ARTICLE BEGINNING

INTRODUCTION

If no faults were found while performing **BASIC TESTING**, proceed with self-diagnostics. If no Diagnostic Trouble Codes (DTC) are present after entering self-diagnostics, proceed to steps in **TESTS W/O CODES** article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.).

**NOTE:** Diagnostic Trouble Codes (DTC) will be referred to as trouble codes in this article.

SELF-DIAGNOSTIC SYSTEM

HARD FAILURES

Hard failures cause Malfunction Indicator Light (MIL) on instrument panel to illuminate and remain on until problem is repaired. If light comes on and remains on (light may flash) during vehicle operation, corresponding trouble code will be retained in Electronic Control Module (ECM) memory on some trouble code applications. Not all trouble codes are retained in ECM memory. The cause of malfunction must be determined using trouble code charts. If a sensor fails, Electronic Control Module (ECM) will use a substitute value in its calculations to continue engine operation. In this condition, commonly known as limp-in mode, the vehicle runs but driveability will not be optimum.

**NOTE:** The MIL may also be referred to as the CHECK ENGINE light. The MIL may not illuminate when certain failure such as faulty starter signal or A/C switch signal exists, or if certain trouble codes are set.

INTERMITTENT FAILURES

Intermittent failures may cause Malfunction Indicator Light (MIL) to flicker or illuminate and go out after intermittent fault goes away. However, the corresponding trouble code will be retained in ECM memory on some trouble code applications. Not all trouble codes are retained in ECM memory. Intermittent failures may be caused by a sensor, connector or wiring related problem. See **INTERMITTENTS** in **TESTS W/O CODES** article.

**NOTE:** Test Mode (if equipped) and Normal Mode on self-diagnostic system are used for retrieving trouble code from ECM memory. For information on different mode usage, see RETRIEVING TROUBLE CODES.

RETRIEVING TROUBLE CODES

**NOTE:** Trouble codes may be retrieved using Toyota scan tester in Normal Mode or Test Mode.
NOTE: Normal Mode is used to retrieve trouble code from Electronic Control Module (ECM) to determine problem area. Test Mode is used to check for trouble codes when operating vehicle to simulate conditions in which trouble code was set. Test mode contains a higher sensing ability to detect malfunctions. Test Mode helps determine malfunctions caused by poor electrical connections, which are difficult to determine using Normal Mode. Test Mode also checks for malfunction in starter signal circuit, A/C switch signal and Park/Neutral switch signal.

NOTE: The Malfunction Indicator Light (MIL) on the instrument panel may also be referred to as CHECK ENGINE light.

Toyota Scan Tester

Connect scan tester to appropriate Data Link Connector (DLC). See Fig. 1. DLC No. 1 is used on all models. Using scan tester manufacturer's instructions, retrieve trouble codes.

Normal Mode

1. Before retrieving trouble code(s), verify MIL on instrument panel comes on with ignition on and engine off. The MIL should go off when engine is started.
2. If MIL does not come on with ignition on and engine off, check bulb circuit on instrument panel and wiring circuit between MIL and ECM. See appropriate wiring diagram in WIRING DIAGRAMS article. See ECM LOCATION.
3. If MIL remains on, self-diagnostic system has detected a malfunction or abnormality. Ensure battery voltage is greater than 11 volts and charging system is okay. Warm engine to normal operating temperature.
4. Apply parking brake. Shift the transmission/transaxle into Neutral (M/T) or Park (A/T). Turn A/C and all accessories off. Ensure throttle is in idle position.
5. Turn ignition on with engine off. Install Jumper Wire (SST 09843-18020) between terminals TE1 and E1 in appropriate Data Link Connector (DLC). See Fig. 1.
6. Count number of flashes from MIL on instrument panel. If system is operating properly (with no trouble codes), MIL will flash continuously and evenly. See Fig. 2.
7. If MIL will not flash, check TE1 and E1 wiring circuit. See appropriate TE1 & TE2 DIAGNOSTIC CIRCUIT CHECK chart under TROUBLE CODE CHARTS. See ECM LOCATION.
8. If trouble code exists, digits of trouble code will be flashed at approximately 1/2-second intervals. A 1 1/2-second pause separates first and second digits of code. See Fig. 2.
9. If more than one trouble code is stored, a 2 1/2-second pause will occur before next trouble code is flashed. Once all trouble codes are displayed, a 4 1/2-second pause will occur then trouble code(s) will be repeated.
10. Trouble codes are displayed in order of smallest to largest. After trouble codes are retrieved, remove jumper wire to exit Normal Mode. See NOTES ON TROUBLE CODES. For additional information on trouble codes, see TROUBLE CODE DIAGNOSTIC HINTS table under SELF-DIAGNOSTIC SYSTEM and appropriate TROUBLE CODE IDENTIFICATION table under TROUBLE CODE IDENTIFICATION.
NOTE: To repair failure causing trouble code, refer to proper trouble code chart under TROUBLE CODE CHARTS. Once repairs for trouble code are made, trouble code must be cleared from ECM memory. See CLEARING TROUBLE CODES.

Test Mode

1. Before retrieving trouble code(s), verify MIL on instrument panel comes on with ignition on and engine off. The MIL should go off when engine is started.

2. Check bulb circuit on instrument panel and wiring circuit between MIL and ECM. See appropriate wiring diagram information in WIRING DIAGRAMS article. See ECM LOCATION.

3. Ensure battery voltage is greater than 11 volts and charging system is okay. Apply parking brake. Shift the transmission/transaxle to Neutral (M/T) or Park (A/T). Turn A/C and all accessories off. Ensure throttle is in idle position and ignition is off.

NOTE: Test Mode will not operate if jumper wire is installed between terminals TE2 and E1 in Data Link Connector (DLC) after ignition is turned on.

4. Install Jumper Wire (SST 09843-18020) between terminals TE2 and E1 in Data Link Connector (DLC) with ignition off. See Fig. 1. 5) Turn ignition on with engine off. Test Mode is operational if MIL on instrument panel flashes.

5. If MIL fails to flash, check TE2 wiring circuit. See appropriate TE1 & TE2 DIAGNOSTIC CIRCUIT CHECK chart under TROUBLE CODE CHARTS. See ECM LOCATION.

6. Drive vehicle at a speed greater than 6 MPH. ECM will set Trouble Codes 42 and 43 if vehicle is not driven. Try to simulate conditions of driveability complaint described by customer, and note when MIL comes on. This indicates when problem exists.

7. Stop vehicle, but DO NOT turn engine off. Install jumper wire between terminals TE1 and E1 in DLC. See Fig. 1. Count number of flashes from MIL on instrument panel. If system is operating properly (with no trouble codes), MIL will flash continuously and evenly. See Fig. 2.

8. If trouble code exists, digits of trouble code will be flashed at approximately 1/2-second intervals. A 1 1/2-second pause separates first and second digits of code. See Fig. 2.

9. If more than one trouble code is stored, a 2 1/2-second pause will occur before next trouble code is flashed. Once all trouble codes are displayed, a 4 1/2-second pause will occur, then trouble code(s) will be repeated. Trouble codes are displayed in order of smallest to largest.

NOTE: On all models, Trouble Code 51 will normally be displayed if automatic transmission/transaxle is in any gear except Park or Neutral, A/C is turned on, or accelerator pedal is depressed.

10. After trouble code(s) is retrieved, remove jumper wires to exit Test Mode. See NOTES ON TROUBLE CODES. For additional information on trouble codes, see TROUBLE CODE DIAGNOSTIC HINTS table under SELF-DIAGNOSTIC SYSTEM and appropriate TROUBLE CODE IDENTIFICATION table under TROUBLE CODE IDENTIFICATION.
NOTE: The MIL may not come on if certain trouble code is set when in Test Mode. See appropriate TROUBLE CODE IDENTIFICATION table under TROUBLE CODE IDENTIFICATION.

NOTE: To repair failure causing trouble code, refer to proper trouble code chart under TROUBLE CODE CHARTS. Once repairs for trouble code are made, trouble code must be cleared from ECM memory. See CLEARING TROUBLE CODES.

Fig. 1: Data Link Connector ID & Installing Jumper Wire
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
Fig. 2: Identifying Normal System Operation & Trouble Code Using MIL
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTES ON TROUBLE CODES

1. When certain trouble codes occur, MIL on instrument panel will not come on. For designation of MIL operation on certain trouble codes, see appropriate TROUBLE CODE IDENTIFICATION table under TROUBLE CODE IDENTIFICATION.

2. When certain malfunctions or trouble codes initially occur, they will be temporarily stored in ECM memory, but MIL on instrument panel will not come on.

3. The second time malfunction or trouble code is detected, MIL on instrument panel will then come on, provided ignition is turned off and then back on after malfunction or trouble code was first detected. This is referred to as the Two Trip Detection Logic and only applies to specified trouble codes. See TWO TRIP DETECTION LOGIC TROUBLE CODES table.

   **NOTE:** When road testing vehicle in Test Mode, the Two Trip Detection Logic will not function. In Test Mode, the MIL on instrument panel will come on the first time malfunction or trouble code is detected.

### TWO TRIP DETECTION LOGIC TROUBLE CODES

<table>
<thead>
<tr>
<th>Application</th>
<th>(1) Trouble Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td>21, 25, 26, 27 &amp; 71</td>
</tr>
</tbody>
</table>

(1) Trouble codes may not apply to all models, as some trouble codes are used only on Calif. models.

4. In Normal Mode, MIL on instrument panel will go off after malfunction is repaired, but trouble codes, except ECM non-memory trouble codes, will be retained in ECM memory until cleared. ECM non-memory trouble codes are not stored in ECM memory. See ECM NON-MEMORY TROUBLE CODES table.

5. In Test Mode (if equipped), all trouble codes except ECM non-memory trouble codes are retained in ECM memory, even with ignition off and repairs made, until cleared. ECM non-memory trouble codes are not retained in ECM memory. See ECM NON-MEMORY TROUBLE CODES table.

   **NOTE:** When in Test Mode, if vehicle is not driven at a speed greater than 6 MPH, ECM will set Trouble Codes 42 and 43. For MIL operation in relation to trouble code when in Test Mode, see appropriate TROUBLE CODE IDENTIFICATION table under TROUBLE CODE IDENTIFICATION.

### ECM NON-MEMORY TROUBLE CODES

<table>
<thead>
<tr>
<th>Application</th>
<th>Trouble Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Mode</td>
<td>16, 43 &amp; 51</td>
</tr>
<tr>
<td>Test Mode</td>
<td>43 &amp; 51</td>
</tr>
</tbody>
</table>

### CLEARING TROUBLE CODES 🧼
1. After performing repairs, clear ECM memory of all stored trouble codes. To clear memory, turn ignition off. Remove proper fuse from fuse/relay box for approximately 30 seconds or more. See FUSE APPLICATION table and FUSE/RELAY BOX LOCATION table.

2. Depending on ambient temperature, fuse may need to be removed for more than 30 seconds, especially in colder temperatures. Install fuse. Road test vehicle. Ensure system operates properly (with no trouble codes) and MIL flashes continuously and evenly. See Fig. 2.

   NOTE: Trouble codes may also be cleared by disconnecting negative battery cable. However, other memory functions (clock, radio, alarm, seats, etc.) will be canceled and must be reset.

3. With certain trouble codes, once trouble code has been cleared from ECM memory, a trouble code detection driving pattern test can be performed to verify repairs and that trouble has not reset. For information on trouble code detection driving pattern test, see TROUBLE CODE DETECTION DRIVING PATTERN TESTS.

FUSE APPLICATION

<table>
<thead>
<tr>
<th>Model</th>
<th>Fuse (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td>EFI (15)</td>
</tr>
</tbody>
</table>

FUSE/RELAY BOX LOCATION

<table>
<thead>
<tr>
<th>Application</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td>Driver Side, Front Corner Of Engine Compartment</td>
</tr>
</tbody>
</table>

TROUBLE CODE DETECTION DRIVING PATTERN TESTS

   NOTE: Trouble code driving pattern test may be referred to as driving pattern test.

1. With certain trouble codes, once trouble code has been cleared from ECM memory, a trouble code detection driving pattern test can be performed to verify repairs and that trouble has not reset. Trouble code driving pattern test will duplicate conditions required to set specified trouble codes.

2. Trouble code detection driving pattern test lists procedure to be performed to ensure trouble code has not reset. See Fig. 3.

3. Trouble code detection driving pattern tests apply only to specified trouble codes. See TROUBLE CODE DETECTION DRIVING PATTERN TEST APPLICATION table. Trouble code detection driving pattern test will be included with proper trouble code chart under TROUBLE CODE CHARTS.

TROUBLE CODE DETECTION DRIVING PATTERN TEST APPLICATION

<table>
<thead>
<tr>
<th>Model</th>
<th>(1) Trouble Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td>21, 25, 26, 27, 52 &amp; 71</td>
</tr>
</tbody>
</table>
MALFUNCTION: Open Or Short In Injector Or Blockage
(ENGINE SPEED)

IDLING

5 MIN.

(TIME)

HINT: Before starting this test, ensure engine coolant temp. is 40°C (104°F) or less.
Before this test, check the feedback voltage for heated oxygen sensor.

1. Disconnect the fuse EFI (15 A) for 10 sec. or more, with IG switch OFF.
2. Initiate test mode (Connect terminal TE2 and E1 of DLC1) with IG switch OFF.
3. Start the engine and warm the engine up, with all ACC switch OFF.
4. After the engine is warmed up, let it idle for 5 min.

HINT: If a malfunction is detected the malfunction indicator lamp will light up during step 4.
NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

94J44973

Fig. 3: Typical Trouble Code Detection Driving Pattern Test
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ECM LOCATION

NOTE: For illustration of ECM location, refer to information in THEORY/OPERATION article.

ECM LOCATION

<table>
<thead>
<tr>
<th>Model</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td>Below Passenger's Side Of Dash, Underneath The Carpet</td>
</tr>
</tbody>
</table>
# TROUBLE CODE DIAGNOSTIC HINTS

**NOTE:** To determine a common cause for a trouble code to be set, see TROUBLE CODE DIAGNOSTIC HINTS table.

## TROUBLE CODE DIAGNOSTIC HINTS

<table>
<thead>
<tr>
<th>Trouble Code</th>
<th>Diagnostic Hints</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>No &quot;G&quot;, &quot;G1&quot;, &quot;G2&quot; or &quot;NE&quot; Ignition Signal To ECM Within 2 Seconds After Engine Is Cranked, No &quot;G&quot; Ignition Signal To ECM For 3 Seconds With Engine Speed Of 600-4000 RPM Open In &quot;G-&quot; Circuit</td>
</tr>
<tr>
<td>13</td>
<td>No &quot;NE&quot; Ignition Signal To ECM When Engine Speed Is Greater Than Approximately 1000 RPM, No &quot;G&quot; Ignition Signal To ECM When &quot;NE&quot; Signal Is Input 4 Times With Engine Speed Of 600-4000 RPM</td>
</tr>
<tr>
<td>14</td>
<td>No &quot;IG&quot; Or &quot;IGF&quot; Ignition Signal To ECM From Ignitor Several Times In Succession</td>
</tr>
<tr>
<td>16</td>
<td>Fault In Transmission/Transaxle ECU Or ECM</td>
</tr>
<tr>
<td>21</td>
<td>Defective O2 Sensor, Open Or Short Circuit In O2 Sensor Signal</td>
</tr>
<tr>
<td>22</td>
<td>Open Or Short Circuit In Engine Coolant Temperature Sensor Signal</td>
</tr>
<tr>
<td>24</td>
<td>Open Or Short Circuit In Intake Air Temp. Sensor Signal</td>
</tr>
<tr>
<td>25</td>
<td>Lean Signal Sent By O2 Sensor For Several Seconds</td>
</tr>
<tr>
<td>26</td>
<td>Rich Signal Sent By O2 Sensor For Several Seconds</td>
</tr>
<tr>
<td>27</td>
<td>Open Or Short Circuit In Sub-O2 Sensor Signal</td>
</tr>
<tr>
<td>28</td>
<td>Defective O2 Sensor, Open Or Short Circuit In O2 Sensor Signal</td>
</tr>
<tr>
<td>31</td>
<td>Open Or Short Circuit In Airflow Meter Or MAP Sensor Signal</td>
</tr>
<tr>
<td>32</td>
<td>Open Or Short Circuit Between Airflow Meter Terminals</td>
</tr>
<tr>
<td>34</td>
<td>Turbocharger Pressure Is Abnormal</td>
</tr>
<tr>
<td>35</td>
<td>Open Or Short Circuit In Turbocharging Pressure Sensor, MAP Sensor Or BARO Sensor</td>
</tr>
<tr>
<td>41</td>
<td>Open Or Short Circuit In Throttle Position Sensor Signal</td>
</tr>
<tr>
<td>42</td>
<td>No Signal From Vehicle Speed Sensor For Several Seconds</td>
</tr>
<tr>
<td>43</td>
<td>No &quot;STA&quot; Signal To ECM Until Engine Reaches 800 RPM With Engine Cranking</td>
</tr>
<tr>
<td>47</td>
<td>Open Or Short Circuit In Sub-Throttle Position Sensor Signal</td>
</tr>
<tr>
<td>51</td>
<td>Problem In One Of 3 Circuits Monitored By ECM</td>
</tr>
<tr>
<td>52</td>
<td>Open Or Short Circuit In Knock Sensor Signal</td>
</tr>
<tr>
<td>53</td>
<td>Knock Control In ECM Is Faulty</td>
</tr>
<tr>
<td>55</td>
<td>Open Or Short Circuit In Knock Sensor Signal</td>
</tr>
</tbody>
</table>
## Trouble Code Diagnostic Hints

<table>
<thead>
<tr>
<th>Trouble Code</th>
<th>Diagnostic Hints</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>EGR Gas Temperature Less Than Predetermined Level During EGR Control</td>
</tr>
<tr>
<td>78</td>
<td>Open Or Short Circuit In Fuel Pump Control Circuit Or Fuel Pump Electronic Control Unit (ECU)</td>
</tr>
<tr>
<td>81</td>
<td>Open In ECT1 Circuit Between ECM &amp; Transmission Control Module (TCM) For At Least 2 Seconds</td>
</tr>
<tr>
<td>83</td>
<td>Open In ESA1 Circuit Between ECM &amp; Transmission Control Module (TCM) For 1/2 Second After Engine Idles At Least 1/2 Second</td>
</tr>
<tr>
<td>84</td>
<td>Open In ESA2 Circuit Between ECM &amp; Transmission Control Module (TCM) For 1/2 Second After Engine Idles At Least 1/2 Second</td>
</tr>
<tr>
<td>85</td>
<td>Open In ESA3 Circuit Between ECM &amp; Transmission Control Module (TCM) For 1/2 Second After Engine Idles At Least 1/2 Second</td>
</tr>
</tbody>
</table>

(1) Listed are possible areas causing trouble codes. Not all trouble codes are used on all models.

(2) Throttle position sensor, Park/Neutral switch and A/C Signal circuits are monitored.

## TROUBLE CODE IDENTIFICATION

### TROUBLE CODE IDENTIFICATION

<table>
<thead>
<tr>
<th>Code</th>
<th>System Affected</th>
<th>(1)MIL In Normal Mode</th>
<th>(1)MIL In Test Mode</th>
<th>Probable Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>RPM Signal</td>
<td>ON</td>
<td>N/A</td>
<td>Distributor, Starter Or Circuit, ECM</td>
</tr>
<tr>
<td>13</td>
<td>RPM Signal</td>
<td>(2)</td>
<td>(3)</td>
<td>Distributor Or Circuit, ECM</td>
</tr>
<tr>
<td>14</td>
<td>Ignition Signal</td>
<td>ON</td>
<td>N/A</td>
<td>Ignitor Or Circuit To ECM, ECM</td>
</tr>
<tr>
<td>16</td>
<td>A/T Control Signal</td>
<td>ON</td>
<td>N/A</td>
<td>ECM Or Circuit</td>
</tr>
<tr>
<td>21</td>
<td>Oxygen Sensor Signal</td>
<td>ON</td>
<td>ON</td>
<td>Oxygen Sensor Or Circuit, ECM</td>
</tr>
<tr>
<td>22</td>
<td>Engine Coolant Temperature Sensor Signal</td>
<td>ON</td>
<td>ON</td>
<td>Engine Coolant Temp. Sensor Or Circuit, ECM</td>
</tr>
<tr>
<td>24</td>
<td>Intake Air Temperature Sensor Signal</td>
<td>ON</td>
<td>ON</td>
<td>Intake Air Temp. Sensor Or Circuit, ECM</td>
</tr>
<tr>
<td>25</td>
<td>Lean Air/Fuel Mixture</td>
<td>ON</td>
<td>ON</td>
<td>Injector Or Circuit, Oxygen Sensor Or Circuit Fuel Pressure, Ignition System, Vacuum Leak,</td>
</tr>
</tbody>
</table>

(1) MIL In Normal Mode
(2) MIL In Test Mode
<table>
<thead>
<tr>
<th>Code</th>
<th>System Affected</th>
<th>(1)MIL In Normal Mode</th>
<th>(1)MIL In Test Mode</th>
<th>Probable Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Rich Air/Fuel Mixture</td>
<td>ON</td>
<td>ON</td>
<td>Compression Pressure, ECM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Injector Or Circuit, Oxygen Sensor Or Circuit, Fuel Pressure, Ignition System,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vacuum Leak, Compression Pressure, ECM</td>
</tr>
<tr>
<td>27</td>
<td>Sub-Oxygen Sensor Signal</td>
<td>ON</td>
<td>ON</td>
<td>Sub-Oxygen Sensor Or Circuit, ECM</td>
</tr>
<tr>
<td>31</td>
<td>MAP Sensor Signal</td>
<td>ON</td>
<td>ON</td>
<td>MAP Sensor Or Circuit, ECM</td>
</tr>
<tr>
<td>41</td>
<td>Throttle Position Sensor Signal</td>
<td>ON</td>
<td>ON</td>
<td>Throttle Position Sensor Or Circuit, ECM</td>
</tr>
<tr>
<td>42</td>
<td>Vehicle Speed Sensor Signal</td>
<td>ON</td>
<td>OFF</td>
<td>Vehicle Speed Sensor Or Circuit, ECM</td>
</tr>
<tr>
<td>43</td>
<td>Starter Signal</td>
<td>N/A</td>
<td>OFF</td>
<td>Starter Signal Circuit, Starter Relay, Ignition Switch Or Circuit, ECM</td>
</tr>
<tr>
<td>51</td>
<td>Switch Condition Signal</td>
<td>N/A</td>
<td>OFF</td>
<td>A/C Switch Circuit, Park/Neutral Switch Or Circuit, TPS Or Circuit, ECM</td>
</tr>
<tr>
<td>52</td>
<td>Knock Sensor Signal</td>
<td>ON</td>
<td>N/A</td>
<td>Knock Sensor Or Circuit, ECM</td>
</tr>
<tr>
<td>71</td>
<td>EGR System Malfunction</td>
<td>ON</td>
<td>ON</td>
<td>EGR System, EGR Temp. Sensor Or Circuit, EGR-VSV, ECM</td>
</tr>
</tbody>
</table>

(1) ON indicates MIL on instrument panel will be illuminated. N/A indicates item is not included in malfunction diagnosis when using this mode. OFF indicates MIL on instrument panel will not be illuminated even if malfunction is detected.

(2) The MIL will be illuminated only if no "NE" signal is sent to ECM with engine at approximately 1500 RPM.

(3) The MIL will be illuminated only if no "G" signal is sent to ECM at least 4 times when engine speed is between 500 and 4000 RPM.

(4) Applies only to models with electronic-controlled automatic transaxle.

TROUBLE CODE CHARTS

DIAGNOSTIC CIRCUIT CHECK ("TE1" & "TE2" TERMINAL CIRCUIT)
Terminals "TE1" and "TE2" are located in Data Link Connectors (DLC) No. 1. DLC is located in engine compartment. When these terminals are connected/jumpered with the DLC "E1" terminal, Diagnostic Trouble Codes (DTC) can be accessed in the normal or test modes using the Malfunction Indicator Light (MIL) located in the instrument cluster.

Check for an open or short in wiring harness or for faulty ECM if test mode or output is not activated when DLC terminals "TE1" and "TE2" is jumpered to DLC terminal "E1" or when MIL blinks even though these terminals are not connected or jumpered.
TE1, TE2 Terminal Circuit

CIRCUIT DESCRIPTION
Terminals TE1 and TE2 are located in the data link connector 1. The data link connector 1 located in the engine compartment. When these terminals are connected with the E1 terminal, diagnostic trouble codes in normal mode or test mode can be read from the malfunction indicator lamp on the combination meter.

DIAGNOSTIC CHART
HINT: If terminals TE1 and TE2 are connected with terminal E1, diagnostic trouble code is not output or test mode is not activated. Even though terminal TE1 is not connected with terminal E1, the malfunction indicator lamp blinks. For the above phenomenon, the likely cause is an open or short in the wire harness, or malfunction inside the ECM.

1. Check voltage of terminals TE1, TE2.
   OK → Check and replace ECM.
   NG

2. Check continuity between terminal E1 and body ground.
   NG → Repair or replace harness or connector.
   OK

3. Check for open and short in harness and connector between data link connector 1 and ECM.
   NG → Repair or replace harness or connector.
   OK → Check and replace ECM.

WIRING DIAGRAM

94F44763
Fig. 4: Diagnostic Circuit Check - Schematic
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**INSPECTION PROCEDURE**

1. Check voltage between terminals TE1, TE2 and E1 of data link connector 1.
   - **P** Turn ignition switch on.
   - **C** Measure voltage between terminals TE1, TE2 and E1 of data link connector 1.
   - **OK** Voltage: 9 – 14 V

   - **NG** Check and replace engine control module.

2. Check continuity between terminal E1 of data link connector 1 and body ground.
   - **OK**
   - **NG** Repair or replace harness or connector.

3. Check for open and short in harness and connector between engine control module and data link connector 1.
   - **OK**
   - **NG** Repair or replace harness or connector.

   Check and replace engine control module.

Fig. 5: Diagnostic Circuit Check - Diagnostic Flowchart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
ECM POWER SOURCE CIRCUIT CHECK

When ignition switch is turned on, battery positive voltage is applied to ignition coil, closing contacts in EFI main relay and supplying power to terminals +B and +B1 of ECM.

Fig. 6: ECM Power Source Circuit Check - Schematic
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
3. Check EFI main relay.

- **P**: Remove EFI main relay from R/B No.2.
- **C**: Check continuity between terminals of EFI main relay shown below.

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 and 5</td>
<td>Open</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Continuity (Reference value 75 Ω)</td>
</tr>
</tbody>
</table>

- **C**: (1) Apply battery positive voltage between terminals 1 and 2.
- **C**: (2) Check continuity between terminals 3 and 5.

- **OK**: Terminals 3 and 5
- **NG**: Replace EFI main relay.

4. Check IGN fuse.

- **P**: Remove IGN fuse from inpane J/B.
- **C**: Check continuity of IGN fuse.
- **OK**: Continuity

- **OK**: Check for short in all the harness and components connected to IGN fuse (See wiring diagram).

94B44694
Fig. 7: ECM Power Source Circuit Check - Diagnostic Flowchart (1 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
1. **Check voltage between terminals +B and E1 of engine control module connector.**

- **ON**
  - IG ON

**for M/T**

```
+ -
E1

| V |
```

**for A/T**

```
+ -
E1

| V |
```

- **P** (1) Turn up the floor mat on the passenger side.
  (2) Turn ignition switch on.

- **C** Measure voltage between terminals +B and E1 of engine control module connector.

- **OK** Voltage: 9 - 14 V

2. **Check for open in harness and connector between terminal E1 of engine control module and body ground**

- **OK**

- **NG** Repair or replace harness or connector.

---

**Fig. 8: ECM Power Source Circuit Check - Diagnostic Flowchart (2 Of 3)**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
5 Check ignition switch.

**P** (1) Remove finish panel lower No.1. (2) Remove finish panel.

**C** Check continuity between terminals.

<table>
<thead>
<tr>
<th>Terminal Switch position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>START</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**OK**

NG Replace ignition switch.

6 Check for open in harness and connector between IG switch and EFI main relay, EFI main relay and body ground

**OK**

**NG** Repair or replace harness or connector.

7 Check EFI fuse.

**P** Remove EFI fuse from R/B No.2.

**C** Check continuity of EFI fuse.

**OK** Continuity

**NG** Check for short in all the harness and components connected to EFI fuse (See wiring diagram).

Check for open in harness and connector between EFI main relay and battery, EFI main relay and ECM.

94B44702
ECM BACK-UP POWER SOURCE CIRCUIT

Battery positive voltage is supplied to BATT terminal of ECM even when ignition switch is turned off for use by the diagnostic trouble code memory, air/fuel ratio adaptive control value memory, etc.
Back Up Power Source Circuit

CIRCUIT DESCRIPTION

Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is off for use by the diagnostic trouble code memory and air-fuel ratio adaptive control value memory, etc.

DIAGNOSTIC CHART

1. Check EFI fuse.
   - OK
   - NG: Check for short in all harness and components connected to EFI fuse.

2. Check voltage of terminal BATT.
   - OK
   - NG: Check and repair harness or connector between battery, EFI fuse and ECM.

3. Check operation of the back up.
   - OK
   - NG: Check and replace ECM.

Proceed to next circuit inspection shown on matrix chart (See page EG-379).

WIRING DIAGRAM
**Fig. 10: ECM Back-Up Power Source Circuit - Schematic**
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

<table>
<thead>
<tr>
<th>DTC</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heated Oxygen Sensor Circuit</td>
<td></td>
</tr>
</tbody>
</table>

Malfunction: Heated Oxygen Sensor Deterioration

1. Disconnect the fuse EFI (15 A) for 10 sec. or more, with IG switch OFF.
2. Start the engine and warm the engine up with all ACC switched OFF.
3. After the engine is warmed up, let it idle for 3 min.
4. Accelerate gradually and maintain at approximately 1,500 rpm, or within the 1,300 to 1,700 rpm range. Turn the A/C on, and drive in "D" for automatic, or in case of manual transmission, upshift appropriately. Shift carefully so that the engine speed would not fall below 1,200 rpm. Depress the accelerator pedal gradually and maintain a steady speed to avoid engine braking.
5. Maintain the vehicle speed at 40 - 50 mph. Keep the vehicle running for 1 - 2 min. after starting acceleration.
6. After driving, stop at a safe place and turn the IG switch OFF for 3 sec. or more.
7. Start the engine and perform steps (3), (4) and (5) again.

**HINT:** if a malfunction is detected, the Malfunction Indicator Lamp will light up during step (7).

**NOTICE:** If this procedure is not strictly followed, you cannot detect the malfunctions.

---

**Fig. 11: ECM Back-Up Power Source Circuit - Diagnostic Flowchart**
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
DTC 12 - RPM SIGNAL

The Integrated Ignition Assembly (IIA) contains 3 pick-up coils. The "G" signal informs ECM of the standard crankshaft position. The "NE" signal informs ECM of the crankshaft position and engine speed.

If "NE" signal is not present to ECM within 2 seconds or more with engine cranking, check for open or short in the "G" or "NE" circuit, or for faulty IIA.

If "G" signal is not present from ECM for 3 seconds or more with engine speed between 600-4000 RPM, check for open or short in "STA" circuit or for a faulty ECM.
DIAGNOSTIC CHART

1. Check resistance of each pickup coils in IIA.  
   NG → Replace distributor housing assembly.  
   OK

2. Check for open and short in harness and connector between ECM and IIA.  
   NG → Repair or replace harness or connector.  
   OK

3. Check air gap.  
   NG → Replace distributor housing assembly.  
   OK

   Check and replace ECM.

WIRING DIAGRAM

Engine Control Module

94J44767
Fig. 12: DTC 12 - Schematic

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
INSPECTION PROCEDURE

1. Check resistance of each pickup coils in IIA.

- Disconnect IIA connector.
- Measure resistance between each terminal shown in table below.

<table>
<thead>
<tr>
<th></th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>G Pickup Coil (G1 - G)</td>
<td>Cold 185 - 275 Ω, Hot 240 - 325 Ω</td>
</tr>
<tr>
<td>NE Pickup Coil (NE - NE)</td>
<td>Cold 370 - 550 Ω, Hot 475 - 650 Ω</td>
</tr>
</tbody>
</table>

"Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

OK  
NG  Replace the distributor housing assembly.

2. Check for open and short in harness and connector between engine control module and IIA.

OK  
NG  Repair or replace harness or connector.

3. Check air gap.

- Remove IIA cap and rotor.
- Using a thickness gauge, measure the air gap between the signal rotor and pickup coil projection.

OK  Air gap: 0.2 - 0.4 mm (0.008 - 0.016 in.)

NG  Replace the distributor housing assembly.

Check and replace engine control module.

94B44769
DTC 13 - RPM SIGNAL

This code indicates that a momentary interruption of the "G" and "NE" signal from the IIA to the ECM has occurred, but has returned to normal. This malfunction is usually a loose or dirty connector or terminal. For further diagnosis, refer to DTC 12 chart.

DTC 14 - IGNITION SIGNAL

ECM determines ignition timing. ECM turns on "Tr1" circuit at a predetermined angle before desired ignition timing, and outputs an ignition signal to the Integrated Ignition Assembly (IIA). Since the width of the "IGT" signal is constant, dwell angle control circuit in the IIA determines the time control circuit starts primary current flow to ignition coil, based on engine RPM and ignition timing one revolution ago, that is, the time "Tr2" circuit turns on.

When it reaches the ignition timing, ECM turns off "Tr1" and outputs the "IGT" signal "0". This turns off "Tr2", interrupting the primary current flow and generating a high voltage in the secondary coil, firing the spark plugs. Also, by the counter electromotive force generated when the primary current is interrupted, the ignitor sends an ignition confirmation signal (IGF) to the ECM. ECM stops fuel injection as a fail safe function when "IGF" signal is not inputted to ECM.

If "IGF" signal to ECM is not present after 4 consecutive "IGT" signals, check for open or short in "IGF" or "IGT" circuit from IIA to ECM. Check for faulty ignitor or ECM.
DTC 14 Ignition Signal Circuit

CIRCUIT DESCRIPTION

The ECM determines the ignition timing, turns on T1 at a predetermined angle (°CA) before the desired ignition timing and outputs an ignition signal (IGT) "1" to the IIA. Since the width of the IGT signal is constant, the dwell angle control circuit in the IIA determines the time the control circuit starts primary current flow to the ignition coil based on the engine speed and ignition timing one revolution ago, that is, the time the T1 turns on. When it reaches the ignition timing, the ECM turns T1 off and outputs the IGT signal "0". This turns T1 off, interrupting the primary current flow and generating a high voltage in the secondary coil which causes the spark plug to spark. Also, by the counter electromotive force generated when the primary current is interrupted, the IIA sends an ignition confirmation signal (IGF) to the ECM. The ECM stops fuel injection as a fail safe function when the IGF signal is not input to the ECM.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Diagnostic Trouble Code Detecting Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>No IGF signal to ECM for 4 consecutive IGT signal.</td>
<td>• Open or short in IGF or IGT circuit from IIA to ECM.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• IIA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ECM</td>
</tr>
</tbody>
</table>

WIRING DIAGRAM

![Wiring Diagram](image)
Fig. 15: DTC 14 - Schematic
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
INSPECTION PROCEDURE

1. Check for spark.
   - **OK**
   - **NG** Go to step 4.
   - 
     Disconnect the high-tension cord from the IIA, hold its end about 12.5 mm (1/2") from the ground, see if spark occurs while the engine is being cranked.
   - **OK**
   - **NG** Spark should be generated.
   - 
     To prevent excessive fuel injected from the injectors during this check, don’t crank the engine for more than 1 – 2 seconds at a time.

2. Check for open and short in harness and connector in IGF signal circuit between engine control module and IIA.
   - **OK**
   - **NG** Repair or replace harness or connector.

3. Disconnect IIA connectors and check voltage between terminal IGF of engine control module connector and body ground.
   - **OK**
     - Replace igniter in IIA.
     - 
       Measure voltage between terminal IGF of engine control module connector and body ground.
       - **OK** Voltage: 4.5 – 5.5 V
       - 
         (1) Disconnect IIA connectors.
         (2) Turn up the floor mat on the passenger side.
         (3) Turn ignition switch on.
       - **OK**

Check and replace engine control module.

94G44772
Fig. 16: DTC 14 - Diagnostic Flowchart (1 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
4. Check voltage between terminal IGT of engine control module connector and body ground.

- **Turn up the floor mat on the passenger side.**
- **Measure voltage between terminal IGT of engine control module connector and body ground when engine is cranked.**
- **Voltage:** 0.5 – 1.0 V
  (Neither 0 V nor 5 V)

---

**Reference**

**INSPECTION USING OSCILLOSCOPE**

- During cranking or idling, check waveform between terminal IGT, IGF and E1 of engine control module.

**HINT:** The correct waveform appears as shown in the illustration on the left, with rectangle waves.

**OK**

94H44773

**NG**

Go to step 7.
Fig. 17: DTC 14 - Diagnostic Flowchart (2 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
Fig. 18: DTC 14 - Diagnostic Flowchart (3 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
7. Disconnect IIA connectors and check voltage between terminal IGT of engine control module connector and body ground.

- Disconnect IIA connectors.
- Measure voltage between terminal IGT of engine control module connector and body ground when engine is cranked.
- Voltage: 0.5 – 1.0 V (Neither 0 V nor 5 V)

NG

OK

Replace igniter in IIA.

8. Check for open and short in harness and connector in IGT signal circuit between engine control module and IIA

OK

NG

Repair or replace harness or connector.

Check and replace engine control module.

Fig. 19: DTC 14 - Diagnostic Flowchart (4 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC 16 - ECT CONTROL SIGNAL

Signal from automatic transmission CPU retards engine ignition timing during shifting, thus momentarily reducing engine torque output for smooth clutch operation and reduces shift roughness.

If there is a fault in communications between ECM and A/T CPU, check for faulty ECM. Fault will set DTC 16 and prohibits transmission torque control.

---

**Fig. 20: DTC 16 - Diagnostic Flowchart**

*Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.*

**DTC 21 - OXYGEN SENSOR SIGNAL**

This code sets when the main oxygen sensor signal voltage is reduced between .35-.70 volt for 60 seconds under following conditions:

- Engine coolant temperature at 176°F (80°C) or greater.
- Engine speed at 1500 RPM or greater.
- Engine load.
- Main oxygen sensor signal voltage alternating at greater than or less than .45 volt.

**WIRING DIAGRAM**

![Wiring Diagram](image)

**Fig. 21: DTC 21 - Schematic**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
Malfunction: (Main*) Oxygen Sensor Deterioration

1. Disconnect the EFI fuse (15 A) for 10 sec. or more, with IG switch OFF. Initiate test mode (Connect terminal TE2 and E1 of data link connector 1 with IG switch OFF).

2. Start the engine and warm up with all ACC switch OFF.

3. After the engine is warmed up, let it idle for 3 min.

4. After performing the idling in ③, perform gradual acceleration with in the range 1,300 ~ 1,700 rpm (centered around 1,500 rpm) with the A/C switch ON and D position for A/T (5th for M/T).

   (Take care that the engine speed does not fall below 1,200 rpm when shifting. Gradually depress the accelerator pedal and kept it. Steady so that engine braking does not occur).

5. Maintain the vehicle speed at 40 ~ 50 mph (64 ~ 80 km/h).

6. Keep the vehicle running for 1 ~ 2 min. after starting acceleration.

HINT: If a malfunction exists, the malfunction indicator lamp will light up after approx. 60 sec. from the start of acceleration.

NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

*: Only for California specification vehicles.

94C44778

Fig. 22: DTC 21 - Inspection Using Oscilloscope
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
**Reference**

**INSPECTION USING OSCILLOSCOPE**

- With the engine racing (2,500 rpm) measure waveform between terminals OX1 and E1 of engine control module.

**HINT:** The correct waveform appears as shown in the illustration on the left, oscillating between approx. 0.1 V and 0.9 V.

If the oxygen sensor has deteriorated, the amplitude of the voltage will be reduced as shown on the left.

---

**Fig. 23: DTC 21 - Detection Driving Pattern**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

---

**DIAGNOSTIC CHART**

1. Are there any other codes (besides code 21) being output?  

   - **YES** Go to relevant diagnostic trouble code chart.  
   - **NO** Replace main oxygen sensor.

---

**Fig. 24: DTC 21 - Diagnostic Flowchart**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
DTC 22 - ENGINE COOLANT TEMPERATURE SENSOR SIGNAL

The engine coolant temperature sensor is a thermistor that changes its resistance value according to engine coolant temperature. ECM supplies a 5-volt reference voltage to engine coolant temperature through ECM terminal "E12". When sensor resistance changes, ECM changes fuel injection volume to improve driveability during cold engine operation.

A failure code is set when there is an open or short in engine coolant temperature sensor circuit for .5 second or more. Check for open or short in engine coolant temperature sensor circuit, a faulty sensor or ECM.
DIAGNOSTIC CHART

HINT: If diagnostic trouble codes "22" (engine coolant temperature sensor circuit), "24" (intake air temperature sensor circuit), "31" (manifold absolute pressure sensor circuit) and "41" (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.

1. Check voltage of sensor. OK
   NG

2. Check resistance of sensor. NG
   OK

3. Check for open and short in harness and connector between ECM and engine coolant temp. sensor.
   OK
   NG

   Check and replace ECM.

   Check for momentary interruption

   Replace engine coolant temp. sensor.

   Repair or replace harness or connector.

WIRING DIAGRAM

Engine Control Module

- 5 V
- THW
- R

Engine Coolant Temp. Sensor

- 2 (G)
- 1 (BR)
- 4 (A/T/M/T)
- 9 (E2)
- E1
**Fig. 25: DTC 22 - Schematic**

*Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.*

**INSPECTION PROCEDURE**

**HINT:** If diagnostic trouble codes "22" (engine coolant temperature sensor circuit), "24" (intake air temperature sensor circuit), "31" (manifold absolute pressure sensor circuit) and "41" (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.

1. **Check voltage between terminals THW and E2 of engine control module connector.**

   **P**
   - (1) Turn up the floor mat on the passenger side.
   - (2) Turn ignition switch on.

   **C**
   - Measure voltage between terminals THW and E2 of engine control module connector.

   **OK**
   - **Engine Coolant Temp. °C (°F)**
   - **Voltage**
     - 20 (68) (Engine is cool) 0.5 - 3.4 V
     - 80 (176) (Engine is hot) 0.2 - 1.0 V

1. **NG**

   **OK**

   Check for momentary interruption

94B44785

---

**Fig. 26: DTC 22 - Voltage Reference Chart**

*Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.*
<table>
<thead>
<tr>
<th>Engine coolant Temp. °C (°F)</th>
<th>Resistance (kΩ)</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20 (-4)</td>
<td>16.0</td>
<td>4.3</td>
</tr>
<tr>
<td>0 (32)</td>
<td>5.9</td>
<td>3.4</td>
</tr>
<tr>
<td>20 (68)</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>40 (104)</td>
<td>1.2</td>
<td>1.5</td>
</tr>
<tr>
<td>60 (140)</td>
<td>0.6</td>
<td>0.9</td>
</tr>
</tbody>
</table>

< Reference >
94I44782

Fig. 27: DTC 22 - Diagnostic Flowchart (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2  Check engine coolant temp. sensor.

- Disconnect the engine coolant temp. sensor connector.
- Measure resistance between terminals.
- Resistance is within Acceptable Zone on chart.

**Acceptable**

<table>
<thead>
<tr>
<th>Engine coolant temp. °C (°F)</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 (68)</td>
<td>2 - 3 kΩ</td>
</tr>
<tr>
<td>80 (176)</td>
<td>0.2 - 0.4 kΩ</td>
</tr>
</tbody>
</table>

**OK**

**NG** Replace engine coolant temp. sensor.

3  Check for open and short in harness and connector between engine control module and engine coolant temp. sensor

**OK**

**NG** Repair or replace harness or connector.

Check and replace engine control module.

94C44786
DTC 24 - INTAKE AIR TEMPERATURE SENSOR SIGNAL

Intake Air Temperature (IAT) sensor is built into air cleaner cover. The IAT sensor senses intake air temperature. If ECM detects a problem in this circuit, it operates in the fail safe mode in which the intake air temperature is assumed to be 68°F (20°C).

A failure code is set there is an open or short in IAT sensor circuit for .5 second or more. Check for open or short in IAT circuit, a faulty IAT sensor or ECM.
DTC 24 Intake Air Temp. Sensor Circuit

CIRCUIT DESCRIPTION

The intake air temp. sensor is built into the air cleaner cap and senses the intake air temperature. The structure of the sensor and connection to the ECM is the same as in the engine coolant temp. sensor shown on page EG-403.

If the ECM detects the diagnostic trouble code “24”, it operates the fail safe function in which the intake air temperature is assumed to be 20°C (68°F).

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Diagnostic Trouble Code Detecting Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| 24      | Open or short in intake air temp. sensor circuit for 0.5 sec. or more. | - Open or short in intake air temp. sensor circuit.  
- Intake air temp. sensor  
- ECM |

DIAGNOSTIC CHART

HINT: If diagnostic trouble codes “22” (engine coolant temperature sensor circuit), “24” (intake air temperature sensor circuit), “31” (manifold absolute pressure sensor circuit) and “41” (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.

1. Check voltage of sensor.  
   OK → Check for momentary interruption  
   NG

2. Check resistance of sensor.  
   NG → Replace intake air temp. sensor.  
   OK

3. Check for open and short in harness and connector between ECM and intake air temp. sensor.  
   NG → Repair or replace harness or connector.  
   OK → Check and replace ECM.

WIRING DIAGRAM

![Wiring Diagram](http://shopkey5.com/mric/common/asp/printart.aspx)
Fig. 29: DTC 24 - Schematic
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2  Check intake air temp. sensor.

- Disconnect the air temp. sensor connector.
- Measure resistance between terminals.
- Resistance is within Acceptable Zone on chart.

OK

Acceptable

<table>
<thead>
<tr>
<th>Intake air temp</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C (°F)</td>
<td>Ω</td>
</tr>
<tr>
<td>20 (68)</td>
<td>2 – 3 Ω</td>
</tr>
<tr>
<td>60 (140)</td>
<td>0.4 – 0.7 Ω</td>
</tr>
</tbody>
</table>

NG  Replace intake air temp. sensor.

3  Check for open and short in harness and connector between engine control module and intake air temp. sensor

OK

NG  Repair or replace harness or connector.

Check and replace engine control module.

94144790

Fig. 30: DTC 24 - Diagnostic Flowchart (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
**INSPECTION PROCEDURE**

1. **Check voltage between terminals THA and E2 of engine control module connector.**

   - **ON**
   - **IG ON**

   **for M/T**

   ![Diagram](image)

   **NG**

   ![Image](image)

   **OK**

   Check for momentary interruption

   **P**

   1. Turn up the floor mat on the passenger side.
   2. Turn ignition switch on.

   **C**

   Measure voltage between terminals THA and E2 of engine control module connector.

   **OK**

<table>
<thead>
<tr>
<th>Intake air temp. °C (°F)</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 (68)</td>
<td>0.5 – 3.4 V</td>
</tr>
<tr>
<td>60 (140)</td>
<td>0.2 – 1.0 V</td>
</tr>
</tbody>
</table>

---

**Fig. 31: DTC 24 - Diagnostic Flowchart (2 Of 2)**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**DTC 25/26 - LEAN OR RICH AIR/FUEL MIXTURE**

DTC 25 is set under following conditions:

- Main oxygen sensor voltage is .45 volt or less (lean) for 90 seconds when engine coolant temperature is at 122°F (50°C) or greater and with engine speed at 1500 RPM or greater.
Engine speed varies by greater than 15 RPM over the preceding crank position period during a period of 30 seconds or more with engine idling and engine coolant temperature at 176°F (80°C) or greater.

DTC 26 is set under following conditions:

- Engine speed varies by greater than 15 RPM over the preceding crank position during a period of 50 seconds or more with engine idling and engine coolant temperature at 176°F (80°C) or greater.

**Malfunction:** Open or Short in (Main*) Oxygen Sensor  
Open or Short in Injector Circuit, Injector Leak or Blockage.

![Graph showing engine speed and time]

**HINT:** Before this test, check the feedback voltage for (main*) oxygen sensor.

1. Disconnect the EFI fuse (15 A) for 10 sec. or more, with IG switch OFF.  
   Initiate test mode (Connect terminal TE2 and E1 of data link connector 1 with IG switch OFF).
2. Start engine and warm up.
3. After the engine is warmed up, let it race at 2,500 rpm for 3 min.
4. After performing the racing in 3, perform idling for 1 min.

**HINT:** If a malfunction exists, the malfunction indicator lamp will light up during step 4.

**NOTICE:** If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

*: Only for California specification vehicles.

9J444791
Fig. 32: DTC 25/26 - Detection Driving Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Check voltage between terminals VF1 and E1 of data link connector 1.

- **P**
  1. Warm up engine to normal operating temperature.
  2. Using SST, connect terminals TE1 and E1 of data link connector 1.
  3. SST 09843-18020
  4. Connect positive probe to terminal VF1 and negative probe to terminal E1 of data link connector 1.

- **C**
  1. Warm up the oxygen sensor by running engine at 2,500 rpm for about 2 minutes.
  2. Then, maintaining engine at 2,500 rpm, count how many times needle of voltmeter fluctuates between 0 and 5 V.

<table>
<thead>
<tr>
<th>Result</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Needle fluctuates 8 times or more for every ten seconds</td>
<td>OK</td>
</tr>
<tr>
<td>Continue at 0 V</td>
<td>NG Type I</td>
</tr>
<tr>
<td>Continue at 5 V</td>
<td>NG Type II</td>
</tr>
</tbody>
</table>

NG Type I

NG Type II Go to step 7.

2. Check voltage between terminals OX1 and E1 of data link connector 1.

- **P**
  1. Warm up engine to normal operating temperature.

- **C**
  1. Measure voltage between terminals OX1 and E1 of data link connector 1 when engine is suddenly raced to full throttle.

- **OK**
  1. The voltage should be 0.5 V or higher at least once.

  **Hint** Perform inspection within 1 second.

NG

OK Go to step 7.

Continued on next graphic

94B44793
Fig. 33: DTC 25/26 - Diagnostic Flowchart (1 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3 Check for open and short in harness and connector between engine control module and main oxygen sensor, engine control module and data link connector 1

   OK

   NG  Repair or replace harness or connector.

4 Check each item found to be a possible cause of problem.

Check each circuit found to be a possible cause of trouble according to the results of the check in 1 or 2. The numbers in the table below show the order in which the checks should be performed.

<table>
<thead>
<tr>
<th>Main oxygen sensor signal continue at 0V</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Faulty sensor installation.</td>
</tr>
<tr>
<td>2</td>
<td>Air leakage</td>
</tr>
<tr>
<td>3</td>
<td>Misfire</td>
</tr>
<tr>
<td>4</td>
<td>Fuel system</td>
</tr>
<tr>
<td>5</td>
<td>Injector circuit</td>
</tr>
<tr>
<td>6</td>
<td>Characteristics deviation in engine coolant temp. sensor.</td>
</tr>
<tr>
<td>7</td>
<td>Characteristics deviation in intake air temp. sensor.</td>
</tr>
<tr>
<td>8</td>
<td>Characteristics deviation in manifold absolute pressure sensor.</td>
</tr>
<tr>
<td>9</td>
<td>Valve timing</td>
</tr>
</tbody>
</table>

   OK

   NG  Repair or replace.

5 Check compression

   OK

   NG  Repair or replace.

6 Does malfunction disappear when a good main oxygen sensor is installed?

   NO

   YES  Replace main oxygen sensor.

Check and replace engine control module.
DTC 27 - SUB-OXYGEN SENSOR SIGNAL

DTC 27 is set when the main oxygen sensor signal is .45 volt or greater and sub-oxygen sensor signal is .45 volt or less when engine coolant temperature is at 176°F (80°C) or greater and engine speed at 1500 RPM or greater with accelerator pedal fully depressed for more than 2 seconds.
Check for open or shorted circuit in sub-oxygen sensor circuit, a faulty sub-oxygen sensor or ECM.

**WIRING DIAGRAM**

![Wiring Diagram](image)

**Fig. 36: DTC 27 - Schematic**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
Malfunction: Open or Short in Sub Oxygen Sensor

1. Disconnect the EFI fuse (15 A) for 10 sec. or more, with IG switch OFF. Initiate test mode (Connect terminals TE2 and E1 of data link connector 1 with IG switch OFF).
2. Start the engine and warm up, with all ACC switch OFF.
3. After the engine is warmed up, let it drive at 50 ~ 55 mph (80 ~ 88 km/h) for 10 min. or more.
4. After driving, stop at a safe place and perform idling for 2 min. or less.
5. After performing the idling in (4), perform acceleration to 60 mph (96 km/h) with the throttle valve fully open.

HINT: If a malfunction exists, the malfunction indicator lamp will light up during step ⑤.

NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

Fig. 37: DTC 27 - Detection Driving Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
DTC 31 - MAP SENSOR SIGNAL

MAP sensor detects the intake manifold absolute pressure as a voltage. ECM determines basic injection duration and basic ignition advance angle based on this voltage. DTC 31 sets when there is an open or short in MAP sensor circuit for .5 second or more. Check for an open or shorted MAP sensor circuit, a faulty MAP sensor or ECM.
**DIAGNOSTIC CHART**

1. Check voltage of terminal VC.
   - OK
   - NG
     - Check and replace ECM.

2. Check voltage of terminal PIM.
   - OK
   - NG
     - When diagnostic trouble code 31 is displayed, check and replace ECM.

3. Check for open and short in harness and connector between manifold absolute pressure sensor and ECM.
   - OK
   - NG
     - Repair or replace harness or connector.
     - Check and replace manifold absolute pressure sensor.

**WIRING DIAGRAM**

Manifold Absolute Pressure Sensor

Engine Control Module

94A44800
Fig. 39: DTC 31 - Schematic
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2 Check voltage between terminals PIM and E2 of engine control module connector.

- Turn ignition switch on
- Measure voltage between terminals PIM and E2 of engine control module connector.
- Voltage: 3.3 – 3.9 V

OK When diagnostic trouble code 31 is displayed, check and replace engine control module.

3 Check for open and short in harness and connector between engine control module and manifold absolute pressure sensor

OK Repair or replace harness or connector.

NG Check and replace manifold absolute pressure sensor.

94D44803
Fig. 40: DTC 31 - Output Voltage/Absolute Pressure Reference Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

![Graph showing a linear relationship between output voltage and manifold absolute pressure.]

Fig. 41: DTC 31 - Diagnostic Flowchart (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
**INSPECTION PROCEDURE**

1. Check voltage between terminals VC and E2 of engine control module connector.

   - **ON** (IG ON)
     - for M/T
     - for A/T

   - **V**

   - **VC**
   - **E2**

   - **OK**
   - **NG**

   **P**
   - Turn up the floor mat on the passenger side.
   - Turn ignition switch on.

   **C**
   - Measure voltage between terminals VC and E2 of engine control module connector.

   **OK**
   - Voltage: 4.5 – 5.5 V

   **NG**
   - Check and replace engine control module.

---

**Fig. 42: DTC 31 - Diagnostic Flowchart (2 Of 2)**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**DTC 41 - THROTTLE POSITION SENSOR SIGNAL**

DTC 41 is set when there is an open or short in throttle position sensor circuit for .5 second or greater. Code will not set when throttle position connector is disconnected. Check for open or short in throttle position sensor circuit, a faulty throttle position sensor or ECM.
HINT: If diagnostic trouble codes "22" (engine coolant temperature sensor circuit), "24" (intake air temperature sensor circuit), "31" (manifold absolute pressure sensor circuit) and "41" (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.

1. Check voltage of throttle position sensor.
   - OK: Check for momentary interruption
   - NG: Adjust or replace throttle position sensor.

2. Check operation for throttle position sensor.
   - OK: Repair or replace harness or connector.
   - NG: Repair or replace harness or connector.

3. Check for open and short in harness and connector between throttle position sensor and ECM.
   - OK: Check and replace ECM.

WIRING DIAGRAM

Throttle Position Sensor

Engine Control Module

94F44805
Fig. 43: DTC 41 - Schematic
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2 Check throttle position sensor.

OK

(1) Disconnect throttle position sensor connector.
(2) Disconnect the vacuum hose from the throttle body, then apply vacuum to the throttle opener.

Measure resistance between terminals 3 (VTA), 2 (IDL) and 1 (E2) of throttle position sensor connector when the throttle valve is opened gradually from the closed condition.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>3 (VTA) – 1 (E2)</th>
<th>2 (IDL) – 1 (E2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully Closed</td>
<td>0.2 – 6.0 kΩ</td>
<td>Less than 2.3 kΩ</td>
</tr>
<tr>
<td>Fully Open</td>
<td>3.3 – 10.0 kΩ</td>
<td>1 MΩ or higher</td>
</tr>
</tbody>
</table>

Unit: Resistance between terminals 3 (VTA) and 1 (E2) should increase gradually in accordance with the throttle valve opening angle.

NG Adjust or replace throttle position sensor

3 Check for open and short in harness and connector between engine control module and throttle position sensor

OK

NG Repair or replace harness or connector.

Check and replace engine control module.

94144808

Fig. 44: DTC 41 - Diagnostic Flowchart (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
INSPECTION PROCEDURE

HINT: If diagnostic trouble code "22" (engine coolant temperature sensor circuit), "24" (intake air temperature sensor circuit), "31" (manifold absolute pressure sensor circuit) and "41" (throttle position sensor circuit) are output simultaneously, E2 (sensor ground) may be open.

1. Check voltage between terminals VTA, IDL and E2 of engine control module connector.

   ON
   IG ON
   for M/T
   IDL VTA
   E2

   ON
   for A/T
   IDL VTA
   E2

   OK
   Check for momentary interruption

   NG

   P
   (1) Turn up the floor mat on the passenger side.
   (2) Disconnect the vacuum hose from the throttle body, then apply vacuum to the throttle opener.
   (3) Turn ignition switch ON.

   C
   Measure voltage between terminals VTA, IDL and E2 of engine control module connector when the throttle valve is opened gradually from the closed condition.

   Throttle Valve
   Terminal | VTA - E2 | IDL - E2
   Fully Closed | 0.3 - 0.8 V | 0 - 3.0 V
   Fully Open | 3.2 - 4.9 V | 9 - 14 V

   HINT
   The voltage should increase steadily in proportion to the throttle valve opening angle.

Fig. 45: DTC 41 - Diagnostic Flowchart (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC 42 - VEHICLE SPEED SENSOR SIGNAL

The No. 1 vehicle speed sensor outputs a 4-pulse signal for every revolution of the rotor shaft, which is rotated by transmission output shaft. ECM determines vehicle speed based on the frequency of these pulse signals.
DTC 42 is set when following conditions are detected continuously for 8 seconds or more:

- On vehicles equipped with A/T, No. 1 vehicle speed signal reads zero MPH with engine speed at 3000 RPM or greater and with P/N switch off.
- On vehicles equipped with M/T, No. 1 vehicle speed signal reads zero MPH with engine speed at 3000-5000 RPM, engine coolant temperature at 176°F (80°C) or greater and with drive wheels turning (driving load).

Check for open or short in No. 1 vehicle speed sensor circuit, a faulty No. 1 vehicle speed sensor, a faulty combination meter or ECM.
**DIAGNOSTIC CHART**

1. Check operation of speedometer.
   - NG: Check speedometer circuit.
   - OK: OK

2. Check voltage of terminal SPD.
   - NG: Check speedometer circuit.
   - OK: Check and replace ECM.

**WIRING DIAGRAM**

[Diagram of wiring connections between Combination Meter, Cruise Control ECU (9 - 14 V), and Engine Control Module with labels for connection points and direction arrows.]
Fig. 46: DTC 42 - Schematic
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
INSPECTION PROCEDURE

1. Check operation of speedometer.
   - OK
     Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
     The No.1 vehicle speed sensor is operating normally if the speedometer display is normal.
   - NG
     Check speedometer circuit.

2. Check voltage between terminal SPD of engine control module connector and body ground.
   - P
     (1) Turn up the floor mat on the passenger side.
     (2) Disconnect cruise control ECU connector.
     (3) Shift the shift lever to N position or neutral.
     (4) Jack up a front wheel on one side.
     (5) Turn ignition switch on.
   - C
     Measure voltage between terminal SPD of engine control module connector and body ground when the wheel is turned slowly.
   - OK
     Voltage is generated intermittently.
   - NG
     Check speedometer circuit.

Check and replace engine control module.

94F44813
Fig. 47: DTC 42 - Voltage Reference Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
DTC  42  No.1 Vehicle Speed Sensor Signal Circuit

CIRCUIT DESCRIPTION

The No. 1 vehicle speed sensor outputs a 4-pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the engine control module. The ECM determines the vehicle speed based on the frequency of these pulse signals.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Diagnostic Trouble Code Detecting Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| 42      | For A/T  
For M/T  
All conditions below are detected  
continuously for 8 sec. or more.  
(a) No.1 vehicle speed sensor signal:  
0 mph (km/h)  
(b) Engine speed: 3,000 rpm or more  
(c) Park/neutral position switch: OFF  | - Open or short in No.1 vehicle speed sensor circuit.  
- No.1 vehicle speed sensor  
- Combination meter.  
- ECM  |
|         | All conditions below are detected  
continuously for 8 sec. or more.  
(a) No.1 vehicle speed sensor signal:  
0 mph (km/h)  
(b) Engine speed: Between 3,000 rpm and  
5,000 rpm  
(c) Engine coolant temp.: 80°C (176°F) or more  
(d) Load driving |  |

HINT: In test mode, diagnostic trouble code 42 is output when vehicle speed is 3 mph (5 km/h) or below.

< Reference >

* Waveform between terminals SPD and E1 when vehicle speed is approx. 12 mph (20 km/h).

HINT: The greater the vehicle speed, the greater the number of No.1 vehicle speed sensor signals produced.
DTC 43 - STARTER SIGNAL

While engine is being cranked, battery voltage is applied to ECM terminal "E5" (STA). Starter signal is mainly used to increase fuel injection volume for the starting injection control and after-start injection control.

DTC 43 is set when there is no starter signal to ECM. Check for open or short in starter signal circuit, an open or short in ignition switch or starter relay circuit or a faulty ECM.
DTC 43 Starter Signal Circuit

CIRCUIT DESCRIPTION

When the engine is cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good startability. While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. The starter signal is mainly used to increase the fuel injection volume for the starting injection control and after-start injection control.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Diagnostic Trouble Code Detecting Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>No starter signal to ECM.</td>
<td>* Open or short in starter signal circuit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Open or short in ignition switch or starter relay circuit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* ECM</td>
</tr>
</tbody>
</table>

DIAGNOSTIC CHART

HINT: This diagnostic chart is based on the premise that engine cranks normally. If engine cannot be cranked, see TROUBLESHOOTING - NO CODES article.

1. Check for the test mode.
   - OK: See TROUBLESHOOTING - NO CODES article.
   - NG: Repair or replace harness or connector.

2. Check for open in harness and connector between ECM and starter relay.
   - OK: Check and replace ECM.
   - NG: Repair or replace harness or connector.

WIRING DIAGRAM

![Wiring Diagram](image-url)
DTC 51 - SWITCH CONDITION SIGNAL

ECM uses Park/Neutral (P/N) position switch signal to determine whether transmission is in Park or Neutral, or in some other gear. ECM uses the output from A/C switch to determine whether or not A/C is operating, so that it can increase idle speed if necessary. ECM detects idle condition through "IDL" terminal of throttle position sensor.
DTC 51 is set when throttle position switch is off 3 seconds or more after engine starts. P/N position switch is off with shift position in either Reverse, Drive or Low (A/T). A/C switch on. Check throttle position sensor "IDL" circuit, accelerator pedal and cable adjustment, P/N position switch circuit, A/C switch circuit or for faulty ECM.

**Fig. 51: DTC 51 - Schematic**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
Check resistance of throttle position sensor.

- (1) Disconnect throttle position sensor connector.
- (2) Disconnect the vacuum hose from the throttle body, then apply vacuum to the throttle opener.
- Measure resistance between terminals 2 (IDL) and 1 (E2) of throttle position sensor connector.

<table>
<thead>
<tr>
<th>Throttle Valve</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully closed</td>
<td>Less than 2.3 kΩ</td>
</tr>
<tr>
<td>Opened</td>
<td>1 MΩ or higher</td>
</tr>
</tbody>
</table>

OK  Adjust or replace throttle position sensor.

Check and repair harness or connector between engine control module and throttle position sensor.

Disconnect A/C amplifier connector, check voltage between terminal AC2 of A/C amplifier connector and body ground.

- (1) Remove glove compartment
- (2) Disconnect A/C amplifier connector.
- (3) Turn ignition switch on.
- Measure voltage between terminal AC2 of A/C amplifier connector and body ground.

OK  Voltage: 9 – 14 V

OK  Check and replace A/C amplifier.

Check for open and short in harness and connector between engine control module and A/C amplifier

OK

NG  Repair or replace harness or connector.

Check and replace engine control module.
DTC 52 - KNOCK SENSOR SIGNAL

DTC 52 is set when ECM detects an open or short in the knock sensor circuit with engine speed of 1200-6000 RPM. Check for open or short in knock sensor circuit, a loose or faulty knock sensor or faulty ECM.
DIAGNOSTIC CHART

1. Check no continuity of knock sensor circuit.
   - OK
   - NG
   - Replace knock sensor.

2. Check knock sensor.
   - OK
   - NG
   - Replace knock sensor.

3. Check for open and short in harness and connector between knock sensor and ECM.
   - OK
   - NG
   - Repair or replace harness or connector.

4. Does malfunction disappear when a good knock sensor is installed?
   - YES
   - Replace knock sensor.
   - NO
   - Check and replace ECM.

WIRING DIAGRAM

[Diagram showing wiring connections between Knock Sensor and Engine Control Module]

94A44818
INSPECTION PROCEDURE

1. Check continuity between terminal KNK of engine control module connector and body ground.

**OFF**

1. Turn up the floor mat on the passenger side.
2. Disconnect the engine control module connector.

**C**

Measure resistance between terminal KNK of engine control module connector and body ground.

**OK**

Resistance: 1 MΩ or higher

Go to step 3.

NG

94E44820
**Fig. 55: DTC 52 - Detection Driving Pattern**
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Malfunction: Open or Short in Knock Sensor

![Diagram of detection driving pattern](Diagram)

1. Start engine and warm up.
2. After engine is warmed up, let it idle for 3 min.
3. With the A/C ON, perform quick racing (5,000 rpm) 3 times. (Rapidly depress the accelerator pedal and suddenly release it.)

HINT: If a malfunction exists, the malfunction indicator lamp will light up when sudden racing is performed.

NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

94J44817

**Fig. 56: DTC 52 - Inspection Using Oscilloscope**
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
### Fig. 57: DTC 52 - Diagnostic Flowchart (1 Of 2)

**Check knock sensor.**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Check knock sensor.</td>
</tr>
<tr>
<td></td>
<td>P Disconnect knock sensor connector.</td>
</tr>
<tr>
<td></td>
<td>C Measure resistance between the knock sensor terminal and body.</td>
</tr>
<tr>
<td></td>
<td>OK Resistance: 1 MΩ or higher</td>
</tr>
<tr>
<td>OK</td>
<td>Replace knock sensor</td>
</tr>
<tr>
<td>NG</td>
<td>Replace knock sensor</td>
</tr>
</tbody>
</table>

**Check for open and short in harness and connector between engine control module and knock sensor**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Check for open and short in harness and connector between engine control module and knock sensor</td>
</tr>
<tr>
<td>OK</td>
<td>Repair or replace harness or connector.</td>
</tr>
<tr>
<td>NG</td>
<td>Repair or replace harness or connector.</td>
</tr>
</tbody>
</table>

**Does malfunction disappear when a good knock sensor is installed?**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Does malfunction disappear when a good knock sensor is installed?</td>
</tr>
<tr>
<td>NO</td>
<td>Replace knock sensor</td>
</tr>
<tr>
<td>YES</td>
<td>Replace knock sensor</td>
</tr>
</tbody>
</table>

Check and replace engine control module.

---

**Fig. 57: DTC 52 - Diagnostic Flowchart (1 Of 2)**

**Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.**
DTC 71 - EGR SYSTEM MALFUNCTION

DTC 71 is set when EGR temperature is 140°F (60°C) or less for 50 seconds under the following conditions:

- Engine coolant temperature at 140°F (80°C) or greater.
- EGR operation possible. Except A/T in 3rd gear or M/T in 5th gear, cruising at 55-60 MPH on a flat road.

Check for open in EGR temperature sensor circuit, a shorted EGR VSV circuit, a plugged EGR passage or a faulty ECM.
DIAGNOSTIC CHART

1. Check voltage of VSV for EGR power source.
   - OK
     - NG
       - Replace VSV for EGR.

2. Check resistance of VSV for EGR.
   - OK
     - NG
       - Replace VSV for EGR.

3. Check for open and short in harness and connector between EFI main relay and ECM.
   - OK
     - NG
       - Repair or replace harness or connector.

   Check and replace ECM.

4. Check EGR system
   - OK
   - NG
     - Repair EGR system.

5. Check resistance of EGR gas temp. sensor.
   - OK
   - NG
     - Replace EGR gas temp. sensor.

6. Check for open in harness and connector between EGR gas temp. sensor and ECM.
   - OK
     - NG
       - Repair or replace harness or connector.

Check and replace ECM.

WIRING DIAGRAM

94D44829

**Fig. 59: DTC 71 - Schematic**
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**Malfunction:** Open in EGR gas temp. sensor circuit

(Vehicle speed)

55 – 60 mph  
(88 – 96 km/h)

Detection

1. Disconnect the EFI fuse (15 A) for 10 sec. or more, with IG switch OFF.  
   Initiate test mode (Connect terminals TE2 and E1 of data link commector 1 with IG switch OFF).
2. Start the engine and warm up.
3. After the engine is warmed up, let it idle for 3 min.
4. With the A/C ON and transmission in 5th gear (A/T in “D” position), drive at 55 ~ 60 mph (88 ~ 96 km/h) for 4 min. or less.

**HINT:** If a malfunction exists, the malfunction indicator lamp will light up during step 4.

**NOTICE:** If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

---

**Fig. 60: DTC 71 - Detection Driving Pattern**
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.
INSPECTION PROCEDURE

1. Check voltage between terminal EGR of engine control module connector and body ground.

   **for M/T**
   
   **P** (1) Turn up the floor mat on the passenger side.
   (2) Warm up engine to normal operating temperature.

   **C** Measure voltage between terminal EGR of engine control module connector and body ground.

   **OK** Voltage: 9 – 14 V

   **NG** Go to step 4.

2. Check resistance between terminals of VSV for EGR.

   **P** Remove VSV for EGR.

   **C** Measure resistance between terminals of VSV for EGR.

   **OK** Resistance: 37 – 44 Ω at 20°C (68°F)

   **NG** Replace VSV for EGR.

94H44831
Fig. 61: DTC 71 - Diagnostic Flowchart (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Check for open and short in harness and connector between EFI main relay and VSV for EGR, VSV and engine control module

   OK
   NG  Repair or replace harness or connector.

Check and replace engine control module.

4. Check EGR system

   OK
   NG  Repair EGR system.

5. Check resistance of EGR gas temp. sensor.

   P  Remove EGR gas temp. sensor.
   C  Measure resistance between terminals of EGR gas temp. sensor connector.
   OK  Resistance: 64 – 97 kΩ at 50°C (122°F)
        11 – 16 kΩ at 100°C (212°F)
        2 – 4 kΩ at 150°C (302°F)

   OK
   NG  Replace EGR gas temp. sensor.

6. Check for open in harness and connector between EGR gas temp. sensor and engine control module

   OK
   NG  Repair or replace harness or connector.

Check and replace engine control module.
SUMMARY

If no hard trouble codes are present, driveability symptoms exist or intermittent trouble codes exist, proceed to steps in TESTS W/O CODES article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.) or intermittent procedures.

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