

OBD On-Board Diagnostics

GENERAL	OBD-1
ON-BOARD DIAGNOSTICS (OBD II)	OBD-1
Malfunction indicator light (MIL)	OBD-2
Scan tool and scan tool display	OBD-3
Diagnostic monitors	OBD-3

Drive cycle	OBD-5
Readiness codes	OBD-5
Diagnostic trouble codes (DTCs)	OBD-7

TABLE

a. Diagnostic trouble codes (DTCs)	OBD-8
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GENERAL

This chapter outlines the fundamentals and equipment requirements of On-Board Diagnostics II (OBD II) standards as they apply to BMW vehicles. Also covered here is a listing of BMW and OBD II diagnostic trouble codes (DTCs).

ON-BOARD DIAGNOSTICS (OBD II)

OBD II standards were developed by the SAE (Society of Automotive Engineers) and CARB (California Air Resources Board). OBD II is the second generation of on-board self-diagnostic equipment requirements. These standards were originally mandated for California vehicles. Since 1996 they have been applied to all passenger vehicles sold in the United States.

On-board diagnostic capabilities are incorporated into the hardware and software of the engine control module (ECM) to monitor virtually every component that can affect vehicle emissions. The OBD II system works to ensure that emissions remain as clean as possible over the life of the vehicle.

Each emission-influencing component is checked by a diagnostic routine (called a monitor) to verify that it is functioning properly. If a problem or malfunction is detected, the **diagnostic executive** built into the OBD II system illuminates a malfunction indicator light (MIL) on the instrument panel.

The OBD II system also stores diagnostic trouble codes (DTCs) about the detected malfunction in the ECM so that a repair technician can accurately find and fix the problem. Specialized OBD II scan tool equipment is needed to access the fault memory and OBD II data.

OBD-2 On-Board Diagnostics

Malfunction indicator light (MIL)

The extra hardware needed to operate the OBD II system consists mainly of the following:

- Additional oxygen sensors downstream of the catalytic converters
- Fuel tank pressure sensor and device to pressurize fuel storage system
- Several engine and performance monitoring devices
- Standardized 16-pin OBD II connector under the dashboard
- Upgraded components for the federally required reliability mandate

Malfunction indicator light (MIL)

OBD II software cause the malfunction indicator light (MIL) to illuminate when emission levels exceed 1.5 times Federal standards.

- For 5 Series vehicles covered by this manual, two MIL symbols are used.

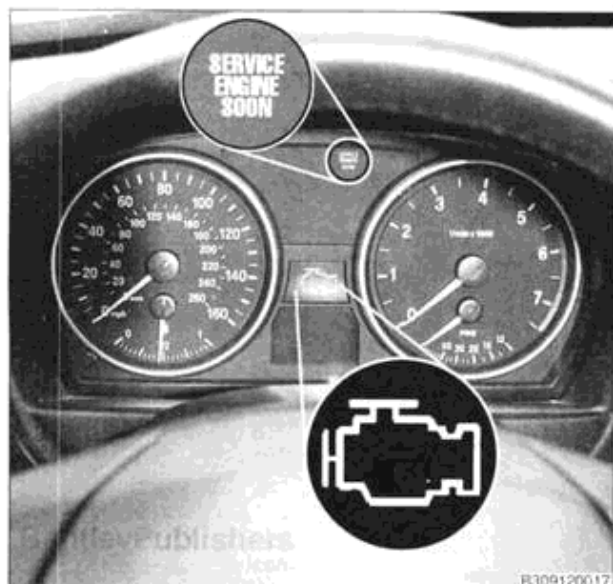
MIL illuminates under the following conditions:

- Engine management system fault detected for **two** consecutive OBD II drive cycles. See **Drive cycle** in this repair group.
- Catalyst damaging fault detected.
- Component malfunction causes emissions to exceed 1.5 times OBD II standards.
- Manufacturer-defined specifications exceeded.
- Implausible input signal.
- Misfire faults.
- Leak in evaporative system.
- Oxygen sensors observe no purge flow from purge valve / evaporative system.
- ECM fails to enter closed-loop operation within specified time.
- ECM or automatic transmission control module (TCM) in "limp home" mode.
- Ignition key ON before cranking (bulb check function).

OBD II fault memory (including the MIL) can only be reset using a special scan tool. Removing the connector from the ECM or disconnecting the battery does not erase the fault memory.

Additional MIL information:

- A fault code is stored within the ECM upon the first occurrence of a fault in the system being checked.
- Two **complete** consecutive drive cycles with the fault present illuminate the MIL. The exception to the two-fault requirement is a catalyst-damaging fault, which illuminates the MIL immediately.
- If the second drive cycle was not complete and the fault was not checked, the ECM counts the third drive cycle as the next consecutive drive cycle. The MIL illuminates if the system is checked and the fault is still present.
- Once the MIL is illuminated, it remains illuminated until the vehicle completes three consecutive drive cycles without detecting a fault.
- An existing fault code is cleared from memory automatically when the vehicle completes **40** consecutive drive cycles without the fault being detected.



In order to automatically clear a catalyst-damaging fault from memory, the condition under which the fault occurred must be evaluated for **80** consecutive drive cycles without the fault reoccurring.

A generic scan tool connected to the OBD II plug can display diagnostic trouble codes (DTCs), along with the conditions associated with the illumination of the MIL. Using a more advanced or BMW-dedicated scan tool, additional proprietary information is normally available.

Scan tool and scan tool display

➤ The complexity of the OBD II system requires that all diagnostics begin by connecting a scan tool to the 16-pin OBD II plug inside the vehicle.

OBD II standards require that the 16-pin OBD II plug be located within three (3) feet of the driver and not require any tools to access.

Professional diagnostic scan tools available at the time of this printing include the BMW factory tools (GT1, ISTA) and a small number of aftermarket BMW-specific tools. See **020 Maintenance**.

In addition to the professional line of scan tools, inexpensive generic OBD II scan tool software programs and handheld units are readily available. Though limited, they are nonetheless powerful diagnostic tools. These tools read live data streams and freeze frame data as well as a host of other valuable diagnostic data.

Diagnostic monitors

Diagnostic monitors run tests and checks on specific emission control systems, components, and functions.

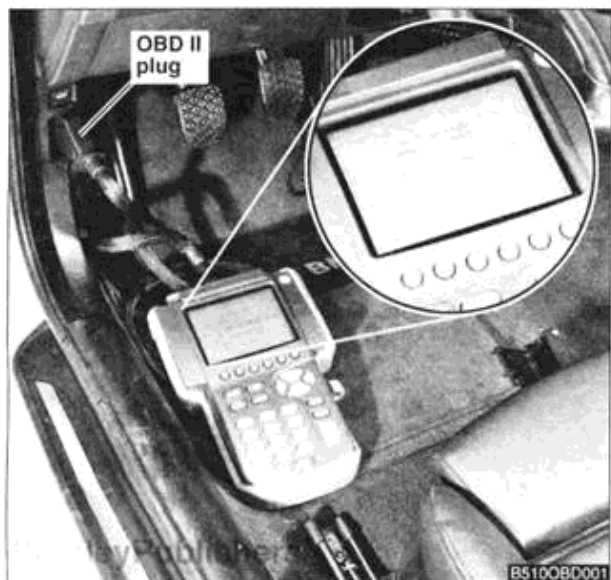
A complete drive cycle is required for the tests to be valid. See **Drive cycle** in this repair group. The diagnostic monitor signals the ECM of the loss or impairment of the signal or component and determines if a signal or sensor is faulty based on 3 conditions:

- Signal or component shorted to ground
- Signal or component shorted to B+
- Signal or component missing (open circuit)

The OBD II system monitors all emission control systems that are installed. Emission control systems vary by vehicle model and year. For example, a vehicle may not be equipped with *secondary air* injection, so no secondary air readiness code would be present.

OBD II software monitors the following:

- Oxygen sensors
- Catalysts
- Engine misfire
- Fuel tank evaporative control system
- Secondary air injection
- Fuel system



Oxygen sensor monitoring. When driving conditions allow, response rate and switching time of each oxygen sensor is monitored. The oxygen sensor heater function is also monitored. The OBD II system differentiates between precatalyst and post-catalyst oxygen sensors and reads each one individually. In order for the oxygen sensor to be effectively monitored, the system must be in closed loop operation.

Catalyst monitoring. This strategy monitors the two heated oxygen sensors per bank of cylinders. It compares the oxygen content going into the catalytic converter to the oxygen leaving the converter.

The diagnostic executive knows that most of the oxygen should be used up during the oxidation phase. If it sees higher than programmed values, a fault is set and the MIL illuminates.

Misfire detection. This strategy monitors crankshaft speed fluctuations and determines if an engine misfire occurs by monitoring variations in speed between each crankshaft sensor trigger point. This strategy is so finely tuned that it can determine the severity of the misfire.

The system determines if a misfire is occurring, as well as other pertinent misfire information such as:

- Specific cylinder(s)
- Severity of the misfire event
- Emissions relevant or catalyst damaging

Misfire detection is an on-going monitoring process that is only disabled under certain limited conditions.

Secondary air injection monitoring. Secondary air injection is used to reduce HC and CO emissions during engine warm up. Immediately following a cold engine start (-10° to 40°C), fresh air (and therefore oxygen) is pumped directly into the exhaust manifold. By injecting additional oxygen into the exhaust manifold, catalyst warm-up time is reduced.

Secondary air system components are:

- Electric air injection pump
- Electric pump relay
- Non-return valve
- Vacuum / vent valve
- Mini air mass meter

The secondary air system is monitored via the use of the pre-catalyst oxygen sensors and a mini air mass meter. The oxygen sensors monitor exhaust gas for a lean condition once the air pump is active and air is injected into the system. If the oxygen sensor signal does not change, a fault is set and the faulty bank(s) identified. If after completing the next cold start a fault is again present, the MIL illuminates. The mini air mass meter monitors the air supplied by the secondary air pump when commanded on. If the mini air mass meter detects no air mass or insufficient air mass, a fault is stored in the ECM and the malfunction indicator light (MIL) is activated.

Fuel system monitoring. This monitor looks at the fuel delivery needed (long / short term fuel trim) for proper engine operation based on programmed data. If too much or not enough fuel is delivered over a predetermined time, a DTC is set and the MIL is turned on.

Fuel trim refers to adjustments to base fuel schedule. Long-term fuel trim refers to gradual adjustments to the fuel calibration adjustment as compared to short term fuel trim. Long term fuel trim adjustments compensate for gradual changes that occur over time.

Fuel system monitoring monitors the calculated injection time (ti) in relation to engine speed, load, and precatlytic converter oxygen sensor(s) signals.

Using this data, the system optimizes fuel delivery for all engine operating conditions.

Evaporative system monitoring. This monitor checks the fuel storage system and related fuel lines for leaks. It can detect very small leaks anywhere in the system.

A leak detection unit (DMTL) is used to pressurize the EVAP system on a continuous basis (as the drive cycle allows) and to check system integrity.

Drive cycle

The OBD II drive cycle is an important concept in understanding OBD II requirements. The purpose of the drive cycle is to run all of the emission-related on-board diagnostics over a broad range of driving conditions.

A drive cycle is considered complete when all of the diagnostic monitors have run their tests without interruption. For a drive cycle to be initiated, the vehicle must be started cold and brought up to 160°F and at least 40°F above its original starting temperature.

Readiness codes

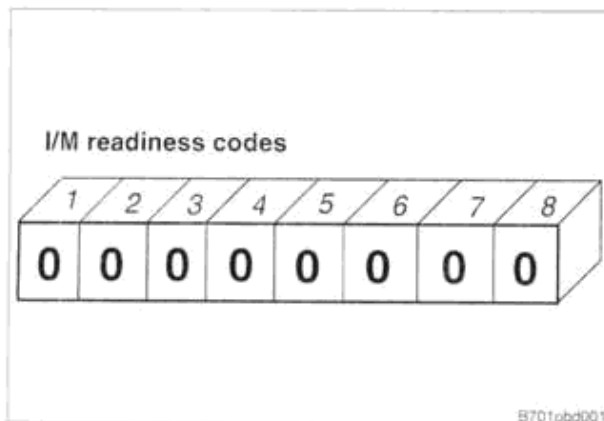
Inspection/maintenance (I/M) readiness codes are mandated as part of OBD II. The readiness code is stored after complete diagnostic monitoring of specified components and systems is carried out. The readiness code function was designed to prevent manipulating an I/M emission test procedure by clearing faults codes or disconnecting the ECM or battery.

Readiness codes indicate whether the OBD II system is actually ready to monitor the various emission control systems on the vehicle. The vehicle must complete a drive cycle to set readiness codes. The code is binary:

- 0 for ready
- 1 for not ready

OBD-6 On-Board Diagnostics

Readiness codes



◀ The parameters which are monitored for readiness are:

1. Catalyst efficiency
2. Catalyst heating
3. Fuel tank evaporative control
4. Secondary air injection
5. A/C refrigerant
6. Oxygen sensors
7. Oxygen sensor heaters
8. Exhaust gas recirculation

When all zeros are displayed, the system has established readiness. Readiness codes can be displayed using BMW and aftermarket scan tools.

Readiness codes are set to 1 (not ready) in the following cases:

- The battery or ECM is disconnected.
- DTCs are erased after completion of repairs and a drive cycle is not completed.

Diagnostic trouble codes (DTCs)

SAE standard J2012 mandates a 5-digit diagnostic trouble code (DTC) standard. Each digit represents a specific value. Emission related DTCs start with the letter P for power train. When the MIL illuminates it indicates that a DTC has been stored:

- DTCs are stored as soon as they occur, whether or not the MIL illuminates.
- DTCs store and display a time stamp.
- DTCs record the current fault status: Present, not currently present, or intermittent.

DTC digit interpretation	
1st digit P B C	powertrain body chassis
2nd digit 0 1	SAE BMW
3rd digit 0 1 2 3 4 5 6 7	total system air / fuel induction fuel injection ignition system or misfire auxiliary emission control vehicle speed & idle control ECM inputs / outputs transmission
4th - 5th digits	individual circuits or components

DTC example: P 0 3 0 6

- **P**: A powertrain problem
- **0**: SAE sanctioned ('generic')
- **3**: Related to an ignition system / misfire
- **06** Misfire detected at cylinder #6

DTCs provide a freeze frame or snap-shot of a vehicle performance or emissions fault at the moment that the fault first occurs. This information is accessible through generic scan tools.

Freeze frame data contains, but isn't limited to, the following information:

- Engine load (calculated)
- Engine rpm
- Short and long-term fuel trim
- Vehicle speed
- Coolant temperature
- Intake manifold pressure
- Open / closed loop operation
- Fuel pressure (if available)

OBD-8 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs)

P-code	BMW FC	Definition
P00B2	2EEC	Radiator Coolant Temperature Sensor Circuit Range / Performance
P00B3	2EEA	Radiator Coolant Temperature Sensor Circuit Low
P00B4	2EEA	Radiator Coolant Temperature Sensor Circuit High
P0010	2A80	'A' Camshaft Position Actuator Circuit Open (Bank 1)
P0011		'A' Camshaft Position Timing Over-Advanced or System Performance (Bank 1)
P0012	2A82	'A' Camshaft Position Timing Over-Retarded (Bank 1)
P0013	2A85	'B' Camshaft Position Actuator Circuit Open (Bank 1)
P0014		'B' Camshaft Position Timing Over-Advanced or System Performance (Bank 1)
P0015	2A87	'B' Camshaft Position Timing Over-Retarded (Bank 1)
P0016	2AA4	Camshaft Position Sensor Correlation (Bank 1 Sensor 'A')
P0017	2AA5	Camshaft Position Sensor Correlation (Bank 1 Sensor 'B')
P0018	2A8F	Camshaft / Crankshaft Position Sensor Correlation (Bank 2 Sensor 'A')
P0019	2A91	Camshaft / Crankshaft Position Sensor Correlation (Bank 2 Sensor 'B')
P0020		VANOS Camshaft Timing Inlet Rationality
P0021		VANOS Inlet Camshaft Range Rationality Check
P0022		VANOS Difference Between Actual and Target
P0023		VANOS Outlet Circuit
P0024		VANOS Outlet Rationality Check
P0025		VANOS Outlet Rationality Check
P0030	2C9C	HO2S Heater Control Circuit (Bank 1 Sensor 1)
P0031	2C9C	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)
P0032	2C9C	HO2S Heater Control Circuit High (Bank 1 Sensor 1)
P0036	2C9E	HO2S Heater Control Circuit (Bank 1 Sensor 2)
P0037	2C9E	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)
P0038	2C9E	HO2S Heater Control Circuit High (Bank 1 Sensor 2)
P0040	2C24	HO2S Signals Swapped Bank 1 Sensor 1 / Bank 2 Sensor 1
P0041	2C64	HO2S Signals Swapped Bank 1 Sensor 2/ Bank 2 Sensor 2
P0050	2C9D	HO2S Heater Control Circuit (Bank 2 Sensor 1)
P0051	2C9D	HO2S Heater Control Circuit Low (Bank 2 Sensor 1)
P0052	2C9D	HO2S Heater Control Circuit High (Bank 2 Sensor 1)
P0053	2CA6	HO2S Heater Resistance (Bank 1 Sensor 1)
P0056	2C9F	HO2S Heater Control Circuit (Bank 2 Sensor 2)
P0057	2C9F	HO2S Heater Control Circuit Low (Bank 2 Sensor 2)
P0058	2C9F	HO2S Heater Control Circuit High (Bank 2 Sensor 2)
P0059	2CA7	HO2S Heater Resistance (Bank 2 Sensor 1)
P0070	2F9A	Ambient Air Temperature Sensor Circuit

On-Board Diagnostics OBD-9

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P0071	2F99	Ambient Air Temperature Sensor Circuit Range / Performance
P0072	2F9A	Ambient Air Temperature Sensor Circuit Low
P0073	2F9A	Ambient Air Temperature Sensor Circuit High
P0090	2FBC	Fuel Pressure Regulator 1 Control Circuit Open
P0091	2FBC	Fuel Pressure Regulator 1 Control Circuit Low
P0092	2FBC	Fuel Pressure Regulator 1 Control Circuit High
P0A14	2FAB	Engine Mount 'A' Control Circuit Open
P0A15	2FAB	Engine Mount 'A' Control Circuit Low
P0A16	2FAB	Engine Mount 'A' Control Circuit High
P0A3B	2E97	Generator Over Temperature
P0A3B	2ECF	Generator Over Temperature
P0100	2D16	Mass Air Flow or Volume 'A' Circuit
P0101	2D15	Mass or Volume Air Flow Circuit Range/Performance
P0102		Mass or Volume Air Flow Circuit Low Input
P0103		Mass or Volume Air Flow Circuit High Input
P0107		Manifold Absolute Pressure/Barometric Pressure Circuit Low Input
P0108		Manifold Absolute Pressure/Barometric Pressure Circuit High Input
P0111	2F09	Intake Temperature Sensor Bank 1 Temperature Range / Performance
P0112	2F08	Intake Air Temperature Sensor 1 Circuit Low
P0113	2F08	Intake Air Temperature Sensor 1 Circuit High
P0116		Coolant Temperature Sensor rationality Check
P0117	2EE0	Engine Coolant Temperature Circuit Low
P0118	2EE0	Engine Coolant Temperature Circuit High
P0120		General Code Used In Conjunction With Other TPS Fault Code
P0121	2CF6	Throttle/Pedal Position Sensor/Switch 'A' Circuit Range/Performance
P0122	2CF9	Throttle/Pedal Position Sensor/Switch 'A' Circuit Low
P0123	2CF9	Throttle/Pedal Position Sensor/Switch 'A' Circuit High
P0125		Insufficient Coolant Temperature for Closed Loop Fuel Control
P0128	2EF4	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)
P0131	2C3F	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)
P0132	2C3F	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)
P0133	2C39	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)
P0134		O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)
P0135	2CA6	O2 Sensor Heater Circuit (Bank 1 Sensor 1)
P0137	2C75	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)
P0138	2C73	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)
P0139	2C7B	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)

OBD-10 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P0139		O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)
P0140	2C77	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 2)
P0141	2CA8	O2 Sensor Heater Circuit (Bank 1 Sensor 2)
P0151	2C40	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)
P0152	2C40	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)
P0153	2C3A	O2 Sensor Circuit Slow Response (Bank 2 Sensor 1)
P0154		O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 1)
P0155	2CA7	O2 Sensor Heater Circuit (Bank 2 Sensor 1)
P0156	2CA7	O2 Sensor Heater Function (Bank 2 Sensor 1)
P0157	2C76	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)
P0158	2C74	O2 Sensor Circuit High Voltage (Bank 2 Sensor 2)
P0159	2C7E	O2 Sensor Circuit Slow Response (Bank 2 Sensor 2)
P0159	2C7C	O2 Sensor Circuit Slow Response (Bank 2 Sensor 2)
P0160	2C78	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 2)
P0161	2CA9	O2 Sensor Heater Circuit (Bank 2 Sensor 2)
P0171	29E0	System Too Lean (Bank 1)
P0171	2A2B	System Too Lean (Bank 1)
P0172	29E0	System Too Rich (Bank 1)
P0172	2A2B	System Too Rich (Bank 1)
P0174	29E1	System Too Lean (Bank 2)
P0174	2A2C	System Too Lean (Bank 2)
P0175	29E1	System Too Rich (Bank 2)
P0175	2A2C	System Too Rich (Bank 2)
P0190	29E2	Fuel Rail Pressure Sensor 'A' Circuit
P0192	29E2	Fuel Rail Pressure Sensor 'A' Circuit Low
P0197		Engine Oil Temperature Sensor Low
P0198		Engine Oil Temperature Sensor High
P02AA	3074	Cylinder 5 Fuel Trim at Maximum Limit
P02AB	3074	Cylinder 5 Fuel Trim at Minimum Limit
P02AE	3075	Cylinder 6 Fuel Trim at Maximum Limit
P02AF	3075	Cylinder 6 Fuel Trim at Minimum Limit
P02A2	3072	Cylinder 3 Fuel Trim at Maximum Limit
P02A3	3072	Cylinder 3 Fuel Trim at Minimum Limit
P02A6	3073	Cylinder 4 Fuel Trim at Maximum Limit
P02A7	3073	Cylinder 4 Fuel Trim at Minimum Limit
P0201	2E30	Injector Circuit/Open - Cylinder 1
P0202	2E31	Injector Circuit/Open - Cylinder 2

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P0203	2E32	Injector Circuit/Open - Cylinder 3
P0204	2E33	Injector Circuit/Open - Cylinder 4
P0205	2E34	Injector Circuit/Open - Cylinder 5
P0206	2E35	Injector Circuit/Open - Cylinder 6
P0207	2E36	Injector Circuit/Open - Cylinder 7
P0208	2E37	Injector Circuit/Open - Cylinder 8
P0221	2CF7	Throttle/Pedal Position Sensor/Switch 'B' Circuit Range/Performance
P0222	2CFA	Throttle/Pedal Position Sensor/Switch 'B' Circuit Low
P0223	2CFA	Throttle/Pedal Position Sensor/Switch 'B' Circuit High
P0234	30FE	Turbocharger 'A' Overboost Condition
P0236	2ABD	Turbocharger Boost Sensor 'A' Circuit Range / Performance
P0237	2ABC	Turbocharger Boost Sensor 'A' Circuit Low
P0238	2ABD	Turbocharger Boost Sensor 'A' Circuit High
P0243	30CF	Turbocharger Wastegate Solenoid 'A'
P0245	30CF	Turbocharger Wastegate Solenoid 'A' Low
P0246	30CF	Turbocharger Wastegate Solenoid 'A' High
P0247	30D0	Turbocharger Wastegate Solenoid 'B'
P0249	30D0	Turbocharger Wastegate Solenoid 'B' Low
P0250	30D0	Turbocharger Wastegate Solenoid 'B' High
P0261	2E30	Cylinder 1 Injector Circuit Low
P0262	2E30	Cylinder 1 Injector Circuit High
P0264	2E31	Cylinder 2 Injector Circuit Low
P0265	2E31	Cylinder 2 Injector Circuit High
P0266	2E32	Cylinder 3 Injector Circuit High
P0267	2E32	Cylinder 3 Injector Circuit Low
P0268	2E32	Cylinder 3 Injector Circuit High
P0269		Injector Circuit Low / High
P0270	2E33	Cylinder 4 Injector Circuit Low
P0271	2E33	Cylinder 4 Injector Circuit High
P0273	2E34	Cylinder 5 Injector Circuit Low
P0274	2E34	Cylinder 5 Injector Circuit High
P0276	2E35	Cylinder 6 Injector Circuit Low
P0277	2E35	Cylinder 6 Injector Circuit High
P0278		Cylinder 7 Injector Circuit Low
P0279		Cylinder 7 Injector Circuit High
P0280		Cylinder 8 Injector Circuit Low
P0281		Cylinder 8 Injector Circuit High

OBD-12 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P0282		Injector Circuit Low / High
P0283		Injector Circuit Low / High
P029A	3070	Cylinder 1 Fuel Trim at Maximum Limit
P029B	3070	Cylinder 1 Fuel Trim at Minimum Limit
P029E	3071	Cylinder 2 Fuel Trim at Maximum Limit
P029F	3071	Cylinder 2 Fuel Trim at Minimum Limit
P0298	12055	Engine Oil Over Temperature
P0299	30FF	Turbocharger 'B' Overboost Condition
P0300	29CC	Cylinder Misfire, Several Cylinders
P0301	29CD	Cylinder 1 Misfire Detected
P0302	29CE	Cylinder 2 Misfire Detected
P0303	29CF	Cylinder 3 Misfire Detected
P0304	29D0	Cylinder 4 Misfire Detected
P0305	29D1	Cylinder 5 Misfire Detected
P0306	29D2	Cylinder 6 Misfire Detected
P0307	29D3	Cylinder 7 Misfire Detected
P0308	29D4	Cylinder 8 Misfire Detected
P0313	29D9	Misfire Detected with Low Fuel
P0326	2E68	Knock Sensor 1 Circuit Range / Performance (Bank 1 or Single Sensor)
P0326	2CA6	Knock Sensor 1 Circuit Range / Performance (Bank 1 or Single Sensor)
P0327	2E68	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)
P0328	2E68	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)
P0332		Knock Sensor 2 Circuit Low (Bank 2)
P0335	2A94	Crankshaft Position Sensor 'A' Circuit
P0336	2B5C	Crankshaft Position Sensor 'A' Range
P0339		Crankshaft Position Sensor 'A' Circuit Intermittent
P0340	2AA0	Camshaft Position Sensor 'A' Circuit (Bank 1 or Single Sensor)
P0341	2A9A	Camshaft Position Sensor 'A' Performance (Bank 1)
P0342	2B62	Camshaft Position Sensor 'A' Circuit Low (Bank 1)
P0343	2B62	Camshaft Position Sensor 'A' Circuit High (Bank 1)
P0344	2A9E	Camshaft Position Sensor 'A' Circuit Intermittent (Bank 1 or Single Sensor)
P0345		Camshaft Position Sensor Rationality Check Inlet
P0346		Camshaft Position Sensor Performance Inlet
P0347		Camshaft Position Sensor Short to Ground Inlet
P0348		Camshaft Position Sensor Short to Battery Inlet
P0351	2E24	Ignition Coil 'A' Primary / Secondary Circuit
P0352	2E25	Ignition Coil 'B' Primary / Secondary Circuit

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P0353	2E26	Ignition Coil 'C' Primary / Secondary Circuit
P0354	2E27	Ignition Coil 'D' Primary / Secondary Circuit
P0355	2E28	Ignition Coil 'E' Primary / Secondary Circuit
P0356	2E29	Ignition Coil 'F' Primary / Secondary Circuit
P0357		Ignition Coil 'G' Primary / Secondary Circuit
P0358		Ignition Coil 'H' Primary / Secondary Circuit
P0365	2AA1	Camshaft Position Sensor 'B' Circuit (Bank 1)
P0366	2A9B	Camshaft Position Sensor 'B' Performance (Bank 1)
P0367		Camshaft Position Sensor Short to Ground Outlet
P0367	2B63	Camshaft Position Sensor 'B' Circuit Low (Bank 1)
P0368	2B63	Camshaft Position Sensor 'B' Circuit High (Bank 1)
P0369	2A9F	Camshaft Position Sensor 'B' Circuit Intermittent (Bank 1)
P0370	29DB	Smooth Running Segment Timing
P0370	2A96	Timing Reference High Signal 'A' Resolution
P0370	2A97	Timing Reference High Signal 'A' Resolution
P0372	2B5D	Timing Reference High Signal 'A' Resolution Erratic Too Few Pulses
P0373	2A95	Timing Reference High Signal 'A' Resolution Erratic
P0390		Camshaft Position Sensor Inlet Outlet Rationality Check
P0391		Camshaft Position Sensor Signal Outlet
P0392		Camshaft Position Sensor Short to Ground Outlet
P0393		Camshaft Position Sensor Short to battery Outlet
P0411		Secondary Air Injection System Low Flow
P0412		Secondary Air Injection System Valve Circuit (Continuity)
P0413		Secondary Air Injection System Switching Valve A Circuit Open
P0414		Secondary Air Injection System Switching Valve A Circuit Shorted
P0418	10755	Secondary Air Injection System Control A Circuit
P0420	29F4	Catalyst System Efficiency Below Threshold (Bank 1)
P0420	29F6	Catalyst System Efficiency Below Threshold (Bank 1)
P0430	29F5	Catalyst System Efficiency Below Threshold (Bank 2)
P0440	2A1A	Evaporative Emission System Incorrect Flow
P0441	2A1A	Evaporative Emission System Incorrect Purge Flow
P0442	2A15	Evaporative Emission System Leak Detected (small leak)
P0443		Evaporative Emission System Purge Control Valve Circuit
P0444	2A19	Evaporative Emission System Purge Control Valve Circuit Open
	2A1A	Fuel Tank Venting Function Fault
P0445		Evaporative Emission System Purge Control Valve Circuit Shorted
P0455		Evaporative Emission System Leak Detected (large leak)

OBD-14 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P0456	2A16	Evaporative Emission System Leak Detected (very small leak)
P0457	2A1B	Evaporative Emission System Leak Detected (Fuel Filler Cap Loose)
P0458	2A19	Evaporative Emission System Purge Control Valve Circuit Low
P0459	2A19	Evaporative Emission System Purge Control Valve Circuit High
P0460	2A1E	Fuel Level Sensor 'A' Circuit
P0461	2A1C	Fuel Level Sensor A Performance
P0462	2DE2	Fuel Level Sensor 'A' Circuit Low
P0463	2DE2	Fuel Level Sensor 'A' Circuit High
P0475	2F6C	Exhaust Pressure Control Valve
P0476	2F6C	Exhaust Pressure Control Valve Low
P0477	2F6C	Exhaust Pressure Control Valve Low
P0478	2F6C	Exhaust Pressure Control Valve High
P0479		Exhaust Pressure Control Valve Intermittent
P0480	2EFE	Fan 1 Control Circuit
P0491	2A00	Secondary Air Injection System Insufficient Flow (Bank 1)
P0492	2A00	Secondary Air Injection System Insufficient Flow (Bank 2)
P0500	2F4E	Vehicle Speed Sensor 'A'
P0503	2F4F	Vehicle Speed Sensor 'A' Intermittent / Erratic
P0505		Idle Air Control System
P0506	2ADF	Idle Air Control System Lower Than Expected
P0507	2ADF	Idle Air Control System Higher Than Expected
P0512	2F58	Starter Request Circuit
P0520	2F7B	Engine Oil Pressure Switch Circuit
P0521	30C6	Engine Oil Pressure Switch Range / Performance
P0522	30C3	Engine Oil Pressure Switch Open
P0523	30C3	Engine Oil Pressure Switch High
P0524	30C5	Engine Oil Pressure Too Low
P053A	2AE4	Positive Crankcase Ventilation Heater Circuit Open
P053B	2AE4	Positive Crankcase Ventilation Heater Circuit Low
P053C	2AE5	Positive Crankcase Ventilation Heater Circuit High
P0530	2F12	A/C Pressure Sensor 'A' Circuit
P0532	2F12	A/C Pressure Sensor 'A' Circuit Low
P0533	2F12	A/C Pressure Sensor 'A' Circuit High
P0545	2C87	Exhaust Gas Temperature Sensor Circuit Low (Bank1 Sensor 1)
P0546	2C87	Exhaust Gas Temperature Sensor Circuit High (Bank1 Sensor 1)
P0560		System Voltage
P0561		System Voltage Unstable

P1300	2AA2	Camshaft Position Sensor 'A' Segment Timing Error (Bank 1)
P1301	2E18	Ignition Monitoring Cylinder 1 Spark Duration Too Short
P1302	2E19	Ignition Monitoring Cylinder 2 Spark Duration Too Short
P1303	2E1A	Ignition Monitoring Cylinder 3 Spark Duration Too Short
P1304	2E1B	Ignition Monitoring Cylinder 3 Spark Duration Too Short
P1305	2E1C	Ignition Monitoring Cylinder 5 Spark Duration Too Short
P1306	2E1D	Ignition Monitoring Cylinder 6 Spark Duration Too Short
P1314		Fuel Mixture Deviation Detected with Low Fuel
P1315		Camshaft Position Sensor Rationality Check (Inlet - Outlet)
P1316		Camshaft Position Sensor Rationality Check (Inlet - Outlet)
P1318		Camshaft Position Sensor Rationality Check (Inlet - Outlet)
P1319		Camshaft Position Sensor Rationality Check (Inlet - Outlet)
P1327	2E69	Knock Sensor 2 Circuit Low (Bank 1 or Single Sensor)
P1328	2E69	Knock Sensor 2 Circuit Range / Performance (Bank 1 or Single Sensor)
P1329		Knock Sensor Range Check Minimum
P1329		Knock Sensor 3 Circuit Low
P1330		Knock Sensor 3 Circuit High
P1330		Knock Sensor Range Minimum
P1332		Knock Sensor Range Minimum
P1333		Knock Sensor Range Maximum
P1338		Camshaft Position Sensor Rationality Check (Inlet - Outlet)
P1339		Camshaft Position Sensor Rationality Check (Inlet - Outlet)
P1342		Misfire During Start Cylinder 1
P1343		Misfire Cylinder 1 with Fuel Cut-Off
P1344		Misfire During Start Cylinder 2
P1345		Misfire Cylinder 2 with Fuel Cut-Off
P1346		Misfire During Start Cylinder 3
P1347		Misfire Cylinder 3 with Fuel Cut-Off
P1348		Misfire During Start Cylinder 4
P1349		Misfire Cylinder 4 with Fuel Cut-Off
P135B	2E69	Knock Sensor 2 Circuit Range / Performance (Bank 1 or Single Sensor)
P1350		Misfire during Start Cylinder 5
P1351		Misfire Cylinder 5 with Fuel Cut-Off

		Knock Sensor Module System Error
P1379		Knock Sensor Module System Error
P1380		Knock Sensor Module System Error
P1381		Knock Sensor Module System Error
P1382		Knock Sensor Module System Error
P1383	2E77	Ignition Monitoring Malfunction
P1384		Knock Sensor 3 Circuit
P1386		Knock Sensor Module System Error
P1396	29DA	Crankshaft Position Sensor Segment Timing Plausibility
P140A	2A00	Secondary Air Injection System Flow Bank 1 and Bank 2
P140B		Secondary Air Injection System Low Flow
P140C		Secondary Air Injection System Low Flow
P140E	29DC	Cylinder Injection Cut Off, Fuel Level Too Low
P14C0	2EFF	Fan Mechanical Hardware Defect
P14C1	2F0F	Radiator Shutter Mechanical hardware Defect
P14C2	2AAB	DISA (Differentiated Intake Manifold) Actuator 1 Fault
P14C3	2AAC	DISA (Differentiated Intake Manifold) Actuator 2 Fault
P14C4	2F11	Upper Radiator Shutter Mechanical fault
P14C5	2F11	Upper Radiator Shutter Electrical fault
P14C6	2F10	Lower Radiator Shutter Electrical fault
P140E	29DC	Cylinder Injection Cut Off, Fuel Level Too Low
P1407	2DE2	Fuel Level Signal 1
P1408	2DE1	Fuel Level Signal 2
P1411		Secondary Air Injection System Pump Not Active
P1412		Secondary Air Injection System Max Limit of Leakage Between Air Pump and Valve
P1413	2A03	Secondary Air Injection Pump Relay Control Circuit Signal Low
P1414	2A03	Secondary Air Injection Pump Relay Control Circuit Signal High
P1415	2D06	Mass or Volume Air Flow Too Low
P1417	2D06	Throttle Control Incorrect Air Supply
P1417	2D09	Throttle Control Incorrect Air Supply
P1418		Secondary Air Injection System Valve or Tube Blocked
P142A	2AE4	Crankcase Ventilation Heater Relay Circuit Input High
P142B	2AE4	Crankcase Ventilation Heater Relay Circuit Input Low
P142C	2AE4	Crankcase Ventilation Heater Relay Circuit Input Open

On-Board Diagnostics OBD-25

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P142E	29DC	Cylinder Injection Cut Off, Pressure Too Low (High Pressure Fuel System)
P142F	29DC	Cylinder Injection Cut Off, Pressure Too Low (Low Pressure Fuel System)
P1424	2D06	Mass or Volume Air Flow Too High
P1429	2A18	DMTL Heater
P143B	2AD9	Direct Ozone Reduction Catalyst Temperature Sensor Wrong Code
P143C	2AD8	Direct Ozone Reduction Catalyst Temperature / Radiator Temperature Correlation
P1429		DMTL Heater Circuit Open
P143E	2AD8	Direct Ozone Reduction Catalyst Temperature Sensor Gradient Too Low
P1429	2A18	DMTL Heater Activation
P1430	2A18	DMTL Heater Circuit Low
P1431	2A18	DMTL Heater Circuit High
P1434	2A17	DMTL Tank Leakage
P1444		Diagnostic Module Tank Leakage (DMTL) Pump Control Open Circuit
P1445		Diagnostic Module Tank Leakage (DMTL) Pump Control Circuit Signal Low
P1446		Diagnostic Module Tank Leakage (DMTL) Pump Control Circuit Signal High
P1447	2A17	Diagnostic Module Tank Leakage (DMTL) Pump Current Too High during Switching Solenoid Test
P1448	2A17	Diagnostic Module Tank Leakage (DMTL) Pump Current Too Low
P1449	2A17	Diagnostic Module Tank Leakage (DMTL) Pump Current Too High
P1451		Diagnostic Module Tank Leakage (DMTL) Switching Solenoid Control Circuit Signal Low
P1452		Diagnostic Module Tank Leakage (DMTL) Switching Solenoid Control Circuit Signal High
P1453	2A03	Secondary Air Injection Pump Relay Control Circuit Fault
P15AA	30FC	Turbocharger Leak in System
P15A1	30C4	Engine Oil Pressure Mechanical Valve Stuck in De-energized Position
P15A2	30C4	Engine Oil Pressure Mechanical Valve Stuck in Fully Energized Position
P15A3	30C5	Engine Oil Pressure Too High
P15A6	30C6	Engine Oil Pressure Too High Before Start
P15A7	30C6	Engine Oil Pressure Too Low Before Start
P15A9	2FC7	Energy Saving Mode - Transportation Mode
P15B0	2DC3	Terminal 15 Sense Circuit Input High
P15B1	2DC3	Terminal 15 Sense Circuit Input Low
P15B2	2DC3	Terminal 15 Sense Circuit CAS Error
P15B3	2DC3	Terminal 15 Sense Circuit Range / Performance
P150A	2E8B	Battery Sensor Extended Communication Circuit
P150B	2E8B	Battery Sensor Serial Data Interface
P150C	2E8B	Battery Sensor Firmware Implausible
P150D	2E8B	Battery Sensor Temperature Error
P150E	2E8C	Battery Sensor Voltage Error

OBD-26 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P150F	28EC	Battery Sensor Current Error
P1500		Idle-Speed Control Valve Stuck Open
P1501		Idle-Speed Control Valve Stuck Closed
P1502		Idle-Speed Control Valve Closing Solenoid Control Circuit Signal High
P1503		Idle-Speed Control Valve Closing Solenoid Control Circuit Signal Low
P1504		Idle-Speed Control Valve Closing Solenoid Control Open Circuit
P1506		Idle-Speed Control Valve Opening Solenoid Control Circuit Signal High
P1507		Idle-Speed Control Valve Opening Solenoid Control Circuit Signal Low
P1508		Idle-Speed Control Valve Opening Solenoid Control Open Circuit
P151A	2E8D	Battery Sensor Terminal 15 / 30 Wakeup Circuit
P151B	2E8D	Battery Sensor Wakeup Circuit
P151C	2E8D	Battery Sensor System Error
P1511	2AA8	DISA (Differentiated Intake Manifold) Control Circuit
P1511	2AA9	DISA (Differentiated Intake Manifold) Control Circuit
	2AAA	Variable Intake System Plausibility
P1512	2AA8	DISA (Differentiated Intake Manifold) Control Circuit Signal Low
P1512	2AA9	DISA (Differentiated Intake Manifold) Control Circuit Signal Low
P1513	2AA8	DISA (Differentiated Intake Manifold) Control Circuit Signal High
P1513	2AA9	DISA (Differentiated Intake Manifold) Control Circuit Signal High
P1515	2F80	Engine OFF Timer Plausibility
P1517	29DD	Poor Road Surface - No Wheel Speed Signal
P1518	29DD	Poor Road Surface - Wheel Speed Too High
P1519	2EA0	Engine Oil Quality Sensor Temperature
P152A	2F4F	Vehicle Speed Sensor Too Low Under Load Compared to Reference Under Load
P152B	2F4F	Vehicle Speed Sensor Too Low During Coast Down Compared to Reference Under Load
P1520	2EA0	Engine Oil Quality Sensor Temperature
P1521	2EA0	Engine Oil Quality Sensor Temperature Communication Error
P1521	2E9F	Engine Oil Quality Sensor Temperature Communication Error
P1522	2EA0	Engine Oil Quality Sensor Temperature
P1523		'A' Camshaft Position Actuator Signal Low (Bank 1)
P1524		'A' Camshaft Position Actuator Control Circuit Signal High (Bank 1)
P1525		'A' Camshaft Position Actuator Control Open Circuit (Bank 1)
P1529		'B' Camshaft Position Actuator Control Circuit Signal Low (Bank 1)
P1530		'B' Camshaft Position Actuator Control Circuit Signal High (Bank 1)
P1531		'B' Camshaft Position Actuator Control Open Circuit (Bank 1)
P1535	2B71	DISA Coil Temperature Limit Exceeded
P1536	2B71	DISA Control Deviation

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P1537	2B71	DISA Potentiometer Voltage in Lower Diagnosis Range
P1538	2B71	DISA Potentiometer Voltage in Upper Diagnosis Range
P1539	2B72	DISA Coil Temperature Threshold Exceeded
P1540	2AC6	Driving Dynamics Switch Input High
P1541	2AC6	Driving Dynamics Switch Input Low
P155A	2DB7	Multifunction Steering Wheel Toggle-Bit Fault
P1551	2F80	Engine OFF Timer Time-out
P1553	2A99	Engine Position System 'B' Performance (Bank 1)
P1554	2A98	Engine Position System 'A' Performance (Bank 1)
P1561	2AE0	Cold Start Idle RPM Lower Than Expected
P1562	2AE0	Cold Start Idle RPM Higher Than Expected
P1563	2DB6	Multifunction Steering Wheel Rocker Switch Defective
P1565	2DB5	Multifunction Steering Wheel Rocker Switch + / - Pressed Simultaneously
P1567	2DB7	Multifunction Steering Wheel Toggle Bit Error
	2DBE	Adaptive Cruise Control Blocked for Driving Cycle
	2DC0	No Message From LDM
	2DC3	Monitoring Terminal 15
P1576	2DB5	Multifunction Steering Wheel Interface Error
P1577	2F50	Speed Indication Instrument Pack
P1578	2F50	Speed Indication Instrument Pack / ASC Signal Correlation
P1582	30C2	Oil Pump Circuit High
P1583	30C2	Oil Pump Circuit Low
P1584	30C2	Oil Pump Circuit Open
P1586	2E9F	Engine Oil Quality Sensor Temperature Measurement
P1587	2E9F	Engine Oil Quality Sensor Temperature Level Measurement
P1588	2E9F	Engine Oil Quality Sensor Temperature Permeability Measurement
P16A0	2AB3	Internal Control Module Checksum Fault
P16A1	2AB3	Internal Control Module Application Software Checksum Fault
P16A2	2AB3	Internal Control Module Checksum Fault in Data
P16A3	2AB4	Internal Control Module Checksum Fault in Non-Volatile Memory
P16A4	2AB5	Time-out Control Module Knock Sensor SPI-Bus
P16A5	2AB6	Time-out Control Module Multiple Output Stage SPI-Bus
P16A6	2D50	Control Module Self test / Cruise Control Monitoring
P16A7	2D51	Control Module Self Test Hot Film Air Mass Meter Monitoring
P16A8	2D51	Control Module Self Test Throttle Position Monitoring
P16A9	2D52	Control Module Self Test Speed Monitoring Reset
P16B0	2D55	ECM Internal Fault Accelerator Pedal Module

OBD-28 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P16B1	2D56	Control Module Self Test Idle Air Control System Plausibility
P16B2	2D56	Control Module Self Test Idle Air Control System Component Plausibility
P16B3	2D57	Control Module Self Test Engine Drag Torque
P16B4	2D50	Control Module Self Test Dynamic Cruise Control Monitoring
P16B5	2D57	Control Module Self Test Automatic Manual Transmission
P16B6	2D57	Control Module Self Test ETC Monitoring
P16B7	2D58	Control Module Self Test Clutch Torque Monitoring Maximum value Plausibility
P16B8	2D58	Control Module Self Test Clutch Torque Monitoring
P16B9	2D58	Control Module Self Test Torque Loss Monitoring
P16C0	2D58	Control Module Self Test Driving Dynamics Control Switch Monitoring
	2D5A	Monitoring Engine Torque Limiting
P16C1	2D59	Control Module Self Test Torque Monitoring Current Indicated value Plausibility
P16C2	2D53	Control Module Self Test Speed Limitation Monitoring
P16C3	2D54	Control Module Self Test Speed Limitation Reset
P16C5	2AAC	DME Main Relay Switching Delay
P16C6	2E7C	CAN Time-out Bit Serial Data Interface
P16C8	2DE0	Serial Communication Link EKP (Electronic Fuel Pump)
P164C	2D1D	Pedal Position Sensor Potentiometer Supply Channel 1 Electrical
P16B0	2D55	Control Module Self Test Pedal Position Monitoring
P160A	2DEC	Powermanagement Exhaustive Discharge
P160B	2DEC	Powermanagement Defective
P160C	2DEB	Powermanagement Overvoltage
P160D	2DEB	Powermanagement Undervoltage
P160E	2DEB	Powermanagement Operation Without Battery
P160F	2DED	Powermanagement No Load Current Error
P165F	2CA6	Internal Control Module Measurement Error O2 Sensor Heating (Bank 1 Sensor 1)
P1602		Control Module Self-Test, Control Module Defective
P1603		Control Module Self-Test, Torque Monitoring
P1604		Control Module Self-Test, Speed Monitoring
P1611	2DC8	Serial Communication Link TCM
P1612	2DD0	Serial Communication Link Instrument Panel
P1613	2DCC	Serial Communication Link ASC
P1613	2DCD	Serial Communication Link ASC
P1613	2DCE	Serial Communication Link ASC
P1614	11711	Serial Communication ACC
P1618	2D5C	Control Module Self Test AD-Converter Monitoring
P1619		Map Cooling Thermostat Control Circuit Signal Low

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P1620		Map Cooling Thermostat Control Circuit Signal High
P1624	2D1D	Pedal Position Sensor Potentiometer Supply Channel 1 Electrical (M52: Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature))
P1625	2D1E	Pedal Position Sensor Potentiometer Supply Channel 2 Electrical
P1628		Throttle Valve Spring Does Not Open
P1629		Throttle Valve Spring Does Not Open
P163C	2B9D	Voltage Monitoring Control Module Overload
P163D	2B9D	Voltage Monitoring Control Module Cut-OFF Detected
P163E	2B9D	Voltage Monitoring Control Module Communication Error
P1631		Throttle Valve Actuator Spring Test
P1632	2CFB	Throttle Valve Adaptation Conditions Not Met
P1633	2CFB	Throttle Valve Adaptation Limp-Home Position Unknown
P1634		Throttle Valve Adaptation Spring Test Failed
P1634	2CFC	Throttle Valve Adaptation Spring Test Failed
P1635	2CFE	Throttle Valve Adaptation Lower Mechanical Stop not Adapted
P1636	2CEF	Throttle Valve Control Circuit
P1637	2CEE	Throttle Valve Position Control, Control Deviation
P1638	2CEC	Throttle Valve Position Control Throttle Stuck Temporarily
P1639	2CED	Throttle Valve Position Control Throttle Stuck Permanently
P164E	2D0C	Throttle Deicing Stuck in Closed Direction
P164F	2D0C	Throttle Deicing Stuck in Open Direction
p1641	2D03	Throttle Valve Adaptation Stop Due to Environmental Conditions
P1642	2D03	Throttle Valve Adaptation Stop Due to Environmental Values
P1643	2CFF	Throttle Actuator Start Test Amplifier Balancing Faulty
P1644	2CFB	Throttle Valve Adaptation Relearning Lower Mechanical Stop
P1645	2B99	Internal Control Module Fault - RAM Reading Error
P1649	2B99	Internal Control Module Fault - RAM Writing Error
P1650		Automatic Start While Engine Running
P166A	2D50	Control Module Self Test, Hot Film Air Mass Meter Monitoring
P166B	2DC0	Longitudinal Dynamics Module Torque Request In spite of Brake Signal
P166C	2DC0	Longitudinal Dynamics Module Request Implausible
P166F	2CA7	Internal Control Module Measurement Error O2 Sensor Heating (Bank 2 Sensor 1)
P166F	2CAB	Internal Control Module Measurement Error O2 Sensor Heating (Bank 2 Sensor 1)
P1660	2F4A	EWS Telegram Error
P1661	2F4A	Time-out EWS Telegram
P165A	2F4A	EWS Interface to ECM Error
P165B	2F4A	EWS Interface to ECM Checksum Error

OBD-30 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P165C	2F4B	EWS Data, No Available Storage Possible
P165D	2F4B	EWS Data, Faulty Release Code
P165E	2F4B	EWS Data Checksum Error
P1655	2F46	EWS Rolling C0de Faulty Storage in EEPROM
P1660	2F45	EWS Telegram Error
P1661	2F45	EWS Telegram Time-out
P1662	2F45	EWS Telegram Parity Error
P1663	2F46	EWS Rolling Code Faulty Storage in EEPROM
P1664	2F46	EWS Rolling Code Faulty Writing in EEPROM
P1665	2F46	EWS Rolling Code Tampering
P1666		EWS Tampering via KWP2000 / Start VAlue Not Accepted
P1667	2F49	EWS Start Value not yet Programmed
P1668	2F4B	EWS Start Value Destroyed
P167C	2D08	Throttle Heating Relay Circuit Input Low
P167D	2D08	Throttle Heating Relay Circuit
P1675	2CFD	Throttle Valve Actuator Start Test Re-Adaptation Required
P1676	2DBF	ACC Signal Plausibility
P1677	2DBF	ACC No Activity Detected
P1678	2DBF	ACC No Response To Cut-OFF
P1680	2D70	Throttle Valve Control Monitor Level 2/3 ADC Processor fault
P1681	2D75	Throttle Valve Control Monitor Level 2/3 Engine Speed Error
P1686	2D76	Throttle Valve Control Monitor Level 2/3 Pedal Position Sensor Error
P1694	2CFB	Throttle Valve Adaptation Value
P169A	2CFC	Throttle Valve Actuator Start Test Failed Limp Home Position
P17EA		Ratio Upshift 5 - 6
P17EB		Ratio Downshift 6 - 5
P17EC		Ratio Downshift 5 - 4
P17ED		Ratio Downshift 4 - 3
P17EE		Ratio Downshift 3 - 2
P17EF		Ratio Downshift 2 - 1
P17E1		Ratio in Gear 1 - Clutch A
P17E2		Ratio in Gear 3 Clutch B
P17E3		Ratio in Gear 2 Clutch A
P17E4		Ratio in Gear 1 - Clutch D
P17E5		Ratio in Gear 4 Clutch E
P17E6		Ratio Upshift 1 - 2
P17E7		Ratio Upshift 2 - 3

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P17E8		Ratio Upshift 3 - 4
P17E9		Ratio Upshift 4 - 5
P17F0		Ratio in Gear 1 - Clutch A or B
P17F1		Ratio in Gear 2 - Clutch A or B
P17F2		Ratio in Gear 3 - Clutch A or B
P17F3		Ratio in Gear 4 - Clutch A or E
P17F4		Ratio in Gear 5 - Clutch B or E
P17F5		Ratio in Gear 6 - Clutch C or E
P17F6		Ratio in Gear R Clutch B or D
P1694	2CFB	Throttle Valve Actuator Start Test Spring Test and Limp-Home Position Failed
P1700		Automatic Transmission 5HP19 Output Speed, Wheel Speed, Double Fault
P1701		Range Position Switch Plausibility
P171A		Watchdog Check
P171B		Watchdog Check
P171C		Watchdog Check
P171D		Watchdog Check
P171E		Watchdog Check
P1702		Colliding Function or Not Allowed Actuating of valves
P1704		ATF Temperature Sensor Range
P1711		ATF Temperature Sensor Rationality
P1712		Level 2 Calculation Check
P1713		Level 2 Calculation Check
P1714		Level 2 Calculation Check
P1718		ATF Temperature Sensor Rationality
P1719		TCM BUS Check
P1720		TCM BUS Check
P1721		CAN Time-out ASC / DSC
P1722		MC Components
P1723		MC Components
P1724		MC Components
P1725		MC Components
P1727		Engine Speed Signal Plausibility
P1728		Engine Overspeed Plausibility
P1729		CAN Version Plausibility
P1730		Impossible Combination of Substitute Functions or Not Allowed Actuating Valves
P1731		Automatic Transmission 5HP19 Gear Ratio Rationality
P1732		Automatic Transmission 5HP19 4th Gear Ratio Rationality

OBD-32 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P1736		Automatic Transmission 6th Gear Ratio Plausibility
P1747		TCM BUS Check
P1760		Desired Engine Torque Message on CAN
P1761		Shift Lock Rationality
P1762		Shift Lock Short to Power
P1763		Shift Lock Short to Ground
P1764		Shift Lock Circuit Disconnection
P1765		TCM Rationality
P1766		Engine Speed Plausibility
P1767		CAN Speed Rear Wheels Plausibility
P1771		CAN Generated Engine Torque Plausibility
P1780		TCM Rationality
P1782		CAN Brake Signal Plausibility
P1790		TCM Rationality
P1791		TCM Self Check
P1792		TCM Rationality Micro controller
P1793		TCM Hot Disabling
P1794	2DD3	TCM Checksum Error
P1796		Power Latch Relays Plausibility
P1798		EPROM Plausibility
P1810		Turbine Input Speed Sensor (NTU) Upper Threshold
P1811		Turbine Input Speed Sensor (NTU) Lower Threshold
P1812		Output Speed Sensor Upper Threshold
P1813		Output Speed Sensor Lower Threshold
P1814		Output Speed Sensor Plausibility
P1817		Gear Lever Analog Lines 0 Upper Threshold
P1818		Gear Lever Analog Lines 0 Lower Threshold
P1819		Gear Lever Analog Lines 0 Plausibility
P1820		Gear Lever Analog Lines 1 Upper Threshold
P1821		Gear Lever Analog Lines 1 Lower Threshold
P1822		Gear Lever Analog Lines 1 Plausibility
P1823		Gear Lever Digital Line No Signal
P1850		Shift Position Sensor Upper Threshold
P1851		Shift Position Sensor Lower Threshold
P1852		Shift Position Sensor Plausibility
P1859		Gear Lever Halls Sensors No Signal
P1860		Clutch Speed Plausibility

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P1861		2-1 Shift General
P1862		3-2 Shift General
P1863		4-3 Shift General
P1864		5-4 Shift General
P1865		6-5 Shift General
P1866		Gear Lever Analog Lines 2 Upper Threshold
P1867		Gear Lever Analog Lines 2 Lower Threshold
P1868		Gear Lever Analog Lines 2 Upper Plausibility
P1869		Gear Lever Analog Lines 3 Upper Threshold
P1870		Gear Lever Analog Lines 3 Lower Threshold
P1876		Gear Lever Analog Lines 3 Plausibility
P1881		Range Shift Monitoring A 1-2 Upper Threshold
P1882		2-3 Shift Rationality, No Change
P1883		3-4 Shift Rationality Too Big
P1884		4-5 Shift Upper Threshold
P1885		5-6 Shift Upper Threshold
P1887		Hydraulic Pump Failure
P1889		System Voltage Rationality
P1890		Power Supply General
P1891		Power Supply Rationality
P1892		System Voltage Low Input
P1893		Control Solenoid / Shift Solenoid Short to Power
P1894		Control Solenoid / Shift Solenoid Short to Ground
P1895		Control Solenoid / Shift Solenoid Circuit Disconnection
P1896		Valve Voltage Supply Plausibility
P1897		Sensor Voltage Supply Upper Threshold
P1898		Sensor Voltage Supply Lower Threshold
P2065		Fuel Level Sensor 'B' Circuit
P2067	2DE1	Fuel Level Sensor 'B' Circuit Low
P2068	2DE1	Fuel Level Sensor 'B' Circuit High
P2088	2A80	'A' Camshaft Position Actuator Control Circuit Low (Bank 1)
P2089	2A80	'A' Camshaft Position Actuator Control Circuit High (Bank 1)
P2090	2A85	'B' Camshaft Position Actuator Control Circuit Low (Bank 1)
P2091	2A85	'B' Camshaft Position Actuator Control Circuit High (Bank 1)
P2092		VANOS Inlet Camshaft Range Minimum
P2093		VANOS Inlet Camshaft Range Maximum
P2094		VANOS Range Limit Minimum

OBD-34 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P2095		VANOS Range Limit Maximum
P2096	2C31	Post Catalyst Fuel Trim System Too Lean (Bank 1)
P2097	2C31	Post Catalyst Fuel Trim System Too Rich (Bank 1)
P2098	2C32	Post Catalyst Fuel Trim System Too Lean (Bank 2)
P2099	2C32	Post Catalyst Fuel Trim System Too Rich (Bank 2)
P2100	2CEF	Throttle Actuator 'A' Control Motor Circuit Open
P2102	2CEF	Throttle Actuator 'A' Control Motor Circuit Low
P2103	2CEF	Throttle Actuator 'A' Control Motor Circuit High
P213F	2AAD	Fuel Pump System Fault Engine Shut Down
P2120	2D1F	Throttle / Pedal Position Sensor 'D' Circuit
P2122	2D1B	Throttle Pedal Position Sensor 'D' Circuit Low
P2123	2D1B	Throttle Pedal Position Sensor 'D' Circuit High
P2127	2D1C	Throttle Pedal Position Sensor 'E' Circuit Low
P2128	2D1C	Throttle Pedal Position Sensor 'E' Circuit High
P213F	2AAD	Fuel Pump Emergency Cut Off
P2138	2D20	Throttle / Pedal Position Sensor 'D' 'E' Voltage Correlation
P2177		Fuel Trim Limit Exceeded System Too Lean
P2178		Fuel Trim Limit Exceeded System Too Rich
P2179		Fuel Trim Limit Exceeded System Too Lean
P2180		Fuel Trim Limit Exceeded System Too Rich
P2183	2EEC	Engine Coolant Temperature Sensor 2 Circuit Range / Performance
P2184	2EEA	Engine Coolant Temperature Sensor 2 Circuit Low
P2185	2EEA	Engine Coolant Temperature Sensor 2 Circuit High
P2187	29E0	System Too Lean at Idle (Bank 1)
P2188	29E0	System Too Rich at Idle (Bank 1)
P2189	29E1	System Too Lean at Idle (Bank 2)
P2190	29E1	System Too Rich at Idle (Bank 2)
P2191	29E5	System Too Lean, Higher Load (Bank 1)
P2192	29E5	System Too Rich, Higher Load (Bank 1)
P2193	2E96	System Too Lean, Higher Load (Bank 2)
P2194	2E96	System Too Rich, Higher Load (Bank 2)
P2195	2C27	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 1)
P2196	2C27	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)
P2196	2C2B	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)
P2196	2C2C	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)
P2197	2C28	O2 Sensor Signal Stuck Lean (Bank 2 Sensor 1)
P2198	2C2C	O2 Sensor Signal Stuck Rich (Bank 2 Sensor 1)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P2200	2AF4	NOx Sensor Circuit (Bank 1)
P2205	2AF0	NOx Sensor Heater Control Circuit Open (Bank 1)
P2227		ECM Integrated Barometric Pressure Sensor Rationality Check
P2228	2F76	Barometric Pressure Circuit Low
P2228		ECM Emigrated Barometric Pressure Sensor Circuit
P2229	2F76	Barometric Pressure Circuit High
P2229		ECM Emigrated Barometric Pressure Sensor Circuit
P2231		O2 Sensor Signal Shorted To Heater (Bank 1 Sensor 1)
P2234		O2 Sensor Signal Shorted To Heater (Bank 2 Sensor 1)
P2237		O2 Sensor Reference Circuit Continuity (Bank 1 Sensor 1)
P2240		O2 Sensor Reference Circuit Continuity (Bank 2 Sensor 1)
P2243	2C3D	O2 Sensor Reference Voltage Circuit Open (Bank 1 Sensor 1)
P2247	2C3E	O2 Sensor Reference Voltage Circuit Open (Bank 2 Sensor 1)
P2251		O2 Sensor Reference Circuit Continuity (Bank 1 Sensor 1)
P2254		O2 Sensor Reference Circuit Continuity (Bank 2 Sensor 1)
P2270	2C6B	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 2)
P2271	2C6B	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 2)
P2272	2C6C	O2 Sensor Signal Stuck Lean (Bank 2 Sensor 2)
P2273	2C6C	O2 Sensor Signal Stuck Lean (Bank 2 Sensor 2)
P2297	2C2D	O2 Sensor Signal Out Of Range During Decel (Bank 1 Sensor 1)
P2298	2C2E	O2 Sensor Signal Out Of Range During Decel (Bank 2 Sensor 1)
P2299	2F8F	Brake Pedal Position / Accelerator Pedal Position Incompatible
P2301	30A0	Ignition Coil Primary 'A' Circuit High
P2304	30A1	Ignition Coil Primary 'B' Circuit High
P2307	30A2	Ignition Coil Primary 'C' Circuit High
P2310	30A3	Ignition Coil Primary 'D' Circuit High
P2313	30A4	Ignition Coil Primary 'E' Circuit High
P2316	30A5	Ignition Coil Primary 'F' Circuit High
P2332	2ED1	Generator Mechanical
P232D	2D78	Air Mass Balancing Control Range
P240A	2A18	DMTL Pump Heater Circuit Open
P240B	2A18	DMTL Pump Heater Circuit Low
P240C	2A18	DMTL Pump Heater Circuit High
P2400	2A13	DMTL Activation Control Circuit Open
P2401	2A13	DMTL Activation Control Circuit Low
P2402	2A13	DMTL Activation Control Circuit High
P2414	2C3B	O2 Sensor Oxygen Sample Error (Bank 1 Sensor 1)

OBD-36 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P2415	2C3C	O2 Sensor Oxygen Sample Error (Bank 2 Sensor 1)
P2418	2A12	DMTL Solenoid Control Circuit Open
P2419	2A12	DMTL Solenoid Control Circuit Low
P2420	2A12	Evaporative Emission System Switching Valve Control Circuit High
P2430		Secondary Air Injection System Mass Air Flow Sensor Rationality (Disconnected or Stuck)
P2440		Secondary Air Injection System Air Valve Jammed Open
P2450		Evaporative Emission System Switching Valve Short to Power
P250A	2F9E	Engine Oil Level Sensor Circuit
P250B	2F9E	Engine Oil Level Sensor Range / Performance
P250F	2F9E	Engine Oil Level Too Low
P252A	2EA1	Engine Oil Quality Sensor Circuit
P2420	2A12	DMTL Solenoid Control Circuit High
P2541	29F3	Low Pressure Fuel System Sensor Circuit Low
P2542	29F3	Low Pressure Fuel System Sensor Circuit High
P2568	2ADA	Direct Ozone Reduction Catalyst Temperature Sensor Performance
P2569	2ADA	Direct Ozone Reduction Catalyst Temperature Sensor Circuit Low
P2570	2ADA	Direct Ozone Reduction Catalyst Temperature Sensor Circuit High
P2610		Engine OFF Timer Plausibility Comparison With CAN Timer
P2626	2C3D	O2 Sensor Pumping Current Circuit Open (Bank 1 Sensor 1)
P2629	2C3E	O2 Sensor Pumping Current Circuit Open (Bank 2 Sensor 1)
P2713		Pressure Control Valve 4 Plausibility
P2716		Pressure Control Valve 4 No Signal
P2720		Pressure Regulator Valve 4 Lower Threshold
P2721		Pressure Regulator Valve 4 Upper Threshold
P2722		Pressure Regulator Valve 5 Plausibility
P2725		Pressure Regulator Valve 5 No Signal
P2729		Pressure Control Valve 5 Lower Threshold
P2730		Pressure Control Valve 5 Upper Threshold
P2759		Pressure Control Valve Circuit
P2761		Pressure Control Valve 4 Rationality
P2763		Pressure Control Valve 4 Short to Power
P2764		Pressure Control Valve 4 Short to Ground
P300A	2F0D	Controlled Air Guiding Circuit High
P300B	2F0D	Controlled Air Guiding Circuit Low
P300C	2F0D	Controlled Air Guiding Circuit
P3003	29F2	Fuel Rail Pressure Flow Rate Controlled, Pressure Too High
P3004	29F2	Fuel Rail Pressure Flow Rate Controlled, Maximum Pressure Exceeded

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P3008		O2 Sensor Low Engine Cold (Bank 1 Sensor 1)
P3009		O2 Sensor Low Engine Cold (Bank 1 Sensor 1)
P3010		O2 Sensor Range Check Cold Sensor (Bank 1 Sensor 2)
P3011		O2 Sensor Range Check Cold Sensor (Bank 2 Sensor 2)
P3012		Adaptation value Too High (Bank 1 Sensor 1)
P3013		Adaptation value Too High (Bank 2 Sensor 1)
P3014		O2 Sensor IC Supply Voltage Too Low (Bank 1 Sensor 1)
P3015		O2 Sensor IC Supply Voltage Too Low (Bank 2 Sensor 1)
P3016		O2 Sensor Ceramic Internal Resistance Adjusted Value Plausibility (Bank 1 Sensor 1)
P3017		O2 Sensor Ceramic Internal Resistance Adjusted Value Plausibility (Bank 2 Sensor 1)
P3018		O2 Sensor Lambda Controller Value Above Threshold Due to Open Pumping Circuit (Bank 1 Sensor 1)
P3019		O2 Sensor Lambda Controller Value Above Threshold Due to Open Pumping Circuit (Bank 2 Sensor 1)
P3020		O2 Sensor Signal Too Low During Coast Down Fuel Cut-OFF (Bank 1 Sensor 1)
P3021		O2 Sensor Signal Too Low During Coast Down Fuel Cut-OFF (Bank 2 Sensor 1)
P3022	2C41	O2 Sensor Disturbed SPI WRAF-IC (Bank 1 Sensor 1)
P3023	2C42	O2 Sensor Disturbed SPI WRAF-IC (Bank 2 Sensor 1)
P3024	2C41	O2 Sensor Initialization Error WRAF-IC (Bank 1 Sensor 1)
P3025	2C42	O2 Sensor Initialization Error WRAF-IC (Bank 1 Sensor 1)
P3026	2CAA	O2 Sensor Operating Temperature Not Reached (Bank 1 Sensor 1)
P3027	2CAA	O2 Sensor Operating Temperature Not Reached (Bank 2 Sensor 1)
P3028	2CA0	O2 Sensor Heater Control No Activity Detected (Bank 1 Sensor1)
P3029	2CA1	O2 Sensor Heater Control No Activity Detected (Bank 2 Sensor1)
P3030		O2 Sensor Heater Internal Resistance (Bank 1 Sensor 1)
P3031		O2 Sensor Heater Internal Resistance (Bank 2 Sensor 1)
P3041		O2 Sensor Lean and Rich Voltage Thresholds not Reached (Bank 2 Sensor 2)
P3090	29F2	Fuel Rail Pressure Flow Rate Controlled, Fallen Below Minimum Pressure
P3094	2A2D	Fuel Low Pressure System Pressure Too High
P3095	2A2D	Fuel Low Pressure System Pressure Maximum Pressure Exceeded
P3096	2A2D	Fuel Low Pressure System Pressure Minimum Pressure Fallen Below
P310B	2E30	Cylinder 1 High Pressure Injector Low Side / High Side Electrical
P310E	2E31	Cylinder 2 High Pressure Injector Low Side / High Side Electrical
P3101	30AC	Cylinder 1 High Pressure Injector Low Side Circuit Low
P3102	30AC	Cylinder 1 High Pressure Injector Low Side Circuit High
P3105	30AD	Cylinder 2 High Pressure Injector Low Side Circuit Low
P3106	30AD	Cylinder 2 High Pressure Injector Low Side Circuit high
P3109	30AE	Cylinder 3 High Pressure Injector Low Side Circuit Low
P311B	2E32	Cylinder 3 High Pressure Injector Low Side / High Side Electrical

OBD-38 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P311E	2E33	Cylinder 4 High Pressure Injector Low Side / High Side Electrical
P3110	30AE	Cylinder 3 High Pressure Injector Low Side Circuit High
P3113	30AF	Cylinder 4 High Pressure Injector Low Side Circuit Low
P3114	30AF	Cylinder 4 High Pressure Injector Low Side Circuit High
P3117	30B0	Cylinder 5 High Pressure Injector Low Side Circuit Low
P3118	30B0	Cylinder 5 High Pressure Injector Low Side Circuit High
P312B	2E34	Cylinder 5 High Pressure Injector Low Side / High Side Electrical
P312E	2E35	Cylinder 6 High Pressure Injector Low Side / High Side Electrical
P3121	30B1	Cylinder 6 High Pressure Injector Low Side Circuit Low
P3122	30B1	Cylinder 6 High Pressure Injector Low Side Circuit High
P3149	30AC	Cylinder 1 High Pressure Injector High Side Circuit Low
P3150	30AC	Cylinder 1 High Pressure Injector High Side Circuit High
P3152	30AC	Cylinder 2 High Pressure Injector High Side Circuit Low
P3153	30AD	Cylinder 2 High Pressure Injector High Side Circuit High
P3155	30AD	Cylinder 3 High Pressure Injector High Side Circuit Low
P3156	30AE	Cylinder 3 High Pressure Injector High Side Circuit High
P3158	30AF	Cylinder 4 High Pressure Injector High Side Circuit Low
P3159	30AF	Cylinder 4 High Pressure Injector High Side Circuit High
P316A	2EE6	Engine Coolant Temperature Signal Stuck High
P3161	30B0	Cylinder 5 High Pressure Injector High Side Circuit Low
P3162	30B0	Cylinder 5 High Pressure Injector High Side Circuit High
P3164	30B1	Cylinder 6 High Pressure Injector High Side Circuit Low
P3165	30B1	Cylinder 6 High Pressure Injector High Side Circuit High
	2FBF	Fuel Supply Pressure Low During Release of Injection
	2FC0	Fuel Rail Pressure Management Range
P319A	2FBD	Fuel Pressure Control Minimum Characteristic Curve Operation 1 Out of Range
P3194	2FBD	Fuel Pressure Control Basic Characteristic Curve Operation 1 Out of Range
P3196	2EEC	Radiator Coolant Temperature Sensor High
P3197	2EEB	Radiator Coolant Temperature Gradient Too High
P3198	2EE3	Engine Coolant Temperature Gradient Too High
P230D		ECM BUS Check
P3199	2EE2	Engine Coolant Temperature Signal Stuck
P3200		CAN Internal Powertrain Chip
P3201		BUS Check CAN Powertrain Chip
P3202	CD87	Powertrain CAN Chip Cut-Off
P3203		BUS Check Local CAN
P3204		BUS Check Local CAN

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P3205	CD8B	Local CAN Chip Cut-Off
P3206	11737	CAN Time-out ARS
P3207	11737	CAN Message Monitoring ARS, No Signal
P3208	2DD{	CAN Message ARS
P3209	11735	CAN Message ASC / DSC
P321E	2F77	Ambient Pressure Sensor Maximum Pressure Implausible
P321F	2F77	Ambient Pressure Sensor Minimum Pressure Implausible
P3210	11735	CAN Monitoring ASC / DSC
P3211	2DDA	CAN Message CAS
P3212	2DDA	CAN Message CAS
P3213	2DD3	CAN Message Monitoring ETC Alive Check
P3214		ECM BIS Check
P3215	2DDC	CAN Message SZL
P3216	11727	CAN Time-out Instrument Pack
P3217	11727	CAN Message Instrument Pack
P3219	2DDC	CAN Message SZL Alive Check
P322A		Ambient Pressure Sensor Continuity
P3220	2DDC	CAN Message SZL No Signal
P3221	2DDC	CAN Message SZL
P3223	2E97	Generator Mechanical
P3225	11927	Generator Communication Error
P3231	2D70	Control Module Monitoring Error Response
P3233	2D70	Control Module Monitoring Relative Charge Plausibility
P3226	27F1	E-box Control Fan High Input
P3227	27F1	E-box Control Fan Low Input
P3228	27F1	E-box Control Fan Open Circuit
P323F	2D60	Control Module Monitoring Fuel Volume, Air Mass Injected Fuel Volume Correlation
P3231		Control Module Internal Fault, Throttle Actuator Control MONitor 2 / 3 ADC Processor Fault
P3232		Control Module Internal Fault, Monitoring of Engine Functions
P3234	2D71	Control Module Monitoring Throttle Actuator Stop Test
P3235	2FA4	Control Module Monitoring Version Coding Plausibility
P3236	2D71	Control Module Monitoring Injection Time Relative Fuel Quantity Plausibility
P3237	2D71	Control Module Monitoring Fuel Correction Error
P3238		Control Module Monitoring TPU Chip Defective
P3239	2FA3	Control Module - No Coding
P324A	2E97	Generator Type Implausible
P324A	2ED3	Generator Type Implausible

OBD-40 On-Board Diagnostics

Diagnostic trouble codes (DTCs)

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P324C	2ED0	Generator Over Temperature Calculated
P324E	2ED2	Generator Regulator Type Implausible
P3247	2B98	Control Module Fault - RAM Backup
P325A	2ECE	Generator Electrical Error Calculated
P3255	2E96	Generator Voltage In Starting Above Threshold
P3256	2DD2	CAN Time-out Steering Angle Sensor
P3258		Control Module Internal Fault, Hardware
P3259	2D60	Control Module Monitoring Fuel Volume, Lambda Implausible to Operating Mode
P3283	29F1	Fuel Pressure Control Adaptive Fuel Volume Out of Range (Bank 1)
P3284	29F1	Fuel Pressure Control Adaptive Fuel Volume Implausible (Bank 1)
P3300	2E24	Ignition Coil Cylinder 1 High Input
P3301	2E24	Ignition Coil Cylinder 1 High Resistance
P3302	2E24	Ignition Coil Cylinder 1 Cut OFF Due to High Temperature
P3303	2E28	Ignition Coil Cylinder 5 High Input
P3304	2E28	Ignition Coil Cylinder 5 High Resistance
P3305	2E28	Ignition Coil Cylinder 5 Cut OFF Due to High Temperature
P3306	2E27	Ignition Coil Cylinder 4 High Input
P3307	2E27	Ignition Coil Cylinder 4 High Resistance
P3308	2E27	Ignition Coil Cylinder 4 Cut OFF Due to High Temperature
P3309	2E2B	Ignition Coil Cylinder 8 High Input
P3310	2E2B	Ignition Coil Cylinder 8 High Resistance
P3311	2E2B	Ignition Coil Cylinder 8 Cut OFF Due to High Temperature
P3312	2E29	Ignition Coil Cylinder 6 High Input
P3313	2E29	Ignition Coil Cylinder 6 High Resistance
P3314	2E29	Ignition Coil Cylinder 6 Cut OFF Due to High Temperature
P3315		Ignition Coil Cylinder 3 High Input
P3316		Ignition Coil Cylinder 3 High Resistance
P3317	11814	Ignition Coil Cylinder 3 Cut OFF Due to High Temperature
P3318	2E2A	Ignition Coil Cylinder 7 High Input
P3319	2E2A	Ignition Coil Cylinder 7 High Resistance
P3320	2E2A	Ignition Coil Cylinder 7 Cut OFF Due to High Temperature
P3321	11813	Ignition Coil Cylinder 2 High Input
P3322	11813	Ignition Coil Cylinder 2 High Resistance
P3323	11813	Ignition Coil Cylinder 2 Cut OFF Due to High Temperature
P3325	2E26	Ignition Coil Cylinder 3 High Input
P3326	2E26	Ignition Coil Cylinder 3 High Resistance
P3327	2E26	Ignition Coil Cylinder 3 Cut OFF Due to High Temperature

Table a. Diagnostic trouble codes (DTCs) (continued)

P-code	BMW FC	Definition
P3321	2E25	Ignition Coil Cylinder 2 High Input
P3322	2E25	Ignition Coil Cylinder 2 High Resistance
P3323	2E25	Ignition Coil Cylinder 2 Cut OFF Due to High Temperature
P3400		Cylinder Deactivation System (Bank 1)
P3497		Cylinder Deactivation System (Bank 20)

