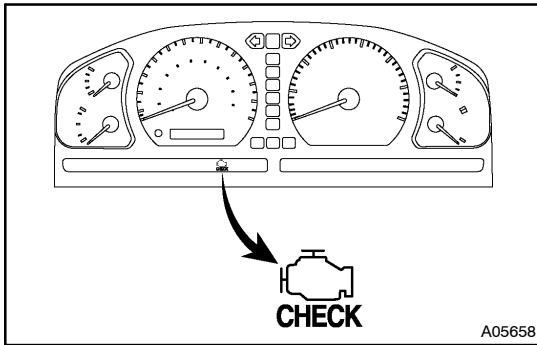




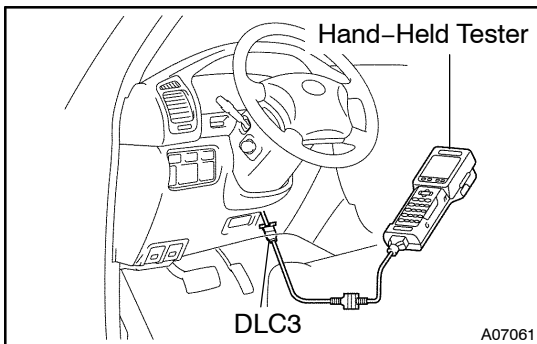
PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) 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 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-43](#)).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



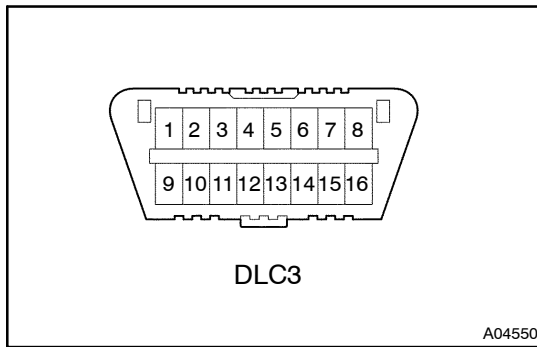
- To check the DTC, connect the hand-held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand-held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (See the instruction manual for the OBD 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 [DI-43](#)).

- 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 (hand-held tester only) (See step 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 determining 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:

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:

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



(b) Check the 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	Name	Result
(Terminal No.)	(Reference terminal)	(Condition)
SIL	Bus "+" line	Pulse generation
(7)	(5 – Signal ground)	(During transmission)
CG	Chassis ground	1 Ω or less
(4)	(Body ground)	(Always)
SG	Signal ground	1 Ω or less
(5)	(Body ground)	(Always)
BAT	Battery positive	9 to 14 V
(16)	(Body ground)	(Always)

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.

(c) Inspect the battery voltage.

Battery Voltage: 11 to 14 V

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

(d) Check the MIL.

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

HINT:

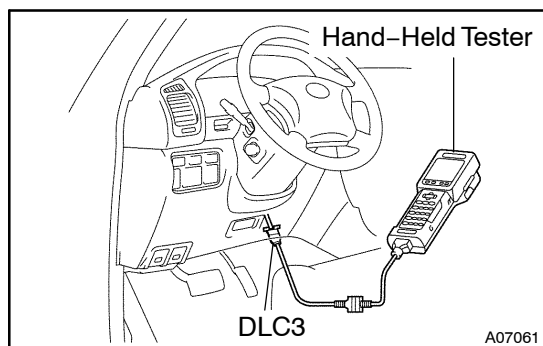
If the MIL is not illuminated, troubleshoot the MIL circuit (See page [DI-363](#)).

- (2) 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.

2. DTC CHECK (Normal Mode)

NOTICE:

- If no DTC appears in normal mode:
On the OBD II scan tool or the hand-held tester check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979).
- 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 will be erased. Before changing modes, always check and make a note of DTCs and freeze frame data.



(a) Checking DTCs using the OBD II scan tool or hand-held tester.

- (1) Connect the OBD II scan tool or the hand-held tester to DLC3.
- (2) Turn the ignition switch ON.
- (3) Use the OBD II scan tool or the hand-held tester to check the DTCs and freeze frame data and then write them down.

For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES. For the OBD II scan tool, see its instruction manual.

- (4) See page [DI-43](#) to confirm the details of the DTCs.

NOTICE:

When simulating a symptom with the OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For DTCs chart subject to "2 trip detection logic", perform either of the following actions.

- Check the pending fault code:
For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
- Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL comes on and the DTCs are recorded in the ECM.

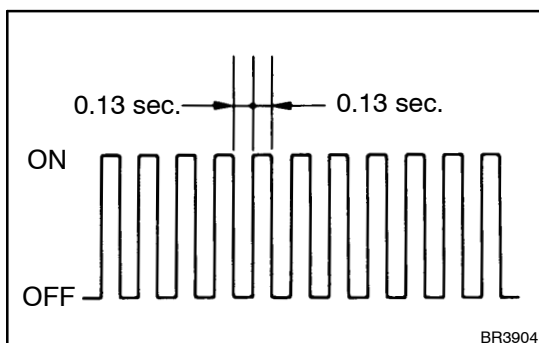
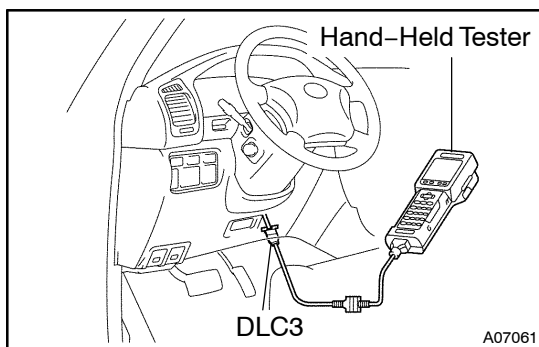
- **Check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool.**
- (b) Clearing the DTCs using the OBD II scan tool or the hand-held tester.
- (1) Connect the OBD II scan tool or the hand-held tester to the DLC3.
 - (2) Turn the ignition switch ON.
 - (3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.
- (c) Clearing the DTCs not using the OBD II scan tool or the hand-held tester.
- Remove the EFI or ECD No. 1 and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
- After disconnecting the battery terminal, perform the "INITIALIZE" procedure.

3. DTC CHECK (Check Mode)

HINT:

Hand-held tester only:

Check mode has a higher sensitivity to detect malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect.



- (a) Follow these steps when preparing to use the hand-held tester check mode.
- (1) Make sure that the items below are true:
 - Battery positive voltage 11 V or more
 - Throttle valve fully closed
 - Transmission in the P or N position
 - A/C switched OFF
 - (2) Turn the ignition switch OFF.
 - (3) Connect the hand-held tester to the DLC3.
 - (4) Turn the ignition switch ON.
 - (5) Change the ECM to check mode with the hand-held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE. Make sure the MIL flashes as shown in the illustration.

NOTICE:

All DTCs and freeze frame data recorded will be erased if:

- 1) the hand-held tester is used to change the ECM from normal mode to check mode or vice-versa; or
- 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

- (6) Start the engine. The MIL should turn off after the engine starts.
- (7) Simulate the conditions of the malfunction described by the customer.
- (8) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTC, freeze frame data and other data.
- (9) After checking the DTC, inspect the applicable circuit.
- (b) Clearing DTCs using the OBD II scan tool or the hand-held tester.
 - (1) Connect the OBD II scan tool or the hand-held tester to the DLC3.
 - (2) Turn the ignition switch ON.
 - (3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.
- (c) Clearing the DTCs without using the OBD II scan tool or the hand-held tester.
 Remove the EFI or ECD No. 1 and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
 After disconnecting the battery terminal, perform the "INITIALIZE" procedure.

4. FAIL-SAFE CHART

If any of the following code is recorded, the ECM enters fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0031 P0032 P0037 P0038 P0051 P0052 P0057 P0058	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0100 P0102 P0103	Ignition timing is calculated from engine speed and throttle angle	"Pass" condition detected
P0110 P0112 P0113	Intake air temperature is fixed at 20°C (68°F)	"Pass" condition detected
P0115 P0117 P0118	Engine coolant temperature is fixed at 80°C (176°F)	"Pass" condition detected

P0120 P0121 P0122 P0123 P0220 P0222 P0223 P0607 P0657 P2102 P2103 P2111 P2112 P2118 P2119 P2135	If the Electronic Throttle Control System (ETCS) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.	"Pass" condition is detected and then the ignition switch is turned OFF.
P0325 P0330	Max. timing retardation	Ignition switch OFF
P0351 P0352 P0353 P0354 P0355 P0356 P0357 P0358	Fuel cut	"Pass" condition detected
P2120 P2121 P2122 P2123 P2125 P2127 P2128 P2138	The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.	"Pass" condition is detected and the ignition switch is turned OFF.

5. CHECK FOR INTERMITTENT PROBLEMS

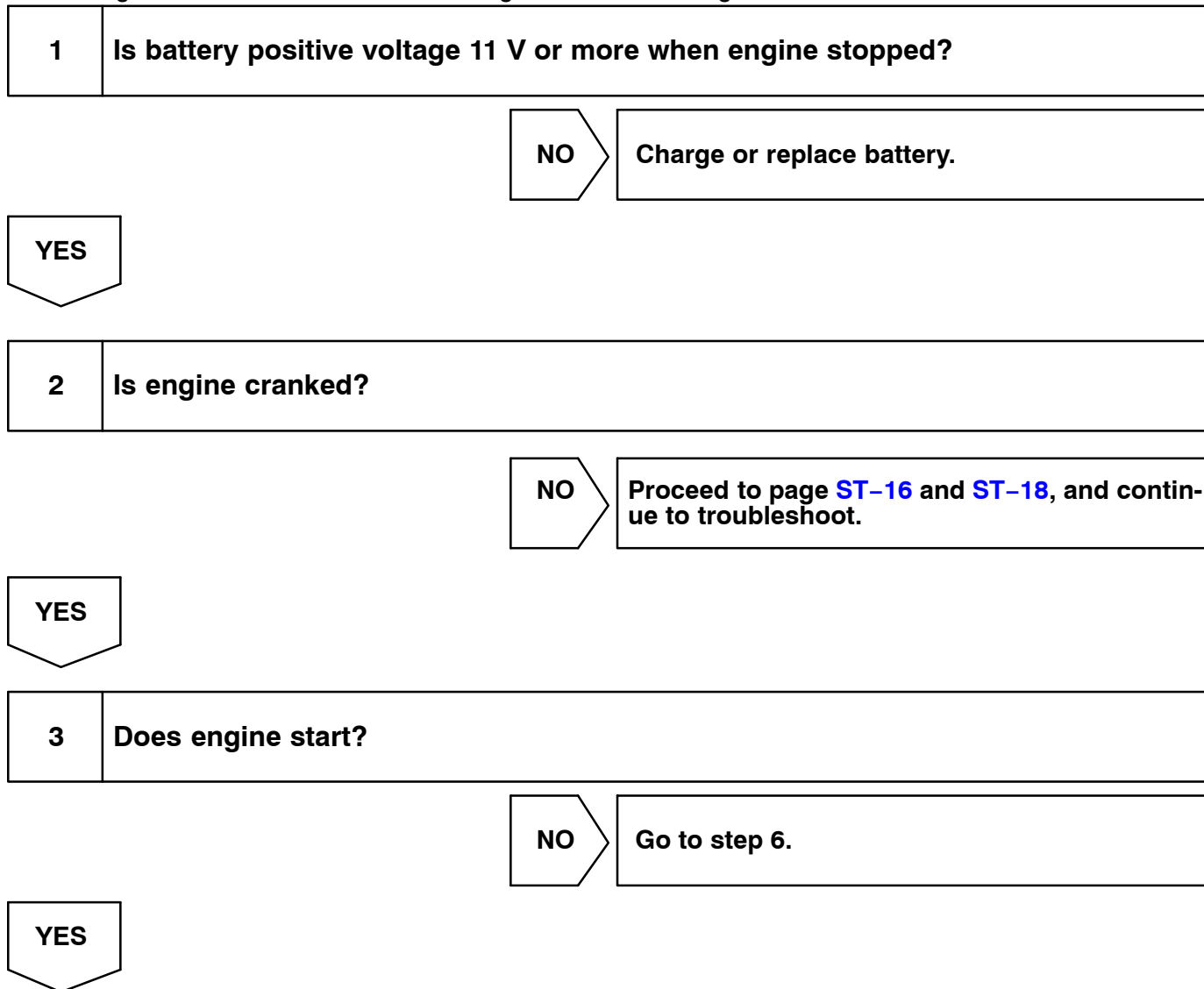
Hand-held tester only:

Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect when the ECM is in check mode with hand-held tester. In check mode, the ECM uses 1 trip detection logic, which has a higher sensitivity to malfunctions than normal mode (default), which uses 2 trip detection logic.

- Clear the DTCs. (See step 2)
- Set the check mode. (See step 3)
- Perform a simulation test (See page [IN-26](#)).
- Check the connector and terminal (See page [IN-36](#)).
- Wiggle the harness and connector (See page [IN-36](#)).

6. BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location causing the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.



4	Check air filter.
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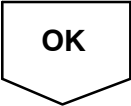
PREPARATION:

Remove the air filter.

CHECK:

Visual check that the air filter is not excessively dirty or oily.

NG	Repair or replace air filter.
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5	Check idle speed.
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PREPARATION:

- (a) Warm up the engine to the normal operating temperature.
- (b) Switch off all the accessories.
- (c) Switch off the A/C.
- (d) Shift the transmission into the N position.
- (e) Connect the OBD II scan tool or hand-held tester to the DLC3 of the vehicle.

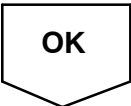
CHECK:

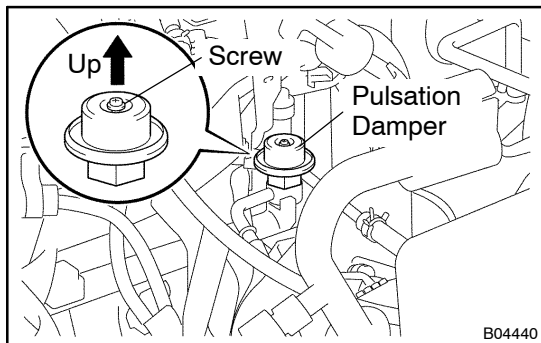
Use CURRENT DATA to check the idle speed.

OK:

Idle speed:
650 to 750 rpm

NG	Proceed to problem symptoms table on page DI-40 .
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6 Check fuel pressure.**PREPARATION:**

- (a) Be sure that enough fuel is in the tank.
- (b) Connect the hand-held tester to the DLC3.
- (c) Turn the ignition switch ON and push the hand-held tester main switch ON.
- (d) Use the ACTIVE TEST mode to operate the fuel pump.
- (e) Please refer to the hand-held tester operator's manual for further details.
- (f) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page [SF-7](#)).

CHECK:

Check that the pulsation damper screw rises up when the fuel pump operation (See page [SF-7](#)).

HINT:

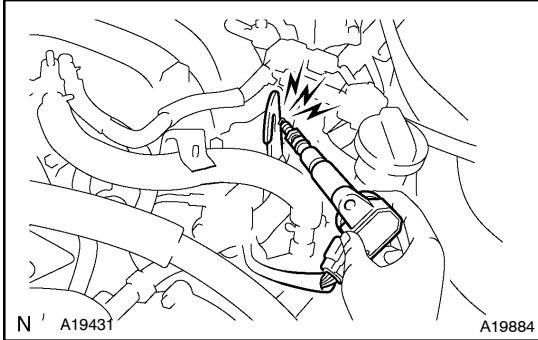
At this time, you will hear a fuel flowing noise.

NG

Proceed to page [SF-7](#) and continue to troubleshoot.

OK

7

Check for spark.**PREPARATION:**

- (a) Disconnect the ignition coil.
- (b) Remove the spark plug.
- (c) Install the spark plug to the ignition coil.
- (d) Disconnect the injector connector.
- (e) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 to 10 seconds at a time.

NG

Proceed to page **IG-1** and continue to troubleshoot.

OK

Proceed to problem symptoms table on page **DI-40**.

7. DATA LIST

HINT:

Using the hand-held tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

- Warm up the engine.
- Turn the ignition switch OFF.
- Connect the hand-held tester or the OBD II scan tool to the DLC3.
- Turn the ignition switch ON.
- Push the "ON" button of the hand-held tester.
- Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
- According to the display on tester, read the "DATA LIST".

Item	Measurement Item/Range (Display)	Normal Condition*	Diagnostic Note
INJECTOR	Injection period of the No. 1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 2.1 to 3.9 ms	–
IGN ADVANCE	Ignition timing advance for No.1 cylinder/ Min.: –64 deg., Max.: 63.5 deg.	Idling: BTDC 5 to 25°	–
CALC LOAD	Calculated load by ECM/ Min.: 0%, Max.: 100%	• Idling: 12.5 to 19.7% • Racing without load (2,500 rpm): 10.7 to 17.9%	–
MAF	Air flow rate from MAF sensor/ Min.: 0 gm/s, Max.: 655 gm/s	• Idling: 4.1 to 6.4 gm/sec. • Racing without load (2,500 rpm): 12.5 to 20.8 gm/sec.	If value is approximately 0.0 gm/s: • Mass air flow meter power source circuit open • VG circuit open or short If value is 160.0 gm/s or more: • E2G circuit open
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 16,383 rpm	Idling: 650 to 750 rpm	–
COOLANT TEMP	Coolant temperature/ Min.: –40°C, Max.: 140°C	After warming up: 80 to 95°C (176 to 203°F)	• If value is –40°C (–40°F): sensor circuit is open.
INTAKE AIR	Intake air temperature/ Min.: –40 °C, Max.: 140 °C	Equivalent to ambient temp. (After cold soak)	• If value is 140°C (284°F) or more: sensor circuit is shorted.
THROTTLE POS	Absolute throttle position sensor/ Min.: 0%, Max.: 100%	• Throttle fully closed: 10 to 24% • Throttle fully open: 66 to 98%	Read value with the ignition switch ON (Do not start engine).
THROTTLE INITIAL	Throttle fully closed rearing value	0.5 to 0.9 V	–
CTP SW	Closed throttle position switch/ ON or OFF	• Throttle fully closed: ON • Throttle open: OFF	–
VEHICLE SPD	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	Speed indicated on speedometer
O2S B1 S1	Oxygen sensor output voltage of the bank 1 sensor 1/ Min.: 0 V, Max.: 1.275 V	Idling: 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B2 S1	Oxygen sensor output voltage of the bank 2 sensor 1/ Min.: 0 V, Max.: 1.275 V		Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.

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O2S B1 S2	Oxygen sensor output voltage of the bank 1 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 50 km/h (31 mph): 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B2 S2	Oxygen sensor output voltage of the bank 2 sensor 2/ Min.: 0 V, Max.: 1.275 V		Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
SHORT FT #1	Short term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is overall, long-term fuel compensation that helps to maintain air-fuel ratio at stoichiometric air-fuel ratio (steadies long term deviations of short-term fuel trim from central value)
TOTAL FT #1	Total fuel trim of bank 1/ Min.: 0.5, Max.: 1.496	Idling: 0.5 to 1.4	–
SHORT FT #2	Short term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
LONG FT #2	Long term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as LONG FT #1
TOTAL FT #2	Total fuel trim of bank 2/ Min.: 0.5, Max.: 1.496	Idling: 0.5 to 1.4	–
O2FT B1 S1	Short term fuel trim associated with the bank 1, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B1 S2	Short term fuel trim associated with the bank 1, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2FT B2 S1	Short term fuel trim associated with the bank 2, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B2 S2	Short term fuel trim associated with the bank 2, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2 LR B1 S1	Response time of the O2 sensor lean to rich (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	–
O2 LR B2 S1	Response time of the O2 sensor lean to rich (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	–
O2 RL B1 S1	Response time of the O2 sensor rich to lean (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	–
O2 RL B2 S1	Response time of the O2 sensor rich to lean (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms		–

FUEL SYS #1	Fuel system status (Bank1)/ OL or CL or OLDRIVE or OL- FAULT or CLFAULT	Idling after warming up: CL	• OL: Open Loop–has not yet satisfied conditions to go closed loop. • CL: Closed Loop–using oxygen sensor(s) as feed back for fuel control. • OL DRIVE: Open loop due to driving conditions (Power enrichment, deceleration enlargement). • OL FAULT: Open loop due to detected system fault. • CL FAULT: Closed loop, but fault with at least one oxygen sensor may be using single oxygen sensor for fuel control.
FUEL SYS #2	Fuel system status (Bank2)/ OL or CL or OLDRIVE or OL- FAULT or CLFAULT		
FC IDL	Idle fuel cut/ ON or OFF	Fuel cut operation: ON	FC IDL = "ON" when throttle valve fully closed and engine speed is over 1,500 rpm.
MIL	MIL status/ ON or OFF	MIL ON: ON	–
STARTER SIG	Starter signal/ ON or OFF	Cranking: ON	–
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	–
PNP SW [NSW]	Park/neutral position switch signal/ ON or OFF	P or N range: ON	–
ELECT LOAD SIG	Electrical load signal/ ON or OFF	Defogger switch ON: ON	–
STOP LIGHT SW	Stop light switch/ ON or OFF	• Brake pedal depressed: ON • Brake pedal released: OFF	–
FUEL PMP SP CTL	Fuel pump speed control status/ ON or OFF	Idling: ON	–
FUEL PUMP/SPD	Fuel pump/speed status/ ON/H or OFF/M, L	Idling: ON	–
A/C MAG CLUTCH	A/C magnet clutch status/ ON or OFF	A/C magnet clutch ON: ON	–
EVAP VSV	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)
IGNITION	Ignition counter/ Min.: 0, Max.: 400	0 to 400	–
VAPOR PRESS	Vapor pressure/ Min.: -4.125 kPa, Max.: 2.125 kPa	Fuel tank cap removed: 0 kPa	Pressure inside of fuel tank as read by the vapor pressure sensor.
CYL #1 – CYL #8	Misfire ratio of the cylinder/ Min.: 0%, Max.: 50%	0%	This item is displayed in only idling

*1: If no conditions are specifically stated for "Idling", it means the shift lever is in the N or P position, the A/C switch is OFF and all accessory switches are OFF.

8. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester or the OBD II scan tool allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display the DATA LIST during the ACTIVE TEST.

- (a) Warm up the engine.
- (b) Turn the ignition switch OFF.
- (c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
- (d) Turn the ignition switch ON.
- (e) Push the "ON" button of the hand-held tester or the OBD II scan tool.
- (f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
- (g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control the injection volume. Min.: -12.5%, Max.: 24.8% [Vehicle Condition] Engine speed: 3,000 rpm or less.	• All injectors are tested at once. • Injection volume is gradually changed between -12.5 and 25%
A/F CONTROL	[Test Details] Control injection volume -12.5 or 25 % (change injection volume -12.5 % or 25 %) [Vehicle Condition] Engine speed: 3,000 rpm or less	Following A/F CONTROL procedure enables technician to check and graph voltage outputs of both the A/F sensor and heated oxygen sensor For displaying graph, enter "ACTIVE TEST / A/F CONTROL / USER DATA", select "AFS B1S1 and O2S B1S2" by pressing "YES" and push "ENTER". Then press "F4"
FUEL PUMP / SPD	[Test Details] Control the fuel pump speed. ON or OFF	–
VVT CTRL B1	[Test Details] Active VVT system (Bank 1) ON or OFF	• ON: Rough idle or engine stall • OFF: Normal engine speed
VVT CTRL B2	[Test Details] Active VVT system (Bank 2) ON or OFF	• ON: Rough idle or engine stall • OFF: Normal engine speed
CAN CTRL VSV	[Test Details] Activate the VSV for canister control. ON or OFF	–
TANK BYPASS VSV	[Test Details] Activate the VSV for tank bypass. ON or OFF	–
A/C MAG CLUTCH	[Test Details] Control the A/C magnet clutch. ON or OFF	–
EVAP VSV (ALONE)	[Test Details] Activate the VSV for EVAP control. ON or OFF	–

TC/TE1	[Test Details] Connect the TC and TE1. ON or OFF	Switch to the same state as the connection between terminal TC and TE1.
FC IDL PROHBT	[Test Details] Control the idle fuel cut prohibit. ON or OFF	–

9. DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code applied to the applicable logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. When a sensor is being monitored, the next sensor or component will not be monitored until the sensor monitoring is finished.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects the malfunction only one time during a single driving cycle. "Continuous" means that the ECM detects malfunction every time an enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediately" means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

10. TOYOTA/LEXUS PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor "A"	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut

DIAGNOSTICS – ENGINE

Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor "A", Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor "A"	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor "A"	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor "A", Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobiliser system, Immobiliser system	Vehicle anti-theft system

11. The monitor will run whenever the following DTCs are not present (Monitor disablement List)**HINT:**

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the "X" mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction				Monitor disablement (X - disabled)																									
	Fault code	Fault code	Component/ system	P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
				P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
				VVT VSV1,2	VVT System1 - Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor - Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0010,P0020	P0010,P0020	VVT VSV1,2																											
P0011	P0011	VVT System1 - Advance																											
P0012	P0012	VVT System1 - Retard																											
P0016,P0018	P0016,P0018	VVT System - Misalignment																											
P0021	P0021	VVT System2 - Advance																											
P0022	P0022	VVT System2 - Retard																											
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																											
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																											
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																											
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																											
P0100,P0101	P0100-P0103	MAF sensor																											
P0105,P0106	P0105-P0108	MAP sensor																											
P0110	P0110-P0113	IAT sensor																											
P0115,P0116	P0115-P0118	ECT sensor																											
P0120,P0121	P0120-P0223,P2135	TP sensor																											
P0125	P0125	Insufficient ECT for Closed Loop																											
P0128	P0128	Thermostat																											
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																											
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1																											
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																											
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																											
P0171,P0172	P0171,P0172	Fuel system																											
P0300-P0308	P0300-P0308	Misfire																											
P0325,P0330	P0325-P0333	Knock sensor																											
P0335	P0335	CKP sensor																											
P0340, P0341	P0340, P0341	CMP sensor																											
P0340-P0346	P0340-P0346	VVT sensor1,2																											
P0351-P0358	P0351-P0358	Ignitor																											
P0385	P0385	CKP sensor 2																											
P0401	P0401	EGR system (closed)																											
P0402	P0402	EGR system (open)																											
P0405,P0409	P0405-P0409	Lift sensor																											
P0420,P0430	P0420,P0430	Catalyst																											
P0442-P0456	P0442-P0456	EVAP system																											
P0450,P0451	P0450-P0453	EVAP press sensor																											

DIAGNOSTICS - ENGINE

Monitor disablement (X - disabled)

Fault code

Fault code

Component/
system

Monitor detected malfunction

Fault code																												
	Fault code	Component/ system	P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0031,32,51,52	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172
P0500	P0500	VSS	VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0500	P0500	VSS																				X	X	X	X	X	X	X
P0511	P0511	IAC valve																					X					
P0510	P0510	Idle switch												X		X						X	X		X	X	X	X
P0560	P0560	System Voltage																				X	X					
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																										
P0850	P0850	PNP switch																										X
P1010,P1020	P1010,P1020	VVTL																				X					X	
P1011,12,(21,22)	P1011,12,(21,22)	VVTL system1(,2)																				X					X	
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor																										
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				X			X	X		
P2226	P2226	BARO sensor																					X		X	X		
P2237,P2240	P2237,P2240	A/F sensor (open)																				X			X	X		
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open																						X	X	X	X	X
P2441	P2441	AIR control valve stuck close																						X	X	X	X	X
P2444	P2444	AIP stuck On																						X	X	X	X	X
P2445	P2445	AIP stuck Off																						X	X	X	X	X
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																					X			X	X	

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Monitor detected malfunction	Fault code		Monitor disablement (X - disabled)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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P0010,P0020	P0010,P0020	VVT VSV1,2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

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DIAGNOSTICS - ENGINE

Monitor detected malfunction				Monitor disablement (X - disabled)															
	Fault code			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500
	Fault code			P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500
	Component/ system			Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1 sensor, non-ECT)	VSS(M/T)
	P0500	P0500	VSS							X	X			X	X				X
	P0511	P0511	IAC valve																
	P0510	P0510	Idle switch								X			X	X				X
	P0560	P0560	System Voltage																
	P0617	P0617	Starter signal																
	P0705	P0705	Shift lever position switch																
	P0710	P0710-P0713	Trans fluid temp sensor																
	P0720-P0793	P0720-P0793	Output speed sensor																
	P0715-P0717	P0715-P0717	Input speed sensor																
	P0724	P0724	Stop lamp switch																
	P0741-P0796	P0741-P0796	Trans solenoid (function)																
	P0748-P0798	P0748-P0799	Trans solenoid (range)																
	P0850	P0850	PNP switch																
	P1010,P1020	P1010,P1020	VVTL																
	P1011,12,(21,22)	P1011,12,(21,22)	VVTL system1,(2)							X	X			X	X				
	P1126	P1126	Electronic magnet clutch																
	P1129	P1129	Electronic throttle system																
	P1430	P1430	HC adsorber ACT press sensor												X	X			
	P2004,6	P2004,6	Intake Manifold Runner Control																
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																
	P2102,P2103	P2102,P2103	Throttle motor																
	P2120-P2138	P2120-P2138	Accel position sensor																
	P2196,P2198	P2196,P2198	A/F sensor (rationality)							X	X			X					X
	P2226	P2226	BARO sensor																
	P2237,P2240	P2237,P2240	A/F sensor (open)							X	X			X					X
	P2423,24	P2423,24	HC Adsorption Catalyst																
	P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																
	P2431	P2431	AIR Pressure Sensor(Rationality)																
	P2440	P2440	AIR control valve stuck open							X	X			X					
	P2441	P2441	AIR control valve stuck close							X	X			X					
	P2444	P2444	AIP stuck On							X	X			X					
	P2445	P2445	AIP stuck Off							X	X			X					
	P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							X	X			X					X

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Monitor detected malfunction				Monitor disablement (X - disabled)																											
	Fault code				P0741-P0796	P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12,(21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03	
		Fault code				P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12,(21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03	
			Component/ system				Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVT	VVT system1,(2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
P0010,P0020	P0010,P0020	VVT VSV1,2																						X	X	X	X				
P0011	P0011	VVT System1 - Advance																						X	X	X	X				
P0012	P0012	VVT System1 - Retard																						X	X	X	X				
P0016,P0018	P0016,P0018	VVT System - Misalignment																						X	X	X	X				
P0021	P0021	VVT System2 - Advance																						X	X	X	X				
P0022	P0022	VVT System2 - Retard																						X	X	X	X				
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																			X		X		X	X	X	X			
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																	X		X	X		X	X	X	X			X	
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																	X			X									
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																				X									
P0100,P0101	P0100-P0103	MAF sensor					X	X											X		X	X		X	X	X	X			X	
P0105,P0106	P0105-P0108	MAP sensor					X	X											X		X	X		X	X	X	X			X	
P0110	P0110-P0113	IAT sensor											X						X		X			X	X	X	X			X	
P0115,P0116	P0115-P0118	ECT sensor	X				X	X					X						X		X	X		X	X	X	X			X	
P0120,P0121	P0120-P0223,P2135	TP sensor												X					X		X	X		X	X	X	X			X	
P0125	P0125	Insufficient ECT for Closed Loop	X				X												X		X	X		X	X	X	X			X	
P0128	P0128	Thermostat																													
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X	X				
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1																	X		X	X		X	X	X	X			X	
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																	X			X									
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																				X									
P0171,P0172	P0171,P0172	Fuel system																	X		X	X		X	X	X	X			X	
P0300-P0308	P0300-P0308	Misfire																	X		X	X		X	X	X	X			X	
P0325,P0330	P0325-P0333	Knock sensor																						X	X	X	X				
P0335	P0335	CKP sensor					X	X											X		X	X		X	X	X	X			X	
P0340, P0341	P0340, P0341	CMP sensor					X	X											X		X	X		X	X	X	X			X	
P0340-P0346	P0340-P0346	VVT sensor1,2																						X	X	X	X				
P0351-P0358	P0351-P0358	Ignitor																				X		X	X	X	X				
P0385	P0385	CKP sensor 2					X	X											X		X	X		X	X	X	X			X	
P0401	P0401	EGR system (closed)																				X									
P0402	P0402	EGR system (open)																	X		X	X		X	X	X	X			X	
P0405,P0409	P0405-P0409	Lift sensor																													
P0420,P0430	P0420,P0430	Catalyst																													
P0442-P0456	P0442-P0456	EVAP system																	X		X			X	X	X	X			X	
P0450,P0451	P0450-P0453	EVAP press sensor																						X	X	X	X				

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DIAGNOSTICS - ENGINE

			Monitor disablement (X - disabled)																
Monitor detected malfunction	Fault code																		
	Fault code																		
	Component/ system																		
			Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1,(2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst
	P0500	P0500	VSS	X												X	X	X	X
	P0511	P0511	IAC valve													X	X		
	P0510	P0510	Idle switch													X	X	X	
	P0560	P0560	System Voltage																
	P0617	P0617	Starter signal																
	P0705	P0705	Shift lever position switch																
	P0710	P0710-P0713	Trans fluid temp sensor																
	P0720-P0793	P0720-P0793	Output speed sensor																
	P0715-P0717	P0715-P0717	Input speed sensor																
	P0724	P0724	Stop lamp switch																
	P0741-P0796	P0741-P0796	Trans solenoid (function)																
	P0748-P0798	P0748-P0799	Trans solenoid (range)	X															
	P0850	P0850	PNP switch																
	P1010,P1020	P1010,P1020	VVTL																
	P1011,12,(21,22)	P1011,12,(21,22)	VVTL system1,(2)																
	P1126	P1126	Electronic magnet clutch																
	P1129	P1129	Electronic throttle system																
	P1430	P1430	HC adsorber ACT press sensor																
	P2004,6	P2004,6	Intake Manifold Runner Control																
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																
	P2102,P2103	P2102,P2103	Throttle motor																
	P2120-P2138	P2120-P2138	Accel position sensor																
	P2196,P2198	P2196,P2198	A/F sensor (rationality)														X	X	X
	P2226	P2226	BARO sensor													X	X	X	X
	P2237,P2240	P2237,P2240	A/F sensor (open)														X	X	X
	P2423,24	P2423,24	HC Adsorption Catalyst															X	X
	P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)															X	X
	P2431	P2431	AIR Pressure Sensor(Rationality)															X	X
	P2440	P2440	AIR control valve stuck open													X	X	X	X
	P2441	P2441	AIR control valve stuck close													X	X	X	X
	P2444	P2444	AIP stuck On													X	X	X	X
	P2445	P2445	AIP stuck Off													X	X	X	X
	P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																

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12. O2S TEST RESULT

INTRODUCTION

The O2S TEST RESULT refers to the results of the engine control module (ECM) when it monitors the oxygen sensor (O2S), and it can be read using the hand-held tester or the generic OBD II scantool. Based on this, you can find the O2S's conditions.

The ECM monitors the O2S in the various items. You can read the monitor result (TEST DATA) of each monitor item using the O2S TEST RESULT. However, the output value of the TEST DATA is the latest "snapshot" value that is taken after monitoring and therefore is not dynamic.

In this repair manual, the description of the O2S TEST RESULT (for O2S related DTCs) are written in a table.

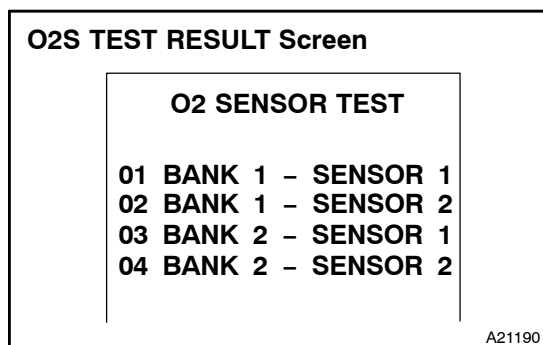
This table consists of 5 items:

- (1) TEST ID (a code applied to each TEST DATA)
- (2) Description of TEST DATA
- (3) Conversion Factor (When Conversion Factor has a value written in the table, multiply the TEST DATA value appearing on the scan tool by the Conversion Factor value. The result will be the required value.)
- (4) Unit
- (5) Standard Value

If the TEST DATA value appearing on the scan tool is out of the standard value, the O2S is malfunctioning. If it is within the standard value, the O2S is functioning normally. However, if the value is on the borderline of the standard value, the O2S may malfunction very soon.

HOW TO READ O2S TEST RESULT USING HAND-HELD TESTER

- (a) Connect the hand-held tester to the DLC3.



- (b) On the tester screen, select the following menus: DIAGNOSIS/CARB OBDII/O2S TEST RESULT. A list of the O2S equipped on the vehicle will be displayed.

TEST DATA Screen

```

LOW SW V .....0.400 V
HIGH SW V .....0.550 V
MIN O2S V .....0.035 V
MAX O2S V .....0.835 V
Time $81 ..... 17
Time $84 ..... 84
Time $85 ..... 79

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- (c) Select the desired O2S and press ENTER. The following screen will appear.
- (d) Press HELP and  simultaneously. More information will appear.
- (e) Example:
 - (1) The hand-held tester displays "17" as a value of the "TIME \$81" (see the illustration on the left).
 - (2) Find the Conversion Factor value of "TIME \$81" in the O2S TEST RESULT chart below. 0.3906 is specified for \$81 in this chart.
 - (3) Multiply "17" in step (1) by 0.3906 (Conversion Factor) in the step (2).
 $17 \times 0.3906 = 6.6 \%$
 - (4) If the answer is within the standard value, the "TIME \$81" can be confirmed to be normal.

O2S TEST RESULT Chart

TEST ID	Description of TEST DATA	Conversion Factor	Unit	Standard Value
\$81	Percentage of monitoring time when the HO2S voltage is less than 0.05V	Multiply 0.3906	%	Within 60 %

13. CHECKING MONITOR STATUS

NOTICE:

The monitor status (mode &) is not applicable to the heated oxygen sensor (HO2S). However, HO2S test values can be checked by O2S TEST RESULT (mode 5).

Outline

The monitor result and the test values can be checked with the OBDII scan tool.

The engine control module (ECM) monitors the emissions-related components as the thermostat, catalyst converter and evaporative emissions (EVAP), and determines whether they are functioning normally or not. When finished monitoring, the ECM stores the monitor results and the test values.

The monitor result indicates whether the component is functioning normally or not. The test value is the value that was used to determine the monitor result. If the test value is outside the test limit (malfunction criterion), the ECM determines the component is malfunctioning. Some emissions-related components have multiple test values to determine monitor result. If one of these test values is outside test limit, the ECM determines the component is malfunctioning.

Description

The test value and test limit information are described as shown in the following table. This information is included under "MONITOR RESULT" in the emissions-related DTC sections:

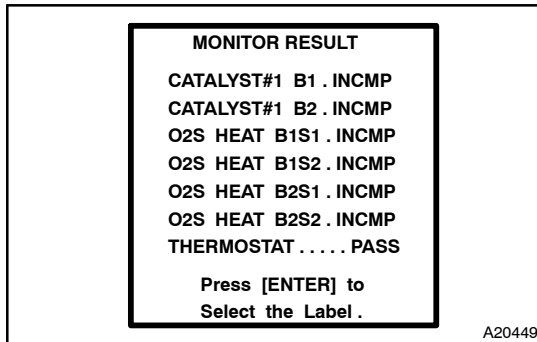
TID \$8: Thermostat

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	\$01	Multiply by 0.625 and subtract 40 [°C]	ECT sensor output when estimated ECT has reached to malfunction criterion	Malfunction criterion for thermostat

- TID (Test Identification Data) is assigned to each emissions-related component.
- TID (Test Limit Type):
If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBDII scan tools.

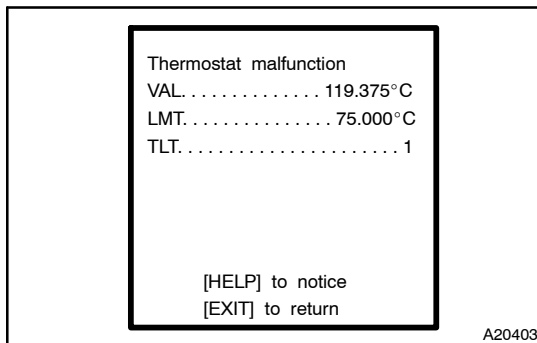
Procedure (using hand-held tester)

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the ignition switch and hand-held tester ON.
- (c) Clear DTCs.
- (d) Allow the vehicle to drive, in accordance with the applicable drive pattern described in the READINESS MONITOR DRIVE PATTERN section (see page [DI-34](#)).



- (e) Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBDII, MONITOR INFO and MONITOR RESULT. The monitor result appears after the component name.

- INCMP indicates the component has not been monitored yet.
- PASS indicates the component is functioning normally.
- FAIL indicates the component is malfunctioning.



- (f) Select the component and press ENTER. If the monitor result has been PASS or FAIL, the accuracy test value appears.

- VAL indicates the test value.
- LMT indicates the test limit (malfunction criterion).
- TLT indicates the test limit type.

- (g) Compare the test value with the test limit.

- If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
- If TLT is 1, the component is malfunctioning when the test value is higher than the test limit.
- If the test value is on the borderline of the test limit, a malfunction is concealed in the component.

HINT:

The monitor result might on rare occasions be PASS even if the malfunction indicator lamp (MIL) is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.