




# ENGINE 111

	Check and adjust engine	Diagnosis Manual Engine Volume 1 Index A Test and adjustment values	dh0a00pm00046x
	Fuel injection and ignition system (HFM-SFI) - diagnosis, previous knowledge		AD07.51-P-2000A
	Connect Hand-Held Tester (HHT), read out DTC memory		AD00.00-P-2000-03A
	Connect pulse counter to data link connector (X11/4) in accordance with connecting diagram.		
	Connecting diagram for pulse counter/Hand- Held Tester, HFM-SFI		AD07.51-P-2000-07A
		The pulse counter can only be used to read out the DTC memory, erase the DTC memory and reset/reactivate the HFM-SFI control module memory on vehicles up to HHT diagnosis code 46. On vehicles as of HHT diagnosis code 49 (incremental control), this is only possible with the HHT.	
	<b>Reading out DTC memory</b>		
a	Ignition: <b>ON</b>		
b	Press start button for 2-4 seconds		
c	Read off and note diagnostic trouble code		
d	Press start button again		
e	Read off diagnostic trouble code. Repeat points d) and e) until the first DTC again appears.		
	<b>Erasing DTC memory</b>		
a	Press start button for 2-4 seconds ("DTC memory") appears.		
b	Press start button for 6-8 seconds. This erases the DTC previously displayed	In the case of control modules made by Bosch up to 08/93, the start button must be pressed for 5-6 seconds to erase DTC's, and for 8-9 seconds when resetting and reactivating the memory.	
c	Repeat points a) and b) until DTC "I" (no fault) appears.		
	<b>Resetting and reactivating HFM-SFI control module memory</b>		
a	Erase DTC memory.		
b	Once the DTC "I" has appeared, press the start button for 6-8 seconds.	In the case of control modules made by Bosch up to 08/93, the start button must be pressed for 5-6 seconds to erase DTC's, and for 8-9 seconds when resetting and reactivating the memory.	
c	Switch off ignition and wait at least 2 seconds.		
d	Switch on ignition and wait at least 10 seconds, then start engine.		
	<b>DTC memory</b>		
<b>DTC code</b> 	<b>DTC text</b> 	<b>Possible cause/note</b>	<b>Remedy</b>
1	No fault recognized in system	In the case of problems, check electrical system of fuel injection and ignition system (HFM-SFI)	AD07.51-P-6000A AD07.51-P-6001A AD07.51-P-6002A
2	002 HFM-SFI, PEC coolant temperature sensor (B11/3) - short circuit		AD07.51-P-6000-09A
2	003 HFM-SFI, PEC coolant temperature sensor (B11/3) - open circuit		AD07.51-P-6000-09A
2	004 HFM-SFI, PEC coolant temperature sensor (B11/3) - implausible		AD07.51-P-6000-09A
2	005 HFM-SFI, PEC coolant temperature sensor (B11/3) - loose contact		Contact at connectors B11/3 and N3/4

3	006	Intake air temperature sensor (B17) - short circuit		AD07.51-P-6000-10A
3	007	Intake air temperature sensor (B17) - open circuit		AD07.51-P-6000-10A
3	008	Intake air temperature sensor (B17) - loose contact		Contacts at connectors B17 and N3/4
4	009	Hot film mass airflow sensor (B2/5) - air mass implausibly high		AD07.51-P-6000-04A AD07.51-P-6000-05A Engine turns stiffly
4	010	Hot film mass airflow sensor (B2/5) - open circuit		AD07.51-P-6000-04A AD07.51-P-6000-05A
5	011	Closed throttle position contact on idle speed control actuator (M16/6s1) - throttle valve angle implausibly large		AD07.51-P-6002-04A
5	012	Closed throttle position contact on idle speed control actuator (M16/6s1) - air mass implausibly high		AD07.51-P-6002-04A
5	013	Closed throttle position contact on idle speed control actuator (M16/6s1) - loose contact		AD07.51-P-6002-04A
6	014	Throttle valve actual value potentiometer (M16/6r1) in idle speed control actuator implausibly high		AD07.51-P-6002-03A
6	015	Throttle valve actual value potentiometer (M16/6r1) in idle speed control actuator implausibly low		AD07.51-P-6002-03A
6	016	Throttle valve actual value potentiometer (M16/6r1) in idle speed control actuator - loose contact		AD07.51-P-6002-03A
7	017	Drive actual value potentiometer (M16/6r2) in idle speed control actuator implausibly high		AD07.51-P-6002-01A AD07.51-P-6002-02A
7	018	Drive actual value potentiometer (M16/6r2) in idle speed control actuator implausibly low		AD07.51-P-6002-01A AD07.51-P-6002-02A
7	019	Drive actual value potentiometer (M16/6r2) in idle speed control actuator - loose contact		AD07.51-P-6002-01A AD07.51-P-6002-02A
8	020	Idle speed control at lower control stop		Air ingress, throttle valve jams
8	021	Idle speed control at upper control stop		Air ingress, throttle valve jams
	022	ISC/CC reports emergency mode		Air ingress, throttle valve jams Adjust throttle control (with autom.) Reset HFM-SFI control module memory
9	023	<b>with TWC</b> O2 sensor (G3/2) - sensor voltage too high		AD07.51-P-6000-13A
9	024	<b>with TWC</b> O2 sensor (G3/2) - too cold or open circuit		AD07.51-P-6000-13A
9	025	<b>with TWC</b> O2 sensor (G3/2) - sensor voltage implausible		AD07.51-P-6000-13A
10	026	<b>only model 202 (USA)</b> O2 sensor after TWC (G3/1) - sensor voltage too high		AD07.51-P-6000-15A
10	027	<b>only model 202 (USA)</b> O2 sensor after TWC (G3/1) - too cold or open circuit		AD07.51-P-6000-17A
10	028	<b>only model 202 (USA)</b> O2 sensor after TWC (G3/1) - sensor voltage implausible		AD07.51-P-6000-17A
11	029	<b>with TWC</b> O2 sensor (G3/2) sensor heater - current too low		AD07.51-P-6000-14A
11	030	<b>with TWC</b> O2 sensor (G3/2) sensor heater - current too high		AD07.51-P-6000-14A
11	031	<b>with TWC</b> O2 sensor (G3/2) sensor heater - short circuit		AD07.51-P-6000-14A

12	032	<b>only model 202</b> 		AD07.51-P-6000-17A
		O2 sensor after TWC (G3/1) sensor heater - current too low		
12	033	<b>only model 202</b> 		AD07.51-P-6000-17A
		O2 sensor after TWC (G3/1) sensor heater - current too high		
12	034	<b>only model 202</b> 		AD07.51-P-6000-17A
		O2 sensor after TWC (G3/1) sensor heater - short circuit		
13	035	<b>with TWC</b> Lambda control is at rich stop, mixture too lean		Air ingress, fuel injection valves Diaphragm pressure regulator
13	036	<b>with TWC</b> Lambda control is at lean stop, mixture too rich		Air ingress, fuel injection valves Diaphragm pressure regulator
14	037	Fuel injection valve (Y62y1) cylinder 1 - short circuit to positive		AD07.51-P-6000-18A
14	038	Fuel injection valve (Y62y1) cylinder 1 - open circuit/short circuit to ground		AD07.51-P-6000-18A
15	039	Fuel injection valve (Y62y2) cylinder 2 - short circuit to positive		AD07.51-P-6000-19A
15	040	Fuel injection valve (Y62y2) cylinder 2 - open circuit/short circuit to ground		AD07.51-P-6000-19A
16	041	Fuel injection valve (Y62y3) cylinder 3 - short circuit to positive		AD07.51-P-6000-20A
16	042	Fuel injection valve (Y62y3) cylinder 3 - open circuit/short circuit to ground		AD07.51-P-6000-20A
17	043	Fuel injection valve (Y62y4) cylinder 4 - short circuit to positive		AD07.51-P-6000-21A
17	044	Fuel injection valve (Y62y4) cylinder 4 - open circuit/short circuit to ground		AD07.51-P-6000-21A
18-19	045-048	not used		
20	049	<b>with TWC</b> Idle speed self-adaption too rich		Air ingress, fuel injection valves, diaphragm pressure regulator, wear to engine (reset self-adaption after repair, AD07.51-P-2000-08A
20	050	<b>with TWC</b> Idle speed self-adaption too lean		Air ingress, fuel injection valves, diaphragm pressure regulator, wear to engine (reset self-adaption after repair, AD07.51-P-2000-08A
20	051	<b>with TWC</b> Self-adaption in lower part-throttle range too rich		Air ingress, fuel injection valves, diaphragm pressure regulator, wear to engine (reset self-adaption after repair, AD07.51-P-2000-08A
20	052	<b>with TWC</b> Self-adaption in lower part-throttle range too lean		Air ingress, fuel injection valves, diaphragm pressure regulator, wear to engine (reset self-adaption after repair, AD07.51-P-2000-08A
20	053	<b>with TWC</b> Self-adaption in upper part-throttle range too rich		Air ingress, fuel injection valves, diaphragm pressure regulator, wear to engine (reset self-adaption after repair, AD07.51-P-2000-08A
20	054	<b>with TWC</b> Self-adaption in upper part-throttle range too lean		Air ingress, fuel injection valves, diaphragm pressure regulator, wear to engine (reset self-adaption after repair, AD07.51-P-2000-08A
21	061-063	not used		

22	055	Ignition output stage 1 or ignition coil (T1/1) for cylinder 1 misses		AD07.51-P-6001-09A AD07.51-P-6001-11A AD07.51-P-6001-13A
22	056	Ignition output stage 1 or ignition coil (T1/1) for cylinder 4 misses		AD07.51-P-6001-09A AD07.51-P-6001-11A AD07.51-P-6001-13A
22	057	Ignition output stage 1 or ignition coil (T1/1) fails to reach specified amperage		AD07.51-P-6001-09A AD07.51-P-6001-11A AD07.51-P-6001-13A
23	058	Ignition output stage 2 or ignition coil (T1/2) for cylinder 2 misses		AD07.51-P-6001-10A AD07.51-P-6001-12A AD07.51-P-6001-14A
23	059	Ignition output stage 2 or ignition coil (T1/2) for cylinder 3 misses		AD07.51-P-6001-10A AD07.51-P-6001-12A AD07.51-P-6001-14A
23	060	Ignition output stage 2 or ignition coil (T1/2) fails to reach specified amperage		AD07.51-P-6001-10A AD07.51-P-6001-12A AD07.51-P-6001-14A
	061-063	not used		
24	064	Crankshaft position sensor (L5) - signal not recognized/implausible		AD07.51-P-6001-06A
24	065	Crankshaft position sensor (L5) - magnet missing (segmental control) Crankshaft position sensor (L5) - number of theeth implausible (incremental control)		AD07.51-P-6001-06A
24	066	Crankshaft position sensor (L5) - speed implausibly high		AD07.51-P-6001-06A
25	067	Crankshaft position sensor (L5/1) - implausible/not recognized (segmental control) Camshaft Hall-effect sensor (B6/1) implausible/not recognized (incremental control)		AD07.51-P-6001-07A AD07.51-P-6001-08A
26	068	<b>except <sup>(USA)</sup>, models 202.024/025, 210.035/037/237 as of 6/96</b> HFM-SFI variable reference resistor (R16/5) - short circuit to ground		AD07.51-P-6000-22A
26	069	<b>except <sup>(USA)</sup>, models 202.024/025, 210.035/037/237 as of 6/96</b> HFM-SFI variable reference resistor (R16/5) - open circuit/short circuit to positive		AD07.51-P-6000-22A
27	070	TN speed signal (output) - short circuit to ground		AD07.51-P-6000-11A
27	071	TN speed signal (output) - short circuit to positive		AD07.51-P-6000-11A
28	072	Vehicle speed signal not recognized		AD07.51-P-6000-24A
28	073	Vehicle speed signal implausibly high		AD07.51-P-6000-24A
29	074	<b>only model 124 with TWC up to 07/93</b> Partial intake manifold preheater PMP (K3/1) - short circuit to positive		AD07.51-P-6000-12A
29	075	<b>only model 124 with TWC up to 07/93</b> Partial intake manifold preheater PMP (K3/1) - open circuit/short circuit to ground		AD07.51-P-6000-12A
30	076	Fuel pump relay (K27) Open circuit/short circuit		AD07.51-P-6000-06A
31	077	<b>without TWC</b> CO potentiometer (R33) - short circuit to positive		AD07.51-P-6000-23A
	078	<b>without TWC</b> CO potentiometer (R33) - loose contact		AD07.51-P-6000-23A
32	079	Knock sensors 1 (A16) - open circuit		Knock sensors
33	081	Maximum retard on at least one cylinder reached		Greater tendency to knock due to poor fuel, coked combustion chambers or mechanical damage
33	082	Ignition angle deviations between individual cylinders is greater than 6° CKA		Greater tendency to knock due to poor fuel, coked combustion chambers or mechanical damage
34	083	Knock control evaluation circuit in HFM-SFI control module (N3/4) defective		N3/4
	084	Brief idle speed/part-throttle self-adaption exceeded		Brief fault in mixture formation

35	085	<b>only model 202</b> (USA) Secondary air pump switchover valve (Y32) and/or secondary air pump relay (K17)	On Australian-version vehicles the pulse display "35" is <b>not a fault</b> , since no secondary air pump is installed	AD07.51-P-6000-38A
36	086	Purge control valve (Y58/1) - open circuit/short circuit		AD07.51-P-6000-25A AD07.51-P-6000-25B
36	087	Purge control valve (Y58/1)- short circuit to positive		AD07.51-P-6000-25A AD07.51-P-6000-25B
37	088	<b>with automatic transmission</b> Upshift delay switchover valve (Y3/3) - open circuit/short circuit		AD07.51-P-6000-29A
38	089	Adjustable camshaft timing solenoid (Y49) - short circuit to positive		AD07.51-P-6000-27A AD07.51-P-6000-27B
38	090	Adjustable camshaft timing solenoid (Y49) - open circuit/short circuit to ground		AD07.51-P-6000-27A AD07.51-P-6000-27B
39	091	<b>only</b> (USA) (J) EGR switchover valve (Y27) - short circuit to positive		AD07.51-P-6000-39A
39	092	<b>only</b> (USA) (J) EGR switchover valve (Y27) - open circuit/short circuit to ground		AD07.51-P-6000-39A
40	093-096	not used		
41	097	<b>only model 202</b> (USA) CAN communication from HFM-SFI control module (N3/4) faulty		AD07.51-P-6000-41A
	098-099	not used		
42	100	<b>only model 202</b> (USA) CAN communication from diagnosis module (N59/1) faulty		AD07.51-P-6000-41A
43	101	Starter signal (circuit 50) missing		AD07.51-P-6000-07A
44	102	<b>only</b> (J) Catalytic converter thermal element/sensor (B16/6, B16/3) - temperature too high		AD07.51-P-6000-37A
44	103	<b>only</b> (J) Catalytic converter thermal element/sensor (B16/6, B16/3) - temperature too low		AD07.51-P-6000-37A
45	104	<b>only model 210 with CC</b> Cruise control safety fuel shutoff active		Check idle speed control actuator AD07.51-P-6002A
45-46	105-106	not used		
	107	Dwell angle control at stop Ignition output stage - short circuit to ground	as of 6/93	AD07.51-P-6001-11A N3/4
48	108	<b>only</b> (USA) O2 sensor (after TWC) heater relay (K35) - short circuit to positive		AD07.51-P-6000-17A
48	109	<b>only</b> (USA) O2 sensor (after TWC) heater relay (K35) - open circuit/short circuit to ground		AD07.51-P-6000-17A
49	110	Circuit 87 U voltage supply at HFM-SFI control module (N3/4) implausible		AD07.51-P-6000-02A
49	111	Circuit 87 U voltage supply at HFM-SFI control module (N3/4) - voltage too low		AD07.51-P-6000-02A
50	112	HFM-SFI control module (N3/4)		N3/4
	113	HFM-SFI control module (N3/4) is not coded	as of 01/94	Encode N3/4
	114	Control module identification of N3/4 faulty	as of 01/94	Encode N3/4, if necessary replace N3/4
	115	Control module encoding bytes for N3/4 faulty	as of 01/94	Encode N3/4, if necessary replace N3/4
	116	CAN communication from infrared RCL control module (N54) faulty	as of 12/94. On model 202 (J) DTC 116 may be displayed in vehicles made between 09/95 and 11/95, even though no fault is present	AD07.51-P-6000-41A
	117	Starting attempt carried out with infrared RCL system locked	as of 12/94. On model 202 (J) DTC 116 may be displayed in vehicles made between 09/95 and 11/95, even though no fault is present	Operator error, erase DTC memory
	118	Operation of compressor implausible		AD07.51-P-6000-46A
	119	Magnetic supercharger clutch (Y2/1) - open circuit/short circuit to ground		AD07.51-P-6000-47A

120	ETS signal - short circuit to ground or ETS fault		AD07.51-P-6002-10A
121	ETS signal - short circuit to positive or open circuit		AD07.51-P-6002-10A
123	Recirculated air flap actuator (M16/7) - open circuit/short circuit to ground		AD07.51-P-6000-47A
124	Recirculated air flap actuator (M16/7) - short circuit to positive		AD07.51-P-6000-47A
125	HFM-SFI control module (N3/4)		N3/4
126			
127	ISC and CC/ISC actuator mixed up		Replace actuator
128			N3/4
129	HFM-SFI control module (N3/4)		
130	Drive actual value potentiometer		AD07.51-P-6002-02A
131	HFM-SFI control module (N3/4)		N3/4
132			
133	Actuator		Teach-in HFM-SFI control module again using HHT. If fault is still indicated, replace actuator
134	HFM-SFI control module (N3/4)		N3/4
135	Voltage supply to actuator potentiometer		AD07.51-P-6002-01A
136	Drive actual value potentiometer active test		AD07.51-P-6002-02A
137	HFM-SFI control module (N3/4)		N3/4
138	Actuator		Teach-in HFM-SFI control module again using HHT. If fault is still indicated, replace actuator
139	Cruise control pushbutton		AD07.51-P-6002-08A
140	HFM-SFI control module (N3/4)		N3/4
141			
142			
143	Stop lamp switch		AD07.51-P-6002-12A
144	HFM-SFI control module (N3/4)		N3/4
145	CAN: rear axle vehicle speed sensor implausible		Diagnosis Manual Chassis
146	CAN: front axle vehicle speed sensor implausible		Diagnosis Manual Chassis
147	CAN: A/C system pressure implausible		Diagnosis Manual Climate Control
148	<b>Only models 170, 208, 202 as of 6/97 and 210 as of 3/96</b> Starter output short circuit to positive		AD07.51-P-6000-08A
149	<b>Only models 170, 208, 202 as of 6/97 and 210 as of 3/96</b> Starter output short circuit to negative		AD07.51-P-6000-08A
150	CAN: no reception from transmission control module (N15/3)		Diagnosis Manual Chassis
151	CAN: no reception from air conditioning/automatic air conditioning (N19, N22)		Diagnosis Manual Climate Control
152	CAN: no reception from instrument cluster (A1)		AD07.51-P-6000-41A Diagnosis Manual Information/Communication
153	Electric suction-type fan (engine/AC) (M4/3) output - short circuit to positive		AD07.51-P-6000-50A
154	Electric suction-type fan (engine/AC) (M4/3) output - short circuit to negative		AD07.51-P-6000-50A
155	Transmission version coding implausible		Perform version coding
156	CAN: signal from ETS/ABS implausible		Diagnosis Manual Chassis
157			

158	CAN: brake information implausible		Diagnosis Manual Chassis
159	CAN: kno reception from EIS		AD07.51-P-6000-41A Diagnosis Manual Body
160	CAN: ASR fuel shutoff implausible		AD07.51-P-6000-41A Diagnosis Manual Chassis
161	CAN: ASR fuel switch-on implausible		AD07.51-P-6000-41A Diagnosis Manual Chassis
162	CAN: cruise control signal from EIS implausible		AD07.51-P-6002-08A HHT test program Diagnosis Manual Body
163	CAN: signal from cruise control pushbutton missing		AD07.51-P-6002-08A HHT test program Diagnosis Manual Body
164	CAN: signal from cruise control pushbutton implausible		AD07.51-P-6002-08A HHT test program Diagnosis Manual Body