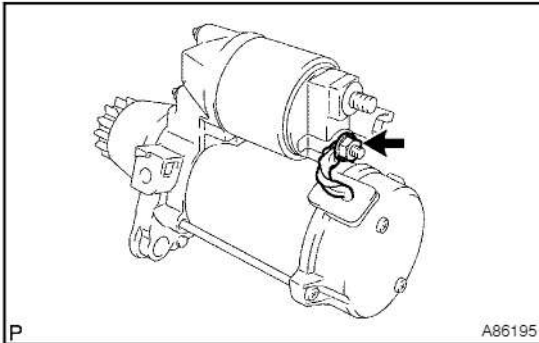


STARTING SYSTEM (2AZ-FSE)

INSPECTION

190V3-01

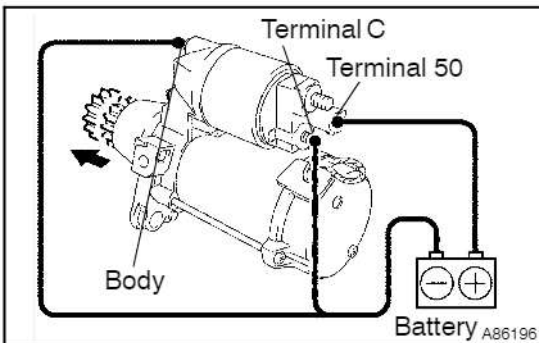


1. INSPECT STARTER ASSY

NOTICE:

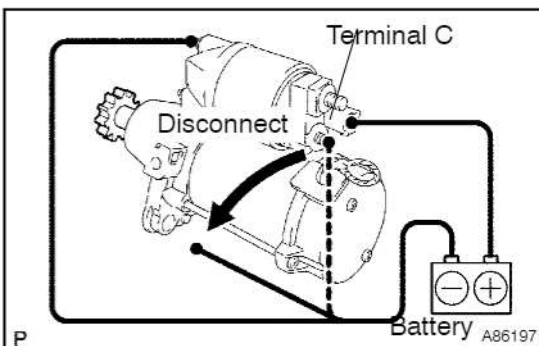
These tests must be performed within 3 to 5 seconds to prevent burnout of the coil.

- (a) Perform the pull-in test.
 - (1) Remove the nut, then disconnect the lead wire from terminal C.



- (2) Connect the battery to the repair service starter kit as shown in the illustration. Check that the clutch pinion gear is extended.

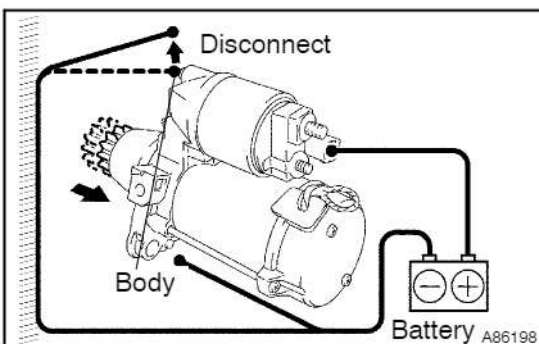
If the clutch pinion gear does not move, replace the starter magnetic switch.



- (b) Perform the hold-in test.

- (1) Disconnect the negative (-) lead from terminal C with the lead wire disconnected from terminal C. Check that the clutch pinion gear remains extended.

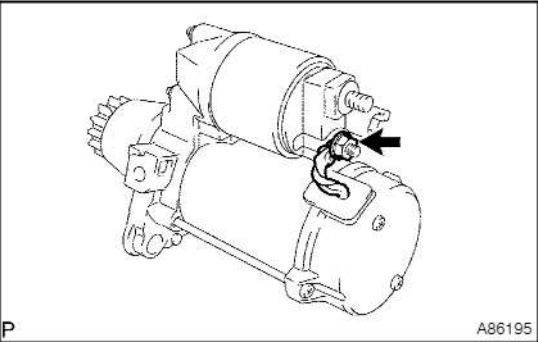
If the clutch pinion gear returns inward, replace the starter magnetic switch.



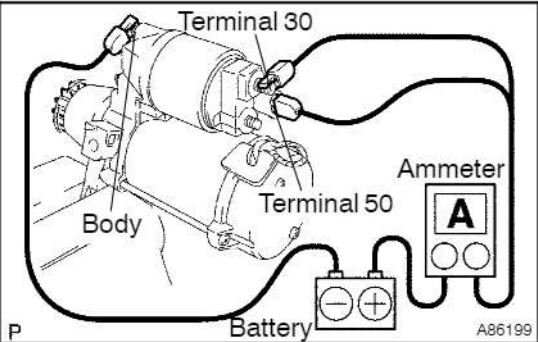
- (c) Check the clutch pinion gear return.

- (1) Disconnect the negative (-) lead from the switch body. Check that the clutch pinion gear returns.

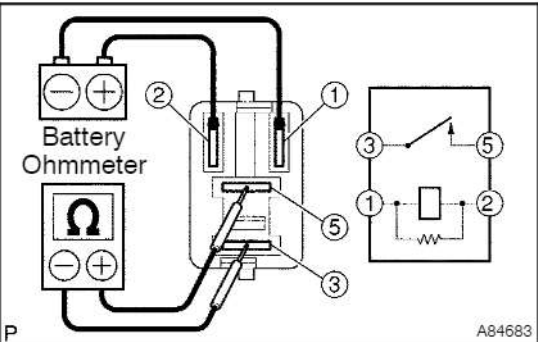
If the clutch pinion gear does not return inward, replace the magnetic switch.



- (d) Perform the no-load performance test.
- (1) Connect the lead wire to terminal C. Make sure that the lead is not grounded.
- Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)**



- (2) Clamp the starter in a vise.
- (3) Connect the battery and an ammeter to the starter as shown in the illustration.
- (4) Check that the starter rotates smoothly and steadily with the clutch pinion gear extended. Check that the ammeter reads the specified current.
- Standard: 75 A or less at 11.5 V**
- If the current is not as specified, replace the starter.



2. INSPECT STARTER RELAY ASSY

- (a) Inspect the resistance.
- (1) Using an ohmmeter, measure the resistance between the terminals.
- Standard:**

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1Ω (Apply battery voltage to terminals 1 and 2)

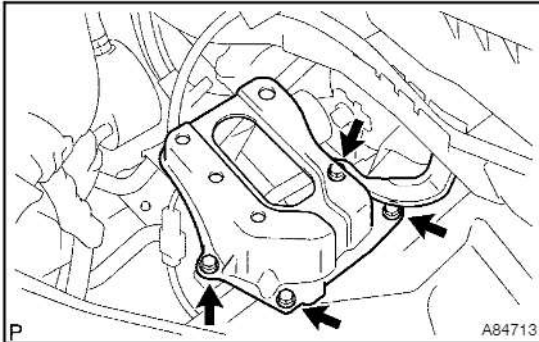
If the result is not as specified, replace the starter relay.

STARTER ASSY (2AZ-FSE)

REPLACEMENT

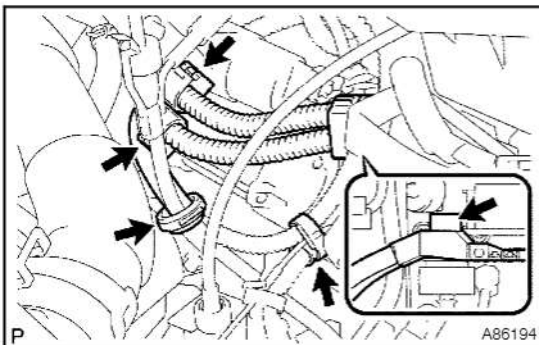
190V4-01

1. REMOVE RADIATOR SUPPORT OPENING COVER (See page 10-8)
2. REMOVE BATTERY CLAMP SUB-ASSY
3. REMOVE BATTERY
4. REMOVE BATTERY TRAY



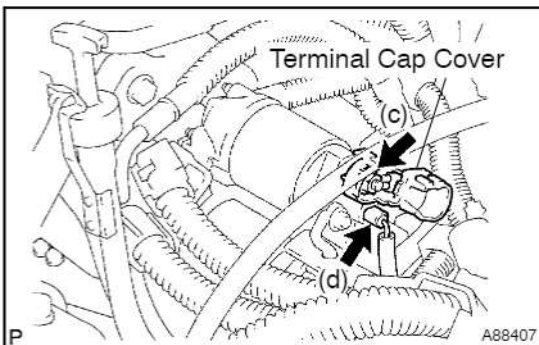
5. REMOVE BATTERY CARRIER

- (a) Remove the 4 bolts, then remove the battery carrier.

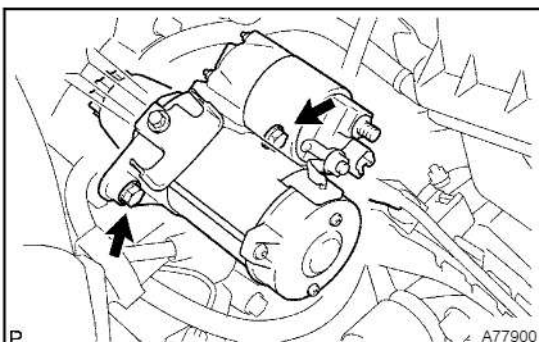


6. REMOVE STARTER ASSY

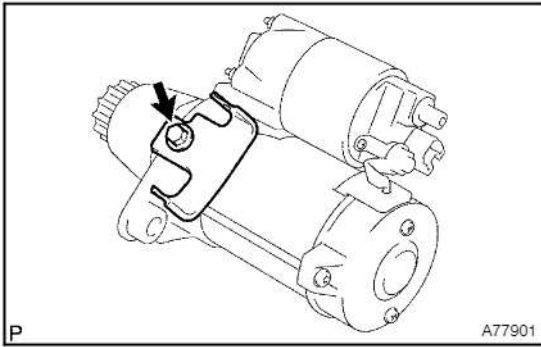
- (a) Remove the 5 wire harness clamps.



- (b) Open the terminal cap cover.
- (c) Remove the nut, then disconnect the starter wire.
- (d) Disconnect the starter connector.



- (e) Remove the 2 bolts, then remove the starter.



- (f) Remove the bolt, then remove the wire harness clamp bracket.

7. INSTALL STARTER ASSY

- (a) Install the wire harness clamp bracket with the bolt.

Torque: 8.4 N·m (86 kgf·cm, 74 in·lbf)

- (b) Install the starter with the 2 bolts.

Torque: 37 N·m (380 kgf·cm, 28 ft·lbf)

- (c) Connect the starter connector.

- (d) Connect the starter wire with the nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

- (e) Close the terminal cap cover.

- (f) Install the 5 wiring harness clamps.

8. INSTALL BATTERY CARRIER

Torque: 13 N·m (131 kgf·cm, 9 ft·lbf)

9. INSTALL BATTERY TRAY

10. INSTALL BATTERY

11. INSTALL BATTERY CLAMP SUB-ASSY

Torque:

5.0 N·m (51 kgf·cm, 44 in·lbf) for bolt

3.5 N·m (36 kgf·cm, 31 in·lbf) for nut

5.4 N·m (55 kgf·cm, 48 in·lbf) for terminal

12. INSTALL RADIATOR SUPPORT OPENING COVER

CHARGING SYSTEM (2AZ-FSE)

190V5-01

PRECAUTION

1. Check that the battery cables are connected to the correct terminals.
2. Disconnect the battery cables if a quick change is given to the battery.
3. Do not perform tests with a high voltage insulation resistance tester.
4. Never disconnect the battery while the engine is running.
5. Check that the charging cable is tightened on terminal B of the generator and the fuse box.
6. Do not check whether the alternator generates or not with connecting terminal F to the other terminal.

cardmagn.com

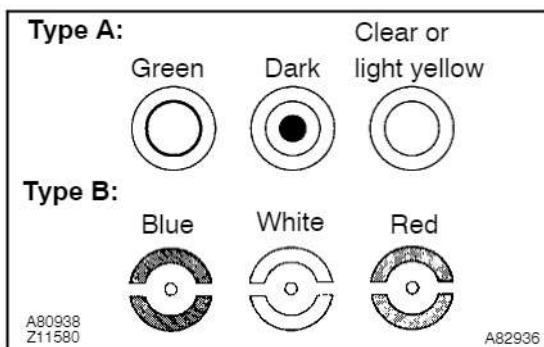
ON-VEHICLE INSPECTION

1. INSPECT BATTERY (EXCEPT MAINTENANCE-FREE BATTERY)

(a) Check the battery electrolyte level.

(1) Check the electrolyte quantity of each cell.

If the electrolyte quantity is below the recommended amount, add distilled water.



(b) Check the indicator as shown in the illustration.

HINT:

Indicator color		Condition
Type A	Type B	
Green	Blue	OK
Dark	White	Charging necessary
Clear or light yellow	Red	Replace

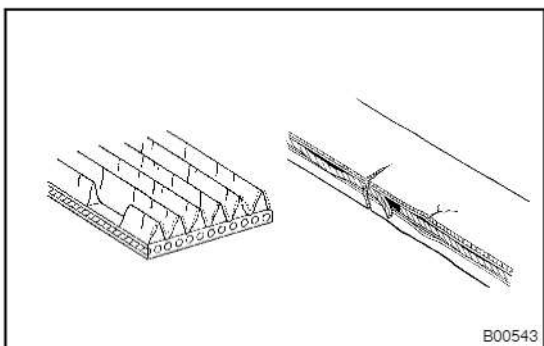
2. INSPECT BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Visually check the battery terminals.

(1) Check that the battery terminals are not loosened or corroded.

(b) Visually check the fusible link and fuses.

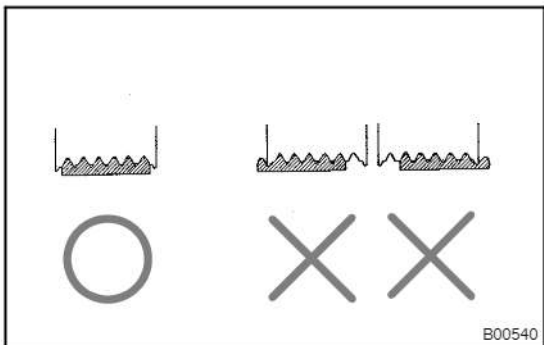
(1) Check that there is continuity of the fusible links, high-current fuses and regular fuses.



3. INSPECT V-RIBBED BELT

(a) Visually check the belt for excessive wear, frayed cords etc.

- If any defects are found, replace the v-ribbed belt.
- Cracks on the rib side of the belt are considered acceptable.
If the belt has chunks missing from the ribs, it should be replaced.



(b) Check that the belt fits properly in the ribbed grooves. Confirm that the belt has not slipped out of the groove on the bottom of the pulley by hand.

4. VISUALLY CHECK GENERATOR WIRING

(a) Check that the wiring is in good condition.

5. LISTEN FOR ABNORMAL NOISES FROM GENERATOR

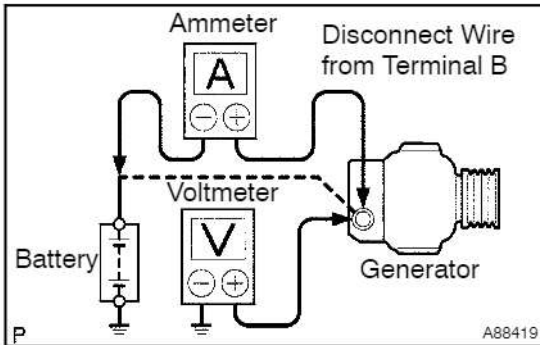
(a) Check that no abnormal noise is heard from the generator while the engine is running.

6. INSPECT CHARGE WARNING LIGHT CIRCUIT

- (a) Turn the ignition switch ON. Check that the charge warning light comes on.
- (b) Start the engine, then check that the light goes off.

HINT:

If the light does not operate as specified, troubleshoot the charge warning light circuit.



7. INSPECT CHARGING CIRCUIT WITHOUT LOAD

- (a) If a tester is not available, connect a voltmeter to the charging circuit as follows:
 - (1) Disconnect the wire from terminal B of the generator, then connect it to the negative (-) lead of the ammeter.
 - (2) Connect the positive (+) lead of the ammeter to terminal B of the generator.
 - (3) Connect the positive (+) lead of the voltmeter to terminal B of the generator.
 - (4) Ground the negative (-) lead of the voltmeter.
- (b) Check the charging circuit.
 - (1) Keep the engine speed at 2,000 rpm, then check the reading on the ammeter and voltmeter.

Standard amperage: 10 A or less

Standard voltage: 12.9 to 14.9 V

8. INSPECT CHARGING CIRCUIT WITH LOAD

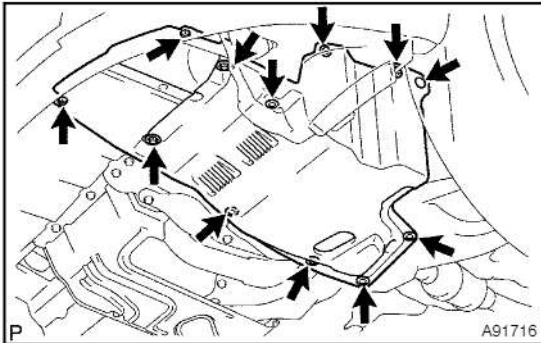
- (a) With the engine running at 2,000 rpm, turn the high beam headlights ON and turn the heater blower switch to the "HI" position.
- (b) Check the reading on the ammeter.

Standard amperage: 30 A or more

- If the ammeter reading is less than the standard amperage, repair the generator.
- If the battery is fully charged, the indication will sometimes be less than the standard amperage.

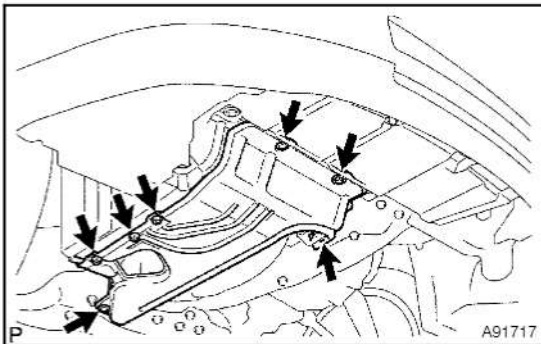
GENERATOR ASSY (2AZ-FSE) REPLACEMENT

190V7-01



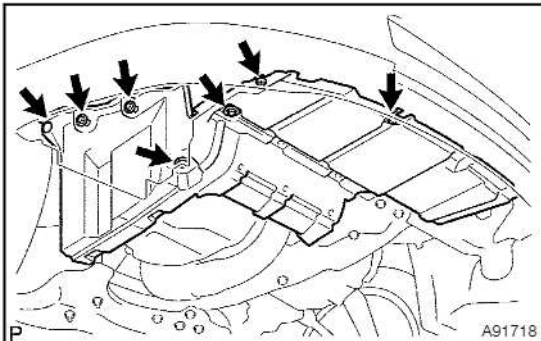
1. REMOVE ENGINE UNDER COVER LH

- (a) Remove the 6 screws and 6 clips, then remove the engine under cover.



2. REMOVE ENGINE UNDER COVER SUB-ASSY NO.1

- (a) Remove the bolt, 3 screws and 3 clips, then remove the engine under cover No. 1.

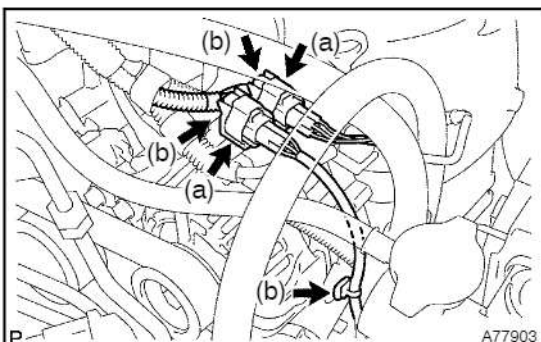


3. REMOVE ENGINE UNDER COVER RH

- (a) Remove the 5 screws and 2 clips, then remove the engine under cover.

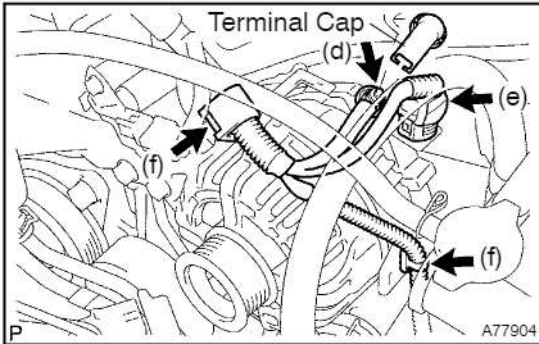
4. REMOVE RADIATOR SUPPORT OPENING COVER ([See page 10-8](#))
5. REMOVE ENGINE ROOM COVER SIDE ([See page 10-8](#))
6. DISCONNECT ENGIEN WIRE NO. 3 (BATTERY NEGATIVE TERMINAL)
7. REMOVE FAN AND GENERATOR V BELT ([See page 14-5](#))

SST 09249-63010

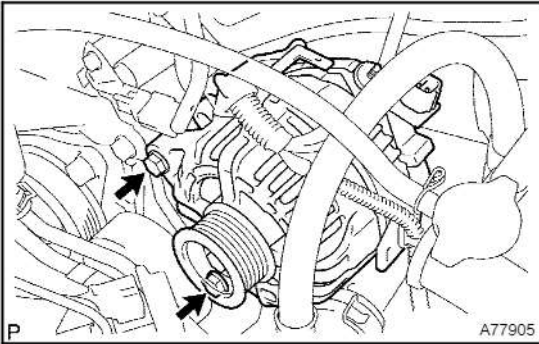


8. REMOVE GENERATOR ASSY

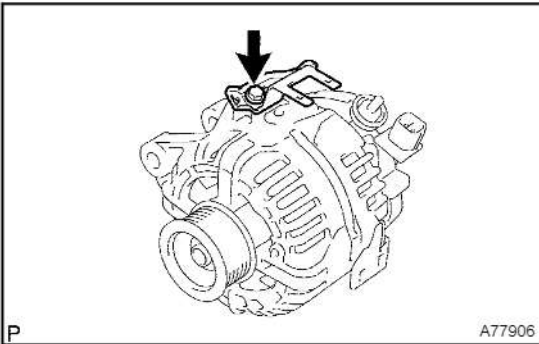
- (a) Disconnect the 2 heated oxygen sensor connectors.
(b) Remove the 2 connector clamps of the heated oxygen sensor and the wiring harness clamp.



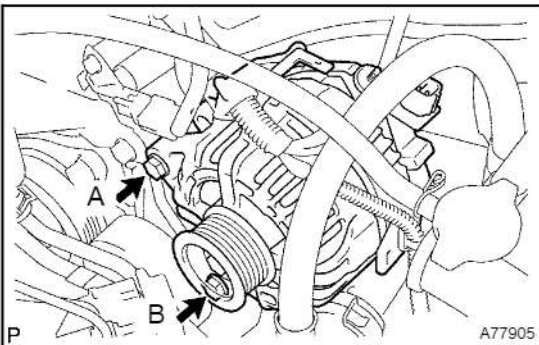
- (c) Remove the terminal cap.
- (d) Remove the nut, then disconnect the generator wire.
- (e) Disconnect the generator connector.
- (f) Remove the 2 wiring harness clamps.



- (g) Remove the 2 bolts, then remove the generator.



- (h) Remove the bolt, then remove the wire harness clamp bracket.



9. INSTALL GENERATOR ASSY

- (a) Install the wire harness clamp bracket with the bolt.

Torque: 8.4 N·m (86 kgf·cm, 74 in·lbf)

- (b) Install the generator with the 2 bolts.

Torque:

52 N·m (530 kgf·cm, 38 ft·lbf) for bolt A

21 N·m (214 kgf·cm, 16 ft·lbf) for bolt B

- (c) Install the 2 wiring harness clamps.
- (d) Connect the generator connector.
- (e) Install the generator wire with the nut.
Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)
- (f) Install the terminal cap.
- (g) Install the 2 connector clamps of the heated oxygen sensor and the wiring harness clamp.
- (h) Connect the 2 heated oxygen sensor connectors.

10. INSTALL FAN AND GENERATOR V BELT (See page 14-5)

SST 09249-63010

11. CONNECT ENGINE WIRE NO. 3 (BATTERY NEGATIVE TERMINAL)

Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)

12. INSTALL ENGINE ROOM COVER SIDE

AVENSIS Supplement (RM1045E)

13. INSTALL RADIATOR SUPPORT OPENING COVER
14. INSTALL ENGINE UNDER COVER RH
15. INSTALL ENGINE UNDER COVER SUB-ASSY NO.1
16. INSTALL ENGINE UNDER COVER LH

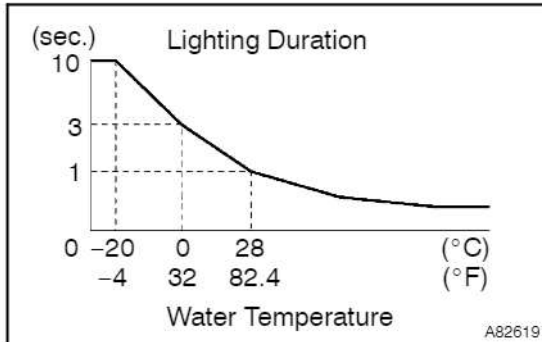
PRE-HEATING SYSTEM (1CD-FTV)(From September, 2003)

ON-VEHICLE INSPECTION

190V9-01

NOTICE:

Turn the ignition switch to OFF for 60 seconds before performing the following inspections.

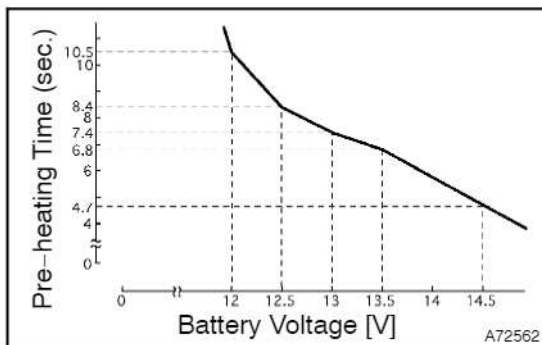


1. INSPECT LIGHTING DURATION OF GLOW INDICATOR LIGHT

- (a) Turn the ignition switch to ON, then measure the lighting duration.

Lighting duration: Refer to the graph

If the result is not as specified, inspect the ECM, engine coolant temperature sensor, glow plug and glow plug relay.



2. INSPECT PRE-HEATING

- (a) Turn the ignition switch to ON, then measure how long it takes for the battery voltage to be applied to the glow plugs.

SST 09082-00030, 09083-00150

Pre-Heating time:

Engine Coolant Temperature	Pre-Heating Time
40 °C or higher	1 second
Below 40 °C	Refer to the graph (15 seconds at the longest)

If the result is not as specified, inspect the ECM, engine coolant temperature sensor, glow plug and glow plug relay.

- (b) Turn the ignition switch to STA, check that the battery voltage applied to the glow plugs.

SST 09082-00030, 09083-00150

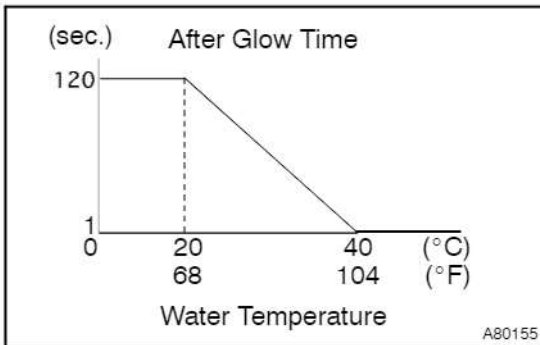
- (c) While cranking the engine, measure how long it takes for the battery voltage to be applied to the glow plugs.

SST 09082-00030, 09083-00150

Pre-Heating time:

Engine Coolant Temperature	Pre-Heating Time
40 °C or higher	1 second
Below 40 °C	Refer to the graph (15 seconds at the longest)

If the result is not as specified, inspect the ECM, engine coolant temperature sensor, glow plug and glow plug relay.

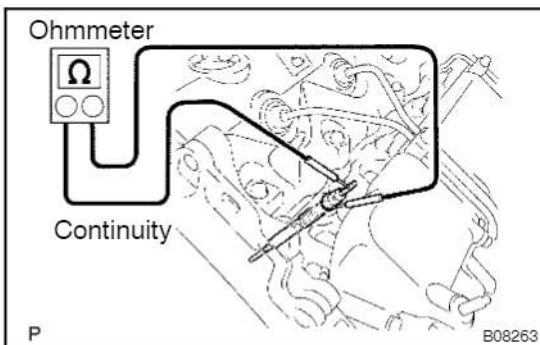
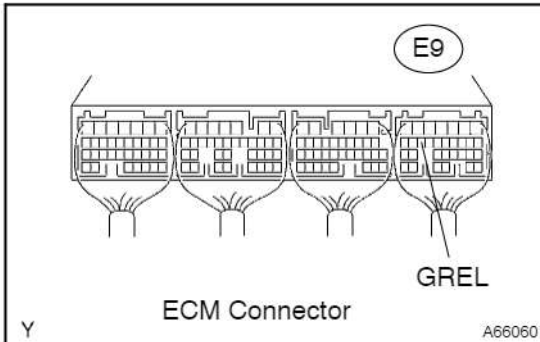


3. INSPECT AFTER GLOW TIME

- (a) After starting the engine, measure how long it takes for the battery voltage to be applied to terminal E9-15 (GREL) of the ECM.

After glow time: Refer to the graph

If the result is not as specified, inspect the ECM, engine coolant temperature sensor, glow plug and glow plug relay.



4. INSPECT GLOW PLUGS

- (a) Using an ohmmeter, measure the resistance between the glow plug terminal and ground.

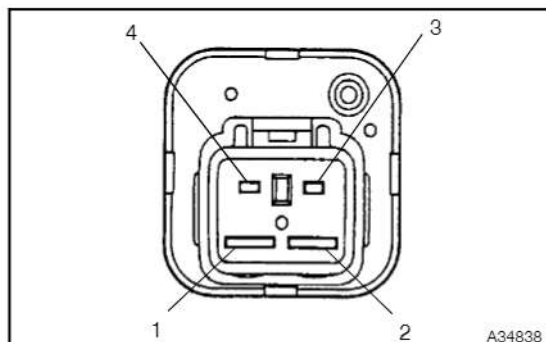
Standard resistance: Approximately 1.1 Ω at 20°C (68°F)

If the resistance is not as specified, replace the glow plug.

NOTICE:

- Be careful not to damage the glow plug pipes as it could cause an open circuit or shorten life of the glow plugs.
- Avoid contact of the glow plug with oil or gasoline when cleaning.
- Wipe up any oil on the terminal and Bakelite washer using a dry cloth if they are stained with oil during the inspection.

INSPECTION



1. INSPECT GLOW PLUG RELAY ASSY

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

Specified condition:

Tester Connection	Specified Condition
1 – 2	10 k Ω or Higher
1 – 2	Below 1 Ω (When battery voltage is applied to terminals 3 and 4)

If the result is not as specified, replace the glow plug relay.