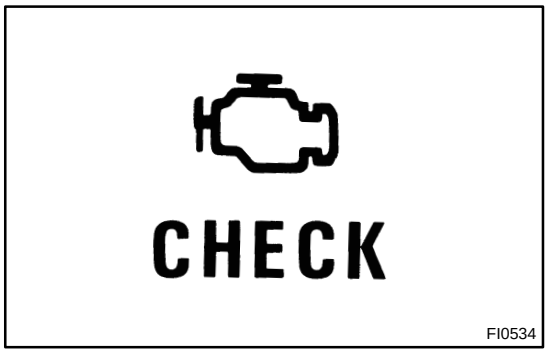
05CRG–08

DIAGNOSIS SYSTEM

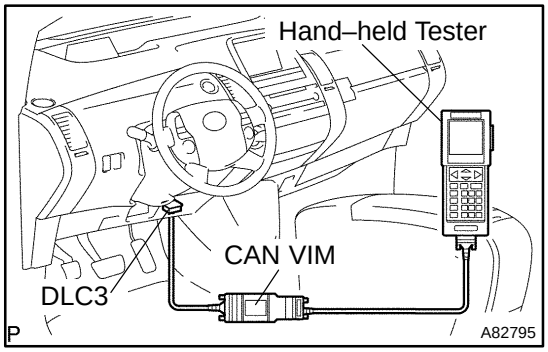


1. DESCRIPTION

- When troubleshooting On–Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (in compliance with SAE J1978) or the hand–held tester. Various data output from the vehicle's ECM can then be read.
- OBD II regulations require that the vehicle's on–board computer illuminates the Malfunction Indicator lamp (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system / components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (see page 05–55).

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 DTCs, connect the hand–held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand–held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (see the instruction manual for the OBD II scan tool or the hand–held tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (see the DTC chart on page 05–55).



- In order to enhance 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.

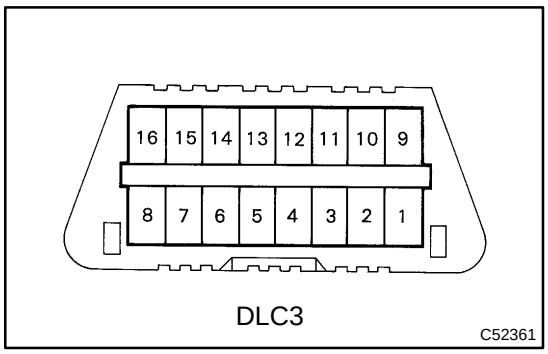
  Since the CAN communication is equipped in this system, CAN VIM (VIM: Vehicle Interface Module) connecting with hand–held tester is necessary to display any information from the ECM on the tester. (Also the communication between the hand–held tester and the ECM uses CAN communication signal) When confirm the DTCs and any data of the ECM, connect the CAN VIM between the DLC3 and the hand–held tester.
- The diagnosis system operates in normal mode during normal vehicle use. In "normal mode", 2 trip detection log-

ic* is used to ensure accurate detection of malfunctions. A ”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 malfunctions (hand–held tester only)
(see page 05–55).

- *2 trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the power switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate (2nd trip).
- Freeze frame data:
  The freeze frame data records the engine conditions (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 priorities should be followed.
If no instructions are given, perform troubleshooting for those DTCs according to the following priorities.

(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. 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 hand–held tester II or the OBD scan tool, first connect its cable to the DLC3. Next, turn ON the main power of the PRIUS by pushing the power switch (IG ON). Finally turn the tester or the scan tool ON. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in its instruction manual.

3. INSPECT BATTERY VOLTAGE

Battery Voltage: 11 to 14 V

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

4. CHECK MIL

(a) The MIL comes on when the power switch is turned ON (IG) and the HV main system is not in operation.

HINT:

If the MIL is not illuminated, troubleshoot the MIL circuit (see page 05–381).

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