at standstill with the engine running

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Increase the engine speed to 2,000 rpm and hold for 30 seconds.
2. Then press the F8 key.
3. Increase the engine speed to 3,000 rpm and hold for 30 seconds.
4. Operate the engine for 30 seconds at engine idle speed.

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1361 - 911 Carrera

Valve lift control, cylinder 2 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/Troubleshooting

Perform system test for small lift

Note!

The test is carried out with the engine running at a standstill

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Increase the engine speed to 2 000 1/min and hold for 30 seconds.
2. Then press the F8 key.
3. Increase the engine speed to 3 000 1/min and hold for 30 seconds.
4. Operate the engine for 30 seconds at engine idle speed.

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1362 - 911 Carrera

Valve lift control, cylinder 4 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Note!

The test is carried out at standstill with the engine running

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Increase the engine speed to 2,000 rpm and hold for 30 seconds.
2. Then press the F8 key.
3. Increase the engine speed to 3,000 rpm and hold for 30 seconds.
4. Operate the engine for 30 seconds at engine idle speed.

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1363 - 911 Carrera

Valve lift control, cylinder 3 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Note!

The test is carried out at standstill with the engine running

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Increase the engine speed to 2,000 rpm and hold for 30 seconds.
2. Then press the F8 key.
3. Increase the engine speed to 3,000 rpm and hold for 30 seconds.
4. Operate the engine for 30 seconds at engine idle speed.

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1364 - 911 Carrera

Valve lift control, cylinder 5 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- A valve does not switch to small lift
- Several valves (various cylinders) do not switch to small lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Note!

The test is carried out at standstill with the engine running

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Increase the engine speed to 2,000 rpm and hold for 30 seconds.
2. Then press the F8 key.
3. Increase the engine speed to 3,000 rpm and hold for 30 seconds.
4. Operate the engine for 30 seconds at engine idle speed.

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1371 - 911 Carrera

Valve lift control checksum error - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Several valves (various cylinders) do not switch to small lift

Note!

The checksum error is only stored in connection with errors in valve lift control of cylinders 1 - 6.

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for small lift

Note!

The test is carried out at standstill with the engine running

1 - Select system test.

2 - Select "Request small lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Increase the engine speed to 2,000 rpm and hold for 30 seconds.
2. Then press the F8 key.
3. Increase the engine speed to 3,000 rpm and hold for 30 seconds.
4. Operate the engine for 30 seconds at engine idle speed.

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

DME 7.8

P1374 - 911 Carrera

Valve lift control checksum error - below limit

Diagnosis conditions

- Acceleration with wide-open throttle

Possible fault cause

- A valve does not switch to large lift
- Several valves (various cylinders) do not switch to large lift

Affected terminals

-

Diagnosis/troubleshooting

Perform system test for large lift

Warning!

Test is carried out while driving. Have a second person operate the Porsche System Tester 2.

1 - Select system test.

2 - Select "Request large lift".

If "Valve lift diagnosis not ready" appears, a fault may have been stored. In this case, delete the fault memory.

The engine must be at operating temperature.

1. Carry out acceleration with wide-open throttle in 2nd gear up to 7,000 rpm. Test in manual range for Tiptronic vehicles

After 3,000 ignitions the Tester indicates whether a fault is present or not.

In order to ensure that the fault is repaired, the flat-base tappets of the inlet valves of the entire cylinder bank should be replaced if a fault occurs.

P1384

220 Knock control zero test - signal implausible

Diagnosis conditions

- Engine speed less than 5,600 rpm
- Knock control active
- Engine load greater than 45 %

Possible fault cause

- ♦ DME control module

Note!

When a fault is stored, the ignition angle is retarded for all cylinders in the range in which knock control is active.

Affected terminals

-

Diagnosis/troubleshooting

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>1</td><td colspan="2">Replace DME control module</td><td colspan="2">⇒ Step 2</td></tr>
<tr><td>2</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
</table>

P1385

221 Knock control offset - signal implausible

Diagnosis conditions

- Engine speed less than 5,600 rpm
- Knock control active
- Engine load greater than 45 %

Possible fault cause

- ♦ DME control module

Note!

When a fault is stored, the ignition angle is retarded for all cylinders in the range in which knock control is active.

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1386

222 Knock control test pulse - signal implausible

Diagnosis conditions

- Engine speed less than 5,600 rpm
- Knock control active
- Engine load greater than 45 %

Possible fault cause

- DME control module

Note!

When a fault is stored, the ignition angle is retarded for all cylinders in the range in which knock control is active.

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1397

113 Camshaft position sensor 2 - signal implausible

Diagnosis conditions

- Engine running

Possible fault cause

- Loose contact
- Camshaft position sensor

Note!

- *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- *For safety reasons, the ignition timing is retarded.*

Affected terminals

Terminals III/7, III/17 and III/18

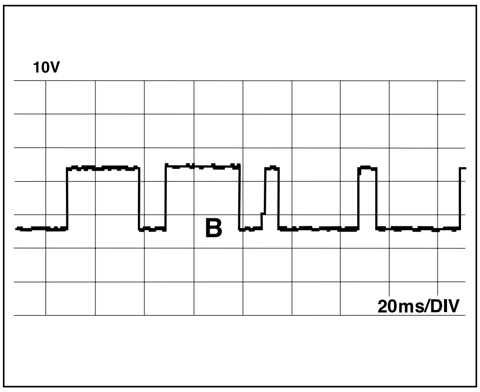
Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check CMP sensor voltage supply	♦ Remove connector of CMP sensor 2 ♦ Switch on the ignition ♦ Measure voltage between Pin 1 and Pin 3	Approx. 5 V ⇒ Step 5	⇒ Step 2
2	Check power supply wiring for continuity	♦ Remove connector of CMP sensor 2 ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin III/7 and CMP sensor 2 plug Pin 3 ♦ Measure resistance between special tool 9637 Pin III/17 and CMP sensor 2 plug Pin 1	0 - 5 Ω ⇒ Step 3	
3	Replace DME control module		⇒ Step 4	

<table>
<tr><th colspan="3">Work instruction</th><th>Display OK</th><th>If not OK</th></tr>
<tr><td>4</td><td>Perform adaptation</td><td>♦ Switch on the ignition
♦ Wait one minute
♦ Do not press the accelerator
♦ Switch off the ignition for at least 10 seconds
♦ Read out the fault memory</td><td colspan="2">→ End</td></tr>
<tr><td>5</td><td>Check CMP sensor signal</td><td>♦ Connect special tool 9637
♦ Connect engine tester; use special input
♦ Positive cable to Pin III/18
♦ Negative cable to Pin III/17
♦ Start the engine</td><td>See Figure 1
⇒ Step 6</td><td>Replace CMP sensor
→ End</td></tr>
</table>

Figure 1:

►



Work instruction			Display OK	If not OK
6	Check signal wire from DME control module, Pin III/18, to CMP sensor	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of CMP sensor 2 ♦ Measure resistance between special tool 9637 Pin III/18 and CMP sensor 2 plug Pin 2	0 - 5 Ω → End	Repair wiring harness → End

113 Camshaft position sensor 2 - below limit

Diagnosis conditions

- Engine running

Possible fault cause

- Short circuit to ground

Note!

- *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- *For safety reasons, the ignition timing is retarded.*

Affected terminals

Terminal III/18

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire from DME control module, Pin III/18, to CMP sensor for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of CMP sensor 2 ♦ Measure resistance between special tool 9637 Pin III/18 and ground	∞ Ω → End	Repair wiring harness → End

113 Camshaft position sensor 2 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- ♦ Short circuit to B+

Note!

- ♦ *If both CMP sensor signals are missing, the start will take at least 10 seconds.*
- ♦ *For safety reasons, the ignition timing is retarded.*

Affected terminals

Terminal III/18

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire from DME control module, Pin III/18, to CMP sensor for short to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of CMP sensor 2 ♦ Switch on the ignition ♦ Measure voltage between special tool 9637 Pin III/18 and ground	0 V → End	Repair wiring harness → End

P1411

208 Secondary Air Injection System, Bank 2 – Below Limit

Diagnosis conditions

- Intake air temperature 4.5 - 60 °C
- Engine temperature 4.5 - 102 °C
- Mass air flow 36 - 150 $^{kg}/_{h}$
- Engine starting temperature less than 42 °C
- Altitude correction factor greater than 0.75
- Oxygen sensors 1 and 2 ahead of TWC are ready for operation
- The secondary air injection pump is switched on
- Diagnosis has not yet taken place during this cycle

Possible fault cause

- ♦ Secondary air injection pump is not triggered
- ♦ Secondary air injection pump does not work
- ♦ Air supply lines restricted
- ♦ Electric change-over valve does not function
- ♦ Air change-over valve does not function
- ♦ Vacuum system leaks

Affected terminals

III/11 and III/14

Diagnosis/troubleshooting

Note!

Secondary air diagnosis can be activated with the Porsche System Tester 2 in the "Short test" menu.

Work instruction			**Display OK**	**If not OK**
1	Activate secondary air pump	♦ Remove relay of secondary air injection pump. ♦ Jumper terminals 30 and 87. ♦ The secondary air pump must be running (audible function). – or ♦ Connect and switch on Porsche System Tester 2. ♦ Select DME. ♦ Call up "Drive links" menu. ♦ Select "Secondary air pump". ♦ Activate secondary air pump (audible function).	⇒ Step 3	⇒ Step 2
2	Check triggering of secondary air pump	♦ Check fuse (Maxi Fuse) of AIR pump (on relay carrier 2). ♦ Remove relay of AIR pump (on relay carrier 2). ♦ Measure voltage between pin 3 and ground ♦ Push relay back on.	Battery positive voltage	Check wire from pin 2 to DME control module pin III/11 for continuity.
		♦ Remove connector of AIR pump. ♦ Measure voltage at pin 1 and pin 2	Battery positive voltage	
3	Check vacuum system for leaks			Seal vacuum system
4	Check electric change-over valve	♦ Remove two-pole connector of electric change-over valve. ♦ Trigger AIR pump with Porsche System Tester 2. ♦ Measure voltage at pin 1 and pin 2	Battery positive voltage	
		♦ Remove vacuum hose of electric change-over valve with the engine running.	Vacuum must be present	

Work instruction			Display OK	If not OK
5	Check air change-over valve	♦ Run engine briefly to produce vacuum. ♦ Activate secondary air pump. ♦ Remove vacuum hose of air change-over valve.	Vacuum must be present	
		♦ After activation, check pneumatic change-over valve for continuity		
6	Check air supply lines for blockage			

P1455

170 A/C compressor control - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Air conditioning on

Possible fault cause

- A/C relay
- Open circuit in wiring

Affected terminals

Terminal IV/27

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check A/C relay	♦ Remove A/C relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace A/C relay → End
2	Check control wire for A/C relay, Pin 2 (terminal 85), for open circuit	♦ Remove A/C relay ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin IV/27 and A/C relay plug Pin 2	0 - 5 Ω → End	Repair wiring harness → End

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P1456

170 A/C compressor control - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Air conditioning on

Possible fault cause

- Short circuit to B+ in wiring

Affected terminals

Terminal IV/27

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check control wire for A/C relay, Pin 2 (terminal 85), for short circuit to B+	♦ Remove A/C relay ♦ Remove DME control module connector ♦ Measure voltage between A/C relay Pin 2 and ground ♦ Ignition on	0 V → End	Repair wiring harness → End

P1457

170 A/C compressor control - below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Air conditioning on

Possible fault cause

- Short circuit to ground in wiring

Affected terminals

Terminal IV/27

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check control wire for A/C relay, Pin 2 (terminal 85), for short circuit to ground	♦ Remove A/C relay ♦ Remove DME control module connector ♦ Measure resistance between Pin 2 (terminal 85) and ground	∞ Ω → End	Repair wiring harness → End

P1501

403 Throttle jacking unit, output stage - signal implausible

Diagnosis conditions

- Engine idling

Possible fault cause

- ♦ Short circuit in wiring harness
- ♦ DME control module output stage faulty

Affected terminals

Terminal I/7

Note!

The vehicle is in emergency air function mode, i.e. the engine is turning at approx. 1200 rpm.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module Pin I/7 to the throttle jacking unit for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure voltage between Pin I/7 and ground ♦ Switch on the ignition	0 V ⇒ Step 2	Repair wiring harness → End
2	Check wiring from DME control module Pin I/7 to the throttle jacking unit for short circuit to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between Pin I/7 and ground	$\infty\ \Omega$ → End	Repair wiring harness → End

DME 7.8

P1502

412 Throttle jacking unit, spring test - above limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Stationary vehicle
- Engine not running
- Engine temperature greater than 5 °C
- Intake air temperature greater than 5 °C

Possible fault cause

- ♦ Throttle part

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Replace throttle part		⇒ Step 2	
2	Erase fault memory		⇒ Step 3	
3	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Actuate accelerator pedal ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1503

402 Throttle Jacking Unit, Position Error - Signal Implausible

Diagnosis conditions

- Driving with changing pedal position

Possible fault cause

- Short circuit in wiring harness
- Sluggish throttle

Affected terminals

Terminal I/9 and I/7

Note!

The vehicle is in emergency function mode, i.e. the engine is turning at approx. 1200 rpm.

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module pin I/7 to the throttle jacking unit for short circuit to B+.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/7 and ground. ♦ Switch on the ignition.	Low battery voltage ⇒ Step 2.	Repair wiring harness → End.
2	Check wiring from DME control module pin I/9 to the throttle jacking unit for short circuit to B+.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/9 and ground. ♦ Switch on the ignition.	Low battery voltage ⇒ Step 3.	Repair wiring harness → End.
3	Check wiring from DME control module pin I/7 to the throttle part for short circuit to ground	♦ Connect special tool 9637. ♦ Measure voltage between pin I/7 and pin I/2.	0 V ⇒ Step 4.	Repair wiring harness → End.

Work instruction			Display OK	If not OK
4	Check wiring from DME control module pin I/9 to the throttle part for short circuit to ground.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/ 9 and pin I/2.	0 V ⇒ Step 5.	Repair wiring harness → End.
5	Check wiring from DME control module, pin I/7, for short circuit to wire, pin I/9.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of throttle part. ♦ Measure resistance between pin I/7 and pin I/9.	∞ Ω ⇒ Step 6.	Repair wiring harness → End.

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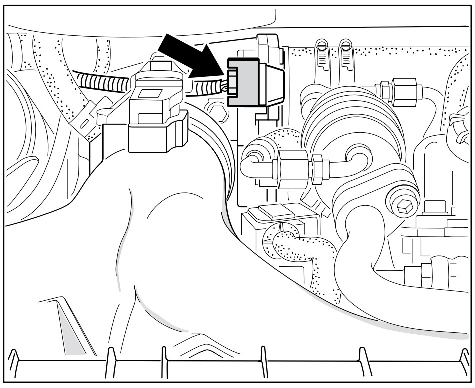
Remove connector of throttle part: ►



Work instruction			Display OK	If not OK
6	Check resistance of motor actuator in throttle part.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between pin I/7 and pin I/9.	1,2 - 1,6 Ω (at 20 °C) ⇒ Step 7.	Replace throttle part ⇒ Step 8.
7	Replace DME control module.		⇒ Step 8.	
8	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

P1504

410 Throttle jacking unit, emergency air position - signal implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)

Possible fault cause

- No adaptation performed
- Throttle part

Affected terminals

-

Note!

The fault is entered during the adaptation phase.

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	Fault entered ⇒ Step 2	→ End
2	Replace throttle part		⇒ Step 3	
3	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Actuate accelerator pedal ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1505

404 Throttle Jacking Unit, Control Range - Open Circuit

Diagnosis conditions

- Driving with changing pedal position

Possible fault cause

- Open circuit
- Short circuit to B+

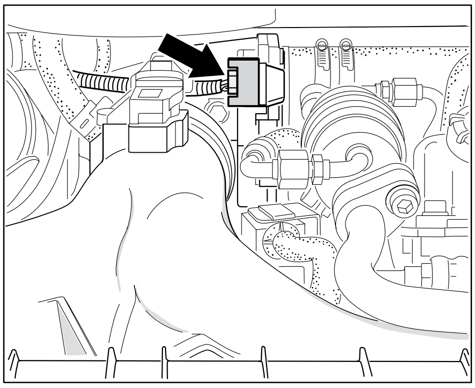
Affected terminals

Terminal I/7 and I/9

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module pin I/7 to the throttle part for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of throttle part. ♦ Measure resistance between special tool 9637 pin I/7 and throttle part plug connection pin 4.	0 - 5 Ω ⇒ Step 2.	Repair wiring harness → End.

Remove connector of throttle part: ►



Work instruction			Display OK	If not OK
2	Check wiring from DME control module pin I/9 to the throttle part for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of throttle part. ♦ Measure resistance between special tool 9637 pin I/9 and throttle part plug connection pin 1.	0 - 5 Ω ⇒ Step 3.	Repair wiring harness → End.
3	Check resistance of motor actuator in throttle part.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Measure resistance between special tool 9637 pin I/7 and pin I/9.	1.2 to 1.6 Ω (at 20 °C) ⇒ Step 4.	Replace throttle part → End.
4	Replace DME control module.		⇒ Step 5.	
5	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

404 Throttle Jacking Unit, Control Range - Below Limit

Diagnosis conditions

- Driving with changing pedal position

Possible fault cause

- Open circuit
- Short circuit to B+

Affected terminals

Terminal I/7 and I/9

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, pin I/7, to throttle part for short circuit to B+.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/7 and ground. ♦ Switch on the ignition.	Low battery voltage ⇒ Step 2.	Repair wiring harness → End.
2	Check wiring from DME control module, pin I/9, to throttle part for short circuit to B+.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/9 and ground. ♦ Switch on the ignition.	Low battery voltage → End.	Repair wiring harness → End.

404 Throttle Jacking Unit, Control Range - Above Limit

Diagnosis conditions

- Driving with changing pedal position

Possible fault cause

- Short circuit to ground
- Short circuit triggering wire
- Sluggish throttle

Affected terminals

Terminal I/7 and I/9

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, pin I/7, to throttle part for short circuit to ground.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/7 and pin I/2.	0 V ⇒ Step 2.	Repair wiring harness → End.
2	Check wiring from DME control module, pin I/9, to throttle part for short circuit to ground.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/9 and pin I/2.	0 V → End.	Repair wiring harness → End.

P1506

413 Throttle jacking unit lower mechanical stop - signal implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Stationary vehicle
- Engine not running
- Engine temperature between 5 and 100 °C
- Intake air temperature between 5 and 100 °C
- Battery voltage greater than 10 V
- Pedal value less than 0.8 %

Possible fault cause

- No adaptation performed

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	Fault is being entered ⇒ Step 2
2	Replace throttle part		⇒ Step 1	

P1507

411 Throttle jacking unit, gain adjustment - signal implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Stationary vehicle
- Engine not running
- Engine temperature between 5 and 100 °C
- Intake air temperature between 5 and 100 °C
- Battery voltage greater than 10 V
- Pedal value less than 0.8 %

Possible fault cause

- ♦ DME control module faulty

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1508

408 Torque comparison function monitor - signal implausible

Diagnosis conditions

- Engine speed greater than 1,120 rpm

Possible fault cause

- DME control module faulty

Affected terminals

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Replace DME control module		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

DME 7.8

P1509

429 Torque Limiter

Diagnosis conditions

- Driving operation

Possible fault cause

- DME control module

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Replace DME control module.			
2	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.		

DME 7.8

P1510

542 Throttle jacking unit - exchange detection without adaptation - signal implausible

Diagnosis conditions

- Ignition on
- Stationary vehicle
- Engine not running
- Engine temperature between 5 and 100 °C
- Intake air temperature between 5 and 100 °C
- Battery voltage greater than 10 V
- Pedal value less than 0.8 %

Possible fault cause

- No new adaptation after replacement of throttle part

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Actuate accelerator pedal ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1511

543 Throttle jacking unit - abortion of test due to negative influence on ambient condition

Diagnosis conditions

- Ignition on

Possible fault cause

- ♦ Starting the vehicle during adaptation after replacement of throttle part

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End
2				

P1512

76 Ambient Temperature (via CAN from instrument cluster) - Signal Implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- Instrument cluster

Affected terminals

Diagnosis/Troubleshooting

Note!

With an outside temperature of less than or equal to -40° C, this fault is stored because no lower temperatures can be displayed in the instrument cluster. In this case, a fault status is not present.

Work instruction			Display OK	If not OK
1	Replace instrument clus-ter.			

DME 7.8

P1513

541 Throttle jacking unit, spring test - above limit/ below limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Stationary vehicle
- Engine not running
- Engine temperature greater than 5 °C
- Intake air temperature greater than 5 °C

Possible fault cause

- ♦ Throttle part

Affected terminals

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Replace throttle part		⇒ Step 2	
2	Erase fault memory		⇒ Step 3	
3	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1514

540 Throttle jacking unit lower mechanical stop - signal implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- No adaptation values available despite repeated adaptations

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Replace throttle part		⇒ Step 2	
2	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1515

Throttle Jacking Unit, Spring Test – Above Limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Stationary vehicle
- Engine not running
- Engine temperature greater than 5°C
- Intake air temperature greater than 5 °C

Possible fault cause

- Throttle part

Affected terminals

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Replace throttle part		⇒ Step 2	
2	Erase Fault Memory		⇒ Step 3	
3	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

P1516

Throttle Jacking Unit, Control Range - Above Limit

Diagnosis conditions

- Driving with changing pedal position

Possible fault cause

- Short circuit to ground
- Short circuit triggering wire
- Sluggish throttle

Affected terminals

Terminal I/7 and I/9

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, pin I/7, to throttle part for short circuit to ground.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/7 and pin I/2.	0 V ⇒ Step 2	Repair wiring harness → End.
2	Check wiring from DME control module, Pin I/9, to throttle part for short circuit to ground.	♦ Connect special tool 9637. ♦ Measure voltage between Pin I/9 and Pin I/2.	0 V → End.	Repair wiring harness → End.

P1517

Throttle Jacking Unit, Abortion of Test due to Negative Influence on Ambient Condition - Above Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- ♦ Starting the vehicle during adaptation after replacement of throttle part

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	→ End.

P1518

Throttle Jacking Unit, Control Range – Below Limit

Diagnosis conditions

- Driving with changing pedal position

Possible fault cause

- Open circuit
- Short circuit to B+

Affected terminals

Terminal I/7 and I/9

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, pin I/7, to throttle part for short circuit to B+.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/7 and ground. ♦ Switch on the ignition.	Low battery voltage ⇒ Step 2.	Repair wiring harness → End.
2	Check wiring from DME control module, pin I/9, to throttle part for short circuit to B+.	♦ Connect special tool 9637. ♦ Measure voltage between pin I/9 and ground. ♦ Switch on the ignition.	Low battery voltage → End.	Repair wiring harness → End.

P1546

171 Charge Pressure Control Valve Output Stage - Above Limit

Diagnosis conditions

- Charge pressure control active

Possible fault cause

- Charge pressure control valve (coil) short circuit
- Short circuit to B+

Affected terminals

III/4

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check charge pressure control valve.	♦ Measure resistance at the charge pressure control valve.	20 - 26 Ω at 20 °C.	
2	Check wiring harness for short to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of charge pressure control valve. ♦ Ignition on. ♦ Measure voltage between special tool 9637 pin III/4 and ground.	0 V.	Repair wiring harness.

P1547

171 Charge Pressure Control Valve Output Stage - Below Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- Short circuit to ground

Affected terminals

III/4

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring harness for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of charge pressure control valve. ♦ Measure resistance between special tool 9637 pin III/4 and ground.	$\infty\ \Omega$	Repair wiring harness.

P1548

171 Charge Pressure Control Valve Output Stage - Open Circuit

Diagnosis conditions

- Ignition on

Possible fault cause

- Charge pressure control valve (coil) open circuit
- Open circuit in wiring

Affected terminals

III/4

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check charge pressure control valve.	♦ Measure resistance at the charge pressure control valve.	20 - 26 Ω at 20 °C.	
2	Check wiring harness for open circuit.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove connector of charge pressure control valve. ♦ Measure resistance between special tool 9637 pin III/4 and charge pressure control valve plug pin 2.	0 - 5 Ω	Repair wiring harness → End.

P1570

39 Immobilizer - signal implausible

Diagnosis conditions

- Start condition
- Motronic reset

Possible fault cause

- Open circuit in wiring between DME control module and alarm system
- Short circuit to ground or short circuit to B+
- Alarm system control module faulty

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire for continuity	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin I/3 and alarm system control module plug Pin I/23	0 - 5 Ω ⇒ Step 3	⇒ Step 2
2	Remove connector X 2/3	♦ Measure resistance between plug connection X 2/3 bushing 6 and special tool 9637 Pin I/3 ♦ Measure resistance between plug connection X 2/3 Pin 6 and alarm system control module plug I Pin 23	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Check signal wire for short circuit to ground	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin I/3 and ground	∞ Ω ⇒ Step 4	Repair wiring harness → End
4	Check signal wire for short circuit to B+	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure voltage between special tool 9637 Pin I/3 and ground	0 V ⇒ Step 4	Repair wiring harness → End
5	Replace alarm system control module.		→ End	→ End

P1571

39 Immobilizer - open circuit/no signal

Diagnosis conditions

- Start condition
- Motronic reset

Possible fault cause

- ♦ Open circuit in wiring between DME control module and alarm system
- ♦ Short circuit to ground or short circuit to B+
- ♦ Alarm system control module faulty

Affected terminals

-

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check signal wire for continuity	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin I/3 and alarm system control module plug Pin I/23	0 - 5 Ω ⇒ Step 3	⇒ Step 2
2	Remove connector X 2/3	♦ Measure resistance between plug connection X 2/3 bushing 6 and special tool 9637 Pin I/3 ♦ Measure resistance between plug connection X 2/3 Pin 6 and alarm system control module plug I Pin 23	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Check signal wire for short circuit to ground	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 Pin I/3 and ground	$\infty\ \Omega$ ⇒ Step 4	Repair wiring harness → End
4	Check signal wire for short circuit to B+	♦ Remove connector I of alarm system control module ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure voltage between special tool 9637 Pin I/3 and ground	0 V ⇒ Step 4	Repair wiring harness → End
5	Replace alarm system control module.		→ End	→ End

P1574

364 Stop light switch - signal implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- Stop light switch
- Wiring harness

Note!

The DME control module receives the signals from the stop light switches via CAN bus.

Affected terminals

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check stop light switch	♦ Remove stop light switch ♦ Measure resistance between Pin 1 and Pin 4 ♦ Actuate stop light switch ♦ Measure resistance between Pin 1 and Pin 2 ♦ Actuate stop light switch ♦ Install stop light switch	0 - 5 Ω ∞ Ω ∞ Ω 0 - 5 Ω ⇒ Step 2	Replace stop light switch → End
2	Check wiring from PSM control module to stop light switch 1 for short circuit to B+	♦ Remove PSM control module connector ♦ Measure voltage between Pin 32 and ground ♦ Switch on the ignition ♦ Actuate brake	0 V Battery voltage ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Check wiring from PSM control module to stop light switch 2 for short circuit to B+	♦ Remove PSM control module connector ♦ Measure voltage between Pin 37 and ground ♦ Switch on the ignition ♦ Actuate brake	Battery voltage 0 V → End	Repair wiring harness → End

P1575

Pedal Sensor Movement - Signal Implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery positive voltage greater than 7 V

Possible fault cause

- Pedal sensor

Affected terminals

-

Note!

- *The system is located in the pedal sensor standby mode*
- *This fault only occurs in combination with fault P0121 or P0221*

Diagnosis/Troubleshooting

Work instruction		Display OK	If not OK
1	Replace pedal sensor	→ End.	→ End.

P1576

662 Cruise Control Standby Lamp via CAN - Open Circuit

Diagnosis conditions

- Ignition on

Possible fault cause

- Instrument cluster

Affected terminals

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Replace instrument cluster			

P1577

427 Accelerator pedal position sensor 1 - signal implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery voltage greater than 7 V

Possible fault cause

- Pedal sensor

Affected terminals

-

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Replace pedal sensor	→ End	→ End

427 Accelerator pedal position sensor 1 - below limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery voltage greater than 7 V

Possible fault cause

- Short circuit to ground
- Pedal sensor

Affected terminals

Terminal IV/8

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, Pin IV/8, to pedal sensor, Pin 2, for short circuit to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool Pin IV/8 and ground	∞ Ω ⇒ Step 2	Repair wiring harness → End
2	Replace pedal sensor		→ End	→ End

427 Accelerator pedal position sensor 1 - above limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery voltage greater than 7 V

Possible fault cause

- Short circuit to B+
- Pedal sensor

Affected terminals

Terminal IV/8

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, Pin IV/8, to pedal sensor, Pin 2, for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Switch on the ignition ♦ Measure voltage between special tool Pin IV/8 and ground	0 V ⇒ Step 2	Repair wiring harness → End
2	Replace pedal sensor		→ End	→ End

P1578

428 Accelerator pedal position sensor 2 - signal implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery voltage greater than 7 V

Possible fault cause

- ♦ Pedal sensor

Affected terminals

-

Note!

- ♦ *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- ♦ *The maximum pedal value is limited to 30 %.*
- ♦ *The dynamic is limited.*

Diagnosis/troubleshooting

Work instruction		Display OK	If not OK
1	Replace pedal sensor	→ End	→ End

428 Accelerator pedal position sensor 2 - below limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery voltage greater than 7 V

Possible fault cause

- ♦ Short circuit to ground
- ♦ Pedal sensor

Affected terminals

Terminal IV/13

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, Pin IV/13, to pedal sensor, Pin 2, for short circuit to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool Pin IV/13 and ground	∞ Ω ⇒ Step 2	Repair wiring harness → End
2	Replace pedal sensor		→ End	→ End

428 Accelerator pedal position sensor 2 - above limit

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery voltage greater than 7 V

Possible fault cause

- Short circuit to B+
- Pedal sensor

Affected terminals

Terminal IV/13

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module, Pin IV/13, to pedal sensor, Pin 2, for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Switch on the ignition ♦ Measure voltage between special tool Pin IV/13 and ground	0 V ⇒ Step 2	Repair wiring harness → End
2	Replace pedal sensor		→ End	→ End

P1579

111 Crankshaft Position Sensor Signal Implausible

Diagnosis conditions

- Engine running

Possible fault cause

- ♦ Corrosion in the connector
- ♦ Loose contact

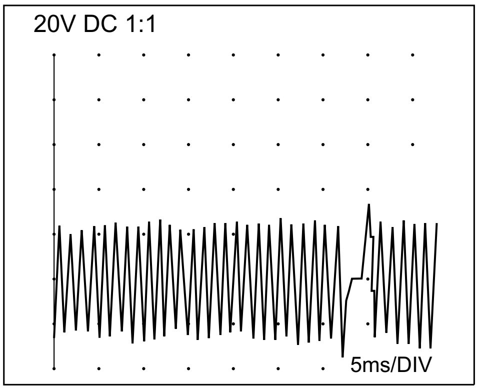
Affected terminals

III/32, III/45 and III/46

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Remove connector.			
2	Check connector for corrosion.	♦ Visual inspection.		Clean contacts.
3	Check rpm/crankshaft position sensor.	♦ Measure resistance between pins 1 and 2.	0.8 - 1.0 kΩ at 20 °C.	Replace rpm/crankshaft position sensor.
		♦ Measure resistance between pins 1 and 3.	∞ Ω	
4	Check signal with engine tester.	♦ Connect special tool 9637. ♦ Connect engine tester. Use special input, connect positive cable to pin III/32, negative cable to pin III/46. ♦ Start engine or crank engine with starter motor.	The following display should appear on the oscilloscope.	

Figure:



P1600

216 CAN timeout PSM - open circuit

Diagnosis conditions

- Vehicle has PSM
- Battery voltage greater than 10 V
- Ignition on

Possible fault cause

- ♦ Wiring harness
- ♦ PSM control module not connected
- ♦ PSM control module faulty

Note!

- ♦ *If all CAN bus faults are stored, there must be a short circuit in the CAN bus wiring.*
- ♦ *If one CAN bus fault is stored, the cruise control system is out of order.*
- ♦ *CAN bus faults may be caused by a control module reset. The fault is then indicated as "Not present".*

Affected terminals

Terminal IV/36 and IV/37

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check whether connector of PSM control module is plugged in.		⇒ Step 2	
2	Check CAN bus from DME control module to PSM control module for continuity	♦ Remove DME control module connector ♦ Remove plug I from instrument cluster ♦ Remove PSM control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug)		Repair wiring harness → End

Work instruction			Display OK	If not OK
		♦ Measure resistance between special tool plug IV Pin 36 and PSM control module plug Pin 61	0 - 5 Ω	
		♦ Measure resistance between special tool 9637 plug IV Pin 37 and PSM control module plug Pin 63	0 - 5 Ω ⇒ Step 3	

Note!

The wires are routed via two connectors.

Work instruction			Display OK	If not OK
3	Check CAN bus from DME control module to PSM control module for short circuit to ground	♦ Remove DME control module connector ♦ Remove plug I from instrument cluster ♦ Remove PSM control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug)		Repair wiring harness → End
		♦ Measure resistance between special tool 9637 plug IV Pin 36 and ground	∞ Ω	
		♦ Measure resistance between special tool plug IV Pin 37 and ground	∞ Ω ⇒ Step 4	

Note!

The wires are also routed to the instrument cluster.

Work instruction			Display OK	If not OK
4	Check CAN bus from DME control module to PSM control module for short circuit to B+	♦ Remove DME control module connector ♦ Remove plug I from instrument cluster ♦ Remove PSM control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug)		Repair wiring harness → End
		♦ Measure voltage between special tool 9637 plug IV Pin 36 and ground ♦ Switch on the ignition	0 V	
		♦ Measure voltage between special tool 9637 plug IV Pin 37 and ground ♦ Switch on the ignition	0 V ⇒ Step 5	
5	Check CAN bus from DME control module to PSM control module for short circuit	♦ Remove DME control module connector ♦ Remove plug I from instrument cluster ♦ Remove PSM control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 plug IV Pin 36 and plug IV Pin 37	$\infty\ \Omega$ → End	Repair wiring harness → End

P1601

CAN timeout instrument cluster - signal implausible

Diagnosis conditions

- Battery positive voltage greater than 10 V
- Ignition on

Possible fault cause

- Instrument cluster faulty

Note!

- *If one CAN bus fault is stored, the cruise control system is out of order.*
- *CAN bus faults may be caused by a control module reset. The fault is then indicated as "Not present".*

Affected terminals

-

Diagnosis/troubleshooting

Replace instrument cluster.

CAN timeout instrument cluster - open circuit

Diagnosis conditions

- Battery positive voltage greater than 10 V
- Ignition on

Possible fault cause

- Wiring harness faulty
- Plug on instrument cluster not connected
- Instrument cluster faulty

Note!

- *If all CAN bus faults are stored, there is a short circuit in the CAN bus wiring*
- *If one CAN bus fault is stored, the cruise control system is out of order.*
- *CAN bus faults may be caused by a control module reset. The fault is then indicated as "Not present".*

Affected terminals

Terminal I/15 and I/31

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check whether connector of instrument cluster is plugged in		⇒ Step 2	
2	Check CAN bus from DME control module to instrument cluster for continuity	♦ Remove DME control module connector ♦ Remove plug I from instrument cluster ♦ Remove PSM control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 plug IV pin 36 and instrument cluster plug I pin 15 ♦ Measure resistance between special tool plug IV pin 37 and instrument cluster plug I pin 31	0 - 5 Ω 0 - 5 Ω ⇒ Step 3	Repair wiring harness → End.
3	Check CAN bus from DME control module to instrument cluster for short circuit to ground	♦ Remove DME control module connector ♦ Remove plug I from instrument cluster ♦ Remove PSM control module connector ♦ Remove plug of steering angle sensor ♦ Connect special tool 9637 to wiring harness (DME control module plug)		Repair wiring harness → End.

Work instruction			Display OK	If not OK
		♦ Measure resistance between special tool 9637 plug IV pin 36 and ground ♦ Measure resistance between special tool 9637 plug IV pin 37 and ground	∞ Ω ∞ Ω ⇒ Step 4	

Note!

The wires are also routed to the PSM control module.

Work instruction			Display OK	If not OK
4	Check CAN bus from DME control module to instrument cluster for short circuit to B+	♦ Remove DME control module connector ♦ Remove plug I from instrument cluster ♦ Remove PSM control module connector ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Switch on the ignition ♦ Measure voltage between special tool 9637 plug IV pin 36 and ground ♦ Measure voltage between special tool 9637 plug IV pin 37 and ground	0 V ⇒ Step 5	Repair wiring harness → End.
5	Check CAN bus from DME control module to instrument cluster for short circuit	♦ Remove DME control module connector ♦ Remove plug I from instrument cluster ♦ Remove PSM control module connector ♦ Remove plug of steering angle sensor ♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Measure resistance between special tool 9637 plug IV Pin 36 and plug IV Pin 37	∞ Ω → End.	Repair wiring harness → End.

P1602

CAN Timeout Instrument Cluster - Signal Implausible

Diagnosis conditions

- Battery positive voltage greater than 10 V
- Ignition on

Possible fault cause

- Instrument cluster faulty

Note!

- *If one CAN bus fault is stored, the cruise control system is out of order.*
- *CAN bus faults may be caused by a control module reset. The fault is then indicated as "Not present".*

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Replace instrument cluster.			

P1654

Cooling Water Shutoff Valve - Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Wiring harness
- DME control module

Affected terminals

Terminal IV/40

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module to coolant shutoff valve for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of coolant shutoff valve ♦ Measure voltage between special tool 9637 plug IV Pin 40 and ground ♦ Switch on the ignition.	0 V ⇒ Step 2	Repair wiring harness → End.
2	Replace DME control module		⇒ Step 3	
3	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P1655

Cooling Water Shutoff Valve - Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V
- Coolant temperature greater than 90 °C or ATF temperature > 85 °C

Possible fault cause

- Wiring harness
- DME control module

Affected terminals

Terminal IV/40

Diagnosis/Troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check wiring from DME control module to colant shutoff valve for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of coolant shutoff valve ♦ Measure resistance between special tool 9637 plug IV Pin 40 and coolant shutoff valve plug Pin 2	∞ Ω ⇒ Step 2	Repair wiring harness → End.
2	Replace DME control module		⇒ Step 3	
3	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

DME 7.8

P1656

575 Coolant shutoff valve - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Coolant temperature greater than 90 °C or ATF temperature > 85 °C

Possible fault cause

- Wiring harness
- DME control module
- Coolant shutoff valve

Affected terminals

Terminal IV/40

Diagnosis/troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check coolant shutoff valve for continuity	♦ Remove connector of coolant shutoff valve ♦ Measure resistance at coolant shutoff valve between Pin 1 and Pin 2	Approx. 20 - 30 Ω ⇒ Step 2	Replace coolant shutoff valve → End
2	Check wiring from DME control module to coolant shutoff valve for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of coolant shutoff valve ♦ Measure resistance between special tool 9637 plug IV Pin 40 and coolant shutoff valve plug Pin 2	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

575 Coolant shutoff valve - below limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Coolant temperature greater than 90 °C or ATF temperature > 85 °C

Possible fault cause

- ♦ Wiring harness
- ♦ DME control module

Affected terminals

Terminal IV/40

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module to colant shutoff valve for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of coolant shutoff valve ♦ Measure resistance between special tool 9637 plug IV Pin 40 and coolant shutoff valve plug Pin 2	∞ Ω ⇒ Step 2	Repair wiring harness → End
2	Replace DME control module		⇒ Step 3	
3	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

575 Coolant shutoff valve - above limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Wiring harness
- DME control module

Affected terminals

Terminal IV/40

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check wiring from DME control module to coolant shutoff valve for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector of coolant shutoff valve ♦ Measure voltage between special tool 9637 plug IV Pin 40 and ground ♦ Switch on the ignition	0 V ⇒ Step 2	Repair wiring harness → End
2	Replace DME control module		⇒ Step 3	
3	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1657

274 Overrun Recirculating Air Valve Output Stage - Open Circuit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Open circuit
- Open circuit in B+ supply
- Overrun recirculating air valve

Affected terminals

III/16

Diagnosis/Troubleshooting

Note!

The wiring for the overrun recirculating air valve is routed via the connector X 59/3 pin 8.

Work instruction			Display OK	If not OK
1	Check triggering wire for continuity.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug connection of overrun recirculating air valve. ♦ Measure resistance between III/16 and overrun recirculating air valve connector pin 1	0 - 5 Ω	
2	Check B+ supply for overrun recirculating air valve.	♦ Remove plug connection of overrun recirculating air valve. ♦ Switch on the ignition. ♦ Measure voltage between overrun recirculating air valve pin 2 and ground.	Battery voltage.	
3	Check overrun recirculating air valve resistance.	♦ Measure overrun recirculating air valve resistance between pin 1 and 2.	20 - 26 Ω at 20° C.	

274 Overrun Recirculating Air Valve Output Stage - Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short to ground triggering wire

Affected terminals

III/16

Diagnosis/Troubleshooting

Note!

The wiring for the overrun recirculating air valve is routed via the connector X 59/3 pin 8.

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug connection of overrun recirculating air valve. ♦ Measure resistance between III/16 and ground.	$\infty\ \Omega$	Repair wiring harness.

274 Overrun Recirculating Air Valve Output Stage - Above Limit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V

Possible fault cause

- Short circuit to B+ triggering wire

Affected terminals

III/16

Diagnosis/Troubleshooting

Note!

The wiring for the overrun recirculating air valve is routed via the connector X 59/3 pin 8.

Work instruction			Display OK	If not OK
1	Check triggering wire for short circuit to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug connection of overrun recirculating air valve. ♦ Switch on the ignition. ♦ Measure voltage between III/16 and ground.	0 V.	Repair wiring harness.

P1658

Overrun Recirculating Air Valve Output Stage - Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short circuit to B+ triggering wire

Affected terminals

III/16

Diagnosis/Troubleshooting

Note!

The wiring for the overrun recirculating air valve is routed via the connector X 59/3 pin 8.

Work instruction			Display OK	If not OK
1	Check triggering wire for short circuit to B+.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug connection of overrun recirculating air valve. ♦ Switch on the ignition. ♦ Measure voltage between III/16 and ground.	0 V.	Repair wiring harness.

P1659

Overrun Recirculating Air Valve Output Stage - Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V

Possible fault cause

- Short to ground triggering wire

Affected terminals

III/16

Diagnosis/Troubleshooting

Note!

The wiring for the overrun recirculating air valve is routed via the connector X 59/3 pin 8.

Work instruction			**Display OK**	**If not OK**
1	Check triggering wire for short to ground.	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove plug connection of overrun recirculating air valve. ♦ Measure resistance between III/16 and ground.	∞ Ω	Repair wiring harness.

P1671

DME relay/control module faulty (computer monitoring: reset) – signal implausible

Diagnosis conditions

- Ignition on

Possible fault cause

- Undervoltage
- DME relay faulty
- DME control module faulty

This fault may be entered if the control module has been operated with undervoltage.

Affected terminals

I/1 and I/8

Diagnosis/troubleshooting

Note!

If no fault is present, erase the fault memory.

Work instruction			Display OK	If not OK
1	Check voltage supply, terminal 15	♦ Measure voltage between pin I/1 and ground.	> 11 V	
2	Check DME relay	♦ Switch on the ignition ♦ Measure voltage between pin I/18 and ground	Battery positive voltage	Check triggering of DME relay Replace DME relay
3	Replace DME control module.		⇒ Step 4	
4	Perform adaptation.	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	→ End

P1674

497 Engine compartment purge fan output stage - open circuit

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Engine compartment purge fan switched on once
- Engine compartment temperature greater than 75 °C
- Front and rear lids closed

Note!

The triggering wire for relay terminal 85 is monitored.

The rear lid may be opened to speed up the warming process. In order to proceed with the diagnosis, the rear lid must then be closed.

Possible fault cause

- Open circuit
- Relay faulty
- DME control module faulty

Affected terminals

Terminal II/20

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check relay	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module to relay for continuity	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay ♦ Measure resistance between special tool 9637, plug II Pin 20, and relay slot, Pin 2 (terminal 85)	0 - 5 Ω ⇒ Step 3	Repair wiring harness → End

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

497 Engine compartment purge fan output stage - short circuit to ground

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Engine compartment purge fan switched on once
- Engine compartment temperature greater than 75 °C
- Front and rear lids closed

Note!

The triggering wire for relay terminal 85 is monitored.

The rear lid may be opened to speed up the warming process. In order to proceed with the diagnosis, the rear lid must then be closed.

Possible fault cause

- ♦ Short circuit to ground
- ♦ Relay faulty
- ♦ DME control module faulty

Affected terminals

Terminal II/20

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check relay	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module to relay for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay ♦ Measure resistance between special tool 9637 plug II Pin 20 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

497 Engine compartment purge fan output stage - short circuit to B+

Diagnosis conditions

- Engine running
- Battery voltage greater than 7 V
- Engine compartment purge fan switched on once
- Engine compartment temperature greater than 75 °C
- Front and rear lids closed

Note!

The triggering wire for relay terminal 85 is monitored.

The rear lid may be opened to speed up the warming process. In order to proceed with the diagnosis, the rear lid must then be closed.

Possible fault cause

♦ Short circuit to B+

- Relay faulty
- DME control module faulty

Affected terminals

Terminal II/20

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check relay	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module to relay for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove relay ♦ Measure voltage between special tool 9637 plug II Pin 20 and ground ♦ Switch on the ignition	0 V ⇒ Step 3	Repair wiring harness → End
3	Replace DME control module		⇒ Step 4	
4	Perform adaptation	♦ Switch on the ignition ♦ Wait one minute ♦ Do not press the accelerator ♦ Switch off the ignition for at least 10 seconds ♦ Read out the fault memory	→ End	

P1675

658 Engine Purge Fan Fault - Above Limit

Diagnosis conditions

- Ignition on

Possible fault cause

- Fuses
- Relays
- Fans

Affected terminals

-

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check fuses B4 and C5.			
2	Check fans.	♦ Remove engine compartment fan relay. ♦ Bridge terminals 30 and 87.	Fan must run.	♦ Check ground supply wire for fan. ♦ Check B+ supply wire for continuity.
3	Check relays.			

P1676

Engine Compartment Purge Fan Output Stage – Above Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V
- Engine compartment purge fan switched on once
- Engine compartment temperature greater than 75 °C
- Front and rear lids closed

Note!

The triggering wire for relay terminal 85 is monitored.

The rear lid may be opened to speed up the warming process. In order to proceed with the diagnosis, the rear lid must then be closed.

Possible fault cause

- Short circuit to B+
- Relay faulty
- DME control module faulty

Affected terminals

Terminal II/20

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check relays.	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module to relay for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove relay ♦ Measure voltage between special tool 9637 plug II Pin 20 and ground ♦ Switch on the ignition.	0 V ⇒ Step 3	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

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P1677

Engine Compartment Purge Fan Output Stage – Below Limit

Diagnosis conditions

- Engine running
- Battery positive voltage greater than 7 V
- Engine compartment purge fan switched on once
- Engine compartment temperature greater than 75 °C
- Front and rear lids closed

Note!

The triggering wire for relay terminal 85 is monitored.

The rear lid may be opened to speed up the warming process. In order to proceed with the diagnosis, the rear lid must then be closed.

Possible fault cause

- Short circuit to ground
- Relay faulty
- DME control module faulty

Affected terminals

Terminal II/20

Diagnosis/Troubleshooting

Work instruction			Display OK	If not OK
1	Check relays.	♦ Remove relay ♦ Measure resistance between Pin 85 and Pin 86	Approx. 75 Ω ⇒ Step 2	Replace relay → End
2	Check wiring from DME control module to relay for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug). ♦ Remove relay ♦ Measure resistance between special tool 9637 plug II Pin 20 and ground	∞ Ω ⇒ Step 3	Repair wiring harness → End.

Work instruction			Display OK	If not OK
3	Replace DME control module		⇒ Step 4.	
4	Perform adaptation.	♦ Switch on the ignition. ♦ Wait one minute. ♦ Do not press the accelerator. ♦ Switch off the ignition for at least 10 seconds. ♦ Read out the fault memory.	→ End.	

P1702

Tiptronic (Supply voltage of valves)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control unit has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

P code	Fault code	Fault text	Fault effect
P1702	10	Supply voltage of valves	Control unit in limp-home mode, minimum cycle initiated

P1748

Tiptronic (Control solenoid valve, shifting pressure)

Diagnostic conditions

- Ignition on

Possible cause of fault

- The Tiptronic control module has detected a malfunction.

Note!

- *The fault is diagnosed in the Tiptronic control unit. OBDII relevant fault codes are sent to the DME control module via the CAN drive. In the process the Tiptronic fault codes are converted to P-code!*
- *Fault management and any activation of the Check Engine lamp is done by the DME control module!*

Affected terminals

-

Diagnosis/troubleshooting

Note!

- *The fault codes stored in the Tiptronic control unit for this P code are to be taken from the following table.*
- *For in-depth troubleshooting see ⇒ Rep. Gr. 3701; Tiptronic diagnosis in the On-Board Diagnosis Manual (OBD II), Tiptronic, Boxster (986), 911 Carrera (996), 911 Turbo (996)*

Note!

This fault code "P1748" is only output by the DME of the 911 (996) Turbo of model year 2001. In the extended fault memory of the Tiptronic control unit, the currently valid P code "P0778" is generated by the 9588 Porsche System Tester II.

P code	Fault code	Fault text	Fault effect
P1748 = P0778	7	Control solenoid valve, shifting pressure	Control unit in limp-home mode, minimum cycle initiated

P2088

Inlet camshaft output stage - below limit

Diagnosis conditions

- Engine running

Possible fault cause

- Triggering wire short to ground
- Solenoid hydraulic valve faulty

Affected terminals

V/7

Diagnosis/troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check triggering wire for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between V/7 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

P2089

Inlet camshaft output stage - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- ♦ Triggering wire short to B+

Affected terminals

V/7

Diagnosis/troubleshooting

Work instruction			**Display OK**	**If not OK**
1	Check triggering wire for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector on the sole-noid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage between V/7 and ground	0 V	Repair wiring har-ness

P2092

Inlet camshaft output stage, bank 2 - below limit

Diagnosis conditions

- Engine running

Possible fault cause

- Triggering wire short to ground
- Solenoid hydraulic valve faulty

Affected terminals

V/8

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short to ground	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector on the solenoid hydraulic valve ♦ Measure resistance between V/8 and ground	∞ Ω	
2	Replace solenoid hydraulic valve			

P2093

Inlet camshaft output stage, bank 2 - above limit

Diagnosis conditions

- Engine running

Possible fault cause

- Triggering wire short to B+

Affected terminals

V/8

Diagnosis/troubleshooting

Work instruction			Display OK	If not OK
1	Check triggering wire for short circuit to B+	♦ Connect special tool 9637 to wiring harness (DME control module plug) ♦ Remove connector on the sole-noid hydraulic valve ♦ Switch on the ignition ♦ Measure voltage between V/8 and ground	0 V	Repair wiring har-ness

P2096

Signal Delay Time for Oxygen Sensor Ageing - Above Limit

Diagnosis conditions

- Oxygen sensing after TWC is active
- No secondary air
- No diagnosis of secondary air system
- EVAP canister not highly loaded
- No faults in memory

Possible fault cause

- Oxygen sensor

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Read out regulator delay after TWC, bank 1, using PST 2 or a scan tool		Less than 1.2 seconds	Replace oxygen sensor

Note!

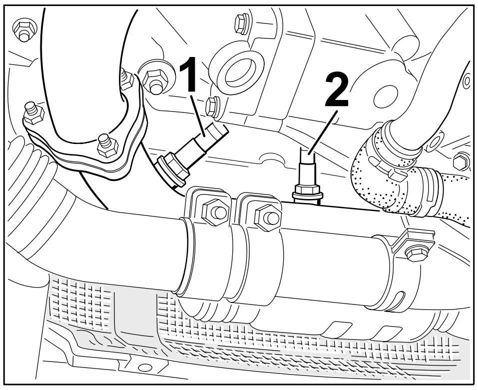
Do not confuse oxygen sensor ahead of catalytic converter and oxygen sensor after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter

►



P2097

Signal Delay Time for Oxygen Sensor Ageing - Below Limit

Diagnosis conditions

- Oxygen sensing after TWC is active
- No secondary air
- No diagnosis of secondary air system
- EVAP canister not highly loaded
- No faults in memory

Possible fault cause

- Oxygen sensor

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Read out regulator delay after TWC, bank 1, using PST 2 or a scan tool		more than 1.2 seconds	Replace oxygen sensor

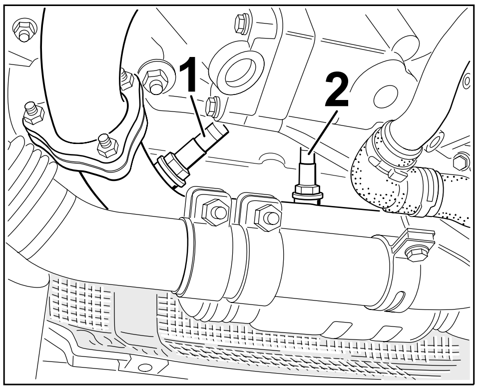
Note!

Do not confuse oxygen sensor ahead of catalytic converter and oxygen sensor after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter



2469 P2097
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P2098

Signal Delay Time for Oxygen Sensor Ageing, Bank 2 – Above Limit

Diagnosis conditions

- Oxygen sensing after TWC is active
- No secondary air
- No diagnosis of secondary air system
- EVAP canister not highly loaded
- No faults in memory

Possible fault cause

- Oxygen sensor

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Read out regulator delay after TWC, bank 2, using PST 2 or a scan tool		Less than 1.2 seconds	Replace oxygen sensor

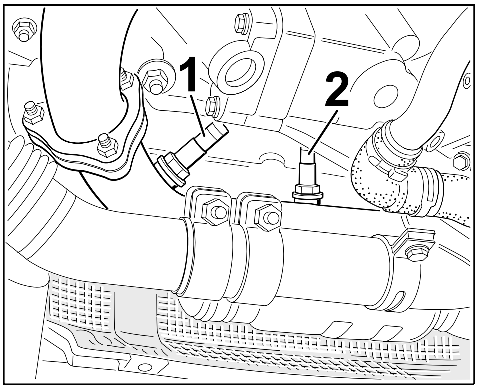
Note!

Do not confuse oxygen sensor ahead of catalytic converter and oxygen sensor after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter



P2099

Signal Delay Time for Oxygen Sensor Ageing, Bank 2 Below Limit

Diagnosis conditions

- Oxygen sensing after TWC is active
- No secondary air
- No diagnosis of secondary air system
- EVAP canister not highly loaded
- No faults in memory

Possible fault cause

- Oxygen sensor

Affected terminals

-

Diagnosis/Troubleshooting

Note!

Do not use contact spray on the connectors to oxygen sensor.

Work instruction			Display OK	If not OK
1	Read out regulator delay after TWC, bank 2, using PST 2 or a scan tool		more than 1.2 seconds	Replace oxygen sensor

Note!

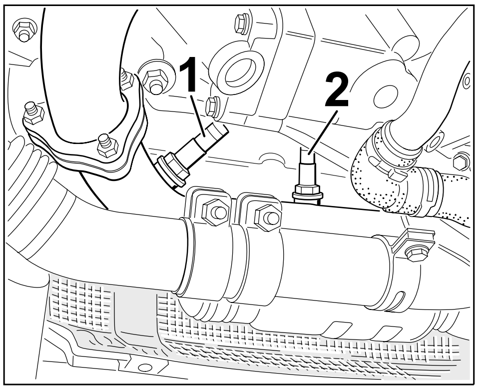
Do not confuse oxygen sensor ahead of catalytic converter and oxygen sensor after catalytic converter.

Oxygen sensors ahead of and after catalytic converter

1 - Oxygen sensor ahead of catalytic converter

2 - Oxygen sensor after catalytic converter

►



P2135

Accelerator Pedal - Signal Implausible

Diagnosis conditions

- Ignition on (approx. 30 sec.)
- Battery positive voltage greater than 7 V

Possible fault cause

- Pedal sensor

Affected terminals

-

Note!

- *The system operates in pedal sensor standby mode, i.e. the angle of the accelerator pedal is calculated from the residual position sensor signal.*
- *The maximum pedal value is limited to 30 %.*
- *The dynamic is limited.*
- *The fault code only appears together with P0121 or P0221.*
- *The pedal value is reset to zero by actuating the brake.*

Diagnosis/Troubleshooting

Work instruction		Display OK	If not OK
1	Replace pedal sensor	→ End.	