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EFI SYSTEM  
PRECAUTION

1. Before working on the fuel system, disconnect the negative (−) terminal cable from the battery.
   HINT: Any diagnostic trouble code retained by the computer will be erased when the negative (−) terminal cable is removed from the battery.
   Therefore, if necessary, read the diagnosis before removing the negative (−) terminal cable from the battery.

2. Do not smoke or work near an open flame when working on the fuel system.

3. Keep gasoline away from rubber or leather parts.

---

Maintenance Precautions

1. PRECAUTION WHEN CONNECTING GAUGE
   (a) Use battery as the power source for the timing light, tachometer, etc.
   (b) Connect the tester probe of a tachometer to the terminal IGΩ of the check connector.

2. IN EVENT OF ENGINE MISFIRE, FOLLOWING PRECAUTIONS SHOULD BE TAKEN
   (a) Check proper connection of battery terminal cables, etc.
   (b) Handle high-tension cords carefully.
   (c) After repair work, check that the ignition coil terminals and all other ignition system lines are reconnected securely.
   (d) When cleaning the engine compartment, be especially careful to protect the electrical system from water.

3. PRECAUTIONS WHEN HANDLING OXYGEN SENSOR
   (a) Do not allow oxygen sensor to drop or hit against an object.
   (b) Do not allow the sensor to come into contact with water.

Air Induction System

1. Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run out of tune.
2. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run out of tune.

**Electronic Control System**

1. Before removing EFI wiring connectors, terminals, etc., first disconnect the power by either turning the ignition switch OFF or disconnecting the negative (−) terminal cable from the battery. **HINT:** Always check the diagnostic code before disconnecting the negative (−) terminal cable from the battery.

2. When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (−) cables.

3. Do not permit parts to receive a severe impact during removal or installation. Handle all EFI parts carefully, especially the ECU.

4. Do not be careless during troubleshooting as there are numerous transistor circuits and even slight terminal contact can further troubles.

5. Do not open the ECU cover.

6. When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the EFI parts and wiring connectors.

7. Parts should be replaced as an assembly.

8. Care is required when pulling out and inserting wiring connectors.
   (a) Release the lock and pull out the connector, pulling on the connectors.
   (b) Fully insert the connector and check that it is locked.

9. When inspecting a connector with a volt/ohmmeter
   (a) Carefully take out the water-proofing rubber if it is a water-proof type connector.
   (b) Insert the test probe into the connector from the wire side when checking the continuity, amperage or voltage.
   (c) Do not apply unnecessary force to the terminal.
   (d) After checking, install the water-proofing rubber on the connector securely.
10. Use SST for inspection or test of the injector or its wiring connector.
   SST 09842-30070

Fuel System
1. When disconnecting the high pressure fuel line, a large amount of gasoline will spill out, so observe the following procedures:
   (a) Put a container under the connection.
   (b) Slowly loosen the connection.
   (c) Disconnect the connection.
   (d) Plug the connection with a rubber plug.

2. When connecting the flare nut or union bolt on the high pressure pipe union, observe the following procedures:
   Union Bolt Type:
   (a) Always use a new gasket.
   (b) Tighten the union bolt by hand.
   (c) Tighten the union bolt to the specified torque.
   Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)

Flare Nut Type:
   (a) Apply a light coat of engine oil to the flare and tighten the flare nut by hand.
   (b) Using SST, tighten the flare nut to the specified torque.
   SST 09631-22020
   Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)
   HINT: Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

3. Observe the following precautions when removing and installing the injectors.
   (a) Never reuse the O-ring.
   (b) When placing a new O-ring on the injector, take care not to damage it in any way.
   (c) Coat a new O-ring with spindle oil or gasoline before installing—never use engine, gear or brake oil.
4. Install the injector to delivery pipe and intake manifold as shown in the illustration.

5. Check that there are no fuel leaks after performing maintenance anywhere on the fuel system.
   (a) Using SST, connect terminals +B and FP of the check connector.
       SST 09843–18020
   (b) Turn the ignition switch ON.
       NOTICE: Do not start the engine.
   (c) Pinch the fuel return hose. The pressure in the high pressure line will rise to approx. 392 kPa (4 kgf/cm², 57 psi). In this state, check to see that there are no leaks from any part of the fuel system.
       NOTICE: Always pinch the hose. Avoid bending as it may cause the hose to crack.
   (d) Turn the ignition switch OFF.
   (e) Remove the SST from the check connector.
       SST 09843–18020
DIAGNOSIS SYSTEM

CHECK ENGINE WARNING LIGHT CHECK

1. The check engine warning light will come on when the ignition switch is at ON and the engine is not running.
2. When the engine is started, the check engine warning light should go off. If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

DIAGNOSTIC CODES OUTPUT

Normal mode:

To obtain an output of diagnostic codes, proceed as follows:

1. Initial conditions
   (a) Battery voltage 11 V or more
   (b) Throttle valve fully closed
   (c) Accessories switched OFF
   (d) Engine at normal operating temperature
2. Turn the ignition switch ON.
   CAUTION: Do not start the engine.
3. Using SST, connect terminals TE1 and E1 of the check connector.
   SST 09843-18020
4. Read the diagnostic code as indicated by the number of flashes of the check engine warning light.

Diagnostic Codes

(a) Normal System Operation (no malfunction)
   • The light will alternately blink ON and OFF at 0.26 second intervals.

(b) Malfunction Code Indication
   • In the event of a malfunction, the light will blink every 0.52 seconds. The 1st number of blinks will equal the 1st digit of a 2 digit diagnostic code, and after a 1.5 second pause, the 2nd number of blinks will equal
the second digit. If there are 2 or more codes, there will be a 2.5 second pause between each code.

- After all the codes have been output, there will be a 4.5 second pause and they will all be repeated along the terminals TE1 and E1 of the check connector are connected.

HINT: In the event of a number of trouble codes, indications will begin from the smaller value and continue to the larger.

(c) 2 trip detection logic:
Diagnostic code 21 use "2 trip detection logic". With this logic, when a malfunction is first detected, the malfunction is temporarily stored in the ECU memory. If the same case is detected again during the second drive test, this second detection causes the warning light to light up.
The 2 trip repeats the same mode a 2nd time. (However, the ignition switch must be turned OFF between the 1st time and 2nd time.) In the Test Mode, the check engine warning light lights up the 1st time a malfunction is detected.

5. After the diagnosis check, remove the SST from the check connector.
SST 09843-18020

Test mode:
HINT:
- Compared to the normal mode, the test mode has an increased sensing ability to detect malfunctions.
- It can also detect malfunctions in the starter signal circuit, air conditioning signal.
- Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the test mode.

To obtain an output of diagnostic codes, proceed as follows:

1. Initial conditions
   (a) Battery voltage 11 V or more
   (b) Throttle valve fully closed
   (c) Accessories switched OFF

2. Turn the ignition switch OFF.
3. First, using SST, connect terminals TE2 and E1 of the check connector.
   SST 09843–18020

4. Turn the ignition switch ON to begin the diagnosis in the test mode.

5. Start the engine and drive the vehicle at a speed of 10 km/h (6 mph) or higher.

6. Simulate the conditions of the malfunction described by the customer.

7. Using SST, connect terminals TE1 and E1 of the check connector.
   SST 09843–18020

8. Read the diagnostic code as indicated by the number of flashes of the check engine warning light.

9. After the diagnosis check, remove the SST from the check connector.
   SST 09843–18020

HINT:
- The test mode will not start if terminals TE2 and E1 are connected after the ignition switch is turned ON.
- The starter signal and vehicle speed signal will be diagnosed by the ECU as malfunctions, and code Nos. 42, and 43 will be output, if the operation in step 5 is not done.
- When the air conditioning is on or when the accelerator pedal is depressed, code "51" (Switch condition signal) is output, but this is not abnormal.

**DIAGNOSTIC CODE CHECK USING HAND–HELD TESTER**

1. Hook up the hand–held tester to the check connector.
2. Read the diagnostic codes by following the prompts on the tester screen.
   Please refer to the hand–held tester operator's manual for further details.
DIAGNOSTIC CODE CANCELLATION

1. After repair of the trouble area, the diagnostic code retained in memory by the ECU must be cancelled out by removing the EFI fuse (15A) for 10 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch OFF.

HINT:
- Cancellation can also be done by removing the negative (−) terminal cable from the battery, but in this case, other memory systems (clock, etc.) will also be cancelled out.
- If the diagnostic code is not cancelled out, it will be retained by the ECU and appear along with a new code in the event of future trouble.
- If it is necessary to work on engine components requiring removal of the battery terminal, a check must first be made to see if a diagnostic code has been recorded.

2. After cancellation, road test the vehicle to check that a normal code is now read on the check engine warning light.

If the same diagnostic code appears, it indicates that the trouble area has not been repaired thoroughly.

DIAGNOSIS INDICATION

1. When 2 or more codes are indicated, the lowest numbered code (code) will appear first.

2. All detected diagnostic codes, except code Nos. 42, 43, and 51 under the test mode will be retained in memory by the ECU from the time of detection until cancelled out.

3. Once malfunction is cleared, the check engine warning light in the combination meter will go off but the diagnostic code(s) remains stored in ECU memory.

ECU DATA MONITOR USING HANDHELD TESTER

1. Hook up the hand-held tester to the check connector.

2. Monitor the ECU data by following the prompts on the tester screen.

HINT: Hand-held tester has a "Snapshot" function which records the monitored data.

Please refer to the hand-held tester operator’s manual for further details.
**ECU TERMINAL VALUES MEASUREMENT USING BREAK-OUT-BOX AND HAND-HELD TESTER**

1. Hook up the break-out-box and hand-held tester to the vehicle.
2. Read the ECU input/output values by following the prompts on the tester screen.

**HINT:** Hand-held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.

Please refer to the hand-held tester/break-out-box operator’s manual for further details.

---

**GNOSTIC CODES**

A malfunction is detected during the diagnostic code check, refer to the circuit indicated in the table, and turn to the corresponding page.

Our readings may vary from the parameters listed in the table, depending on the instruments used.

<table>
<thead>
<tr>
<th>Number of Blinks of Check Engine Warning Light</th>
<th>System</th>
<th>Check Engine Warning Light Normal Mode</th>
<th>Test Mode</th>
<th>Diagnosis</th>
<th>Trouble Area</th>
<th>Memory</th>
<th>See Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1401</td>
<td>Normal</td>
<td>N.A.</td>
<td>ON</td>
<td>Output when no other code is recorded.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1600</td>
<td>RPM Signal</td>
<td>ON</td>
<td>N.A.</td>
<td>* No G or NE signal is not input to ECU for 2 sec. or more after cranking.</td>
<td>* Open or short in G, NE circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1607</td>
<td>RPM Signal</td>
<td>ON</td>
<td>ON</td>
<td>No NE signal to ECU for 50 m sec. or more at 1,000 rpm or more.</td>
<td>* Open or short in NE circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1605</td>
<td>Ignition Signal</td>
<td>ON</td>
<td>N.A.</td>
<td>No IGF signal to ECU for 4 consecutive IGT signals during engine running.</td>
<td>* Open or short in IGF or IGT circuit from igniter to ECU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1609</td>
<td>Oxygen Sensor Signal</td>
<td>OFF</td>
<td>ON</td>
<td>Open or short in heater circuit of oxygen sensor for 0.5 sec. or more. (HT)</td>
<td>* Open or short in heater circuit of oxygen sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1809</td>
<td>Water Temp. Sensor Signal</td>
<td>ON</td>
<td>OFF</td>
<td>At normal driving speed (below 100 km/h (60 mph) and engine speed is above 1,500 rpm), amplitude of oxygen sensor signal (OX) is reduced to between 0.35 – 0.70 V continuously for 60 sec. or more. (2 trip detection logic)</td>
<td>* Open or short in oxygen sensor circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1610</td>
<td>Intake Air Temp. Sensor Signal</td>
<td>ON</td>
<td>ON</td>
<td>Open or short in water temp. sensor circuit for 0.5 sec. or more. (THW)</td>
<td>* Open or short in water temp. sensor circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1611</td>
<td>Intake Air Temp. Sensor Signal</td>
<td>OFF</td>
<td>ON</td>
<td>Open or short in intake air temp. sensor circuit for 0.5 sec. or more. (THA)</td>
<td>* Open or short in intake air temp. sensor circuit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Diagnostic Codes (Cont'd)

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Number of blinks of Check Engine Warning Light</th>
<th>System</th>
<th>Check Engine Warning Light</th>
<th>Diagnosis</th>
<th>Trouble Area</th>
<th>Memory</th>
<th>See Page</th>
</tr>
</thead>
</table>
| 25      |                                               | Air-Fuel Ratio Lean Malfunction | OFF     | ON | Oxygen sensor output in less than 0.45 V for at least 90 sec. when oxygen sensor is warmed up (racing at 1,500 rpm or more). \(^{42}\) (2 trip detection logic) | • Open in injector circuit  
• Fuel line pressure (injector leak, blockage)  
• Ignition system (spark plug, igniter)  
• Vacuum sensor (air intake)  
• Open or short in oxygen sensor circuit  
• Oxygen sensor  
• ECU | O | R-22  
R-29  
R-68 |
| 31      |                                               | Vacuum Sensor Signal | ON     | ON | Open or short in vacuum sensor signal for 0.5 sec. or more. \(^{42}\) (PIM) | • Open or short in vacuum sensor circuit  
• Vacuum sensor  
• ECU | O | R-21  
R-66 |
| 33      |                                               | Idle Speed Control Valve System | ON     | ON | Open or short in idle speed control valve circuit. | • Open or short in idle speed control valve circuit  
• ISC Valve | O | R-27 |
| 41      |                                               | Throttle Position Sensor Signal | OFF    | ON | Open or short in throttle position sensor circuit for 0.5 sec. or more. \(^{141}\) (VT)| • Open or short in throttle position sensor circuit  
• Throttle position sensor  
• ECU | O | R-19 |
| 42      |                                               | Vehicle Speed Sensor Signal | ON     | OFF | No vehicle speed sensor signal to ECU for at least 8 sec. during heavy load driving with engine speed between 2,000 rpm and 5,000 rpm. | • Open or short in vehicle speed sensor circuit  
• Vehicle speed sensor  
• ECU | O | - |
| 43      |                                               | Starter Signal | N.A.  | OFF | No starter signal to ECU when cranking with Test mode. \(^{140}\) (STA) | • Open or short in starter signal circuit  
• Open or short in ignition switch or starter relay circuit  
• ECU | X | R-25 |
| 52      |                                               | No.1 Knock Sensor Signal (front side) | ON     | N.A. | No No.1 knock sensor signal to ECU for crank revolutions with engine speed between 2,000 rpm and 6,000 rpm. \(^{141}\) (KNK1) | • Open or short in knock sensor circuit  
• Knock sensor (looseness)  
• ECU | O | R-67 |
| 53      |                                               | Knock Control Signal | ON     | N.A. | ECU (for knock sensor control) malfunction at engine speed between 700 rpm and 6,000 rpm. | • ECU | X | - |
| 51      |                                               | Switch Condition Signal | OFF    | N.A. | Displayed when A/C is on with check terminals TE1 and E1 connected in test mode. | • A/C switch system  
• Accelerator pedal, cable  
• ECU | X | - |

**Remarks:**

1. "ON" displayed in the diagnosis mode column indicates that the check engine warning light is lighted up when a malfunction is detected. "OFF" indicates that the check engine warning light does not light up during malfunction diagnosis, even if a malfunction is detected.
2. "O" in the memory column indicates that a diagnostic code is recorded in the ECU memory when a malfunction occurs. "X" indicates that a diagnostic code is not recorded in the ECU memory even if a malfunction occurs. Accordingly, output of diagnostic results is performed with the ignition switch ON.
3. "2 trip detection logic." (See step 4 (c) in trouble codes output (normal mode))
INJECTOR TROUBLE CODE DETECTION DRIVING PATTERN

Use of the driving pattern
To simulate diagnostic code detecting condition after diagnostic code is recorded.
To check that the malfunction is corrected when the repair is completed confirming that diagnostic code is no longer detected.

<table>
<thead>
<tr>
<th>Code No.</th>
<th>21</th>
<th>Oxygen Sensor Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction:</td>
<td>Deterioration of Oxygen Sensor</td>
<td></td>
</tr>
</tbody>
</table>

(Vehicle speed)
80 km/h (50 mph)
64 km/h (40 mph)

Detection

Idling
IG s/w OFF

3 min.

5 1 - 2 min.

(Time)

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

2. Start the engine and warm it up with all accessories switched OFF.

3. Let the engine idle for 3 min.

4. Accelerate gradually with in the range 1,300 ~ 1,700 rpm (Centered around 1,500 rpm) with the A/C switch ON and 5th gear.
   (Take care that the engine speed does not fall below 1,200 rpm when shifting.
   Gradually depress the accelerator pedal and keep it steady so that engine braking does not occur).

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

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.
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont’d)

Purpose of the driving pattern
(a) To simulate diagnostic code detecting condition after diagnostic code is recorded.
(b) To check that the malfunction is corrected when the repair is completed confirming that diagnostic code is no longer detected.

<table>
<thead>
<tr>
<th>Code No.</th>
<th>25</th>
<th>Air-Fuel Ratio Lean Malfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction:</td>
<td>Open or Short in Oxygen Sensor</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram showing driving pattern with Engine rpm, Idling, IG SW OFF, 3 min., 90 sec., Time]

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

1. Disconnect the EFI fuse (15 A) for 10 sec. or more, with IG switched OFF. Initiate test mode (Connect terminals TE2 and E1 of check connector with IG switch OFF).
2. Start engine and warm it up with all accessories switched OFF.
3. Let the engine idle for 3 min..
4. Accelerate rapidly to 4,000 rpm three times.
5. Maintain at 2,000 rpm for 90 seconds.

**HINT:** If any malfunction is detected, the check engine warning light 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.
**DIAGNOSIS CIRCUIT INSPECTION**

- **Does check engine warning light come on when ignition switch is at ON?**
  - **YES** System normal.
  - **NO**
    - **Does check engine warning light come on when engine ECU terminal W is grounded to the body?**
      - **YES** Check wiring between engine ECU terminal E1 and body ground.
        - **OK** Try another engine ECU.
        - **BAD** Repair or replace.
      - **NO** Check bulb, fuse and wiring between engine ECU and ignition switch.
        - **BAD** Repair or replace.
  - **B**

- **Does check engine warning light go off when the engine is started?**
  - **YES** System normal.
  - **NO**
    - **Check wiring between engine ECU and check engine warning light.**
      - **BAD** Repair.
      - **OK**
        - **Is there diagnostic code output when check connector terminals TE1 and E1 connected?**
          - **YES**
              - **Does check engine warning light go off after repair according to malfunction code?**
                - **YES** System OK
                - **NO** Further repair required.
          - **NO** Try another engine ECU.
      - **BAD** Repair or replace.
TROUBLESHOOTING w/ VOLT, OHMMETER

HINT:
- The following troubleshooting procedures are designed for inspection of each separate system, and therefore the actual procedure may vary somewhat. However, troubleshooting should be performed while referring to the inspection methods described in this manual.
- Before beginning inspection, it is best to first make a simple check of the fuses, H-fuses, fusible link and the condition of the connectors.
- The following troubleshooting procedures are based on the supposition that the trouble lies in either a short or open circuit within the computer.
- If engine trouble occurs even though proper operating voltage is detected in the computer connectors, then it can be assumed that the ECU is faulty and should be replaced.

LOCATION

![Diagram of fuse box and circuit connections]
EFI SYSTEM CHECK PROCEDURE

PREPARATION
Disconnect the ECU from the vehicle body.

HINT:
- Do all voltage measurements with the connectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is in the "ON" position.

Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Terminal Name</th>
<th>Symbol</th>
<th>Terminal Name</th>
<th>Symbol</th>
<th>Terminal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>E01</td>
<td>POWER GROUND</td>
<td></td>
<td></td>
<td>AC1</td>
<td>A/C AMPLIFIER</td>
</tr>
<tr>
<td>E02</td>
<td>POWER GROUND</td>
<td></td>
<td></td>
<td>ACT</td>
<td>A/C AMPLIFIER</td>
</tr>
<tr>
<td>#1</td>
<td>INJECTOR</td>
<td></td>
<td></td>
<td>SP1</td>
<td>SPEED SENSOR</td>
</tr>
<tr>
<td>#3</td>
<td>INJECTOR</td>
<td>E1</td>
<td>ENGINE GROUND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#2</td>
<td>INJECTOR</td>
<td>VF</td>
<td>CHECK CONNECTOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#4</td>
<td>INJECTOR</td>
<td>VVT</td>
<td>CAMSHAFT OIL CONTROL VALVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS0</td>
<td>ISC VALVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TE1</td>
<td>CHECK CONNECTOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSC</td>
<td>ISC VALVE</td>
<td>OX</td>
<td>OXYGEN SENSOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELS1</td>
<td>ELECTRIC COOLING FAN RELAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELS2</td>
<td>BLOWER RELAY</td>
<td>ELS4</td>
<td>DEFFOGER SWITCH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELS3</td>
<td>TAILLIGHT RELAY</td>
<td>THW</td>
<td>WATER TEMP SENSOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IGT</td>
<td>IGNITER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>THA</td>
<td>INTAKE AIR TEMP SENSOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VTA</td>
<td>THROTTLE POSITION SENSOR</td>
<td></td>
<td>FC CIRCUIT OPENING RELAY</td>
</tr>
<tr>
<td>G2</td>
<td>CRANKSHAFT POSITION SENSOR</td>
<td></td>
<td>VACUUM SENSOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>CRANKSHAFT POSITION SENSOR</td>
<td></td>
<td>EVAP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>CRANKSHAFT POSITION SENSOR</td>
<td></td>
<td>VC</td>
<td></td>
<td>BATTERY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E2</td>
<td>SENSOR GROUND</td>
</tr>
<tr>
<td>IGF</td>
<td>IGNITER</td>
<td></td>
<td></td>
<td></td>
<td>BATTERY</td>
</tr>
<tr>
<td>CF</td>
<td>COOLING FAN RELAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Engine ECU Terminals
### Engine ECU Wiring Connectors Voltage

<table>
<thead>
<tr>
<th>No.</th>
<th>Terminals</th>
<th>Condition</th>
<th>STD voltage (V)</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+B-E1</td>
<td>IG SW ON</td>
<td>9-14</td>
<td>FI-17</td>
</tr>
<tr>
<td>2</td>
<td>BATT-E1</td>
<td>-</td>
<td>9-14</td>
<td>FI-18</td>
</tr>
<tr>
<td>3</td>
<td>VC-E2</td>
<td>IG SW ON</td>
<td>4.5-5.5</td>
<td>FI-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve fully closed</td>
<td>0.3-0.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve fully open</td>
<td>3.2-4.9</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>PIM-E2</td>
<td>IG SW ON</td>
<td>3.3-3.9</td>
<td>FI-21</td>
</tr>
<tr>
<td>5</td>
<td>#1 E01</td>
<td>IG SW ON</td>
<td>4.5-5.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>#4 E02</td>
<td></td>
<td>9-14</td>
<td>FI-22</td>
</tr>
<tr>
<td>6</td>
<td>THA-E2</td>
<td>IG SW ON, Intake air temperature 20°C (68°F)</td>
<td>0.5-3.4</td>
<td>FI-23</td>
</tr>
<tr>
<td>7</td>
<td>THW-E2</td>
<td>IG SW ON, Coolant temperature 80°C (176°F)</td>
<td>0.2-1.0</td>
<td>FI-24</td>
</tr>
<tr>
<td>8</td>
<td>STA-E1</td>
<td>Cranking</td>
<td>6 or more</td>
<td>FI-25</td>
</tr>
<tr>
<td>9</td>
<td>IGF-E1</td>
<td>IG SW ON, Igniter connector disconnected</td>
<td>4.5-5.5</td>
<td>FI-26</td>
</tr>
<tr>
<td>10</td>
<td>IGT-E1</td>
<td>Idling</td>
<td>Pulse generation</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>RSC-E1</td>
<td>IG SW ON, Engine ECU connectors disconnected</td>
<td>9-14</td>
<td>FI-27</td>
</tr>
<tr>
<td>11</td>
<td>W-E1</td>
<td>No trouble (Check engine warning light off) and engine running</td>
<td>9-14</td>
<td>FI-28</td>
</tr>
</tbody>
</table>

### Engine ECU Terminals

![Engine ECU Terminal Diagram]
### ELECTRONIC FUEL INJECTION - TROUBLESHOOTING w/ VOLT/OHM METER

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>+B - E1</td>
<td>No voltage</td>
<td>IG SW ON</td>
<td>9 - 14 V</td>
</tr>
</tbody>
</table>

---

**Diagram:**
- Battery
- FL MAIN 2.0L
- EFI 15A
- EFI Main Relay
- AM2 15A
- IGN 7.5A
- Ignition Switch
- IG2
- Engine ECU
- +B
- E1

---

**Procedure:**

1. **There is no voltage between ECU terminals +B and E1. (IG SW ON)**
   - NO
   - OK

2. **Check that there is voltage between ECU terminal +B and body ground. (IG SW ON)**
   - NO
   - OK
   - BAD

3. **Check wiring between ECU terminal E1 and body ground.**
   - BAD
   - Repair or replace.
   - OK

4. **Check fuses, H-fuse, fusible link and ignition switch.**
   - BAD
   - Repair or replace.
   - OK

5. **Check EFI main relay. (See page FI-60)**
   - BAD
   - Replace.
   - OK

6. **Check wiring between EFI main relay and battery.**
   - BAD
   - Repair or replace.
**Electronic Fuel Injection - Troubleshooting w/Volt, Ohmmeter**

<table>
<thead>
<tr>
<th>No.</th>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>BATT – E1</td>
<td>No voltage</td>
<td></td>
<td>9 – 14 V</td>
</tr>
</tbody>
</table>

**Diagram:**

- **Battery**
- **FL MAIN 2.0L**
- **EFI 15A**
- **Engine ECU**
- **BATT**
- **E1**

**Steps for Troubleshooting:**

1. **There is no voltage between ECU terminals BATT and E1.**
2. Check that there is voltage between ECU terminal BATT and body ground.
   - **NO**
   - **OK**
3. Check wiring between ECU terminal E1 and body ground.
   - **OK** Try another ECU.
   - **BAD** Repair or replace.
   - Check fuse and fusible link.
4. **BAD** Replace.
   - **OK** Check wiring between ECU terminal and battery.
   - **BAD** Repair or replace.
### Electronic Fuel Injection - Troubleshooting with Voltmeter, OHM Meter

<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 SW ON</td>
<td>-</td>
</tr>
<tr>
<td>VTA - E2</td>
<td></td>
<td>Throttle valve fully closed</td>
<td>4.5 - 5.5 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve fully open</td>
<td>0.3 - 0.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.2 - 4.9 V</td>
</tr>
</tbody>
</table>

**Throttle Position Sensor**

**Engine ECU**

- E2
- IDL
- VTA
- VC
- E1

---

**VC - E2**

1. **There is no voltage between ECU terminals VC and E2.**
   (![](image1))

2. **Check that there is voltage between ECU terminal +B and body ground.** (IG SW ON)
   - OK
   - NO
     - Refer to No. 1.
       - (See page FI-17)

3. **Check throttle position sensor.**
   - BAD
   - OK
     - Repair or replace.
   - BAD
     - Check wiring between ECU and throttle position sensor.

4. **Try another ECU.**
   - OK
   - BAD
     - Repair or replace wiring.
ELECTRONIC FUEL INJECTION - TROUBLESHOOTING w/ VOLT, OMMETER

**VTA - E2**

1. **There is no specified voltage at ECU terminals VTA and E2. (IG SW ON)**
   - **Check that there is voltage between ECU terminals VC and E2. (IG SW ON)**
     - If **NO**, refer to VC - E2 trouble section.
     - If **OK**, check throttle position sensor.
       - If **BAD**, repair or replace.
         - If **OK**, check wiring between ECU and throttle position sensor.
           - If **BAD**, repair or replace.
           - If **OK**, try another ECU.

Diagram:
- Voltmeter
  - ECU
  - VTA
  - E2

- Voltmeter
  - ECU
  - VC
  - E2

- Ohmmeter
  - Throttle Position Sensor
  - E2
  - IDL
  - VTA
  - VC
<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 SW ON</td>
<td>3.3 - 3.9 V</td>
</tr>
<tr>
<td>VC - E2</td>
<td></td>
<td></td>
<td>4.5 - 5.5 V</td>
</tr>
</tbody>
</table>

There is no voltage between ECU terminals PIM or VC and E2. (IG SW ON)

Check that there is voltage between ECU terminal +B and body ground. (IG SW ON)

Check wiring between ECU terminal E1 and body ground.

Check vacuum sensor.

Replace vacuum sensor.

Check wiring between ECU and vacuum sensor.

Try another ECU.

Refer to No.1. (See page Fi-17)

Repair or replace.
### Electronic Fuel Injection - Troubleshooting with Volt, Ohmmeter

<table>
<thead>
<tr>
<th>No.</th>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>#1 - E01</td>
<td>No voltage</td>
<td>IG SW ON</td>
<td>9 - 14 V</td>
</tr>
</tbody>
</table>

### Troubleshooting Steps

1. **There is no voltage between ECU terminals #1-#4 and E01 and/or E02. (IG SW ON)**
   - Check that there is voltage between ECU terminal #1, #2, #3 and/or #4 and body ground.
   - **NO**
     - Check wiring between ECU terminal E01 and/or E02 and body ground.
     - **BAD**
       - Try another ECU.
       - Repair or replace.
   - **OK**
     - Check H-fuse, fuse, fusible link and ignition switch.
     - **BAD**
       - Repair or replace.
   - **OK**

2. **Check resistance of each injector, STD resistance: 13.4 - 14.2 Ohm**
   - **OK**
     - Check wiring between ECU terminal #1, #2, #3, and/or #4 and battery.
     - **BAD**
       - Replace injector.
     - **OK**

Diagram:
- Battery
- FL MAIN 2.0L
- Ignition Switch
- AM2 15A
- Engine ECU
- Voltmeter
- Ohmmeter
**Intake Air Temperature Sensor**

<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 SW ON Intake air temperature</td>
<td>0.5 – 3.4 V</td>
</tr>
</tbody>
</table>

**Engine ECU**

1. There is no voltage between ECU terminals THA and E2. (IG SW ON)

2. Check that there is voltage between ECU terminal +B and body ground. (IG SW ON)

   - OK
   - NO

   Refer to No.1. (See page FI-17)

3. Check wiring between ECU terminal E1 and body ground.

   - OK
   - BAD

   3a. Check intake air temp. sensor.

   - BAD
   - OK

   Replace intake air temp. sensor.

   Check wiring between ECU and air temp. sensor.

   - OK
   - BAD

   Try another ECU.

   Repair or replace.

   Repair or replace.
No. | Terminals | Trouble | Condition | STD voltage
---|----------|---------|-----------|-----------
7  | THW - E2 | No voltage | IG SW ON | Coolant temperature 80°C (176°F) | 0.2 – 1.0 V

Water Temperature Sensor

Engine ECU

---

1. There is no voltage between ECU terminals THW and E2. (IG SW ON)

2. Check that there is voltage between ECU terminal +B and body ground. (IG SW ON)
   - OK
   - NO
     - Refer to No.1.
     - (See page FI-17)

3. Check wiring between ECU terminal E1 and body ground.
   - OK
   - BAD
     - Repair or replace.

4. Check water temp. sensor.
   - BAD
   - Replace water temp. sensor.

5. Check wiring between ECU and water temp. sensor.
   - OK
   - BAD
     - Repair or replace.

6. Try another ECU.
There is no voltage between ECU terminals STA and E1. (IG SW START)

Check starter operation. OK

Check wiring between ECU terminal STA and ignition switch terminal ST2.

BAD

OK BAD

Repair or replace.

Check wiring between ECU terminal E1 and body ground.

OK

BAD

Try another ECU. Repair or replace.

Check H-fuses, fusible link, battery, wiring, ignition switch and starter relay.

BAD

Repair or replace.

Check that there is voltage at starter terminal 50. (IG SW START) STD voltage: 6 - 14 V

OK NO

Check starter. Check wiring between ignition switch terminal ST2 and starter terminal 50.
<table>
<thead>
<tr>
<th>No.</th>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>IGF - E1</td>
<td>No voltage</td>
<td>IG SW ON</td>
<td>Igniter connector disconnected</td>
</tr>
<tr>
<td></td>
<td>IGT - E1</td>
<td>No voltage</td>
<td>Idling</td>
<td>Pulse generation</td>
</tr>
</tbody>
</table>

**Diagram**

- **ECU**
- **Ignition Switch**
- **Battery**
- **To Tachometer**
- **Ignition Coil**
- **Igniter**

**Textual Description**

1. There is no voltage between ECU terminals IGF and E1.
   (Disconnect igniter connector, IG SW ON)
2. Check that there is voltage between ECU terminals IGT and E1. (Idling)
3. Check wiring between ECU terminal E1 and body ground.
   BAD: Repair or replace.
   OK: Try another ECU.
4. Check H-fuse, fuse, fusible link and ignition switch.
   BAD: Repair or replace.
   OK: Check ignition coil.
   BAD: Repair or replace.
   OK: Check wiring between ECU and battery.
   BAD: Repair or replace.
   OK: Check igniter.
ELECTRONIC FUEL INJECTION — TROUBLESHOOTING w/ VOLT, OHMMETER

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Trouble</th>
<th>Condition</th>
<th>STD voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSC RSO — E1</td>
<td>No voltage</td>
<td>IG SW ON Engine ECU connectors disconnected</td>
<td>9 – 14 V</td>
</tr>
</tbody>
</table>

**Diagram:**

- **Battery**
- **FL MAIN 2.0L**
- **ECU**
- **Ignition Switch**
  - AM2 15A
  - IG2 7.5A
- **EFI Main Relay**
- **ISC Valve**
  - +B
  - E1
- **Engine ECU**
  - RSO
  - RSC

**Troubleshooting:**

1. **Check** there is no voltage between terminals RSC or RSO and E1 of ECU connector.
   - (IG SW ON, Engine ECU connectors disconnected)
   - **OK**
   - **NO**

2. **Check** that there is voltage between ECU terminal +B and body ground. (IG SW ON)
   - **OK**
   - **BAD**

3. **Check** resistance between ISC valve terminals +B and RSC or RSO.
   - **STD resistance:** 19.3 – 22.3 Ω
     - Cold: 17.5 – 20.5 Ω
     - Hot: 17.0 – 24.5 Ω
   - **BAD**
     - Replace ISC valve.
   - **OK**
     - **BAD**
       - Repair or replace wiring.

4. **Check** wiring between ECU and ISC valve.
   - **BAD**
   - **OK**

**Try another ECU.**
No. | Terminals | Trouble | Condition | STD voltage |
---|-----------|---------|-----------|-------------|
11 | W - E1 | No voltage | No trouble (Check engine warning light off) and engine running. | 9 - 14 V |

To Ignition Switch (IG1)

GAUGE 10A

Check Engine Warning Light

Combination Meter

Engine ECU

W

E1

1. There is no voltage between ECU terminals W and E1. (Idling)

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

<table>
<thead>
<tr>
<th>NO</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>

3. Check wiring between ECU terminal E1 and body ground.

<table>
<thead>
<tr>
<th>OK</th>
<th>BAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>

   | Try another ECU. |
   | Repair or replace. |

Check GAUGE fuse (10A) and check engine warning light.

<table>
<thead>
<tr>
<th>OK</th>
<th>BAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>

   | Repair or replace. |

Check wiring between ECU terminal W and fuse.

<table>
<thead>
<tr>
<th>BAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair or replace.</td>
</tr>
</tbody>
</table>
Oxygen Sensor

To EFI Main Relay

Electronic Fuel Injection - Troubleshooting w/Voltmeter

ECU

+8 (+B2)

OX

E1

Check Connector

Check Wiring between ECU terminal E1 and body ground.

OK

No

Try another ECU.

BAD

Repair or replace.

Check for suction of air into exhaust system.

OK

BAD

Repair air suction.

Check for air leak from air intake system.

OK

BAD

Repair air leak.

Check spark plugs.

OK

BAD

Repair or replace.

Check ignition system.

OK

BAD

Repair or replace.

Check fuel pressure.

OK

BAD

Repair or replace.

Check injectors.

OK

BAD

Repair or replace.

Check vacuum sensor.

OK

BAD

Repair or replace.

Check operation of oxygen sensor.

OK

BAD

System normal.

BAD

Repair wiring.

Check wiring between oxygen sensor and ECU.

OK

BAD

Replace oxygen sensor.

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

OK

BAD

Repair or replace.
REFERENCE VALUE OF ENGINE ECU DATA

HINT: Engine ECU data can be monitored by hand-held tester.
1. Hook up the hand-held tester to the check connector.
2. Monitor engine ECU data by following the prompts on the tester screen.
   Please refer to the hand-held tester operator's manual for further details.

REFERENCE VALUE FOR ENGINE ECU DATA
(Engine at normal operating temp.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Inspection condition</th>
<th>Reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INJECTOR</td>
<td>Engine cold to hot</td>
<td>Gradually decreases</td>
</tr>
<tr>
<td></td>
<td>Engine idling at normal operating temp. *1</td>
<td>Approx. 3 - 4 mSecs</td>
</tr>
<tr>
<td>IGNITION</td>
<td>Increase engine speed</td>
<td>Gradually increases</td>
</tr>
<tr>
<td>ISC DUTY</td>
<td>Engine idling at normal operating temp. *1</td>
<td>Approx. 29 - 39 %</td>
</tr>
<tr>
<td></td>
<td>A/C switch ON</td>
<td>Duty ratio increases</td>
</tr>
<tr>
<td></td>
<td>A/T shifting in &quot;D&quot; position</td>
<td>Duty ratio increases</td>
</tr>
<tr>
<td>ENGINE SPD</td>
<td>RPM kept stable (Comparison with tachometer)</td>
<td>No great changes</td>
</tr>
<tr>
<td>INTAKE MAN.</td>
<td>Engine idling at normal operating temp. *1</td>
<td>Approx. 160 - 350 mmHg</td>
</tr>
<tr>
<td></td>
<td>Increase engine speed</td>
<td>Gradually increases</td>
</tr>
<tr>
<td>COOLANT TEMP.</td>
<td>Engine at normal operating temp.</td>
<td>75 - 95°C (167 - 203°F)</td>
</tr>
<tr>
<td>THROTTLE</td>
<td>Closed throttle position</td>
<td>Below 5°</td>
</tr>
<tr>
<td></td>
<td>Wide open throttle</td>
<td>Above 70°</td>
</tr>
<tr>
<td></td>
<td>From closed throttle position to wide open throttle</td>
<td>Gradually increases</td>
</tr>
<tr>
<td>VEHICLE SPD</td>
<td>During driving (Comparison with speedometer)</td>
<td>No large differences</td>
</tr>
<tr>
<td>TARGET A/F L</td>
<td>Engine idling at normal operating temp.</td>
<td>2.50 ± 0.7 V</td>
</tr>
<tr>
<td>A/F FB LEFT</td>
<td>RPM stable at 2,500 rpm with normal operating temp.</td>
<td>ON</td>
</tr>
<tr>
<td>KNOCK FB</td>
<td>Depress throttle pedal suddenly during idling</td>
<td>ON</td>
</tr>
<tr>
<td>STA SIGNAL</td>
<td>During cranking</td>
<td>ON</td>
</tr>
<tr>
<td>IDL SIGNAL</td>
<td>Closed throttle position</td>
<td>ON</td>
</tr>
<tr>
<td>A/C SIGNAL</td>
<td>A/C switch ON</td>
<td>ON</td>
</tr>
<tr>
<td>Ox L</td>
<td>RPM stable at 2,500 rpm with normal operating temp.</td>
<td>RICH LEAN is repeated</td>
</tr>
</tbody>
</table>

*1: All accessories and A/C are switch OFF.
*2: If the engine coolant temp. sensor circuit is open or shorted, the engine ECU assumes an engine coolant temp. value of 80°C (176°F).
*3: When feedback control is forbidden, 0 V is displayed.
FUEL PUMP

ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION
   (a) Using SST, connect terminals +B and FP of the check connector.
       SST 09843-18020
       NOTICE: Do not connect wrong the terminals.
   (b) Turn the ignition switch ON.
       NOTICE: Do not start the engine.
   (c) Check that there is pressure in the fuel inlet hose from the fuel filter.
       HINT: If there is fuel pressure, you will hear the sound of the fuel flowing.
       If there is no pressure, check these parts:
       • Fusible link
       • H-Fuses
       • Fuses
       • EFI main relay
       • Fuel pump
       • Wiring connections
   (d) Turn the ignition switch OFF.
   (e) Remove the SST from the check connector.
       SST 09843-18020

2. INSPECT FUEL PRESSURE
   (a) Check that battery voltage is above 11 V.
   (b) Disconnect the negative (−) terminal cable from the battery.
   (c) Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose from the delivery pipe.
       HINT:
       • Put a suitable container or shop towel under the delivery pipe.
       • Slowly loosen the union bolt.
   (d) Install the fuel inlet hose and SST (pressure gauge) to the delivery pipe with the 3 gaskets and SST (union bolt).
       SST 09268-45012
       Torque: 33 N·m (330 kgf-cm, 24 ft-lbf)
   (e) Wipe off any splattered gasoline.
   (f) Reconnect the negative (−) terminal cable to the battery.
Using SST, connect terminals +B and FP of the check connector.
SST 09843-18020

Turn the ignition switch ON.

Measure the fuel pressure.

**Fuel pressure:**
235 - 275 kPa (2.4 - 2.8 kgf/cm², 34 - 40 psi)

If pressure is high, replace the fuel pressure regulator.
If pressure is low, check these parts:
- Fuel hoses and connection
- Fuel pump
- Fuel filter
- Fuel pressure regulator

Remove the SST from the check connector.
SST 09843-18020

Start the engine.

Disconnect the vacuum sensing hose from the fuel pressure regulator, and plug the hose end.

Measure the fuel pressure at idle.

**Fuel pressure:**
235 - 275 kPa (2.4 - 2.8 kgf/cm², 34 - 40 psi)

Reconnect the vacuum sensing hose to the fuel pressure regulator.

Measure the fuel pressure at idle.

**Fuel pressure:**
196 kPa (2.0 kgf/cm², 28 psi)

If pressure is not as specified, check the vacuum sensing hose and fuel pressure regulator.

Stop the engine.

After checking fuel pressure, disconnect the negative terminal cable from the battery and carefully remove the SST to prevent gasoline from splashing.
SST 09268-45012

Connect the fuel inlet hose to the delivery pipe with 2 new gaskets and the union bolt.
Torque: 33 N·m (330 kgf·cm, 24 ft·lbf)

Check for fuel leaks.

3. **REMOVE REAR SEAT CUSHION**
4. **REMOVE FLOOR SERVICE HOLE COVER**
5. **DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR**
6. **INSPECT FUEL PUMP RESISTANCE**
Using an ohmmeter, measure the resistance between the terminals 4 and 5.
Resistances:
- 0.2 – 3.0 Ω at 20°C (68°F)
If the resistance is not as specified, replace the fuel pump.

7. **INSPECT FUEL PUMP OPERATING**
Connect the positive (+) lead from the battery to terminal 4 of the connector, and the negative (−) lead to terminal 5. Check that the fuel pump operates.
If operation is not as specified, replace the fuel pump.
**NOTICE:**
- These tests must be performed quickly (within 10 seconds) to prevent the coil from burning out.
- Keep the fuel pump as far away from the battery as possible.
- Always perform switching at the battery side.

8. **RECONNECT FUEL PUMP & SENDER GAUGE CONNECTOR**
9. **REINSTALL FLOOR SERVICE HOLE COVER**
10. **REINSTALL REAR SEAT CUSHION**
COMPONENTS

Rear Seat Cushion

Floor Service Hole Cover

3.4 (35, 30 in.-lbf)

Fuel Pump Bracket Assembly

Fuel Outlet Pipe

Fuel Inlet Pipe

Gasket

[N•m (kgf•cm, ft•lbf)]: Specified torque

Non-reusable part

Gasket

Connector

Connector Support

Fuel Pump Bracket

Clip

Fuel Hose

Clip

Fuel Pump Filter

Fuel Pump

Clip

Rubber Cushion

Non-reusable part
REMOVAL

CAUTION: Do not smoke or work near an open flame when working on the fuel pump.

1. REMOVE REAR SEAT CUSHION
2. REMOVE FLOOR SERVICE HOLE COVER
   (a) Remove the service hole cover.
   (b) Disconnect the fuel pump & sender gauge connector.

INSTALLATION HINT: Check fuel leakage.

3. DISCONNECT FUEL PIPE AND HOSE FROM FUEL PUMP BRACKET
   CAUTION: Remove the fuel filter cap to prevent the fuel from flowing out.
   (a) Using SST, disconnect the outlet pipe from the pump bracket.
   SST 09631–22020
   Torque: 30 N-m (310 kgf-cm, 22 ft-lbf)
   INSTALLATION HINT: Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).
   (b) Disconnect the return hose from the pump bracket.

4. REMOVE FUEL PUMP BRACKET ASSEMBLY FROM FUEL TANK
   (a) Remove the 8 bolts.
   Torque: 3.4 N-m (35 kgf-cm, 30 in.-lb)
   (b) Pull out the pump bracket assembly.
   (c) Remove the gasket from the pump bracket.

INSTALLATION HINT: Install a new gasket to the pump bracket.

DISASSEMBLY

1. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET
   (a) Pull off the lower side of the fuel pump from the pump bracket.
   (b) Disconnect the fuel pump connector.
   (c) Disconnect the fuel hose from the fuel pump, and remove the fuel pump.
   (d) Remove the rubber cushion from the fuel pump.
2. REMOVE FUEL PUMP FILTER FROM FUEL PUMP
   (a) Using a small screwdriver, remove the clip.
   (b) Pull out the pump filter.
   ASSEMBLY HINT: Install the pump filter with a new clip.

3. REMOVE FUEL SENDER GAUGE FROM FUEL PUMP BRACKET
   (a) Disconnect the fuel sender gauge connector.
   (b) Remove the 2 screws and sender gauge.

4. REMOVE CONNECTOR
   Remove the 2 screws, connector support, connector and gasket.
   INSTALLATION HINT: Install the connector with a new gasket.

REASSEMBLY
Reassembly is in the reverse order of disassembly.

INSTALLATION
Installation is in the reverse order of removal.
FUEL PRESSURE REGULATOR
ON-VEHICLE INSPECTION

INSPECT FUEL PRESSURE
(See step 2 in on-vehicle inspection in fuel pump)

COMPONENTS

REMOVAL

1. DISCONNECT VACUUM SENSING HOSE FROM FUEL PRESSURE REGULATOR
2. DISCONNECT FUEL RETURN HOSE FROM FUEL PRESSURE REGULATOR
   HINT: Put a suitable container or shop towel under the pressure regulator.

3. REMOVE FUEL PRESSURE REGULATOR
   (a) Remove the 2 bolts, and pull out the pressure regulator.
   (b) Remove the O-ring from the pressure regulator.
INSTALLATION

1. INSTALL FUEL PRESSURE REGULATOR
   (a) Apply a light coat of gasoline to a new O-ring, and install it to the pressure regulator.

   (b) While turning the pressure regulator left and right, install it to the delivery pipe.

   (c) Install the pressure regulator with the 2 bolts. Torque: 7.0 N-m (70 kgf-cm, 60 in.-lbf)

2. CONNECT FUEL RETURN HOSE TO FUEL PRESSURE REGULATOR
3. CONNECT VACUUM SENSING HOSE TO FUEL PRESSURE REGULATOR
4. START ENGINE AND CHECK FOR FUEL LEAKAGE
INJECTOR

ON-VEHICLE INSPECTION

1. INSPECT INJECTOR OPERATION
   Check operation sound from each injector.
   (a) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine speed.
   (b) If you have no sound scope, you can check the injector transmission operation with your finger. If no sound or unusual sound is heard, check the wiring connector, injector or injection signal from the ECU.

2. INSPECT INJECTOR RESISTANCE
   (a) Disconnect the injector connector.
   (b) Using an ohmmeter, measure the resistance between the terminals.
   Resistance: 13.4 – 14.2 Ω at 20°C (68°F)
   If the resistance is not as specified, replace the injector.
   (c) Reconnect the injector connector.
REMOVAL
1. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY
2. REMOVE LINK BRACKET AND CABLE BRACKET
   (a) Disconnect link rod from link bracket.
   (b) Remove the 2 bolts and link bracket.
   (c) Remove the 2 bolts and cable bracket.
3. DISCONNECT INJECTOR CONNECTORS
4. REMOVE INJECTORS
   (a) Remove the bolt and injector cover. Remove the 2 injector covers.
   (b) Remove the insulator from each injector.
   (c) Pull out the 4 injectors from throttle body.
   (d) Remove the 2 O-rings and insulator from each injector.

INSPECTION
1. INSPECT INJECTOR INJECTION
   CAUTION: Keep injector clean of sparks during the test.
   (a) Remove the throttle body assembly.
   (See throttle body)
   (b) Install the 4 injectors to throttle body assembly.
   (c) Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose from the fuel filter outlet.
(d) Connect SST (union and hose) to the fuel filter outlet with the 2 gaskets and union bolt.  
SST 09268-41046 (90405-09015, 95336-08070)  
Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)

(e) Connect SST (union and hose) to the throttle body assembly with the 2 gasket and union bolt

(f) Using SST, connect terminals +B and FP of the check connector.  
SST 09843-18020

(g) Reconnect negative (−) terminal cable to the battery.

(h) Turn the ignition switch ON.  
NOTICE: Do not start the engine.

(i) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.  
SST 09842-30070  
Volume:  
65 - 82 cm³ (4.0 - 5.0 cu in.) per 15 sec.  
Difference between each injector:  
5 cm³ (0.3 cu in.) or less  
If the injection volume is not as specified, replace the injector.

2. INSPECT LEAKAGE
   (a) In the condition above, disconnect the test probes of SST (wire) from the battery and check the fuel leakage from the injector.  
SST 09842-30070  
Fuel drop:  
One drop or less per minute
(b) Turn the ignition switch OFF.
(c) Disconnect the negative (⁻) terminal cable from the battery.
(d) Remove the SST.
SST 09268–41046 (90405–09015, 95336–08070)
09643–18020
(e) Reinstall the fuel inlet hose to the fuel filter outlet with 2 new gaskets and the union bolt.
Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)
(f) Remove the 4 injectors from the throttle body assembly.
(g) Reinstall the throttle body assembly.
(See throttle body)

INSTALLATION
1. INSTALL INJECTORS AND DELIVERY PIPE
(a) Install 2 new O–rings and a new insulator to each injector.
(b) Apply a light coat of gasoline to 2 new O–rings.

(c) Push in the 4 injectors.
(d) Position the injector connector upward.

(e) Install 4 new insulators.
(f) Temporarily install the injector cover with the bolt. Install the 2 injector covers.

(g) Check that the injectors rotate smoothly. 
HINT: If the injectors do not rotate smoothly, the probable cause is incorrect installation of the O-rings. Replace the O-rings.

(h) Position the injector connector upward.

(i) Tighten the bolt holding the injector cover to the throttle body. Hold the 2 injector covers. 
Torque: 7.0 N-m (70 kgf-cm, 60 in.-lbf)

2. CONNECT INJECTOR CONNECTORS
3. INSTALL LINK BRACKET AND CABLE BRACKET
   (a) Install the cable bracket with the 2 bolts. 
   Torque: 7.0 N-m (70 kgf-cm, 60 in.-lbf)
   (b) Install the link bracket with the 2 bolts. 
   Torque: 7.0 N-m (70 kgf-cm, 60 in.-lbf)
   (c) Connect the link rod to the link bracket.
4. CONNECT ACCELERATOR CABLE TO THROTTLE BODY
THROTTLE BODY
ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY
(a) Check that the throttle linkage moves smoothly.

(b) Check the vacuum at the purge port.
   - Start the engine.
   - Check the vacuum with your finger.

2. INSPECT THROTTLE POSITION SENSOR
(a) Disconnect the throttle position sensor connector.
(b) Insert a feeler gauge between the throttle stop screw and throttle lever.

(c) Using an ohmmeter, measure the resistance between each terminal.

<table>
<thead>
<tr>
<th>Clearance between lever and stop screw</th>
<th>Between terminals</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 mm (0 in.)</td>
<td>VTA - E2</td>
<td>0.3 – 6.3 kΩ</td>
</tr>
<tr>
<td>0.8 mm (0.031 in.)</td>
<td>IDL - E2</td>
<td>0.5 kΩ or less</td>
</tr>
<tr>
<td>1.0 mm (0.040 in.)</td>
<td>IDL - E2</td>
<td>Infinity</td>
</tr>
<tr>
<td>Throttle valve fully open</td>
<td>VTA - E2</td>
<td>1.8 – 11.5 kΩ</td>
</tr>
<tr>
<td></td>
<td>VC - E2</td>
<td>3.5 – 6.5 kΩ</td>
</tr>
</tbody>
</table>

(d) Reconnect the sensor connector.
3. ADJUST THROTTLE BODY
   (a) Remove the surge tank.
   (b) Fully close the bypass screws of the No.1, No.2, No.3 and No.4 throttle bodies.
   (c) Allow the engine to warm up to normal operating temperature.
   
   (d) Using a carburetor balancer, search out the maximum flowed cylinder.
   (e) Using the carburetor balancer, and adjusting the bypass screws, tune the other three cylinders in the same as maximum air flowed cylinder.
   HINT: Do not loosen the bypass screw until it becomes of flange surface of the throttle body.
   (f) Stop the engine.
   (g) Reinstall the surge tank.
   (h) Start the engine.
   (i) Check that the idle speed is stable in the specification:
   
   Idle speed: 830 ~ 930 rpm
   
   If not within the specified idle speed, stop the engine and screw the bypass screws which adjust as step (e) in 1 1/2 turns.
   (j) Repeat step (i) until the idle speed becomes stable in specification.

4. INSPECT THROTTLE OPENER
   (a) Allow the engine to warm up to normal operating temperature.
   (b) Disconnect the vacuum hose from the throttle opener and plug the hose end.
   (c) Check the throttle opener setting speed.
   Throttle opener setting speed: 2,500 rpm or less
   (d) If the throttle opener setting speed is not as specified, adjust or replace the throttle opener.
   (See step 8 in installation)
REMOVAL

1. REMOVE AIR CLEANER HOSE
   (a) Loosen the 2 air cleaner hose clamp bolts.
   (b) Disconnect the air hose.
   (c) Remove the air cleaner hose.

2. DISCONNECT ACCELERATOR CABLE FROM
   THROTTLE BODY

3. DISCONNECT FUEL HOSES
   (a) Remove the union bolt and 2 gaskets, and disconnect the
       fuel inlet hose from the throttle body.
   (b) Disconnect the fuel return hose from the throttle body.

4. REMOVE SURGE TANK
   (a) Disconnect the cord clip from the surge tank.
   (b) Using a 5 mm hexagon wrench, remove the 5 bolts, surge
       tank cover and gasket.
   (c) Disconnect the vacuum hose and ISC hose from the
       surge tank.
   (d) Remove the 2 bolts with the intake pipe. Remove the 4
       intake pipes, surge tank and gasket.

5. REMOVE THROTTLE BODY ASSEMBLY
   (a) Disconnect these connectors and hoses:
       (1) Air hoses
(2) VSV for EVAP connector

(3) PCV hose
(4) Injector connectors
(5) Throttle position sensor connector
(6) Vacuum hose

(b) Remove the 2 bolts and engine wire from the throttle body.

(c) Remove the 5 bolts and the 2 surge tank stays with the engine wire from the throttle body.

(d) Remove the 2 nuts, 7 bolts, throttle body assembly and gasket.

6. REMOVE LINK BRACKET AND ACCELERATOR CABLE BRACKET
   (a) Disconnect the link rod from the throttle lever.
   (b) Remove the 2 bolts and link bracket.
   (c) Remove the 2 bolts and accelerator cable bracket.
7. **REMOVE THROTTLE OPENER**
   (a) Disconnect the vacuum hose from the throttle opener.
   (b) Remove the 2 screws and throttle opener.

8. **REMOVE NO.1 – NO.4 THROTTLE BODIES**
   (a) No.1 and No.4:
       Disconnect the vacuum hose from the throttle body.
   (b) No.1:
       Remove the 3 screws, clip, throttle body and gasket.
   (c) No.2 – No.4:
       Remove the 3 screws, throttle body and gasket. Remove the No.2 – No.4 throttle bodies and gaskets.

**INSPECTION**

1. **CLEAN THROTTLE BODY**
   Using compressed air, clean all the passages and features. Clean the all throttle bodies.
   **NOTICE:** To prevent deterioration, do not clean the throttle position sensor.

2. **INSPECT THROTTLE VALVE**
   Check that there is no clearance between the throttle screw and throttle lever when the throttle valve is closed.
   **NOTICE:** Do not adjust the throttle stop screws.

3. **INSPECT THROTTLE POSITION SENSOR**
   (See step 2 in on-vehicle inspection)

**INSTALLATION**

1. **INSTALL NO.1 – NO.4 THROTTLE BODIES**
   (a) No.1:
       Install a new gasket and the throttle body with the screws and clip.
       Torque: 7.0 N-m (70 kgf-cm, 60 in.-lb)
   (b) No.2 – No.4:
       Install a new gasket and the throttle body with the screws. Install the No.2 – No.4 throttle bodies.
Torque: 7.0 N-m (70 kgf-cm, 60 ft-lbf)
(c) No. 1 and No. 4:
Connect the vacuum hose to the throttle body.

2. INSTALL THROTTLE OPENER
(a) Install the throttle opener with the 2 bolts.
(b) Connect the vacuum hose to the throttle opener.

3. INSTALL LINK BRACKET AND ACCELERATOR CABLE BRACKET
(a) Install the accelerator cable bracket with the 2 bolts.
Torque: 7.0 N-m (70 kgf-cm, 60 in-lbf)
(b) Install the link bracket with the 2 bolts.
Torque: 7.0 N-m (70 kgf-cm, 60 in-lbf)
(c) Connect the link rod to the throttle lever.

4. ADJUST NO. 1 THROTTLE BODY
(a) Apply vacuum to the throttle opener.

(b) Loosen the lock nut A.
(c) Using a feeler gauge and 2 mm hexagon wrench, turn the adjusting screw A to adjust the clearance as shown in the illustration.
Clearance: 0.03 mm (0.001 in.)
(d) Tighten the lock nut A.

(e) Open fully the throttle valve.
(f) Using a wire, fix the link as keep step (e).
NOTICE: Do not fix the throttle valve by inserting the tools.
(g) Loosen the lock nut B.
(h) Using a 2 mm hexagon wrench, turn the adjusting screw B until the clearance becomes 0 mm (0 in.).
(i) Return the adjusting screw B 0.33 to 0.50 turns then tighten the lock nut B.

Clearance:
0.15 – 0.25 mm (0.006 – 0.010 in.)
(j) Remove the wire.

5. ADJUST NO.2 THROTTLE BODY
(a) See procedure (a) to (d) in step 4.
(b) Loosen the lock nut C.
(c) Using a feeler gauge and 2 mm hexagon wrench, turn the adjusting screw C to adjust the clearance as shown in the illustration.

Clearance:
0.03 mm (0.001 in.)
(d) Tighten the lock nut C.

(e) Loosen the lock nut D.
(f) Using a feeler gauge and 2 mm hexagon wrench, turn the adjusting screw D to adjust the clearance as shown in the illustration.

Clearance:
0.03 mm (0.001 in.)
(g) Tighten the lock nut D.

(h) See procedure (e) to (i) in step 4.
(i) Loosen the lock nut E.
(j) Using a 2 mm hexagon wrench, turn the adjusting screw E until the clearance becomes 0 mm (0 in.).
(k) Return the adjusting screw E 0.33 to 0.50 turns then tighten the lock nut E.

Clearance: 0.15 – 0.25 mm (0.006 – 0.010 in.)
(l) Remove the wire.

6. ADJUST NO.3 THROTTLE BODY
(a) Apply vacuum to the throttle opener.
(b) See procedure (b) to (c) and (i) to (l) in step 5.

7. ADJUST NO.4 THROTTLE BODY
(a) Apply vacuum to the throttle opener.
(b) See procedure (e) to (g) and (i) to (l) in step 5.
8. **ADJUST THROTTLE OPENER**
   (a) Loosen the lock nut.
   (b) Using a feeler gauge and 2 mm hexagon wrench, turn the adjusting screw to adjust the clearance as shown in the illustration.
   **Clearance:**
   - 1.23 – 1.37 mm (0.048 – 0.054 in.)
   (c) Tighten the lock nut.

9. **INSTALL THROTTLE BODY ASSEMBLY**
   (a) Place a new gasket to the cylinder head.
   (b) Install the throttle body assembly with the 7 bolts and 2 nuts.
   **Torque:** 28 N·m (280 kgf·cm, 20 ft-lbf)
   (c) Install the 2 surge tank stays with the engine wire and 4 bolts.
   **Torque:** 22 N·m (220 kgf·cm, 16 ft-lbf)
   (d) Connect these connectors and hoses:
      (1) Air hoses
(2) VSV for EVAP connector

(3) PCV hose
(4) Injector connectors
(5) Throttle position sensor connector
(6) Vacuum hose
(e) Install the engine wire with the 2 bolts.

10. INSTALL SURGE TANK
(a) Place the gasket in position on the surge tank.

(b) Place the surge tank with the gasket in position on the throttle body.
(c) Install the intake pipe with the 2 bolts. Install the 4 intake pipes.
   Torque: 22 N-m (220 kgf-cm, 16 ft-lbf)
(d) Connect the vacuum hose and ISC hose.
(e) Place the gasket in position on the surge tank.
(f) Using a 5 mm hexagon wrench, install the surge tank cover with the 5 bolts.
   Torque: 15 N-m (150 kgf-cm, 11 ft-lbf)

(g) Connect the cord clip to the surge tank.

11. CONNECT FUEL HOSES
(a) Install the fuel inlet hose with 2 new gaskets and the union bolt.
   Torque: 33 N-m (330 kgf-cm, 24 ft-lbf)
(b) Connect the fuel return hose the throttle body.

12. CONNECT ACCELERATOR CABLE TO THROTTLE BODY

13. INSTALL AIR CLEANER HOSE
(a) Install the air cleaner hose.
(b) Tighten the 2 air cleaner hose clamp bolts.
(c) Connect the air hose.

14. ADJUST THROTTLE BODY ASSEMBLY BALANCE
   (See step 3 in on-vehicle inspection)

15. CHECK THROTTLE OPENER
   (See step 4 in on-vehicle inspection)
CAMSHAFT TIMING OIL CONTROL VALVE

ON-VEHICLE INSPECTION

INSPECT OIL CONTROL VALVE RESISTANCE
(a) Disconnect the oil control valve connector.
(b) Using an ohmmeter, measure the resistance between terminals.
Resistance:
11 - 13 Ω at 20°C (68°F)
If the resistance is not as specified, replace the valve.
(c) Reconnect the oil control valve connector.

REMOVAL

REMOVE OIL CONTROL VALVE
(a) Disconnect the oil control valve connector.
(b) Remove the 2 bolts, oil control valve and O-ring.
INSTALLATION HINT: Use a new O-ring.
Torque: 8.0 N-m (80 kgf-cm, 71 in.-lbf)

INSPECTION

INSPECT OIL CONTROL VALVE OPERATION
Apply battery voltage across the terminals, then check the movement of the valve.
If operation is not as specified, replace the oil control valve.

INSTALLATION
Installation is in the reverse order of removal.
ISC VALVE
ON-VEHICLE INSPECTION

1. INSPECT ISC VALVE OPERATION
   (a) Initial conditions:
       • Engine at normal operating temperature
       • Idle speed set correctly
       • Transmission in neutral position
   (b) Using SST, connect terminals TE1 and E1 of the check connector.
       SST 09843-18020
   (c) After engine speed are kept at 1,000 - 1,500 rpm for 5 seconds, check that they return to idle speed.
       If the rpm operation is not as specified, check the ISC valve, wiring and ECU.
   (d) Remove the SST from the check connector.
       SST 09843-18020

2. INSPECT ISC VALVE RESISTANCE
   NOTICE: "Cold" and "Hot" in the following sentences express the temperature of the coils themselves. "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).
   (a) Disconnect the ISC valve connector.
   (b) Using an ohmmeter, measure the resistance between terminal +B and other terminals (RSC, RSO).
       Resistance:
       Cold: 17.5 - 28.5 Ω
       Hot: 17.0 - 24.5 Ω
       If resistance is not as specified, replace the ISC valve.
   (c) Reconnect the ISC valve connector.
REMOVAL

1. REMOVE THROTTLE BODY ASSEMBLY
   (See throttle body)

2. REMOVE ISC VALVE
   Remove the 2 bolts and ISC valve.
   Torque: 22 N-m (220 kgf-cm, 16 ft-lbf)

INSPECTION

INSPECT ISC VALVE OPERATION

(a) Connect the positive (+) lead from the battery to terminal +B and negative (−) lead to terminal RSC, and check operating sound.

(b) Connect the positive (+) lead from the battery to terminal +B and negative (−) lead to terminal RSO, and check operating sound.

If operation is not as specified, replace the ISC valve.

INSTALLATION

Installation is in the reverse order of removal.
EFI MAIN RELAY
INSPECTION

1. REMOVE EFI MAIN RELAY (Marking: EFI)

2. INSPECT EFI MAIN RELAY CONTINUITY
   (a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.
   (b) Check that there is no continuity between terminals 3 and 5.
      If continuity is not as specified, replace the relay.

3. INSPECT EFI MAIN RELAY OPERATION
   (a) Apply battery voltage across terminals 1 and 2.
   (b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.
      If operation is not as specified, replace the relay.

4. REINSTALL EFI MAIN RELAY
CIRCUIT OPENING RELAY INSPECTION

1. REMOVE RH COWL SIDE TRIM
2. REMOVE CIRCUIT OPENING RELAY

3. INSPECT CIRCUIT OPENING RELAY CONTINUITY
   (a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.
   (b) Check that there is no continuity between terminals 3 and 5.
       If continuity is not as specified, replace the relay.

4. INSPECT CIRCUIT OPENING RELAY OPERATION
   (a) Apply battery voltage across terminals 1 and 2.
   (b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.
       If operation is not as specified, replace the relay.

5. REINSTALL CIRCUIT OPENING RELAY
6. INSTALL RH COWL SIDE TRIM
INSPECTION
1. REMOVE SURGE TANK
2. REMOVE VSV
   (a) Disconnect the 2 EVAP hoses from the VSV.
   (b) Remove the 2 bolts and VSV.

3. INSPECT VSV FOR OPEN CIRCUIT
   Using an ohmmeter, check that there is continuity between the terminals.
   Resistance:
   \[ 30 - 33 \, \Omega \text{ at } 20^\circ C (68^\circ F) \]
   If there is no continuity, replace the VSV.

4. INSPECT VSV FOR GROUND
   Using an ohmmeter, check that there is no continuity between each terminal and the body.
   If there is continuity, replace the VSV.

5. INSPECT VSV OPERATION
   (a) Check that air flows with difficulty from port E to port F.
   (b) Apply battery voltage across the terminals.
   (c) Check that air flows from port E to port F.
      If operation is not as specified, replace the VSV.

6. REINSTALL VSV
   (a) Install the VSV with the screw.
   (b) Connect the 2 EVAP hoses to the VSV.

7. REINSTALL EMISSION CONTROL VALVE SET

8. REINSTALL HIGH–TENSION CORD COVER

9. REINSTALL V–BANK COVER
WATER TEMPERATURE SENSOR

INSPECTION

1. DRAIN ENGINE COOLANT
2. REMOVE WATER TEMPERATURE SENSOR

3. INSPECT WATER TEMPERATURE SENSOR
   Using an ohmmeter, measure the resistance between terminals.
   Resistance:
   
<table>
<thead>
<tr>
<th>Temperature °C (°F)</th>
<th>Acceptable Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20 (4)</td>
<td>30</td>
</tr>
<tr>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>20 (68)</td>
<td>30</td>
</tr>
<tr>
<td>40 (104)</td>
<td>10</td>
</tr>
<tr>
<td>60 (140)</td>
<td>5</td>
</tr>
<tr>
<td>80 (176)</td>
<td>2</td>
</tr>
<tr>
<td>100 (212)</td>
<td>1</td>
</tr>
</tbody>
</table>

   If the resistance is not as specified, replace the water temperature sensor.

4. REINSTALL WATER TEMPERATURE SENSOR
   Install a new gasket to the water temperature sensor.

5. FILL RADIATOR WITH ENGINE COOLANT
INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION

1. REMOVE IAT SENSOR

2. INSPECT IAT SENSOR RESISTANCE
   Using an ohmmeter, measure the resistance between the terminals.
   Resistance:
   - Refer to the graph
   If the resistance is not as specified, replace the IAT sensor.

3. REINSTALL IAT SENSOR
VACUUM SENSOR
INSPECTION
1. INSPECT POWER SOURCE VOLTAGE OF VACUUM SENSOR
   (a) Disconnect the vacuum sensor connector.
   (b) Turn the ignition switch ON.
   (c) Using a voltmeter, measure the voltage between connector terminals VC and E2 of the wiring harness side.
   Voltage:
   4.5 – 5.5 V
   (d) Turn the ignition switch OFF.
   (e) Reconnect the vacuum sensor connector.
2. INSPECT POWER OUTPUT OF VACUUM SENSOR
   (a) Turn the ignition switch ON.
   (b) Disconnect the vacuum hose on the air intake manifold side.
   (c) Connect a voltmeter to terminals PIM and E2 of the ECU and measure the output voltage under ambient atmospheric pressure.
   (d) Apply vacuum to the vacuum sensor in 13.3 kPa (100 mmHg, 3.94 in.Hg) segments to 66.7 kPa (500 mmHg, 19.69 in.Hg).
   (e) Measure the voltage drop from step (c) above for each segment.
   Voltage drop:

<table>
<thead>
<tr>
<th>Applied Vacuum kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>mmHg</td>
</tr>
<tr>
<td>13.3 (100)</td>
</tr>
<tr>
<td>26.7 (200)</td>
</tr>
<tr>
<td>40.0 (300)</td>
</tr>
<tr>
<td>53.5 (400)</td>
</tr>
<tr>
<td>66.7 (500)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage drop V</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 – 0.5</td>
</tr>
<tr>
<td>0.7 – 0.9</td>
</tr>
<tr>
<td>1.1 – 1.3</td>
</tr>
<tr>
<td>1.5 – 1.7</td>
</tr>
<tr>
<td>1.9 – 2.0</td>
</tr>
</tbody>
</table>

(f) Reconnect the vacuum hose to the intake manifold.
KNOCK SENSOR
COMPONENTS

1. REMOVE SURGE TANK
2. REMOVE KNOCK SENSOR
   (a) Disconnect the knock sensor connector.
   (b) Using SST, remove the knock sensor.
      SST 09816-30010
3. INSPECT KNOCK SENSOR
   Using an ohmmeter, check that there is no continuity between the terminal and body.
   If there is continuity, replace the sensor.
4. REINSTALL KNOCK SENSOR
   (a) Using SST, install the knock sensor.
      SST 09816-30010
      Torque: 44 N·m (450 kgf·cm, 33 ft-lbf)
   (b) Connect the knock sensor connector.
5. REINSTALL SURGE TANK
**OXYGEN SENSOR INSPECTION**

1. **INSPECT HEATER RESISTANCE OF OXYGEN SENSOR**
   
   (a) Disconnect the oxygen sensor connector.
   
   (b) Using an ohmmeter, measure the resistance between the terminals +B and HT.
   
   Resistance:
   
   11 – 16 Ω at 20°C (68°F)
   
   If the resistance is not as specified, replace the sensor.
   
   Torque: 44 N·m (450 kgf·cm, 33 ft-lbf)
   
   (c) Reconnect the oxygen sensor connector.

2. **WARM UP ENGINE**
   
   Allow the engine to warm up to normal operating temperature.

3. **INSPECT FEEDBACK VOLTAGE**
   
   Connect the positive (+) tester probe of a voltmeter to terminal VF1 of the check connector, and negative (−) test probe to terminal E1. Do the test as described.
   
   HINT: Use SST when connecting between terminals T and E1 of the check connector.
   
   SST 09843–18020

---

Warm up the oxygen sensor with the engine at 2,500 rpm for approx. 120 seconds.

Connect terminals TE1 and E1 of the check connector.
And maintain engine speed at 2,500 rpm.

Check the number of times the voltmeter needle fluctuates in 10 seconds.

- **Less than 8 times**
  
  Warm up the oxygen sensor with the engine at 2,500 rpm for approx. 120 seconds.
  And maintain engine speed at 2,500 rpm.

- **8 times or more**
  
  Check the number of times the voltmeter needle fluctuates in 10 seconds.
  
  - **Less than 8 times**
    
    Disconnect terminals TE1 and E1 of the check connector.
    And maintain engine speed at 2,500 rpm.

  - **8 times or more**
    
    Replace the ECU.

Zero

CONTINUED ON PAGE FI–69
Measure voltage between terminals VF1 and E1.

More than 0 V

0 V

Read and record diagnostic trouble codes. (See page FI-69)

Normal code, code Nos. 21 and 25
Malfunction code(s) (Except code Nos. 21 and 25)

Repair the relevant diagnostic trouble codes.

Malfunction code(s) (Except code Nos. 21 and 25)

Read and record diagnostic trouble codes. (See page FI-69)

Normal code, code Nos. 21 and 25

Disconnect terminals TE1 and E1 of the check connector. And maintain engine speed at 2,500 rpm.

Measure voltage between terminals VF1 and F1.

0 V

5 V

Disconnect the PCV hose.

Measure voltage between terminals VF1 and E1.

0 V

More than 0 V

Repair (Over rich)

Disconnect the water temp. sensor connector, and connect resistor with a resistance of 4 – 8 kΩ or send an equivalent simulation signal.

Connect terminals TE1 and E1 of the check connector.

Warm up the oxygen sensor with the engine at 2,500 rpm for approx. 120 seconds. And maintain engine speed at 2,500 rpm.

Measure voltage between terminals VF1 and E1.

0 V

5 V

Replace the oxygen sensor.

Repair (Over lean)
ENGINE ECU INSPECTION

HINT: The EFI circuit can be checked by measuring the resistance and voltage at the wiring connectors of the engine ECU.

1. PREPARATION
(See EFI check procedure in Troubleshooting w/ Volt, Ohmmeter)

2. INSPECT VOLTAGE OF ECU
(a) Turn the ignition switch ON.
(b) Measure the voltage between each terminal of the wiring connectors.

HINT:
- Perform all voltage measurements with the connectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is ON.

### Engine ECU Terminals

### ECU Wiring Connectors Voltage

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Condition</th>
<th>STD voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATT - E1</td>
<td>-</td>
<td>9 – 14</td>
</tr>
<tr>
<td>+B – E1</td>
<td>IG SW ON</td>
<td>9 – 14</td>
</tr>
<tr>
<td>VC – E2</td>
<td>IG SW ON</td>
<td>9 – 14</td>
</tr>
<tr>
<td>VTA – E2</td>
<td>IG SW ON (Throttle valve fully closed)</td>
<td>0.3 – 0.8</td>
</tr>
<tr>
<td>VTA – E2</td>
<td>IG SW ON (Throttle valve open)</td>
<td>3.2 – 4.9</td>
</tr>
<tr>
<td>PIM – E2</td>
<td>IG SW ON</td>
<td>3.3 – 3.9</td>
</tr>
<tr>
<td>#1 – E01, E02</td>
<td>IG SW ON</td>
<td>9 – 14</td>
</tr>
<tr>
<td>#2 – E01, E02</td>
<td>IG SW ON</td>
<td>9 – 14</td>
</tr>
<tr>
<td>#3 – E01, E02</td>
<td>IG SW ON</td>
<td>9 – 14</td>
</tr>
<tr>
<td>#4 – E01, E02</td>
<td>IG SW ON</td>
<td>9 – 14</td>
</tr>
<tr>
<td>THA – E2</td>
<td>IG SW ON (Intake air temp. 20°C (68°F))</td>
<td>0.5 – 3.4</td>
</tr>
<tr>
<td>THW – E2</td>
<td>IG SW ON (Coolant temp. 80°C (176°F))</td>
<td>0.2 – 1.0</td>
</tr>
<tr>
<td>STA – E1</td>
<td>Cranking</td>
<td>6 or more</td>
</tr>
<tr>
<td>IGF – E1</td>
<td>IG SW ON (Igniter connector disconnected)</td>
<td>4.5 – 5.5</td>
</tr>
<tr>
<td>IG1 – E1</td>
<td>Idling</td>
<td>Pulse generation</td>
</tr>
<tr>
<td>RSC – E1</td>
<td>IG SW ON (Engine ECU connector disconnected)</td>
<td>9 – 14</td>
</tr>
<tr>
<td>RSO – E1</td>
<td>IG SW ON (Engine ECU connector disconnected)</td>
<td>9 – 14</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Time</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>W-E1</td>
<td>No trouble (Check engine warming light off) and engine running</td>
<td>9 - 14</td>
</tr>
<tr>
<td>AC1-E1</td>
<td>IG SW ON (Air conditioning ON)</td>
<td>1.5 or less</td>
</tr>
<tr>
<td>ACT-E1</td>
<td>IG SW ON (Air conditioning ON)</td>
<td>4.5 - 5.5</td>
</tr>
<tr>
<td>VF-E1</td>
<td>Maintain engine speed at 2,500 rpm for 2 minutes after warming up then return idling</td>
<td>1.8 - 3.2</td>
</tr>
<tr>
<td>G1-G-</td>
<td>Idling</td>
<td>Pulse generation</td>
</tr>
<tr>
<td>G2-G-</td>
<td>Idling</td>
<td>Pulse generation</td>
</tr>
<tr>
<td>NE-G-</td>
<td>Idling</td>
<td>Pulse generation</td>
</tr>
<tr>
<td>OX-E1</td>
<td>Maintain engine speed at 2,500 rpm for 2 minutes after warming up</td>
<td>Pulse generation</td>
</tr>
<tr>
<td>KKNK-E1</td>
<td>Idling</td>
<td>Pulse generation</td>
</tr>
<tr>
<td>ELS1-E1</td>
<td>Electric cooling fan ON</td>
<td>7.5 - 14</td>
</tr>
<tr>
<td>ELS1-E1</td>
<td>Electric cooling fan OFF</td>
<td>0 - 1.5</td>
</tr>
<tr>
<td>ELS2-E1</td>
<td>Blower motor ON</td>
<td>7.5 - 14</td>
</tr>
<tr>
<td>ELS2-E1</td>
<td>Blower motor OFF</td>
<td>0 - 1.5</td>
</tr>
<tr>
<td>ELS3-E1</td>
<td>Taillight switch ON</td>
<td>7.5 - 14</td>
</tr>
<tr>
<td>ELS3-E1</td>
<td>Taillight switch OFF</td>
<td>0 - 1.5</td>
</tr>
<tr>
<td>ELS4-E1</td>
<td>Defogger switch ON</td>
<td>7.5 - 14</td>
</tr>
<tr>
<td>ELS4-E1</td>
<td>Defogger switch OFF</td>
<td>0 - 1.5</td>
</tr>
<tr>
<td>HT-E1</td>
<td>IG SW ON</td>
<td>9 - 14</td>
</tr>
<tr>
<td>HT-E1</td>
<td>Idling</td>
<td>0 - 3</td>
</tr>
<tr>
<td>FC-E1</td>
<td>IG SW ON</td>
<td>9 - 14</td>
</tr>
<tr>
<td>FC-E1</td>
<td>Idling</td>
<td>0 - 3</td>
</tr>
<tr>
<td>TE1-E1</td>
<td>IG SW ON</td>
<td>9 - 14</td>
</tr>
<tr>
<td>TE2-E1</td>
<td>IG SW ON</td>
<td>9 - 14</td>
</tr>
</tbody>
</table>
3. **INSPECT RESISTANCE OF ECU**

(a) Turn the ignition switch OFF.
(b) Disconnect the 3 connectors from the ECU.
(c) Measure the resistance between each terminal of the wiring connectors.

**NOTICE:**
- Do not touch the ECU terminals.
- The tester probe should be inserted in the wiring connector from the wiring side.

### Engine ECU Terminals

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Condition</th>
<th>STD resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTA - E2</td>
<td>Throttle valve fully open</td>
<td>2,400 - 11,200</td>
</tr>
<tr>
<td>VTA - E2</td>
<td>Throttle valve fully closed</td>
<td>340 - 6,300</td>
</tr>
<tr>
<td>VC - E2</td>
<td>–</td>
<td>3,100 - 7,200</td>
</tr>
<tr>
<td>THA - E2</td>
<td>Intake air temp. 20°C (68°F)</td>
<td>2,000 - 3,000</td>
</tr>
<tr>
<td>THW - E2</td>
<td>Coolant temp. 80°C (176°F)</td>
<td>200 - 400</td>
</tr>
<tr>
<td>G1, G2 - G-</td>
<td>Cold (−10°C (14°F) to 50°C (122°F))</td>
<td>125 - 200</td>
</tr>
<tr>
<td>G1, G2 - G-</td>
<td>Hot (50°C (122°F) to 100°C (212°F))</td>
<td>150 - 250</td>
</tr>
<tr>
<td>NE - G-</td>
<td>Cold (−10°C (14°F) to 50°C (122°F))</td>
<td>125 - 200</td>
</tr>
<tr>
<td>NE - G-</td>
<td>Hot (50°C (122°F) to 100°C (212°F))</td>
<td>160 - 250</td>
</tr>
<tr>
<td>RSC - +B</td>
<td>Cold (−10°C (14°F) to 50°C (122°F))</td>
<td>17 - 24.5</td>
</tr>
<tr>
<td>RSC - +B</td>
<td>Hot (50°C (122°F) to 100°C (212°F))</td>
<td>21.5 - 28.5</td>
</tr>
<tr>
<td>RSC - +B</td>
<td>Cold (−10°C (14°F) to 50°C (122°F))</td>
<td>17 - 24.5</td>
</tr>
<tr>
<td>RSC - +B</td>
<td>Hot (50°C (122°F) to 100°C (212°F))</td>
<td>21.5 - 28.5</td>
</tr>
<tr>
<td>HT - +B</td>
<td>–</td>
<td>11 - 16</td>
</tr>
</tbody>
</table>
FUEL CUT RPM INSPECTION

1. WARM UP ENGINE
   Allow the engine to warm up to normal operating temperature.

2. CONNECT TACHOMETER TO ENGINE
   (See EM section)

3. INSPECT FUEL CUTOFF OPERATION
   (a) Increase the engine speed to at least 2,500 rpm.
   (b) Check for injector operating noise.
   (c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.
   HINT: Measure with the A/C OFF.
   Fuel return speed:
   1,400 rpm

4. DISCONNECT TACHOMETER