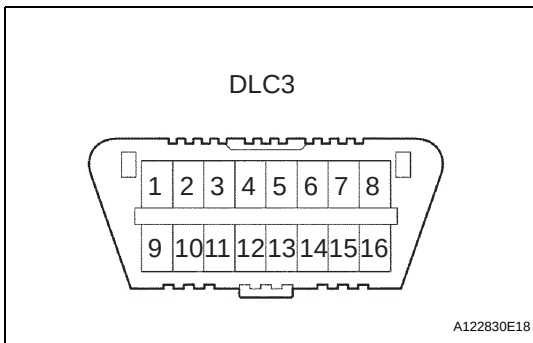
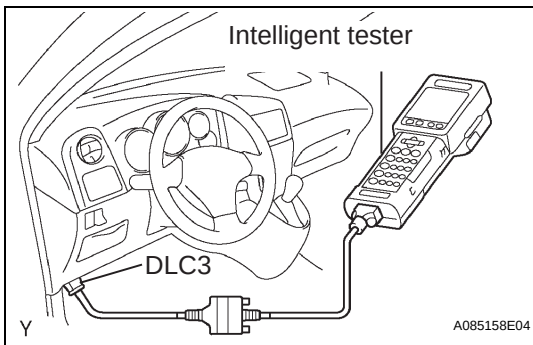


DIAGNOSIS SYSTEM

1. DESCRIPTION

- When troubleshooting OBD II (On-Board Diagnostics) vehicles, an intelligent tester or OBD II scan tool (complying with SAE J1987) must be connected to the DLC3 (Data Link Connector 3) of the vehicle. Various data in the vehicle's ECM (Engine Control Module) can be then read.
- OBD II regulations require that the vehicle's on-board computer illuminates the MIL (Malfunction Indicator Light) on the instrument panel when the computer detects a malfunction in:
 - The emission control systems and components
 - The power train control components (which affect vehicle emissions)
 - The computer itself
 - In addition, the applicable DTCs (Diagnostic Trouble Codes) prescribed by SAE J2012 are recorded on 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.
 - To check DTCs, connect an intelligent tester or OBD II scan tool to the DLC3. The tester and scan tool display DTCs, freeze frame data, and a variety of engine data. The DTCs and freeze frame data can be erased with the tester or scan tool (See page [ES-30](#)).



2. NORMAL MODE AND CHECK MODE

The diagnosis system operates in the 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 as an option for technicians. 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 only) (See page [ES-31](#)).

3. 2 TRIP DETECTION LOGIC

When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next subsequent drive cycle, the MIL is illuminated (2nd trip).

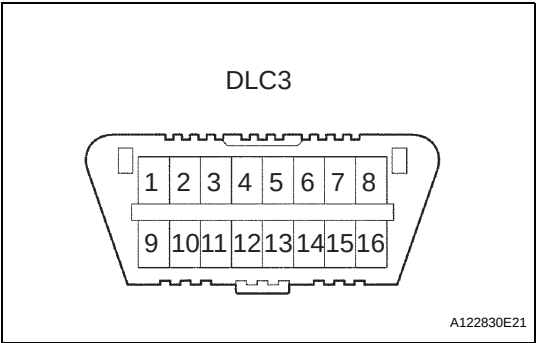
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4. **FREEZE FRAME DATA**

The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

5. **DLC3 (Data Link Connector 3)**

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



Symbols	Terminal No.	Names	Reference terminals	Results	Conditions
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:

- The DLC3 is the interface prepared for reading various data from the vehicle's ECM. After connecting the cable of an intelligent tester or OBD II scan tool, turn the ignition switch to ON and turn the tester or scan tool ON.
- If a communication failure message is displayed on the tester or scan tool screen (on the tester: UNABLE TO CONNECT TO VEHICLE), a problem exists in either the vehicle or tester. In order to identify the location of the problem, connect the tester to another vehicle.
- If communication is normal: Inspect the DLC3 on the original vehicle.
- If communication is impossible: The problem is probably with the tester itself. Consult the Service Department listed in the instruction manual.

6. **BATTERY VOLTAGE**

Battery Voltage:

11 to 14 V

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

7. **MIL (Malfunction Indicator Light)**

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

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

HINT:

If the MIL is not illuminated when the ignition switch is first turned to ON, check the MIL circuit (See page [ES-385](#)).

DTC CHECK / CLEAR

NOTICE:

Intelligent tester only:

When the diagnosis system is changed from normal mode to check mode or vice versa, all DTCs and freeze frame data recorded in normal mode are erased. Before changing modes, always check and make a note of DTCs and freeze frame data.

HINT:

- DTCs which are stored in the ECM can be displayed on an intelligent tester or OBD II scan tool. An intelligent tester can display current and pending DTCs.
- Some DTCs are not set if the ECM does not detect the same malfunction again during a second consecutive driving cycle. However, such malfunctions, detected on only one occasion, are stored as pending DTCs.

1. CHECK DTC (Using an intelligent tester or OBD II scan tool)

- Connect an intelligent tester or OBD II scan tool to the DLC3.
- Turn the ignition switch to ON.
- Turn the tester or scan tool ON.
- If using an intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- If using an OBD II scan tool, refer to the instruction manual.
- Check the DTC(s) and freeze frame data, and then write them down.
- Check the details of the DTC(s) (See page [ES-38](#)).

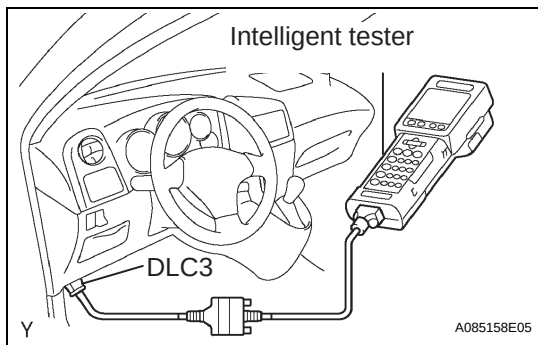
HINT:

When simulating a symptom with an OBD II scan tool to check DTCs in the DIAGNOSTIC TROUBLE CODE CHART, subject to 2 trip detection logic, conduct either of the following operations. (For more information, refer to the scan tool instruction manual.)

- Check pending DTCs using the Continuous Test Result function (Mode 07 for SAE J1979).
- Simulate the symptom again after turning the ignition switch to OFF upon finishing the first symptom simulation, so that the MIL is illuminated and the DTC(s) is stored in the ECM.

2. CLEAR DTC (Using the intelligent tester or OBD II scan tool)

- Connect the intelligent tester or the OBD II scan tool to the DLC3.
- Turn the ignition switch to ON.
- Turn the tester or the scan tool ON.
- If using an intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
- Press the YES button.



- (f) If using an OBD II scan tool, refer to the instruction manual.

3. CLEAR DTC (Without using an intelligent tester or OBD II scan tool)

- (a) Perform either one of the following operations.
 - (1) Disconnect the negative battery cable for more than 1 minute.
 - (2) Remove the EFI and ETCS fuses from the Relay Block (R/B) located inside the engine compartment for more than 1 minute.

NOTICE:

When disconnecting the battery cable, perform the INITIALIZE procedure (See page [AX-14](#)).

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CHECK MODE PROCEDURE

HINT:

Intelligent tester only:

Compared to normal mode, check mode is more sensitive to malfunctions. Therefore, check mode can detect the malfunctions that cannot be detected by normal mode.

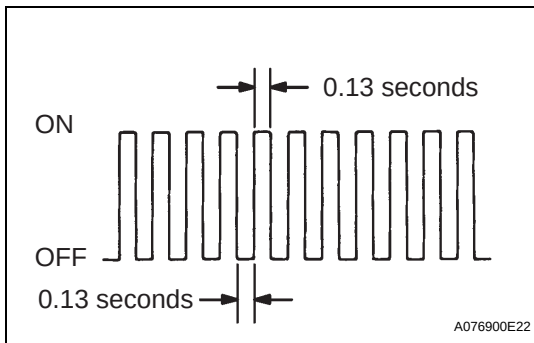
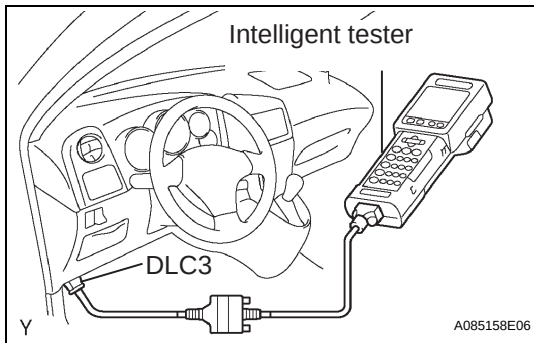
NOTICE:

All the stored DTCs and freeze frame data are erased if:

1) the ECM is changed from normal mode to check mode or vice versa; or 2) the ignition switch is turned from ON to ACC or OFF while in check mode.

Before changing modes, always check and make a note of any DTCs and freeze frame data.

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1. CHECK MODE PROCEDURE (Using an intelligent tester)

- (a) Check and ensure the following conditions:
 - (1) Battery voltage 11 V or more
 - (2) Throttle valve fully closed
 - (3) Transmission in the P or N positions
 - (4) A/C switched OFF
- (b) Turn the ignition switch OFF.
- (c) Connect an intelligent tester to the DLC3.
- (d) Turn the ignition switch to ON.
- (e) Turn the tester ON.
- (f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.
- (g) Switch the ECM from normal mode to check mode.
- (h) Make sure the MIL flashes as shown in the illustration.
- (i) Start the engine.
- (j) Make sure the MIL turns off.
- (k) Simulate the conditions of the malfunction described by the customer.
- (l) Check DTCs and freeze frame data using the tester.