

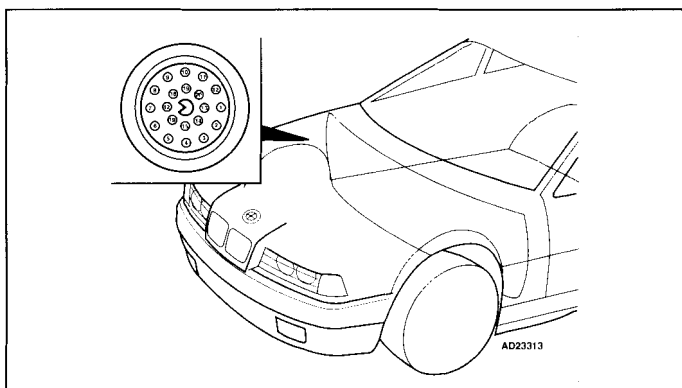
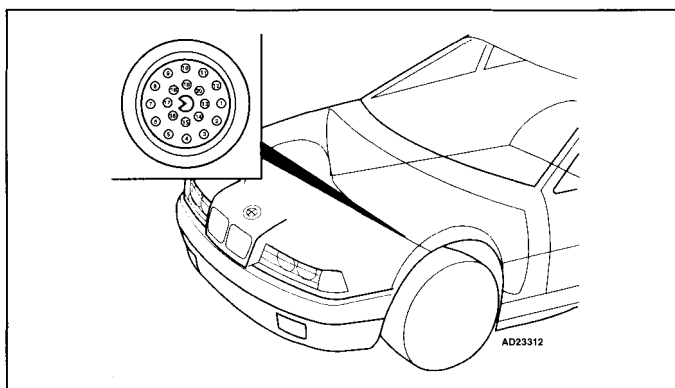
**BMW**

Model: 316i/Compact, 318i/iS/Coupe/Compact, 320i, 325i (E36) • Z3 1,8i • 518i, 520i, 525i/iX (E34) 750i (E32) • 850i/CSI (E31)

Year: 1987-00

Engine code: 16 4E 1, 16 4 E2, 18 4E 1, 18 4S 1, 18 4E 2, 20 6S 2, 25 6S 2, 50 12 A, 56 12 1

System: Motronic M1.2/1.3/1.7/1.7.2/1.7.3/3.1

Engine management**Data link connector (DLC) locations****Z3, 3 Series (M1.2/1.7/3.1), 5 Series, 8 Series – engine bay RH side****3 Series (M1.7.2/1.7.3), 7 Series – engine bay LH side****Trouble codes****General information**

- Refer to the front of this manual for general test conditions, terminology, detailed descriptions of wiring faults and a general trouble shooter for electrical and mechanical faults.
- Trouble codes are displayed by using an LED connected to one of the ECM terminals.
- The ECM fault memory can also be checked using diagnostic equipment connected to the data link connector (DLC).

Accessing – flash type

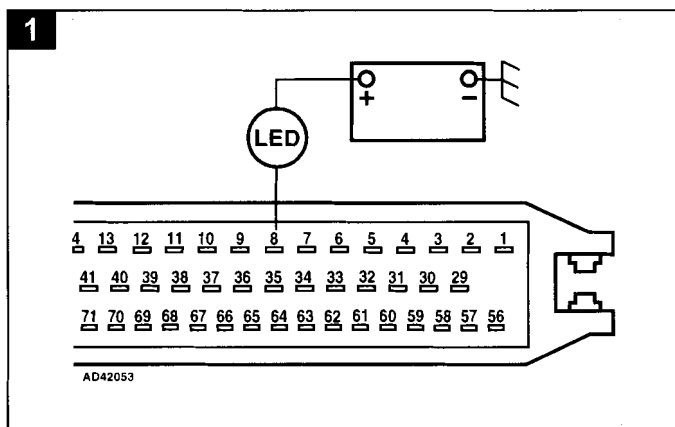
NOTE: *Flash type cannot be accessed from some engine control modules (ECM).*

- Ensure ignition switched OFF.
- Connect breakout box between ECM and harness multi-plug.
- ECM located in plenum chamber.
- Motronic M1.7/3.1: Connect LED tester between breakout box terminal 8 and battery (12 volt) positive **1**.
- Motronic M1.2: Connect LED tester between breakout box terminal 15 and battery (12 volt) positive **2**.
- Switch ignition ON.
- Depress accelerator pedal fully 5 times within 5 seconds.
- V12: To access trouble codes from ECM LH bank, depress accelerator pedal fully 6 times within 5 seconds.

NOTE: *V12 engine is controlled by two ECMs, RH bank and LH bank.*

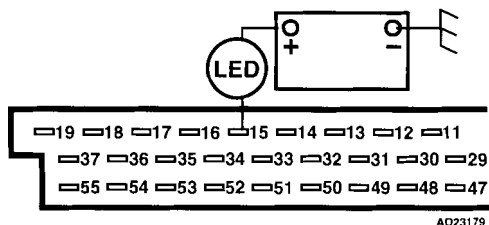
- Count LED flashes. Note trouble codes. Compare with trouble code table.
- Long flash indicates start of trouble code display **3** [A].
- Each trouble code consists of four groups of flashes **3** [B].

- For example: Trouble code 1211 displayed: Engine control module (ECM) **3** [B].
- LED flashes code 0000 **4**, 1000 **5** or 2000 **6** at end of trouble code output.
- Switch ignition OFF.
- Disconnect LED.

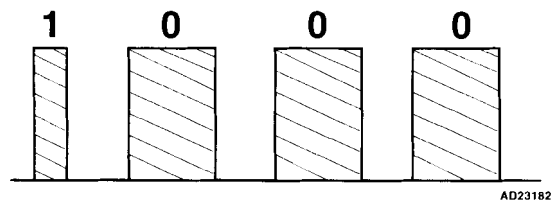




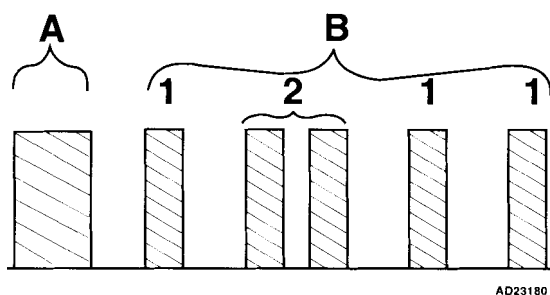
2



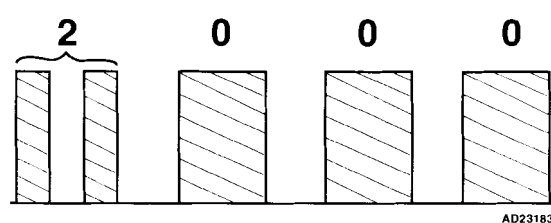
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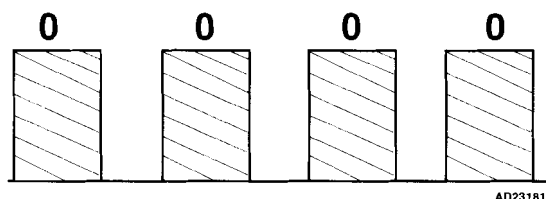
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4



Erasing – flash type

- Depress accelerator pedal fully for 10 seconds minimum when trouble code 0000, 1000 or 2000 (end of output) is flashed.
- Switch ignition OFF.

**BMW**

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518i, 520i, 525i/iX (E34) • 750i (E32) • 850i/CSI (E31)

Engine management

Trouble code identification

NOTE: V12: Flash types 1xxx for RH bank, 2xxx LH bank.

Flash type	Fault location	Probable cause
0000	End of trouble code output	–
1000	End of trouble code output	–
1211	Engine control module (ECM) – defective	Disconnect ECM multi-plug for at least 10 min. – check if trouble code reappears before replacing ECM
1215	Mass air flow (MAF) sensor/volume air flow (VAF) sensor – incorrect signal	Wiring, connector(s), MAF sensor/VAF sensor
1216	Throttle position (TP) sensor – defective	Wiring, connector(s), TP sensor
1218	Engine control module (ECM) – output stage	Wiring, ECM controlled components
1221	Heated oxygen sensor (HO2S) – circuit malfunction	Wiring, connector(s), HO2S
1222	Heated oxygen sensor (HO2S) – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, EVAP canister purge valve, injector(s), HO2S, ECM
1223	Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector(s), ECT sensor
1224	Intake air temperature (IAT) sensor – malfunction	Wiring, connector(s), IAT sensor
1225	Knock sensor (KS) 1 – defective	Wiring, connector, KS incorrectly tightened
1226	Knock sensor (KS) 2 – defective	Wiring, connector, KS incorrectly tightened
1231	Battery voltage – too low/high	Wiring, alternator, battery
1232	Closed throttle position (CTP) switch – malfunction	Wiring, connector, CTP switch, ECM
1233	Throttle position (TP) sensor – malfunction	Wiring, TP sensor, ECM
1234	Vehicle speed sensor (VSS) – incorrect/no signal	Wiring, instrument panel, VSS
1235	Torque converter clutch (TCC) solenoid – defective	Wiring, TCC solenoid
1236	Throttle control, traction control system (TCS) – defective	Wiring, connector(s), throttle control system
1236 ■	Engine control module (ECM)/ABS control module communication, ASR system	Wiring, ABS trouble code(s) stored, ECM
1237	AC compressor clutch relay – malfunction	Wiring, AC compressor clutch relay
1238	Intake manifold air control solenoid – circuit malfunction	Wiring, connector, intake manifold air control solenoid
1238 ■	Engine control module (ECM) – unused output stage	Wiring short to earth/positive, ignore flash code if terminal 18 not connected
1241	Engine control module (ECM) – no supply voltage	Wiring, fuse(s), battery
1241 ■ 3	Engine control module (ECM)/ABS control module communication, traction control system (TCS)	Wiring, ABS trouble code(s) stored, ECM
1241 ■	Engine control module (ECM), electronic throttle system (ETS) – overrun torque control	Wiring short to positive, ECM
1242	AC control module/engine control module (ECM) communication – malfunction	Wiring, AC control module
1243	Crankshaft position (CKP) sensor/engine speed (RPM) sensor – incorrect/no signal	Wiring, CKP sensor/RPM sensor
1244	Camshaft position (CMP) sensor – range/performance problem	Wiring, CMP sensor
1245	Engine control module (ECM)/transmission control module (TCM) communication – short to earth	Wiring, ECM, TCM
1247	Ignition circuit – primary circuit	Wiring, ignition coil(s)



Flash type	Fault location	Probable cause
1251	Injector(s), group 1 – circuit malfunction	Wiring, injector(s)
1251	Injector, cyl. 1 – circuit malfunction	Wiring, injector
1252	Injector(s), group 2 – circuit malfunction	Wiring, injector(s)
1252	Injector, cyl. 5 – circuit malfunction	Wiring, injector
1253	Injector, cyl. 3 – circuit malfunction	Wiring, injector
1254	Injector, cyl. 6 – circuit malfunction	Wiring, injector
1255	Injector, cyl. 2 – circuit malfunction	Wiring, injector
1256	Injector, cyl. 4 – circuit malfunction	Wiring, injector
1261	Fuel pump relay – malfunction	Wiring, connector(s), fuel pump relay
1262	Idle speed control (ISC) actuator/idle air control (IAC) valve – malfunction	Wiring, connector(s), ISC actuator/IAC valve
1263	Evaporative emission (EVAP) canister purge valve – malfunction	Wiring, connector(s), EVAP canister purge valve
1264	Oxygen sensor heater relay – malfunction	Wiring, connector, oxygen sensor heater relay
1265	Malfunction indicator lamp (MIL) – short to earth/positive	Wiring short to earth/positive, MIL
1268	Mixture adjustment resistor – signal too low/high	Wiring, mass air flow (MAF) sensor
1271	Ignition circuit – defective	Wiring, connector, ignition coil, ECM
1271	Ignition circuit, cyl. 1 – defective	Wiring, connector, ignition coil, ECM
1272	Ignition circuit, cyl. 5 – defective	Wiring, connector, ignition coil, ECM
1273	Ignition circuit, cyl. 3 – defective	Wiring, connector, ignition coil, ECM
1274	Ignition circuit, cyl. 6 – defective	Wiring, connector, ignition coil, ECM
1275	Ignition circuit, cyl. 2 – defective	Wiring, connector, ignition coil, ECM
1276	Ignition circuit, cyl. 4 – defective	Wiring, connector, ignition coil, ECM
1278	Transmission control module (TCM) – signal	Wiring, TCM
1281	Battery voltage – too low	Wiring, alternator, battery
1282	Engine control module (ECM) – internal fault	Disconnect ECM multi-plug for at least 10 min. – check if trouble code reappears before replacing ECM
1283	Injector(s) – circuit malfunction	Wiring, injector(s)
1285	Engine control module (ECM)/alarm system control module communication – alarm system active	Wiring short to positive, alarm system control module
1286	Knock control circuit – defective	Wiring, connector, KS incorrectly tightened, knock sensor (KS), ECM
1287	Engine control module (ECM) – electronic throttle system (ETS) signal	Wiring short to positive, ignore flash code if terminal 62 not connected
1288	Engine control module (ECM) – internal fault	ECM
1288	Engine control module (ECM) – automatic stability control (ASR)/overrun torque control defective	Wiring, ETS, ABS trouble code(s) stored
1444	No fault found	–
1513	Engine control module (ECM) – unused output stage	Wiring short to earth/positive, ignore flash code if terminal 18 not connected
2000	End of trouble code output	–
2211	Engine control module (ECM) – defective	Disconnect ECM multi-plug for at least 10 min. – check if trouble code reappears before replacing ECM



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518i, 520i, 525i/iX (E34) • 750i (E32) • 850i/CSI (E31)**Engine management**

Flash type	Fault location	Probable cause
2215	Mass air flow (MAF) sensor/volume air flow (VAF) sensor – incorrect signal	Wiring, connector(s), MAF sensor/VAF sensor
2218	Engine control module (ECM) – output stage	Wiring, ECM controlled components
2221	Heated oxygen sensor (HO2S) – circuit malfunction	Wiring, connector(s), HO2S
2222	Heated oxygen sensor (HO2S) – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, evaporative emission (EVAP) canister purge valve, injector(s), HO2S, ECM
2223	Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector(s), ECT sensor
2224	Intake air temperature (IAT) sensor – malfunction	Wiring, connector(s), IAT sensor
2231	Battery voltage – too low/high	Wiring, alternator, battery
2232	Closed throttle position (CTP) switch – malfunction	Wiring, connector, CTP switch, ECM
2233	Throttle position (TP) sensor – malfunction	Wiring, TP sensor, ECM
2234	Vehicle speed sensor (VSS) – incorrect/no signal	Wiring, instrument panel, VSS
2235	Torque converter clutch (TCC) solenoid – defective	Wiring, TCC solenoid
2236	Engine control module (ECM)/ABS control module communication, automatic stability control (ASR) system	Wiring, ABS trouble code(s) stored, ECM
2237	AC compressor clutch relay – malfunction	Wiring, AC compressor clutch relay
2241	Engine control module (ECM)/ABS control module communication, traction control system (TCS)	Wiring, ABS trouble code(s) stored, ECM
2244	Camshaft position (CMP) sensor – range/performance problem	Wiring, CMP sensor
2245	Engine control module (ECM)/transmission control module (TCM) communication – short to earth	Wiring, ECM, TCM
2444	No fault found	–
2251	Injector(s), group 1 – circuit malfunction	Wiring, injector(s)
2252	Injector(s), group 2 – circuit malfunction	Wiring, injector(s)
2261	Fuel pump relay – malfunction	Wiring, connector(s), fuel pump relay
2263	Evaporative emission (EVAP) canister purge valve – malfunction	Wiring, connector(s), EVAP canister purge valve
2264	Oxygen sensor heater relay – malfunction	Wiring, connector, oxygen sensor heater relay
2265	Malfunction indicator lamp (MIL) – short to earth/positive	Wiring short to earth/positive, MIL
2268	Mixture adjustment resistor – signal too low/high	Wiring, mass air flow (MAF) sensor
2278	Transmission control module (TCM) – signal	Wiring, TCM
2513	Engine control module (ECM) – unused output stage	Wiring short to earth/positive – ignore flash code if terminal 18 not connected
4444	No fault found	–

1 Motronic M1.7 (V12), M3.1

2 Motronic M3.1

3 Motronic M1.7 (V12)



Accessing and erasing – scanner type

- The engine control module (ECM) fault memory can also be checked using diagnostic equipment connected to the data link connector (DLC).

Trouble code identification

Scanner type	Fault location	Probable cause
–	No fault found	–
0	Engine control module (ECM) – undefined fault	–
1	Engine control module (ECM) – defective	ECM
1 1	Fuel pump relay – malfunction	Wiring, connector(s), fuel pump relay
2	Idle speed control (ISC) actuator/idle air control (IAC) valve – malfunction	Wiring, connector(s), ISC actuator/IAC valve
3 ■	Fuel pump relay – malfunction	Wiring, connector(s), fuel pump relay
3	Injector(s), cyl. 1 & 3 or cyl. 2, 4, 6 & 8, 10, 12 – circuit malfunction	Wiring, injector(s)
3 3	Injector(s), cyl. 2 & 4 – circuit malfunction	Wiring, injector(s)
3 4	Injector(s), cyl. 1 – circuit malfunction	Wiring, injector
4	Injector(s), cyl. 3 – circuit malfunction	Wiring, injector
5	Evaporative emission (EVAP) canister purge valve – malfunction	Wiring, connector(s), EVAP canister purge valve
5 4	Injector(s), cyl. 2 – circuit malfunction	Wiring, injector
6	Injector(s) – circuit malfunction	Wiring, injector(s)
7	Mass air flow (MAF) sensor/volume air flow (VAF) sensor – incorrect signal	Wiring, connector(s), MAF sensor/VAF sensor
10	Heated oxygen sensor (HO2S) – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, evaporative emission (EVAP) canister purge valve, injector(s), ECM
12	Throttle position (TP) sensor – defective	Wiring, connector(s), TP sensor
15	Knock sensor (KS) 1 – defective	Wiring, connector, KS incorrectly tightened, KS
16	Injector(s), cyl. 1, 3, 5 & 7, 9, 11 – circuit malfunction	Wiring, injector(s)
16 1	Camshaft position (CMP) sensor – range/performance problem	Wiring, CMP sensor
17	Injector(s), cyl. 2, 4, 6 & 8, 10, 12 – circuit malfunction	Wiring, injector(s)
18	Engine control module (ECM) – unused output stage	Wiring short to earth/positive, ignore flash code if terminal 18 not connected
18 5	Intake manifold air control solenoid – circuit malfunction	Wiring, connector, intake manifold air control solenoid
19	Engine control module (ECM) – unused output stage	Wiring short to earth/positive, ignore flash code if terminal 18 not connected
23	Oxygen sensor heater relay – malfunction	Wiring, connector, oxygen sensor heater relay
23 4	Ignition circuit, cyl. 2 – defective	Wiring, connector, ignition coil, ECM
24	Engine control module (ECM)/transmission control module (TCM) communication	Wiring short to earth, TCM trouble code(s) stored
24 ■	Ignition circuit, cyl. 3 – defective	Wiring, connector, ignition coil, ECM
25	Ignition circuit, cyl. 1 – defective	Wiring, connector, ignition coil, ECM



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518i, 520i, 525i/iX (E34) • 750i (E32) • 850i/CSI (E31)**Engine management**

Scanner type	Fault location	Probable cause
26	Battery voltage – too low	Wiring, alternator, battery
28	Heated oxygen sensor (HO2S) – circuit malfunction	Wiring, connector(s), HO2S
29	Idle speed control (ISC) actuator/idle air control (IAC) valve – malfunction	Wiring, connector(s), ISC actuator/IAC valve
31	Injector, cyl. 5 – circuit malfunction	Wiring, injector
32	Injector(s), cyl. 2 & 4 – circuit malfunction	Wiring, injector(s)
32 ■	Injector(s), cyl. 1, 3, 5 & 7, 9, 11 – circuit malfunction	Wiring, injector(s)
32 ■	Injector(s), cyl. 1 & 3 – circuit malfunction	Wiring, injector(s)
32 ■	Injector, cyl. 6 – circuit malfunction	Wiring, injector
33	Injector, cyl. 4 – circuit malfunction	Wiring, injector
36	Evaporative emission (EVAP) canister purge valve – malfunction	Wiring, connector(s), EVAP canister purge valve
37	Battery voltage – too low/high	Wiring, alternator, battery
37 1	Oxygen sensor heater relay – malfunction	Wiring, connector, oxygen sensor heater relay
38	Engine control module (ECM)/ABS control module communication, acceleration skid control (ASR) system	Wiring, ABS trouble code(s) stored, ECM
41	Mass air flow (MAF) sensor/volume air flow (VAF) sensor – incorrect signal	Wiring, connector(s), MAF sensor/VAF sensor
42	Knock sensor (KS) 2 – defective	Wiring, connector, KS incorrectly tightened, KS
44	Intake air temperature (IAT) sensor – malfunction	Wiring, connector(s), IAT sensor
45	Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector(s), ECT sensor
46	AC condenser blower motor relay – short to positive	Wiring short to positive, AC condenser blower motor relay, ECM
46 ■	Engine control module (ECM) – output stage	Wiring, ECM controlled components
48	AC compressor clutch relay – malfunction	Wiring, AC compressor clutch relay
50	Ignition circuit, cyl. 4 – defective	Wiring, connector, ignition coil, ECM
51	Transmission control module (TCM) – signal	Wiring, TCM
51 4	Ignition circuit, cyl. 6 – defective	Wiring, connector, ignition coil, ECM
52	Closed throttle position (CTP) switch – malfunction	Wiring, connector, CTP switch, ECM
52 ■	Ignition circuit, cyl. 5 – defective	Wiring, connector, ignition coil, ECM
53	Throttle position (TP) sensor/wide open throttle (WOT) switch – malfunction	Wiring, TP sensor, ECM
54	Engine control module (ECM)/transmission control module (TCM) communication	Wiring short to earth, TCM trouble code(s) stored
54 1	Battery voltage – too low/high	Wiring, alternator, battery
55	Ignition circuit – defective	Wiring, connector, ignition coil, ECM
62	Engine control module (ECM) – electronic throttle system (ETS) signal	Wiring short to positive, ignore flash code if terminal 62 not connected
63	Torque converter clutch (TCC) solenoid – defective	Wiring, TCC solenoid
64	Engine control module (ECM)/transmission control module (TCM) communication – short to earth	Wiring, TCM trouble code(s) stored, ECM, TCM



Scanner type	Fault location	Probable cause
67	Crankshaft position (CKP) sensor/engine speed (RPM) sensor – incorrect/no signal	Wiring, CKP sensor/RPM sensor
70	Heated oxygen sensor (HO2S) – circuit malfunction	Wiring, connector(s), HO2S
73	Vehicle speed sensor (VSS) – incorrect/no signal	Wiring, instrument panel, VSS
76	Mixture adjustment resistor – signal too low/high	Wiring, mass air flow (MAF) sensor
77	Intake air temperature (IAT) sensor – malfunction	Wiring, connector(s), IAT sensor
78	Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector(s), ECT sensor
81	Engine control module (ECM)/immobilizer control module communication – malfunction	Wiring, electrical interference, immobilizer control module, ECM
81 ⁴	Engine control module (ECM)/alarm system control module communication – alarm system active	Wiring short to positive, alarm system control module
82	Engine control module (ECM)/ABS control module communication, traction control system (TCS)	Wiring, ABS trouble code(s) stored, ECM
82 ⁴	Engine control module (ECM), electronic throttle system (ETS) – overrun torque control	Wiring short to positive, ECM
83	Throttle control, traction control system (TCS) – defective	Wiring, connector(s), throttle control system
83 ⁴	Engine control module (ECM) – acceleration skid control (ASR) defective	Wiring short to positive, ECM
85	Air conditioning (AC) control module/engine control module (ECM) communication – malfunction	Wiring, AC control module
100	Engine control module (ECM) – output stage	Wiring, ECM controlled components
200	Engine control module (ECM) – defective	Disconnect ECM multi-plug for at least 10 min. – check if trouble code reappears before replacing ECM
201	Heated oxygen sensor (HO2S) – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, evaporative emission (EVAP) canister purge valve, injector(s), HO2S, ECM
202	Engine control module (ECM) – internal fault	Disconnect ECM multi-plug for at least 10 min. – check if trouble code reappears before replacing ECM
203	Ignition circuit – primary circuit	Wiring, ignition coil(s)
204	Engine control module (ECM) – acceleration skid control (ASR)/overrun torque control defective	Wiring, trouble code(s) stored in other system(s)
206	Knock control circuit – defective	Wiring, connector, knock sensor (KS), ECM
207	Knock control circuit – range/performance problem	Wiring, connector, KS incorrectly tightened, knock sensor (KS)
220	Engine control module (ECM) – immobilizer active	Incorrect/damaged key, incorrectly coded, ECM/immobilizer replacement without coding, wiring, immobilizer defective
300	Engine control module (ECM) – engine cannot be started	Wiring, engine speed (RPM) sensor, mass air flow (MAF) sensor/volume air flow (VAF) sensor, fuel pump relay, ignition system, injector(s), fuel pressure, throttle control system

¹ Motronic M1.7/1.7.2/1.7.3/3.1

² Motronic M1.2

³ Motronic M1.7.3

⁴ Motronic M3.1

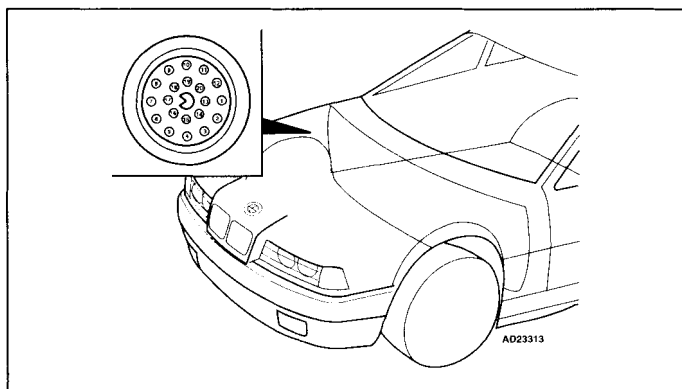
⁵ Motronic M1.7.2/1.7.3

⁶ Motronic M1.7, V12



**BMW**

Model: 325td/tds (E36) • 525td/tds (E34)
 Year: 1991-99
 Engine code: 25 6T 1/-L
 System: Bosch EDC 1.2.3 (DDE 2)

Engine management**Data link connector (DLC) locations**

Underbonnet, RH

Trouble codes**General information**

- Refer to the front of this manual for general test conditions, terminology, detailed descriptions of wiring faults and a general trouble shooter for electrical and mechanical faults.

Accessing and erasing

- The engine control module (ECM) fault memory can only be accessed and erased using diagnostic equipment connected to the data link connector (DLC).

Trouble code identification

Scanner type	Fault location	Probable cause
1	Fuel quantity adjuster, in fuel injection pump – mechanical/electrical fault	Wiring, connector, fuel quantity adjuster
3	Fuel shut-off solenoid, in fuel injection pump – electrical fault	Wiring, connector, fuel shut-off solenoid, ECM
3	Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector, ECT sensor
5	Injector needle lift sensor – malfunction	Wiring, connector, air in fuel system, fuel leak, fuel level low, RPM sensor, injector needle lift sensor, shield wiring, ECM
6	Glow plug(s) – circuit malfunction	Wiring, connector, glow plug(s), glow plug timer relay, ECM
9	Vehicle speed sensor (VSS) – signal	Wiring, connector, VSS, instrument panel
10	Fuel injection timing solenoid, in fuel injection pump – malfunction	Fuel filter, fuel pump, air in fuel system, fuel injection timing solenoid
10	Cruise control module – malfunction	Wiring, connectors, cruise control module



Scanner type	Fault location	Probable cause
11	Engine control module (ECM) – internal fault	ECM
12	Intake air temperature (IAT) sensor – malfunction	Wiring, connector, IAT sensor
15 	Engine control module (ECM) – supply voltage	Wiring, connectors, battery
15	Exhaust gas recirculation (EGR) solenoid – defective	Wiring, EGR solenoid
20	Cruise control module – malfunction	Wiring, connectors, cruise control module
21	Fuel quantity adjuster position sensor, in fuel injection pump – malfunction	Wiring, connector, fuel quantity adjuster position sensor
23	Battery voltage – too low	Wiring, alternator, battery
25	Glow plug timer relay – defective	Wiring, glow plug timer relay, ECM
27	Alarm system control module – circuit malfunction	Wiring, alarm system control module
28	Clutch pedal position (CPP) switch – malfunction	Wiring, connector, CPP switch
29	Vehicle speed sensor (VSS) – signal	Wiring, connector, VSS, instrument panel
31	Brake pedal position (BPP) switch – malfunction	Wiring, connector, BPP switch
35	Fuel temperature sensor, in fuel injection pump – circuit malfunction	Wiring, connector, fuel injection pump
36	Fuel filter warning lamp switch – water detected	Drain fuel filter
37	Accelerator pedal position (APP) sensor – malfunction	Wiring, connector, APP sensor
45	Alarm system control module – circuit malfunction	Wiring, alarm system control module
47	Engine speed (RPM) sensor – circuit malfunction	Wiring, connectors, flywheel ring gear damaged, air gap, RPM sensor
52	Intake air temperature (IAT) sensor – malfunction	Wiring, connector, IAT sensor
53	Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector, ECT sensor
54	Manifold absolute pressure (MAP) sensor, TC system – malfunction	Wiring, connector, intake leak, MAP sensor
56	Engine control module (ECM) – internal fault	ECM
58	Engine control module (ECM) – output stages	Wiring, ECM controlled components, ECM
59	Turbocharger (TC) boost pressure – low/high	Wiring, MAP sensor, hose(s), TC bypass valve, TC
129	Engine speed (RPM) sensor – circuit malfunction	Wiring, connectors, flywheel ring gear damaged, air gap, RPM sensor
130	Fuel temperature sensor, in fuel injection pump – circuit malfunction	Wiring, connector, fuel injection pump
132	Accelerator pedal position (APP) sensor – malfunction	Wiring, connector, APP sensor
133	Manifold absolute pressure (MAP) sensor, TC system – malfunction	Wiring, connector, intake leak, MAP sensor
134	Fuel quantity adjuster position sensor, in fuel injection pump/injector needle lift sensor – malfunction	Wiring, connector, fuel quantity adjuster position sensor, injector needle lift sensor, shield wiring
135	Turbocharger (TC) system – malfunction	Wiring, connectors, hoses, TC, TC bypass valve, MAP sensor, ECM



**BMW**

Model: 325td/tds (E36) • 525td/tds (E34)

Engine management

Scanner type	Fault location	Probable cause
136	Fuel quantity adjuster, in fuel injection pump – malfunction	Wiring, fuel quantity adjuster
142	Injector needle lift sensor – malfunction	Wiring, connector, air in fuel system, fuel leak, fuel level low, RPM sensor, injector needle lift sensor, shield wiring, ECM
144	Start of injection – malfunction	Wiring, fuel injection timing solenoid, fuel pressure, fuel filter
146	Brake pedal position (BPP) switch – malfunction	Wiring, connector, BPP switch
147	Barometric pressure (BARO) sensor, incorporated in ECM – malfunction	ECM
148	Fuel shut-off solenoid, in fuel injection pump – defective	Wiring, connector, fuel shut-off solenoid
149	Engine control module (ECM) – output stages	Wiring, ECM controlled components
150	Fuel filter warning lamp switch – water detected	Wiring, drain fuel filter
154	Clutch pedal position (CPP) switch – malfunction	Wiring, connector, CPP switch
300	Engine operation not possible	Wiring, connectors, mechanical fault, fuel system, pre-heating system, starting system
301	Irregular engine speed	Injector(s), fuel injection pump, fuel shut-off solenoid, air in fuel system, vehicle speed signal, accelerator pedal jammed
302	Engine performance, loss of power	Injector(s), air filter blocked, turbocharger (TC) boost pressure
303	Engine cuts out	Wiring, engine control relay, fuel shut-off solenoid, vehicle speed sensor (VSS), fuel quantity adjuster position sensor

1 →1992



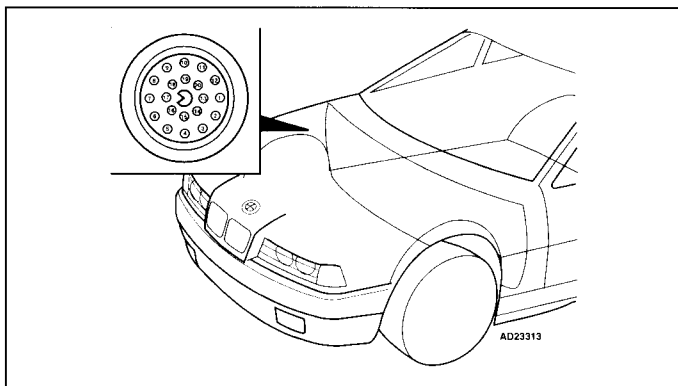
Model: 3 Series/Compact (E36) • 3 Series (E46)
520i (E34) • 5 Series (E39) • 7 Series (E38) • Z3
Year: 1992-00
Engine code: 19 4E/S 1, 20 6S 2/3/4, 25 6S 3/4, 28 6S 2, 35 8S 1/2,
35 8S 2, 44 8S 1/2, 54 12 1/2
System: Siemens MS40/41/42
Trouble codes: Scanner type

BMW

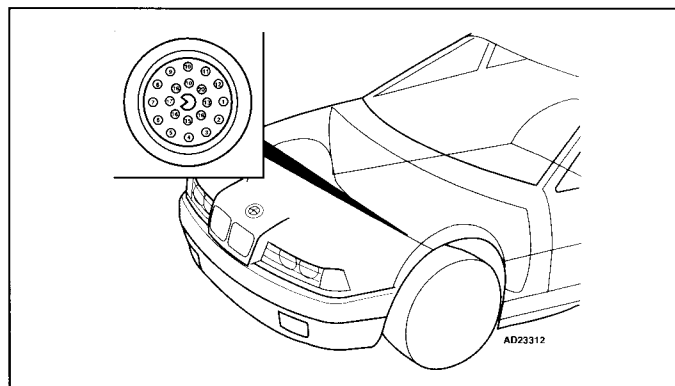


Engine management

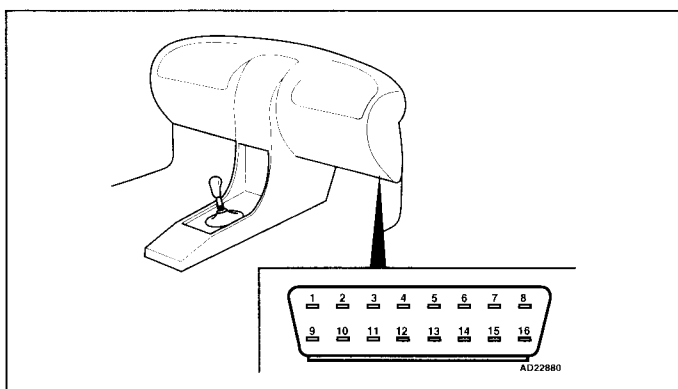
Data link connector (DLC) locations



Z3, 3 Series, 5 Series, 7 Series – engine bay RH side



3 Series Compact – engine bay LH side



3 Series (E46), Z3, 5 Series (E39) – 2000 →

Trouble codes

General information

- Refer to the front of this manual for general test conditions, terminology, detailed descriptions of wiring faults and a general trouble shooter for electrical and mechanical faults.

Accessing and erasing

- The engine control module (ECM) fault memory can only be accessed and erased using diagnostic equipment connected to the data link connector (DLC).

NOTE: Some models may have both DLCs fitted. DO NOT open 20-pin DLC while using 16-pin DLC.



**BMW**Model: 3 Series/Compact (E36) • 3 Series (E46) • 520i (E34)
5 Series (E39) • 7 Series (E38) • Z3**Engine management****Trouble code identification**

Scanner type	Fault location	Probable cause
–	Engine control module (ECM) – data exchange not possible	Wiring between DLC and ECM, supply voltage, engine control relay, DLC
0	Engine control module (ECM) – undefined fault	Disconnect ECM multi-plug for at least 10 min. – check if trouble code reappears before replacing ECM
00	No fault found	–
1	Ignition circuit, cyl. 1 – defective	Wiring, connector, ignition coil, ECM
	MS42: Ignition circuit, cyl. 2 – defective	Wiring, connector, ignition coil, ECM
2	MS41: Ignition circuit, cyl. 2 – defective	Wiring, connector, ignition coil, ECM
	Ignition circuit, cyl. 3 – defective	Wiring, connector, ignition coil, ECM
	MS42: Ignition circuit, cyl. 4 – defective	Wiring, connector, ignition coil, ECM
3	MS41: Ignition circuit, cyl. 4 – defective	Wiring, connector, ignition coil, ECM
	Ignition circuit, cyl. 5 – defective	Wiring, connector, ignition coil, ECM
	MS42: Ignition circuit, cyl. 6 – defective	Wiring, connector, ignition coil, ECM
5	MS41: Ignition circuit, cyl. 6 – defective	Wiring, connector, ignition coil, ECM
	Injector, cyl. 6 – circuit malfunction	Wiring, injector
	MS42: Injector, cyl. 2 – circuit malfunction	Wiring, injector
6	MS41: Injector, cyl. 2 – circuit malfunction	Wiring, injector
	Injector, cyl. 4 – circuit malfunction	Wiring, injector
	MS42: Injector, cyl. 1 – circuit malfunction	Wiring, injector
8	MS41: Injector, cyl. 1 – circuit malfunction	Wiring, injector
	Mass air flow (MAF) sensor/volume air flow (VAF) sensor – circuit malfunction	Wiring, connector(s), MAF sensor/VAF sensor
10	AC control module/ECM communication – malfunction	Wiring, AC control module
	MS42: Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector(s), ECT sensor
11	MS41/42: Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector(s), ECT sensor
	Evaporative emission (EVAP) pressure sensor – malfunction	Wiring, EVAP pressure sensor
12	Vehicle speed sensor (VSS) – incorrect/no signal	Wiring, instrument panel, VSS
	MS42: Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector(s), ECT sensor
14	MS41: Throttle position (TP) sensor – defective	Wiring, connector(s), TP sensor
	ECM/transmission control module (TCM) communication – short to earth	Wiring, ECM, TCM
	MS42: Intake air temperature (IAT) sensor – malfunction	Wiring, connector(s), IAT sensor
16	MS41: Intake air temperature (IAT) sensor – malfunction	Wiring, connector(s), IAT sensor
	AC control module – signal	Wiring, AC condenser blower motor relay, AC refrigerant high pressure switch, AC refrigerant low pressure switch, AC control module



Scanner type	Fault location	Probable cause
18	ECM/immobilizer control module communication – signal	Wiring, immobilizer control module
	MS42: Camshaft position (CMP) sensor 2 – circuit malfunction	Wiring, connector, CMP sensor
19	MS42: Camshaft position (CMP) actuator 2 – circuit malfunction	Wiring, connector, CMP actuator
20	Malfunction indicator lamp (MIL) – circuit malfunction	Wiring, bulb, ECM
21	Camshaft position (CMP) actuator – malfunction	Wiring, connector, CMP actuator
	MS42: Camshaft position (CMP) actuator 1 – circuit malfunction	Wiring, connector, CMP actuator
22	Injector, cyl. 3 – circuit malfunction	Wiring, injector
23	Injector, cyl. 1 – circuit malfunction	Wiring, injector
	MS42: Injector, cyl. 6 – circuit malfunction	Wiring, injector
24	MS41: Injector, cyl. 6 – circuit malfunction	Wiring, injector
	AC compressor clutch relay – malfunction	Wiring, AC compressor clutch relay
	MS42: Injector, cyl. 4 – circuit malfunction	Wiring, injector
25	MS41: Injector, cyl. 4 – circuit malfunction	Wiring, injector
	MS40/42: Oxygen sensor heater 1, bank 1 – circuit malfunction	Wiring, connector, engine control relay, HO2S, ECM
27	Idle speed control (ISC) actuator/idle air control (IAC) valve – malfunction	Wiring, connector(s), ISC actuator/IAC valve, ECM
29	Ignition circuit, cyl. 2 – defective	Wiring, connector, ignition coil, ECM
	MS42: Ignition circuit, cyl. 1 – defective	Wiring, connector, ignition coil, ECM
30	MS41: Ignition circuit, cyl. 1 – defective	Wiring, connector, ignition coil, ECM
	Ignition circuit, cyl. 4 – defective	Wiring, connector, ignition coil, ECM
	MS42: Ignition circuit, cyl. 3 – defective	Wiring, connector, ignition coil, ECM
31	MS41: Ignition circuit, cyl. 3 – defective	Wiring, connector, ignition coil, ECM
	Ignition circuit, cyl. 6 – defective	Wiring, connector, ignition coil, ECM
	MS42: Ignition circuit, cyl. 5 – defective	Wiring, connector, ignition coil, ECM
33	MS41: Ignition circuit, cyl. 5 – defective	Wiring, connector, ignition coil, ECM
	MS40/42: Injector, cyl. 5 – circuit malfunction	Wiring, injector
35	Secondary air injection (AIR) pump relay – malfunction	Wiring, connector, AIR pump relay
38	Clutch pedal position (CPP) switch – malfunction	Wiring, connector, CPP switch
39	Brake pedal position (BPP) switch – circuit malfunction	Wiring, connector, BPP switch
40	Brake pedal position (BPP) switch/throttle position (TP) sensor(s) – incorrect signal	Wiring, connector, BPP switch, TP sensor(s), ECM
42	Steering wheel multifunction switch – incorrectly coded	Wiring, connector, steering wheel multifunction switch
43	Steering wheel multifunction switch – malfunction	Wiring, spiral cable, steering wheel multifunction switch, ECM



**BMW**Model: 3 Series/Compact (E36) • 3 Series (E46) • 520i (E34)
5 Series (E39) • 7 Series (E38) • Z3**Engine management**

Scanner type	Fault location	Probable cause
45	Steering wheel multifunction switch – incorrect signal	Wiring, spiral cable, steering wheel multifunction switch, ECM
46	Fuel level signal	Fuel level low, wiring, fuel gauge tank sensor
49	Battery voltage – too low	Wiring, alternator, battery
50	Injector, cyl. 2 – circuit malfunction	Wiring, injector
	MS42: Evaporative emission (EVAP) canister purge valve – malfunction	Wiring, connector(s), EVAP canister purge valve
51	MS41: Evaporative emission (EVAP) canister purge valve – malfunction	Wiring, connector(s), EVAP canister purge valve
	Evaporative emission (EVAP) canister purge valve – malfunction	Wiring, connector(s), EVAP canister purge valve
52	Fuel pump relay – malfunction	Wiring, connector(s), fuel pump relay
	MS42: Exhaust gas control solenoid – malfunction	Wiring, connector, exhaust gas control solenoid
53	MS41: Exhaust gas control solenoid – malfunction	Wiring, connector, exhaust gas control solenoid
	Oxygen sensor heater – circuit malfunction	Wiring, connector, HO2S
	MS42: Idle air control (IAC) valve – circuit malfunction	Wiring, connector, IAC valve
55	MS41: Idle speed control (ISC) actuator/idle air control (IAC) valve – malfunction	Wiring, connector(s), ISC actuator/IAC valve, ECM
	Oxygen sensor heater 2 – circuit malfunction	Wiring, connector, engine control relay, HO2S, ECM
	MS42: Oxygen sensor heater 1, bank 2 – circuit malfunction	Wiring, connector, engine control relay, HO2S, ECM
56	Ignition signal resistor – defective	Wiring, ignition signal resistor
57	Knock sensor (KS) 1 – defective	Wiring, connector, KS incorrectly tightened, KS
59	Knock sensor (KS) 2 – defective	Wiring, connector, KS incorrectly tightened, KS
61	MS42: Oxygen sensor heater 2, bank 2 – circuit malfunction	Wiring, connector, engine control relay, HO2S, ECM
62	Ignition circuit – secondary circuit	Wiring, ignition coil(s)
	MS42: Secondary air injection (AIR) solenoid – defective	Wiring, connector, AIR solenoid
63	MS41: Secondary air injection (AIR) solenoid – defective	Wiring, connector, AIR solenoid
	Knock sensor (KS) 2 – defective	Wiring, connector, KS incorrectly tightened, KS
64	Knock sensor (KS) 1 – defective	Wiring, connector, KS incorrectly tightened, KS
65	Camshaft position (CMP) sensor – circuit malfunction	Wiring, connector, CMP sensor
	MS42: Camshaft position (CMP) sensor 1 – circuit malfunction	Wiring, connector, CMP sensor
68	Mass air flow (MAF) sensor/volume air flow (VAF) sensor – incorrect signal	Wiring, connector(s), MAF sensor/VAF sensor
	MS42: Evaporative emission (EVAP) canister purge valve – electrical fault	Wiring, connector, EVAP canister purge valve



Scanner type	Fault location	Probable cause
69	MS41: Evaporative emission (EVAP) canister purge valve – electrical fault	Wiring, connector, EVAP canister purge valve
	MS40/42: Fuel pump relay – malfunction	Wiring, connector(s), fuel pump relay
74	AC compressor clutch relay – malfunction	Wiring, AC compressor clutch relay
75	Heated oxygen sensor (HO2S) – circuit malfunction	Wiring, connector(s), HO2S
76	MS41: Heated oxygen sensor (HO2S) 1 – circuit malfunction	Wiring, connector(s), HO2S, ECM
	Heated oxygen sensor (HO2S) 2 – circuit malfunction	Wiring, connector(s), HO2S, ECM
77	Throttle position (TP) sensor – defective	Wiring, connector(s), TP sensor
79	Crankshaft position (CKP) sensor/engine speed (RPM) sensor – incorrect/no signal	Wiring, CKP sensor/RPM sensor
	MS42: Oxygen sensor heater 2, bank 1 – circuit malfunction	Wiring, connector, engine control relay, HO2S, ECM
80	Engine control module (ECM)/ABS control module communication, ASR system	Wiring, electrical interference, ABS trouble code(s) stored, ECM
81	Engine coolant temperature (ECT) sensor – malfunction	Wiring, connector(s), ECT sensor
82	MS41: Engine control module (ECM)/ABS control module communication, ASR system	Wiring, electrical interference, ABS trouble code(s) stored, ECM
	Engine control module (ECM)/ABS control module communication, ASR system	Wiring, electrical interference, ABS trouble code(s) stored, ECM
83	Crankshaft position (CKP) sensor/engine speed (RPM) sensor – circuit malfunction	Wiring, connector, CKP sensor/RPM sensor
84	Camshaft position (CMP) sensor – range/performance problem	Wiring, CMP sensor
85	Intake air temperature (IAT) sensor – malfunction	Wiring, connector(s), IAT sensor
97	Evaporative emission (EVAP) canister purge valve – mechanical fault	EVAP canister purge valve
98	Idle speed control (ISC) actuator/idle air control (IAC) valve – mechanical fault	ISC actuator/IAC valve
99	Heated oxygen sensor (HO2S) – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, evaporative emission (EVAP) canister purge valve, injector(s), HO2S, ECM
100	Engine control module (ECM) – defective	Disconnect ECM multi-plug for at least 10 min. – check if trouble code reappears before replacing ECM
103	Camshaft position (CMP) actuator 1 – malfunction	Wiring, connector(s), mechanical fault, engine control relay, CMP actuator, ECM
104	Camshaft position (CMP) actuator 2 – malfunction	Wiring, connector(s), mechanical fault, engine control relay, CMP actuator, ECM
105	Camshaft position (CMP) actuator 1 – malfunction	Wiring, connector(s), mechanical fault, engine control relay, CMP actuator, ECM
106	Camshaft position (CMP) actuator 2 – malfunction	Wiring, connector(s), mechanical fault, engine control relay, CMP actuator, ECM
109	Throttle control unit – range/performance problem	Wiring, connector(s), throttle control unit, ECM



**BMW**

Model: 3 Series/Compact (E36) • 3 Series (E46) • 520i (E34)
5 Series (E39) • 7 Series (E38) • Z3

Engine management

Scanner type	Fault location	Probable cause
110	Throttle control unit/accelerator pedal position (APP) sensor 1 – range/performance problem	Wiring, connector(s), throttle control unit, ECM
111	Throttle control unit/accelerator pedal position (APP) sensor 2 – range/performance problem	Wiring, connector(s), throttle control unit, ECM
112	Throttle control unit/throttle position (TP) sensor 1 – range/performance problem	Wiring, connector(s), throttle control unit, ECM
113	Throttle control unit/throttle position (TP) sensor 2 – range/performance problem	Wiring, connector(s), throttle control unit, ECM
114	Throttle control unit/throttle position motor – circuit malfunction	Wiring, connector(s), throttle control unit, ECM
115	Throttle control unit/APP sensor 1/ TP sensor 1 – supply voltage	Wiring, connector(s), throttle control unit, ECM
116	Throttle control unit/APP sensor 1/ TP sensor 1 – supply voltage	Wiring, connector(s), throttle control unit, ECM
117	Throttle control unit/APP sensor 1/2 – malfunction	Wiring, connector(s), throttle control unit, ECM
118	Throttle control unit/TP sensor 1/2 – malfunction	Wiring, connector(s), throttle control unit, ECM
119	Throttle control unit/throttle valve – mechanical fault	Throttle valve, throttle control unit
120	Throttle control unit – malfunction	Wiring, connector(s), throttle control unit, ECM
122	Engine oil temperature sensor – malfunction	Wiring, connector(s), engine oil temperature sensor, ECM
123	Engine cooling system – circuit malfunction	Wiring, connector(s), engine coolant thermostat, ECT sensor, engine coolant blower motor temperature sensor, engine coolant blower motor, ECM
124	Intake manifold air control solenoid – circuit malfunction	Wiring, connector(s), intake manifold air control solenoid, ECM
125	Engine coolant blower motor – circuit malfunction	Wiring, connector(s), engine coolant blower motor, ECM
128	Immobilizer control module – malfunction	Wiring, connector(s), immobilizer control module, ECM
130	CAN data bus, ABS/ASR – defective	Wiring, connector(s), ABS control module/traction control module
131	CAN data bus, instrumentation – defective	Wiring, connector(s), instrument panel
132	CAN data bus, instrumentation – defective	Wiring, connector(s), instrument panel
133	CAN data bus, ABS/ASR – defective	Wiring, connector(s), ABS control module/traction control module
140	Fuel system leak detection pump motor – malfunction	Wiring, connector(s), fuel system leak detection pump motor, ECM
141	Fuel system leak detection pump motor – malfunction	Wiring, connector(s), fuel system leak detection pump motor, ECM
142	Fuel system leak detection pump motor – malfunction	Wiring, connector(s), fuel system leak detection pump motor, ECM
143	Fuel system leak detection pump motor – hose(s) blocked	Hose(s), fuel system leak detection pump motor
144	Fuel system leak detection pump motor – leak detected	Hose(s), fuel system leak detection pump motor
145	Fuel system leak detection pump motor – leak detected	Hose(s), fuel system leak detection pump motor



Scanner type	Fault location	Probable cause
146	Fuel system leak detection pump motor – leak detected	Hose(s), fuel system leak detection pump motor
149	Mass air flow (MAF) sensor/throttle valve – plausibility	Wiring, connector(s), MAF sensor, throttle control unit/throttle valve, ECM
150	Heated oxygen sensor (HO2S) 1, bank 1 – high voltage	Wiring, connector(s), HO2S
151	Heated oxygen sensor (HO2S) 1, bank 1 – low voltage	Wiring, connector(s), HO2S
152	Heated oxygen sensor (HO2S) 1, bank 1 – no signal	Wiring, connector(s), HO2S
153	Heated oxygen sensor (HO2S) 1, bank 2 – high voltage	Wiring, connector(s), HO2S
154	Heated oxygen sensor (HO2S) 1, bank 2 – low voltage	Wiring, connector(s), HO2S
155	Heated oxygen sensor (HO2S) 1, bank 2 – no signal	Wiring, connector(s), HO2S
156	Heated oxygen sensor (HO2S) 2, bank 1 – high voltage	Wiring, connector(s), HO2S
157	Heated oxygen sensor (HO2S) 2, bank 1 – low voltage	Wiring, connector(s), HO2S
159	Heated oxygen sensor (HO2S) 2, bank 2 – high voltage	Wiring, connector(s), HO2S
160	Heated oxygen sensor (HO2S) 2, bank 2 – low voltage	Wiring, connector(s), HO2S
168	Engine coolant thermostat – mechanical fault	Engine coolant thermostat
169	Throttle control unit – malfunction	Wiring, connector(s), mechanical fault, throttle control unit, ECM
170	Engine control module (ECM)/throttle control unit – plausibility	Wiring, connector(s), mechanical fault, throttle control unit, ECM
171	Throttle control unit – plausibility	Wiring, connector(s), throttle control unit, ECM
172	Throttle control unit/accelerator pedal position (APP) sensor 1/2 – circuit malfunction	Wiring short to earth/positive, connector(s), throttle control unit, ECM
172	Throttle control unit/throttle position (TP) sensor 1/2 – circuit malfunction	Wiring short to earth/positive, connector(s), throttle control unit, ECM
173	Throttle control unit/throttle position (TP) sensor 1/2 – circuit malfunction	Wiring short to earth/positive, connector(s), throttle control unit, ECM
174	Throttle control unit/throttle position (TP) sensor 1/2 – malfunction	Wiring, connector(s), throttle control unit, ECM
175	Throttle control unit – malfunction	Wiring, connector(s), throttle control unit, ECM
176	Throttle control unit/accelerator pedal position (APP) sensor 2 – malfunction	Wiring, connector(s), throttle control unit, ECM
186	Heated oxygen sensor (HO2S) 1, bank 1 – malfunction	Wiring, connector(s), HO2S
187	Heated oxygen sensor (HO2S) 1, bank 2 – malfunction	Wiring, connector(s), HO2S
188	Heated oxygen sensor (HO2S) 1, bank 1 – range/performance problem	Wiring, connector(s), HO2S



**BMW**Model: 3 Series/Compact (E36) • 3 Series (E46) • 520i (E34)
5 Series (E39) • 7 Series (E38) • Z3**Engine management**

Scanner type	Fault location	Probable cause
189	Heated oxygen sensor (HO2S) 1, bank 2 – range/performance problem	Wiring, connector(s), HO2S
190	Heated oxygen sensor (HO2S) 2, bank 1 – range/performance problem	Wiring, connector(s), HO2S
191	Heated oxygen sensor (HO2S) 2, bank 2 – range/performance problem	Wiring, connector(s), HO2S
200	Engine control module (ECM) – defective	Disconnect ECM multi-plug for at least 5 min. – check if trouble code reappears before replacing ECM
201	MS41: Heated oxygen sensor (HO2S) 1 – circuit malfunction	Wiring, connector(s), HO2S
	Heated oxygen sensor (HO2S) 2 – circuit malfunction	Wiring, connector(s), HO2S
202	Heated oxygen sensor (HO2S), cyl. 1-3 – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, evaporative emission (EVAP) canister purge valve, injector(s), HO2S, ECM
203	Heated oxygen sensor (HO2S), cyl. 4-6 – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, evaporative emission (EVAP) canister purge valve, injector(s), HO2S, ECM
204	Idle speed control (ISC) actuator/idle air control (IAC) valve – idle speed incorrect	Intake leak, ISC actuator/IAC valve, TP sensor, throttle valve
208	Immobilizer control module/engine control module (ECM) – plausibility	Wiring, immobilizer control module, ECM
209	Immobilizer control module – incorrect signal	Wiring, incorrectly coded, immobilizer control module
210	Misfire detected – more than 2 cylinders	Wiring, ignition coils, spark plugs, ignition signal resistor, ECM
211	Idle speed control (ISC) actuator/idle air control (IAC) valve – mechanical fault	ISC actuator/IAC valve
212	Camshaft position (CMP) actuator – mechanical fault	Camshaft timing mechanism, CMP actuator
214	Vehicle speed sensor (VSS) – signal	Wiring, ECM/ABS control module communication, electrical interference, ABS trouble code(s) stored, ECM
215	Engine control module (ECM)/ABS control module communication – plausibility	Wiring, electrical interference, ABS trouble code(s) stored, ECM
	MS42: Heated oxygen sensor (HO2S) 2, bank 1 – no signal	Wiring, connector(s), HO2S
216	CAN data bus, TCM – signal	Wiring, transmission range (TR) switch, electrical interference, TCM, ECM
	MS42: Heated oxygen sensor (HO2S) 2, bank 2 – no signal	Wiring, connector(s), HO2S
217	CAN data bus, TCM – no data transmission	Wiring, electrical interference, TCM
218	CAN data bus, ECM	Wiring
219	CAN data bus, ECM	Wiring
220	Heated oxygen sensor (HO2S) 2, bank 1 – malfunction	Wiring, connector(s), HO2S
221	Heated oxygen sensor (HO2S) 2, bank 2 – malfunction	Wiring, connector(s), HO2S



Scanner type	Fault location	Probable cause
222	Lambda regulation – defective	Engine coolant temperature (ECT) sensor, oxygen sensor heater circuit, HO2S, ECM
	MS42: CAN data bus, instrument panel/engine coolant temperature – plausibility	Wiring, instrument panel, engine coolant temperature (ECT) sensor, instrument panel
223	Heated oxygen sensor (HO2S) 2, bank 1 – malfunction	Wiring, connector(s), HO2S
224	Heated oxygen sensor (HO2S) 2, bank 1 – malfunction	Wiring, connector(s), HO2S
225	Heated oxygen sensor (HO2S) control, bank 1 – plausibility	Wiring, connector(s), intake/exhaust leak, catalytic converter, HO2S, ECM
226	Heated oxygen sensor (HO2S) control, bank 2 – plausibility	Wiring, connector(s), intake/exhaust leak, catalytic converter, HO2S, ECM
227	Mixture control (MC), cyl. 1-3 – range/performance problem	Wiring, fuel level low, fuel pressure, intake/exhaust leak, MAF sensor/MAF sensor, injector(s), HO2S, EVAP canister purge valve, ECT sensor, ECM
228	Mixture control (MC), cyl. 4-6 – range/performance problem	Wiring, fuel level low, fuel pressure, intake/exhaust leak, MAF sensor/MAF sensor, injector(s), HO2S, EVAP canister purge valve, ECT sensor, ECM
229	Heated oxygen sensor (HO2S) 1 – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, EVAP canister purge valve, injector(s), HO2S, ECM
	MS42: Heated oxygen sensor (HO2S) 1, bank 1 – range/performance problem	Wiring, connector(s), intake/exhaust leak, fuel level low, fuel pressure, EVAP canister purge valve, injector(s), HO2S, ECM
230	Heated oxygen sensor (HO2S) 2 – range/performance problem	Wiring, intake/exhaust leak, fuel level low, fuel pressure, EVAP canister purge valve, injector(s), HO2S, ECM
	MS42: Heated oxygen sensor (HO2S) 1, bank 2 – range/performance problem	Wiring, connector(s), intake/exhaust leak, fuel level low, fuel pressure, EVAP canister purge valve, injector(s), HO2S, ECM
231	Heated oxygen sensor (HO2S) 1 – malfunction	Wiring, connector(s), HO2S
	MS42: Heated oxygen sensor (HO2S) 1, bank 1 – malfunction	Wiring, connector(s), HO2S
232	Heated oxygen sensor (HO2S) 2 – malfunction	Wiring, HO2S
	MS42: Heated oxygen sensor (HO2S) 1, bank 2 – malfunction	Wiring, connector(s), HO2S
233	Catalytic converter system, bank 1 – efficiency	Wiring, HO2S, ECM
234	Catalytic converter system, bank 2 – efficiency	Wiring, HO2S, ECM
235	Heated oxygen sensor (HO2S) control, bank 1 – malfunction	Wiring, connector(s), intake/exhaust leak, catalytic converter, HO2S, ECM
236	Heated oxygen sensor (HO2S) control, bank 2 – malfunction	Wiring, connector(s), intake/exhaust leak, catalytic converter, HO2S, ECM
238	Combustion failure – cyl. 1	Wiring, ignition/fuel system, ECM
239	Combustion failure – cyl. 2	Wiring, ignition/fuel system, ECM
240	Combustion failure – cyl. 3	Wiring, ignition/fuel system, ECM
241	Combustion failure – cyl. 4	Wiring, ignition/fuel system, ECM
242	Combustion failure – cyl. 5	Wiring, ignition/fuel system, ECM
243	Combustion failure – cyl. 6	Wiring, ignition/fuel system, ECM
244	Engine speed (RPM) sensor/crankshaft position (CKP) sensor – circuit malfunction	Wiring, connector, mechanical fault, RPM sensor/CKP sensor, ECM



**BMW**Model: 3 Series/Compact (E36) • 3 Series (E46) • 520i (E34)
5 Series (E39) • 7 Series (E38) • Z3**Engine management**

Scanner type	Fault location	Probable cause
245	Secondary air injection (AIR) system – bank 1	Wiring, connector(s), AIR pump relay, AIR solenoid
246	Secondary air injection (AIR) system – bank 2	Wiring, connector(s), AIR pump relay, AIR solenoid
247	Secondary air injection (AIR) solenoid – mechanical fault	AIR solenoid
248	Heated oxygen sensor (HO2S) 2, bank 1 – malfunction	Wiring, connector(s), HO2S
249	Heated oxygen sensor (HO2S) 2, bank 2 – malfunction	Wiring, connector(s), HO2S
250	Fuel tank vent valve – malfunction	Wiring, connector(s), fuel tank vent valve, ECM
251	Fuel tank vent system – malfunction	Wiring, hoses, fuel tank vent valve
252	Fuel tank vent system – malfunction	Wiring, hoses, fuel tank vent valve
253	Evaporative emission (EVAP) canister purge valve – mechanical fault	EVAP canister purge valve
254	Fuel tank vent system – leak detected	Hose(s), fuel tank vent valve
255	Evaporative emission (EVAP) canister purge valve – mechanical fault	EVAP canister purge valve



Model: 3 Series/Compact (E36) • 3 Series (E46)
5 Series (E39) • 7 Series (E38) • Z3
8 Series (E31) • X5 4,4 (E53)

Year: 1991-04

Engine code: 16 4E3, 19 4E/S 1, 20 6S 2/3/4, 25 6S 3/4, 28 6S 2, 35
8S 1/2, 35 8S 2, 44 8S 1/2, 54 12 1/2

System: Siemens MS41/42 • Bosch Motronic M5.2
Bosch BMS46 • Bosch ME7.2

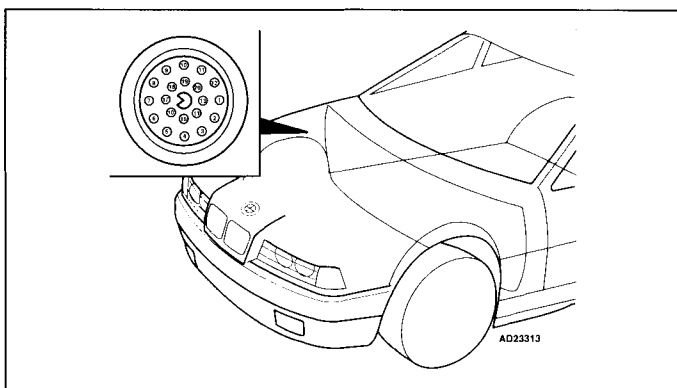
Trouble codes: EOBD type

BMW

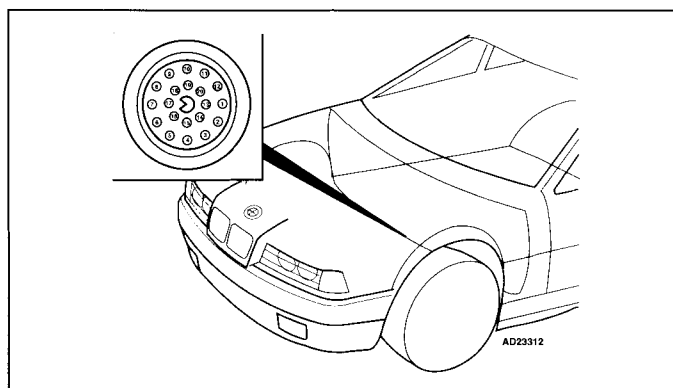


Engine management

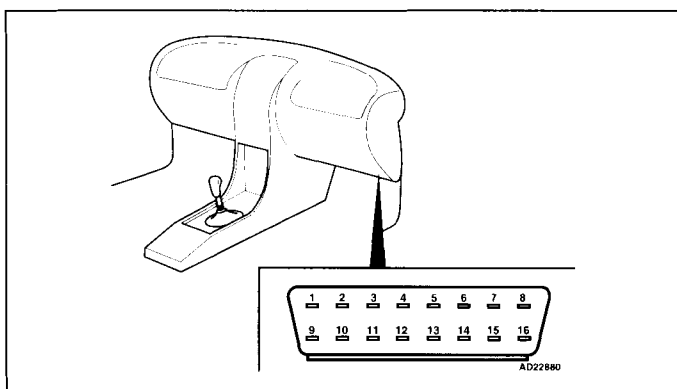
Data link connector (DLC) locations



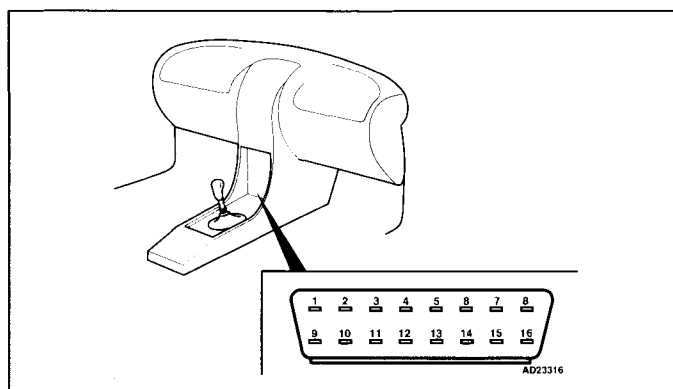
Z3, 3 Series, 5 Series, 7 Series, 8 Series – →1999 – engine bay RH side



3 Series Compact, X5 – engine bay LH side



3 Series (E46), Z3, 5 Series (E39), X5 – 2000 →



7 Series – 2000 →

Trouble codes

General information

- Refer to the front of this manual for general test conditions, terminology, detailed descriptions of wiring faults and a general trouble shooter for electrical and mechanical faults.

Accessing and erasing

- The engine control module (ECM) fault memory can only be accessed and erased using diagnostic equipment connected to the data link connector (DLC).

NOTE: Some models may have both DLCs fitted. DO NOT open 20-pin DLC while using 16-pin DLC.

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Model: 3 Series/Compact (E36) • 3 Series (E46) • 5 Series (E39)
7 Series (E38) • Z3 • 8 Series (E31) • X5 4,4i (E53)

Engine management**Trouble code identification**

EOBD type	Fault location	Probable cause
P0	Refer to EOBD trouble code table	–
P1140	Mass air flow (MAF) sensor/throttle position (TP) sensor communication – plausibility	Wiring, MAF sensor/TP sensor, ECM
P1161	Engine oil temperature (EOT) sensor – range/performance problem	Wiring, connector, EOT sensor, ECM
P1174	Fuel trim (FT), bank 1 – range/performance problem	Wiring, connectors, intake/fuel system, injectors, HO2S, MAF sensor, ECT sensor, EVAP canister purge valve, ECM
P1176	Heated oxygen sensor (HO2S) 1, bank 1 – slow response	Wiring, HO2S
P1186	Heated oxygen sensor (HO2S) 2, bank 2 – heater circuit malfunction	Wiring, connector, fuel pump relay, HO2S
P1188	Fuel trim (FT), bank 1 – range/performance problem	Wiring, connectors, intake/fuel system, injectors, HO2S, MAF sensor, ECT sensor, EVAP canister purge valve, ECM
P1270	Engine torque difference bank 1 to 2 – malfunction	Trouble code(s) stored, intake leak, mechanical fault, electronic throttle system (ETS)
P1383	Ignition circuit – malfunction	Wiring, connectors, spark plug(s), ignition coil(s)
P1386	Knock sensor(s) (KS) – circuit malfunction	Wiring, connector, KS incorrectly tightened, KS
P1396	Crankshaft position (CKP) sensor/engine speed (RPM) sensor 1 & 2 – faulty signal	CKP/RPM sensor(s), excessive crankshaft clearance, flywheel ring gear damaged
P1423	Secondary air injection (AIR) system, bank 1 – insufficient flow detected	Hose connection(s), AIR valve, AIR pump
P1453	Secondary air injection (AIR) system, bank 1 – electrical fault	Wiring, connectors, AIR pump relay, AIR pump
P1470	Evaporative emission (EVAP) canister purge valve – ECM output stage	Wiring, EVAP canister purge valve, ECM
P1475	Evaporative emission (EVAP) system – malfunction	Wiring, connector, EVAP canister purge valve relay, EVAP canister purge valve, ECM
P1509	Idle speed control (ISC) actuator – malfunction	Wiring, ISC actuator
P1511	Intake manifold air control solenoid – circuit malfunction	Wiring, connector, intake manifold air control solenoid
P1519	MS40/41/42/46/M5.2: Inlet camshaft control system, end position – plausibility	Wiring, connector, camshaft position (CMP) sensor, crankshaft position (CKP) sensor, ECM
	ME7.2: Inlet camshaft control system, bank 1 – plausibility	Wiring, connector, mechanical fault, camshaft position (CMP) actuator, camshaft position (CMP) sensor(s), crankshaft position (CKP) sensor, ECM
P1520	Exhaust camshaft control system, end position – plausibility	Wiring, connector, camshaft position (CMP) sensor, crankshaft position (CKP) sensor, ECM
P1522	Inlet camshaft control system, camshaft position – plausibility	Wiring, connector, camshaft position (CMP) actuator, ECM
	ME7.2: Inlet camshaft control system, bank 2 – plausibility	Wiring, connector, mechanical fault, camshaft position (CMP) actuator, camshaft position (CMP) sensor(s), crankshaft position (CKP) sensor, ECM
P1523	Exhaust camshaft control system, camshaft position – plausibility	Wiring, connector, camshaft position (CMP) actuator, ECM
P1525	Camshaft position (CMP) actuator, inlet camshaft – ECM output stage	Wiring, connector, CMP actuator, ECM
	ME7.2: Inlet camshaft control system, bank 1 – ECM output stage	Wiring, connectors, CMP actuator, ECM

Model: 3 Series/Compact (E36) • 3 Series (E46) • 5 Series (E39)
7 Series (E38) • Z3 • 8 Series (E31) • X5 4,4i (E53)

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Engine management

EOBD type	Fault location	Probable cause
P1526	Inlet camshaft control system, bank 2 – ECM output stage	Wiring, connectors, CMP actuator, ECM
P1529	Camshaft position (CMP) actuator, exhaust camshaft – ECM output stage	Wiring, connector, CMP actuator, ECM
P1550	Idle speed control (ISC) actuator – malfunction	Wiring, ISC actuator
P1585	Random/multiple cylinder(s) – misfire detected	Fuel level low, ignition/fuel system, injector(s), intake leak, mechanical fault
P1589	Knock sensor(s) (KS) – circuit malfunction	Wiring, connector, KS incorrectly tightened, KS
P1593	Intake manifold air control solenoid – ECM output stage	Wiring, intake manifold air control solenoid, ECM
P1622	Engine coolant temperature (ECT) sensor, ECM controlled cooling system – ECM output stage	Wiring, ECT sensor, ECM
P1690	Malfunction indicator lamp (MIL) – circuit malfunction	Wiring, MIL

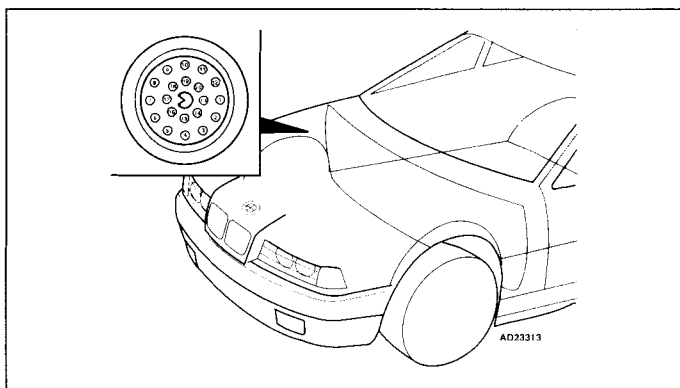


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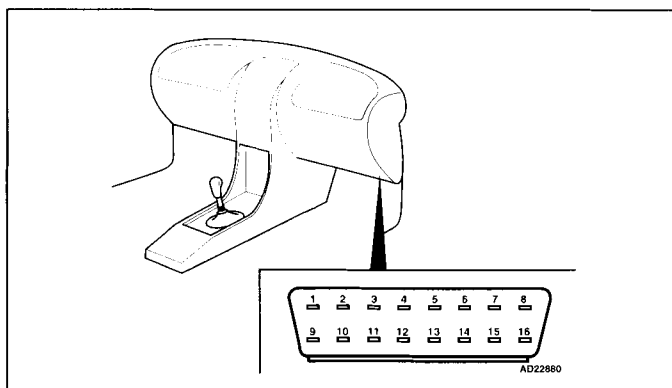
Model: 3 Series (E36) • 5 Series (E34) • 5 Series (E39)
7 Series (E32/E38) • 8 Series (E31)
Year: 1987-02
System: GS 1.2/21/22/26/27 (4 HP-22/24)
GS 4.14/15/16/19/21 (A4S 310R)
GS 7.1 (A5S 310Z) • GS 9.2 (A5S 560Z)

Transmission

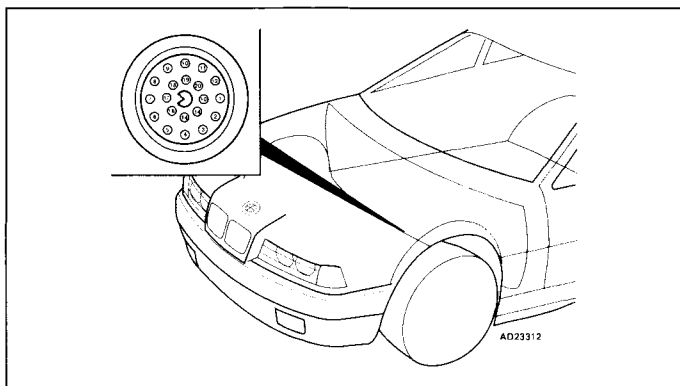
Data link connector (DLC) locations



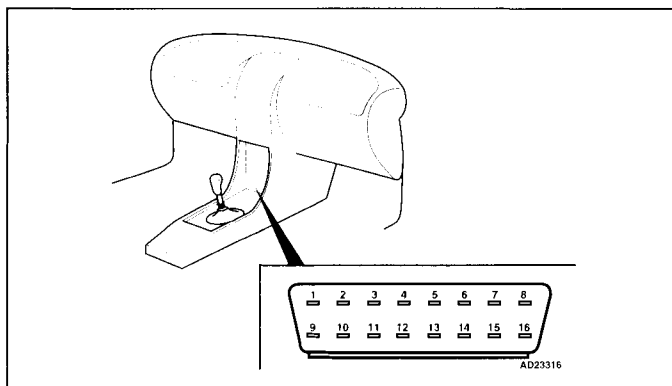
3 Series, 5 Series – →2000, 7 Series (E38) – →2000,
8 Series – engine bay RH side



5 Series (E39) – 2000→



7 Series (E32), Compact – engine bay LH side



7 Series (E38) – 2000→

Trouble codes

General information

- Refer to the front of this manual for general test conditions, terminology, detailed descriptions of wiring faults and a general trouble shooter for electrical and mechanical faults.

Accessing and erasing

- The transmission control module (TCM) fault memory can only be accessed and erased using diagnostic equipment connected to the data link connector (DLC).



Trouble code identification

Scanner type	Fault location	Probable cause
1	Transmission control module (TCM) – internal fault	TCM
1 1	Transmission park position interlock solenoid – electrical fault	Wiring, solenoid valve
1 2	Pressure control (PC) solenoid 2 – electrical fault	Wiring, solenoid valve
2	Transmission control module (TCM) – EPROM error	TCM
2 1	Transmission mode selection switch – defective	Wiring, transmission mode selection switch
2 3	Transmission park position interlock solenoid – electrical fault	Wiring, solenoid valve
2 2	Transmission park position interlock solenoid – electrical fault	Wiring, solenoid valve
3	Transmission kick-down switch – defective	Wiring, transmission kick-down switch
3 3	Solenoid valve 5 – electrical fault	Wiring, solenoid valve
4	Transmission mode selection switch – defective	Wiring, transmission mode selection switch
4 1	ECM/TCM communication – ignition timing adjustment/torque reduction	Wiring, ECM
4 3	Torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve
4 2	Pressure control (PC) solenoid 4 – electrical fault	Wiring, solenoid valve
5	ETS control module/TCM communication, APP sensor – signal	Wiring, APP sensor, TP sensor
5 3	Pressure control (PC) solenoid – electrical fault	Wiring, solenoid valve
5 2	Pressure control (PC) solenoid 1 – electrical fault	Wiring, solenoid valve
6	Solenoid valve 1 – electrical fault	Wiring, solenoid valve
7	Solenoid valve 2 – electrical fault	Wiring, solenoid valve
8 4	Solenoid valve 1 & 2 – electrical fault	Wiring, solenoid valves
8	Transmission range (TR) switch – malfunction	Wiring, TR switch
9 4	Transmission park position interlock solenoid – electrical fault	Wiring, solenoid valve
9 1	ECM/TCM communication – injection signal	Wiring, ECM
9	Transmission range (TR) switch – malfunction	Wiring, TR switch
10	Solenoid valve 1/transmission park position interlock solenoid – electrical fault	Wiring, solenoid valves
11	Solenoid valve 2/transmission park position interlock solenoid – electrical fault	Wiring, solenoid valves
11 1	ECM/TCM communication – no RPM signal	Wiring
12 4	Solenoid valve 1 & 2/transmission park position interlock solenoid – electrical fault	Wiring, solenoid valves
12	Transmission mode selection switch – defective	Wiring, transmission mode selection switch
13	Torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve
14	Solenoid valve 1/torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve(s)
15	Solenoid valve 2/torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve(s)
16	Solenoid valve 1 & 2/torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve(s)
16 3	Output shaft speed (OSS)/engine speed signal – plausibility	Wiring, output shaft speed (OSS) sensor, RPM sensor

**BMW**Model: 3 Series (E36) • 5 Series (E34) • 5 Series (E39)
7 Series (E32/E38) • 8 Series (E31)

Transmission

Scanner type	Fault location	Probable cause
16 2	Turbine shaft speed (TSS) sensor – no signal	Wiring, TSS sensor
17	Transmission park position interlock solenoid/torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve(s)
18 4	Solenoid valve 1/transmission park position interlock solenoid/torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve(s)
18	Transmission kick-down switch – defective	Wiring, transmission kick-down switch
19 4	Solenoid valve 2/transmission park position interlock solenoid/torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve(s)
19	ECM/TCM communication – ASR function	Wiring, trouble code(s) stored in other system(s)
20	Solenoid valves/pressure control (PC) solenoid – supply voltage	Wiring, solenoid valves
20 1	ECM/TCM communication – no VSS/RPM signal above approximately 2700 rpm	Wiring
21	ECM/TCM communication – no RPM signal	Wiring
22 4	Pressure control (PC) solenoid – electrical fault	Wiring, solenoid valve
22	Transmission fluid temperature (TFT) sensor – defective	Wiring, TFT sensor, transmission overloaded
23	ECM/TCM communication – ignition timing adjustment	Wiring
23 1	Transmission range (TR) switch – malfunction	Wiring, TR switch
24	ECM/TCM communication, no VSS/RPM signal – downshift protection	Wiring
25	ECM/TCM communication – maximum RPM exceeded	Wiring, ECM
26 4	ECM/TCM communication – injection signal	Wiring, ECM
26	Battery – supply voltage	Wiring, battery, alternator
27	Output shaft speed (OSS) sensor – no signal	Wiring to VSS, RPM sensor, TCC lock-up solenoid
28 5	Transmission warning lamp – circuit malfunction	Wiring, connector, instrument panel
28 1	Battery – supply voltage	Wiring, battery, alternator
29 5	Transmission control module (TCM) – internal fault	TCM
29	Pressure control (PC) solenoid 3 – electrical fault	Wiring, solenoid valve
30	Battery – supply voltage	Wiring, battery, alternator
30 ■	Transmission kick-down switch – defective	Wiring, transmission kick-down switch
30 6	Solenoid valve 1 – electrical fault	Wiring, solenoid valve
31	Transmission range (TR) switch – malfunction	Wiring, TR switch
31 ■	Solenoid valve 4 – electrical fault	Wiring, solenoid valve
32	Solenoid valve 3 – electrical fault	Wiring, solenoid valve
33	Solenoid valve 2 – electrical fault	Wiring, solenoid valve
35	ECM/TCM communication – TP signal	Wiring between ECM/TCM or TP sensor/ECM
36	Transmission range (TR) switch – malfunction	Wiring, TR switch
36 2	Transmission range (TR) switch – open circuit/short to earth	Wiring, TR switch
37	Battery – supply voltage low/high	Wiring, battery
38	Torque converter clutch (TCC) lock-up solenoid – electrical fault	Wiring, solenoid valve
40	Pressure control (PC) solenoid – electrical fault	Wiring, solenoid valve



Scanner type	Fault location	Probable cause
40 3	ECM/TCM communication – ignition timing adjustment/torque reduction	Wiring, ECM trouble code(s) stored
41	ECM/TCM communication – injection signal	Wiring, ECM
42	ECM/TCM communication – no VSS/RPM signal above approximately 2700 rpm	Wiring
42 2	Output shaft speed (OSS) sensor – malfunction	Wiring, electrical interference, OSS sensor
43	Solenoid valve 2 – electrical fault	Wiring, solenoid valve
43 3	ECM/TCM communication – no RPM signal	Wiring
45	Solenoid valve, brake band – electrical fault	Wiring, solenoid valve
48	Solenoid valve 1 – electrical fault	Wiring, solenoid valve
51	Pressure control (PC) solenoid 5 – electrical fault	Wiring, solenoid valve
52	Solenoid valves/pressure control (PC) solenoid – supply voltage	Wiring, solenoid valve(s)
53	Solenoid valves – supply voltage	Wiring
54 1	Solenoid valves – electrical fault	Earth wire
54	Battery – supply voltage low/high	Wiring, battery
55	ECM/TCM communication – TP signal	Wiring between ECM/TCM or TP sensor/ECM
100	Output shaft speed (OSS)/engine speed signal – plausibility	Solenoid valves, valve body, OSS sensor
101 1	ECM/TCM communication, RPM signal – downshift protection	Wiring, TCM
101	Transmission control module (TCM) – EPROM error	TCM
102 1	ECM/TCM communication – maximum RPM exceeded	Wiring, ECM
102	Transmission control module (TCM) – EPROM error	TCM
103	Transmission control module (TCM) – EPROM error	TCM
103 3	Transmission system relay – defective	Wiring, transmission system relay
103 2	Solenoid valves – supply voltage	Wiring, transmission system relay
104	ECM/TCM communication, ECT sensor – malfunction	Wiring, ECT sensor
104 ■	ECM/TCM communication – maximum RPM exceeded	Wiring, ECM
105	ECM/TCM communication, TP sensor – malfunction	Wiring, TP sensor
150	CAN data bus – malfunction	Wiring, TCM
151	CAN data bus – malfunction	Wiring, TCM
152	CAN data bus, TCM	Wiring, TCM
152 2	CAN data bus – malfunction	Wiring, TCM
153	CAN data bus, test – malfunction	Wiring
153 ■	CAN data bus, TCM	Wiring, TCM
155	ECM/TCM communication, engine load signal – malfunction	Wiring, MAF sensor, trouble code(s) stored in other system(s), ECM
156	ECM/TCM communication, engine torque signal – malfunction	Wiring, trouble code(s) stored in other system(s), ECM, TCM
157	ECM/TCM communication, ECT sensor – malfunction	Wiring, ECT sensor, ECM
200 4	ETS control module/TCM communication – no kick-down function	Wiring, APP sensor, transmission kick-down switch

**BMW**

Model: 3 Series (E36) • 5 Series (E34) • 5 Series (E39)
7 Series (E32/E38) • 8 Series (E31)

Transmission

Scanner type	Fault location	Probable cause
200	Transmission kick-down switch – defective	Wiring, transmission kick-down switch
201 ⁴	ETS control module/TCM communication – kick-down malfunction	Wiring, APP sensor, transmission kick-down switch
201	Transmission mode selection switch, S-program – malfunction	Wiring, transmission mode selection switch
202	Transmission mode selection switch, S-program – malfunction	Wiring, transmission mode selection switch
202 ¹	Transmission mode selection switch, M-program – malfunction	Wiring, transmission mode selection switch
202 ³	Transmission mode selection switch – malfunction	Wiring, transmission mode selection switch
203	Transmission mode selection switch, M-program – malfunction	Wiring, transmission mode selection switch
203 ¹	Transmission control module (TCM), pin 10 – display indicates wrong transmission program	Wiring, connector(s), instrument panel
203 ³	Transmission mode selection switch – malfunction	Wiring, transmission mode selection switch
204	Transmission mode selection switch – malfunction	Wiring, transmission mode selection switch
204 ¹	Transmission control module (TCM), pin 12 – display indicates wrong transmission program	Wiring, connector(s), instrument panel
204 ³	ECM/TCM communication – ignition timing adjustment/torque reduction	Wiring, ECM
205	ECM/TCM communication – ignition timing adjustment/torque reduction	Wiring, ECM
205 ¹	Transmission mode selection switch – malfunction	Wiring, transmission mode selection switch
205 ³	Brake pedal position (BPP) switch – defective	Wiring, BPP switch
206	Transmission warning lamp – wiring	Wiring open circuit/short to positive
206 ¹	ECM/TCM communication – ignition timing adjustment/torque reduction	Wiring, ECM
207 ⁷	Transmission control module (TCM) – TP signal	Wiring, TP switch/sensor
207 ¹	AC control module/TCM communication, AC activated – gearshift malfunction	Wiring
208	Brake pedal position (BPP) switch – defective	Wiring, BPP switch
209	Transmission warning lamp – wiring	Wiring open circuit/short to positive
300	Data link connector (DLC) – no communication	Wiring
301	Transmission control module (TCM) – supply voltage	Wiring
302	Transmission range (TR) switch – range/performance problem	TR switch incorrectly adjusted
303	Transmission range (TR) switch – circuit malfunction	Wiring, fuse, supply voltage, TR switch

¹ GS 4.14/15/16/19/21 (A4S 310R)² GS 9.2 (A5S 560Z)³ GS 7.1* (A5S 310Z)⁴ GS 1.2/21/22/26/27 (4 HP-22/24)⁵ GS 1.21/22/26/27 (4 HP-22/24)⁶ GS 7.1* (A5S 310Z) & GS 9.2 (A5S 560Z)⁷ GS 1.2/21/22/26/27 (4 HP-22/24) without ETS