

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

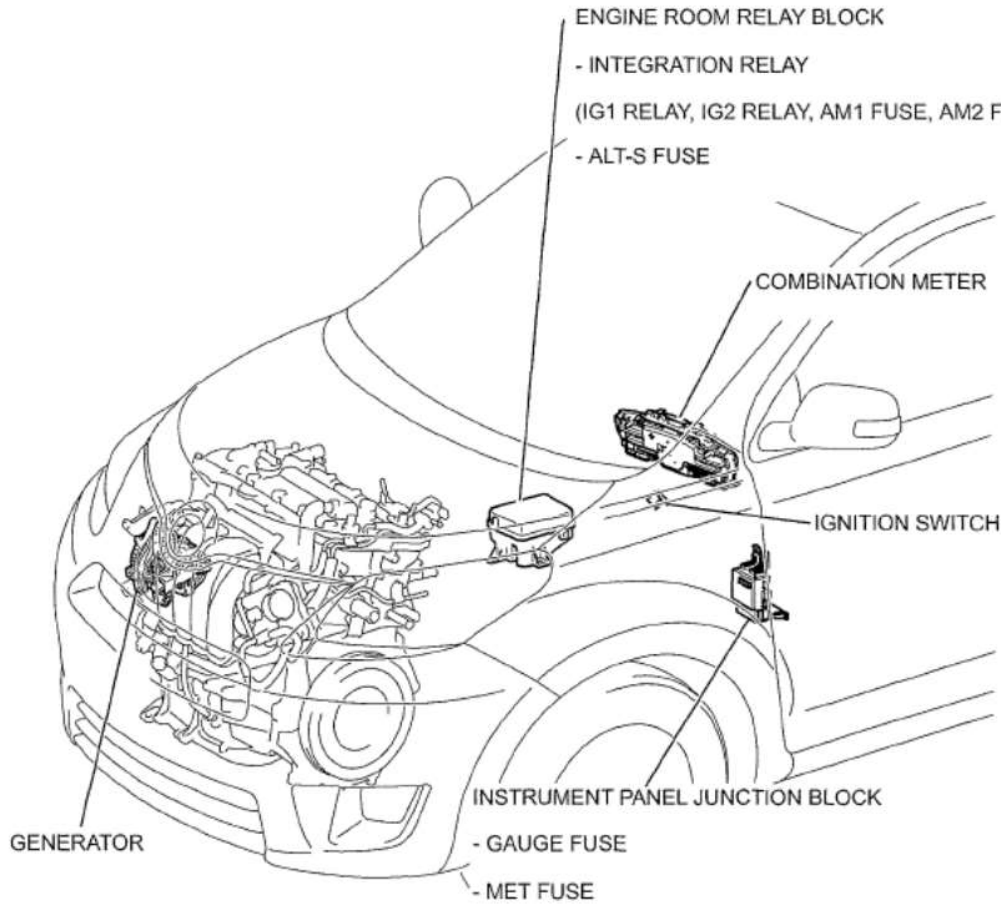
2008 ELECTRICAL**2ZR-FE Charging - xD****CHARGING SYSTEM****PRECAUTION**

1. Check that the battery cables are connected to the correct terminals.
2. Disconnect the battery cables when the battery is given a quick charge.
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 nut is tightened on terminal B of the generator and the engine room relay block.

PARTS LOCATION

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD



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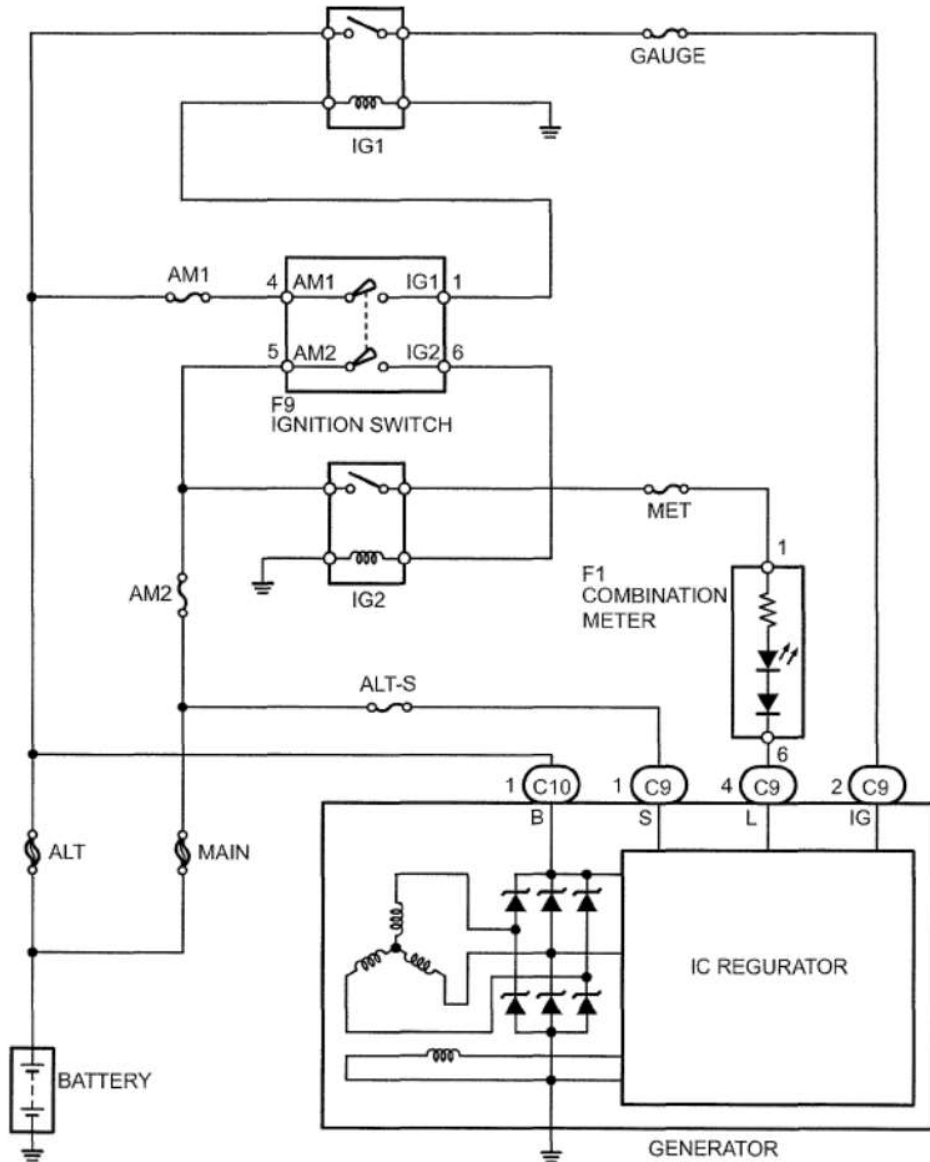
Fig. 1: Identifying Charging Parts Location

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

SYSTEM DIAGRAM

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2008 ELECTRICAL 2ZR-FE Charging - xD



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Fig. 2: Charging System Diagram

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

ON-VEHICLE INSPECTION

CAUTION: If the battery is weak or if the engine is difficult to start, recharge the battery and perform inspections again before returning the vehicle to the customer.

1. CHECK BATTERY CONDITION

- Check the battery for damage and deformation. If severe damage, deformation or leakage is found.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

replace the battery.

b. Check the volume of electrolyte in each cell.

1. For batteries that are maintenance-free:

- If the electrolyte volume is below the lower line, replace the battery.
- If the electrolyte volume is above the lower line, check the battery voltage when cranking the engine.
- If the voltage is less than 9.6 V, recharge or replace the battery.

HINT:

Before checking the battery voltage, turn off all electrical systems (headlights, blower motor, etc.).

2. For batteries that are not maintenance-free:

- If the electrolyte volume is below the lower line, add distilled water to each cell. Then, recharge the battery and check the electrolyte specific gravity.

Standard specific gravity:

1.25 to 1.29 at 20°C (68°F)

If the electrolyte volume is above the lower line, check the battery voltage when cranking the engine. If the voltage is less than 9.6 V, recharge or replace the battery.

HINT:

Before checking the battery voltage, turn off all electrical systems (headlights, blower motor, rear defogger, etc.).

2. CHECK BATTERY VOLTAGE

- a. If it has been less than 20 minutes since you stopped driving the vehicle, turn the ignition switch and electrical systems (headlight, blower motor, rear defogger, etc.) for 60 seconds to remove the surface charge on the battery.

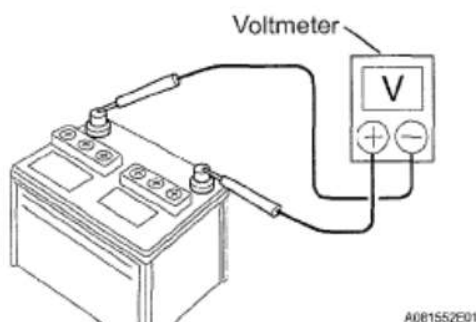


Fig. 3: Measuring Battery Voltage Between Negative And Positive Terminals Of Battery

2008 Scion xD**2008 ELECTRICAL 2ZR-FE Charging - xD**

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

- b. Turn off the ignition switch and electrical systems.
- c. Measure the battery voltage between the negative (-) and positive (+) terminals of the battery.

Standard voltage:

11 to 14 V at 20°C (68°F)

If the voltage is less than the specified range, charge the battery.

3. CHECK BATTERY TERMINAL AND FUSE

- a. Check that the battery terminals are not loose or corroded.

If the terminals are corroded, clean the terminals.

- b. Measure the resistance of the H-fuse and remaining fuses.

Standard resistance:

Below 1 ohms

If the results are not as specified, replace the fuses as necessary.

4. CHECK V-RIBBED BELT

- a. Check the belt for wear, cracks and other signs of damage.

If any defects are found, replace the V-ribbed belt.

HINT:

Replace the drive belt if any of the following defects are found:

- The belt is worn out and the wire is exposed.
- The cracks reach the wire in more than one place.
- The belt has pieces missing from the ribs.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

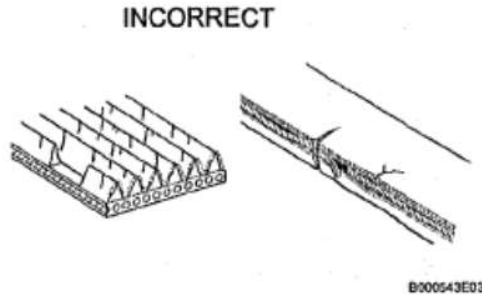


Fig. 4: Identifying V-Ribbed Belt Cracks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check that the belt fits properly into the ribbed grooves.

HINT:

Confirm by hand that the belt has not slipped out of the grooves on the bottom of the pulley.



Fig. 5: Identifying Belt Incorrect And Correct Grooves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. VISUALLY CHECK GENERATOR WIRING

- a. Check that the wiring is in good condition.

6. LISTEN FOR ABNORMAL NOISES FROM GENERATOR

- a. Check that the generator does not emit any abnormal noise while the engine is running.

7. CHECK CHARGE WARNING LIGHT CIRCUIT

- a. Turn the ignition switch on (IG). Check that the charge warning light turns on.
- b. Start the engine and check that the light turns off. If the light does not operate as specified, troubleshoot the charge warning light circuit.

8. CHECK CHARGING CIRCUIT WITHOUT LOAD

- a. Connect a voltmeter and an ammeter to the charging circuit as follows.

HINT:

If a battery/generator tester is available, connect the tester to the charging circuit according to the manufacturer's instructions.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

1. Disconnect the wire from terminal B of the generator and connect it to the negative (-) lead of the ammeter.
2. Connect the positive (+) ammeter lead to terminal B of the generator.
3. Connect the positive (+) voltmeter lead to positive (+) terminal of the battery.
4. Ground the negative (-) voltmeter lead.

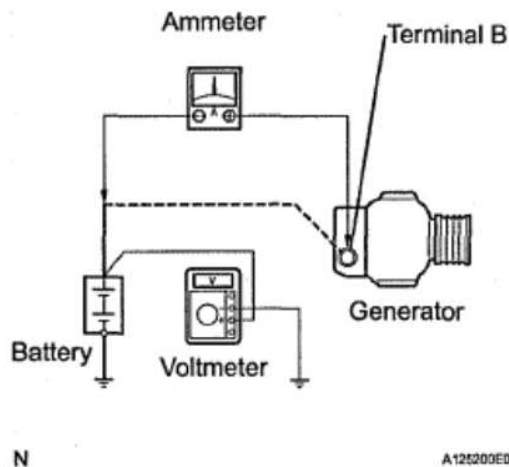


Fig. 6: Connecting Voltmeter And Ammeter To Charging Circuit
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check the charging circuit.
 1. Keep the engine speed at 2000 rpm and check the reading on the ammeter and voltmeter.

Standard current:

10 A or less

Standard voltage:

13.2 to 14.8 V

If the result is not as specified, replace the generator.

HINT:

If the battery is not fully charged, the ammeter reading will sometimes be more than the standard current.

9. CHECK CHARGING CIRCUIT WITH LOAD

- a. With the engine running at 2000 rpm, turn on the high beam headlights and turn the heater blower switch to the HI position.
- b. Check the reading on the ammeter.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

Standard current:**30 A or more**

If the ammeter reading is less than the standard current, replace the generator.

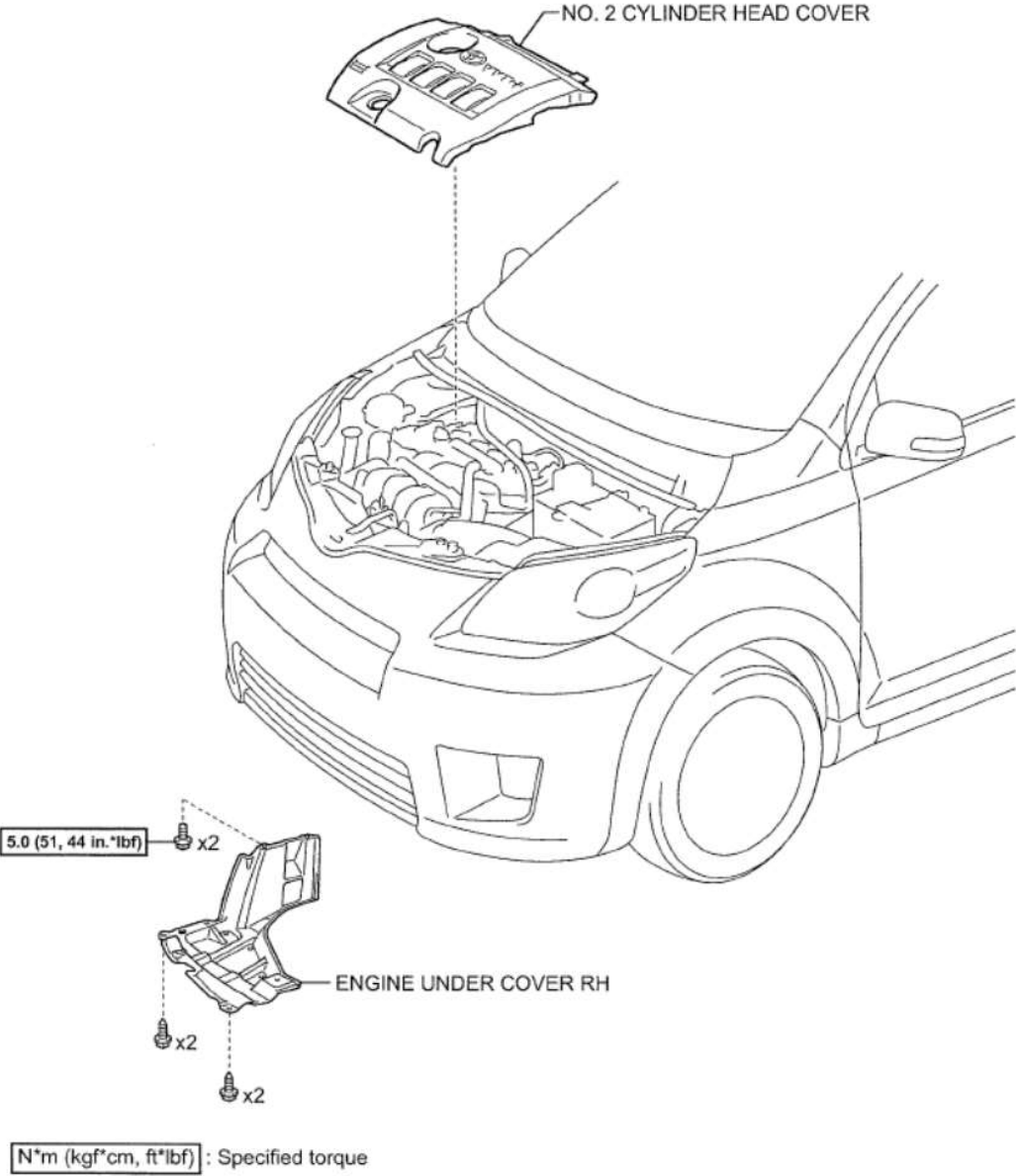
HINT:

If the battery is fully charged, the ammeter reading will sometimes be less than the standard current. In this case, operate the wiper motor and the window defogger to increase the load and then check the charging circuit again.

GENERATOR**COMPONENTS**

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD



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Fig. 7: Identifying Generator Components With Torque Specification (1 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

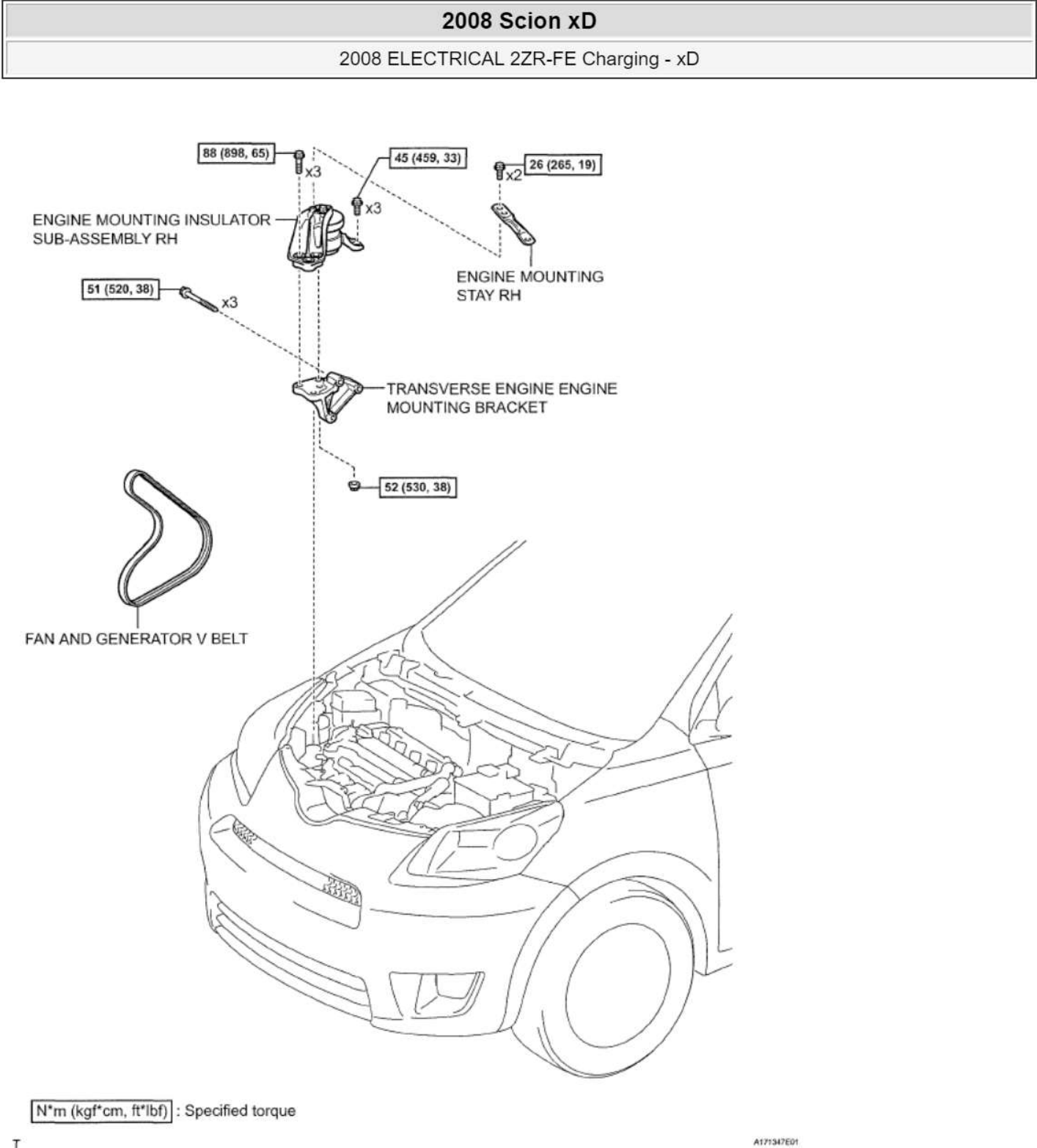
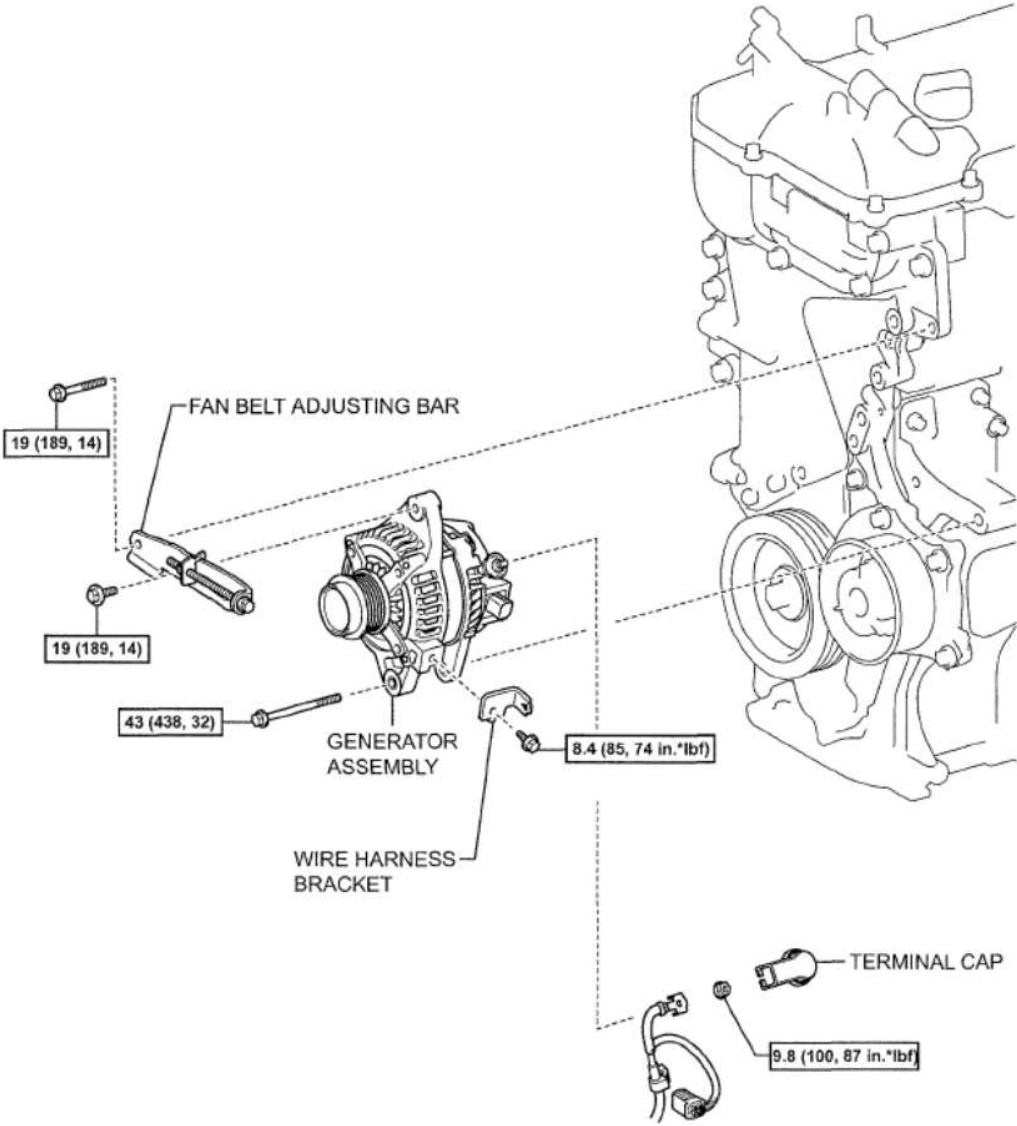


Fig. 8: Identifying Generator Components With Torque Specifications (2 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2008 Scion xD

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

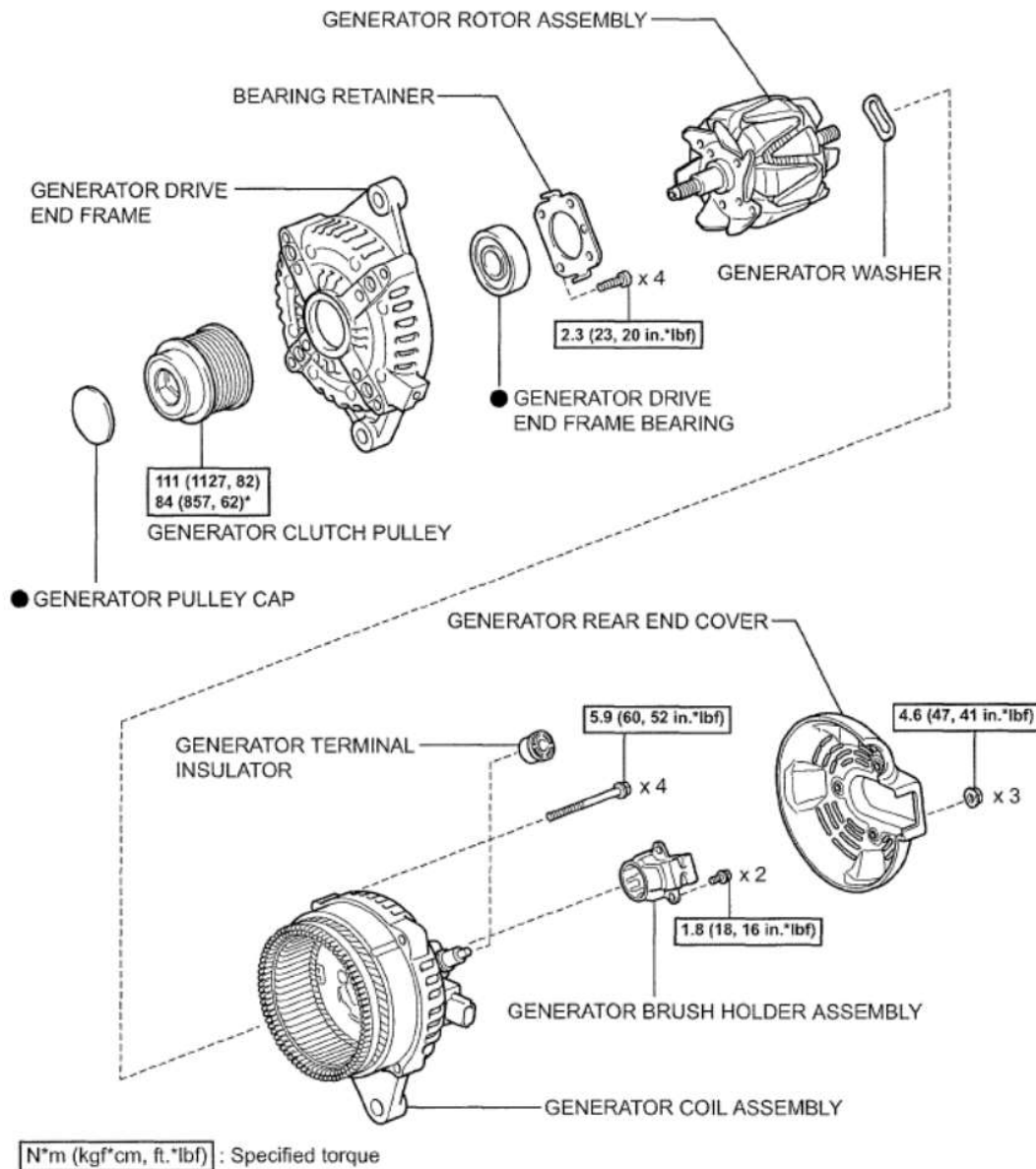
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Fig. 9: Identifying Generator Components With Torque Specifications (3 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2008 Scion xD

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Fig. 10: Identifying Generator Components With Torque Specifications (4 Of 4)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

2. **REMOVE ENGINE UNDER COVER RH**
3. **REMOVE NO. 2 CYLINDER HEAD COVER** (See REMOVAL)
4. **REMOVE FAN AND GENERATOR V BELT** (See REMOVAL)
5. **REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH**
 - a. Remove 2 bolts and remove the engine mounting stay RH.

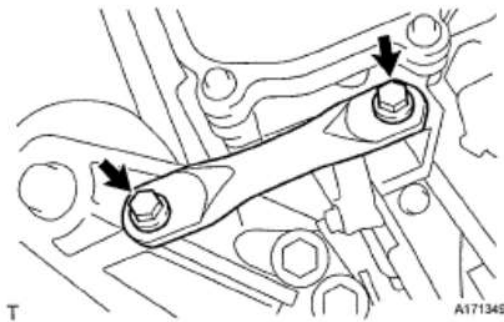


Fig. 11: Locating Engine Mounting Stay RH And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Place a wooden block on a jack underneath the engine.

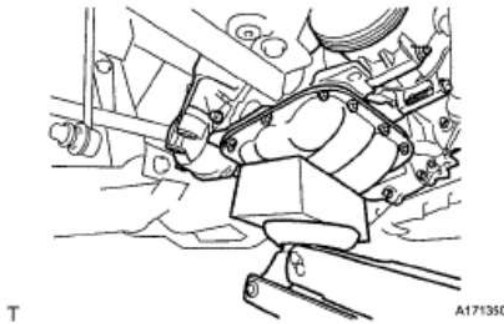


Fig. 12: Placing Wooden Block On Jack Underneath Engine
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the 6 bolts and nut and remove the engine mounting insulator sub-assembly RH.

NOTE: Do not remove bolt A.

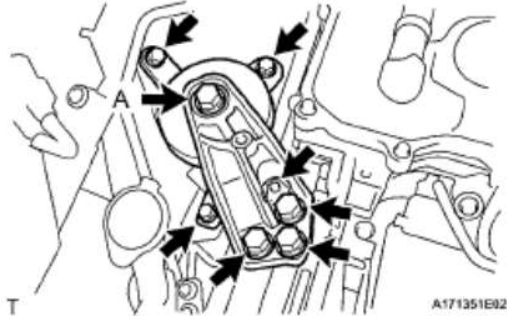
2008 Scion xD**2008 ELECTRICAL 2ZR-FE Charging - xD**

Fig. 13: Locating Engine Mounting Insulator Sub-Assembly RH, Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **REMOVE TRANSVERSE ENGINE MOUNTING BRACKET**
 - a. Remove the 3 bolts and remove the engine mounting bracket.

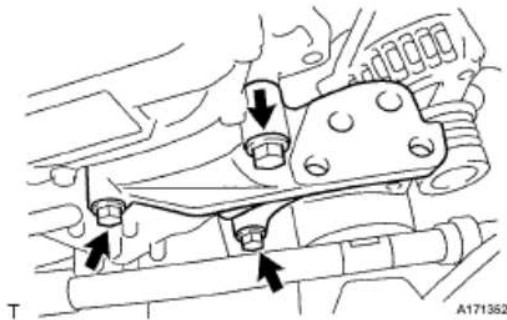


Fig. 14: Locating Engine Mounting Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **REMOVE GENERATOR ASSEMBLY**
 - a. Remove the 2 bolts and remove the fan belt adjusting bar.

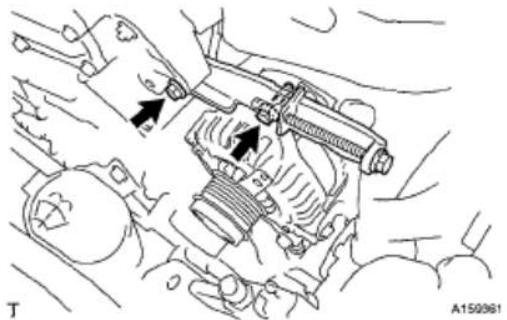


Fig. 15: Locating Fan Belt Adjusting Bar Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the terminal cap.

2008 Scion xD**2008 ELECTRICAL 2ZR-FE Charging - xD**

- c. Remove the nut and remove terminal B.
- d. Disconnect the connector and harness clamp.

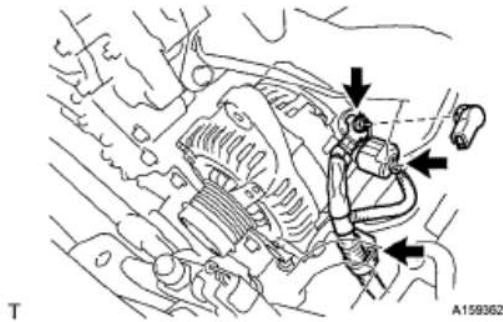


Fig. 16: Locating Connector And Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Remove the bolt and remove the generator assembly.

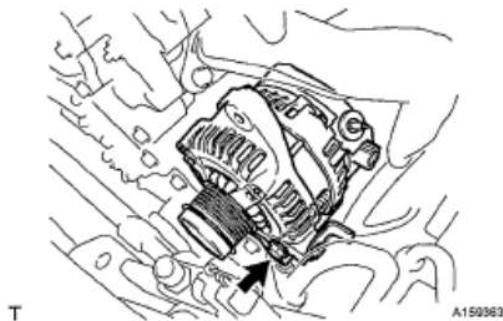


Fig. 17: Locating Generator Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

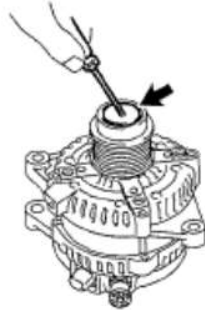
- f. Remove the bolt and remove the wire harness bracket.

DISASSEMBLY**1. REMOVE GENERATOR CLUTCH PULLEY**

- a. Using a screwdriver, remove the generator pulley cap.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD



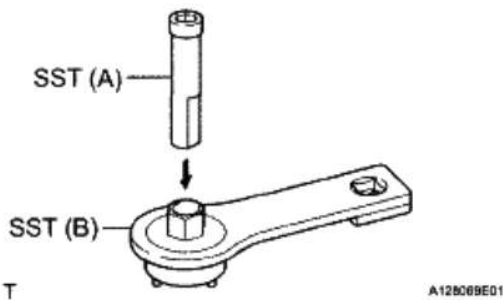
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Fig. 18: Removing Generator Pulley Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Set SST (A) and (B).

SST 09820-63020

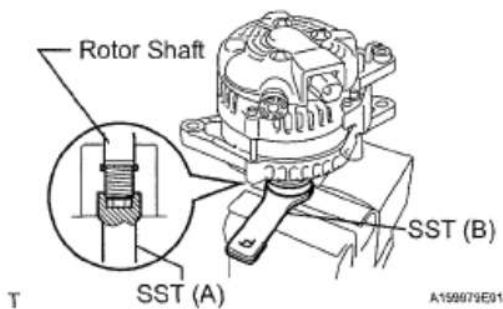


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Fig. 19: Identifying SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Clamp SST (A) in a vise.
d. Place the rotor shaft end into SST (A).



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Fig. 20: Identifying Rotor Shaft End And SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Fit SST (B) onto the clutch pulley.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

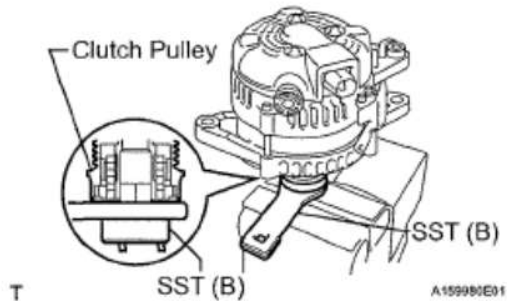


Fig. 21: Identifying Clutch Pulley With SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Loosen the pulley by turning SST (B) in the direction shown in the illustration.

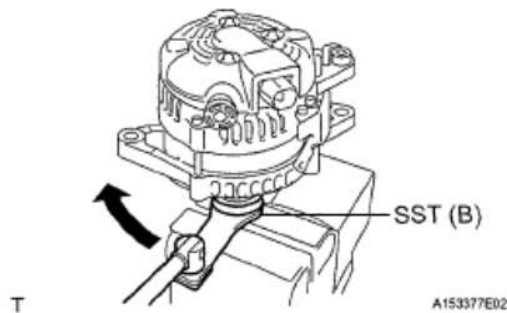


Fig. 22: Loosening Pulley By Turning SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Remove the generator assembly from SST.
h. Remove the clutch pulley from the rotor shaft.

2. REMOVE GENERATOR REAR END COVER

- a. Place the generator assembly on the clutch pulley.

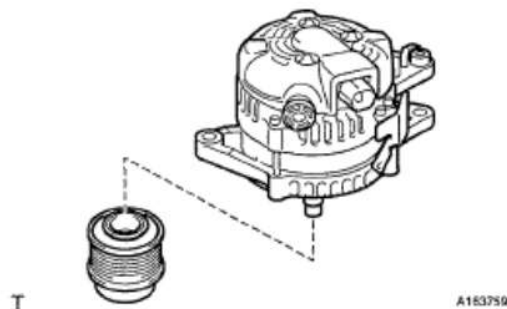
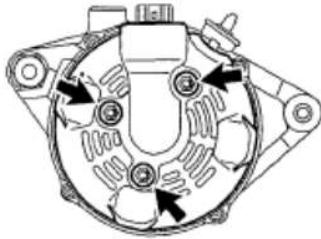


Fig. 23: Identifying Generator Rear End Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 3 nuts and generator rear end cover.

2008 Scion xD**2008 ELECTRICAL 2ZR-FE Charging - xD**

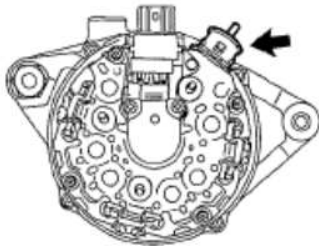
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Fig. 24: Identifying Generator Rear End Cover Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. REMOVE GENERATOR TERMINAL INSULATOR

- a. Remove the terminal insulator from the generator coil.



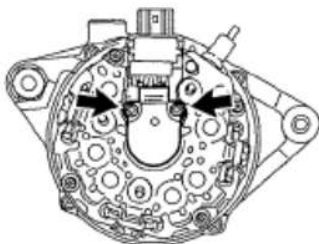
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Fig. 25: Locating Terminal Insulator Of Generator Coil
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY

- a. Remove the 2 screws and brush holder from the generator coil.



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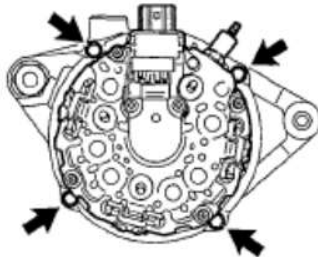
Fig. 26: Locating Generator Brush Holder Assembly Screw
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. REMOVE GENERATOR COIL ASSEMBLY

- a. Remove the 4 bolts.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD



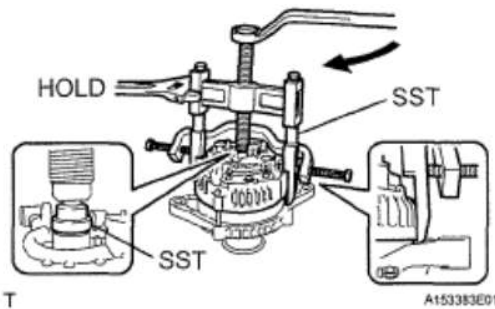
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Fig. 27: Locating Generator Coil Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using SST, remove the generator coil assembly.

SST 09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04010, 09955-04071, 09957-04010, 09958-04011, 91111-51014)



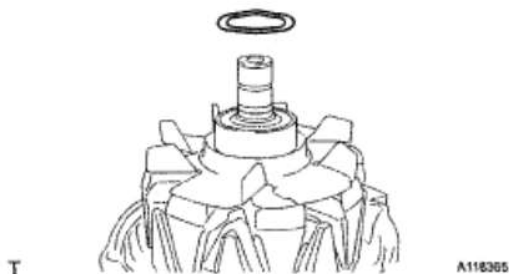
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Fig. 28: Removing Generator Coil Assembly With SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE GENERATOR ROTOR ASSEMBLY

- a. Remove the generator washer.



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Fig. 29: Identifying Generator Washer
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the generator rotor assembly.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

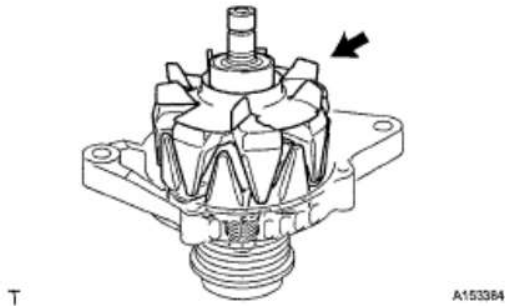


Fig. 30: Locating Generator Rotor Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE GENERATOR DRIVE END FRAME BEARING

- Remove the 4 screws and bearing retainer from the drive end frame.

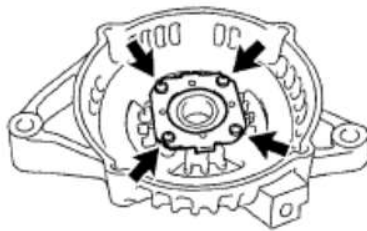


Fig. 31: Locating Bearing Retainer Of Drive End Frame
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Using SST and a hammer, tap out the drive end frame bearing from the drive end frame.

SST 09950-60010 (09951 -00250), 09950-70010 (09951-07100)

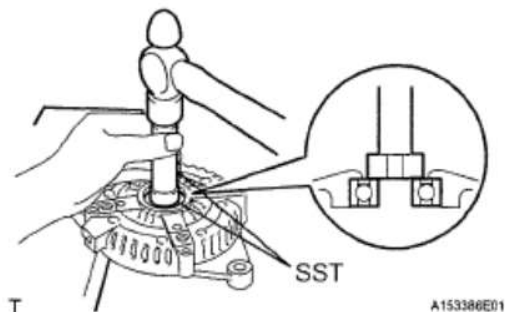


Fig. 32: Tapping Drive End Frame Bearing Of Drive End Frame
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

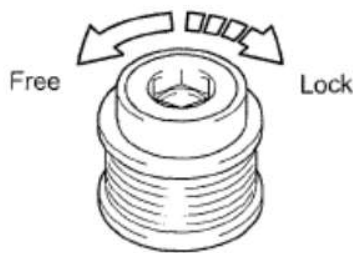
2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

1. INSPECT GENERATOR CLUTCH PULLEY

- a. Hold the center of the pulley, and confirm that the outer ring turns counterclockwise and does not turn clockwise.

If the result is not as specified, replace the clutch pulley.



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Fig. 33: Inspecting Generator Clutch Pulley

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

2. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY

- a. Using vernier calipers, measure the length of the exposed brushes.

Standard exposed length:

9.5 to 11.5 mm (0.374 to 0.453 in.)

Minimum exposed length:

4.5 mm (0.177 in.)

If the exposed length is less than the minimum, replace the brush holder assembly.

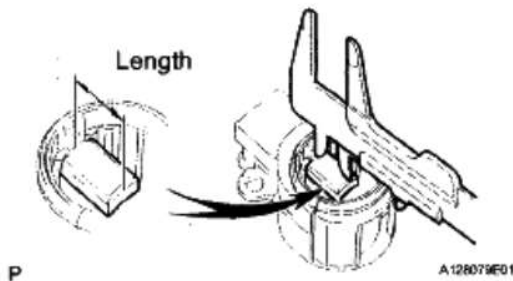


Fig. 34: Measuring Length Of Exposed Brushes

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

3. INSPECT GENERATOR ROTOR ASSEMBLY

- a. Check the generator rotor for an open circuit.
 1. Measure the resistance according to the value (s) in the table below.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

Standard resistance

RESISTANCE REFERENCE

Tester connection	Condition	Specified condition
Slip ring - Slip ring	20°C (68°F)	2.3 to 2.7 kohms

If the result is not as specified, replace the generator rotor assembly.

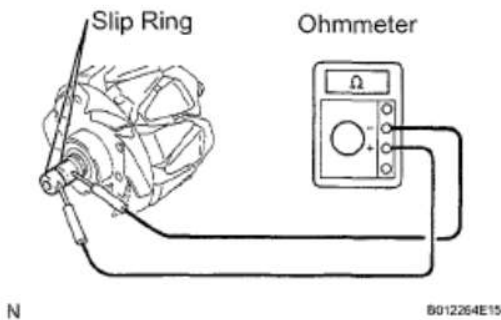


Fig. 35: Measuring Resistance Value
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check the rotor for ground.
 - 1. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE REFERENCE

Tester connection	Specified condition
Slip ring - Rotor	1 Mohms or higher

If the result is not as specified, replace the generator rotor assembly.

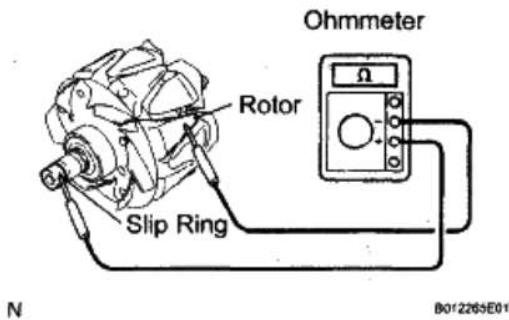


Fig. 36: Checking Rotor For Ground
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Check that the generator rotor bearing is not rough or worn. If necessary, replace the generator

2008 Scion xD**2008 ELECTRICAL 2ZR-FE Charging - xD**

rotor assembly.

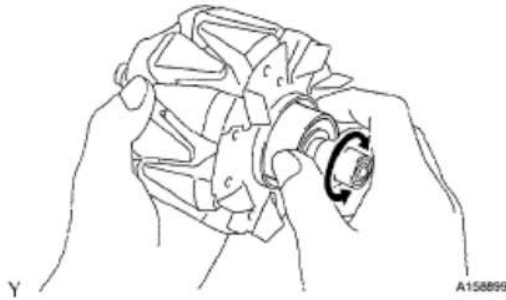


Fig. 37: Checking Generator Rotor Bearing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Using vernier calipers, measure the slip ring diameter.

Standard diameter:

14.2 to 14.4 mm (0.559 to 0.567 in.)

Minimum diameter:

14.0 mm (0.551 in.)

If the diameter is less than the minimum, replace the generator rotor assembly.

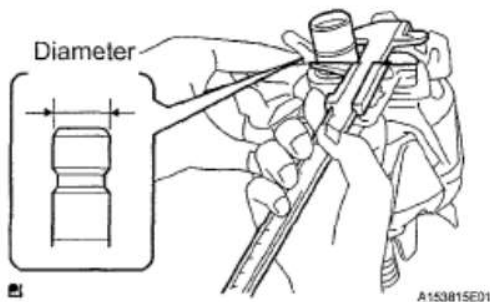


Fig. 38: Measuring Slip Ring Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSPECT GENERATOR DRIVE END FRAME BEARING

- a. Check that the bearing is not rough or worn. If necessary, replace the generator drive end frame bearing.

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

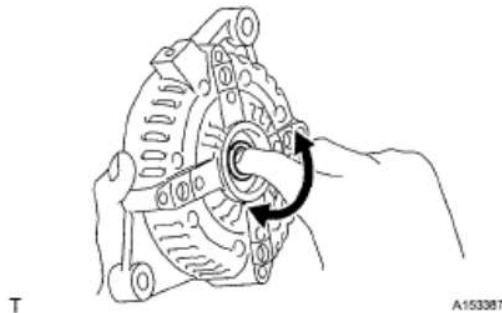


Fig. 39: Inspecting Generator Drive End Frame Bearing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REASSEMBLY**1. INSTALL GENERATOR DRIVE END FRAME BEARING**

- a. Using SST and a press, press in a new generator drive end frame bearing.

SST 09950-60010 (09951-00470), 09950-70010 (09951-07100)

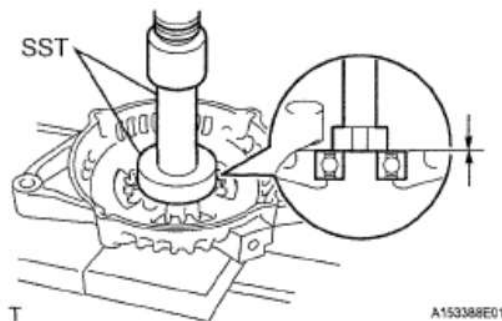


Fig. 40: Pressing Generator Drive End Frame Bearing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Fit the tabs on the retainer plate into the cutouts on the drive end frame to install the retainer plate.

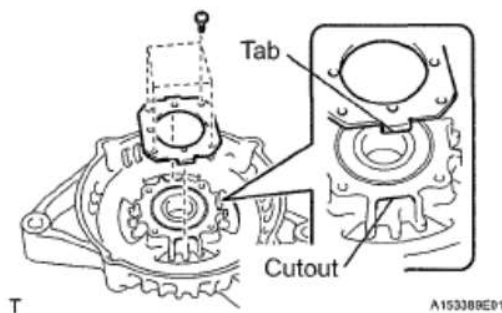


Fig. 41: Identifying Retainer Plate Into Cutouts On Drive End Frame
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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- c. Install the 4 screws.

Torque: 2.3 N*m (23 kgf*cm, 20 in.*lbf)

2. INSTALL GENERATOR ROTOR ASSEMBLY

- a. Place the drive end frame on the clutch pulley.
b. Install the generator rotor assembly onto the drive end frame.

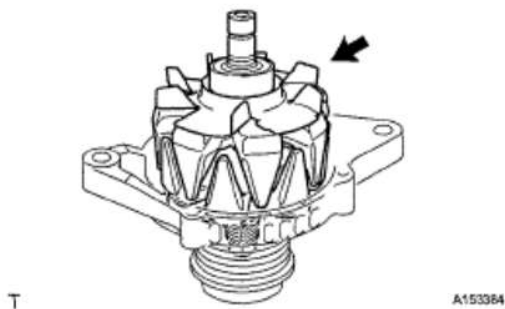


Fig. 42: Locating Generator Rotor Assembly Onto Drive End Frame
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Place the generator washer on the generator rotor.



Fig. 43: Identifying Generator Washer On Generator Rotor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL GENERATOR COIL ASSEMBLY

- a. Using SST and a press, slowly press in the generator coil assembly.

SST 09612-70100 (09612-07240)

2008 Scion xD

2008 ELECTRICAL 2ZR-FE Charging - xD

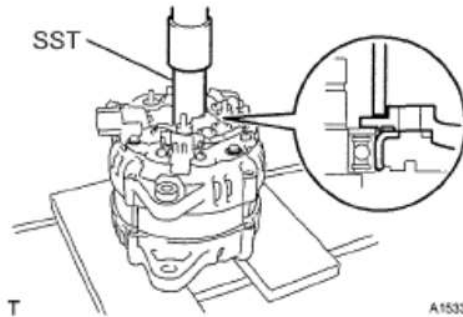


Fig. 44: Pressing Generator Coil Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the 4 bolts.

Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)

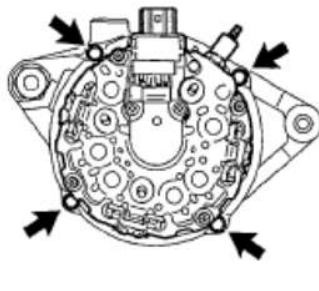


Fig. 45: Locating Generator Coil Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY

- a. While pushing the 2 brushes into the generator brush holder assembly, insert a ϕ 1.0 mm (0.039 in.) pin into the brush holder hole.

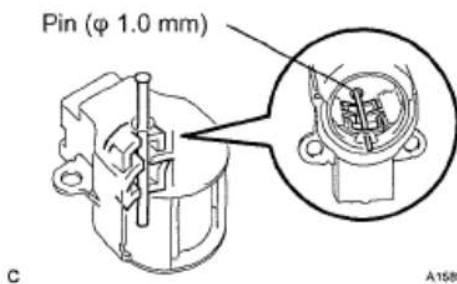


Fig. 46: Pushing Brushes Into Generator Brush Holder Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the brush holder assembly onto the generator coil with the 2 screws.

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Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)



Fig. 47: Locating Generator Coil With Screws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Pull out the pin from the generator brush holder.



Fig. 48: Pulling Pin From Generator Brush Holder
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL GENERATOR TERMINAL INSULATOR

- a. Install the terminal insulator onto the generator coil.

NOTE: Pay attention to installation direction of the terminal insulator.

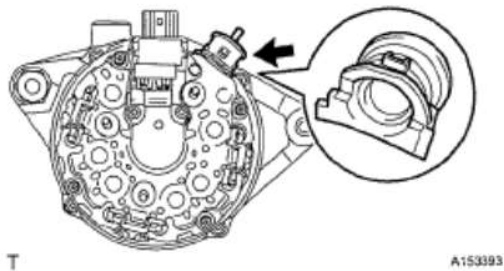


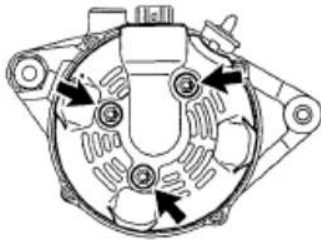
Fig. 49: Locating Terminal Insulator Onto Generator Coil
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSTALL GENERATOR REAR END COVER

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- a. Install the generator rear end cover onto the generator coil with the 3 nuts.

Torque: 4.6 N*m (47 kgf*cm, 41 in.*lbf)



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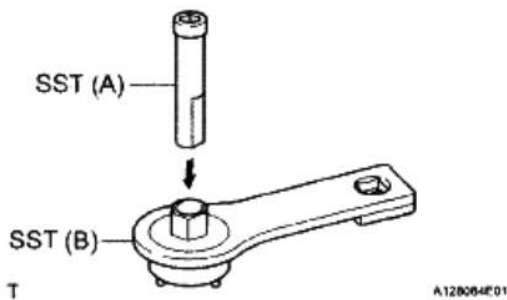
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Fig. 50: Locating Generator Rear End Cover Onto Generator Coil With Nuts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSTALL GENERATOR CLUTCH PULLEY

- a. Temporarily install the clutch pulley onto the rotor shaft.
 b. Set SST (A) and (B).

SST 09820-63020 (09821-63020)



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A128004E01

Fig. 51: Identifying SST
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Clamp SST (A) in a vise.
 d. Place the rotor shaft end into SST (A).

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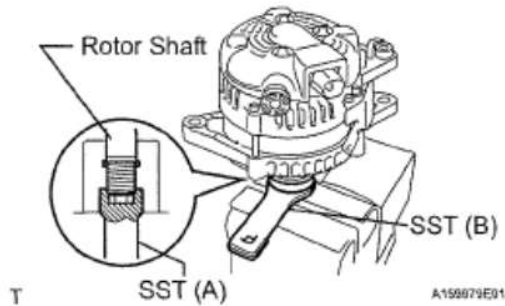


Fig. 52: Identifying Rotor Shaft End And SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Fit SST (B) to the clutch pulley.

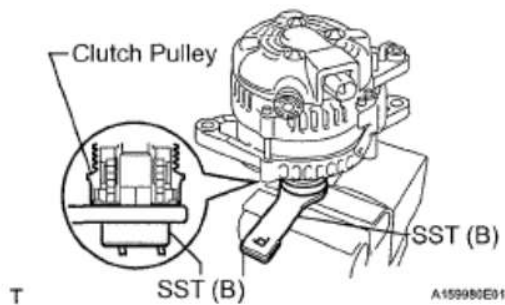


Fig. 53: Identifying Clutch Pulley With SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Tighten the pulley by turning SST (B) in the direction shown in the illustration.

Torque: without SST

111 N*m (1127 kgf*cm, 82 ft.*lbf)

with SST

84 N*m (857 kgf*cm, 62 ft.*lbf)

NOTE:

- Use a torque wrench with a fulcrum length of 318 mm (12.52 in.).
- This torque value is effective when SST is parallel to the torque wrench.

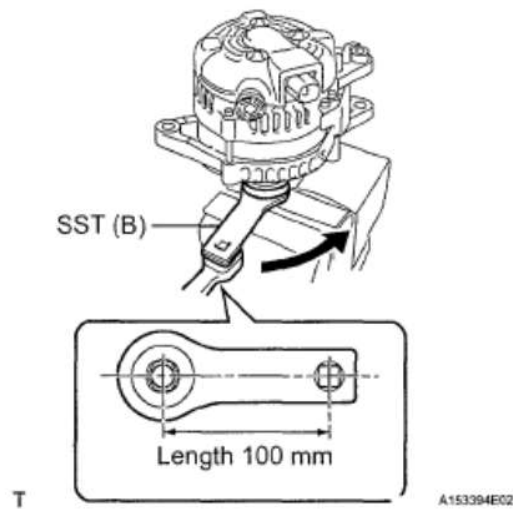
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Fig. 54: Tightening Pulley With Turning SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Remove the generator assembly from SST.
- h. Check that the clutch pulley rotates smoothly.
- i. Install a new clutch pulley cap onto the clutch pulley.

INSTALLATION**1. INSTALL GENERATOR ASSEMBLY**

- a. Install the wire harness bracket with the bolt.

Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

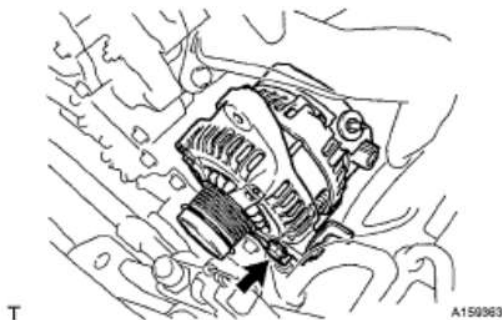


Fig. 55: Locating Wire Harness Bracket With Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Provisionally install the generator assembly with the bolt.
- c. Provisionally install the fan belt adjusting bar and generator assembly with the 2 bolts.

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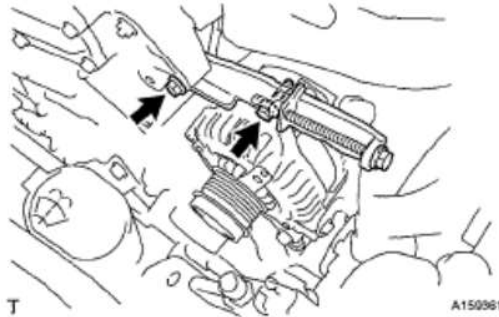


Fig. 56: Locating Generator Assembly With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Tighten the bolt A to the specified torque.

Torque: 19 N*m (189 kgf*cm, 14 ft.*lbf)

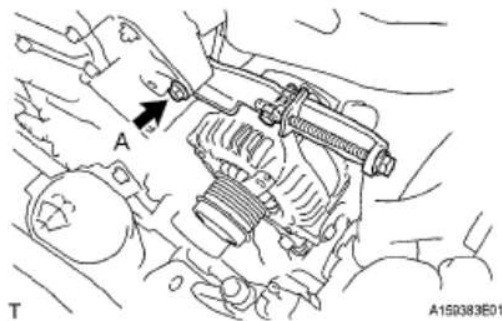


Fig. 57: Locating Generator Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Connect the connector and wire harness clamp.

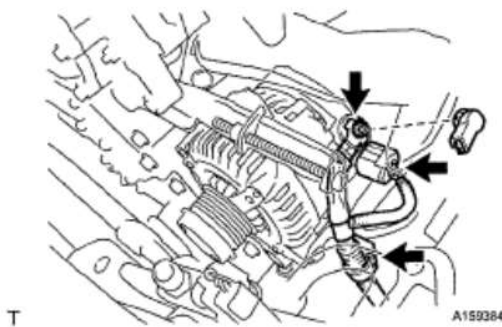


Fig. 58: Locating Connector And Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Install terminal B with the nut.

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Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

g. Install the terminal cap.

2. INSTALL TRANSVERSE ENGINE MOUNTING BRACKET

a. Install the engine mounting bracket with the 3 bolts.

Torque: 51 N*m (520 kgf*cm, 38 ft.*lbf)

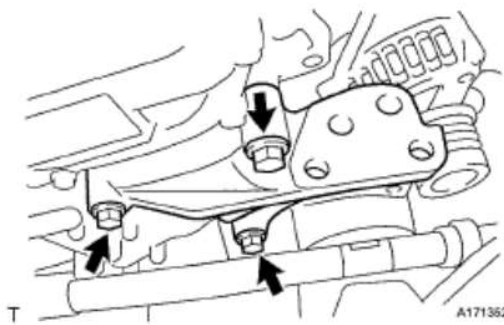


Fig. 59: Locating Engine Mounting Bracket With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH

a. Install the engine mounting insulator sub-assembly RH with the 6 bolts and nut.

Torque: 45 N*m (459 kgf*cm, 33 ft.*lbf) for bolt A 88 N*m (898 kgf*cm, 65 ft.*lbf) for bolt B 52 N*m (530 kgf*cm, 38 ft.*lbf) for nut

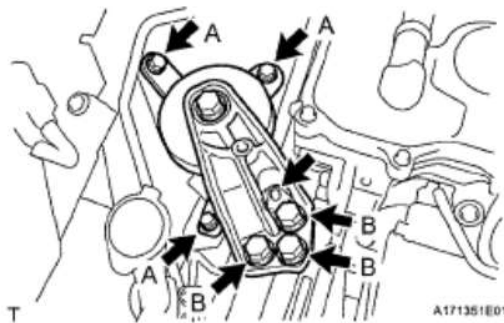


Fig. 60: Locating Engine Mounting Insulator Sub-Assembly RH With Bolts And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the engine mounting stay RH with the 2 bolts.

Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

2008 Scion xD

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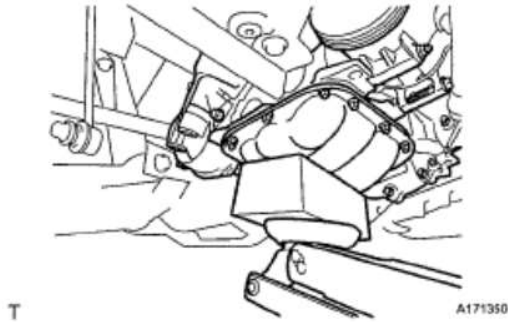


Fig. 61: Installing Engine Mounting Stay RH
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL FAN AND GENERATOR V BELT** (See **INSTALLATION**)
5. **ADJUST FAN AND GENERATOR V BELT** (See **INSTALLATION**)
6. **INSPECT FAN AND GENERATOR V BELT** (See **INSTALLATION**)
7. **INSTALL NO. 2 CYLINDER HEAD COVER** (See **INSTALLATION**)
8. **INSTALL ENGINE UNDER COVER RH** Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

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