AX

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle's ECM can then be read.

(b) 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
(2) The powertrain control components (which affect vehicle emissions)
(3) The computer
In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory.
When the malfunction does not reoccur, the MIL stays illuminated until the ignition switch is turned OFF, and the MIL turns OFF when the engine is started. However, the DTCs remain recorded in the ECM memory.

(c) To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The tester displays DTCs, the freeze frame data and a variety of the engine data.
The DTCs and freeze frame data can be erased with the tester (see page AX-40).

2. NORMAL MODE AND CHECK MODE

(a) 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 malfunctions.

3. 2 TRIP DETECTION LOGIC

(a) 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 drive cycle, the MIL is illuminated (2nd trip).

AX
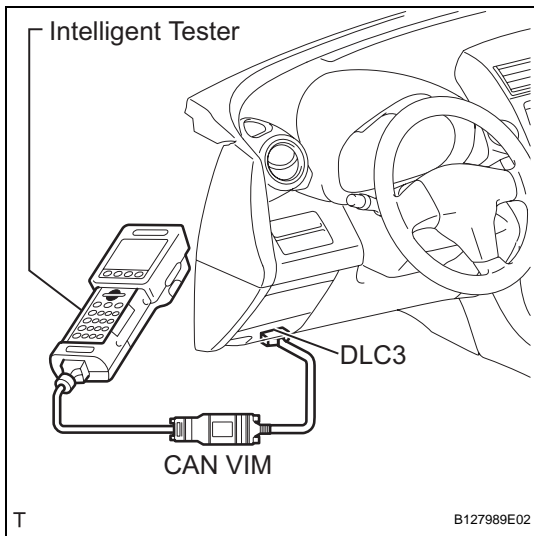
4. FREEZE FRAME DATA

(a) 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.

(b) The intelligent tester records freeze frame data in 5 different instances: 1) 3 times before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. These data can be used to simulate the vehicle's condition around the time when the malfunction occurred. The data may help find the cause of the malfunction, or judge if the DTC is being caused by a temporary malfunction or not.

DTC was set.

0.5 sec. 0.5 sec. 0.5 sec.

★: Freeze frame data which can be read

C140837E01
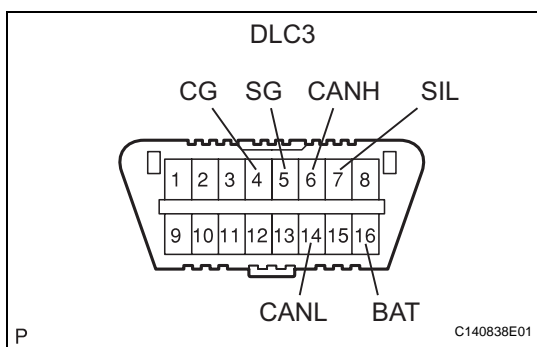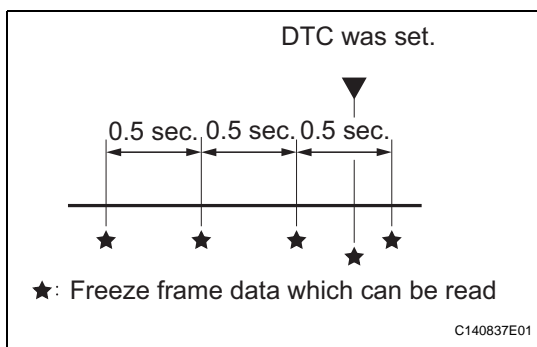
5. DATA LINK CONNECTOR 3 (DLC3)

(a) 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.

DLC3

CG SG CANH SIL

1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16

CANL BAT

P   C140838E01

Terminal of DLC3

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	9 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher

NOTICE:
*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.