

### Diagnosis - Diagnostic Trouble Code (DTC) Memory

#### Note regarding diagnostic trouble code (DTC) readout:

- DTC memory: Fault display
  - Actual faults:** are on a **grey** background
  - Stored faults:** are on a **light** background

The signal plausibility is checked on all input and output connections during operation.

All malfunctions which occur are stored in the diagnostic trouble code memory of the IFI control module (N3/7).

The DTC memory remains active even if the ignition is turned "OFF" or the vehicle's battery is disconnected.

With emission related faults the CHECK ENGINE MIL (A1e26) lights up and the multifunction indicator displays:

CHECK ENGINE  
ENGINE ELECTRONICS

The faults are identified with an OBD failure code: See listing starting on page 5.

Such faults are for example:

- EGR lifting sender (B28/3)
- EGR valve pressure transducer (Y31/1)
- Pressure control flap vacuum transducer (Y31/2)

#### Fault freeze frame data

Additionally, ambient conditions present at the time the fault occurs, can be displayed with the HHT. Only those freeze frame data are stored which were present when the fault first occurred. The freeze frame data may be indicated on several screen displays (up to 8 screen displays). The last two screen displays are for development purposes only.

Screen displays with the result  $\sqrt{F}$  indicate the cause of the fault e.g.

- Voltage too high
- Voltage too low
- Signal too large
- Signal too small
- Value implausible

#### Substitution for missing signals.

The Engine control module (IFI) (N3/7) replaces missing input signals with substitute values based on other signals available in order to maintain system function.

The substitute values may result in:

- Performance reduction/reduction of maximum engine rpm.
- EGR system malfunction.
- Cruise control malfunction.
- Intake MAP control malfunction.

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#### Notes for HHT

- **Loose connections:**  
Loose connections are stored if they occur several times in a certain time period. Therefore, they can appear only as stored DTC's and only rarely as actual DTC's.
- **Nominal values:**  
All nominal values relative to the actual values shown on the HHT are listed in the Diagnostic Manual, Diesel Engines, Volume 1.1, section A.
- **Actual value for engine coolant, air and fuel temperatures:**  
In case of an open or short circuit, the actual value is immediately replaced by a substitute value which is very close to the actual value. Therefore, a fault can not be recognized clearly. A readout of the fault is possible only via the diagnostic trouble code (DTC) memory.
- **Actual value for engine rpm:**  
In case of the engine rpm's, the HHT display indicates under menu selection 3/1 the closed throttle (idle) speed **nominal value** calculated by the control module on the **left** and the rpm **actual value** on the **right**.
- **Actual value for injection quantity:**  
In case of the injection quantity, the HHT display indicates under menu selection 3/2 engine test the injection quantity **nominal value** calculated by the control module on the **left** and the injection quantity **actual value** on the **right**.
- **Actual value for intake manifold pressure:**  
In case of the intake manifold pressure, the HHT display indicates under menu selection 3/2 engine test the intake manifold pressure **nominal value** calculated by the control module on the **left** and the intake manifold pressure **actual value** on the **right**.

The values should differ from each other only slightly. The permissible tolerances are presently unknown.

#### Notes regarding the Drive Authorization System Stage X (DAS)

- The activation of the drive authorization system stage X takes place only from the DAS control module (N54/1) via the CAN data bus to the engine control module (IFI) (N3/7).  
After activation of the DAS stage X, the engine control module (IFI) (N3/7) renders the fuel injection system inoperable. The activation or deactivation is accomplished with transponder technology via the ignition key. As soon as the ignition key is turned to position "2" in the steering lock, the DAS control module (N54/1) receives a signal and the fuel injection system is made operative via the CAN data bus. The engine control module (IFI) (N3/7) and the DAS control module (N54/1) are permanently matched to one another via an identification code. This identification code can not be erased (see HHT actual value "drive authorization system" menu selection 3/7).  
Troubleshooting of an engine control module (IFI) (N3/7) or the DAS control module (N54/1) by swapping control modules from another vehicle is no longer possible.  
If a new engine control module (IFI) (N3/7) is installed for test purposes only, a maximum of 40 engine starts can be performed before the control modules are permanently locked with each other.  
**After 40 engine starts, the engine control module (IFI) (N3/7) can no longer be used in any other vehicle.**  
Before the first engine start, version coding **must** be performed on the engine control module (IFI) (N3/7) with the HHT. After that, identification must be initiated.

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#### Version coding with HHT

a) Version coding can be performed automatically and manually only with the Hand-Held Tester (see menu selection 5 "Version coding").

- **Automatic**

Before removing the engine control module (IFI) (N3/7), read existing version code with HHT. After installation of the new control module, enter the previously read version code (menu program in HHT).

- **Manual**

If the code number can **not** be read, the vehicle equipment/version must be determined. The corresponding code number is obtained from the Spare Parts Microfiche, Group 54 and manually entered with the HHT.

The following vehicle version data must be observed for coding:

- Vehicle model
- 5-speed automatic transmission
- With cruise control
- Country version

When returning a new control module to a PDC, the code number must be erased.

Trial installation of a control module from an other vehicle is **not** possible. Trial installation of a new control module from spare parts stock is possible, but only to a maximum of 40 engine starts. After 40 engine starts, the control module is permanently assigned to the vehicle.

#### Operating Cycle version only

One operating cycle is reached if:

- Engine coolant temperature > 60° C
- Turn off engine
- Wait 5 seconds (internal control module test)
- Start engine
- Run engine at idle speed for 20 seconds
- In selector lever position P/N raise engine speed to 2500 rpm and release accelerator pedal and allow engine to return to idle speed.
- Accelerate (full load acceleration) vehicle in transmission range D to approx. 53 mph (85 km/h) and then decelerate (coasting) to approx. 37 mph (60 km/h).

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#### Prerequisite for DTC memory readout

1. Review section 11, 12, 21, 22, 23,
2. Fuse on relay module (K40) in order,
3. Connect HHT to data link connector (X11/4, 38-pole) according to connection diagram (see section 0),  
Yellow wire to socket 4.
4. Review electrical wiring diagram: PE07.00-P-1100A

Electrical wiring diagram:


Electrical Troubleshooting Manual, Model 210, Volume 1

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DTC 	OBD DTC	Possible cause	DTC Description	Test step/Remedy <sup>1)</sup>
		No malfunction in system		–
P0105	P0105	Pressure sensor (B28)	13 $\geq$ 1	23 $\Rightarrow$ 5.0
P0110	P0111	IAT sensor (B17)	13 $\geq$ 2	23 $\Rightarrow$ 4.0
P0115	P0115	ECT sensor (B11)	13 $\geq$ 3	23 $\Rightarrow$ 3.0
P0180	P0181	Fuel temperature sensor (Y1/1b1)	13 $\geq$ 4	23 $\Rightarrow$ 12.0
P0600	P0600	CAN data bus	13 $\geq$ 5	23 $\Rightarrow$ 13.0
P0700	P0700 P0715 P0720 P0730 P0740	Transmission failure		see DM, Chassis and Drivetrain, Volume 1, section 2
P0702	P0702 P0743 P0748 P0753 P0758 P0763	Transmission failure		see DM, Chassis and Drivetrain, Volume 1, section 2


<sup>1)</sup> Observe Preparation for Test, see 22.

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DTC 	OBD DTC	Possible cause		Test step/Remedy <sup>1)</sup>
P1105	P0106	Atmospheric pressure sensor in control module	13 $\geq$ 6	N3/7
P1220	P0200	Fuel quantity actuator (Y23/1)	13 $\geq$ 7	23 $\Rightarrow$ 7.0
P1221	P0600	CAN communication, ETC or ETS interrupted	13 $\geq$ 8	23 $\Rightarrow$ 13.0
P1222	P0220	IFI/DFI accelerator pedal position sensor (R25/2)	13 $\geq$ 9	23 $\Rightarrow$ 9.0
P1223	P0200	Fuel rack position sensor (Y23/11)	13 $\geq$ 10	
P1335	P0725	CKP sensor (IFI/DFI) (L5/6)	13 $\geq$ 11	23 $\Rightarrow$ 6.0
P1401	P0403	EGR lifting sender (B28/3)	13 $\geq$ 12	23 $\Rightarrow$ 17.0
P1404	P0400	EGR control	13 $\geq$ 13	23 $\Rightarrow$ 27.0
P1470	P0120	Pressure control flap vacuum transducer (Y31/2)	13 $\geq$ 14	23 $\Rightarrow$ 20.0
P1475	P0200	Shifting induction pipe switchover valve (Y22/6)	13 $\geq$ 15	23 $\Rightarrow$ 21.0
P1476	P0200	Resonance intake line switchover valve (Y22/7)	13 $\geq$ 16	23 $\Rightarrow$ 23.0
P1480	P0380	Preglow control	13 $\geq$ 17	23 $\Rightarrow$ 14.0
P1481	P1365 P1367 P1369	Glow plug failure, cylinder 1 – 2 Glow plug failure, cylinder 3 – 4 Glow plug failure, cylinder 5 – 6	13 $\geq$ 18	23 $\Rightarrow$ 16.0
P1482	P0380	Preglow control module (N14/2)	13 $\geq$ 19	23 $\Rightarrow$ 15.0

<sup>1)</sup> Observe Preparation for Test, see 22.

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DTC 	OBD DTC	Possible cause		Test step/Remedy <sup>1)</sup>
P1520		CC switch (S40)		23⇒ 10.0
P1610	P0560	Voltage supply missing or relay module (K40)	13 ≥ 20	23⇒ 18.0
P1611 P1613	P0200	Engine control module (IFI) (N3/7)	13 ≥ 21	N3/7
P1612	P0560	Engine control module (IFI) (N3/7) voltage, circuit 15	13 ≥ 22	23⇒ 19.0
P1614	P0200	Engine control module (IFI) (N3/7) or fuel metering actuator (Y23/1k1) or fuel rack position sensor (Y23/111)	13 ≥ 23	23⇒ 7.0 23⇒ 8.0
P1615		Engine control module (IFI) (N3/7), supply voltage		23⇒ 1.0 23⇒ 2.0
P1617	P0200	Engine control module (IFI) (N3/7) or not properly coded	13 ≥ 24	see HHT “Version Coding” menu selection 5
P1622	P0215	IFI/DFI electrohydraulic shut-off actuator (Y1/1)	13 ≥ 25	23⇒ 11.0
P1630		Drive authorization signal (DAS)		see HHT actual values “Drive Authorization” menu selection 3/7

<sup>1)</sup> Observe Preparation for Test, see 22.