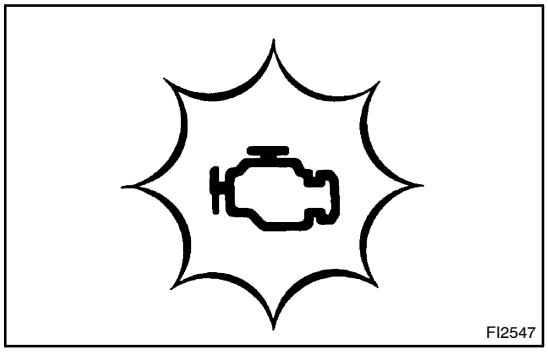
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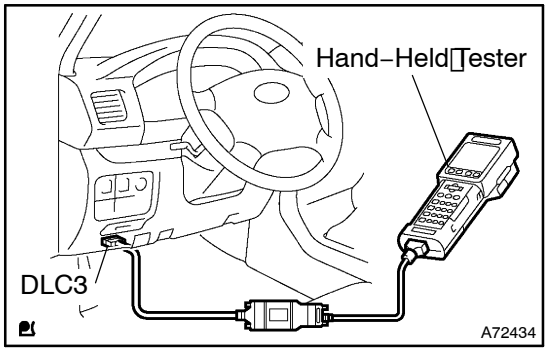

FI2547

PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description for Euro–OBD (European spec.)

- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you connect an OBD scan tool complying with ISO 15031–4 or a hand–held tester to the vehicle, and read off various data output from the vehicle's ECM.
- Euro–OBD regulations require that the vehicle's on–board computer illuminates the check engine warning light (CHK ENG) on the instrument panel when the computer detects a malfunction in the emission control system / components or in the powertrain control components which affect vehicle emissions, or a malfunction in the computer. In addition to an illumination of the CHK ENG when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO 15031–4 are recorded in the ECM memory (See page 05–22). If the malfunction does not reoccur in 3 consecutive trips, the CHK ENG goes off automatically but the DTCs remain recorded in the ECM memory.



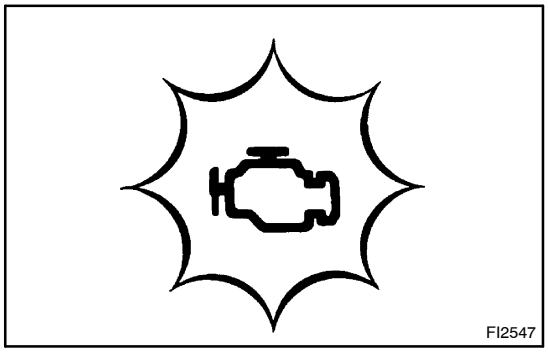
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- To check the DTCs, connect the OBD scan tool or hand–held tester to Data Link Connector 3 (DLC3) on the vehicle. The OBD scan tool or hand–held tester also enables you to erase the DTCs and check freezed frame data and various forms of engine data. (For operating instructions, see the OBD scan tool's instruction book.)
  DTCs include ISO controlled codes and manufacturer controlled codes. ISO controlled codes must be set as prescribed by the ISO, while manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page 05–22).
- The diagnosis system operates in the normal mode during normal vehicle use. It also has a check (test) mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and to ensure a thorough malfunction detection. By switching the ECM to the check (test) mode using hand–held tester when troubleshooting, a technician can cause the CHK ENG to illuminate for a malfunction that is only detected once or momentarily (Hand–held tester only) (See step 3).

- * 2 trip detection logic
  When a logic malfunction is first detected, the malfunction is temporally stored in the ECM memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the CHK ENG to illuminate (2nd trip) (However, the ignition switch must be turned OFF between the 1st trip and 2nd trip).
- Freeze frame data:
  Freeze frame data records the engine condition when a misfire (DTCs P0300 – P0306) or fuel trim malfunction (DTCs P0171, P0172, P0174 and P0175) or other malfunction (first malfunction only) is detected.
  Because freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- Priorities for troubleshooting:
  If troubleshooting priorities for multiple DTCs are given in the applicable DTC chart, these should be followed.

If no instructions are given, troubleshoot according to the following priorities.

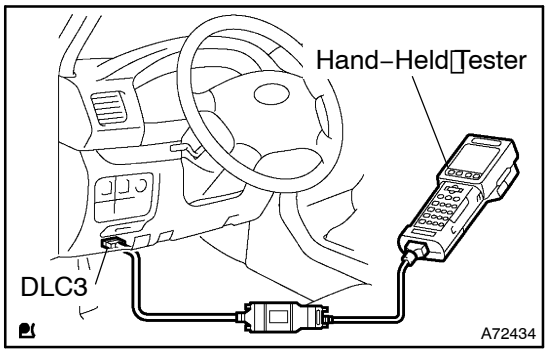
(1) DTCs other than fuel trim malfunction (DTCs P0171, P0172, P0174 and P0175) and misfire (DTCs P0300 – P0306).
(2) Fuel trim malfunction (DTCs P0171, P0172, P0174 and P0175).
(3) Misfire (DTCs P0300 – P0306).


FI2547

(b) Description for M–OBD (Except European spec.)

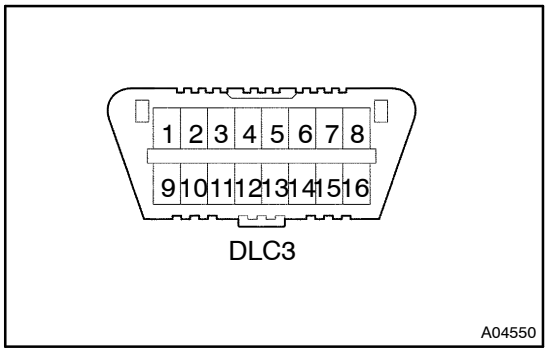
- When troubleshoot Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the hand–held tester to the vehicle, and read off various data output from the vehicle's ECM.

- The vehicle's on–board computer illuminates the check engine warning light (CHK ENG) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components. In addition to an illumination of the CHK ENG when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the ECM memory (See page 05–22). If the malfunction does not recur, the CHK ENG lamp will be disappeared by turning off the ignition switch but the recorded DTC will be remaining in the ECM memory.



- To check the DTCs, connect the hand–held tester to the Data Link Connector 3 (DLC3) on the vehicle or read the DTC which is indicated on the multi information display when TC and CG terminals on the DLC3 are connected. The hand–held tester also enables you to erase the DTCs and check the freeze frame data and various forms of engine data. (for operating instructions, see the instruction book.)
- The diagnosis system operates in the normal mode during normal vehicle use. It also has a check (test) mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and to ensure a thorough malfunction detection. By switching the ECM to the check (test) mode using hand–held tester when troubleshooting, a technician can cause the CHK ENG to illuminate for a malfunction that is only detected once or momentarily (Hand–held tester only) (See step 3).
- * 2 trip detection logic
  When a logic malfunction is first detected, the malfunction is temporally stored in the ECM memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the CHK ENG to illuminate (2nd trip) (However, the ignition switch must be turned OFF between the 1st trip and 2nd trip).

- Freeze frame data:
  Freeze frame data records the engine conditions (fuel system, calculator load, water temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.



(c) Check the DLC3.
The vehicle's ECM uses the ISO 9141–2 (Euro–OBD)/ ISO 14230(M–OBD) communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 9141–2/ ISO 14230 format.

Symbol	Terminal No.	Connection/Voltage or Resistance	Condition
SIL	7	Bus + Line/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:
If the display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the hand–held tester to the DLC3, turned the ignition switch ON and operated the hand–held tester, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible is when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Deparment listed in the tool's instruction manual.

(d) Inspect the battery voltage.
Battery voltage: 11 to 14 V

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

(e) Check the CHK ENG.
(1) The CHK ENG lamp comes on when the ignition switch is turned ON and the engine is not running.

HINT:
If the CHK ENG does not illuminate, troubleshoot the combination meter.

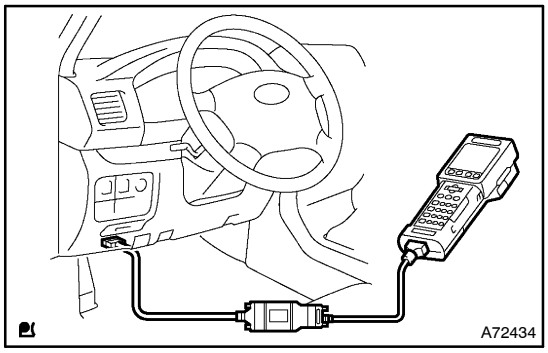
(2) When the engine is started, the CHK ENG should go off. If the lamp remains on, it means that the diagnosis system has detected a malfunction or abnormality in the system.

2. Normal Mode:
DTC CHECK

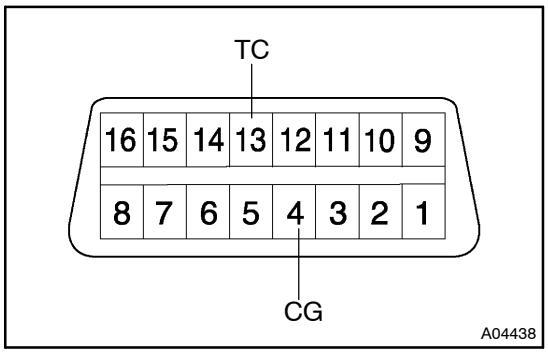
NOTICE:

Hand–held tester only:

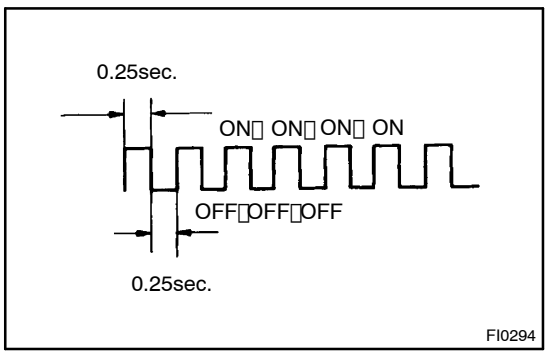
When the diagnosis system is switched from the normal mode to the check (test) mode, it erases all DTCs and freeze frame data recorded in the normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.



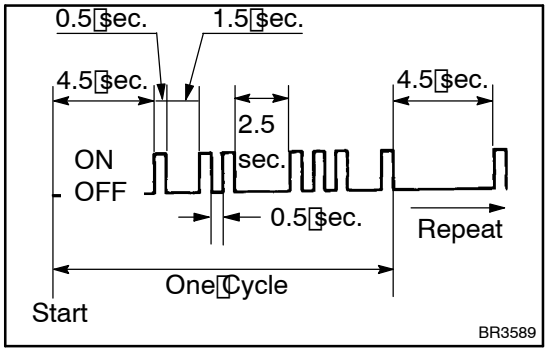
(a) Checking DTCs using the hand–held tester.
(1) Connect the hand–held tester to the DLC3.
(2) Turn the ignition switch ON and switch the hand–held tester main switch ON.
(3) Use the hand–held tester to check the DTCs and freeze frame data and note them down (for operating instructions, see the hand–held tester's instruction book).
(4) See page 05–22 to confirm the details of the DTCs.



(b) If you have no hand–held tester, perform the following step (1) to (6).
(1) Turn the ignition switch ON.
(2) Using SST, connect between terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843 – 18040



(3) Read DTC by observing the CHK ENG lamp. If any DTC is not detected, the CHK ENG blinks as shown in the illustration.



(4) Example

If DTC 12 and 31 are detected, the CHK ENG flashes 1 time (for 0.5 sec) and flashes 2 times after the 1.5 sec interval, then, flashes 3 times after a 2.5 sec interval from the previous DTC and flashes 1 time.

If the interval between the previous DTC and the next DTC is 4.5 sec, it means the previous DTC is the last one of the multiple string DTCs. The CHK ENG lamp repeats the indication of DTCs from the initial cycle. (Refer to the illustration on the left)

(5) Check the details of the malfunction using the DTC chart on page 05–22.

(6) After completing the check, disconnect terminals 13 (TC) and 4 (CG) and turn off the display.

HINT:

In the event that 2 or more DTCs are detected, the CHK ENG lamp will indicate the smaller number DTC first.

(c) Clearing the DTCs using the hand–held tester.

(1) Connect the hand–held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) When operating the hand–held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the hand–held tester's instruction book for operating instructions.)

(d) Clearing the DTCs not using the hand–held tester.

(1) Disconnecting the battery terminal or remove the EFI and ETCS fuses from the engine room R/B more than 60 seconds.

3. Check (Test) Mode:

DTC CHECK

HINT:

Hand–held tester only:

Compared to the normal mode, the check mode has more sensing ability to detect malfunctions.

Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check (test) mode.

(a) Procedure for check mode using the hand–held tester.

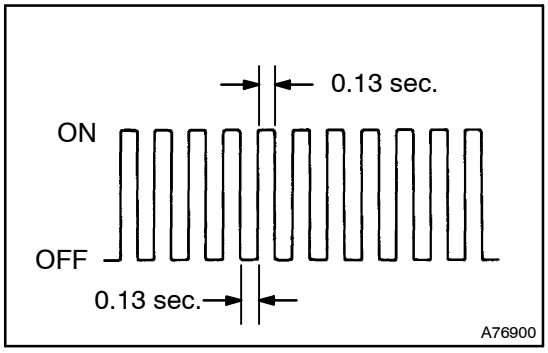
(1) Check the initial conditions

- Battery positive voltage 11 V or more.
- Throttle valve fully closed.
- Transmission in the "P" or "N" position.
- Air conditioning switched OFF.

(2) Turn the ignition switch OFF.

(3) Connect the hand–held tester to the DLC3.

(4) Turn the ignition switch ON and switch the hand–held tester main switch ON.



(5) Switch the hand–held tester from the normal mode to the check (test) mode. The CHK ENG blinks in 0.13 sec intervals as shown in the illustration.

NOTICE:

If the hand–held tester switches the ECM from the normal mode to the check mode or vice–versa, or if the ignition switch is turned from ON to ACC or OFF during the check mode, the DTC and freeze frame data will be erased.

(6) Start the engine. (The CHK ENG goes off after the engine start.)

(7) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTC, etc.

(8) After simulating the malfunction conditions, use the hand–held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:

Be sure not to turn the ignition switch OFF, because the diagnosis system is changed from the check mode to the normal mode and will result in all of the DTCs and freeze frame data being erased.

(9) After checking the DTC, inspect the applicable circuit.

(b) Clearing the DTCs using the hand–held tester.

(1) Connect the hand–held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) When operating the hand–held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the hand–held tester's instruction book for operating instructions.)

(c) Clearing the DTCs not using the hand–held tester.

(1) Disconnecting the battery terminal or remove the EFI and ETCS fuses from the engine room R/B more than 60 seconds.

4. FAIL–SAFE CHART

If any of the following codes are recorded, the ECM enters the fail–safe mode.

DTC No.	Fail–Safe Operation	Fail–Safe Deactivation Conditions
P0031/28 P0032/28 P0037 P0038 P0051/21 P0052/21 P0057 P0058	The heater circuit in which the abnormality is detected is turned off	Ignition switch OFF
P0100/31 P0102/31 P0103/31	Ignition timing is calculated from engine speed and throttle angle	Returned to normal condition
P0110/24 P0112/24 P0113/24	Intake air temp. is fixed at 20°C (68°F)	Returned to normal condition
P0115/22 P0117/22 P0118/22	Engine coolant temp. is fixed at 80°C (176°F)	Returned to normal condition
P0120/41 P0122/41 P0123/41 P0220/41 P0222/41 P0223/41 P2135/41	Fuel cut intermittently when idle	Returned to normal condition and ignition switch OFF
P0121/41	Fuel cut intermittently when idle	Returned to normal condition and ignition switch OFF
P0325/55 P0327/55 P0328/55 P0330/52 P0332/52 P0333/52	Max. timing retardation	Ignition switch OFF
P0351/14 P0352/15 P0353/15 P0354/14 P0355/14 P0356/15	Fuel cut	Returned to normal condition
P2102/41 P2103/41	Fuel cut intermittently when idle	Returned to normal condition and ignition switch OFF
P2111/41 P2112/41	Fuel cut intermittently when idle	
P2119/89	Fuel cut intermittently when idle	

5. CHECK FOR INTERMITTENT PROBLEMS

Hand–held tester only:

By putting the vehicle's ECM in the check mode, the 1 trip detection logic is possible instead of the 2 trip detection logic, and the sensitivity to detect faults is increased. This makes it easier to detect intermittent problems.

(1) Clear the DTCs (See step 2).
(2) Set the check mode (See step 3).
(3) Perform a simulation test (See page 01–25).
(4) Check the connector and terminal (See page 01–35).
(5) Handle the connector (See page 01–35).

6. DATA LIST

HINT:

According to the DATA LIST displayed by the hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the methods to shorten the diagnostic time.

NOTICE:

The values given below for "Normal Condition" are representative values. So, a vehicle may still be normal even if its value differs from those listed here. Do not solely depend on the "Normal Condition" here when deciding whether a part is faulty or not.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of the hand–held tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST".
(g) According to the display on tester, read the "DATA LIST".

Hand–held Tester Display	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
INJECTOR	Injection period of the No. 1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 1.6 to 2.4 ms	—
IGN ADVANCE	Ignition timing advance for No. 1 cylinder/ Min.: –64 deg., Max.: 63.5 deg.	Idling: BTDC 7 to 24˚	—
CALC LOAD	Calculated load by ECM/ Min.: 0 %, Max.: 100 %	• Idling: 11.4 to 16.4 % • Racing without load (2,500 rpm): 13.1 to 18.9 %	—
MAF	Air flow rate from MAF sensor/ Min.: 0 gm/s, Max.: 655 gm/s	• Idling: 3.2 to 4.7 gm/s • Racing without load (2,500 rpm): 13.1 to 18.9 gm/s	If the value is Approximately 0.0 gm/s: • Mass air flow meter power source circuit open • VG circuit open or short Or if it is 160.0 gm/s or more: • E2G circuit open
ENGINE SPD	Engine speed/ Min.: 0 rpm, Max.: 16383 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 the value is –40°C (–40°F): sensor circuit is open. • Or if it is 140°C (284°F): sensor circuit is shorted.
INTAKE AIR	Intake air temperature/ Min.: –40 °C, Max.: 140 °C	Equivalent to Ambient Temp.	
THROTTLE POS	Absolute throttle position sensor/ Min.: 0 %, Max.: 100 %	• Throttle fully closed: 10 to 24 % • Throttle fully open: 64 to 96 %	Read the value when the ignition switch is ON (Do not start engine).
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	Actual vehicle speed	Speed indicated on speedometer
ACCEL POS #1	Accelerator pedal position sensor No.1 output voltage/ Min.: 0 V, Max.: 5 V	• Accelerator pedal released: 0.5 to 1.1 V • Accelerator pedal depressed: 2.6 to 4.5 V	Read the value when the ignition switch is ON (Do not start engine).
ACCEL POS #2	Accelerator pedal position sensor No.2 output voltage/ Min.: 0 V, Max.: 5 V	• Accelerator pedal released: 1.2 to 2.0 V • Accelerator pedal depressed: 3.4 to 5.3 V	Read the value when the ignition switch is ON (Do not start engine).

Hand–held Tester Display	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
THROTTLE POS #2	Throttle position sensor No.2 output voltage/ Min.: 0 V, Max.: 5 V	• Throttle fully closed: 2.1 to 3.1 V • Throttle fully open: 4.5 to 5.5 V	Read the value when the ignition switch is ON (Do not start engine).
THROTTLE TARGT	Target position of throttle valve/ Min.: 0 V, Max.: 5 V	Idling: 0.4 to 1.1 V	—
THROTTLE OPN DUTY	Throttle motor opening duty ratio/ Min.: 0 %, Max.: 100 %	Throttle fully closed: 0 %	• When the accelerator pedal is depressed, duty ratio is increased. • Read the value when the ignition switch is ON (Do not start the engine)
THROTTLE CLS DUTY	Throttle motor closed duty ratio/ Min.: 0 %, Max.: 100 %	Throttle fully closed: 0 %	• When the accelerator pedal is released quickly, duty ratio is increased. • Read the value when the ignition switch is ON (Do not start the engine)
THROTTLE MOT	Whether or not throttle motor control is permitted/ ON or OFF	Idling: ON	—
+BM	Whether or not electric throttle control system power is inputted/ ON or OFF	Idling: ON	—
ACCEL IDL POS	Whether or not accelerator pedal position sensor is detecting idle/ ON or OFF	Idling: ON	—
THROTTLE IDL POS	Whether or not throttle position sensor is detecting idle/ ON or OFF	Idling: ON	—
FAIL #1	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
FAIL #2	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
THROTTLE INITIAL	Throttle fully closed learning value Min.: 0 V, Max.: 5 V	0.5 to 0.9 V	—
ACCEL LEARN VAL	Accelerator fully closed learning value Min.: 0 V, Max.: 5 V	0.4 to 0.8 V	—
THROTTLE MOT	Throttle motor current Min.: 0 A, Max.: 20 A	Idling: 0 to 3.0 A	—
O2S B1 S2	Heated 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 the INJ VOL or A/F CONTROL of the ACTIVE TEST enables the user to check the voltage output of each sensor.
O2S B2 S2	Heated oxygen sensor output voltage of the bank 2 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving (50 km/h, 31 mph): 0.1 to 0.9 V	
AFS B1 S1	A/F sensor output voltage of the bank 1 sensor 1/ Min.: 0 V, Max.: 7.999 V	Idling 2.8 to 3.8 V	
AFS B2 S1	A/F sensor output voltage of the bank 2 sensor 1/ Min.: 0 V, Max.: 7.999 V	Idling 2.8 to 3.8 V	
SHORT FT #1	Short term fuel trim of bank 1/ Min.: –100 %, Max.: 100%	0 ± 20 %	This item is the short–term fuel compensation used to maintain the air–fuel ratio at stoichiometric air–fuel ratio

Hand–held Tester Display	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
LONG FT #1	Long term fuel trim of bank 1/ Min.: –100 %, Max.: 100 %	0 ± 20 %	This item is the overall fuel compensation carried out in long–term to compensate for a continual deviation of the short–term fuel trim from the central value.
SHORT FT #2	Short term fuel trim of bank 2/ Min.: –100 %, Max.: 100 %	0 ± 20 %	This item is the short–term fuel compensation used to maintain the air–fuel ratio at stoichiometric air–fuel ratio
LONG FT #2	Long term fuel trim of bank 2/ Min.: –100 %, Max.: 100 %	0 ± 20 %	This item is the overall fuel compensation carried out in long–term to compensate for a continual deviation of the short–term fuel trim from the central value.
O2FT B1 S2	Short term fuel trim associated with the bank 1 sensor 2/ 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
AF FT B1 S1	Short term fuel trim associated with the bank 1 sensor 1/ Min.: 0, Max.: 1.999	• Lean: 0 ≦ AF FT B1 S1 < 1 • Stoichiometric Air–Fuel Ratio=1 • Rich: 1 ≦ AF FT B1 S1 < 1.999	—
AF FT B2 S1	Short term fuel trim associated with the bank 2 sensor 1/ Min.: 0, Max.: 1.999	• Lean: 0 ≦ AF FT B2 S1 < 1 • Stoichiometric Air–Fuel Ratio=1 • Rich: 1 ≦ AF FT B2 S1< 1.999	—
FUEL SYS #1	Fuel system status (Bank1) / OL or CL or OL DRIVE or OL FAULT or CL FAULT	Idling after warming up: CL	• OL: Open Loop–has not yet satisfied conditions to go closed loop. • CL: Closed Loop–using heated oxygen sensor(s) as feed back for fuel control. • OL DRIVE: Open loop due to driving conditions. (fuel enrichment) • OL FAULT: Open loop due to detected system fault. • CL FAULT: Closed loop but one of heated oxygen sensors, which is used for fuel control, is functioning improperly.
FUEL SYS #2	Fuel system status (Bank2) / OL or CL or OL DRIVE or OL FAULT or CL FAULT		
FC IDL	Fuel cut operation/ ON or OFF	Fuel cut operation: ON	—
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] *2	Park/neutral position switch signal/ ON or OFF	P or N position: ON	—
ELECT LOAD SIG	Electrical load signal/ ON or OFF	• Tail light switch ON: ON • Defogger switch ON: ON	—
STOP LIGHT SW	Stop light switch/ ON or OFF	• Brake pedal depressed: ON • Brake pedal released: OFF	—
PS OIL PRESS SW	Power steering signal/ ON or OFF	• During controlling the steering wheel: ON • During non–controlling the steering wheel: OFF	The idle–up control is performed when PS is ON.

Hand–held Tester Display	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
PS SIGNAL	Power steering signal/ ON or OFF	After steer the steering: ON	—
INTAKE CTL VSV1	VSV status for intake control (bank1)/ ON or OFF	VSV operation: ON	—
FUEL PUMP SP CTL	Fuel pump speed control status/ ON or OFF	• Idling: ON • Cranking: OFF	—
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)
VVT CTRL B2	VVT control status (bank 2)/ ON or OFF	VVT system operation: ON	—
VVT CTRL B1	VVT control status (bank 1)/ ON or OFF	VVT system operation: ON	—
IGNITION *3	Ignition counter/ Min.: 0, Max.: 600	0 to 600	—
CYL #1, #2, #3, #4, #5, #6 *3	Misfire ratio of the cylinder 1 – 6/ Min.: 0 %, Max.: 50 %	0 %	This item is displayed in only idling
MISFIRE LOAD *3	Engine load for first misfire range/ Min: 0 g/rev, Max.: 3.98 g/rev	Misfire 0: 0 r/rev	—
MISFIRE RPM *3	Engine RPM for first misfire range/ Min: 0 g/rpm, Max.: 6,375 rpm	Misfire 0: 0 rpm	—
FC TAU	Fuel Cut TAU: Fuel cut during very light load/ ON or OFF	Fuel cut operating: ON	The fuel cut is being performed under very light load to prevent the engine combustion from becoming incomplete.
CHECK MODE	Check mode/ ON or OFF	Check mode ON: ON	—

*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.
*2: For A/T only
*3: For Europe only

7. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester 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 of the method to shorten the labor 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 to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the ”ON” button of the hand–held tester.
(f) Select the item ”DIAGNOSIS / OBD/MOBD / ACTIVE TEST”
(g) According to the display on tester, perform the ”ACTIVE TEST”.

Hand–held Tester Display	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control the injection volume Min.: –12.5 %, Max.: 25 % [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 the injection volume –12.5 or 25 % (Change the injection volume to –12.5 % or 25 %.) [Vehicle Condition] Engine speed: 3,000 rpm or less	The following procedure of A/F CONTROL enables the user to check its output (show its graph indication) of heated oxygen sensor: Select O2S B1 S1 and press button ”F4” after selecting ”ACTIVE TEST/A/F CONTROL/USER DATA”.
FUEL PMP SP CTL	[Test Details] Control the fuel pump speed ON or OFF	—
INTAKE CTL VSV1	[Test Details] Activate the VSV for intake control. ON or OFF	—
EVAP VSV (ALONE)	[Test Details] Activate the VSV for EVAP control ON or OFF	—
A/C MAG CLUTCH	[Test Details] Control the A/C magnet clutch ON or OFF	—
FUEL PUMP / SPD	[Test Details] Control the fuel pump ON or OFF	—
VVT CTRL B1	[Test Details] Active the VVT system (Bank 1). ON or OFF	• ON: Rough idle or engine stall. • OFF: Normal engine speed.
VVT CTRL B2	[Test Details] Active the VVT system (Bank 2). ON or OFF	• ON: Rough idle or engine stall. • OFF: Normal engine speed.
TC/TE1	[Test Details] Connect the TC and TE1 ON or OFF	—
FC IDL PROHBT	[Test Details] Control the idle fuel cut prohibit ON or OFF	—

BASIC INSPECTION

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

1	CHECK BATTERY VOLTAGE

NOTICE:
Carry out this check with the engine stopped and ignition switch OFF.

	OK	NG
Voltage	11 V or more	Less than 11 V

NG → **CHARGE OR REPLACE BATTERY**

OK

2	CHECK IF ENGINE WILL CRANK

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05–33**

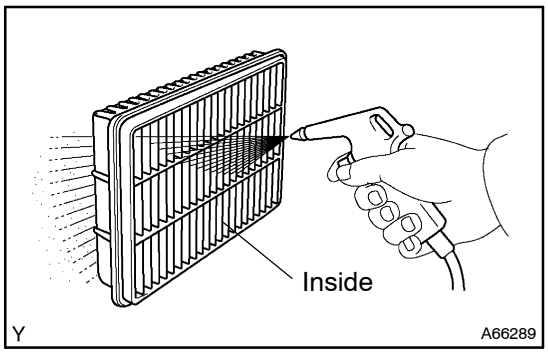
OK

3	CHECK IF ENGINE STARTS

NG → **GO TO STEP 7**

OK

4	CHECK AIR FILER



(a) Visually check that the air filter is not excessively dirty or oily.

NOTICE:
If necessary, clean the filter with compressed air. First blow from the inside thoroughly, then blow from the outside of the filter.

NG → **REPAIR OR REPLACE**

OK

5	CHECK IDLE SPEED (See page 14–1)

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05–33**

OK

6	CHECK IGNITION TIMING (See page 14–1)

NG → PROCEED TO PAGE 18–1 AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05–33

7	CHECK FUEL PRESSURE (See page 11–5)

NG → PROCEED TO PAGE 11–5 AND CONTINUE TO TROUBLESHOOT

OK

8	CHECK FOR SPARK (See page 18–3)

NG → PROCEED TO PAGE 18–1 AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05–33