Diagnosis - Diagnostic Trouble Code (DTC) Memory

Preliminary work: . . . . . Engine Test, Adjustment, Engines, Volume 1

Note regarding diagnostic trouble code (DTC) readout:
The engine control module (N3/4) for the HFM-SFI system is equipped with diagnostic trouble code (DTC) memory. Malfunctions are recognized and stored as trouble codes and are distinguished as follows:

- Malfunctions which are constantly present,
- Malfunctions which occur longer than 3 seconds,
- Intermittent contact malfunctions which have occured 5× during a trip.

The DTC memory remains active even if the vehicle's battery is disconnected.

Malfunctions which are no longer present, are automatically erased again after a maximum of 19 trips. A trip has occured if:

- Vehicle speed > 2.5 mph (4 km/h),
- Engine speed >700 rpm,
- Engine shut off for 30 seconds.

The stored diagnostic trouble codes (DTCs) can be read at the data link connector (DTC readout) (X11/4) with the ignition switched "ON" or with the "engine running".

Diagnosis via an on-off ratio readout has been eliminated.

Note regarding mixture preparation self-adaptation:
The Lambda control system determines fuel injection duration precisely so that the fuel/air ratio is kept constant at Lambda level 1 (equals 14.7 kg air to 1 kg fuel) under all operating conditions.

Should malfunctions occur in the form of:
- Intake air leaks,
- Injector wear or carbon build-up,
- Engine wear,
- Contact resistance in MAF sensor,
- Defective diaphragm pressure regulator,
- Defective purge control valve,

the engine control module automatically performs a mixture adjustment. The degree of correction is calculated constantly and stored permanently. The self-adaptation is performed at idle and under partial load. Maximum correction towards rich or lean is 25%. After repair work is performed, the engine control module will automatically adapt itself again after approx. 10 trips. After eliminating a malfunction or after trial installation of an engine control module from another vehicle, the self-adaptation feature must be reset to its mean value (see "Resetting and Reactivating Engine Control Module Memory" 11/5).

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Note regarding version coding on vehicles up to 02/94 (up to HHT Diagnosis Version 42):
The engine control module recognizes and stores the following equipment and/or version information during the vehicle's initial operation:

- Catalytic converter/non-cataytic converter,
- Manual/automatic transmission,
- (USA) version.

After replacing the engine control module or after trial installation of an engine control module from another vehicle, the stored data must be erased and the recognition feature reactivated (see "Resetting and Reactivating Engine Control Module Memory" 11/5).

Initial programming of engine control module.

Prerequisite for initial programming process:

- Battery voltage ⇒ 11 Volt minimum
- Vehicle speed signal ⇒ V = 0
- Engine rpm signal ⇒ n = 0
- Transmission range ⇒ P/N = 1
- Idle speed contact closed ⇒ CTP = 1
  (Caution: Vehicle can not be moved during initial programming process)
- Drive vehicle ⇒ V = > 5 km/h (3 mph)
  (Only than will the transmission version be recognized).

Note regarding automatic recognition of the mechanical end stop of the closed throttle valve:
The mechanical end stop of the closed throttle valve at idle is determined by the ISC actuator and stored in the engine control module.
After replacement of the engine control module or the ISC actuator, the mechanical end stop of the throttle valve must be again determined and stored (see "Resetting and Reactivating Engine Control Module Memory" 11/5).

Note regarding version coding on vehicles starting 03/94 (as of HHT Diagnosis Version 45):
The engine control module is equipped with a version coding feature as of 03/94. The coding can only be performed with the Hand-Held Tester (automatically or manually, see Notes for HHT 11/4).

The following vehicle versions must be observed for coding:

- Vehicle model,
- Catalytic converter (TWC),
- Non-catalytic converter (non-TWC),
- 4 or 5-speed automatic transmission,
- Cruise control (CC),
- Acceleration slip regulation (ASR),
- Electronic traction system (ETS),
- Country version.

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Notes regarding drive authorization system (DAS):

- Up to the end of model year 1995, a starter lock-out system is installed which interrupts circuit 50 to the starter.

- On vehicles starting model year 1996 (HHT Diagnosis Version 46), the RCL system is enhanced with a so-called drive authorization system, stage 2 (DAS).
  The activation of the drive authorization system (DAS) is initiated by the RCL control module and transmitted to the engine control module via the CAN data bus.
  After activation of the drive authorization system (DAS), the fuel injection system is rendered inoperative by the engine control module.
  The drive authorization system (DAS) can be activated or deactivated with the infrared remote control transmitter or the master key.
  The engine control module and RCL control module are permanently locked with one another by an identification code. This identification code can not be erased (see HHT actual values “DAS“ menu selection 3/6).
  Therefore, trial installation of an engine control module or RCL control module from another vehicle is no longer possible.

  ⚠ **CAUTION!**
  If a **new** engine control module is installed for test purposes only, a maximum of 40 engine starts can be performed before the control modules are **permanently** locked with one another. **After 40 engine starts, the engine control module can no longer be used in any other vehicle.**

  Additionally, the code number and VIN must be entered (see HHT actual values “DAS“, menu selection 3/6).

  As of model year 1997, model 202 is equipped with an electronic ignition key. The electronic ignition key controls the activation/deactivation of the drive authorization system, stage 3, via the CAN data bus.

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Notes for HHT

- **Fault search with HHT**
  Diagnostic trouble code (DTC) memory: Select “Current DTC’s”.
  If the actual condition changes, e.g. when wiggling a connector, the change is reported optically and acoustically so that troubleshooting can be performed directly with the 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 “Current DTC’s”.
- **Nominal values**
  All nominal values relative to the actual values shown on the HHT are listed in the Diagnostic Manual, Engines, Volume 1, Section A.
- **Actual values for coolant temperature, intake air temperature and air mass**
  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 shows the closed throttle (idle) speed nominal value calculated by the control module on the left and on the right, the rpm actual value. Both values should differ from each other only slightly. The permissible tolerances are not yet known.
- **Version coding with HHT starting 03/94 (up to HHT Diagnosis Identification 45).**
  a) Before replacement of the engine control module, the existing code number must be read and stored with the HHT (menu selection 6 “Version coding”). After installation of the new control module, the previously read code number must be entered.
  Note:
  If returning a new control module to a PDC, the code number must be erased.

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

  c) When performing a trial installation of a control module with the same part number from another vehicle (up to model year 1995), but with a different code number, the following must be observed:
  - Read and record code number from vehicle with complaint.
  - Exchange control modules.
  - Read and record code number from the exchanged control module.
  - Enter the code number from the original control module into the exchange control module.
  - Perform function test.
  - Before returning control module to other vehicle, enter recorded code number into exchange control module.
  - Exchange control modules.

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Notes for HHT (continued)

- **Drive authorization system, stage 2, 2b, 3 (DAS)**
  Upon replacement the engine control module must be version coded using the HHT. Additionally, the code number and VIN must be entered (see HHT nominal values “DAS“, menu selection 3/6).

Preparation for Test with Impulse Counter Scan Tool

Note:

The DTC memory readout, DTC memory clearing as well as resetting and reactivating the engine control module can be performed with the impulse counter scan tool only on vehicles up to HHT Diagnosis Version 46. On vehicles as of HHT Diagnosis Version 49, it is possible only with the HHT.

- Connect impulse counter scan tool to data link connector (X11/4) according to connection diagram.

Reading Diagnostic Trouble Code (DTC) Memory

a) Ignition: **ON**
b) Press start button for 2 to 4 seconds.
c) Read and record DTC.
d) Press start button again.
e) Read and record DTC.
Repeat steps d) and e) until the first DTC reappears.

Clearing Diagnostic Trouble Code (DTC) Memory

a) Press start button for 2 to 4 seconds (DTC appears).
b) Press start button for 6 to 8 seconds, thereby clearing the previously displayed malfunction (DTC) from memory.
c) Repeat steps a) and b) until the number “I” appears (no malfunctions stored).

Resetting and Reactivating Engine Control Module Memory

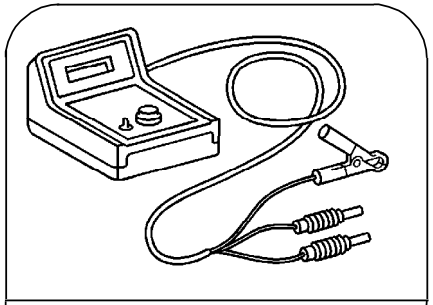
a) Clear diagnostic trouble code (DTC) memory.
b) After the number “I” appears, press start button for 6 to 8 seconds.
c) Switch ignition **OFF** and wait a minimum of 2 seconds.
d) Turn ignition **ON**, wait a minimum of 10 seconds and then start engine.

Note:

Control modules manufactured by Bosch up to 8/93, the start button must be pressed 5 to 6 seconds to clear the DTC memory and 8 to 9 seconds to reset and reactivate the engine control module memory.

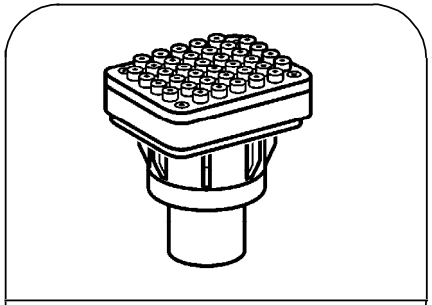
Diagnosis - Diagnostic Trouble Code (DTC) Memory

Special Tools



124 589 19 21 00

Pulse counter

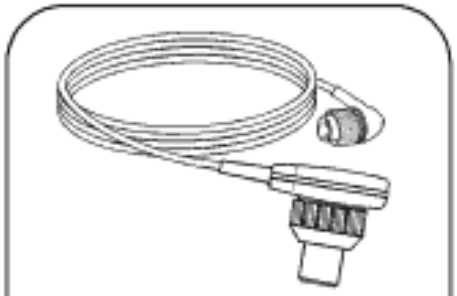


140 589 14 63 00

Adapter

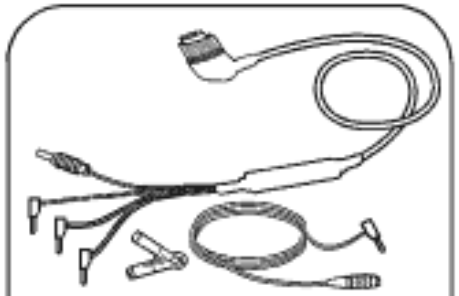
965 589 00 01 00

Hand-Held-Tester



965 589 00 40 00

Test cable



965 589 00 50 00

Adapter cable

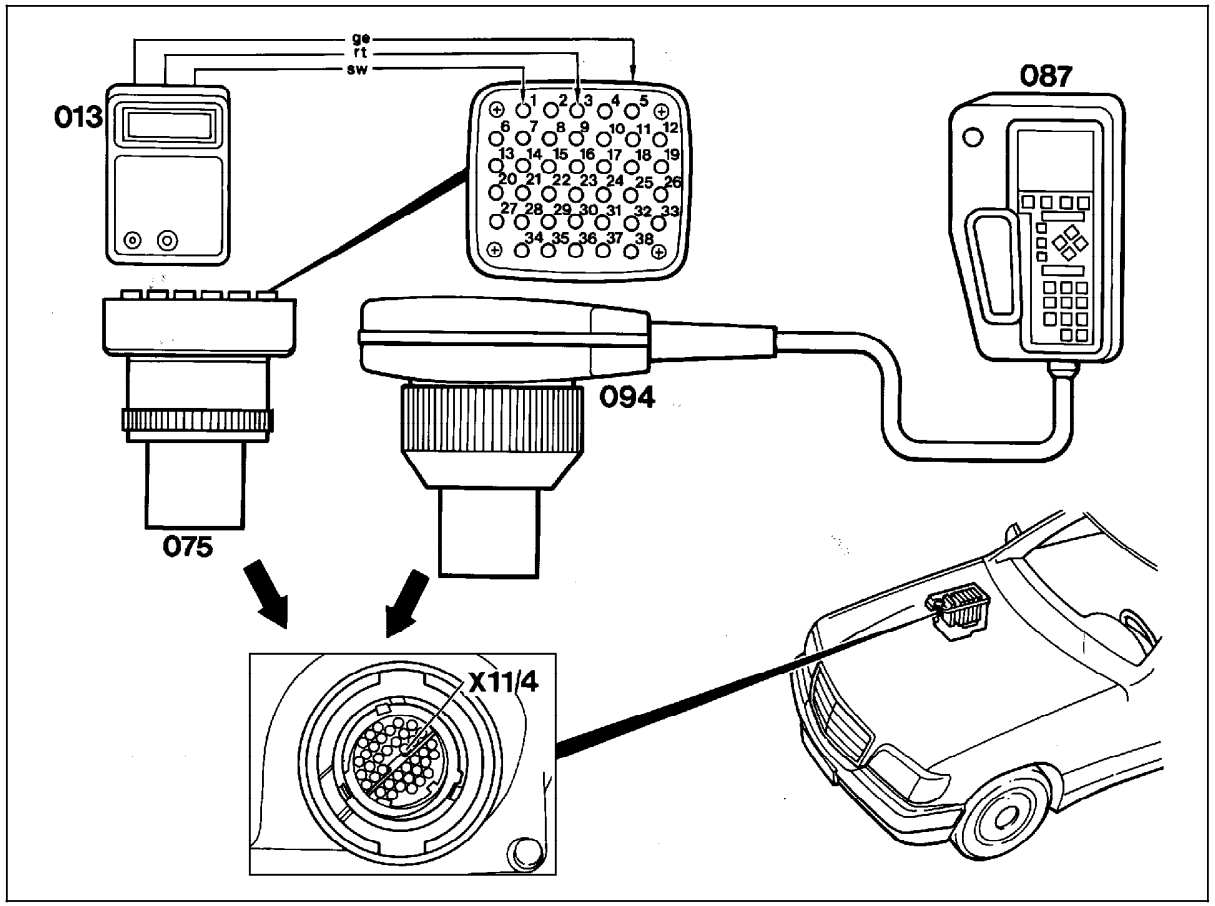
Diagnosis - Diagnostic Trouble Code (DTC) Memory

Connection Diagram - Impulse Counter Scan Tool/Hand-Held Tester (HHT)
Model 202

Note:
The DTC memory can be read with the impulse counter scan tool only on vehicles up to HHT diagnosis code 46. On vehicles starting HHT diagnosis code 49 it can be read only with the HHT.

Connect red wire of impulse counter scan tool to socket 3, black wire to socket 1, and connect yellow wire as follows:

Engine control module (HFM-SFI)	Socket 4
Cruise control	Socket 7
Rpm signal (TN output)	Socket 17
Diagnostic module	Socket 19



P07-5925-57

Figure 1

013	Impulse counter scan tool (Hand-Held Tester 087 optional)
075	Impulse counter scan tool adapter
087	Hand-Held Tester (Impulse counter scan tool 013 optional)
094	Multiplexer
X11/4	Data link connector (DTC readout)

Diagnosis – Diagnostic Trouble Code (DTC) Memory

Connection Diagram - Hand-Held Tester (HHT)

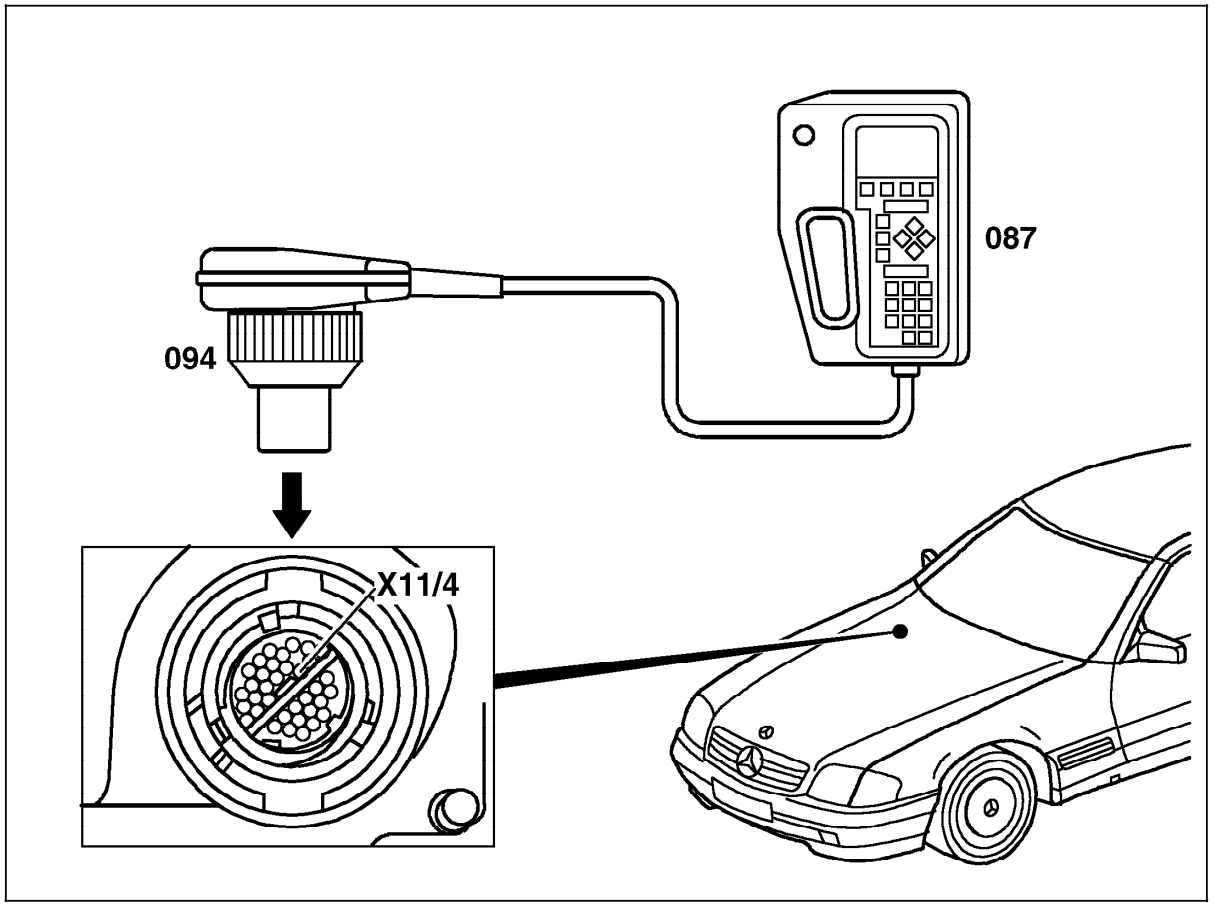
1. Connect HHT with Multiplexer (094) attached to the data link connector X11/4.

2. Turn ignition: **ON**

3. According to the instructions in HHT display:
   a) Readout DTC memory/erase
   b) Readout actual values
   c) Perform activations
   d) Program control modules

4. Disconnect HHT.

Observe all system specific instructions listed in the "Preparation for test" section of each Test Program. Diagnostic Trouble Codes (DTC's) which have been stored due to testing or the disconnection of lines must be erased from the diagnostic trouble code memory at the end of testing.



P00.19-0411-06

Figure 1

087	Hand-Held Tester
094	Multiplexer
X11/4	Data link connector (DTC readout)

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC [7)]		Possible cause	Test step/Remedy [1)]
1	–	No malfunction in system	–
2	002	ECT sensor (B11/3) short circuit	23⇒ 9.0
2	003	ECT sensor (B11/3) open circuit	23⇒ 9.0
2	004	ECT sensor (B11/3) implausible	23⇒ 9.0
2	005	ECT sensor (B11/3) intermittent contact	Contacts in connector of B11/3 or N3/4.
3	006	IAT sensor (B17) short circuit	23⇒ 10.0
3	007	IAT sensor (B17) open circuit	23⇒ 10.0
3	008	IAT sensor (B17) intermittent contact	Contacts in connector of B17 or N3/4.
4	009	Hot film MAF sensor (B2/5) air flow implausibly high	23 ⇒ 4.0 – 5.3 Engine friction excessive.
4	010	Hot film MAF sensor (B2/5) open circuit	23 ⇒ 4.0 – 5.3
5	011	CTP switch (M16/6s1) throttle valve angle implausibly large	25⇒ 4.0
5	012	CTP switch (M16/6s1) air flow implausibly high	25⇒ 4.0
5	013	CTP switch (M16/6s1) intermittent contact	25⇒ 4.0
6	014	Throttle valve actual value potentiometer (M16/6r1) implausibly high	25⇒ 3.0
6	015	Throttle valve actual value potentiometer (M16/6r1) implausible	25⇒ 3.0
6	016	Throttle valve actual value potentiometer (M16/6r1) intermittent contact	25⇒ 3.0

1) Observe Preparation for Test, see 22.

7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC  7) 	Possible cause	Test step/Remedy 1)
7 017	Drive actual value potentiometer (M16/6r2) implausibly high	25⇒ 1.0, 2.0
7 018	Drive actual value potentiometer (M16/6r2) implausibly low	25⇒ 1.0, 2.0
7 019	Drive actual value potentiometer (M16/6r2) intermittent contact	25⇒ 1.0, 2.0
8 020	ISC system at lower control stop	Intake air leak, throttle body binding.
8 021	ISC system at upper control stop	Intake air leak, throttle body binding.
022	CC or EA indicates “limp-home” mode	Intake air leak, throttle body binding, adjust throttle linkage, erase DTC's in HFM-SFI control module.
9 023	O2S 1 (before TWC) (G3/2) sensor voltage too high	23 ⇒ 13.0
9 024	O2S 1 (before TWC) (G3/2) cold or open circuit	23 ⇒ 13.0
9 025	O2S 1 (before TWC) (G3/2) sensor voltage implausible	23 ⇒ 13.0
10 026	O2S 2 (after TWC) (G3/1) sensor voltage too high	23 ⇒ 15.0
10 027	O2S 2 (after TWC) (G3/1) cold or open circuit	23 ⇒ 15.0
10 028	O2S 2 (after TWC) (G3/1) sensor voltage implausible	23 ⇒ 15.0
11 029	O2S 1 (before TWC) heater (G3/2) current too low	23 ⇒ 14.0
11 030	O2S 1 (before TWC) heater (G3/2) current too high	23 ⇒ 14.0
11 031	O2S 1 (before TWC) heater (G3/2) short circuit	23 ⇒ 14.0

1) Observe Preparation for Test, see 22.

7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC [7)]		Possible cause	Test step/Remedy [1)]
12	032	O2S 2 (after TWC) heater (G3/1) current too low	23 ⇒ 16.0
12	033	O2S 2 (after TWC) heater (G3/1) current too high	23 ⇒ 16.0
12	034	O2S 2 (after TWC) heater (G3/1) short circuit	23 ⇒ 16.0
13	035	O2S system operating at rich limit, mixture too lean	Intake air leak, fuel injectors, diaphragm pressure regulator.
13	036	O2S system operating at lean limit, mixture too rich	Intake air leak, fuel injectors, diaphragm pressure regulator.
14	037	Injector (Y62y1), cylinder 1 short circuit to plus	23 ⇒ 18.0
14	038	Injector (Y62y1), cylinder 1 open/short circuit to ground	23 ⇒ 18.0
15	039	Injector (Y62y2), cylinder 2 short circuit to plus	23 ⇒ 19.0
15	040	Injector (Y62y2), cylinder 2 open/short circuit to ground	23 ⇒ 19.0
16	041	Injector (Y62y3), cylinder 3 short circuit to plus	23 ⇒ 20.0
16	042	Injector (Y62y3), cylinder 3 open/short circuit to ground	23 ⇒ 20.0
17	043	Injector (Y62y4), cylinder 4 short circuit to plus	23 ⇒ 21.0
17	044	Injector (Y62y4), cylinder 4 open/short circuit to ground	23 ⇒ 21.0
18 – 19	045 – 048	Not used	-

1) Observe Preparation for Test, see 22.

7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC [7)]		Possible cause	Test step/Remedy [1)]
20	049	Self-adaptation at idle speed too rich	Intake air leak, fuel injectors, diaphragm pressure regulator, engine wear (reset self-adaptation following repair, see 11/5).
20	050	Self-adaptation at idle speed too lean	Intake air leak, fuel injectors, diaphragm pressure regulator, engine wear (reset self-adaptation following repair, see 11/5).
20	051	Self-adaptation at lower partial load too rich	Intake air leak, fuel injectors, diaphragm pressure regulator, engine wear (reset self-adaptation following repair, see 11/5).
20	052	Self-adaptation at lower partial load too lean	Intake air leak, fuel injectors, diaphragm pressure regulator, engine wear (reset self-adaptation following repair, see 11/5).
20	053	Self-adaptation at upper partial load too rich	Intake air leak, fuel injectors, diaphragm pressure regulator, engine wear (reset self-adaptation following repair, see 11/5).
20	054	Self-adaptation at upper partial load too lean	Intake air leak, fuel injectors, diaphragm pressure regulator, engine wear (reset self-adaptation following repair, see 11/5).

1) Observe Preparation for Test, see 22.

7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC [7]		Possible cause	Test step/Remedy [1]
21	061 – 063	Not used	–
22	055	Ignition output 1 or ignition coil (T1/1) for cylinder 1 misfires	24 ⇒ 4.0, 9.0, 11.0 and 13.0
22	056	Ignition output 1 or ignition coil (T1/1) for cylinder 4 misfires	24 ⇒ 4.0, 9.0, 11.0 and 13.0
22	057	Ignition output 1 or ignition coil (T1/1) current value not obtained	24 ⇒ 4.0, 9.0, 11.0 and 13.0
23	058	Ignition output 2 or ignition coil (T1/2) for cylinder 2 misfires	24 ⇒ 5.0, 10.0, 12.0 and 14.0
23	059	Ignition output 2 or ignition coil (T1/2) for cylinder 3 misfires	24 ⇒ 5.0, 10.0, 12.0 and 14.0
23	060	Ignition output 2 or ignition coil (T1/2) current value not obtained	24 ⇒ 5.0, 10.0, 12.0 and 14.0
	061 – 063	Not used	–
24	064	CKP sensor (L5) signal not recognized/implausible	24 ⇒ 6.0
24	065	CKP sensor (L5) magnet is missing (segment control) CKP sensor (L5) tooth count on flywheel implausible	24 ⇒ 6.0
24	066	CKP sensor (L5) rpm implausibly high	24 ⇒ 6.0
25	067	CMP sensor (L5/1) not recognized/implausible (segment control)	24 ⇒ 7.0
26	068	Not used	–
26	069	Not used	–
27	070	TN-signal (rpm signal), short circuit to ground	23 ⇒ 11.0

1) Observe Preparation for Test, see 22.

7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC [7]		Possible cause	Test step/Remedy [1]
27	071	TN-signal (rpm signal), short circuit to plus	23 ⇒ 11.0
28	072	VSS, not recognized	23 ⇒ 24.0
28	073	VSS, implausible high	23 ⇒ 24.0
29	074 – 075	Not used	–
30	076	FP relay module (K27) open/short circuit	23 ⇒ 6.0
31	077	Not used	–
31	078	Not used	–
32	079	KS 1 (A16) open circuit	Replace knock sensors (KS).
32	080	KS 2 (A16) open circuit	Replace knock sensors (KS).
33	081	Maximum retard setting on at least one cylinder has been reached	Increased tendency to knock due to poor fuel quality, combustion chamber carbon build-up or mechanical damage.
33	082	Ignition angle deviation between the individual cylinders is > 6° CKA.	Increased tendency to knock due to poor fuel quality, combustion chamber carbon build-up or mechanical damage.
34	083	Knock control evaluation circuit in engine control module (N3/4) defective	N3/4.
34	084	Momentary fault in self-adaptation of closed throttle speed/partial load	Momentary malfunction in fuel mixture preparation.
35	085	AIR pump switchover valve (Y32) and/or AIR relay module (K17)	23 ⇒ 38.0

1) Observe Preparation for Test, see 22.
7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC [7]		Possible cause	Test step/Remedy [1]
36	086	Purge control valve (Y58/1) open/short circuit	23 ⇒ 25.0 – 26.0
36	087	Purge control valve (Y58/1) short circuit to plus	23 ⇒ 25.0 – 26.0
37	088	Upshift delay switchover valve (Y3/3) open/short circuit	23 ⇒ 29.0
38	089	Adjustable camshaft timing solenoid (Y49) short circuit to plus	23 ⇒ 27.0 – 28.0
38	090	Adjustable camshaft timing solenoid (Y49) open/short circuit to ground	23 ⇒ 27.0 – 28.0
39	091	EGR switchover valve (Y27) short circuit to plus	23 ⇒ 39.0
39	092	EGR switchover valve (Y27) open/short circuit to ground	23 ⇒ 39.0
40	093 – 096	Not used	–
41	097	CAN communication from engine control module (N3/4) defective	23 ⇒ 42.0 – 43
	098 – 099	Not used	–
42	100	CAN communication from diagnostic module (OBD II) (N59/1) defective	23 ⇒ 42.0
43	101	Starter signal (circuit 50) not present	23 ⇒ 7.0
44	102	Not used	–
44	103	Not used	–
45 – 46	104 – 106	Not used	–

1) Observe Preparation for Test, see 22.
7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC [7]		Possible cause	Test step/Remedy [1]
	107 [4]	Control of ignition coil preloading voltage exceeds limits	24 ⇒ 11.1, Engine control module (N3/4).
48	108	O2S 2 (after TWC) heater relay module (K35) short circuit to plus	23 ⇒ 17.0
48	109	O2S 2 (after TWC) heater relay module (K35) open/short circuit to ground	23 ⇒ 17.0
49	110	Voltage supply circuit 87 U at engine control module (N3/4) implausible	23 ⇒ 2.0
49	111	Voltage supply circuit 87 U at engine control module (N3/4) low voltage	23 ⇒ 2.0
50	112	Engine control module (N3/4)	N3/4.
	113 [5]	Engine control module (N3/4) not coded	Code N3/4.
	114 [5]	Engine control module identification of N3/4 faulty	Code N3/4, if necessary, replace N3/4.
	115 [5]	Engine control module code bytes of N3/4 faulty	Code N3/4, if necessary, replace N3/4.
	116 [6]	CAN communication from RCL control module (N54) faulty	23 ⇒ 41.1
	117 [6]	Engine starts with RCL system locked	Incorrect operation, clear DTC memory.
	118	*Not applicable for U.S.A. version vehicles*	-
	119	*Not applicable for U.S.A. version vehicles*	-
	120	*Not applicable for U.S.A. version vehicles*	-

1) Observe Preparation for Test, see 22.
4) As of 06/93
5) As of 01/94
6) As of model year 1996
7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC [7)]	Possible cause	Test step/Remedy [1)]
123	*Not applicable for U.S.A. version vehicles*	-
124	*Not applicable for U.S.A. version vehicles*	-
125 126	Engine control module (N3/4)	N3/4.
127	ISC and CC/ISC actuators interchanged	Replace actuator.
128 129	Engine control module (N3/4)	N3/4.
130	Drive actual value potentiometer (M16/6r2)	25 ⇒ 2.0
131 132	Engine control module (N3/4)	N3/4.
133	ISC actuator	Perform learning process on engine control module with HHT. If the fault is still present, replace actuator.
134	Engine control module (N3/4)	N3/4.
135	Voltage supply for actuator potentiometer	25 ⇒ 1.0
136	Drive actual value potentiometer (M16/6r2)	25 ⇒ 2.0
137	Engine control module (N3/4)	N3/4.

1) Observe Preparation for Test, see 22.

7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC  7) 	Possible cause	Test step/Remedy 1)
138	ISC actuator	Perform learning process on engine control module with HHT. If the fault is still present, replace actuator.
139	Switch cruise control	25 ⇒ 8.0
140 141 142	Engine control module (N3/4)	N3/4.
143	Brake light switch	25 ⇒ 11.0
144	Engine control module (N3/4)	N3/4.
145	*Not applicable for U.S.A version vehicles*	-
146	*Not applicable for U.S.A version vehicles*	-
147	*Not applicable for U.S.A version vehicles*	-
148	*Not applicable for U.S.A version vehicles*	-
149	*Not applicable for U.S.A version vehicles*	-
150	*Not applicable for U.S.A version vehicles*	-
151	*Not applicable for U.S.A version vehicles*	-
152	*Not applicable for U.S.A version vehicles*	-
153	*Not applicable for U.S.A version vehicles*	-

1) Observe Preparation for Test, see 22.

7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC  7) 	Possible cause	Test step/Remedy 1)
154	*Not applicable for U.S.A version vehicles*	-
155	*Not applicable for U.S.A version vehicles*	-
156 157	*Not applicable for U.S.A version vehicles*	-
158	*Not applicable for U.S.A version vehicles*	-
159	*Not applicable for U.S.A version vehicles*	-
160	*Not applicable for U.S.A version vehicles*	-
161	*Not applicable for U.S.A version vehicles*	-
162	*Not applicable for U.S.A version vehicles*	-
163	*Not applicable for U.S.A version vehicles*	-
164	*Not applicable for U.S.A version vehicles*	-

1) Observe Preparation for Test, see 22.

7) Only possible up to end of model year 1995.

Diagnosis – Diagnostic Trouble Code (DTC) Memory OBD II

DTC	Possible cause		Test step/Remedy [1]
	SAE nomenclature	Explanation	
–	No malfunction in system		
P0 101	Mass or volume air flow circuit range/performance problem	Hot film MAF sensor (B2/5)	23⇒ 4.0 - 4.2
P0 105	Manifold absolute pressure/barometric pressure circuit malfunction	MAP sensor (B5/2)	
P0 111	Intake air temperature circuit range performance problem	IAT sensor (sensor B17)	23⇒ 10.0
P0 116	Engine coolant temperature circuit range performance problem	ECT sensor (B11/3)	23⇒ 8.0
P0 125	Insufficient coolant temperature for closed loop control	ECT sensor (B11/3)	23⇒ 8.0
P0 131	O2S 1 circuit low voltage	O2S 1 (before TWC) (G3/2) Voltage too low	23⇒ 13.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory OBD II

DTC	Possible cause		Test step/Remedy [1]
	SAE nomenclature	Explanation	
P0 132	O2S 1 circuit high voltage	O2S 1 (before TWC) (G3/2) Voltage too high	23 ⇒ 13.0
P0 133	O2S 1 circuit slow response	A O2S 1 (before TWC) (G3/2), ageing correction value exceeded B O2S 1 (before TWC) (G3/2), ageing time period too long	
P0 134	O2S 1 circuit no activity detected	O2S 1 (before TWC) (G3/2)	23⇒ 13.0
P0 135	O2S 1 heater circuit malfunction	O2S 1 heater (before TWC) (G3/2)	23⇒ 14.0
P0 138	O2S 2 circuit high voltage	O2S 2 (after TWC) (G3/1) Voltage too high	23⇒ 15.0
P0 141	O2S 2 heater circuit malfunction	O2S 2 heater (after TWC) (G3/1)	23 ⇒ 16.0
P0 170	Fuel trim malfunction	Self adaptation of fuel mixture at limit from engine control module (N3/4).	Intake air leak, injectors, diaphragm pressure regulator, engine wear.
P0 200	Injector circuit malfunction - cyl. 1 Injector circuit malfunction - cyl. 2 Injector circuit malfunction - cyl. 3 Injector circuit malfunction - cyl. 4	Injector (Y62y1) – cylinder 1 Injector (Y62y2) – cylinder 2 Injector (Y62y3) – cylinder 3 Injector (Y62y4) – cylinder 4	23 ⇒ 18.0 23 ⇒ 19.0 23 ⇒ 20.0 23 ⇒ 21.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory OBD II

DTC	Possible cause		Test step/Remedy [1]
	SAE nomenclature	Explanation	
P0 300	Random misfire detected	A Random misfire, several cylinders B Random misfire, TWC damaging	24 ⇒ 11.0 – 14.1
P0 301	Cylinder 1 misfire detected	A Cylinder 1 misfire B Cylinder 1 misfire, TWC damaging	24 ⇒ 11.0 – 14.1
P0 302	Cylinder 2 misfire detected	A Cylinder 2 misfire B Cylinder 2 misfire, TWC damaging	24 ⇒ 11.0 – 14.1
P0 303	Cylinder 3 misfire detected	A Cylinder 3 misfire B Cylinder 3 misfire, TWC damaging	24 ⇒ 11.0 – 14.1
P0 304	Cylinder 4 misfire detected	A Cylinder 4 misfire B Cylinder 4 misfire, TWC damaging	24 ⇒ 11.0 – 14.1

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory OBD II

DTC	Possible cause		Test step/Remedy [1]
	SAE nomenclature	Explanation	
P0 325	Knock sensor 1 circuit malfunction	Knock control at limit KS 1 (A16)	
P0 326	Knock sensor 1 circuit range/performance	KS 1 (A16)	
P0 327	Knock sensor 1 circuit low input	KS 1 (A16) Signal implausible	
P0 335	CKP sensor circuit malfunction	CKP sensor (L5) Tooth count implausible	24 ⇒ 6.0
P0 341	CMP sensor circuit range/performance	CMP sensor (L5/1)	24 ⇒ 7.0
P0 400	Exhaust gas recirculation flow malfunction	Exhaust gas recirculation malfunction (logic chain)	
P0 411	Secondary air injection system incorrect flow detected	Secondary air injection system incorrect flow detected (logic chain)	
P0 412	Secondary air injection system switching valve circuit malfunction	Air pump switchover valve (Y32) Air relay module (K17)	23 ⇒ 38.0 23 ⇒ 38.1
P0 420	Catalyst system efficiency below threshold	Catalyst system efficiency below threshold (logic chain)	
P0 441	Evaporative emission control system incorrect purge flow	EVAP not functioning properly (logic chain)	23 ⇒ 25.0 - 26.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory OBD II

DTC	Possible cause		Test step/Remedy [1]
	SAE nomenclature	Explanation	
P0 443	Evaporative emission control system purge control valve circuit malfunction	Purge control valve (Y58/1)	23 ⇒ 25.0 - 26.0
P0 500	Vehicle speed sensor malfunction	VSS rear axle	23 ⇒ 24.0
P0 501	Vehicle speed sensor range/performance	VSS signal malfunction Implausible high	23 ⇒ 24.0
P0 505	Idle control system malfunction	Idle control system in "limp-home" mode	Intake air leak, throttle body binding, adjust throttle linkage, erase DTC's in control module
P0 507	Idle control system rpm higher than expected	Idle control system valve at lower limit and engine speed is too high	25 ⇒ 1.0 - 5.0
P0 510	Closed throttle position switch malfunction	Idle control system	25 ⇒ 4.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory OBD II

DTC	Possible cause		Test step/Remedy [1]
	SAE nomenclature	Explanation	
P0 600	Serial communication link malfunction	CAN communication from diagnostic module OBDII (N59/1) defective	23 ⇒ 42.0
P1 131	O2S 1 circuit short circuit	O2S 1 (before TWC) (G3/2) Short to voltage	
P1 132	O2S 1: Oxygen sensor integration on rich or lean stop	O2S 1 (before TWC) (G3/2) Lambda integrator at limit	
P1 137	O2S 2 circuit short circuit	O2S 2 (after TWC) (G3/2) Short to voltage	
P1 138	O2S 2 operating condition	O2S 2 (after TWC) (G3/2) No signal/low voltage	
P1 170	Short term fuel trim	Self adaptation of fuel mixture at limit from engine control module (N3/4).	
P1 335	Engine speed signal TNA not received by diagnostic module	TNA-signal to diagnostic module missing	
P1 336	Crankshaft sensor signal: Magnet coding on segment	CKP sensor (L5) magnet is missing (segment control)	24 ⇒ 7.0
P1 337	Engine speed signal TNA not transmitted from engine control module	TNA-signal to diagnostic module implausible	23 ⇒ 11.0
P1 340	CMP sensor monitoring signal from engine control module (HFM) (N3/4)	CMP sensor signal to diagnostic module implausible (camshaft signals not in sync)	23 ⇒ 46.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory OBD II

DTC	Possible cause		Test step/Remedy [1]
	SAE nomenclature	Explanation	
P1 341	Camshaft timing adjuster without function	Camshaft timing adjuster without function (logic chain)	
P1 342	Electrical activation of adjustable camshaft timing solenoid	Adjustable camshaft solenoid (Y49)	23 ⇒ 27.0 - 28.0
P1 400	Electrical activation of the EGR switchover valve	EGR switchover valve (Y27/6)	23 ⇒ 39.0
P1 443	Electrical activation of the purge flow switchover valve	Purge flow switchover valve malfunction (Y27/6), open circuit/short circuit	23 ⇒ 39.0
P1 444	Pressure switchover without function	Pressure switchover valve malfunction (logic chain)	
P1 700	Transmission upshift delay without function	Transmission upshift malfunction (logic chain)	
P1 701	Electrical activation of upshift delay switchover valve (Y3/3)	Upshift delay switchover valve (Y3/3) open/short circuit	23 ⇒ 29.0
P1 740	Full load information: Load implausible	Throttle valve actual value potentiometer (M16/6r1) implausibly high	25 ⇒ 2.0 - 3.1
P1 741	Full load information: Throttle valve position implausible	Throttle valve actual value potentiometer (M16/6r1) implausible	25 ⇒ 2.0 - 3.1
P1 750	Battery voltage too low		

[1] Observe Preparation for Test, see 22.