

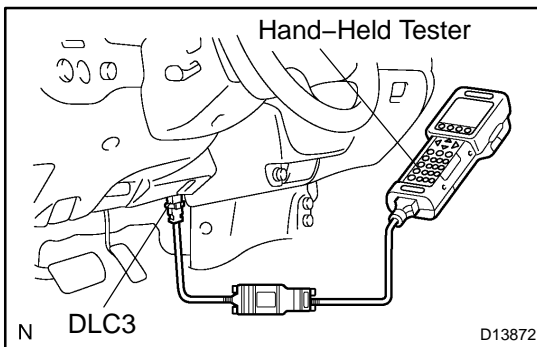
## DIAGNOSIS SYSTEM

### 1. Description

- When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to 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 Light (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 [DI-477](#)).

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 DTC, 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 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 [DI-477](#)).



### 2. NORMAL MODE AND CHECK MODE

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. 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 (See page [DI-430](#)).

### 3. 2-TRIP DETECTION LOGIC

When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. This is known as 1st trip detection. If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate. This is known as 2nd trip detection.

- 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, as well as other data from the time when a malfunction occurred.

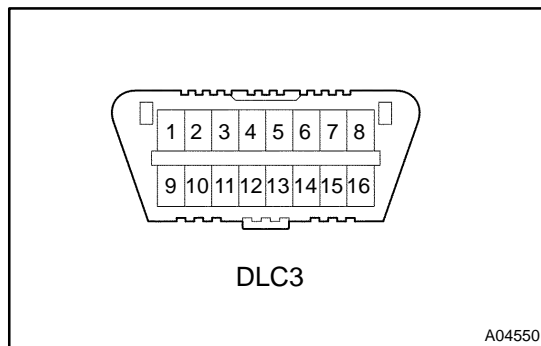
Priorities for troubleshooting:

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

- DTCs other than fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175) and misfire DTCs (P0300 to P0308).
- Fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175).
- Misfire DTCs (P0300 to P0308).

#### 4. CHECK DLC3

The vehicle's ECM uses the ISO 9141–2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.



Symbol	Terminal Description	Condition	Specified Condition
SIL (7) – SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) – Body ground	Chassis ground	Always	Below 1 $\Omega$
SG (5) – Body ground	Signal ground	Always	Below 1 $\Omega$
BAT (16) – Body ground	Battery positive	Always	11 to 14 V
CANH (6) – CANL (14)	HIGH–level CAN bus line	Ignition switch OFF	54 to 69 $\Omega$
CANH (6) – Battery positive	HIGH–level CAN bus line	Ignition switch OFF	1 M $\Omega$ or higher
CANH (6) – CG (4)	HIGH–level CAN bus line	Ignition switch OFF	1 k $\Omega$ or higher
CANL (14) – Battery positive	LOW–level CAN bus line	Ignition switch OFF	1 M $\Omega$ or higher
CANL (6) – CG (4)	LOW–level CAN bus line	Ignition switch OFF	1 k $\Omega$ or higher

#### HINT:

Connect the cable of the hand–held tester to the DLC3, turn the ignition switch ON and attempt to use the hand–held tester. 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 the tool's instruction manual.

## **5. INSPECT BATTERY VOLTAGE**

### **Battery Voltage: 11 to 14 V**

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

## **6. CHECK MIL**

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

HINT:

If the MIL is not illuminated, troubleshoot the MIL circuit (See page [DI-940](#)).

- (b) When the engine is started, the MIL should not illuminate. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

## **7. ALL READINESS**

For this vehicle, using the hand-held tester allows readiness codes corresponding to all DTCs to be read. When diagnosis (normal or malfunctioning) has been complete, readiness codes are set. Enter the following menus: ENHANCED OBD II / MONITOR STATUS on the hand-held tester.