
ELECTRONIC CONTROL DIESEL

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ECD SYSTEM

ED027-01

PRECAUTION

1. **BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (–) TERMINAL CABLE FROM BATTERY**

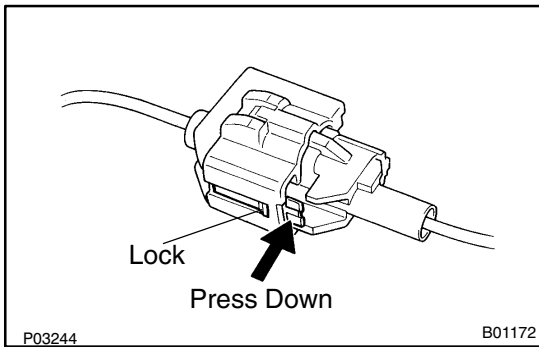
HINT:

- Any DTC 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 FUEL SYSTEM**
 3. **KEEP DIESEL FUEL AWAY FROM RUBBER OR LEATHER PARTS**
 4. **AIR INDUCTION SYSTEM**
 - (a) Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run out of tune.
 - (b) 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.
 5. **ELECTRONIC CONTROL SYSTEM**
 - (a) Before removing ECD 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:

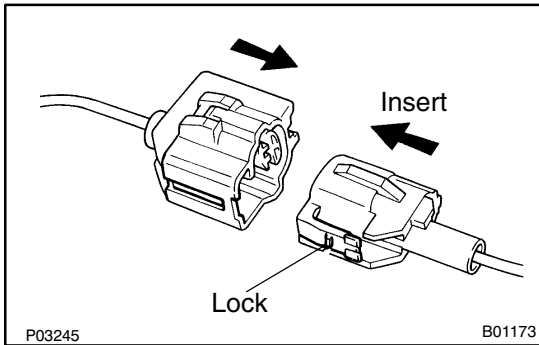
Always check the DTC before disconnecting the negative (–) terminal cable from the battery.

- (b) When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (–) cables.
- (c) Do not permit parts to receive a severe impact during removal or installation. Handle all ECD parts carefully, especially the engine ECU.
- (d) Do not be careless during troubleshooting as there are numerous transistor circuits and even slight terminal contact can further troubles.
- (e) Do not open the engine ECU cover.
- (f) When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the ECD parts and wiring connectors.
- (g) Parts should be replaced as an assembly.



(h) Care is required when pulling out and inserting wiring connectors.

- (1) Release the lock and pull out the connector, pulling on the connectors.

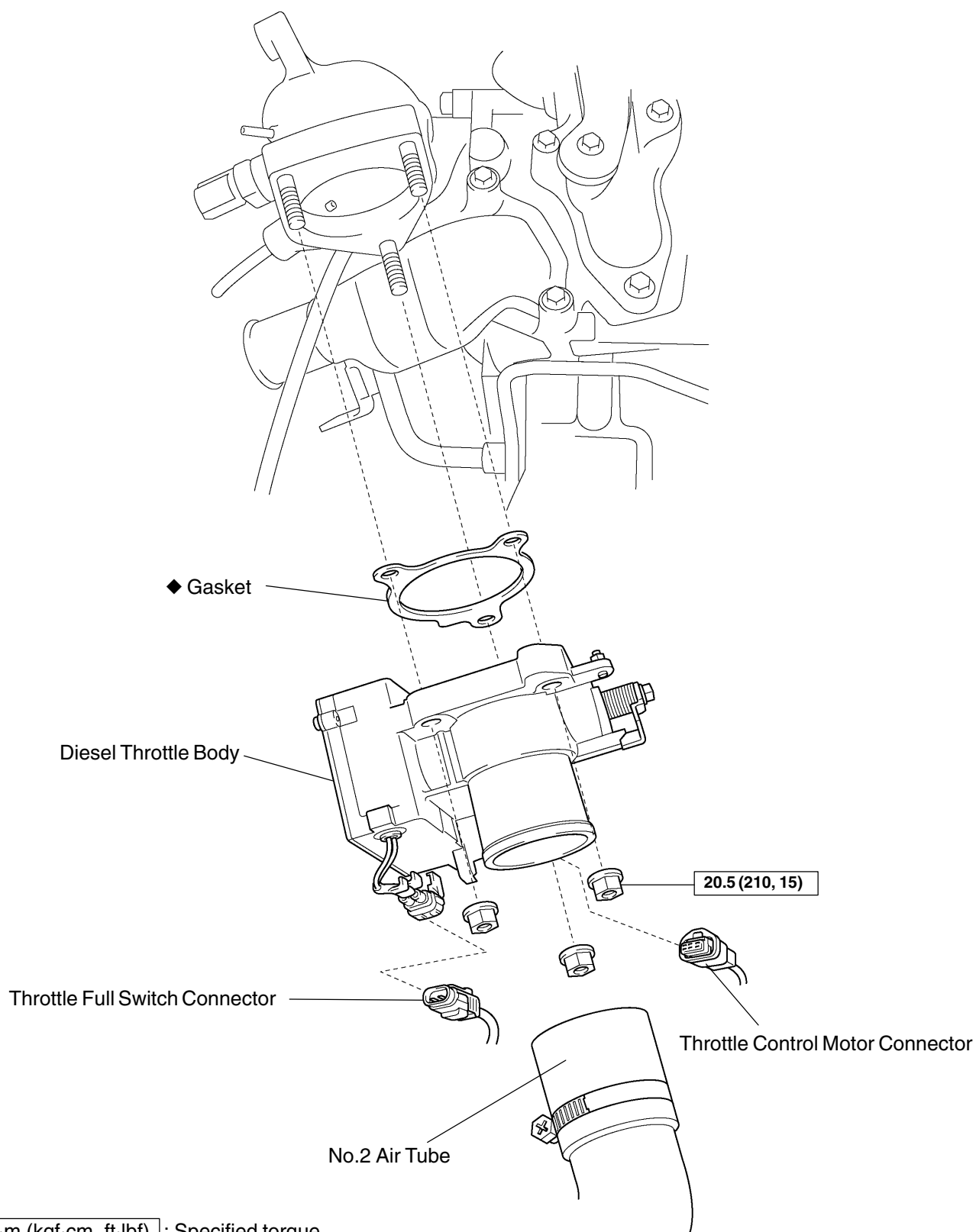


(i) Fully insert the connector and check that it locked. When inspecting a connector with a volt/ohmmeter.

- (1) Carefully take out the water-proofing rubber if it is a water-proof type connector.
- (2) Insert the test probe in to the connector from the wiring side when checking the continuity, amperage or voltage.
- (3) Do not apply unnecessary force to the terminal.
- (4) After checking, install the water-proofing rubber on the connector securely.

DIESEL THROTTLE COMPONENTS

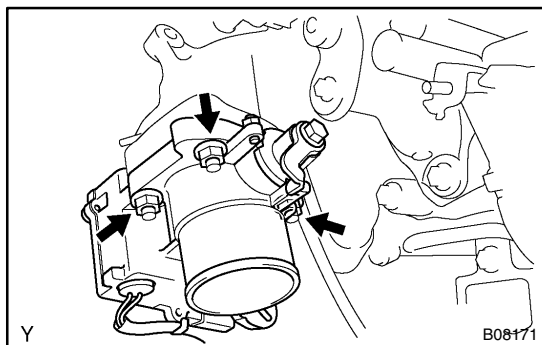
ED028-01



N·m (kgf·cm, ft·lbf) : Specified torque

Y ◆ Non-reusable part

B08172



REMOVAL

1. DISCONNECT NO.2 AIR TUBE

2. REMOVE DIESEL THROTTLE BODY

- (a) Disconnect the throttle control motor connector and throttle full switch connector.
- (b) Remove the 3 nuts, diesel throttle body and gasket.

Torque: 20.5 N·m (210 kgf·cm, 15 ft·lbf)

HINT:

At the time of installation, please refer to the following items.
Place a new gasket to the No.3 intake manifold.

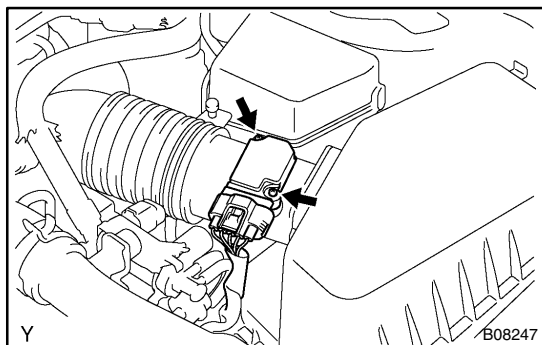
INSPECTION

INSPECT DIESEL THROTTLE BODY (See page DI-26)



INSTALLATION

Installation is in the reverse order of removal. (See page ED-4)

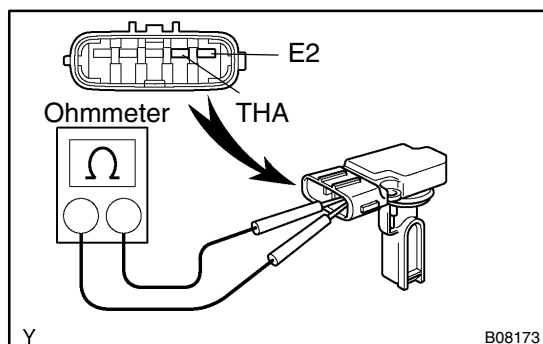


AIR FLOW METER INSPECTION

ED02L-01

1. **DISCONNECT AIR FLOW METER CONNECTOR**
2. **REMOVE AIR FLOW METER**

Remove the 2 screws and air flow meter.

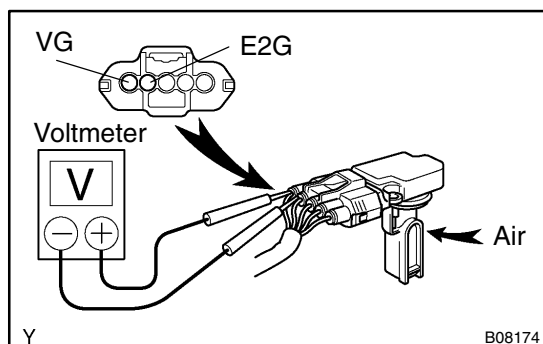


3. INSPECT AIR FLOW METER

- (a) Using an ohmmeter, measure the resistance between terminals THA and E2.

Terminals	Resistance	Temperature
THA – E2	12.5 – 16.9 k Ω	-20°C (-4°F)
THA – E2	2.19 – 2.67 k Ω	20°C (68°F)
THA – E2	0.50 – 0.68 k Ω	60°C (140°F)

If the resistance is not as specified, replace the air flow meter.

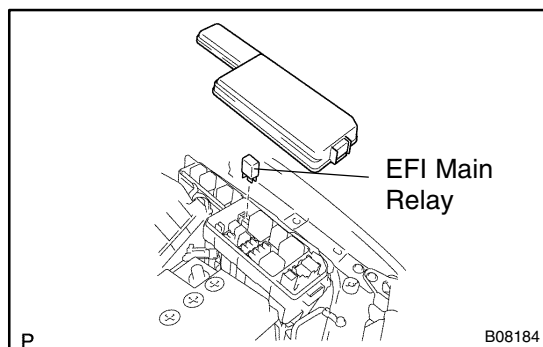


- (b) Inspect for operation.
 - (1) Connect the air flow meter connector.
 - (2) Connect the negative (-) terminal cable to the battery.
 - (3) Turn the ignition switch ON.
 - (4) Using a voltmeter, connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal E2G.
 - (5) Blow air into the air flow meter, and check that the voltage fluctuates.
- If operation is not as specified, replace the air flow meter.
- (6) Turn the ignition switch OFF.
 - (7) Disconnect the negative (-) terminal cable from the battery.
 - (8) Disconnect the air flow meter connector.

4. REINSTALL AIR FLOW METER

Install the air flow meter with the 2 screws.

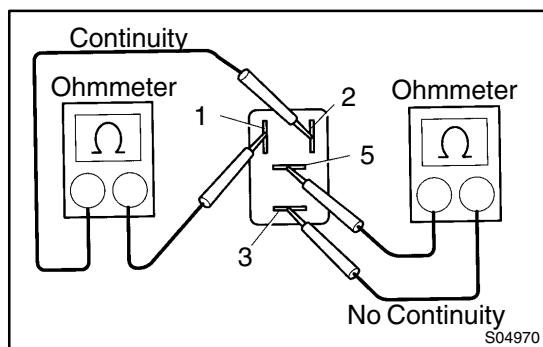
5. RECONNECT AIR FLOW METER CONNECTOR



EFI MAIN RELAY INSPECTION

ED02M-01

1. REMOVE ENGINE J/B COVER
2. REMOVE EFI MAIN RELAY (Marking: EFI)

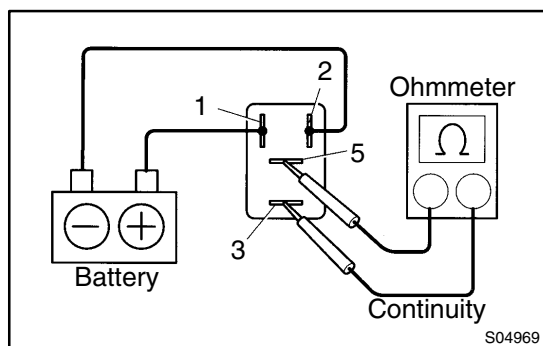


3. INSPECT EFI MAIN RELAY

- (a) Inspect the relay continuity.
 - (1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.
 - (2) Check that there is no continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

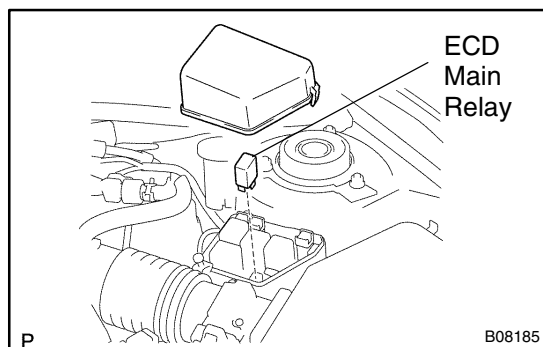
If there is continuity, replace the relay.



- (b) Inspect the relay operation.
 - (1) Apply battery voltage across terminals 1 and 2.
 - (2) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

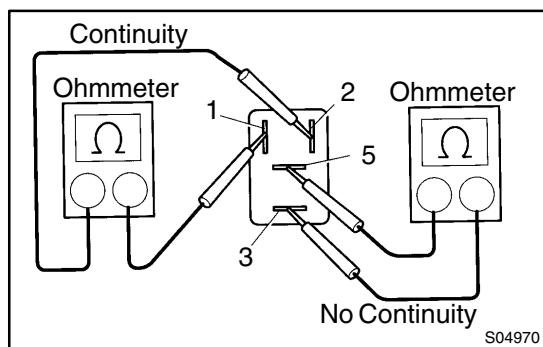
4. REINSTALL EFI MAIN RELAY
5. REINSTALL ENGINE J/B COVER



ECD MAIN RELAY INSPECTION

ED02C-01

1. REMOVE NO.3 RELAY BOX COVER
2. REMOVE ECD MAIN RELAY (Marking: INJ)



3. INSPECT ECD MAIN RELAY

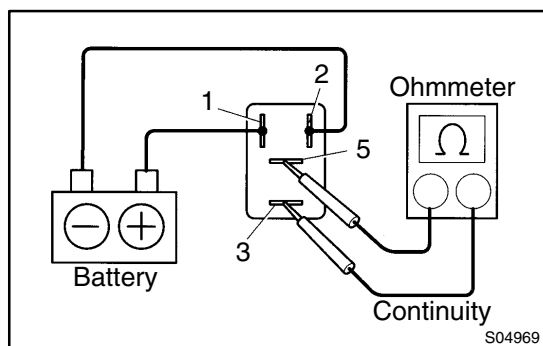
- (a) Inspect the relay continuity.

- (1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

- (2) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.

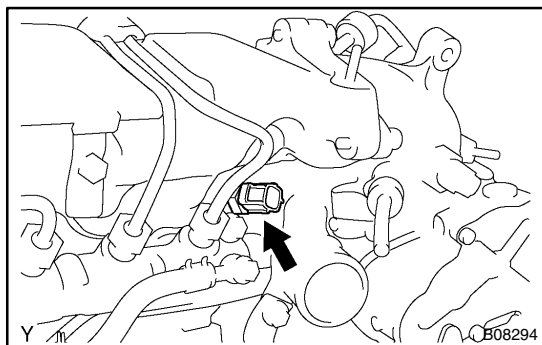


- (b) Inspect the relay operation.

- (1) Apply battery voltage across terminals 1 and 2.
- (2) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

4. REINSTALL ECD MAIN RELAY
5. REINSTALL RELAY BOX COVER



WATER TEMPERATURE SENSOR INSPECTION

ED02D-01

1. DRAIN ENGINE COOLANT

2. REMOVE WATER TEMPERATURE SENSOR

- (a) Disconnect the sensor connector.
- (b) Using a 19 mm deep socket wrench, remove the sensor and gasket.

3. INSPECT WATER TEMPERATURE SENSOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the chart graph

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

4. REINSTALL WATER TEMPERATURE SENSOR

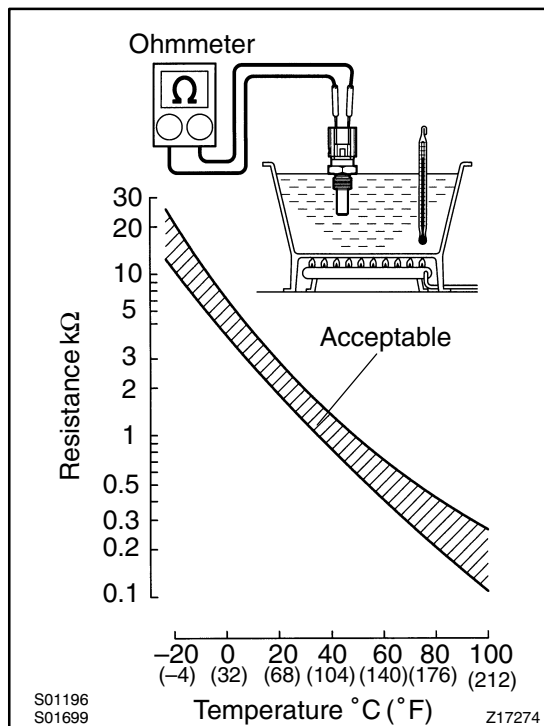
- (a) Using a 19 mm deep socket wrench, install a new gasket and the sensor.

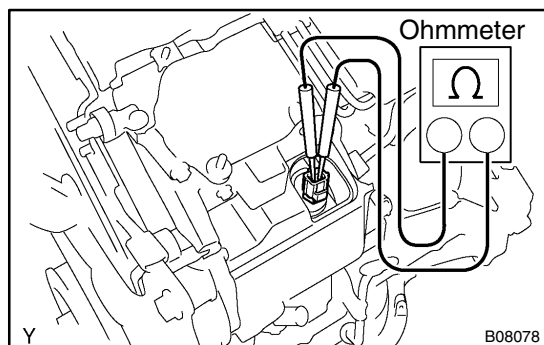
Torque: 20.4 N·m (208 kgf·cm, 15 ft·lbf)

- (b) Connect the sensor connector.

5. REFILL WITH ENGINE COOLANT

(See page CO-2)





FUEL TEMPERATURE SENSOR INSPECTION

ED02F-01

1. **DISCONNECT FUEL TEMPERATURE SENSOR CONNECTOR**
2. **INSPECT FUEL TEMPERATURE SENSOR**

Using an ohmmeter, measure the resistance between terminals.

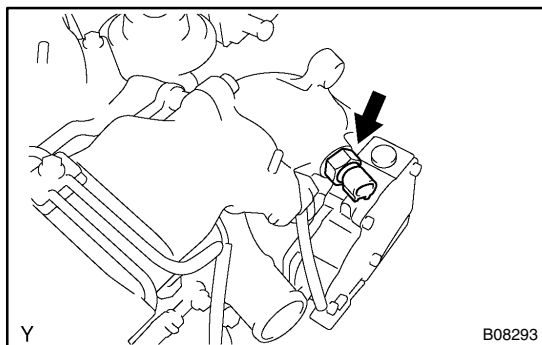
Resistance: 0.5 – 3.0 Ω at 40°C (104°F)

If the resistance is not specified, replace the supply pump assembly. (See page FU-16)

NOTICE:

In case of having the supply pump assembly replaced, must replace fuel inlet pipe, too.

3. **RECONNECT FUEL TEMPERATURE SENSOR CONNECTOR**



INTAKE AIR TEMPERATURE SENSOR INSPECTION

ED02E-01

1. REMOVE INTAKE AIR TEMP. SENSOR

- (a) Disconnect the sensor connector.
- (b) Using a 22 mm deep socket wrench, remove the intake air temp. sensor.

2. INSPECT INTAKE AIR TEMP. SENSOR

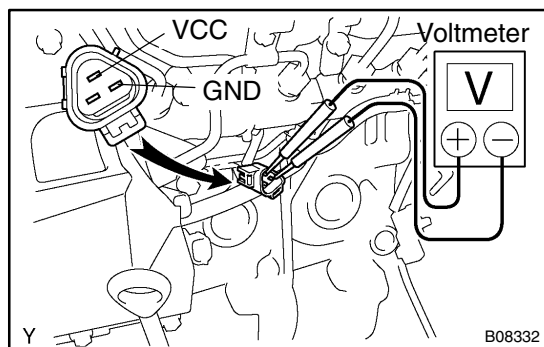
(See page ED-10)

3. REINSTALL INTAKE AIR TEMP. SENSOR

- (a) Using a 22 mm deep socket wrench, install the intake air temp. sensor.

Torque: 34.3 N·m (350 kgf·cm, 25 ft·lbf)

- (b) Connect the sensor connector.



FUEL PRESSURE SENSOR INSPECTION

ED02G-01

1. INSPECT POWER SOURCE VOLTAGE OF FUEL PRESSURE SENSOR

- (a) Disconnect the sensor connector.
- (b) Turn the ignition switch ON.
- (c) Using a voltmeter, measure the voltage between connector terminals VCC and GND of the wiring harness side.

Voltage: 4.5 – 5.5 V

- (d) Turn the ignition switch OFF.
- (e) Reconnect the sensor connector.

2. INSPECT VOLTAGE BETWEEN TERMINALS PCR AND E2 (See page DI-80)

TURBO PRESSURE SENSOR

INSPECTION

ED02H-01

INSPECT TURBO PRESSURE SENSOR (See page TC-21)

CAMSHAFT POSITION SENSOR INSPECTION

ED021-01

NOTICE:

"Cold" and "Hot" in the following sentences express the temperature of the sensor itself. "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).

1. DISCONNECT CAMSHAFT POSITION SENSOR CONNECTOR

2. INSPECT CAMSHAFT POSITION SENSOR

Using an ohmmeter, measure the resistance between terminals.

Resistance:

Cold	1,630 – 2,740 Ω
Hot	2,065 – 3,225 Ω

If the resistance is not as specified, replace the camshaft position sensor.

Torque: 8.8 N·m (90 kgf·cm, 78 in.-lbf)

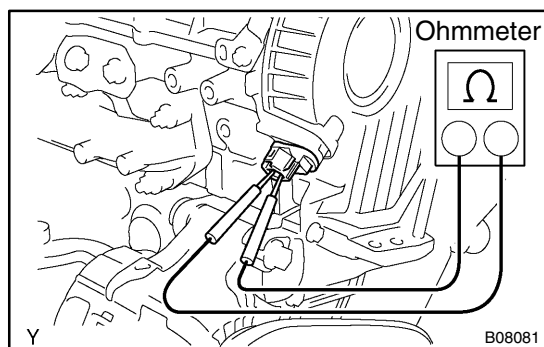
NOTICE:

Be careful not drop and shock the sensor.

HINT:

Apply engine oil to the O-ring.

3. RECONNECT CAMSHAFT POSITION SENSOR CONNECTOR



CRANKSHAFT POSITION SENSOR INSPECTION

ED02J-01

NOTICE:

"Cold" and "Hot" in the following sentences express the temperature of the sensor itself. "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).

1. DISCONNECT CRANKSHAFT POSITION SENSOR CONNECTOR**2. INSPECT CRANKSHAFT POSITION SENSOR**

Using an ohmmeter, measure the resistance between terminals.

Resistance:

Cold	1,630 – 2,740 Ω
Hot	2,065 – 3,225 Ω

If the resistance is not as specified, replace the crankshaft position sensor.

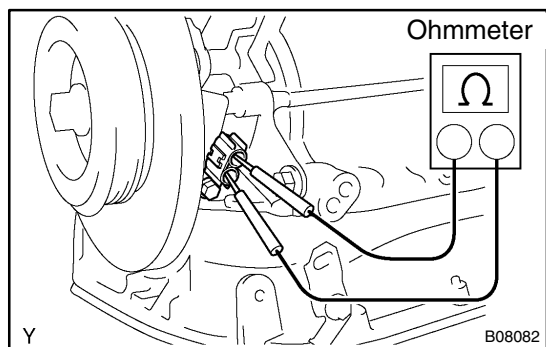
Torque: 8.8 N·m (90 kgf·cm, 78 in.-lbf)

NOTICE:

Be careful not drop and shock the sensor.

HINT:

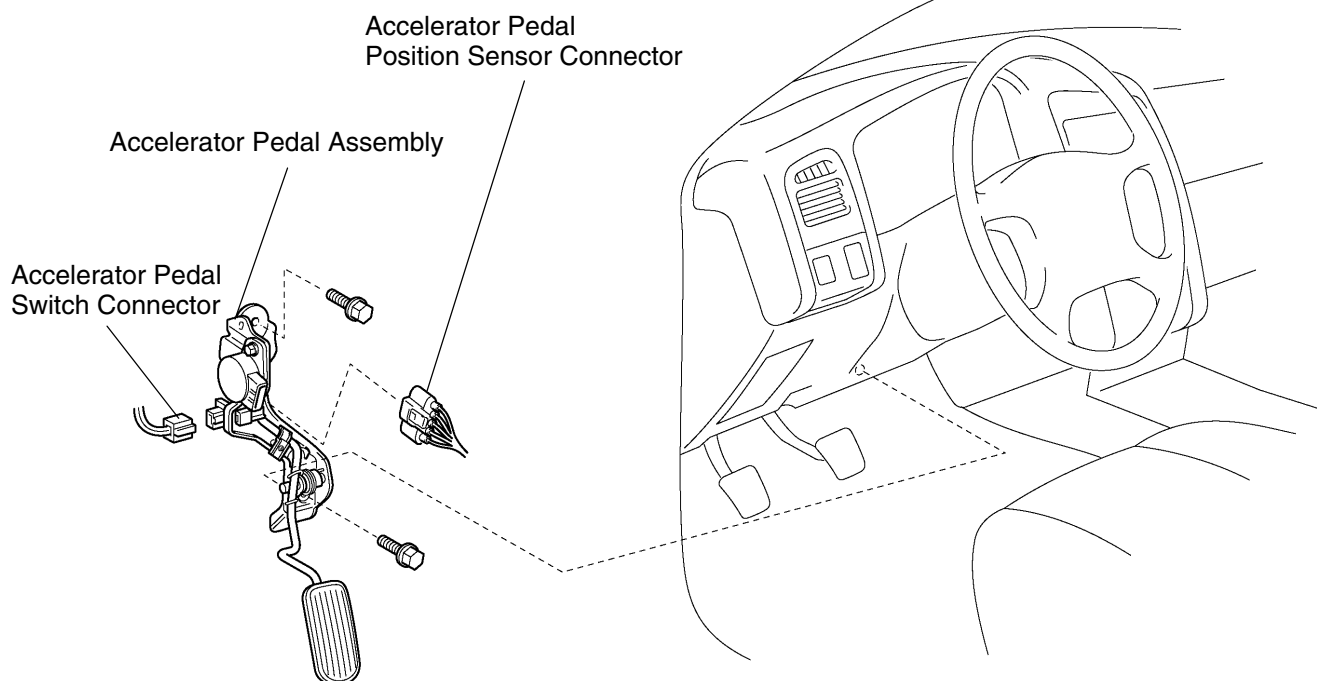
Apply engine oil to the O-ring.

3. RECONNECT CRANKSHAFT POSITION SENSOR CONNECTOR

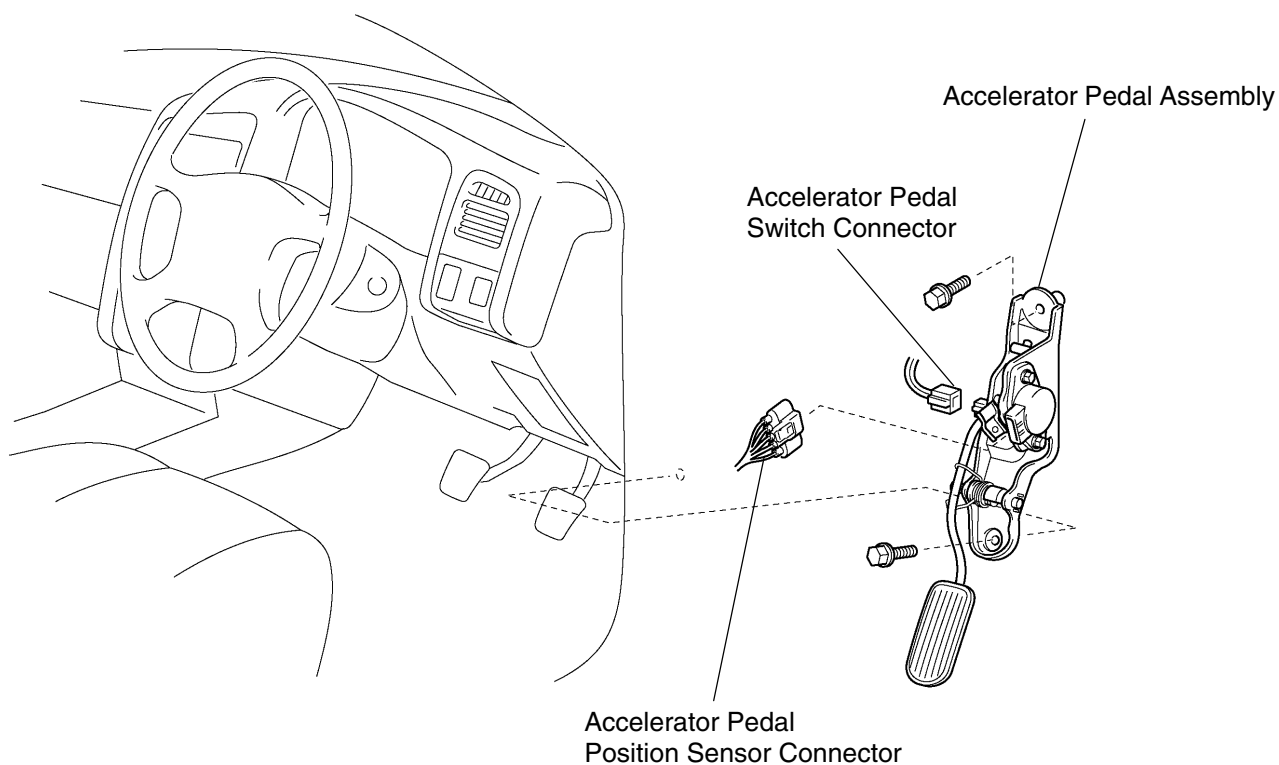
ACCELERATOR PEDAL COMPONENTS

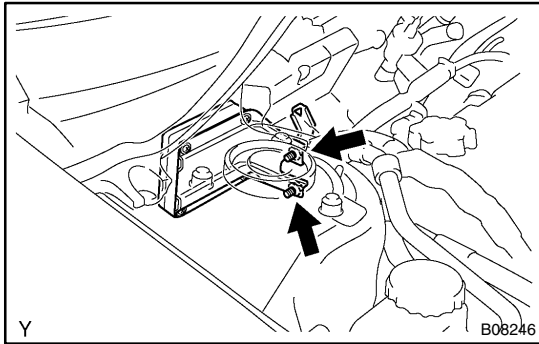
ED02K-01

LHD



RHD





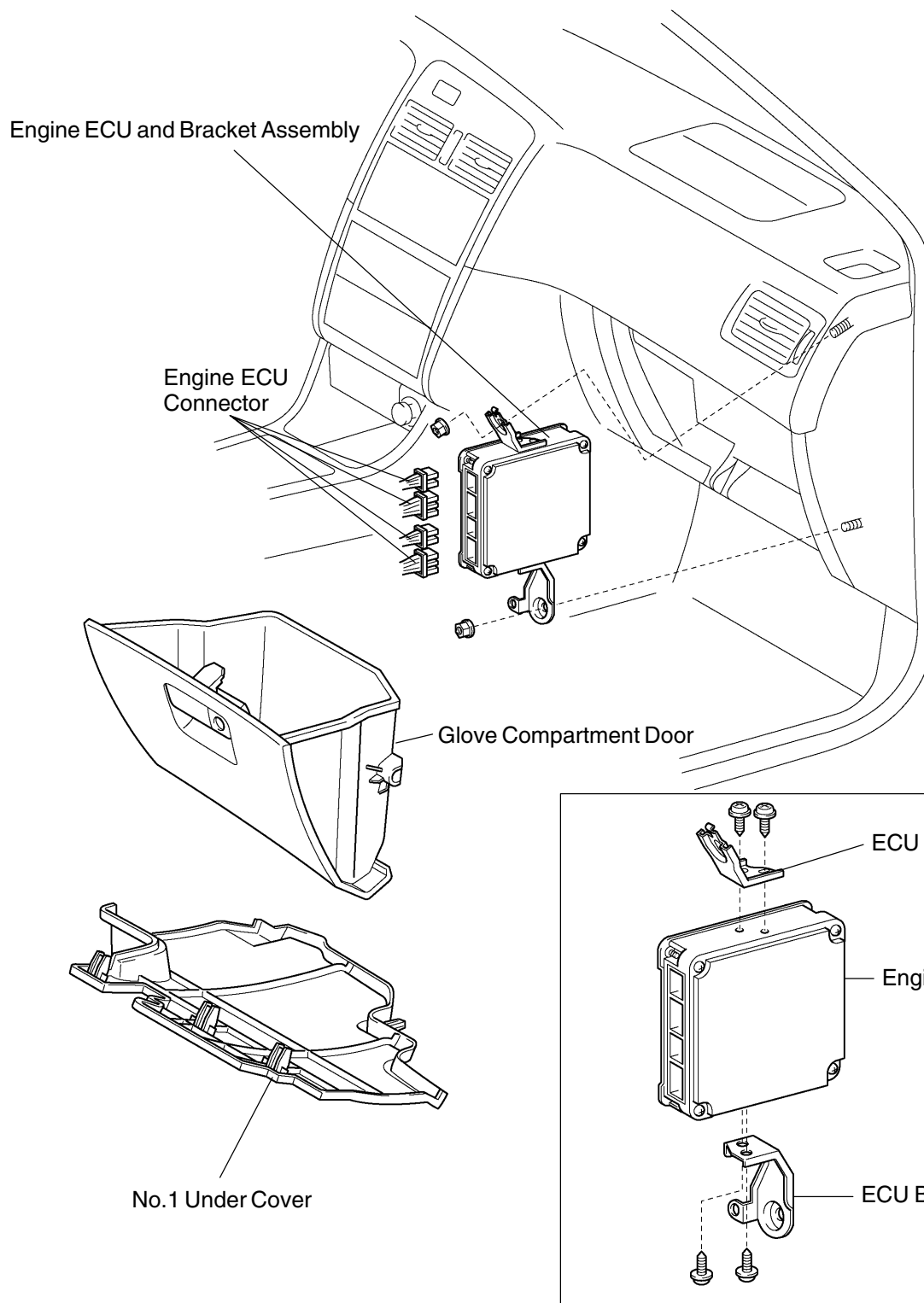
ELECTRONIC DRIVING UNIT (EDU) INSPECTION

ED02N-01

- 1. REMOVE EDU**
 - (a) Disconnect the 2 connectors.
 - (b) Remove the 2 bolts and EDU.
- 2. INSPECT EDU (See page DI-89)**
- 3. INSTALL EDU**
 - (a) Install the EDU with the 2 bolts.
 - (b) Connect the 2 connectors.

ENGINE ECU COMPONENTS

ED020-01



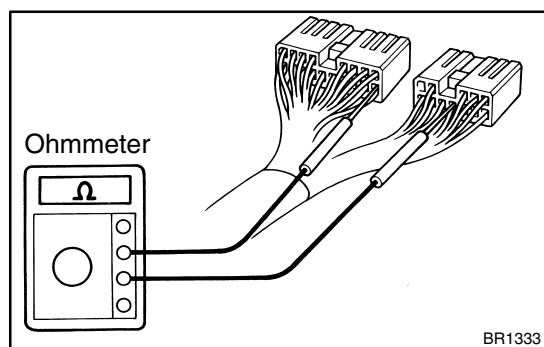
INSPECTION

HINT:

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

1. **REMOVE ENGINE ECU FROM VEHICLE BODY**
2. **INSPECT VOLTAGE OF ENGINE ECU**
(See page DI-17)
3. **INSPECT RESISTANCE OF ECD CIRCUITRY**

Terminals	Condition	STD resistance (Ω)
LU+A – +B	–	15 – 30
LU-A – +B	–	15 – 30
LU+B – +B	–	15 – 30
LU-B – +B	–	15 – 30
THOP – E1	–	10 or less
THW – E2	Coolant temp. 80°C (176°F)	0.2 – 0.4 k
THA – E2	Intake air temp. 20°C (68°F)	2.0 – 3.0 k
THF – E2	Fuel temp. 20°C (68°F)	2.0 – 3.0 k
G+ – G–	Cold (–10°C (14°F) to 50°C (122°F)) Hot (50°C (122°F) to 100°C (212°F))	1630 – 2740 2065 – 3225
NE+ – NE–	Cold (–10°C (14°F) to 50°C (122°F)) Hot (50°C (122°F) to 100°C (212°F))	1630 – 2740 2065 – 3225
PDL – E1	Accelerator pedal fully opened	10 or less
THAF – E2	–	2.0 – 3.0 k
MREL – E01	–	60 – 80
EDUREL – E01	–	60 – 80
EGR – +B	20°C (68°F)	11 – 13
EGRC – +B	20°C (68°F)	37 – 44
PA – +B	20°C (68°F)	37 – 44
RINJ1 – E01	20°C (68°F)	30 – 9600
RINJ2 – E01	20°C (68°F)	30 – 9600
RINJ3 – E01	20°C (68°F)	30 – 9600
RINJ4 – E01	20°C (68°F)	30 – 9600
PCV1 – COM	20°C (68°F)	1.5 – 1.8
PCV2 – COM	20°C (68°F)	1.5 – 1.8



- (a) Turn the ignition switch OFF.
- (b) Disconnect the 4 connectors from the engine ECU.
- (c) Measure the resistance between each terminal of the wiring connectors.

NOTICE:

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