

#### 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 for an extended period of 5 secs, are stored in the diagnostic trouble code memory of the engine control module (IFI) (N3/7) except; control deviations (boost pressure, EGR etc.), in which case the malfunction is stored after 5 - 10 seconds.

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/or the multifunction indicator displays:

CHECK ENGINE  
ENGINE ELECTRONICS

Such faults are identified with an OBD fault code, see: 13/1

- EGR lifting sender (B28/3) or hot film MAF sensor (B2/5)
- EGR valve pressure transducer (Y31/1)
- Boost pressure control/pressure control flap vacuum transducer (Y31/5)

##### 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 √/F indicate the cause of the fault e.g.

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

##### Limp mode for missing signals.

The engine control module (IFI) (N3/7) will go into limp mode operation if important input signals are not received or other serious malfunctions occur.

Limp mode operation may result in:

- Performance reduction/reduction of maximum engine rpm.
- Switching off anti-vibration control.
- EGR system malfunction.
- Cruise control malfunction.
- Boost control malfunction.

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

##### 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 never 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 values for engine coolant temperature (ECT):**  
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, 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 manifold pressure for "tuned", variable length runner intake manifold (non-turbo engine only):**  
The manifold pressure in the "tuned" intake manifold is indicated on the HHT screen under menu selection 3/2, engine test.

The intake manifold pressure **nominal value**, calculated by the control module, is displayed on the **left** and the intake manifold pressure **actual value** is displayed on the **right** side of the HHT screen. The values should differ from each other only slightly. The permissible tolerances have not been established.

##### Notes regarding the Drive Authorization System (DAS) Stage 3.

- The activation of the drive authorization system stage 3 takes place only from the electronic ignition-starter switch (EIS) control module (N73) via the CAN data bus to the engine control module (IF1) (N3/7). After activation of the DAS, the engine control module renders the fuel injection system inoperable. This drive authorization system stage 3 can only be activated or de-activated using the ignition key. The engine control module (IF1) (N3/7) and the RCL or electronic ignition-starter switch (EIS) control module (N73) 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, RCL, or electronic ignition-starter switch control module by swapping control modules from another vehicle is no longer possible. Version coding must be performed on the engine control module with the HHT before the first engine start. The VIN number will be inputted into the engine control module when it is "married" to the RCL control module.



If an engine control module is swapped for testing purposes, a maximum of 40 starts can be undertaken before the engine and RCL control modules will be "married".

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

#### Version coding with HHT

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 (see menu program in HHT).

- **Manually**

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 version coding:

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

Upon the return of a control module back to the parts stock be certain to erase the code number first.

Trial installation of a control module from another vehicle is **not** possible.  
Trial installation of a new control module from spare parts stock is possible.

#### Driving cycle:

A drive cycle is reached when the following conditions are met:

- Coolant temperature > 60° C
- Stop engine
- Wait 5 seconds
- Start engine
- Run engine at idle for 2 minutes
- Perform full load acceleration with gear selector level in "D" up to 55 mph and then:
- Allow vehicle to coast to 40 mph

#### Prerequisite for DTC memory readout:


1. Review 11, 12, 21, 22, 23, 31,
2. Fuse on passenger-side fuse and relay box (K40/4) 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.

#### Electrical wiring diagram:

Electrical Troubleshooting Manual, Model 210




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

| DTC<br> | OBDDTC                  | Possible cause   | DTC Description | Test step/Remedy <sup>1)</sup>                     |
|--|-------------------------|--|-----------------|--|
| P0703  |                         | Stop lamp switch (S9/1)  |                 | DM, C& D, Vol. 3, Section 9.3, 23                  |
| P1105  | P1105                   | Atmospheric pressure sensor in control module                          | 13 ≥ <b>8</b>   | N3/7   |
| P1220  | P0200                   | Fuel quantity actuator (IFI) (Y23/1)                                   | 13 ≥ <b>9</b>   | 23 ⇒ 9.0   |
| P1221  | P0600                   | CAN communication ASR/ESP/ETC interrupted                              |                 | Readout DTC memory of ASR/ESP/ETC control modules. |
| P1222  | P0220                   | IFI/DFI accelerator pedal position sensor (R25/2)                      | 13 ≥ <b>10</b>  | 23 ⇒ 11.0  |
| P1223  | P0200                   | Fuel rack position sensor (Y23/11)                                     | 13 ≥ <b>11</b>  | 23 ⇒ 10.0  |
| P1330  |                         | Starter activation   |                 | 23 ⇒ 27.0  |
| P1335  | P0725                   | CKP sensor (IFI) (L5/6)  | 13 ≥ <b>12</b>  | 23 ⇒ 8.0   |
| P1401  |                         | EGR lifting sender (B28/3)   |                 | 23 ⇒ 25.0  |
| P1403<br>P1404   | P0400                   | EGR valve pressure transducer (Y31/1)                                  | 13 ≥ <b>13</b>  | 23 ⇒ 24.0  |
| P1470  | P0243                   | Boost pressure control/pressure control flap vacuum transducer (Y31/5) | 13 ≥ <b>14</b>  | 23 ⇒ 13.0  |
| P1480  | P0380                   | Preglow control  | 13 ≥ <b>15</b>  | 23 ⇒ 19.0  |
| P1481  | P1365<br>P1367<br>P1369 | Glow plug failure  | 13 ≥ <b>16</b>  | 23 ⇒ 21.0  |

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

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

| DTC<br> | OBDDTC | Possible cause   | DTC<br>Description | Test step/Remedy <sup>1)</sup> |
|--|--------|--|--------------------|--------------------------------|
| P1482  | P0380  | Preglow control module (N14/2)                                     | 13 ≥ <b>17</b>     | 23 ⇒ 20.0                      |
| P1520  |        | CC switch (S40)  |                    | 23 ⇒ 12.0                      |
| P1610  | P0560  | Passenger-side fuse and relay module (K40/4)                       | 13 ≥ <b>18</b>     | 23 ⇒ 4.0                       |
| P1611  | P0200  | Internal reference voltage (2.5 V)                                 | 13 ≥ <b>19</b>     | N3/7                           |
| P1612  | P0560  | Engine control module (IFI) (N3/7) voltage, circuit 15             | 13 ≥ <b>20</b>     | 23 ⇒ 23.0                      |
| P1613  | P0200  | Engine control module (IFI) (N3/7)                                 | 13 ≥ <b>20</b>     | N3/7                           |
| P1614  | P0200  | Engine control module (IFI) (N3/7) microprocessor/fuel calculation | 13 ≥ <b>22</b>     | N3/7                           |
| P1615  | P0560  | Engine control module (IFI) (N3/7) voltage supply                  |                    | 23 ⇒ 1.0                       |
| P1617  | P0200  | N3/7 EEPROM or incorrectly coded                                   | 13 ≥ <b>23</b>     |                                |
| P1622  | P0215  | IFI electrohydraulic shut-off actuator (Y1/1)                      | 13 ≥ <b>24</b>     | 23 ⇒ 14.0                      |
| P1630  |        | Drive authorization signal   |                    | 23 ⇒ 3.0                       |
| P1705  |        | ETC control module (N15/3)   |                    | 23 ⇒ 17.0                      |

1) Observe Preparation for Test, see 22.