
CHARGING SYSTEM

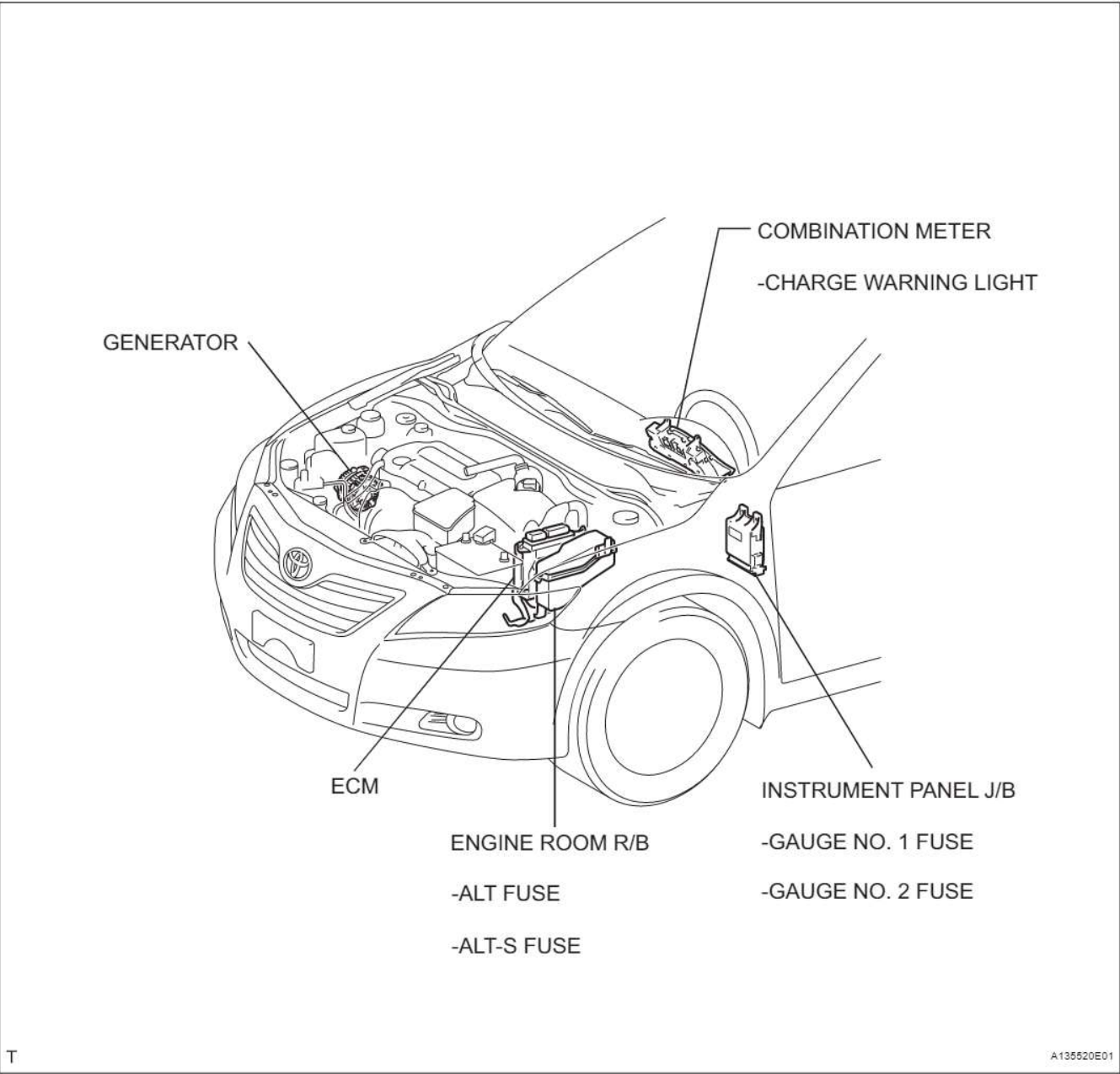
PRECAUTION

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 **R/B**.

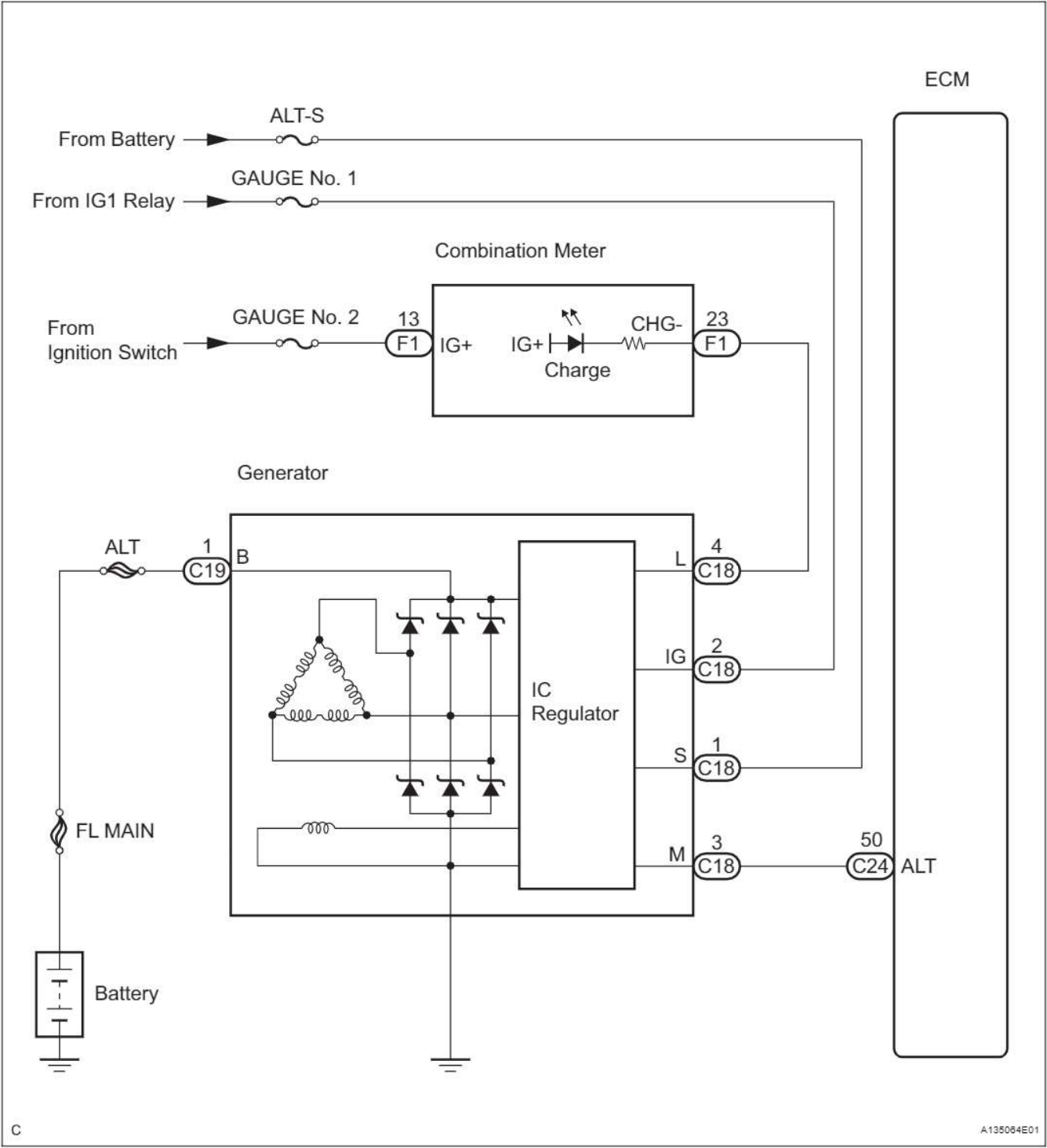
CH-2

2AZ-FE CHARGING – CHARGING SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM



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2AZ-FE CHARGING – CHARGING SYSTEM

PROBLEM SYMPTOMS TABLE

Result

Symptom	Suspected area	See page
Charge Warning Light Comes ON while Driving	1. Clutch pulley	CH-7
	2. Generator assembly	
Noise Occurs from Generator while Engine is Running	1. V-ribbed belt	CH-8
	2. Clutch pulley	
	3. Generator assembly	

ON-VEHICLE INSPECTION

1. CHECK BATTERY ELECTROLYTE LEVEL

- (a) Check the electrolyte level.
- (1) If the electrolyte level is low, replace the battery (or add distilled water) and check the charging system.

2. CHECK BATTERY SPECIFIC GRAVITY

- (a) Check the color of the indicator.

Result

Indicator color	Condition
Green	Good
Dark	Charging necessary
Clear or light yellow	Replacement necessary

3. CHECK BATTERY VOLTAGE

- (a) If it has not been 20 minutes since you drove the vehicle or since the engine was stopped, turn the ignition switch to the ON position and turn on the electrical systems (headlight, blower motor, rear defogger, etc.) for 60 seconds. This will remove the surface charge from the battery.
- (b) Turn off the ignition switch and the electrical systems.
- (c) Measure the battery voltage between the negative (-) and positive (+) terminals of the battery.

Standard voltage:

12.5 to 12.9 V at 20°C (68°F)

HINT:

If the voltage is below the specification, charge the battery.

4. CHECK BATTERY TERMINAL

- (a) Check that the battery terminals are not loose or corroded.
- If the terminals are corroded, clean them.

5. CHECK FUSES

- (a) Measure the resistance of the ALT fuse, ALT-S fuse, GAUGE No. 1 fuse and GAUGE No. 2 fuse.

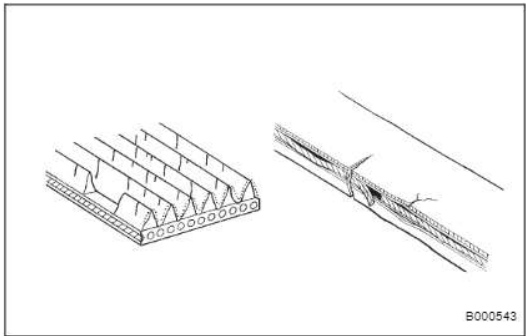
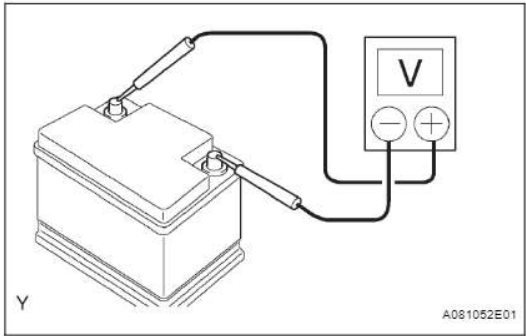
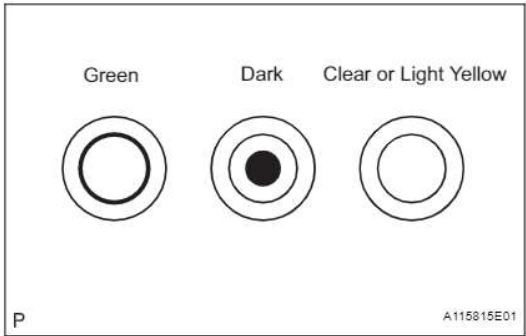
Standard resistance:

Below 1 Ω

If the result is not as specified, replace the fuses as necessary.

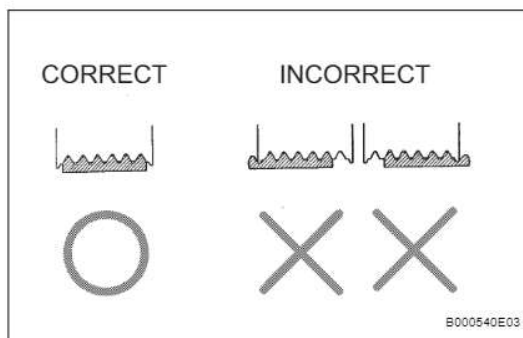
6. CHECK V-RIBBED BELT

- (a) Check the belt for wear, cracks or other signs of damage.
- If any of the following defects is found, replace the V-ribbed belt.
- The belt is worn out, cracked, or the cords are exposed.
 - The cracks reach the cords in more than one place.
 - The belt has chunks missing from the ribs.



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- (b) Check that the belt fits properly in the ribbed grooves.

HINT:

Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

If it has slipped out, replace the V-ribbed belt. Install a new V-ribbed belt correctly.

7. VISUALLY CHECK GENERATOR WIRING

- (a) Check that the generator wiring is in good condition. If the condition is not good, repair or replace the generator wire.

8. LISTEN FOR ABNORMAL NOISES FROM GENERATOR

- (a) Check that there is no abnormal noise from the generator while the engine is running. If there is abnormal noise, replace the pulley or generator.

9. CHECK CHARGE WARNING LIGHT CIRCUIT

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

10. CHECK CHARGING CIRCUIT WITHOUT LOAD

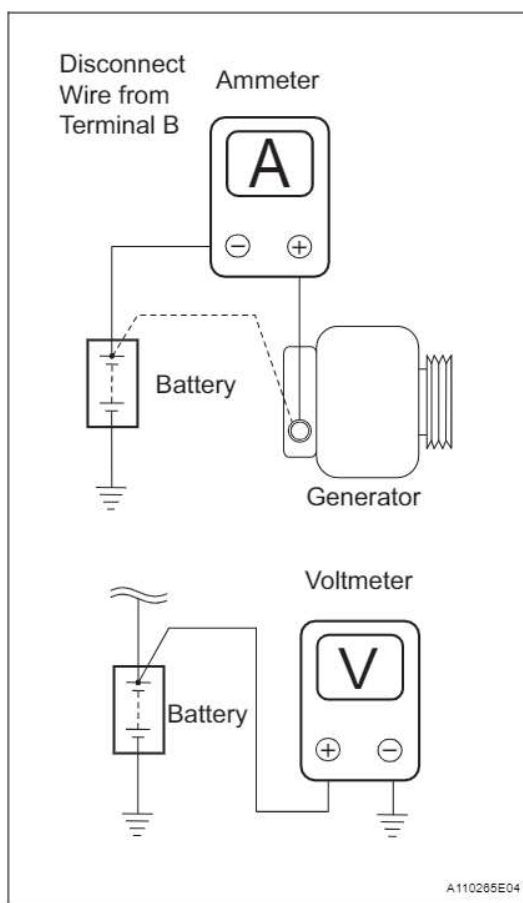
- (a) According to the following procedure, connect an ammeter and voltmeter as shown in the illustration.
(1) Disconnect the wire from terminal B of the generator and connect it to the negative (-) lead of the ammeter.
(2) Connect the positive (+) lead of the ammeter to terminal B of the generator.
(3) Connect the positive (+) lead of the voltmeter to positive (+) terminal of the battery.
(4) Ground the negative (-) lead of the voltmeter.
(b) Check the charging circuit.
(1) While keeping the engine speed at 2,000 rpm, check the readings on the ammeter and voltmeter.

Standard amperage:**10 A or less****Standard voltage:****13.2 to 14.8 V**

If the results are not as specified, replace the generator assembly.

HINT:

- If the battery is not fully charged, the ammeter reading may be more than the standard amperage. In this case, increase electrical load by operating devices such as the wiper motor and rear window defogger. Then, recheck the reading on the ammeter.



11. CHECK CHARGING CIRCUIT WITH LOAD

- (a) Keep the engine speed at 2,000 rpm, turn on the high beam headlights, 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, replace the generator assembly.

HINT:

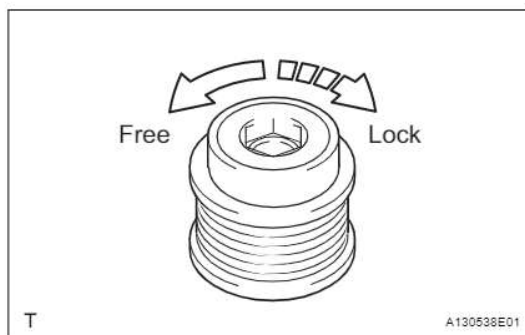
- If the battery is fully charged, the ammeter reading may be less than the standard amperage. In this case, increase electrical load by operating devices such as the wiper motor and rear window defogger. Then, recheck the reading on the ammeter.

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Charge Warning Light Comes ON while Driving**INSPECTION PROCEDURE****1 CHECK LOCK FUNCTION OF CLUTCH PULLEY**

- (a) Check the lock function with the pulley installed in the vehicle.
 - (1) Visually check that the rotor in the generator operates with the engine started.
- (b) Check the lock function with the pulley removed from the vehicle.
 - (1) Remove the generator pulley cap. Using SST, hold the generator rotor.
 - (2) Turn the clutch pulley clockwise and check that the outer ring locks.

OK:**The outer ring locks.****SST 09820-63020****NG****REPLACE CLUTCH PULLEY****OK****2 CHECK LOCK OF CLUTCH PULLEY**

- (a) Start the engine and visually check looseness of the clutch pulley.

OK:**The clutch pulley is not loose.****NG****TIGHTEN CLUTCH PULLEY TO THE SPECIFIED TORQUE****OK****REPLACE GENERATOR ASSEMBLY**

2AZ-FE CHARGING – CHARGING SYSTEM

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Noise Occurs from Generator while Engine is Running**INSPECTION PROCEDURE****1 CHECK LOOSENESS OF V-RIBBED BELT**

- (a) Check the tension of the belt by pushing it down with a finger.

OK:

The tension of the belt is enough.

NG**REPLACE V-RIBBED BELT TENSIONER ASSEMBLY****OK****2 CHECK V-RIBBED BELT FOR WEAR**

- (a) Check the V-ribbed belt for wear.

OK:

The V-ribbed belt is not worn.

NG**REPLACE V-RIBBED BELT****OK****3 CHECK CLUTCH PULLEY FOR WEAR**

- (a) Check the clutch pulley groove for wear or other defects.

OK:

The clutch pulley groove is not damaged.

NG**REPLACE CLUTCH PULLEY****OK****4 CHECK FOR NOISE WHILE CLUTCH PULLEY IS OPERATING**

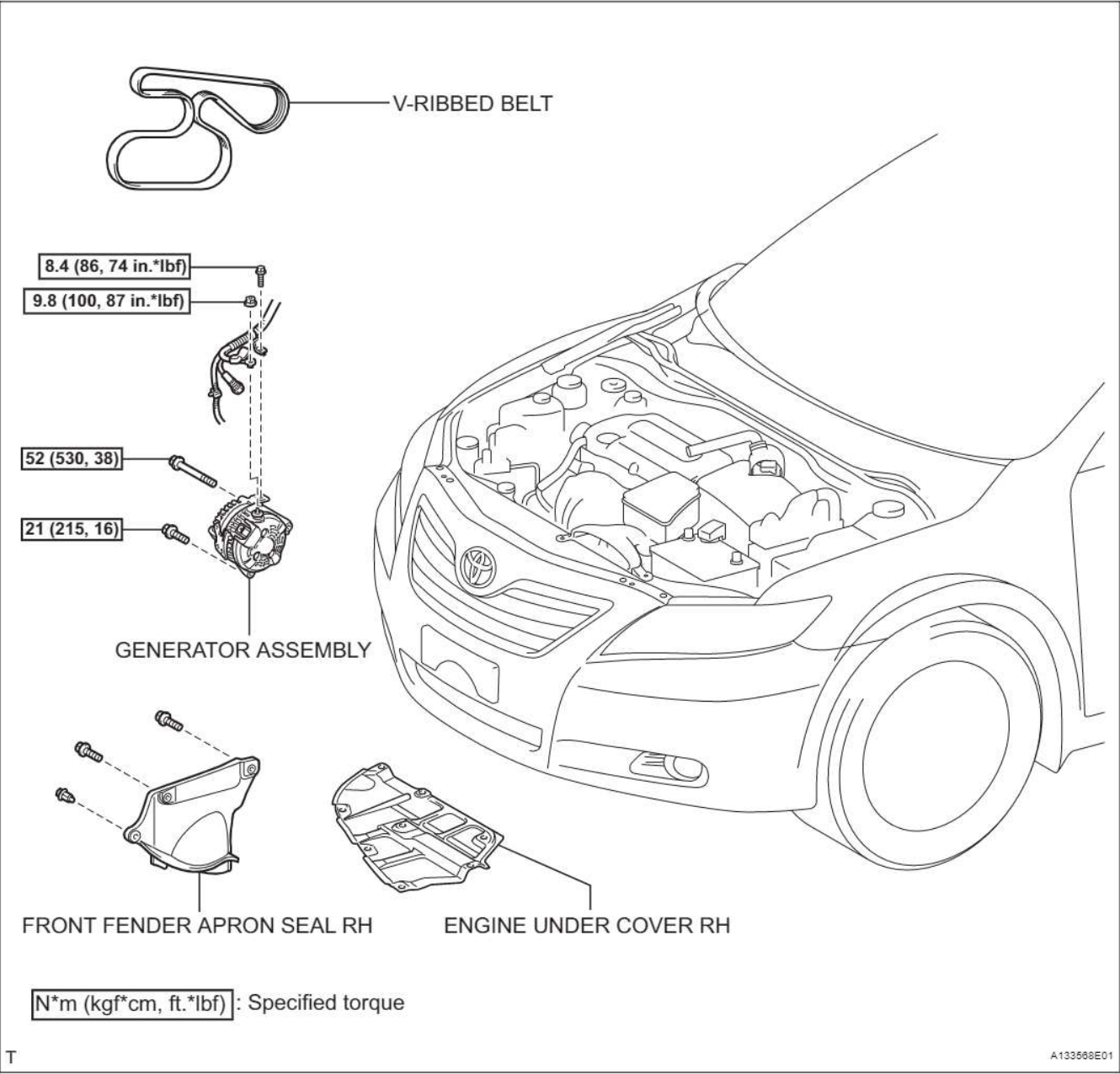
- (a) Perform a driving test and check if noise occurs when decelerating.

OK:

Noise does not occur.

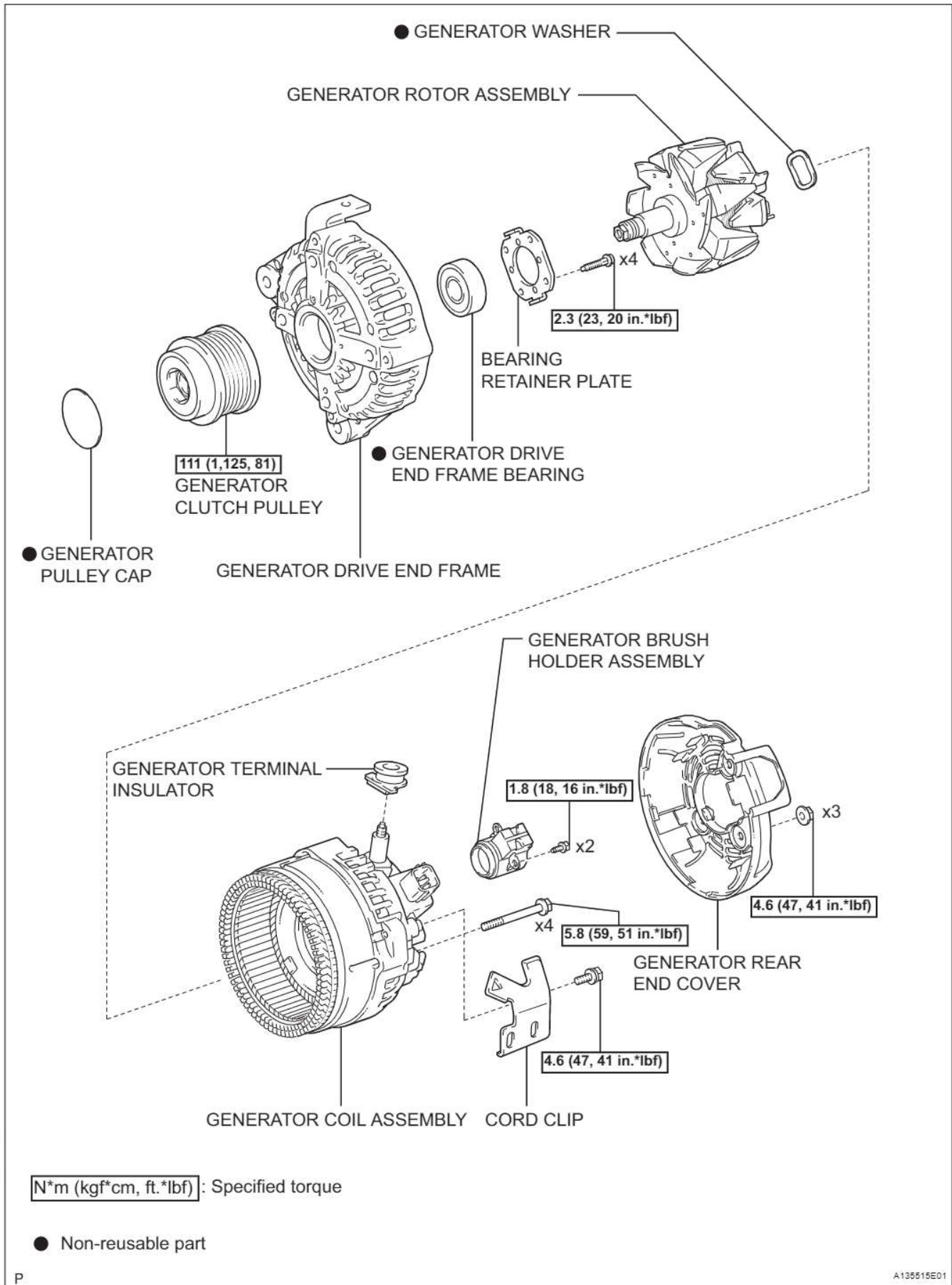
NG**REPLACE CLUTCH PULLEY****OK****REPLACE GENERATOR ASSEMBLY****CH**

GENERATOR
COMPONENTS



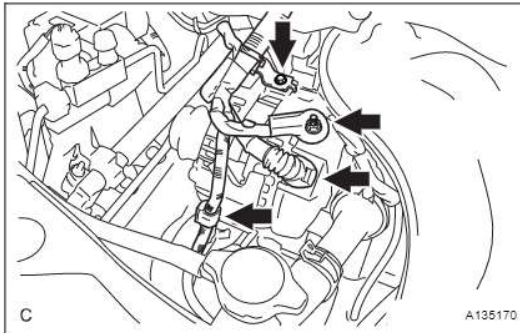
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2AZ-FE CHARGING – GENERATOR

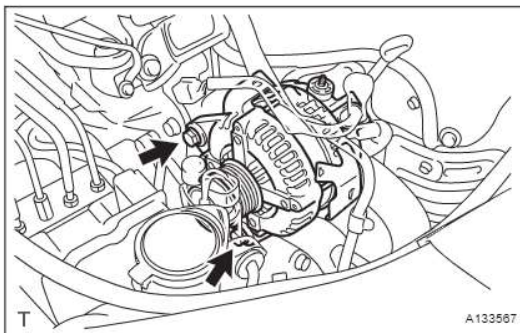


REMOVAL

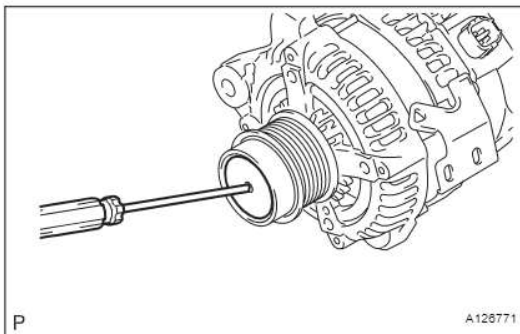
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE FRONT WHEEL RH
3. REMOVE ENGINE UNDER COVER RH
4. REMOVE FRONT FENDER APRON SEAL RH
5. REMOVE V-RIBBED BELT (See page [EM-6](#))
6. REMOVE GENERATOR ASSEMBLY



- (a) Disconnect the generator connector.
- (b) Remove the nut and disconnect the wire harness from terminal B.
- (c) Remove the bolt and wire harness clamp bracket.
- (d) Remove the wire harness clamps.



- (e) Remove the 2 bolts and generator assembly.

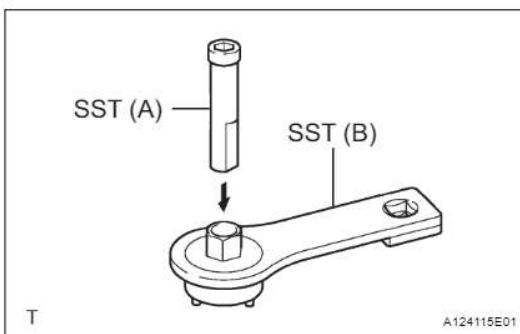


DISASSEMBLY

1. REMOVE GENERATOR CLUTCH PULLEY
 - (a) Using a screwdriver, puncture the center of the generator pulley cap and pry it off.

NOTICE:

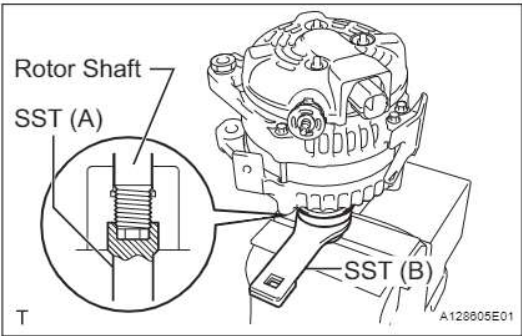
Do not reuse the generator pulley cap.



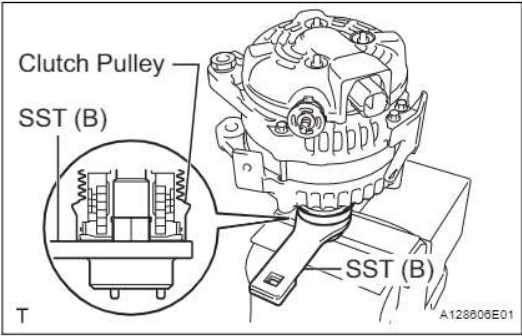
- (b) Set SST (A) and (B).
- SST 09820-63020**
- (c) Clamp SST (A) in a vise.

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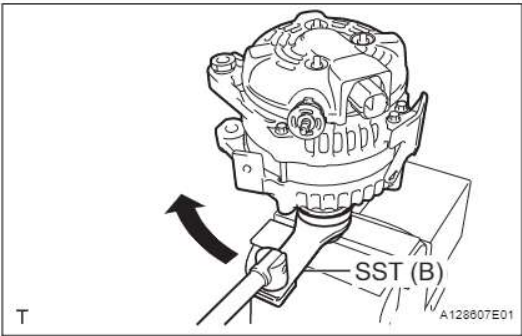
2AZ-FE CHARGING – GENERATOR



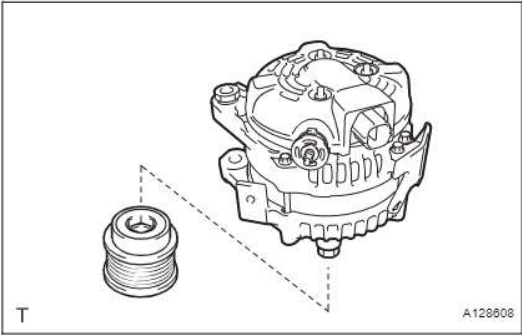
(d) Place the rotor shaft end into SST (A).



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

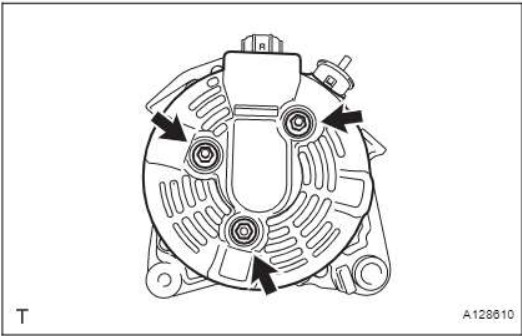


- (f) Loosen the pulley by turning SST (B) in the direction shown in the illustration.
- (g) Remove the generator assembly from the SST.
- (h) Remove the clutch pulley from the rotor shaft.

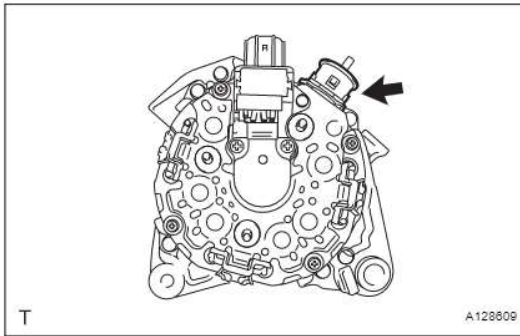


2. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY

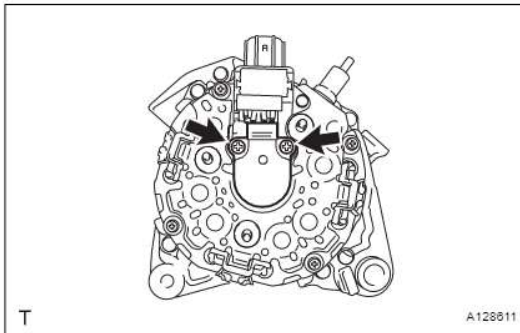
(a) Place the generator assembly on the clutch pulley.



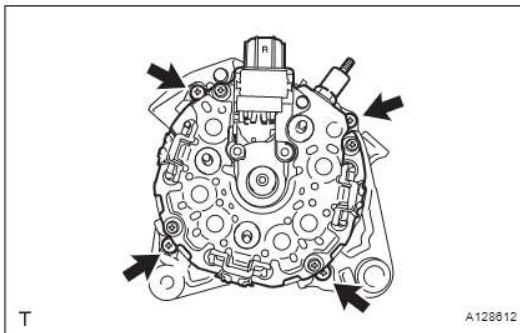
(b) Remove the 3 nuts and generator rear end cover.

2AZ-FE CHARGING – GENERATOR**CH-13****3. REMOVE GENERATOR TERMINAL INSULATOR**

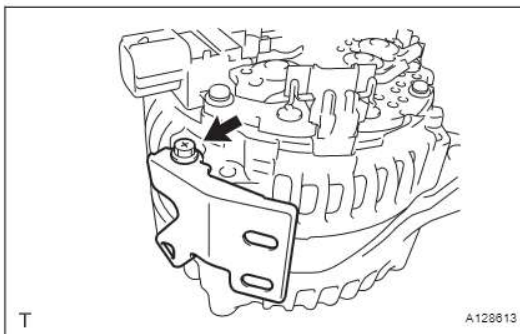
- (a) Remove the terminal insulator.

**4. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY**

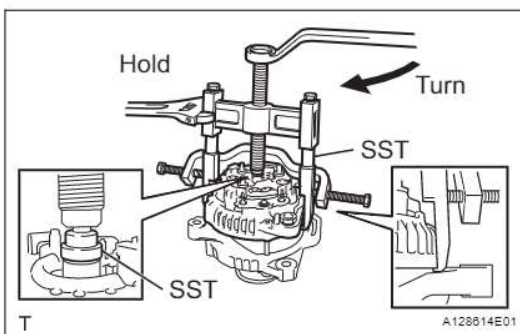
- (a) Remove the 2 screws and generator brush holder.

**5. REMOVE GENERATOR ROTOR ASSEMBLY**

- (a) Remove the 4 bolts.



- (b) Remove the bolt and cord clip.



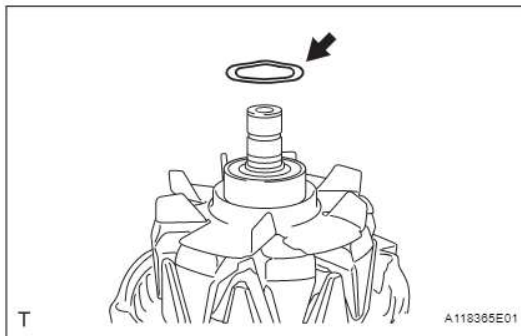
- (c) Using SST, remove the coil.

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

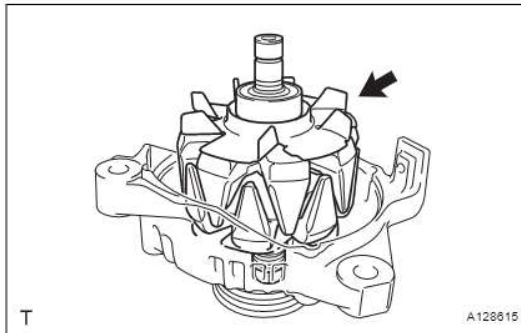
CH

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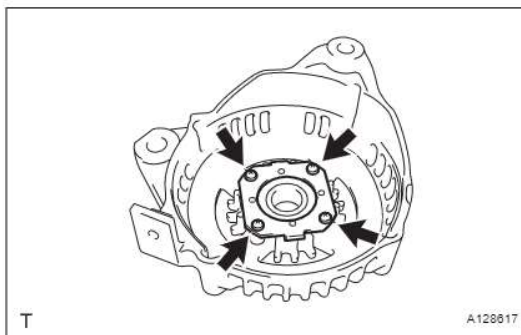
2AZ-FE CHARGING – GENERATOR

**6. REMOVE GENERATOR ROTOR ASSEMBLY**

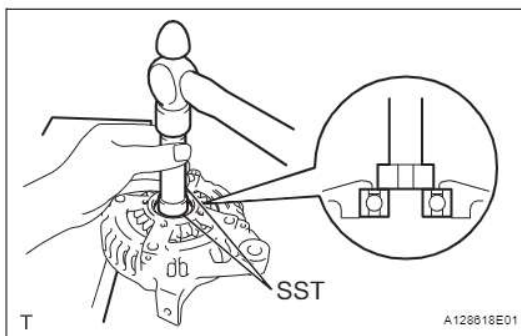
(a) Remove the washer.



(b) Remove the generator rotor.

**7. REMOVE GENERATOR DRIVE END FRAME BEARING**

(a) Remove the 4 screws and bearing retainer.

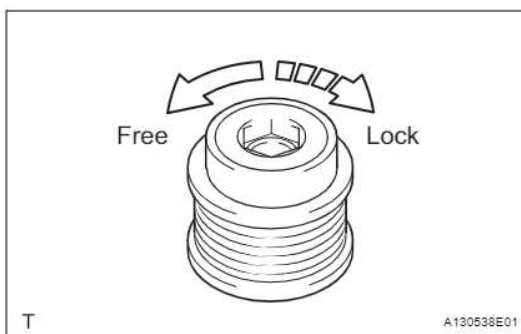


(b) Using SST and a hammer, tap out the bearing.

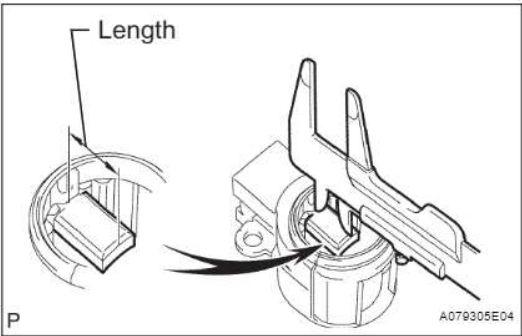
SST 09950-60010 (09951-00250), 09950-70010 (09951-07100)**INSPECTION****1. INSPECT GENERATOR CLUTCH PULLEY**

(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 generator pulley with clutch.

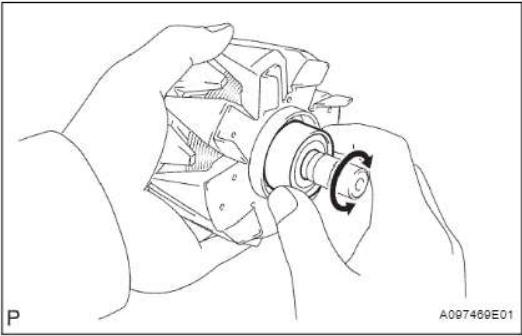


2AZ-FE CHARGING – GENERATOR



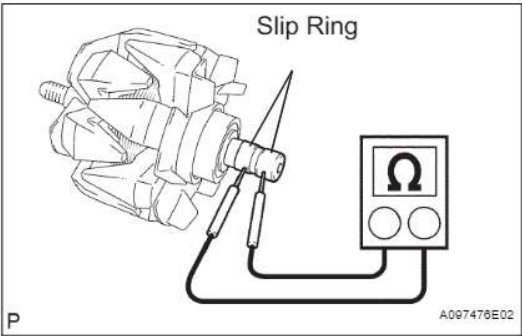
2. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY

- (a) Using vernier calipers, measure the brush length.
Standard length:
9.5 to 11.5 mm (0.374 to 0.453 in.)
Minimum length:
4.5 mm (0.177 in.)
If the brush length is less than the minimum, replace the generator brush holder assembly.



3. INSPECT GENERATOR ROTOR ASSEMBLY

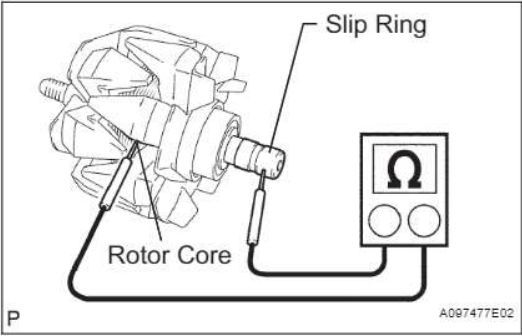
- (a) Check the appearance.
(1) Check that the bearing is not rough or worn.
OK:
The bearing rotates smoothly.
If the result is not as specified, replace the generator rotor assembly.



- (b) Check the resistance.
(1) Measure the resistance between the slip rings.
Standard resistance

Condition	Specified condition
Approx. 20°C (68°F)	2.3 to 2.7 Ω

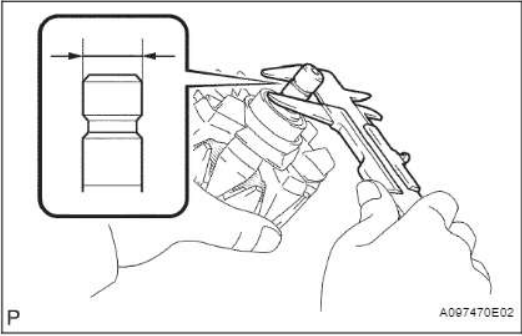
If the result is not as specified, replace the generator rotor assembly.



- (2) Measure the resistance between the slip ring and rotor core.
Standard resistance

Tester condition	Specified condition
Slip ring - Rotor core	1 MΩ or higher

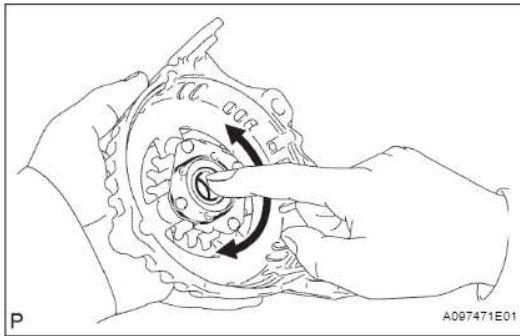
If the result is not as specified, replace the generator rotor assembly.



- (c) Check the slip ring diameter.
(1) 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 mm (0.551 in.)
If the diameter is less than the minimum, replace the generator rotor assembly.

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2AZ-FE CHARGING – GENERATOR



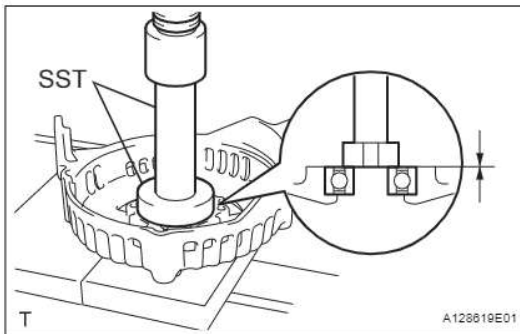
4. INSPECT GENERATOR DRIVE END FRAME BEARING

- (a) Check that the bearing is not rough or worn.

OK:

The bearing rotates smoothly.

If the bearing does not rotate smoothly, replace the bearing.

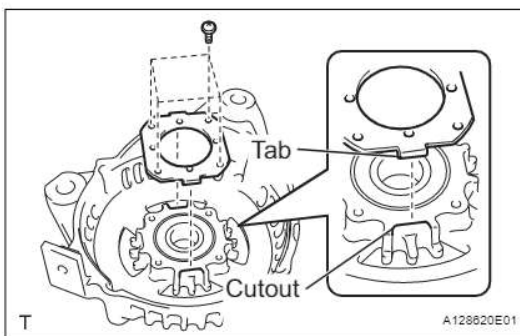


REASSEMBLY

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



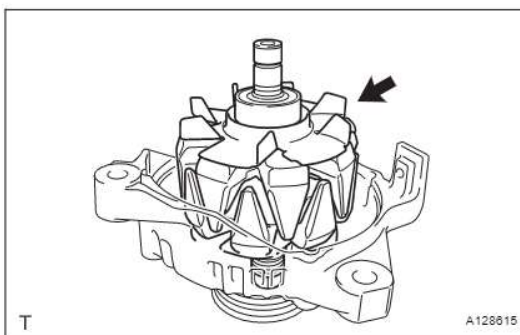
- (b) Fit the tabs on the retainer plate into the cutouts on the drive end frame to install the retainer plate.

- (c) Install the 4 screws.

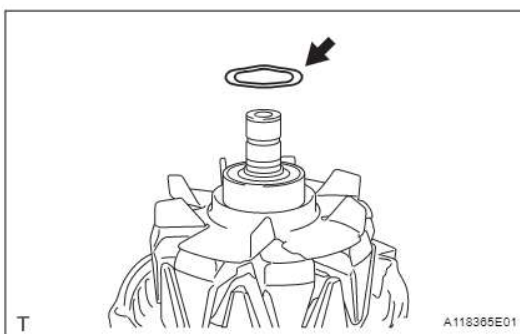
Torque: 2.3 N*m (23 kgf*cm, 20 in.*lbf)

2. INSTALL GENERATOR ROTOR ASSEMBLY

- (a) Place the drive end frame on the clutch pulley.



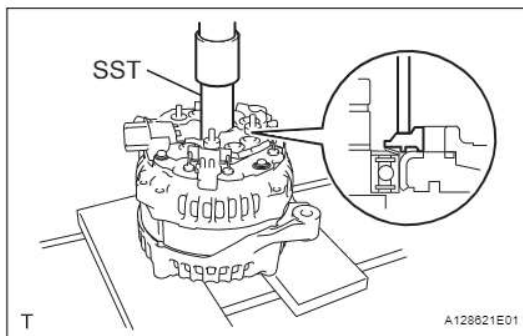
- (b) Install the generator rotor onto the generator rectifier end frame.



- (c) Place a new generator washer on the generator rotor.

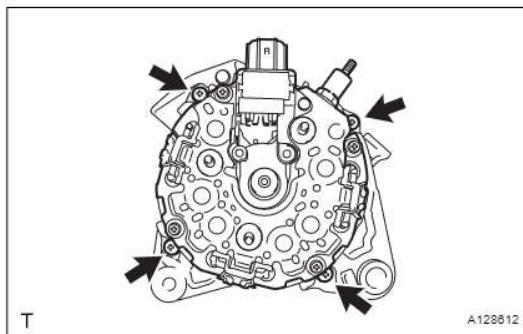
2AZ-FE CHARGING – GENERATOR

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**3. INSTALL GENERATOR COIL ASSEMBLY**

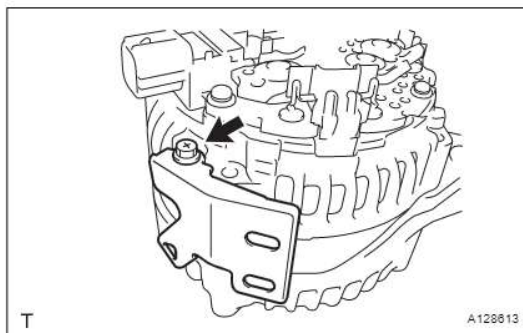
- (a) Using SST and a press, press in the generator coil assembly to the drive end frame.

SST 09612-70100 (09612-07240)



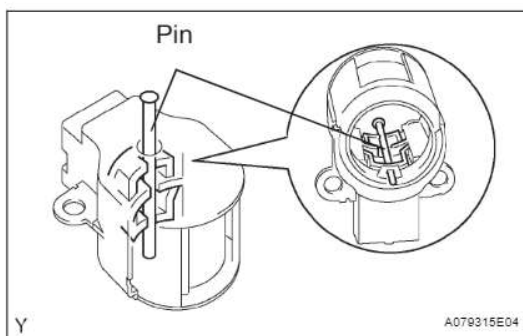
- (b) Tighten the 4 bolts.

Torque: 5.8 N*m (59 kgf*cm, 51 in.*lbf)

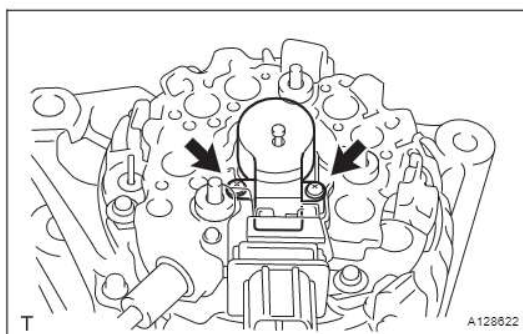


- (c) Install the cord clip with the bolt.

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

**4. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY**

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



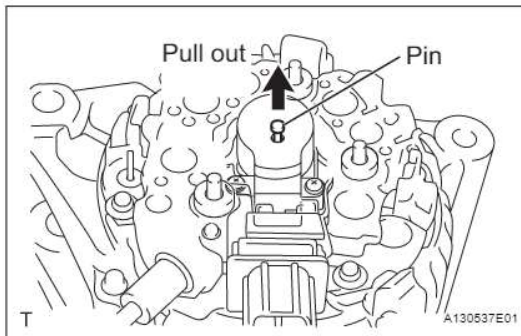
- (b) Install the generator brush holder with the 2 screws.

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

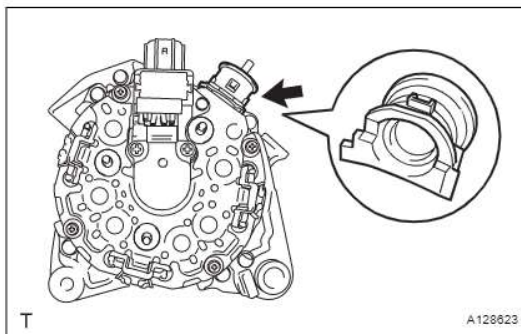
CH

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2AZ-FE CHARGING – GENERATOR

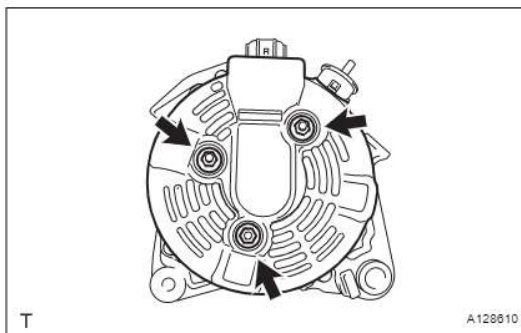


(c) Pull the pin out of the generator brush holder.



5. INSTALL GENERATOR TERMINAL INSULATOR

(a) Install the terminal insulator onto the generator rectifier end frame.

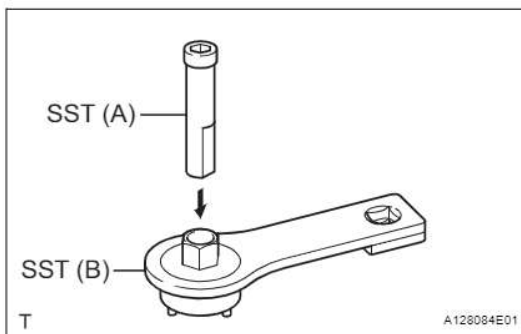


6. INSTALL GENERATOR REAR END COVER

(a) Install the generator rear end cover with the 3 nuts.
Torque: 4.6 N*m (47 kgf*cm, 41 in.*lbf)

7. INSTALL GENERATOR CLUTCH PULLEY

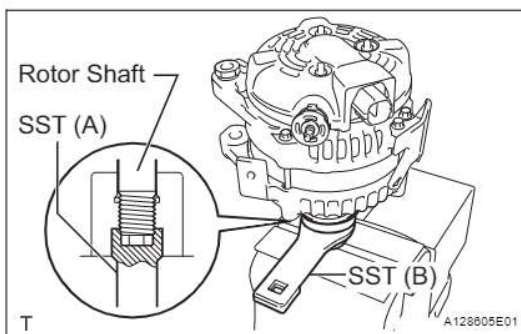
(a) Temporarily install the clutch pulley onto the rotor shaft.



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

SST 09820-63020

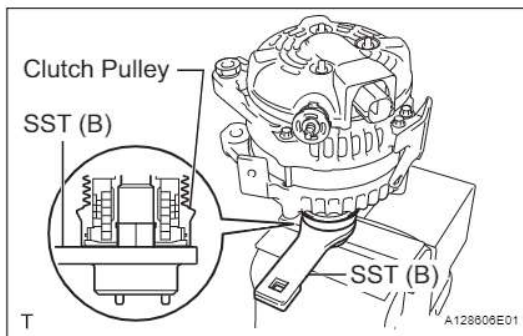
(c) Clamp SST (A) in a vise.



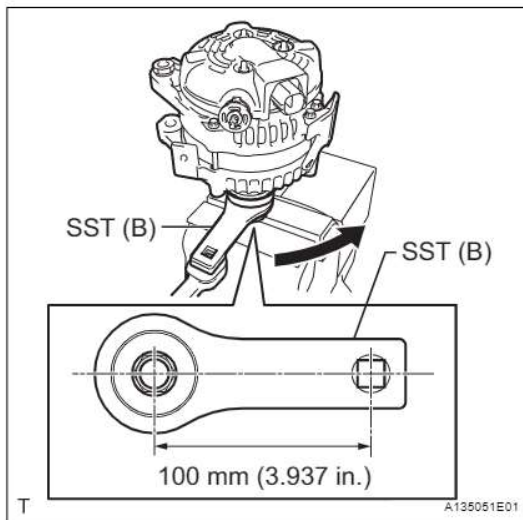
(d) Place the rotor shaft end into SST (A).

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



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

Torque: 111 N*m (1,125 kgf*cm, 81 ft.*lbf)

NOTICE:

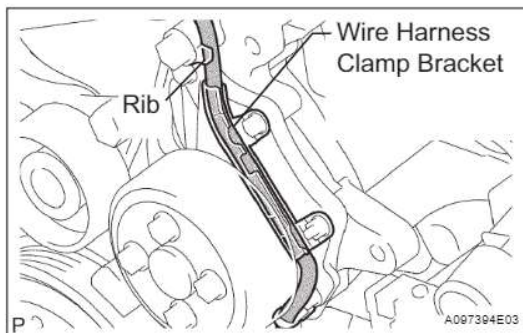
The torque shown above should be used for tightening without using the SST. When the SST is used for tightening, the torque should be calculated based on the length of the SST (See page IN-6).

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

INSTALLATION

1. INSTALL GENERATOR ASSEMBLY

- (a) Confirm that the wire harness of the crankshaft position sensor is secured to the wire harness clamp bracket through the back of the rib of the timing chain cover.



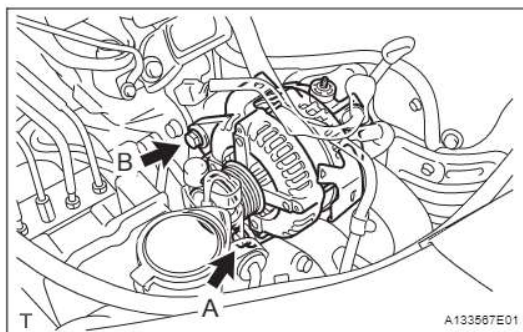
- (b) Install the generator assembly with the 2 bolts.

Torque: Bolt A

21 N*m (215 kgf*cm, 16 ft.*lbf)

Bolt B

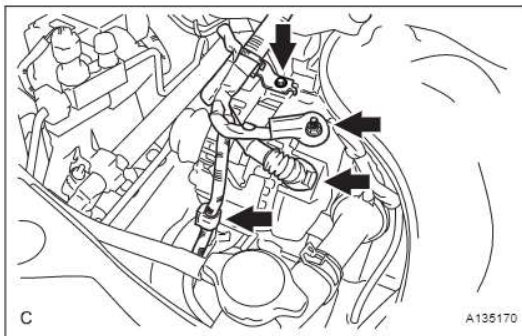
52 N*m (530 kgf*cm, 38 ft.*lbf)



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- (c) Install the generator wire to terminal B with the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
- (d) Install the clamp bracket with the bolt.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)
- (e) Attach the clamp and connect the generator connector to the generator.

2. **INSTALL V-RIBBED BELT** (See page [EM-6](#))
3. **INSTALL FRONT FENDER APRON SEAL RH**
4. **INSTALL ENGINE UNDER COVER RH**
5. **INSTALL FRONT WHEEL RH** (See page [EM-7](#))
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL** (See page [EM-120](#))