DESCRIPTION

The Toyota Computer Control System (TCCS) is a computerized emission, ignition and fuel control system. The TCCS controls Electronic Fuel Injection (EFI), engine operation and lowers exhaust emissions while maintaining good fuel economy and driveability.

The Electronic Control Unit (ECU) controls the TCCS. The ECU contains data used for maintaining ignition timing under all operating conditions. Input from various sensors allows the ECU to deliver spark at precise timing. The ECU controls engine related systems to adjust engine operation.

The TCCS is primarily an emission control system, designed to maintain proper air/fuel ratio at all operating conditions.

OPERATION

The TCCS consists of the following subsystems: Electronic Fuel Injection (EFI) system, data sensors, Electronic Control Unit (ECU), Electronic Spark Advance (ESA) system, Idle Speed Control (ISC) system, EGR Control, Electronic Controlled Transmission (ECT), diagnostic system and catalytic converter.

ELECTRONIC FUEL INJECTION (EFI)

All models are equipped with a Bosch AFC fuel injection system. An electric fuel pump provides fuel to the fuel pressure regulator. Pressure regulator maintains constant fuel pressure to the injectors.

The ECU controls the injection duration in accordance with engine conditions to provide efficient engine operation. For more information, see BOSCH AFC FUEL INJECTION article in the FUEL SYSTEMS section.

DATA SENSORS

NOTE: The following data sensors are not necessarily used on every model. Note engine application. See TOYOTA ENGINE CODE IDENTIFICATION chart and appropriate computer control system schematic. See Figs. 6 through 8.

A/C Switch
Switch sends a signal to the ECU during A/C operation. ECU uses this signal for controlling idle speed during A/C operation.

Airflow Sensor
Airflow sensor, mounted within the airflow meter, measures airflow rate through the airflow meter. Signal is sent to ECU for controlling fuel injection duration and spark advance system.

Air Temperature Sensor
Sensor is mounted in the airflow meter. Sensor measures incoming air temperature. Signal is sent to ECU for controlling fuel injection duration.
Cold Start Injector Time Switch
Switch determines coolant temperature and sends signal to ECU on some models for cold start injector control.

Coolant Temperature Sensor
Coolant temperature sensor sends signal to ECU in relation to coolant temperature. ECU uses sensor signal for controlling fuel injection duration, spark advance system, idle speed control system and EGR system.

Coolant Temperature Switch
Switch monitors coolant temperature and sends signal to ECU.

EGR Gas Temperature Sensor
Sensor determines EGR gas temperature and sends signal to ECU.

Engine Speed
Engine speed signal information is received from the ignition coil. The ECU uses these signals for fuel injection duration control and spark advance system operation.

Knock Sensor
Sensor monitors ignition knock conditions and sends signal to ECU.

Neutral/Start Switch
Switch is installed on A/T models to inform ECU of gear selection. Information is used by the ECU to allow starter operation and control engine idle.

Oxygen (O2) Sensor
Oxygen sensor is installed in the exhaust system and monitors oxygen content of exhaust gases. Signal is sent to the ECU and is used for determining fuel injection duration.

Sub-Oxygen Sensor (Calif. Only)
Sensor is used in conjunction with O2 sensor. Sensor monitors oxygen content of exhaust gases and sends signal to the ECU.

Throttle Position Sensor (TPS)
Throttle Position Sensor (TPS) is mounted on throttle body. Sensor determines changes in throttle valve positions and send signals to the ECU. Signals are used for controlling fuel injection duration and idle speed control system.

Turbo Pressure Sensor
Sensor monitors turbo pressure and sends signal to ECU.

Vehicle Speed Sensor (VSS)
Sensor is used to monitor vehicle speed. Vehicle speed information is used by the ECU for cruise control and electronic control of automatic transmission.

4WD Switch
Switch indicates 4WD operation and sends signal to ECU.

<table>
<thead>
<tr>
<th>TOYOTA ENGINE CODE IDENTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application</strong></td>
</tr>
<tr>
<td>4-Cylinder Engine</td>
</tr>
</tbody>
</table>
ELECTRONIC CONTROL UNIT (ECU)

The ECU controls all functions of the TCCS. The ECU receives signals from the data sensors and switches. Signals are processed by the ECU for controlling the Electronic Fuel Injection (EFI), Electronic Spark Advance (ESA), Idle Speed Control (ISC), Electronic Controlled Transmission (ECT) and EGR systems.

The ECU contains a fail-safe function used in case of a data sensor or switch failure. This function provides a back-up system to provide minimal driveability. The "CHECK ENGINE" light will also be activated during this function.

DIAGNOSTIC SYSTEM

The ECU is equipped with a self-diagnostic system which detects system failures or abnormalities. When malfunction occurs, the "CHECK ENGINE" light on instrument panel is activated. On models with Super Monitor Display, trouble code may be obtained from the screen on the instrument panel.

By analyzing various signals, the ECU detects system malfunctions related to various operating parameter sensors. The ECU stores trouble codes associated with the detected failure until the diagnostic system is cleared. The "CHECK ENGINE" light will go out when trouble codes are cleared.

COMPONENT LOCATIONS

Fig. 1: Non-Turbo 3S-FE TCCS Component Locations
Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 2: Non-Turbo 3S-GE TCCS Component Locations
Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 3: Non-Turbo TCCS Component Locations
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Fig. 4: 4WD Turbo (1 of 2) TCCS Component Locations
Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 5: 4WD Turbo (2 of 2) TCCS Component Locations
Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 6: 3S-FE 2WD Computer Control System
Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 7: 3S-GE Computer Control System
Courtesy of Toyota Motor Sales, U.S.A., Inc.
DIAGNOSIS & TESTING INFORMATION

DIAGNOSIS

1) Ensure all engine systems NOT related to TCCS are fully operational. Do not proceed with testing until all other problems have been repaired. Ensure fuses, fusible links and wire connectors are in good condition before diagnosing ECU.

2) Enter diagnostic mode and record trouble codes. Exit diagnostic mode. If no trouble codes were displayed, proceed to appropriate DIAGNOSTIC CIRCUIT CHECK charts. Follow instructions given there.

3) If no trouble codes were displayed after performing diagnostic circuit check, perform voltage and resistance checks. See appropriate ECU PIN VOLTAGE TEST chart in this article.

4) If trouble codes are displayed, perform tests to confirm cause of malfunction which set the corresponding trouble code. After any repairs are made, clear trouble codes and perform diagnostic circuit check. Normal system operation code should be displayed if repair solved cause of malfunction.
CHECK ENGINE LIGHT

Turn ignition on. The "CHECK ENGINE" light will activate with ignition on and engine not running. Start engine and note that light is not activated. If light remains activated, a system malfunction or abnormality exists.

RETRIEVING TROUBLE CODES

1) Ensure battery voltage is greater than 11 volts and throttle valve is fully closed. Place transmission or transaxle in Neutral and turn off all accessory switches.
2) To enter diagnostic mode, turn ignition on. DO NOT start engine. Install jumper wire between terminals of engine check connector. See Fig. 9.

3) Count number of flashes from "CHECK ENGINE" light. If system is operating properly (with no codes), "CHECK ENGINE" light will blink continuously and evenly.
4) On all models, a code will be identified by a .5 second flash on and off for the first number. A 1.5 second pause will occur followed by the second number. See Fig. 10.
5) If more than one code is stored, a 2.5 second pause will

![Connect Jumper Wire Between These Terminals](image1)

![Engine Check Connector with Jumper Wire](image2)

Fig. 9: Installing Engine Check Connector Jumper Wire
Courtesy of Toyota Motor Sales, U.S.A., Inc.
occur prior to the flashing of the second code. Once all codes have been displayed, a 4.5 second pause will occur and code(s) will repeat.

7) On all models, trouble codes are given from smallest value in order to largest value. After code(s) are retrieved, remove jumper wire to exit diagnostic mode.

8) Compare trouble code to that listed to locate probable cause. See appropriate TROUBLE CODE IDENTIFICATION and TROUBLE CODES & PROBABLE CAUSE tables.

CAUTION: Ensure trouble codes are cleared after performing repair. Road test and recheck that trouble code does not exist.

Clearing Trouble Codes
1) After repairs are performed, clear ECU memory of all stored trouble codes. To clear memory, turn ignition off and remove EPI 15 Amp fuse from fuse block for 30 seconds or more.

2) Fuse may require to be removed longer depending on the ambient temperature. Replace fuse and exit diagnostic mode. Trouble codes can also be cleared by disconnecting vehicle battery. However, other memory functions (clock, etc.), will need to be reset.

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Fig. 10: Example of Trouble Codes
Courtesy of Toyota Motor Sales, U.S.A., Inc.

SYSTEM TESTING
1) If trouble codes exist and diagnostic circuit check has been performed, compare code with appropriate code chart for circuits and components associated with trouble code(s). Trouble code flow charts are arranged in alphabetical order by each model. A test No. has been assigned each chart. The test No. and trouble code are in numerical order for each model. All ECU pin identifications are at end of TROUBLE CODES & PROBABLE CAUSE charts.

2) If no code is present, circuit checking is necessary. Each model has an ECU PIN VOLTAGE TEST table after DIAGNOSTIC CIRCUIT CHECK flow chart. DIAGNOSTIC CIRCUIT CHECK flow chart is the first flow chart on each model. Using ECU PIN VOLTAGE TEST table, check appropriate circuits using the test No. in the right column of the appropriate table.

3) Component testing will also be necessary. All component testing available from manufacturer and pertaining to CEC, follow the CEC flow charts. For components not covered, see appropriate article in FUEL or DISTRIBUTORS & IGNITION SYSTEMS.

**TROUBLE CODE I.D.**

**TROUBLE CODE IDENTIFICATION**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Circuit Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Code</td>
<td>System Normal</td>
</tr>
<tr>
<td>11</td>
<td>ECU (B+)</td>
</tr>
<tr>
<td>12 &amp; 13</td>
<td>RPM Signal</td>
</tr>
<tr>
<td>14</td>
<td>Ignition Signal</td>
</tr>
<tr>
<td>21</td>
<td>Oxygen Sensor Signal</td>
</tr>
<tr>
<td>22</td>
<td>Coolant Temp. Sensor Signal</td>
</tr>
<tr>
<td>23</td>
<td>Intake Air Temp. Sensor Signal</td>
</tr>
<tr>
<td>24</td>
<td>Intake Air Temp. Sensor Signal</td>
</tr>
<tr>
<td>25 (1)</td>
<td>Lean Air/Fuel Mixture</td>
</tr>
<tr>
<td>26 (1)</td>
<td>Rich Air/Fuel Mixture</td>
</tr>
<tr>
<td>31</td>
<td>Airflow Meter Signal</td>
</tr>
<tr>
<td>32</td>
<td>Airflow Meter Signal</td>
</tr>
<tr>
<td>34 (2)</td>
<td>Turbocharger Pressure</td>
</tr>
<tr>
<td>35 (3)</td>
<td>Turbocharger Pressure</td>
</tr>
<tr>
<td>41</td>
<td>Throttle Position Sensor Signal</td>
</tr>
<tr>
<td>42</td>
<td>Vehicle Speed Sensor Signal</td>
</tr>
<tr>
<td>43</td>
<td>Starter Signal</td>
</tr>
<tr>
<td>51</td>
<td>Switch Signal</td>
</tr>
<tr>
<td>52 (4)</td>
<td>Knock Sensor Signal</td>
</tr>
<tr>
<td>53 (4)</td>
<td>Knock Sensor Control (ECU)</td>
</tr>
<tr>
<td>54 (3)</td>
<td>Intercooler Control (ECU)</td>
</tr>
<tr>
<td>71 (5)</td>
<td>EGR System Malfunction</td>
</tr>
</tbody>
</table>

(1) - Only applicable to 3S-GE and 4WD models.
(2) - Only applicable to 4WD models.
(3) - Only applicable to 4WD models.
(4) - Only applicable to 4WD models.
(5) - Only applicable to 3S-GE and Calif. applications of 4WD models.

**TROUBLE CODES & PROBABLE CAUSE**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Probable Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Main Relay and/or Circuit, Ignition Switch and/or Circuit, ECU</td>
</tr>
</tbody>
</table>
12  ........  Distributor and/or Circuit, Starter Signal, ECU
13  .........................  Distributor and/or Circuit, ECU
14  ......................  Ignition Coil, Ignitor and/or Circuit, ECU
21  ......................  O2 Sensor and/or O2 Heater Signal
and/or Circuit, ECU
22  .....................  Coolant Temp. Sensor and/or Circuit, ECU
24  ..................  Intake Air Temp. Sensor or Circuit, ECU
25 (1)  ........  Injector and/or Circuit, O2 Sensor and/or,
Circuit, Fuel Line Pressure, Airflow Meter,
Coolant Temp. Sensor, Ignition System, ECU
26 (1)  ......  Injector and/or Circuit, Fuel Line Pressure,
Cold Start Injector, Airflow Meter,
Coolant Temp. Sensor, ECU
31  ..............  Airflow Meter and/or Circuit, ECU
34 (2)  ..............  Turbo, Turbo Pressure Sensor
and/or Circuit, ECU
35 (2)  .............  Turbo Pressure Sensor and/or Circuit,
Airflow Meter, ECU, Intercooler
41  ..............  Throttle Position Sensor and/or Circuit, ECU
42  .................  Speed Sensor and/or Circuit, ECU
43  .....................  Ignition Switch and/or Circuit, ECU
51  .....................  Throttle Position Sensor and/or Circuit
A/C Switch Circuit, A/C Amplifier, ECU
Neutral/Start Switch and/or Circuit,
Accelerator Pedal and/or Cable
52 (3)  ..................  Knock Sensor or Circuit, ECU
53 (3)  ............................  ECU
54 (4)  ...............  Intercooler, Coolant Level Sensor
and/or Circuit, Intercooler Water Pump
and/or Circuit, Intercooler ECU, ECU
71 (5)  ...........  EGR System, EGR Gas Temp. Sensor and/or
Circuit, BVSV for EGR and/or Circuit, ECU

(1) - 4WD & 3S-GE California models only.
(2) - On 4WD models.
(3) - On 4WD models.
(4) - On 4WD models.
(5) - 4WD California models only.

ECU CONNECTOR I.D.

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Fig. 11: 3S-FE ECU Connector Pin Identification

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Fig. 12: 3S-GE ECU Connector Pin Identification
CELICA ALL TRAC 4WD (3S-GTE)

Fig. 13: All TRAC 4WD, 3S-GTE ECU Connector Pin Identification

DIAGNOSTIC CHARTS

DIAGNOSTIC CIRCUIT CHECK

Fig. 14: Diagnostic Circuit Check, Schematic
Fig. 15: Diagnostic Circuit Check, Flow Chart

ECU PIN VOLTAGE TEST
<table>
<thead>
<tr>
<th>Terminals</th>
<th>STD voltage (V)</th>
<th>Condition</th>
<th>TEST NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>+B E1</td>
<td>10 – 14</td>
<td>Ignition S/W ON</td>
<td>1</td>
</tr>
<tr>
<td>+B1 E1</td>
<td>10 – 14</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>BATT E1</td>
<td>10 – 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDL E1</td>
<td>8 – 14</td>
<td>Ignition S/W ON</td>
<td>8</td>
</tr>
<tr>
<td>PSW E1</td>
<td>4 – 5</td>
<td>Throttle valve fully closed</td>
<td></td>
</tr>
<tr>
<td>IGT E1</td>
<td>0.7 – 1.0</td>
<td>Idling</td>
<td>2</td>
</tr>
<tr>
<td>STA E1</td>
<td>6 – 14</td>
<td>Cranking</td>
<td>9</td>
</tr>
<tr>
<td>No. 10 E01 E02</td>
<td>9 – 14</td>
<td>Ignition S/W ON</td>
<td>12</td>
</tr>
<tr>
<td>W E1</td>
<td>8 – 14</td>
<td>No trouble (check engine warning light off) and engine running</td>
<td>13</td>
</tr>
<tr>
<td>VC E2</td>
<td>4 – 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VS E2</td>
<td>4 – 5</td>
<td>Ignition S/W ON</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>0.02 – 0.5</td>
<td>Measuring plate fully closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 – 4</td>
<td>Idling</td>
<td></td>
</tr>
<tr>
<td>THA E2</td>
<td>1 – 3</td>
<td>Ignition S/W ON</td>
<td>5</td>
</tr>
<tr>
<td>THW E2</td>
<td>0.1 – 1.0</td>
<td>Intake air temperature 20°C (68°F)</td>
<td></td>
</tr>
<tr>
<td>ISC1 ISC2 E1</td>
<td>9 – 14</td>
<td>Ignition S/W ON</td>
<td>14</td>
</tr>
<tr>
<td>A/C E1</td>
<td>8 – 14</td>
<td>Ignition S/W ON</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air conditioning ON</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 16: ECU Pin Voltage Test (2WD)
<table>
<thead>
<tr>
<th>Terminals</th>
<th>STD voltage (V)</th>
<th>Condition</th>
<th>TEST NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>+B +B1 - E1</td>
<td>10 – 14</td>
<td>Ignition S/W ON</td>
<td>1</td>
</tr>
<tr>
<td>BATT – E1</td>
<td>10 – 14</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>IDL – E2</td>
<td>4 – 6</td>
<td>Throttle valve open</td>
<td></td>
</tr>
<tr>
<td>VTA – E2</td>
<td>0.1 – 1.0</td>
<td>Ignition S/W ON</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>3 – 4.5</td>
<td>Throttle valve fully closed</td>
<td></td>
</tr>
<tr>
<td>VC – E2</td>
<td>4 – 6</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>IGT – E1</td>
<td>0.7 – 1.0</td>
<td>Cranking or idling</td>
<td>2</td>
</tr>
<tr>
<td>STA – E1</td>
<td>6 – 14</td>
<td>Cranking</td>
<td>9</td>
</tr>
<tr>
<td>No. 1 No. 2 E01 No. 3 E02 No. 4</td>
<td>10 – 14</td>
<td>Ignition S/W ON</td>
<td>12</td>
</tr>
<tr>
<td>W – E1</td>
<td>8 – 14</td>
<td>No trouble (Check engine warning light off) and engine running</td>
<td>13</td>
</tr>
<tr>
<td>VC – E2</td>
<td>4 – 6</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>VS – E2</td>
<td>4 – 6</td>
<td>Ignition S/W ON</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>1.0 or less</td>
<td>Measuring plate fully closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 – 4</td>
<td>Measuring plate fully open</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Idling</td>
<td></td>
</tr>
<tr>
<td>THA – E2</td>
<td>1 – 3</td>
<td>Ignition S/W ON</td>
<td>5</td>
</tr>
<tr>
<td>THW – E2</td>
<td>0.1 – 1.0</td>
<td>Intake air temp. 20°C (68°F)</td>
<td></td>
</tr>
<tr>
<td>ISC1 ISC2 – E1</td>
<td>9 – 14</td>
<td>Coolant temp. 80°C (176°F)</td>
<td>4</td>
</tr>
<tr>
<td>PIM – E2</td>
<td>2.5 – 4.5</td>
<td>Ignition S/W ON</td>
<td>7</td>
</tr>
<tr>
<td>VC – E2</td>
<td>4 – 6</td>
<td>Ignition S/W ON</td>
<td>14</td>
</tr>
<tr>
<td>A/C – E1</td>
<td>8 – 14</td>
<td>Air conditioning ON</td>
<td>15</td>
</tr>
</tbody>
</table>

Fig. 17: ECU Pin Voltage Test (4WD)

NO. 1 TEST, CODE 11 ECU (+B) CIRCUIT
<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>+B</td>
<td>No Voltage</td>
<td>Ignition S/W ON</td>
<td>10 – 14 V</td>
</tr>
<tr>
<td>+B1 - E1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 18: No. 1 Test Schematic, Code 11 ECU (+B) Circuit
No voltage between ECU terminals +B or +B1 and E1. (IG S/W ON)

Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)

NO  OK

Check wiring between ECU terminal E1 and body ground.

OK  BAD

Try another ECU.  Repair or replace.

Check fuse, fusible link and ignition switch.

BAD  OK

Repair or replace.  Replace.

Check EFI main relay.

BAD  OK

Replace.  Repair or replace.
Fig. 20: No. 2 Test, Code 12, 13, 14, RPM & Ign. Sig. (2WD W/3S-FE) Schematic

Fig. 21: No. 2 Test, Code 12, 13, 14, RPM & Ign. Sig. (2WD (3S-GE)) & 4WD) Schematic
No voltage between ECU terminals IGT and E1. (Cranking or Idling)

Check that there is voltage between ECU terminal IGT and body ground. (Idling)

NO → OK

Check wiring between ECU terminal E1 and body ground. BAD → Repair or replace.

OK → Try another ECU.

Check fuse, fusible link and ignition switch. BAD → Repair or replace.

OK → Check distributor. BAD → Repair or replace.

OK → Check wiring between ECU and battery. BAD → Repair or replace.

OK → Check igniter. BAD → Repair or replace.

Fig. 22: No. 2 Test, Code 12, 13, 14, RPM & Ign. Sig. Flow Chart

NO. 3 TEST, CODE 21, 25, 26, O2 SENSOR SIGNAL
Fig. 23: No. 3 Test, Code 21, 25, 26 Schematic, O2 Sensor Signal
There is no voltage between ECU terminals VF and E1.

Check that there is voltage between ECU terminal VF and body ground.

NO OK

Check wiring between ECU terminal E1 and body ground.

OK

Check spark plugs.

BAD

Repair or replace.

BAD

Repair air leak.

BAD

Repair or replace.

BAD

Repair or replace.

BAD

Repair or replace.

BAD

Repair or replace.

BAD

Repair or replace.

BAD

Repair or replace.

BAD

Repair or replace.

BAD

Repair or replace.

BAD

Repairing wiring.

BAD

*Rich malfunction only

Fig. 24: No. 3 Test, Code 21, 25, 26 Flow Chart, O2 Sensor Signal
Fig. 25: No. 3 Test, Code 21, 25, 26, O2 Sensor Operation Check

NO. 4 TEST, CODE 22, COOLANT TEMP. SENSOR SIGNAL

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>THW – E2</td>
<td>No voltage</td>
<td>IG S/W ON, Coolant temperature 80°C (176°F)</td>
<td>0.1 – 1.0 V</td>
</tr>
</tbody>
</table>

50B02306

Fig. 26: No. 4 Test, Code 22 Schematic, Coolant Temp. Sensor Signal
No voltage between ECU terminals THW and E2. (IG S/W ON)

Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)

OK

NO

Refer to No. 1. TEST

Check wiring between ECU terminal E1 and body ground.

OK

BAD

Check water temp. sensor.

BAD

Replace water temp. sensor.

OK

Try another ECU.

Check wiring between ECU and water temp. sensor.

BAD

Repair or replace.

Repair or replace.

Fig. 27: No. 4 Test, Code 22 Flow Chart, Coolant Temp. Sensor Signal

NO. 5 TEST, CODE 24, INTAKE AIR TEMP. SENSOR SIGNAL
<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>THA - E2</td>
<td>No voltage</td>
<td>IG S/W ON</td>
<td>1 - 3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intake air temperature 20°C (68°F)</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram of Air Temp. Sensor (Air Flow Meter)](image)

**50H02309**

Fig. 28: No. 5 Test, Code 24 Schematic, Intake Air Temp. Sens. Signal

- No voltage between ECU terminals THA and E2.
  - (IG S/W ON)

- Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)
  - OK: Refer to No. 1. TEST
  - NO: Check wiring between ECU terminal E1 and body ground.
    - OK: Check air temp. sensor.
      - BAD: Replace air flow meter.
      - OK: Check wiring between ECU and air temp. sensor.
        - BAD: Repair or replace.
        - OK: Try another ECU.
          - BAD: Repair or replace.

**50H02310**

Fig. 29: No. 5 Test, Code 24 Flow Chart, Intake Air Temp. Sens. Sig.

**CODE 25, 26, AIR/FUEL, LEAN OR RICH**

**NOTE:** Use No. 3 test in this article.
NO. 6 TEST, CODE 31, 32, AIRFLOW METER SIGNAL

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC - E2</td>
<td>No voltage</td>
<td>IG S/W ON</td>
<td>4 – 6 V</td>
</tr>
<tr>
<td>VS - E2</td>
<td></td>
<td>Measuring plate fully closed</td>
<td>4 – 5 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measuring plate fully open</td>
<td>0.02 – 0.5 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Idling</td>
<td>2 – 4 V</td>
</tr>
</tbody>
</table>

Fig. 30: No. 6 Test, Code 31, 32 Schematic, Airflow Meter Signal

50102338

No specified voltage at ECU terminals VC or VS and E2. (IG S/W ON)

Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)

OK → NO

Refer to No. 1. TEST

Check wiring between ECU terminal E1 or E2 and body ground.

OK → BAD

Check air flow meter.

Repair or replace.

BAD → OK

Replace air flow meter.

Check wiring between ECU and air flow meter.

OK ↔ BAD

Repair or replace.

NO. 7 TEST, CODE 34, 35, TURBO PRESSURE SIGNAL
<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIM – E2</td>
<td>No voltage</td>
<td>IG S/W ON</td>
<td>2.5 – 4.5 V</td>
</tr>
<tr>
<td>VC – E2</td>
<td></td>
<td></td>
<td>4 – 6 V</td>
</tr>
</tbody>
</table>

Fig. 32: No. 7 Test, Code 34, 35 Schematic, Turbo Pressure Signal
No voltage at ECU terminals PIM or VC and E2. (IG S/W ON)

Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)

NO  OK

Check wiring between ECU terminal E1 and body ground.

BAD

Repair or replace.

Check turbocharging pressure sensor.

BAD

Repair or replace.

OK

Check wiring between ECU and vacuum sensor.

BAD

Repair or replace.

OK

Try another ECU.
**Fig. 34: 2WD (W/3S-FE) No. 8 Test, Code 41 Schematic, TPS Sens. Sig.**

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDL – E1</td>
<td>No voltage</td>
<td>Throttle valve open</td>
<td>8 – 14 V</td>
</tr>
<tr>
<td>PSW – E1</td>
<td>IG S/W ON</td>
<td>Throttle valve fully closed</td>
<td>4 – 5 V</td>
</tr>
</tbody>
</table>

50F02313
No voltage between ECU terminals IDL or PSW and E1. (IG S/W ON)

Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)

NO

Check wiring between ECU terminal E1 and body ground.

OK

Refer to No. 1 TEST

BAD

Repair or replace.

OK

Check throttle position sensor.

BAD

Replace or repair throttle position sensor.

BAD

Check wiring between ECU and throttle position sensor.

OK

Try another ECU.

Fig. 35: 2WD (N/3S-FE) No. 8 Test, Code 41 Flow Chart, TPS Sens. Sig.
Fig. 36: 2WD (W/3S-FE) No. 8 Test, Code 41, TPS Sensor Signal Check

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDL - E2</td>
<td></td>
<td>Throttle valve open</td>
<td><strong>1</strong> 4 – 6 V or <strong>2</strong> 8 – 14 V</td>
</tr>
<tr>
<td>VTA - E2</td>
<td>No voltage</td>
<td>Throttle valve fully closed</td>
<td>0.1 – 1.0 V</td>
</tr>
<tr>
<td>VC - E2</td>
<td></td>
<td>Throttle valve fully open</td>
<td>4 – 5 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 – 6 V</td>
</tr>
</tbody>
</table>

Fig. 37: 2WD (W/3S-GE) & 4WD, No. 8 Test, Code 41 Schematic, TPS Sensor Signal
Fig. 38: 2WD (W/3S-GE) & 4WD, TPS Sens. Connector
No voltage between ECU terminals IDL and E2. (IG S/W ON) (Throttle valve open)

Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)

NO  OK

Check wiring between ECU terminal E1 and body ground.

BAD  Repair or replace.

Refer to No. 1. TEST

BAD  Repair or replace.

OK

Check throttle position sensor.

BAD  Repair or replace throttle position sensor.

OK  Check wiring between ECU and throttle position sensor.

OK  Try another ECU.

50E02317

Fig. 39: 2WD (W/3S-GE) & 4WD, Flow Chart (1 of 3) No. 8 Test, Code 41 TPS Sensor Signal
VTA – E2

No specified voltage at ECU terminals VTA and E2.
(IG S/W ON)

Check that there is voltage between ECU terminal +B or +B1 and body ground.
(IG S/W ON)

NO       OK

Check wiring between ECU terminal E2 and body ground.

BAD

Repair or replace.

Refer to No. 1. TEST

BAD

Repair or replace.

OK

Check throttle position sensor.

BAD

Repair or replace.

OK

Check wiring between ECU and throttle position sensor.

BAD

Repair or replace.

OK

Try another ECU.

50G02318

Fig. 40: 2WD (W/3S-GE) & 4WD, Flow Chart (2 of 3) No. 8 Test, Code 41
TPS Sensor Signal
CODE 42, VEHICLE SPEED SENSOR

NOTE: See component test in this article.

NO. 9 TEST, CODE 43, STARTER SIGNAL
Fig. 42: No. 9 Test, Code 43 Schematic, Starter Signal
No voltage between ECU terminals STA and E1. (IG S/W START)

Check starter operation. OK → Check wiring between ECU terminal STA and ignition switch terminal ST1.

BAD → OK → BAD

Repair or replace.

Check wiring between ECU terminal E1 and body ground.

OK → BAD

Try another ECU. Repair or replace.

Check fusible link, battery, wiring, ignition switch clutch start switch, starter relay and neutral start switch.

BAD → Repair or replace.

OK

Check that there is voltage at STA (50) terminal of starter. (IG S/W START) STD voltage: 6 – 12 V

OK

Check starter.

NO → Check wiring between ignition switch terminal ST1 and starter terminal STA (50).

50C02321

Fig. 43: No. 9 Test, Code 43 Flow Chart, Starter Signal

CODE 51

No "IDL", "NSW" or "A/C" Signal to ECU,
With Check Connector Terminals "E1" & "T" Shorted

NOTE: No further information available from manufacturer.

CODE 52, 53, KNOCK SENSOR SIGNAL

Open or Short in Knock Sensor Signal (KNK)
or Knock Control in ECU Faulty

NOTE: No further information available from manufacturer.

CODE 54, INTERCOOLER ECU SIGNAL

Due to Low Coolant Level for Intercooler
and/or Defective Intercooler Water Pump Motor

NOTE: No further information available from manufacturer.

NO. 10 TEST, CODE 71, EGR SYSTEM SIGNAL

Fig. 44: No. 10 Test, Code 71 Schematic, EGR System Signal
No voltage between ECU terminals THG and E2. (IG S/W ON)

Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)

OK

NO

Refer to No. 1. TEST

Check wiring between ECU terminal E1 and body ground.

OK

BAD

Repair or replace.

Check EGR system.

BAD

Repair or replace.

OK

Check EGR gas temp. sensor.

BAD

Replace EGR gas temp. sensor.

OK

Check wiring between ECU and EGR gas temp. sensor.

OK

Try another ECU.

BAD

Repair or replace.

50G02323

Fig. 45: No. 10 Test, Code 71 Flow Chart, EGR System Signal

NO. 11 TEST, ECU POWER SOURCE
Fig. 46: No. 11 Test Schematic, ECU Power Source
Fig. 47: No. 11 Test Flow Chart, ECU Power Source

NO. 12 TEST, INJECTOR CIRCUIT TEST
Fig. 48: 2WD (W/3S-FE) No. 12 Test Schematic, Injector Circuit Test
No voltage between ECU terminals No. 10 and/or No. 20 and E01 and/or E02. (IG S/W ON)

Check that there is voltage between ECU terminal No. 10 and/or No. 20 and body ground.

NO  OK

Check wiring between ECU terminal E01 and/or E02 and body ground.

OK  BAD

Try another ECU.  Repair or replace.

Check fuse, fusible link and ignition switch.

BAD  Repair or replace.

OK

Check resistance of each injector.
STD resistance: Approx. 13.8 Ω

OK  BAD

Replace injector.  Repair or replace.

Check wiring between ECU terminal No. 10 and/or No. 20 and battery.

BAD  Repair or replace.

50F02327
<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td></td>
<td>No voltage</td>
<td></td>
</tr>
<tr>
<td>No. 2</td>
<td>E01</td>
<td>IG S/W ON</td>
<td>10 – 14 V</td>
</tr>
<tr>
<td>No. 3</td>
<td>E02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 50: 2WD (W/3S-GE) & 4WD, No. 12 Test Schematic, Inj. Ckt. Test
No voltage between ECU terminals No. 1, No. 2, No. 3 and/or No. 4 and E01 and/or E02. (IG S/W ON)

Check that there is specified voltage between solenoid resistor terminal +B and body ground. STD voltage: 10 – 14 V

OK → NO

Check fusible link, wiring and ignition switch. BAD → Repair or replace.

Check that there is specified voltage between resistor terminals (No. 10, No. 20, No. 30 or No. 40) and body ground. STD voltage: 10 – 14V

OK → NO

Check resistance of each injector. STD resistance: 2 – 4 Ω

OK → BAD

Replace injector.

Check wiring between ECU and resistor. BAD → Repair or replace wiring.

OK → Try another ECU.
Fig. 52: 2WD (W/3S-GE) & 4WD, No. 12 Test, Voltage Between Resistor Terminals Check

Fig. 53: No. 13 Test Schematic, "CHECK ENGINE" Light Circuit

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>W – E1</td>
<td>No voltage</td>
<td>No trouble (check engine warning light off) and engine running</td>
<td>8 – 14 V</td>
</tr>
</tbody>
</table>

50B02330

Fig. 53: No. 13 Test Schematic, "CHECK ENGINE" Light Circuit
No voltage between ECU terminals W and E1. (Idling)

Check that there is voltage between ECU terminal W and body ground.

NO  OK

Check wiring between ECU terminal E1 and body ground.

OK

Try another ECU.

BAD  Repair or replace.

Check GAUGE fuse (15A) and check engine warning light.

OK  BAD

Repair or replace.

Fuse blows again

Check wiring between ECU terminal W and fuse.

BAD

Repair or replace.

Fig. 54: No. 13 Test Flow Chart, "CHECK ENGINE" Light Circuit

NO. 14 TEST, ISC VALVE CIRCUIT TEST
Fig. 55: Exc. 2WD (W/3S-GE), No. 14 Test Schematic, ISC Valve Circuit Test

There is no voltage between ECU terminals ISC1 or ISC2 and E1. (IG S/W ON)

Check that there is voltage between ECU terminal +B or +B1 and body ground. (IG S/W ON)

OK

NO

Refer to No. 1 TEST

Check resistance between ISC valve terminals +B and ISC1 or ISC2, STD resistance: Approx. 18Ω

BAD

Replace ISC valve.

OK

Check wiring between ECU and ISC valve.

BAD

Repair or replace wiring.

OK

Try another ECU.

Fig. 56: Exc. 2WD (W/3S-GE), No. 14 Test Flow Chart, ISC Valve Ckt. Test

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISC1, ISC2 – E1</td>
<td>No voltage</td>
<td>IG S/W ON</td>
<td>9 – 14 V</td>
</tr>
</tbody>
</table>
NO. 15 TEST, A/C SWITCH CIRCUIT

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/C -- E1</td>
<td>No voltage</td>
<td>Air conditioning ON</td>
<td>8 — 14 V</td>
</tr>
</tbody>
</table>

Fig. 57: Exc. 2WD (W/3S-GE), No. 14 Test, ISC Valve Resistance Check

Fig. 58: No. 15 Test Schematic, A/C Switch Circuit
No voltage between ECU terminals A/C and E1.
(Air conditioning ON)

Check that there is voltage between ECU terminal A/C and body ground.

NO  OK

Check wiring between ECU terminal E1 and body ground.

OK  BAD

Try another ECU.  Repair or replace.

Check compressor running.

BAD

Check wiring between ECU terminal A/C and amplifier.

BAD  OK

Repair or replace.

Check that there is voltage between amplifier terminal and body ground.

BAD  OK

Check wiring between amplifier and ECU or compressor.

BAD  BAD

Repair or replace.
AIRFLOW METER

Turn ignition off. Disconnect wiring connector from airflow meter. Note terminal identification. See Fig. 60. Using an ohmmeter, measure resistance between specified terminals. Replace airflow meter if not within specification. See AIRFLOW METER RESISTANCE SPECIFICATIONS table.

---

**AIRFLOW METER RESISTANCE SPECIFICATIONS TABLE**

<table>
<thead>
<tr>
<th>Application</th>
<th>Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Models</td>
<td></td>
</tr>
<tr>
<td>E2-THA</td>
<td></td>
</tr>
<tr>
<td>-4°F (20°C)</td>
<td>10,000-20,000</td>
</tr>
<tr>
<td>32°F (0°C)</td>
<td>4000-7000</td>
</tr>
<tr>
<td>68°F (20°C)</td>
<td>2000-3000</td>
</tr>
<tr>
<td>104°F (40°C)</td>
<td>900-1300</td>
</tr>
<tr>
<td>140°F (60°C)</td>
<td>400-700</td>
</tr>
<tr>
<td>E2-Vc</td>
<td>200-400</td>
</tr>
<tr>
<td>E1-Fc</td>
<td></td>
</tr>
<tr>
<td>Measuring Plate Fully Closed</td>
<td>Infinity</td>
</tr>
<tr>
<td>Measuring Plate Other Than Closed</td>
<td>0</td>
</tr>
<tr>
<td>E2-Vs</td>
<td></td>
</tr>
<tr>
<td>Measuring Plate Fully Closed</td>
<td>200-600</td>
</tr>
</tbody>
</table>

---

Fig. 60: Airflow Meter Terminal Identification
Courtesy of Toyota Motor Sales, U.S.A., Inc.
IDLE SPEED CONTROL (ISC) VALVE

2WD 3S-FE
1) Warm engine to normal operating temperature. Ensure idle speed is correct. Apply parking brake and place transaxle in Neutral. Install jumper wire between terminals "T" and "E1" of check connector located near left shock tower. See Fig. 61.
2) Note that engine RPM is maintained at 600-800 RPM on Celica models.
3) If engine RPM was not within specification, disconnect ISC valve connector. Using ohmmeter, measure resistance between terminals "B +" and "ISC1" AND "ISC2". See Fig. 62. Replace valve if resistance is not within 16-17 ohms.

4WD
1) Warm engine to normal operating temperature. Ensure idle...
speed is correct. Disconnect ISC valve connector. Engine speed should be above 1000 RPM.

2) Reconnect ISC valve. Engine should return to idle speed of 700-800 RPM. If engine RPM was not within specification, disconnect ISC valve connector. Using ohmmeter, measure resistance between terminals "B +" and "ISC1" AND "ISC2". See Fig. 62. Replace valve if resistance is not within 16-17 ohms.

THROTTLE POSITION SENSOR (TPS)

Turn ignition off and disconnect electrical connector at TPS. Note terminal identification. See Fig. 63. Insert specified thickness feeler gauge between throttle stop screw and throttle ever. See TPS RESISTANCE SPECIFICATIONS table. Using an ohmmeter, check for resistance or continuity. Replace or adjust TPS if not within specification. See TPS SPECIFICATIONS table.
### TPS RESISTANCE SPECIFICATIONS TABLE

<table>
<thead>
<tr>
<th>Application</th>
<th>Clearance In. (mm)</th>
<th>Terminal</th>
<th>Ohmmeter Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3S-GE</td>
<td>0 (0)</td>
<td>VTA &amp; E2</td>
<td>200-800</td>
</tr>
<tr>
<td></td>
<td>.020 (.51)</td>
<td>IDL &amp; E2</td>
<td>2300 or Less</td>
</tr>
<tr>
<td></td>
<td>.028 (.71)</td>
<td>IDL &amp; E2</td>
<td>Infinity</td>
</tr>
<tr>
<td></td>
<td>Fully Open</td>
<td>VTA &amp; E2</td>
<td>3300-10,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VC &amp; E2</td>
<td>3000-7000</td>
</tr>
<tr>
<td>3S-GTE</td>
<td>0 (0)</td>
<td>VTA &amp; E2</td>
<td>200-800</td>
</tr>
<tr>
<td></td>
<td>.020 (.51)</td>
<td>IDL &amp; E2</td>
<td>2300 or Less</td>
</tr>
<tr>
<td></td>
<td>.028 (.71)</td>
<td>IDL &amp; E2</td>
<td>Infinity</td>
</tr>
<tr>
<td></td>
<td>Fully Open</td>
<td>VTA &amp; E2</td>
<td>3300-10,300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VC &amp; E2</td>
<td>3000-8300</td>
</tr>
<tr>
<td>3S-FE</td>
<td>.020 (.51)</td>
<td>IDL &amp; E1</td>
<td>Continuity</td>
</tr>
<tr>
<td></td>
<td>.020 (.51)</td>
<td>PSW &amp; E1</td>
<td>No Continuity</td>
</tr>
<tr>
<td></td>
<td>.035 (.89)</td>
<td>IDL &amp; E1</td>
<td>No Continuity</td>
</tr>
<tr>
<td></td>
<td>.035 (.89)</td>
<td>PSW &amp; E1</td>
<td>No Continuity</td>
</tr>
<tr>
<td></td>
<td>Fully Open</td>
<td>IDL &amp; E1</td>
<td>No Continuity</td>
</tr>
<tr>
<td></td>
<td>PSW &amp; E1</td>
<td>Continuity</td>
<td></td>
</tr>
</tbody>
</table>
COLD START INJECTOR TIME SWITCH

Disconnect switch connector. Note terminal identification. See Fig. 65. Using ohmmeter, check resistance between terminals "STA" & "STJ" at appropriate temperature. See COLD START INJECTOR TIME SWITCH SPECIFICATIONS table. Check resistance between terminal "STA" and ground. Replace switch if not within specification.

COLD START INJECTOR TIME SWITCH SPECIFICATIONS TABLE

<table>
<thead>
<tr>
<th>Application</th>
<th>Ohms</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica 3S-GE &amp; 3S-GTE</td>
<td>30-50</td>
<td>Below 50°F (10°C)</td>
</tr>
<tr>
<td></td>
<td>70-90</td>
<td>Above 77°F (25°C)</td>
</tr>
<tr>
<td></td>
<td>30-90</td>
<td>To Ground</td>
</tr>
<tr>
<td>Celica 3S-FE</td>
<td>20-40</td>
<td>Below 86°F (30°C)</td>
</tr>
<tr>
<td></td>
<td>40-60</td>
<td>Above 104°F (40°C)</td>
</tr>
<tr>
<td></td>
<td>20-80</td>
<td>To Ground</td>
</tr>
</tbody>
</table>

Fig. 65: Checking Cold Start Injector Time Switch
Courtesy of Toyota Motor Sales, U.S.A., Inc.

COOLANT TEMPERATURE SENSOR

Remove connector from sensor. Using ohmmeter, check
resistance between sensor terminals. Replace sensor if resistance is not within specification at specified temperature. See Fig. 66.

Fig. 66: Coolant Temperature Sensor Specifications
Courtesy of Toyota Motor Sales, U.S.A., Inc.
Place threaded end of sensor and thermometer in container of oil. Attach ohmmeter to sensor terminals. Heat the oil and note the resistance at specified temperature. See EGR TEMPERATURE SENSOR SPECIFICATIONS table. Replace sensor if not within specification.

**EGR TEMPERATURE SENSOR SPECIFICATIONS TABLE**

<table>
<thead>
<tr>
<th>Temperature °F (°C)</th>
<th>Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>122 (50)</td>
<td>69-89</td>
</tr>
<tr>
<td>212 (100)</td>
<td>12-14</td>
</tr>
<tr>
<td>302 (150)</td>
<td>3-4</td>
</tr>
</tbody>
</table>

**OXYGEN (O2) SENSOR HEATER**

Disconnect sensor connector. Using ohmmeter, measure resistance between sensor terminals. Replace sensor if resistance is not within 5-6 ohms at 68°F (20°C).

**KNOCK SENSOR**

Information not available at time of publication.

**OXYGEN SENSOR**

---

**Fig. 67: Measuring Oxygen Sensor Resistance**

Courtesy of Toyota Motor Sales, U.S.A., Inc.

Feedback Voltage Test
1) Warm engine to normal operating temperature. Connect an
analog type voltmeter to appropriate EFI check connector terminal. See Fig. 68. Install jumper wire between appropriate check engine connector terminals. See CHECK ENGINE CONNECTOR TERMINALS table.

CHECK ENGINE CONNECTOR TERMINALS TABLE

<table>
<thead>
<tr>
<th>Application</th>
<th>Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td>T &amp; E1</td>
</tr>
</tbody>
</table>

Fig. 68: Attaching Voltmeter To EFI Check Connector Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

2) Maintain engine speed at 2500 RPM and check the number of times voltmeter needle fluctuates in 10 seconds. See VOLTMASTER NEEDLE FLUCTUATION table. If needle does not fluctuate at all, go to step 4). If needle fluctuations are less than amount specified, go to step 3). If needle fluctuations are as specified or more, oxygen sensor is okay.

VOLTMASTER NEEDLE FLUCTUATION TABLE

<table>
<thead>
<tr>
<th>Application</th>
<th>Normal Fluctuations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td>8 Times</td>
</tr>
</tbody>
</table>
3) If needle fluctuations are less than amount specified, remove jumper wire at check engine connector, but keep voltmeter connected to EFI check connector terminals. Maintain engine speed at 2500 RPM (ensuring oxygen sensor is thoroughly warmed), and measure voltage at EFI check connector terminals. If voltage reading is 0 (zero), go to step 4). If voltage is more than 0 (zero) volts, replace main oxygen sensor and repeat step 1).

4) Read and record diagnostic codes. See RETRIEVING TROUBLE CODES in DIAGNOSIS & TESTING in this article. Repair any codes that are nonrelated. If codes are relevant or are normal, remove jumper wire previously installed at check engine connector, but keep voltmeter connected to EFI check connector terminals.

5) Maintain engine speed at 2500 RPM and measure voltage again. If voltage is 5 volts or more, go to next step. If voltage does not exist, disconnect PCV hose and measure voltage again. If voltage reading remains at 0 (zero), replace oxygen sensor and repeat step 1). If voltage is more than 0 (zero) volts, repair for an over rich condition.

6) Unplug coolant temperature sensor connector. Connect a 4-8 ohm resistor across connector terminals. If resistor is not available, replace with new coolant temperature sensor. Repeat step 1) and measure voltage at terminals. If voltage is not present, replace the main oxygen sensor and repeat step 1). If needle fluctuations are less than specified after replacing the oxygen sensor, replace ECU.

TURBOCHARGING PRESSURE SENSOR

Power Source
Turn ignition on. Disconnect turbocharging pressure sensor connector and measure voltage between terminals "VC" and "E2" of harness connector. See Fig. 69. Voltage should be 4-6 volts.

![Turbocharging Pressure Sensor Diagram](image)

Turn ignition on. Disconnect turbocharging pressure sensor vacuum hose from intake manifold. Connect voltmeter to terminals "PIM" and "E2" (pressure sensor) of ECU connector and measure output voltage under ambient atmospheric pressure.

2) Attach a vacuum pump to turbocharging pressure sensor
Vacuum hose and apply vacuum in specified stages. See Fig. 70. Measure and record voltage readings for each stage of applied vacuum. See VACUUM/VOLTAGE SPECIFICATIONS table. Replace sensor if readings are not within specifications.

### VACUUM/VOLTAGE SPECIFICATIONS TABLE

<table>
<thead>
<tr>
<th>Applied Vacuum</th>
<th>Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>In. Hg</td>
<td></td>
</tr>
<tr>
<td>3.94</td>
<td>.15-.35</td>
</tr>
<tr>
<td>7.87</td>
<td>.4-.35</td>
</tr>
<tr>
<td>11.81</td>
<td>.65-.85</td>
</tr>
<tr>
<td>15.75</td>
<td>.9-1.1</td>
</tr>
<tr>
<td>19.69</td>
<td>1.15-11.35</td>
</tr>
</tbody>
</table>

### TURBOCHARGING PRESSURE VACUUM SWITCHING VALVE (VSV)

1) Using an ohmmeter, check continuity between both terminals of turbocharging pressure VSV connector. See Fig. 71. Replace VSV if no continuity exists.
2) Check that no continuity exists between VSV case (body) and each terminal. If continuity exists, replace VSV.
3) Check that air does not flow from pipe "E" to pipe "F". If air flows through from pipe "E" to pipe "F", replace VSV.
VEHICLE SPEED SENSOR

Speed Sensor (Analog Type)
Remove combination meter from instrument cluster. Connect
ohmmeter between proper terminals. See Fig. 72. See NO. 1 SPEED SENSOR
TEST TERMINALS (ANALOG TYPE). Rotate meter shaft and note reading.
Ohmmeter should deflect from 0 (zero) to infinity ohms as shaft is
rotated.

NO. 1 SPEED SENSOR TEST TERMINALS TABLE (ANALOG TYPE)

<table>
<thead>
<tr>
<th>Application</th>
<th>Test Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celica</td>
<td>SPD (+) &amp; SPD (-)</td>
</tr>
</tbody>
</table>

CELICA

Fig. 72: No. 1 Speed Sensor Terminal I.D. (Analog Type)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

FUEL-CUT RPM
1) Connect a tachometer to engine (to monitor needle fluctuations). Start engine and warm to operating temperature. Disconnect throttle position sensor connector from throttle position sensor. Short terminals IDL and E1 (or E2) on wire side of connector. See Fig. 73.
2) Gradually raise engine RPM. Fuel-cut operation can be checked by noting the fluctuation of tachometer needle. Fluctuation indicates fuel-cut system is being turned on and off. See Fig. 74. Check that fuel-cut points and fuel return points are within specifications. See FUEL-CUT & FUEL RETURN RPM table.

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**Fig. 73: Terminal Connectors For Testing Fuel-Cut RPM**
Courtesy of Toyota Motor Sales, U.S.A., Inc.

**Fig. 74: Needle Fluctuations When Testing Fuel-Cut RPM**
Courtesy of Toyota Motor Sales, U.S.A., Inc.

**FUEL-CUT & FUEL RETURN RPM TABLE**
NEUTRAL/START SWITCH

Disconnect switch connector. Note terminal identification. See Fig. 75. Using ohmmeter, check for continuity at specified terminals with gearshift in proper range. See NEUTRAL/START SWITCH SPECIFICATIONS table.

NEUTRAL/START SWITCH SPECIFICATIONS TABLE

<table>
<thead>
<tr>
<th>Gearshift Position</th>
<th>Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;N&quot;</td>
<td>N &amp; C</td>
</tr>
<tr>
<td>&quot;2&quot;</td>
<td>2 &amp; C</td>
</tr>
<tr>
<td>&quot;L&quot;</td>
<td>L &amp; C</td>
</tr>
</tbody>
</table>

Fig. 75: Neutral/Start Switch Terminal I.D. Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 77: 3S-GE Engine Wiring Diagram
Fig. 78: 3S-GTE Engine Wiring Diagram