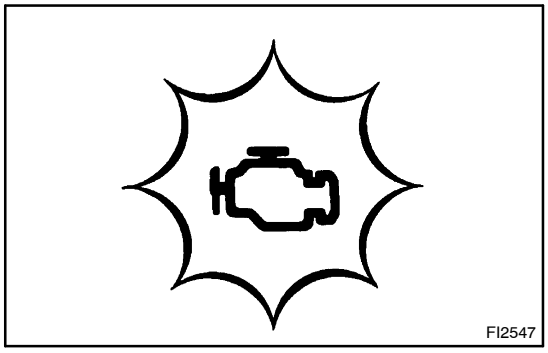

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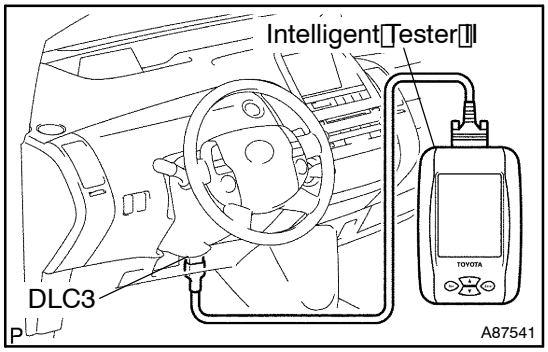
DIAGNOSIS SYSTEM

1. Description

Description for Euro–OBD (European spec.)

- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you connect a general OBD scan tool complying with ISO 15031–4 or the intelligent tester II to the vehicle, and read various data output from the vehicle's ECM.
- Euro–OBD regulations require that the vehicle's on–board computer illuminates the check engine warning lamp (CHK ENG) on the instrument panel when the computer detects a malfunction in the emission control system/components or in the power train control components which affect vehicle emissions, or malfunction in the computers. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO 15031–4 are recorded in the ECM memory (see page 05–39).

If the malfunction does not reoccur in 3 consecutive trips, the CHK ENG 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 Data Link Connector 3 (DLC3) on the vehicle. The OBD scan tool or intelligent tester II also enables you to erase the DTCs and check freezed frame data and various forms of engine data. (For operating instructions, see its instruction book.)

  DTCs include ISO controlled codes and manufacturer controlled codes. ISO controlled codes must be set as prescribed by the ISO, while manufacturer controlled codes can be set by the manufacturer within the prescribed limits (see page 05–39).
- In order to enhance the OBD function on vehicles and develop the Off–Board diagnosis system, CAN communication is introduced in this system. (CAN: Controller Area Network) It minimizes a gap between technician skills and vehicle technology. CAN is a network, which uses a pair of data transmission lines, spanning multiple computers and sensors. It allows a high speed communication between the systems and to simplify the wire harness connection.

  Since the CAN communication is equipped in this system, intelligent tester II connecting to the DLC3 is necessary to display any information from the ECM on the tester (also the communication be-

tween the intelligent tester II and the ECM uses CAN communication signal).

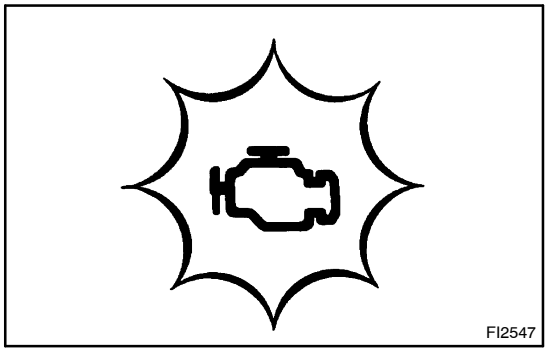
- The diagnosis system operates in normal mode during normal vehicle use. It also has check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and to ensure a thorough malfunction detection. By switching the ECM to check mode using the intelligent tester II when troubleshooting, a technician can cause the CHK ENG to illuminate for a malfunction that is only detected once or momentarily (intelligent tester II only) (see step 3).
- * 2 trip detection logic:
  When a malfunction is first detected, the pending fault code is stored in the ECM memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the CHK ENG to illuminate (2nd trip) (However, the power switch must be OFF between the 1st trip and 2nd trip).
- Freeze frame data:
  Freeze frame data records the engine condition (fuel system, calculated 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 running or stopped, 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:

If troubleshooting priorities for multiple DTCs are given in the applicable DTC chart, these should be followed.

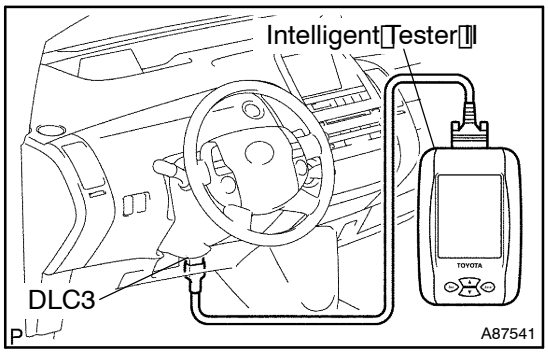
If no instruction is given, troubleshoot according to the following priorities.

(1) DTCs other than fuel trim malfunction (DTCs P0171, P0172, P0174 and P0175) and misfire (DTCs P0300 – P0304).
(2) Fuel trim malfunction (DTCs P0171 and P0172).
(3) Misfire (DTCs P0300 – P0304).


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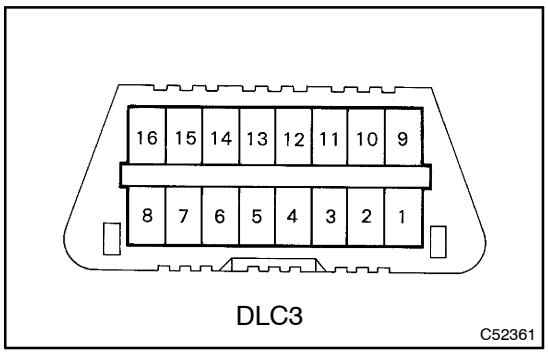
(a) Description for M–OBD (Except European spec.)

- When troubleshoot 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 off various data output from the vehicle's ECM.
- The vehicle's on–board computer illuminates the check engine warning lamp (CHK ENG) on the instrument panel when the computer detects malfunction in the computer itself or in drive system components. In addition, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the ECM memory (see page 05–39). If the malfunction does not recur, the CHK ENG will be disappeared by turning off the power switch but the recorded DTC will remain in the ECM memory.



- To check the DTCs, connect the intelligent tester II to the Data Link Connector 3 (DLC3) on the vehicle The intelligent tester II also enables you to erase the DTCs and check the freeze frame data and various forms of engine data. (For operating instructions, see its instruction book.)
- In order to enhance the OBD function on vehicles and develop the Off–Board diagnosis system, CAN communication is introduced in this system (CAN: Controller Area Network). It minimizes a gap between technician skills and vehicle technology. CAN is a network, which uses a pair of data transmission lines, spanning multiple computers and sensors. It allows a high speed communication between the systems and to simplify the wire harness connection.
  Since the CAN communication is equipped in this system, intelligent tester II connecting to the DLC3 is necessary to display any information from the ECM on the tester (also the communication between the intelligent tester II and the ECM uses CAN communication signal).
- The diagnosis system operates in normal mode during normal vehicle use. It also has check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and to ensure a thorough malfunction detection. By switching the ECM to check mode using the intelligent tester II when troubleshooting, a technician can cause the CHK ENG to illuminate for a malfunction that is only detected once or momentarily (intelligent tester II only) (see step 3).

- *2 1trip detection logic:
  When a malfunction is first detected, the pending fault code is stored in the ECM memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the CHK ENG to illuminate (2nd trip). However, the power switch must be turned OFF between the 1st trip and 2nd trip).
- Freeze frame data:
  Freeze frame data records the engine condition (fuel system, calculator load, water 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 running or stopped, 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. (see page 05–26).



DLC3

2. CHECK DLC3

The vehicle's ECM uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765–4 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
CANH	6	CAN "High" line	CANL	54 to 69 Ω	Power switch OFF
CANH	6	CAN "High" line	Battery positive	1 MΩ or higher	Power switch OFF
CANH	6	CAN "High" line	CG	1 kΩ or higher	Power switch OFF
CANL	4	CAN "Low" line	Battery Positive	1 MΩ or higher	Power switch OFF
CANL	4	CAN "Low" line	CG	1 kΩ or higher	Power switch OFF

HINT:

When you use the intelligent tester II, first connect a cable of the tester to the DLC3. Next, turn ON the main power of the PRIUS by pushing the power switch (IG 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 side or the tester side.

- If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in

the tester itself, so consult the Service Department listed in its instruction book.

3. INSPECT BATTERY VOLTAGE

Battery Voltage: 11 to 14 V

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

4. CHECK CHK ENG

(a) The CHK ENG illuminates when the power switch is turned ON (IG) and the HV main system is not in operation.

HINT:

If the CHK ENG is not illuminated, troubleshoot the CHK ENG circuit (see page 05–209).

(b) When the HV main system is activated (READY ON), the CHK ENG should turn off. If the CHK ENG illuminates again, the diagnosis system has detected malfunction or abnormality in the diagnosis system.