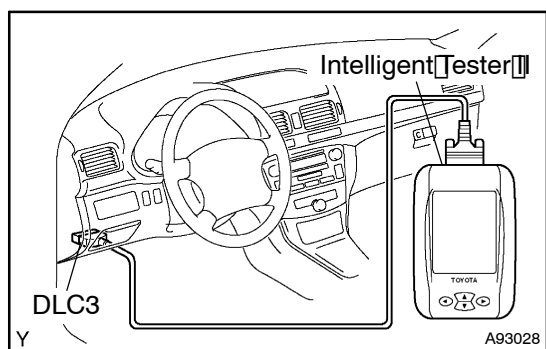


DIAGNOSIS SYSTEM

1. DESCRIPTION for EURO-OBD (European spec.)

- When troubleshooting Euro-OBD vehicles, the only difference from the usual troubleshooting procedure is that you connect an OBD scan tool (complying with ISO 15031-4) or the intelligent tester II to the vehicle, and read the various data output from the vehicle's ECM.
- Euro-OBD regulations require that the vehicle's on-board computer illuminates the MIL (Malfunction Indicator Lamp) on the instrument panel when the computer detects a malfunction: 1) the emission control systems and components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computer. In addition, the applicable DTCs (Diagnostic Trouble Codes) prescribed by ISO 15031-4 are recorded in the ECM memory (see page 05-29).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



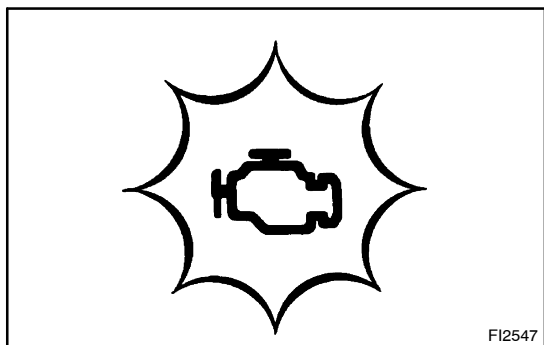
- To check the DTCs, connect the OBD scan tool or intelligent tester II to the DLC3 (Data Link Connector 3) on the vehicle. The OBD scan tool or intelligent tester II also enables you to erase the DTCs and check the freeze frame data and various forms of engine data. (See the instruction manual for the OBD scan tool or intelligent tester II.)
- The diagnosis system operates in normal mode during normal vehicle use. In normal mode, 2 trip detection logic* is used to ensure accurate detection of malfunctions. Check mode is also available to technicians as an option. In check mode, 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent problems (intelligent tester II only) (see page 05-29).
- *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the ignition switch is turned to OFF and then to ON again, and the same malfunction is detected again, the MIL will illuminate (2nd trip).

- **Freeze frame data:**
The freeze frame data record the engine condition (fuel system, calculated engine load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Priorities for troubleshooting:

When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the DTC chart. If no instructions are written in the DTC chart, check the DTCs in the following order of priority:

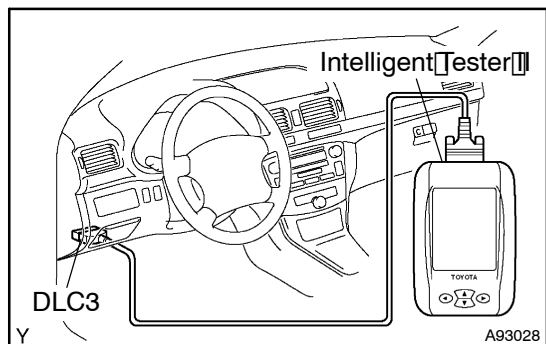
- (a) DTCs other than fuel trim malfunction DTCs (P0171 and P0172) and misfire DTCs (P0300 to P0304).
- (b) Fuel trim malfunction DTCs (P0171 and P0172).
- (c) Misfire DTCs (P0300 to P0304).



2. DESCRIPTION for M-OBD (Except European spec.)

- When troubleshooting Multiplex OBD (M-OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the Intelligent Tester II to the vehicle, and read the various data output from the vehicle's ECM.
- The vehicle's on-board computer illuminates the MIL (Malfunction Indicator Lamp) on the instrument panel when the computer detects a malfunction in the computer itself or in the drive system components. In addition, the applicable DTCs (Diagnostic Trouble Codes) are recorded in the ECM memory (see page 05-29).

If the malfunction does not recur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.

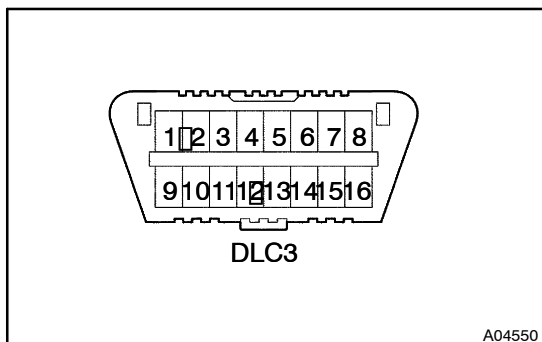


- To check the DTCs, connect the Intelligent Tester II to the DLC3 (Data Link Connector 3) on the vehicle or connect terminals TC and CG on the DLC3 (DTCs will be displayed in the combination meter).
- The diagnosis system operates in normal mode during normal vehicle use. In normal mode, 2 trip detection logic* is used to ensure accurate detection of malfunctions. Check mode is also available to technicians as an option. In check mode, 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent problems (see page 05-29).
- *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the ignition switch is turned to OFF and then to ON again, and the same malfunction is detected again, the MIL will illuminate (2nd trip).
- Freeze frame data:
The freeze frame data record the engine condition (fuel system, calculated engine load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Priorities for troubleshooting:

When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the DTC chart. If no instructions are written in the DTC chart, check the DTCs in the following order of priority:

- (a) DTCs other than Fuel Trim malfunction DTCs (P0171 and P0172) and misfire DTCs (P0300 to P0304).
- (b) Fuel Trim malfunction DTCs (P0171 and P0172).
- (c) Misfire DTCs (P0300 to P0304).



3. CHECK DLC3

- (a) The vehicle's ECM uses the ISO 9141-2 (Euro-OBD)/ISO 14230 (M-OBD) communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031-03 and matches the ISO 9141-2/ISO 14230 format.

| Symbol | Terminal No. | Name | Reference Terminal | Result | Condition |
|--------|--------------|------------------|--------------------|--------------------|---------------------|
| SIL | 7 | Bus "+" line | 5 - Signal ground | Pulse generation | During transmission |
| CG | 4 | Chassis ground | Body ground | 1 Ω or less | Always |
| SG | 5 | Signal ground | Body ground | 1 Ω or less | Always |
| BAT | 16 | Battery positive | Body ground | 9 to 14 V | Always |

HINT:

When you use the Intelligent Tester II, first connect the cable of the tester to the DLC3. Next, turn the ignition switch to ON. Finally turn the tester ON. If the screen displays NO INFORMATION AVAILABLE and bus check is also failed, a problem exists in the vehicle, the tester or the tester cable.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester or the cable, so consult the Service Department listed in its instruction manual.

4. INSPECT BATTERY VOLTAGE

Battery voltage: 11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.

5. CHECK MIL

- (a) The MIL illuminates when the ignition switch is turned to ON and the engine is not running.

HINT:

If the MIL is not illuminated, check the MIL Circuit (see page 05-247).

- (b) When the engine is started, the MIL should turn off. If the MIL remains on, the diagnosis system has detected a malfunction or abnormality in the system.