

CHARGING SYSTEM

PRECAUTION

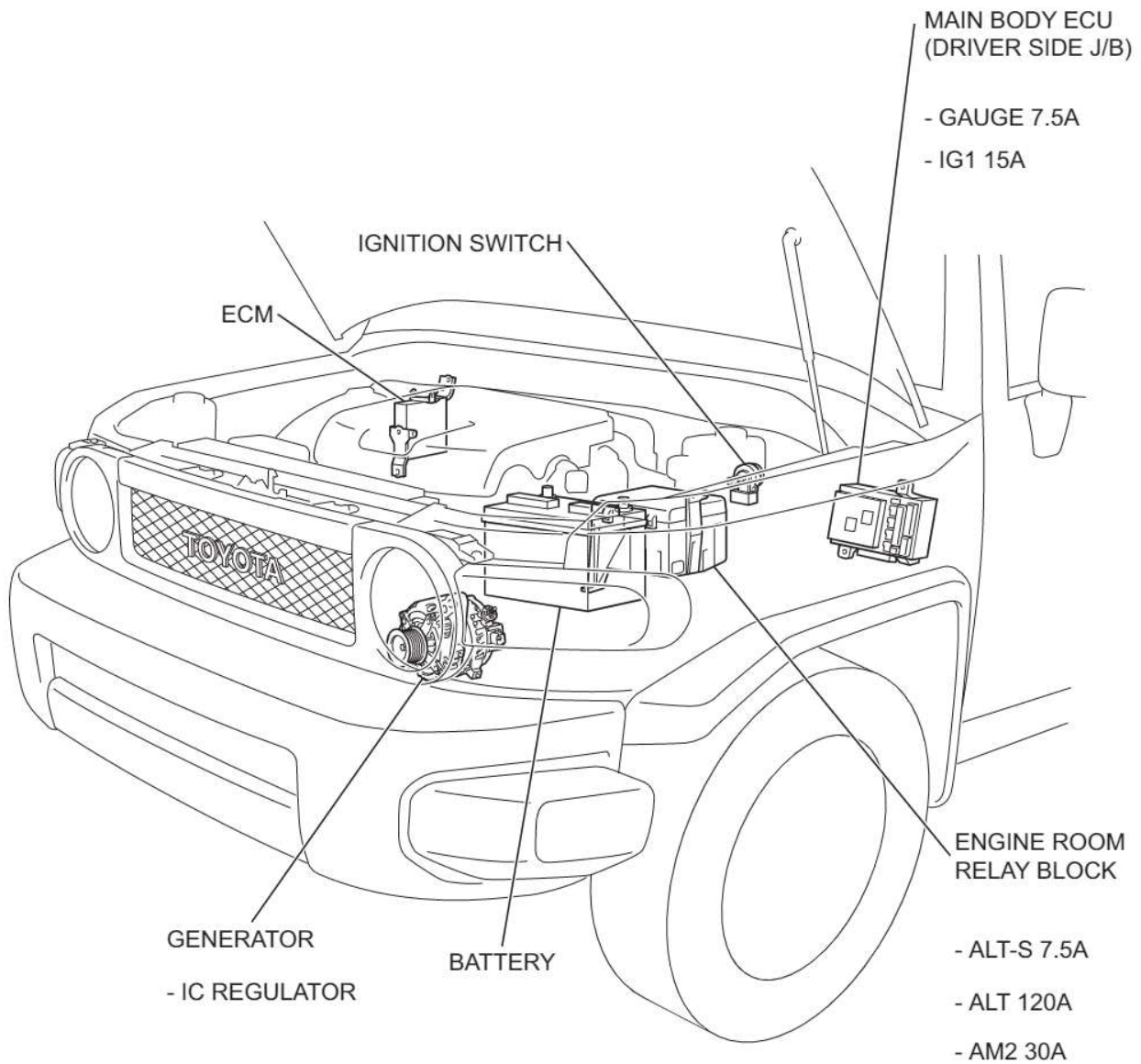
1. PRECAUTION

- (a) Check that the battery cables are connected to the correct terminals.
- (b) Disconnect the battery cables if the battery is charged quickly.
- (c) Do not perform tests using a high voltage insulation resistance tester.
- (d) Never disconnect the cable from the battery while the engine is running.
- (e) Check that the charging cables are tightly connected to terminals B of the generator and the fuse box.
- (f) Do not check whether the generator generates current or not while terminal F is connected to the other terminals.

CH-2

1GR-FE CHARGING – CHARGING SYSTEM

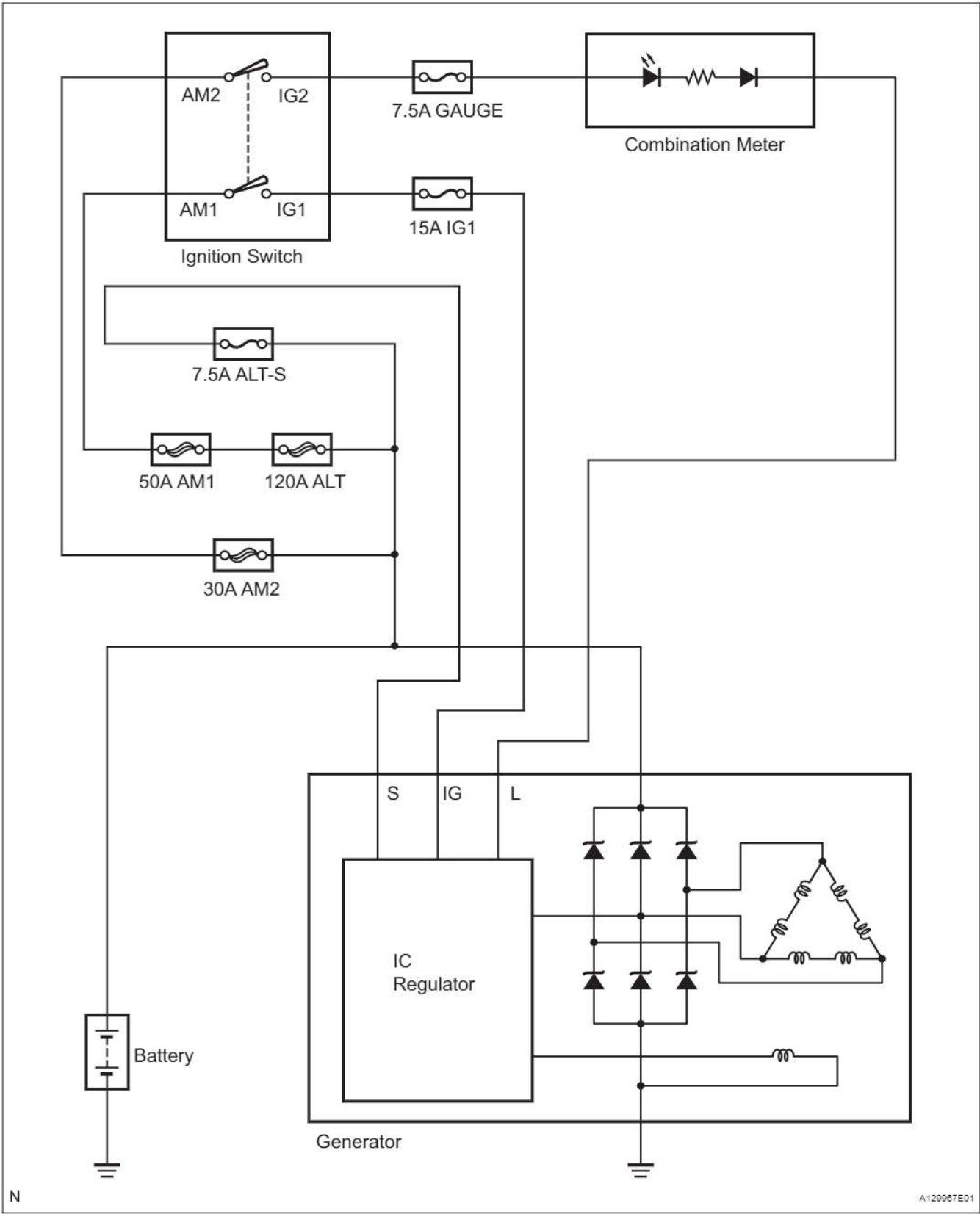
PARTS LOCATION



Y

A129970E01

SYSTEM DIAGRAM



CH-4

1GR-FE CHARGING – CHARGING SYSTEM

ON-VEHICLE INSPECTION

NOTICE:

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. INSPECT BATTERY

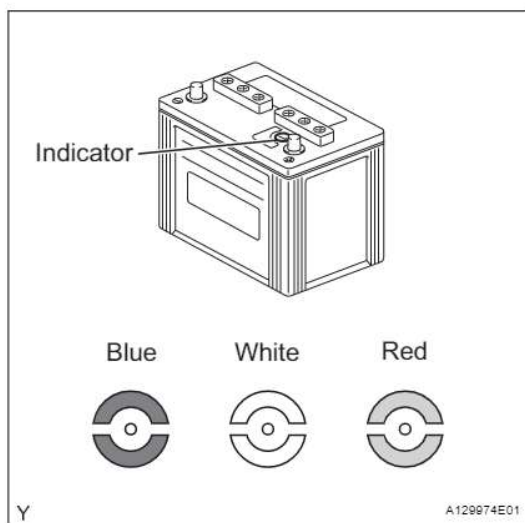
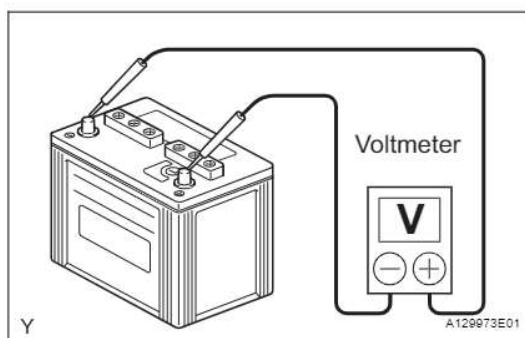
- (a) Check the battery for damage and deformation. If severe damage, deformation or leakage is found, replace the battery.
- (b) Check the voltage of electrolyte in each cell.
 - (1) For batteries that are maintenance-free:
 - If the electrolyte volume is below the lower line, replace the battery.
 - If the electrolyte volume is above the lower line, check the battery voltage when cranking the engine.
- (c) Check the voltage.
 - (1) If it has been less than 20 minutes since you stopped driving the vehicle or since the engine was stopped, turn the ignition switch and electrical systems (headlight, blower motor, rear defogger etc.) to the ON position for 60 seconds. This will remove the surface charge on the battery.
 - (2) Turn the ignition switch to OFF.
 - (3) Turn the electrical systems to OFF.
 - (4) Using a voltmeter, measure the battery voltage between the negative (-) and positive (+) terminals of the battery.

Standard voltage:

12.6 to 12.9 V at 20°C (68°F)

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

- (d) Check that the indicator is as shown in the illustration.



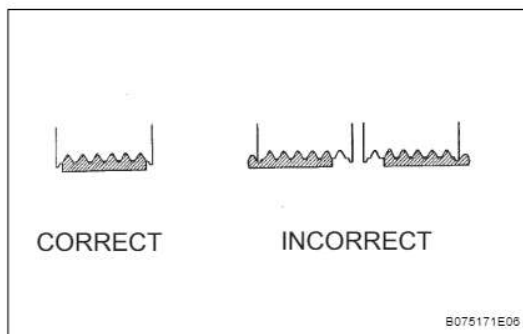
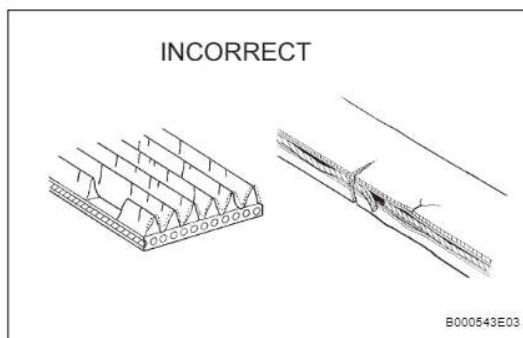
Indicator Color	Condition
Blue	Ready
White	Charging Necessary
Red	Have battery checked by Toyota dealer

2. INSPECT BATTERY TERMINALS, FUSIBLE LINK AND FUSES

- (a) Visually check the battery terminals.
 - (1) Check that the battery terminals are not loose or corroded.
- (b) Visually check the fusible link and fuses.
 - (1) Check that there is continuity between the fusible links, high current fuses and regular fuses.

1GR-FE CHARGING – CHARGING SYSTEM

CH-5

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

4. INSPECT GENERATOR WIRING

- (a) Visually check the generator wiring.
 - (1) Check that the wiring is in good condition.

5. INSPECT ABNORMAL NOISES

- (a) Listen for abnormal noises from the generator.
 - (1) Check that no abnormal noises are heard from the generator while the engine is running.

6. INSPECT CHARGE WARNING LIGHT CIRCUIT

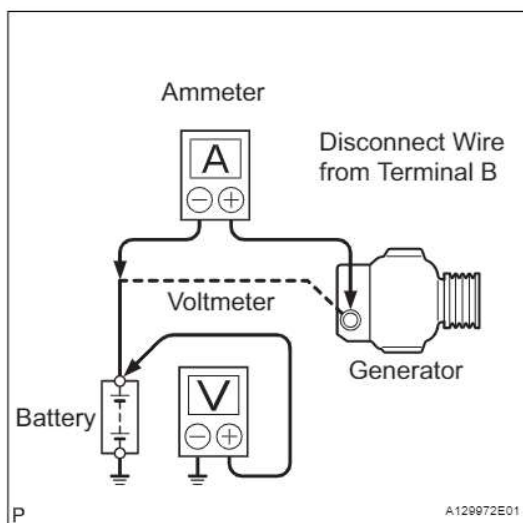
- (a) Turn the ignition switch ON. Check that the charge warning light comes on.
- (b) Start the engine and check that the light goes off. If the light does not operate as specified, troubleshoot the charge warning light circuit.

7. INSPECT CHARGING CIRCUIT WITHOUT LOAD

- (a) If a tester is not available, connect a voltmeter and ammeter 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 positive (+) terminal of the battery.
 - (4) Ground the negative (-) lead of the voltmeter.
- (b) Check the charging circuit.
 - (1) Maintain the engine speed at 2,000 rpm and check the reading on the ammeter and voltmeter.

Standard:**10 A or less for current****13.2 to 14.8 V for voltage****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.



CH

CH-6

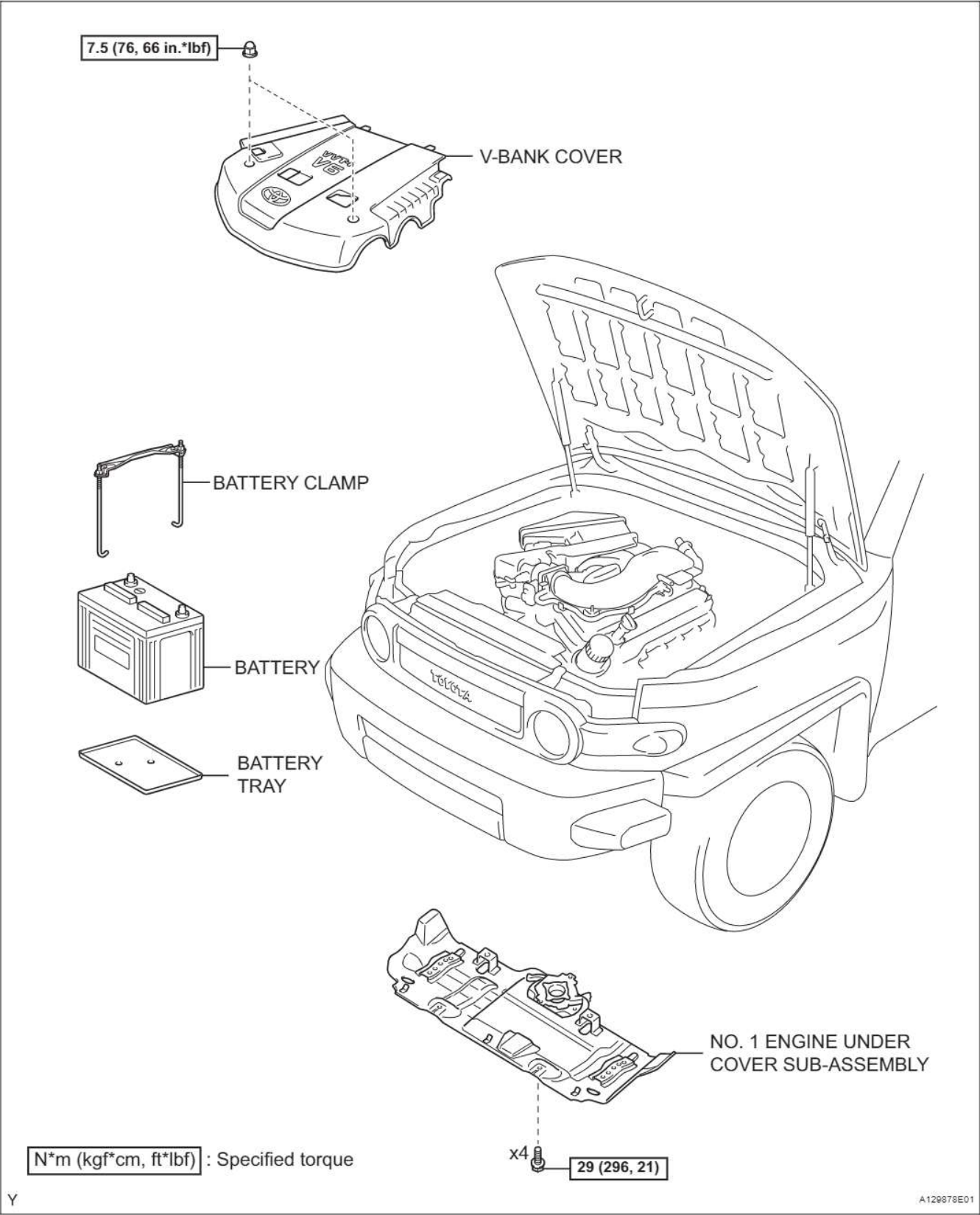
1GR-FE CHARGING – CHARGING SYSTEM

- (b) Check the reading on the ammeter.

Standard current:**30 A or more**

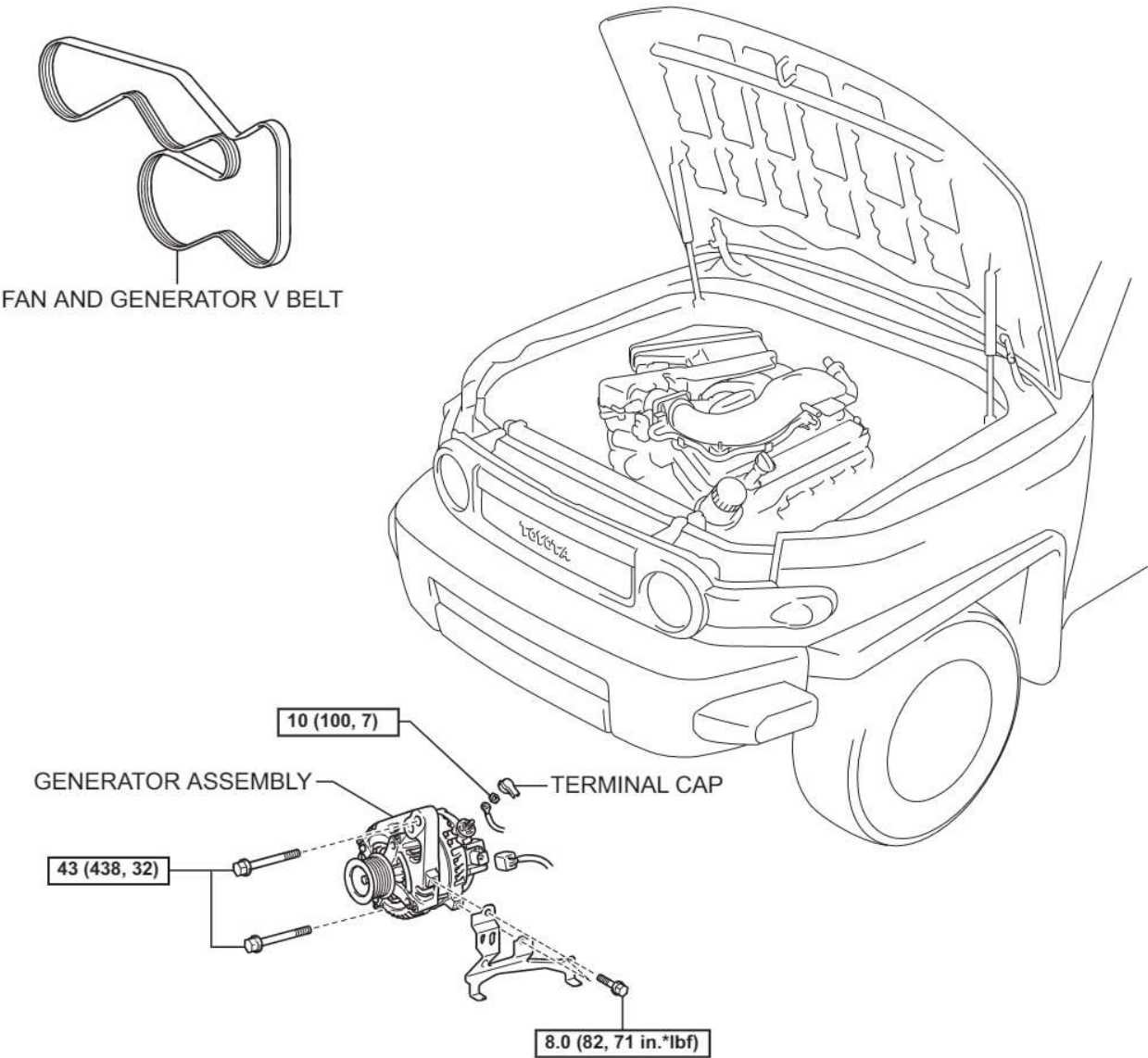
- If the ammeter reading is less than the standard current, repair the generator.
- If the battery is fully charged, the indication will sometimes be less than the standard current.
- In this case, increase electrical load by operating devices such as the wiper motor and rear window defogger. Then recheck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

GENERATOR
COMPONENTS



CH-8

1GR-FE CHARGING – GENERATOR

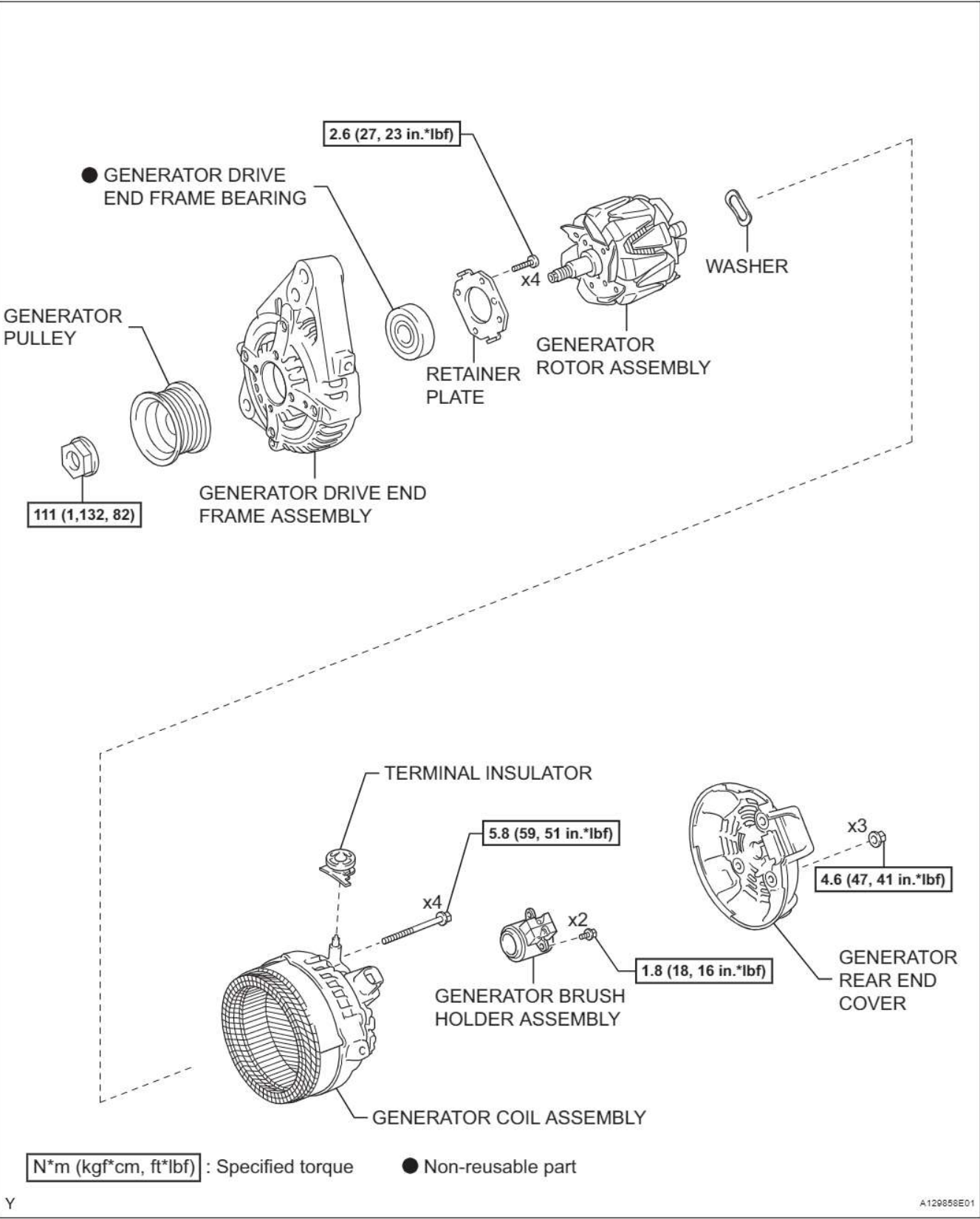


N*m (kgf*cm, ft*lbf) : Specified torque

1GR-FE CHARGING – GENERATOR

CH-9

CH



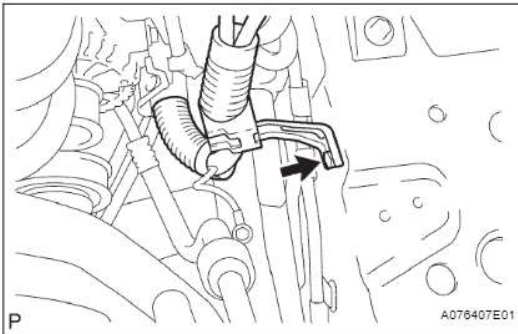
CH-10

1GR-FE CHARGING – GENERATOR

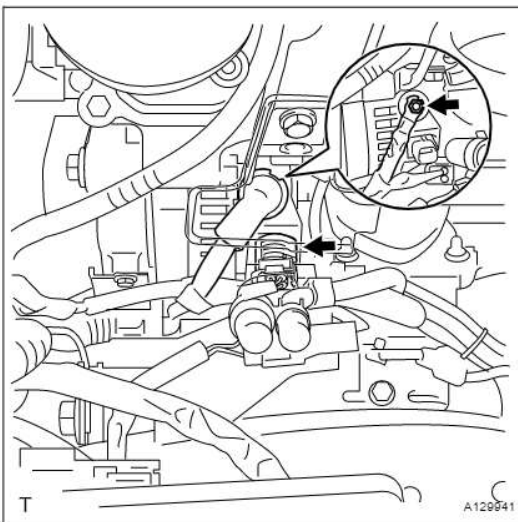
REMOVAL

1. REMOVE BATTERY
2. REMOVE V-BANK COVER (See page [ES-428](#))
3. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY (See page [EM-6](#))
4. REMOVE FAN AND GENERATOR V BELT (See page [EM-6](#))
5. REMOVE GENERATOR ASSEMBLY

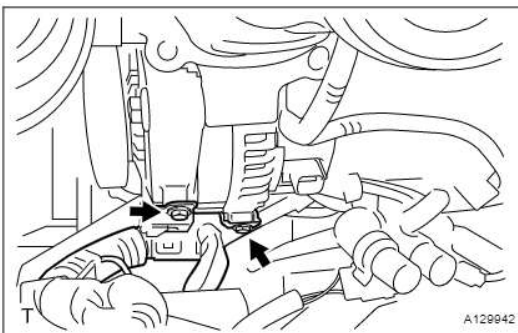
- (a) Disconnect the wire harness.
 - (1) Remove the bolt and wire harness stay.
 - (2) Disconnect the connector from the generator assembly.

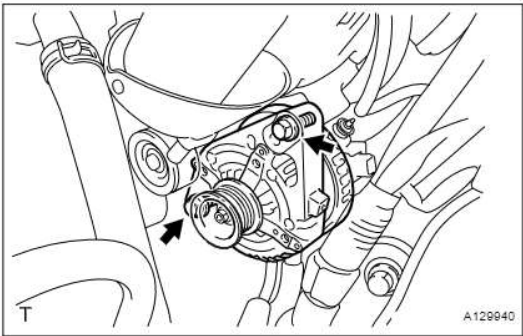


- (3) Remove the terminal cap and nut.
- (4) Disconnect the wire harness from terminal B.

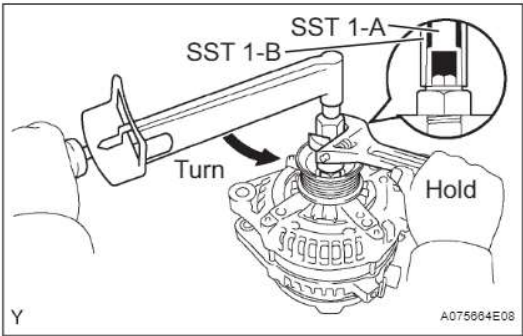


- (b) Remove the 2 bolts, then separate the wire harness clamp bracket from the generator assembly.





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



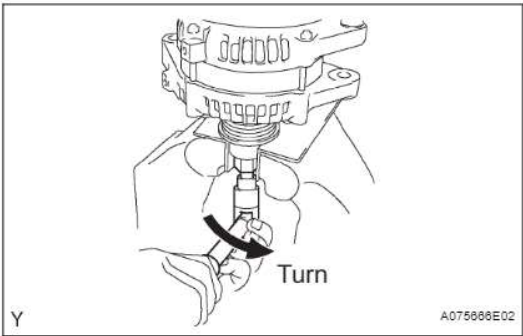
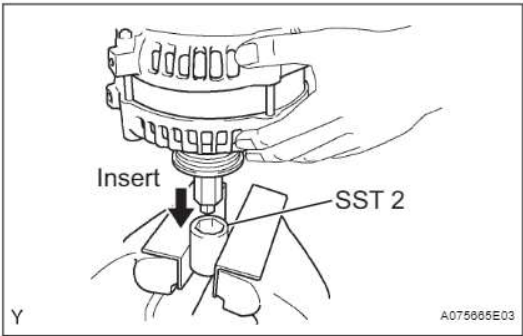
DISASSEMBLY

1. REMOVE GENERATOR PULLEY
SST 09820-63010 (09820-06010, 09820-06020)
HINT

SST 1-A and B	09820 - 06010
SST 2	09820 - 06020

- (a) Hold SST 1-A with a torque wrench, and tighten SST 1-B clockwise with the specified torque.
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)
NOTICE:
Check that SST is secured to the rotor shaft.

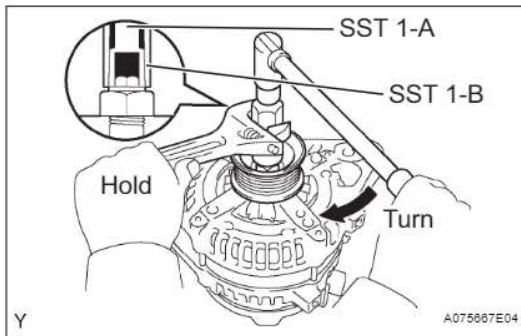
- (b) Mount SST 2 in a vise.
(c) Insert SST 1-A and B into SST 2, and attach the pulley nut to SST 2.



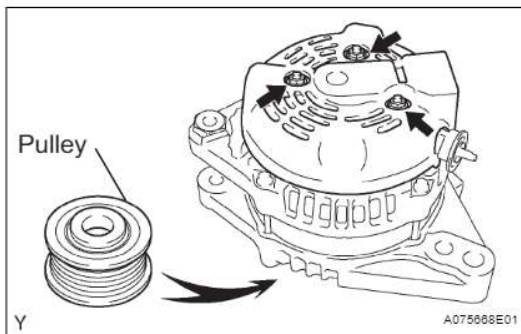
- (d) To loosen the pulley nut, turn SST 1-A in the direction shown in the illustration.
NOTICE:
To prevent damage to the rotor shaft, do not loosen the pulley nut more than one-half turn.
(e) Remove the generator from SST 2.

CH-12

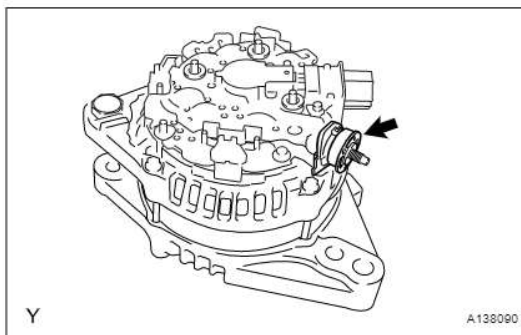
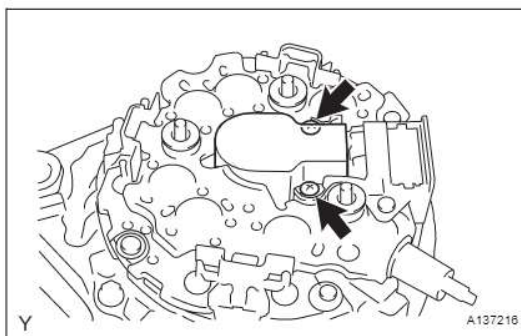
1GR-FE CHARGING – GENERATOR



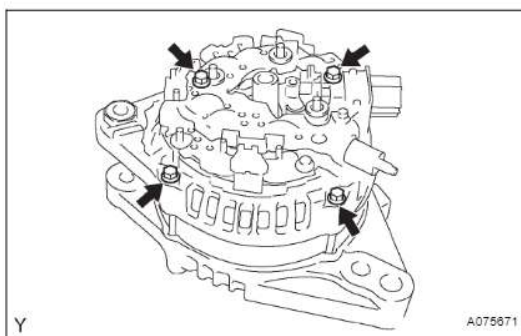
- (f) Turn SST 1-B, and remove SST 1-A and B.
- (g) Remove the pulley nut and pulley.

**2. REMOVE GENERATOR REAR END COVER**

- (a) Place the generator on the pulley.
- (b) Remove the 3 nuts and the rear end cover.

**3. REMOVE TERMINAL INSULATOR****4. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY**

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

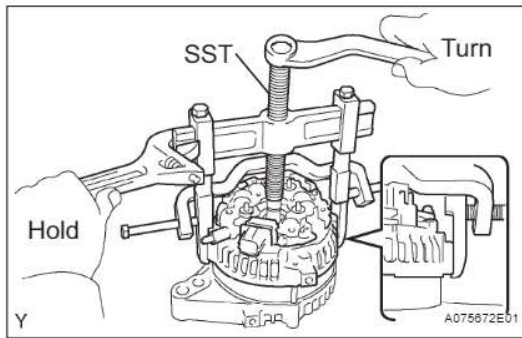
**5. REMOVE GENERATOR COIL ASSEMBLY**

- (a) Remove the 4 bolts.

CH

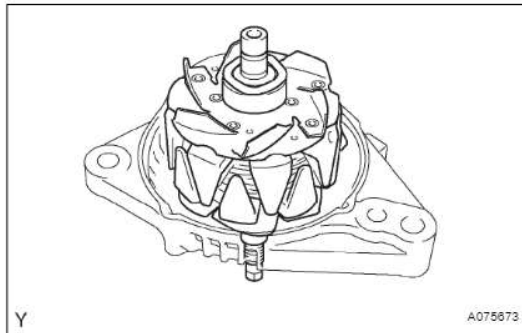
1GR-FE CHARGING – GENERATOR

CH-13



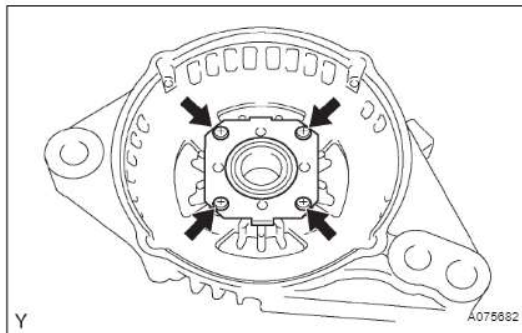
- (b) Using SST, remove the coil.

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



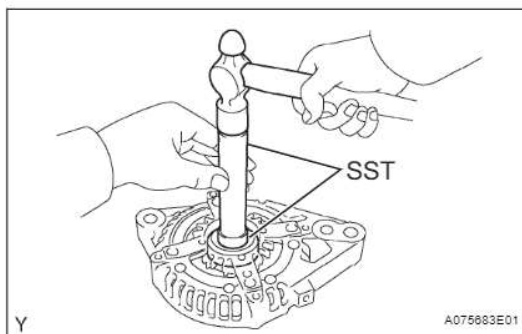
6. REMOVE GENERATOR ROTOR ASSEMBLY

- (a) Remove the washer and rotor.



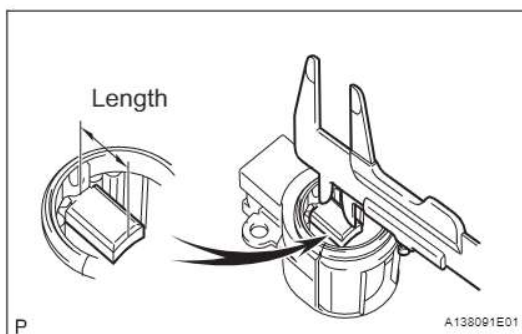
7. REMOVE GENERATOR DRIVE END FRAME BEARING

- (a) Remove the 4 screws and the retainer plate.



- (b) Using SST, tap out the bearing.

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



INSPECTION

1. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY

- (a) Using vernier calipers, measure the exposed brush length.

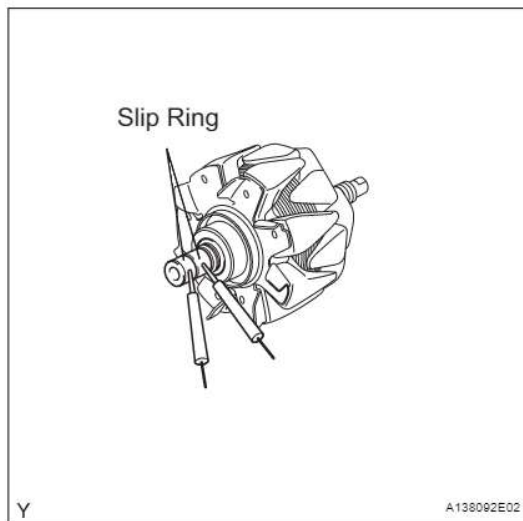
Standard exposed brush length:
10.5 mm (0.413 in.)

Minimum exposed brush length:
4.5 mm (0.177 in.)

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

CH-14

1GR-FE CHARGING – GENERATOR



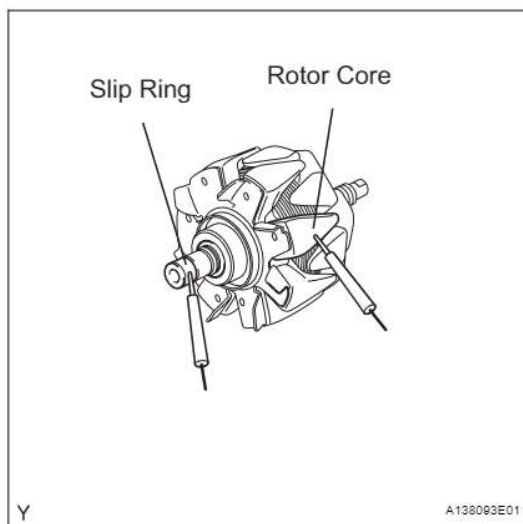
2. INSPECT GENERATOR ROTOR ASSEMBLY

(a) Check the rotor for an open circuit.

- (1) Using an ohmmeter, measure the resistance between the slip rings.

Standard resistance:**2.3 to 2.7 Ω at 20°C (68°F)**

If the resistance is not as specified, replace the rotor.



(b) Check the rotor for ground.

- (1) Using an ohmmeter, check the resistance between the slip ring and rotor.

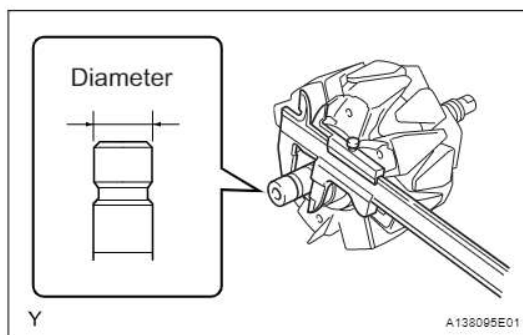
Standard resistance:**10 k Ω or higher**

If there is continuity, replace the rotor.

(c) Inspect the slip rings.

- (1) Check that the slip rings are not rough or scored.

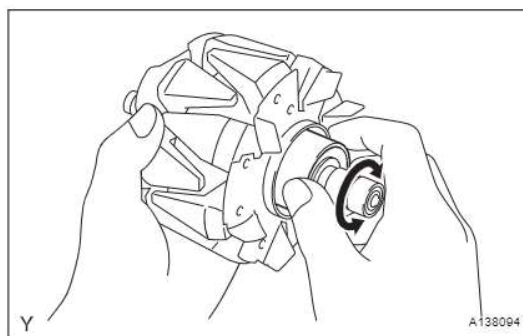
If rough or scored, replace the rotor assembly.



- (2) 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 rotor.



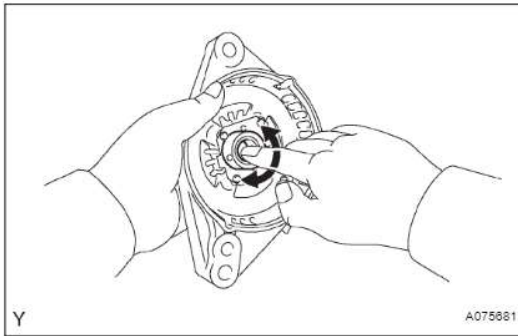
3. INSPECT GENERATOR ROTOR BEARING

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

If necessary, replace the generator rotor assembly.

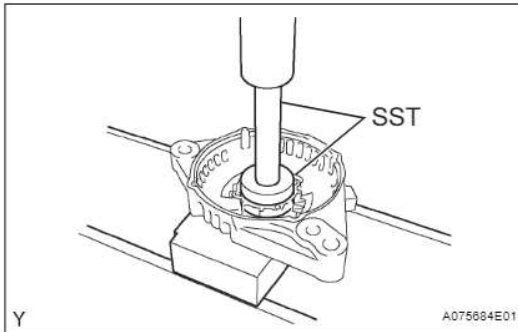
1GR-FE CHARGING – GENERATOR

CH-15



4. INSPECT GENERATOR DRIVE END FRAME BEARING

- (a) Check that the bearing is not rough or worn.
If necessary, replace the bearing.



REASSEMBLY

1. INSTALL GENERATOR DRIVE END FRAME BEARING

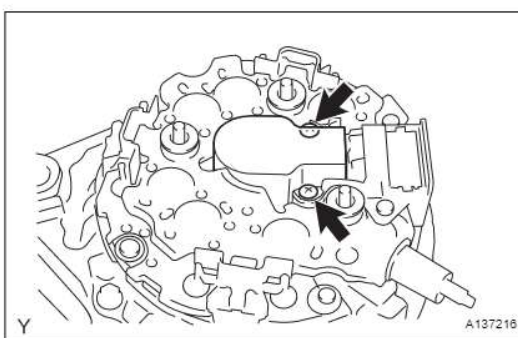
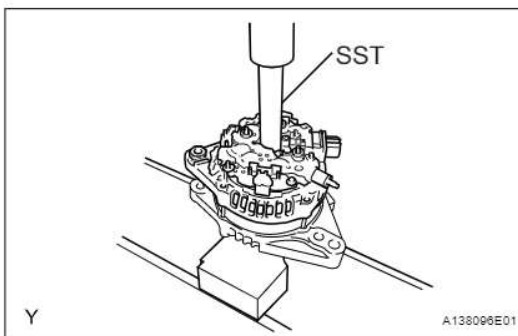
- (a) Using SST and a press, press in a new bearing.
SST 09950-60010 (09951-00470), 09950-70010 (09951-07100)
(b) Install the retainer plate with the 4 screws.
Torque: 2.6 N*m (27 kgf*cm, 23 in.*lbf)

2. INSTALL GENERATOR ROTOR ASSEMBLY

- (a) Place the drive end frame on the rotor.
(b) Install the rotor and washer.

3. INSTALL GENERATOR COIL ASSEMBLY

- (a) Using SST and a press, press in the coil carefully.
SST 09285-76010
(b) Install the 4 bolts.
Torque: 5.8 N*m (59 kgf*cm, 51 in.*lbf)



4. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY

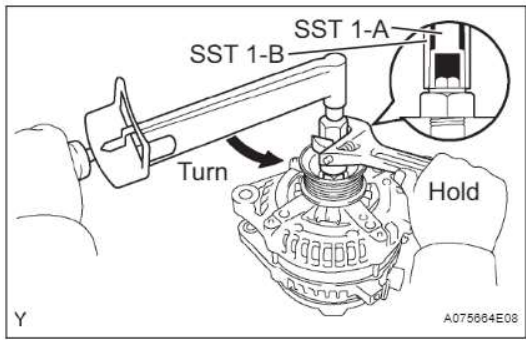
- (a) Install the 2 screws.
Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)

5. INSTALL TERMINAL INSULATOR

6. INSTALL GENERATOR REAR END COVER

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

CH



7. INSTALL GENERATOR PULLEY
SST 09820-63010 (09820-06010, 09820-06020)
HINT

SST 1-A and B	09820 - 06010
SST 2	09820 - 06020

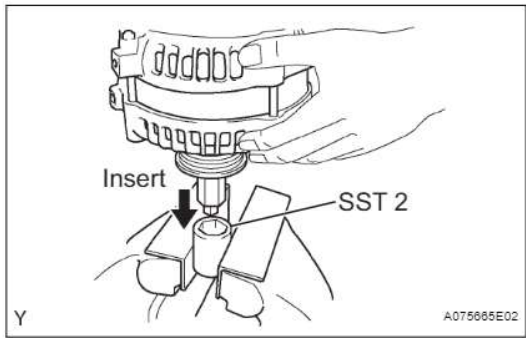
- (a) Install the pulley onto the rotor shaft by tightening the pulley nut by hand.
- (b) Hold SST 1-A with a torque wrench, and tighten SST 1-B clockwise with the specified torque.

Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

NOTICE:

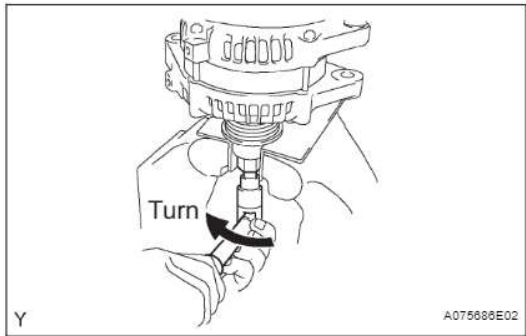
Check that SST is secured to the rotor shaft.

- (c) Mount SST 2 in a vice.
- (d) Insert SST 1-A and B into SST 2, and attach the pulley nut to SST 2.

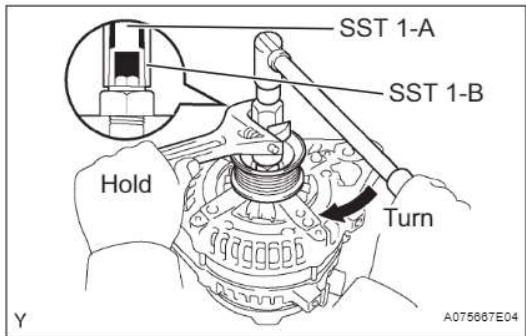


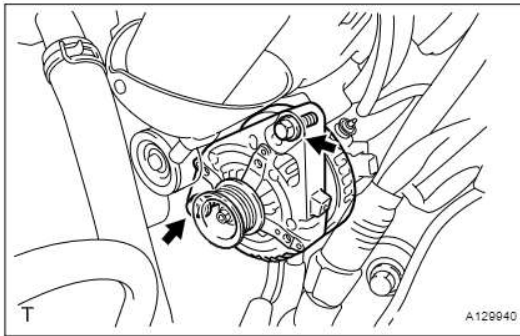
- (e) Tighten the pulley nut by turning SST 1-A in the direction shown in the illustration.
- (f) Remove the generator from SST 2.

Torque: 111 N*m (1,132 kgf*cm, 82 ft.*lbf)



- (g) Turn SST 1-B, and remove SST 1-A and B.
- (h) Turn the pulley, and check that the pulley moves smoothly.

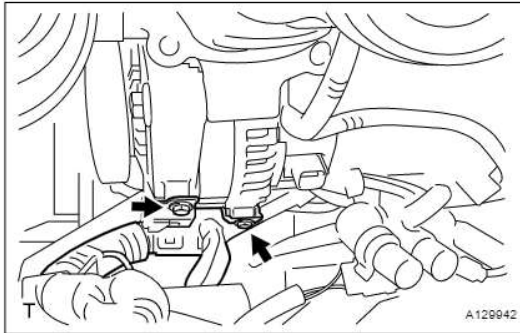




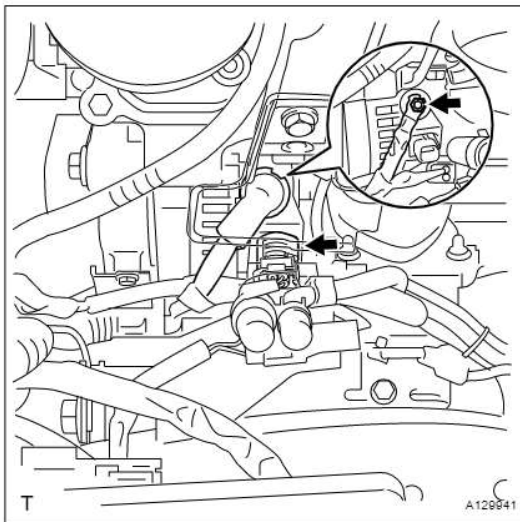
INSTALLATION

1. INSTALL GENERATOR ASSEMBLY

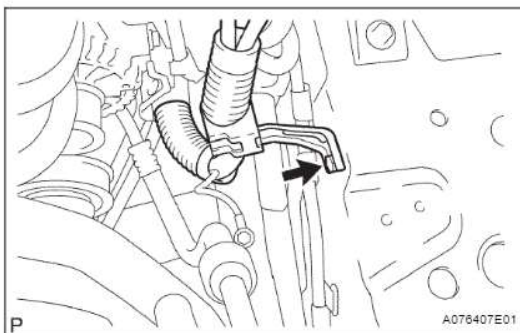
- (a) Install the generator assembly with the 2 bolts.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)



- (b) Install the wire harness clamp bracket with the 2 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



- (c) Connect the wire harness.
 (1) Connect the wire harness to terminal B and install the nut.
Torque: 10 N*m (100 kgf*cm, 7 ft.*lbf)
 (2) Connect the connector to the generator assembly.



- (3) Install the wire harness stay with the bolt.
Torque: 5.8 N*m (59 kgf*cm, 51 in.*lbf)

2. INSTALL FAN AND GENERATOR V BELT (See page [EM-6](#))
 3. INSTALL NO. 1 UNDER COVER SUB-ASSEMBLY (See page [EM-7](#))
 4. INSTALL V-BANK COVER (See page [ES-431](#))
 5. INSTALL BATTERY
Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)