Diagnosis – Diagnostic Trouble Code (DTC) Memory

The individual test steps (e.g. ECT sensor, IAT sensor, etc.) are combined into a test program. If a complaint is confirmed during engine diagnosis in Volume 1 and a reference is made to a particular test step, only perform that test step (with respective time allowed) and not the entire test program.

Test Note:
Connect impulse counter scan tool according to connection diagram, see section 0, Connection und Use of Test Equipment.
For information on performing the On-off Ratio Test as well as recalling the DTC's with the impulse counter scan tool, see volume 1, section B 1.

a) On-off Ratio Test, Ignition: ON

In this test, the input signals to the CFI control module are tested in the respective component's static state (ignition: **ON**). **This readout mode can also be used for a quick test of the signals being monitored.**

A fixed on-off ratio of 50% indicates that all input signals are OK.
If a different on-off ratio is displayed, see Malfunction Table.

Malfunction Table On-off Ratio Test, Ignition: ON

On–off Ratio %	Possible cause	Test step/Remedy 1)
0	Not used.	–
10	CTP contact of WOT/CTP switch (S29/2) open.	23 ⇒ 17.0
20	WOT contact of WOT/CTP switch (S29/2) closed.	23 ⇒ 12.0
30	ECT not between 70 and 100 °C	23 ⇒ 13.0

1) Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

Malfunction Table **On-off Ratio Test, Ignition: ON** (*continued*)

On–off Ratio %	Possible cause	Test step/Remedy [1]
40	VAF sensor (B2) plate deflected.	23 ⇒ 14.0
50	Input signals OK.	–
60	Recognition of vehicle speed signal from electronic speedometer (A1p8).	23 ⇒ 18.0
70	Starter signal (circuit 50) recognized.	23 ⇒ 36.0 [2]
80	Transmission engaged in gear.	–
90	Electrohydraulic actuator (Y1) current implausible	23 ⇒ 10.0 – 11.0
100	Not used.	–

1) Observe Preparation for Test, see 22.
2) See DI control module.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

b) On-off Ratio Test, Engine: at Idle

In this test, the input signals to the CFI control module are checked for plausibility with the engine running at idle.
If the indicator oscillates, then there is no malfunction in the system.

If a fixed on-off ratio is displayed, see Malfunction Table.
Malfunctions are indicated in ascending order of on-off ratio.

Malfunction Table On-off Ratio Test, Engine: at Idle

On–off Ratio %	Possible cause	Test step/Remedy [1]
0	Open circuit at socket 2 of 9-pole diagnostic socket (X11). Open circuit in wire to socket 3 or 6 of 9-pole diagnostic socket (X11) or on-off ratio tester defective. Mixture adjustment too rich.	Ground connection, Wiring, See DM, Engines Volume 1 – B 2 31 ⇒ 6
10	VAF sensor (B2) polarity reversed or defective. Terminals of WOT/CTP switch (S29/2) connector reversed or short circuit, WOT contact closed with insufficient air flow.	23 ⇒ 14.0 23 ⇒ 12.0 23 ⇒ 17.0
20	WOT contact defective or WOT/CTP switch (S29/2) polarity reversed. 20% indicated only if WOT/CTP switch (S29/2) is activated.	23 ⇒ 12.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

Malfunction Table **On-off Ratio Test, Engine: at Idle** (*continued*)

On–off Ratio %	Possible cause	Test step/Remedy [1]
30	Short or open circuit between CFI control module (N3) and 4-pole ECT sensor (B11/2), or 4-pole ECT sensor (B11/2) defective or greater deviation of temperature values as compared with DI control module (N1/3).	23 ⇒ 13.0
40	Wire to VAF sensor (B2) has open or short circuit, or VAF sensor (B2) defective.	23 ⇒ 14.0
50	O2S 1 (before TWC) (G3/2) not operational or defective, open circuit.	23 ⇒ 21.0
60	Vehicle speed signal at CFI control module (N3) implausible.	23 ⇒ 18.0
70	TNA-signal (rpm signal) at CFI control module (N3) implausible.	23 ⇒ 15.0
80	Data exchange DI control module (N1/3) ↔ CFI control module (N3) defective.	23 ⇒ 19.0
90	Current to electrohydraulic actuator (Y1) implausible.	23 ⇒ 10.0 – 11.0
95	Deceleration shut-off active.	23 ⇒ 37.0
100	Current or ground at CFI control module (N3) not present or CFI control module defective. On-off ratio tester defective. Mixture adjustment too lean. O2S 1 (before TWC) (G3/2) defective (short to circuit 31 [ground]).	23 ⇒ 1.0 – 3.0 See DM, Engines Volume 1 – B 2 31 ⇒ 6 23 ⇒ 21.0 – 22.0
Needle oscillates	No malfunction of signals monitored.	–

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

c) CFI Control Module (N3) DTC Readout

DTC	Possible cause	Test step/Remedy [1]
1	No malfunction in system.	–
2	WOT contact, WOT/CTP switch (S29/2) implausible.	23 ⇒ 12.0
3	ECT in CFI control module (N3) implausible.	23 ⇒ 13.0
4	VAF sensor (B2) potentiometer current implausible.	23 ⇒ 14.0
5	O2S 1 (before TWC) (G3/2) signal implausible	23 ⇒ 21.0 – 22.0
6	Not used.	–
7	TNA-signal (rpm signal) at CFI control module (N3) implausible.	23 ⇒ 15.0
8	Altitude correction signal from DI control module (N1/3) implausible.	See DI control module, section 5.1.
9	Current to electrohydraulic actuator (Y1) implausible.	23 ⇒ 10.0 – 11.0
10	CTP contact, WOT/CTP switch (S29/2) implausible.	23 ⇒ 17.0
11	Secondary air injection system implausible.	23 ⇒ 30.0
12	MAP values from DI control module (N1/3) implausible.	See DI control module, section 5.1.

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

c) CFI Control Module (N3) DTC Readout (*continued*)

DTC	Possible cause	Test step/Remedy [1]
13	IAT implausible.	23 ⇒ 20.0
14	Vehicle speed signal at CFI control module implausible.	23 ⇒ 18.0
15	Not used.	–
16	EGR switchover valve (Y27).	23 ⇒ 40.0
17	O2S 1 (before TWC) (G3/2) signal wire is shorted to positive or ground.	23 ⇒ 21.1 – 22.0
18	Current to ISC valve (Y6) implausible.	23 ⇒ 33.0
19	Not used.	–
20	Not used.	–
21	Not used.	–
22	O2S 1 (before TWC) heater voltage implausible.	23 ⇒ 22.3
23	Short to positive in purge control valve (Y58/1) circuit.	23 ⇒ 34.1
24	Not used.	–
25	Short to positive in start valve (Y8) circuit.	23 ⇒ 31.0 – 32.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

c) CFI Control Module (N3) DTC Readout (*continued*)

DTC	Possible cause	Test step/Remedy [1]
26	Short to positive in upshift delay solenoid valve (Y3/2) circuit.	23 ⇒ 44.0
27	Data exchange CFI control module (N3) ↔ DI control module (N1/3) defective.	23 ⇒ 19.0, Matching N3 ↔ N1/3.
28	Intermittent contact in ECT sensor (B11/2) circuit.	23 ⇒ 13.0
29	Difference in ECT between CFI control module (N3) and DI control module (N1/3)	23 ⇒ 13.0, See DI control module, section 5.1.
30	Not used.	–
31	Intermittent contact in IAT sensor (B17/2) circuit.	23 ⇒ 20.0
32	Not used.	–
33	Not used.	–
34	ECT from DI control module (N1/3) implausible.	See DI control module, section 5.1.

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

d) Engine Systems Control Module (N16) DTC Readout

DTC	Possible cause	Test step/Remedy [1]
1	No malfunction in system.	–
2	Fuel pump relay not functioning.	Replace engine systems control module (N16)
3	TD-signal interrupted (no longer implemented as of approx. 5/90 production).	23 ⇒ 16.0
4	Output for O2S 1 (before TWC) heater control defective.	23 ⇒ 22.0
5	Output for secondary air injection pump control defective.	23 ⇒ 30.0
6	Output for kickdown switch control defective.	Replace engine systems control module (N16)
7	Not used.	–
8	Not used.	–
9	Not used (implemented as of approx. 5/90 production for open circuit in O2S 1 (before TWC) heater	23 ⇒ 22.0
10	Not used.	–
11	A/C compressor engagement signal missing.	23 ⇒ 29.0
12	Output for A/C compressor control defective.	See DM, Climate Control, Volume 1.
13	A/C compressor slippage too great.	See DM, Climate Control, Volume 1.
14	Vehicle speed signal implausible.	23 ⇒ 18.0
15	Short circuit detected in fuel pump circuit.	23 ⇒ 8.0 – 9.0

[1] Observe Preparation for Test, see 22.