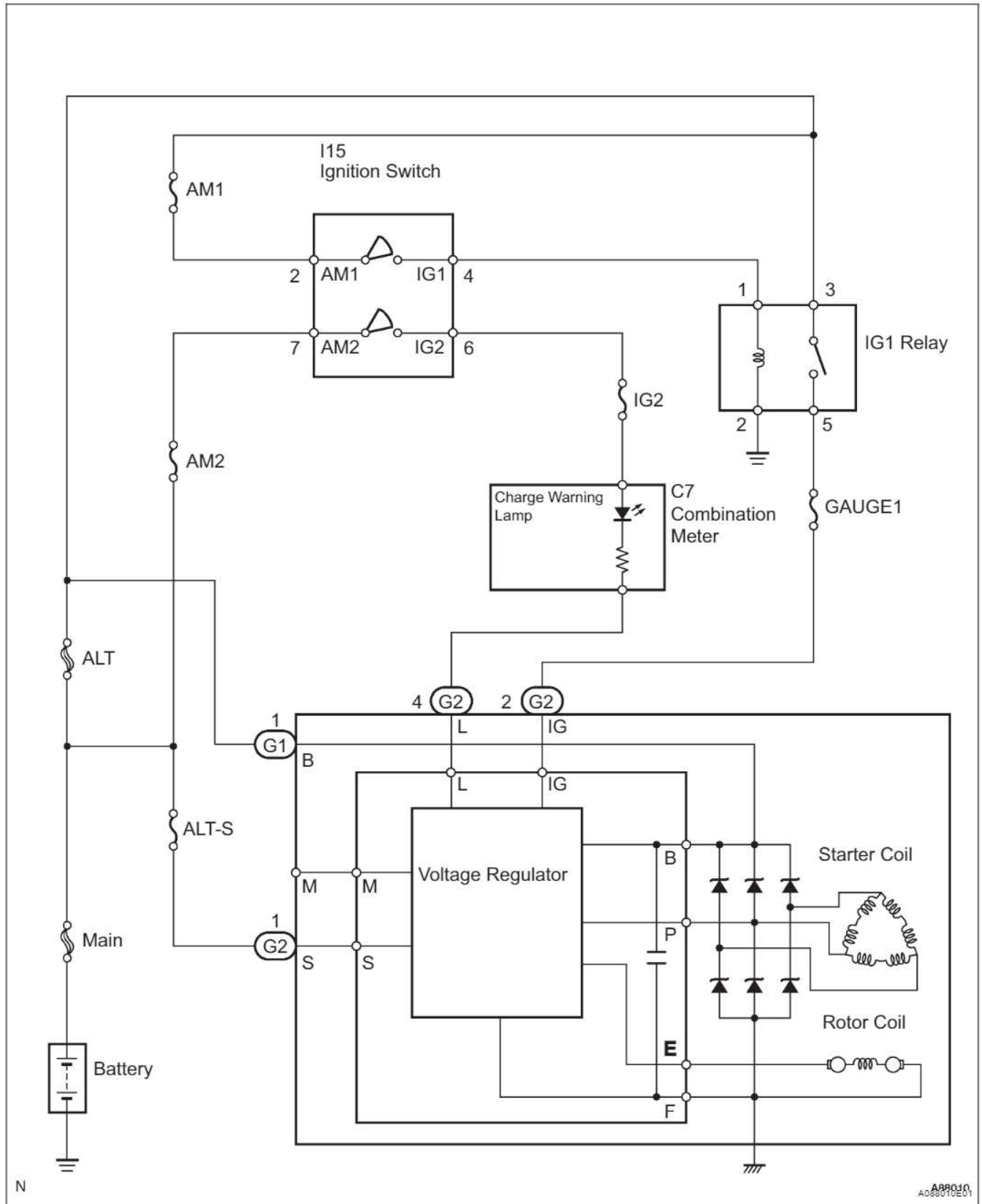


3MZ-FE CHARGING – CHARGING SYSTEM

CH-3

SYSTEM DIAGRAM

The charging system uses the voltage regulator to regulate the electricity that is generated by the rotations of the rotor coil and stores this electricity in the battery.



CH-4

3MZ-FE CHARGING – CHARGING SYSTEM

ON-VEHICLE INSPECTION**1. INSPECT BATTERY CONDITION**

- (a) Check the battery for damage and deformation. If severe damage, deformation or leakage is found, replace the battery.
- (b) Check the electrolyte quantity of each cell.
For batteries that are maintenance-free:
If the electrolyte quantity is below the recommended amount, replace the battery.
For batteries that are not maintenance-free:
If the electrolyte quantity is below the recommended amount, add distilled water.

CAUTION:

If the battery is depleted or if the engine cannot be started easily, the engine may not be recovered properly. Recharge the battery and perform inspections again before returning the vehicle to the customer.

2. INSPECT BATTERY SPECIFIC GRAVITY

- (a) Except maintenance - free battery
 - (1) Check the specific gravity of each cell.
Voltage:
1.25 to 1.29 at 2 °C (68°F)
If the result is not as specified, charge the battery.

3. INSPECT BATTERY VOLTAGE

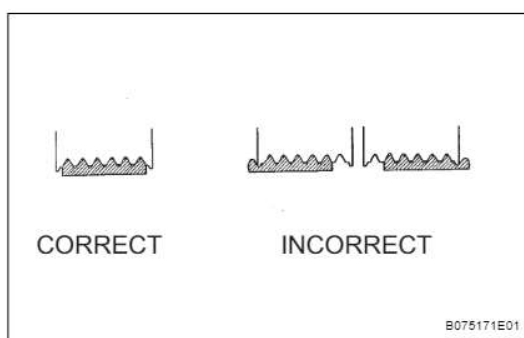
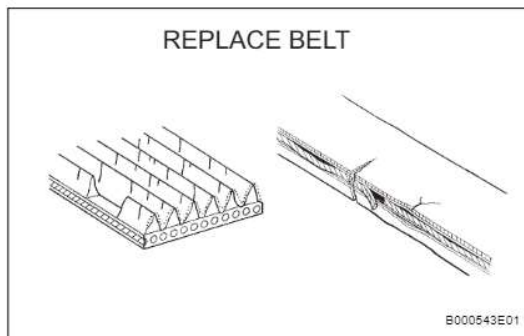
- (a) Maintenance - free battery
 - (1) After the vehicle has run for 20 minutes, stop the engine.
 - (2) Turn the ignition switch ON, and turn on the headlight, blower fan and defogger for 1 minute.
 - (3) Turn the ignition switch OFF.
 - (4) Measure the battery voltage.
Voltage:
1.25 to 1.29 V at 2 °C (68°F)
If the result is not as specified, charge the battery.

4. INSPECT BATTERY TERMINALS, FUSIBLE LINK AND FUSES

- (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 fusible link and fuse.
Resistance:
Below 1 Ω
If the result is not as specified, replace the fusible link and/or fuse.

3MZ-FE CHARGING – CHARGING SYSTEM

CH-5

**5. INSPECT DRIVE BELT**

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

If any defect is found, replace the drive belt.

HINT:

Replace the drive belt if the following defects are found.

- If the belt has worn out until the wire can be seen.
- If the cracks reach the wire more than one place.
- If the belt has chunks missing from the ribs.

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

HINT:

With you hand, confirm that the belt has not slipped out of the groove on the bottom of the pulley.

6. VISUALLY CHECK GENERATOR WIRING

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

7. LISTEN FOR ABNORMAL NOISES FROM GENERATOR

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

8. CHECK CHARGE WARNING LIGHT CIRCUIT

- (a) Turn the ignition switch ON. 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.

9. CHECK CHARGING CIRCUIT WITHOUT LOAD

HINT:

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

- (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 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 terminal B of the generator.
- (4) Ground the negative (-) lead of the voltmeter.

- (b) Check the charging circuit.

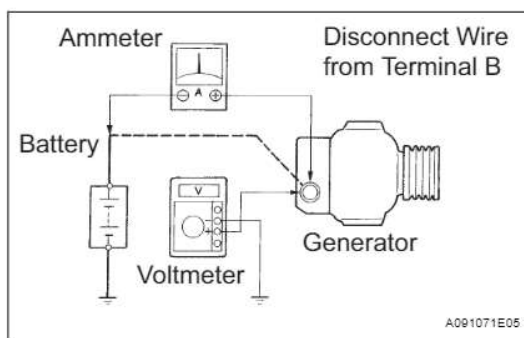
- (1) Keep the engine speed at 2,000 rpm, check the reading on the ammeter and voltmeter.

Standard amperage:

10 A or less

Standard voltage:

13.2 to 14.8 V



CH-6

3MZ-FE CHARGING – CHARGING SYSTEM

10. INSPECT CHARGING CIRCUIT WITH LOAD

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

Standard amperage:

30 A or more

HINT:

- 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.

CHARGING SYSTEM

PRECAUTION

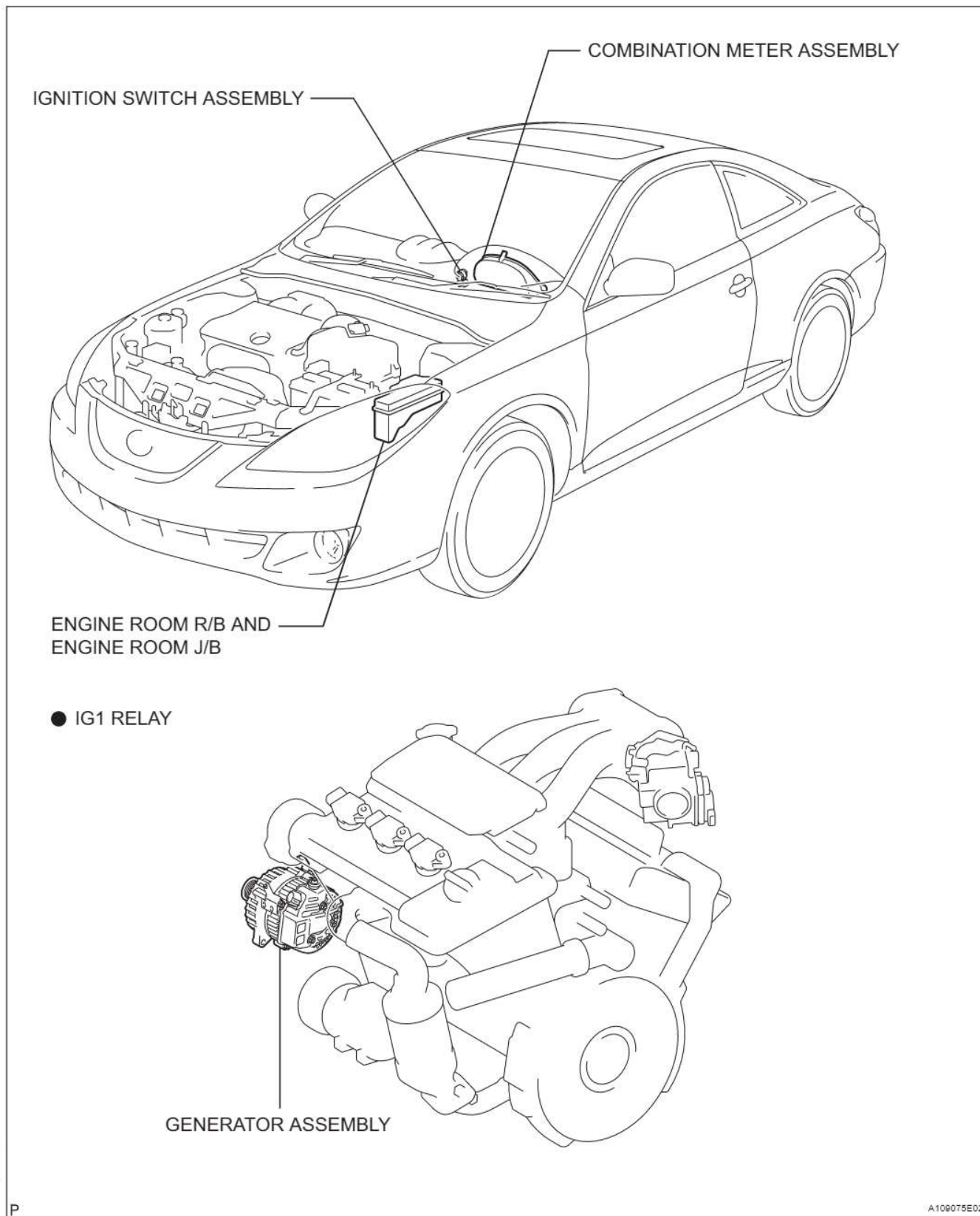
CAUTION:

- Check that the battery cables are connected to the correct terminals.
- Disconnect the battery cables when the battery is given a quick charge.
- Do not perform tests with a high voltage insulation resistance tester.
- Never disconnect the battery while the engine is running.
- Check that the charging cable is tightened on terminal B of the generator and the fuse box.

CH-2

3MZ-FE CHARGING – CHARGING SYSTEM

PARTS LOCATION



3MZ-FE CHARGING – GENERATOR

CH-11

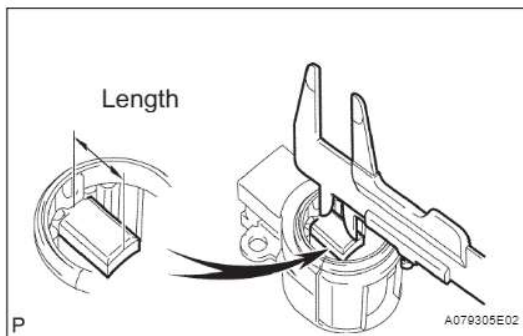
INSPECTION

1. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY

- (a) Check the brush length.
 (1) Using a vernier caliper, measure the exposed brush length.

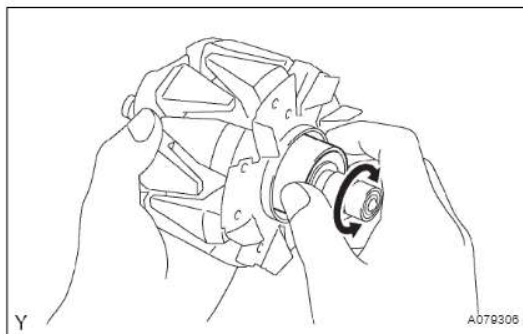
Specified brush length:**4.5 to 10.5 mm (0.177 to 0.413 in.)**

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



2. INSPECT GENERATOR ROTOR ASSEMBLY

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

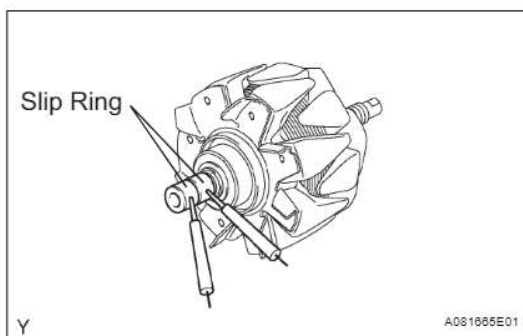


- (b) Check if the rotor has an open circuit.

- (1) Measure the resistance between the slip ring.

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

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



- (c) Check if the rotor is grounded.

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

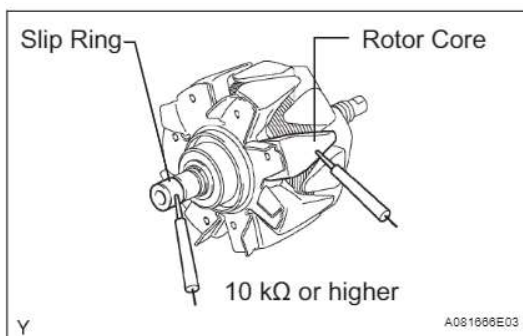
Resistance:**10 k Ω or higher**

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

- (d) Inspect slip rings.

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

If rough or scored, replace the rotor assembly.

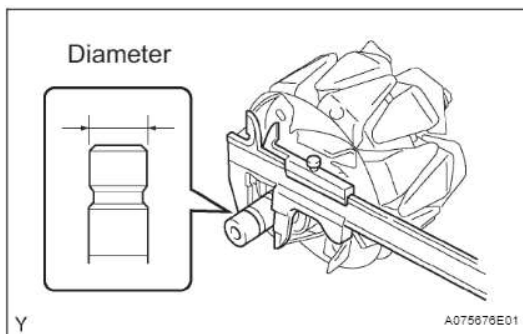


- (e) Check the slip ring diameter.

- (1) Using a vernier caliper, measure the slip ring diameter.

Specified diameter:**14.0 to 14.4 mm (0.551 to 0.567 in.)**

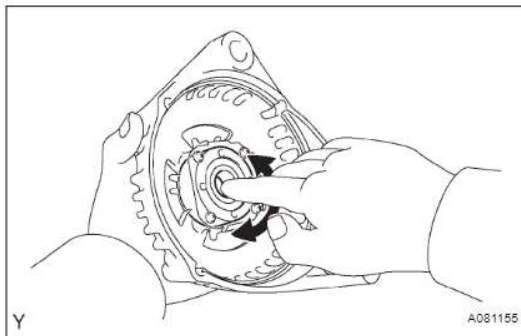
If the diameter is less than minimum, replace the rotor assembly.



CH

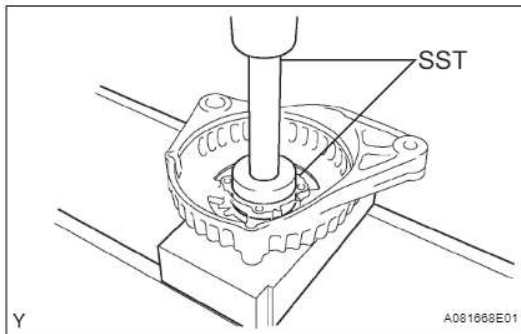
CH-12

3MZ-FE CHARGING – GENERATOR



3. INSPECT GENERATOR DRIVE END FRAME BEARING

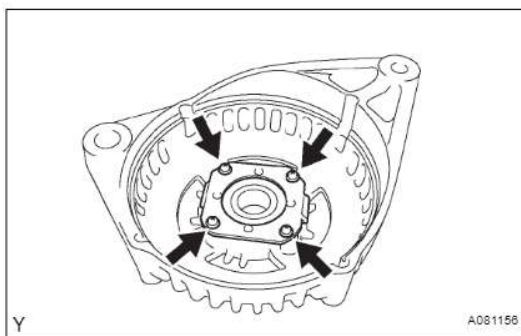
- (a) Check that the bearing is not rough or worn.
If necessary, replace the bearing.



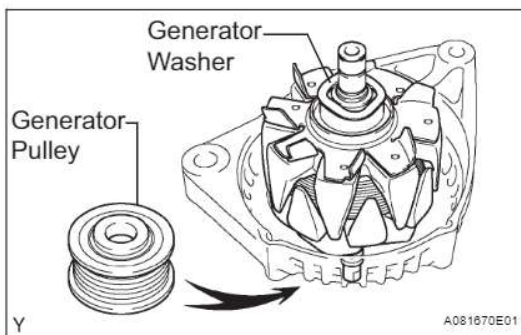
REASSEMBLY

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)

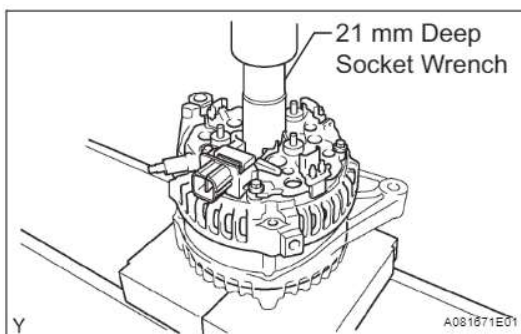


- (b) Install the retainer with the 4 screws.
Torque: 2.3 N*m (23 kgf*cm, 20 in.*lbf)



2. INSTALL GENERATOR ROTOR ASSEMBLY

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

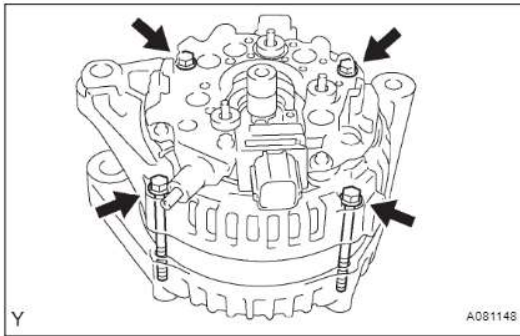


3. INSTALL GENERATOR RECTIFIER END FRAME

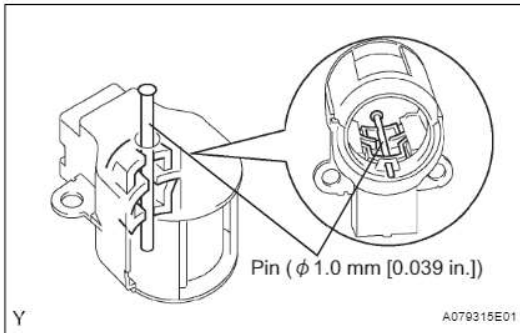
- (a) Using a 21 mm deep socket wrench and a press, press in the generator rectifier end frame carefully.

3MZ-FE CHARGING – GENERATOR

CH-13

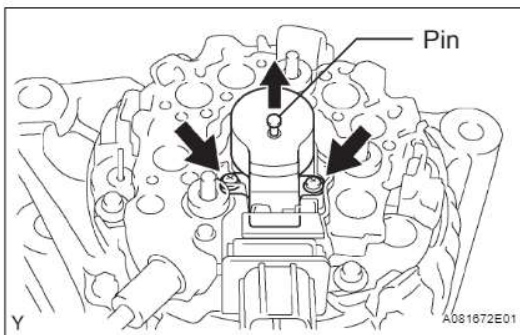


- (b) Install the 4 bolts.
Torque: 5.8 N*m (59 kgf*cm, 51 in.*lbf)

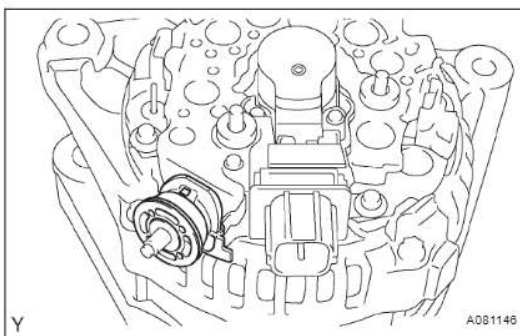


4. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY

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



- (b) Install the generator brush holder with the 2 screws.
Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)
 (c) Pull out the pin from the generator brush holder.

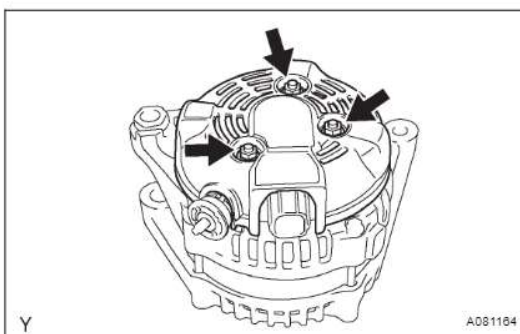


5. INSTALL TERMINAL INSULATOR

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

NOTICE:

Pay attention to the mounting orientation of the terminal insulator.



6. INSTALL GENERATOR REAR END COVER

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

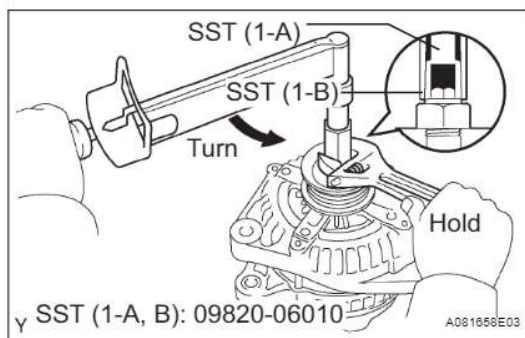
7. INSTALL GENERATOR PULLEY

- (a) Install the generator pulley to the rotor shaft by tightening the pulley nut by hand.

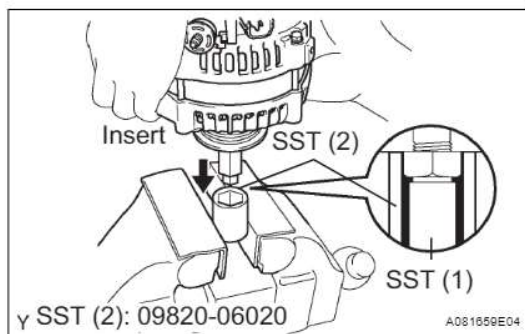
CH

CH-14

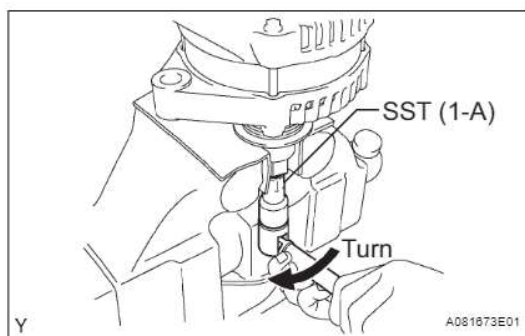
3MZ-FE CHARGING – GENERATOR



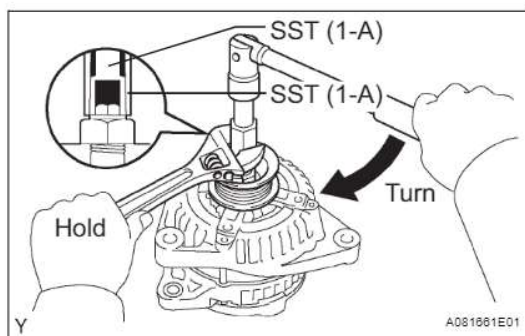
- (b) Hold SST (1-A) with a torque wrench, and tighten SST (1-B) clockwise to the specified torque.
SST 09820-63010 (09820-06010, 09820-06020)
Torque: 39 N*m (400 kgf*cm, 29 in.*lbf)
NOTICE:
Check that SST is secured to the rotor shaft.



- (c) Clamp SST 2 in a vise.
 (d) Insert SST (1-A, 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.
Torque: 110 N*m (1,122 kgf*cm, 81 in.*lbf)
 (f) Remove the generator from SST (2).

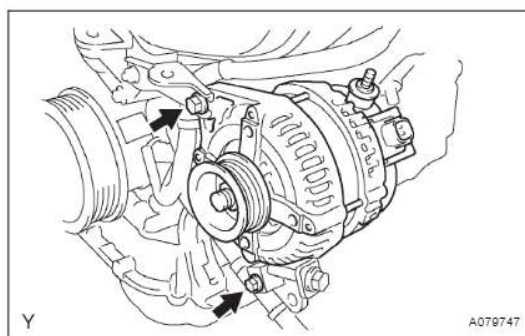


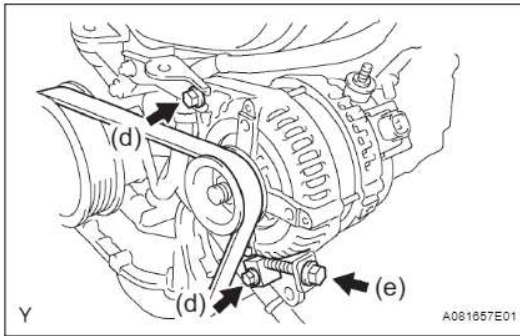
- (g) Turn SST (1-B), and remove SST (1-A, B).
 (h) Turn the generator pulley and check that the generator pulley moves smoothly.

INSTALLATION

1. INSTALL GENERATOR ASSEMBLY

- (a) Install the generator with the 2 bolts, but do not fully tighten the bolts.



3MZ-FE CHARGING – GENERATOR**CH-15**

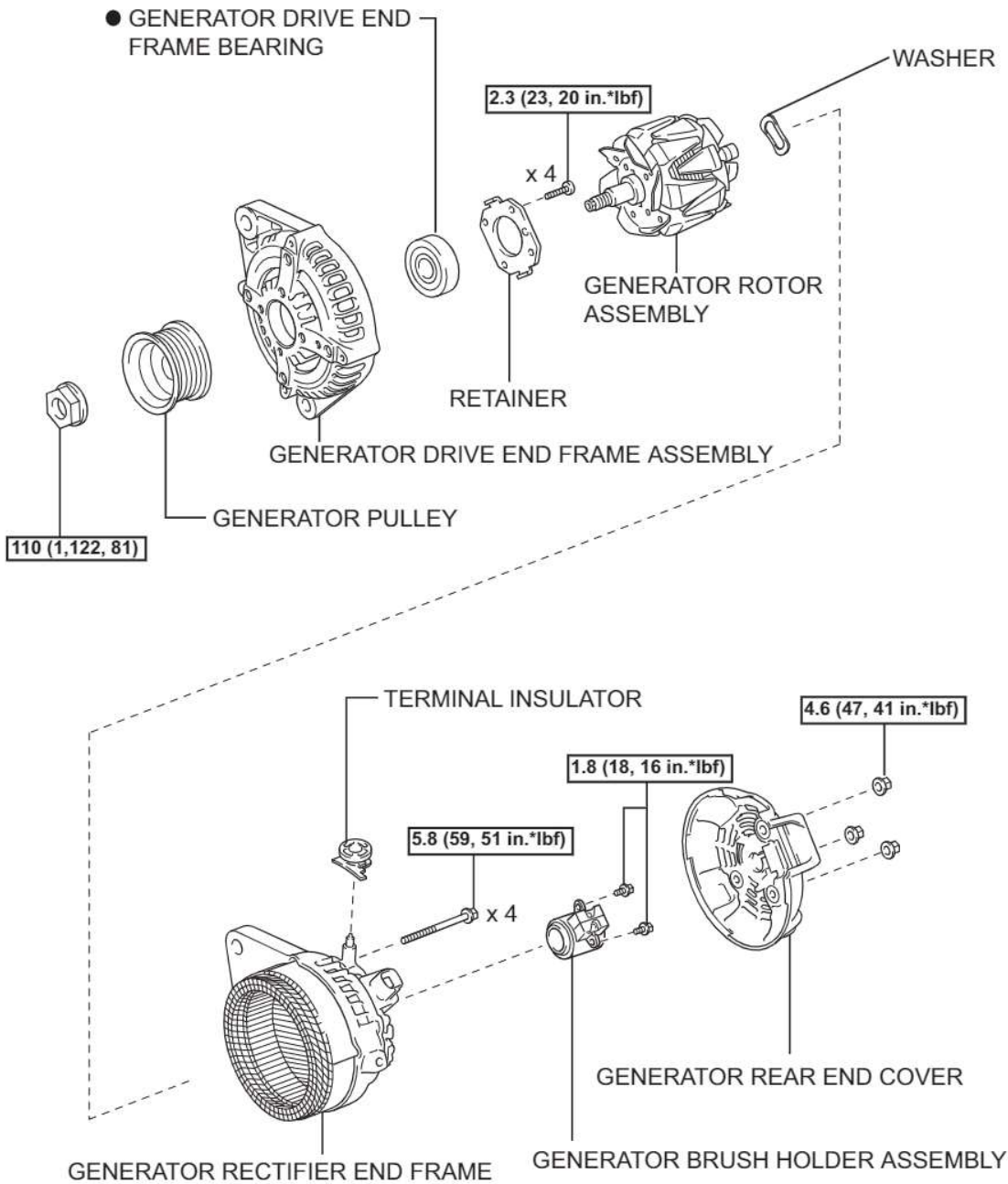
- (b) Adjust the V belt tension by tightening the bolt.
- (c) Tighten the 2 bolts.

Torque: Bolt A**58 N*m (592 kgf*cm, 43 ft.*lbf)****Bolt B****18 N*m (184 kgf*cm, 13 ft.*lbf)**

- (d) Install the generator wire with the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
- (e) Connect the generator connector.
- (f) Install the wire harness clamp.

2. INSPECT DRIVE BELT**HINT:**See page [CH-5](#)**CH**

GENERATOR
COMPONENTS



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

● Non-reusable part

CH

A109039E04

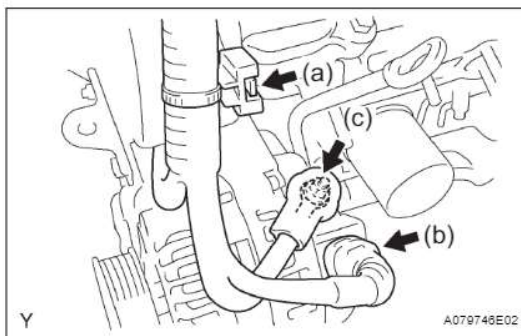
CH-8

3MZ-FE CHARGING – GENERATOR

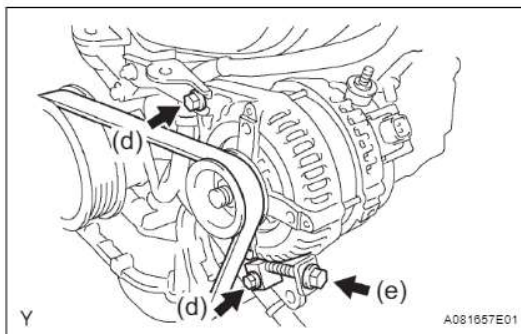
REMOVAL

1. REMOVE GENERATOR ASSEMBLY

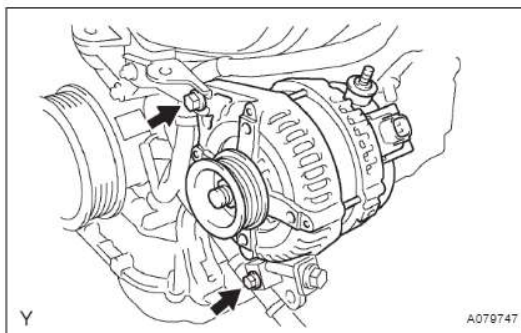
- (a) Remove the wire harness clamp.
- (b) Disconnect the generator connector.
- (c) Open the terminal cap, remove the nut and disconnect the generator wire.



- (d) Loosen the 2 bolts.
- (e) Loosen the bolt to lessen the tension of the V belt.



- (f) Remove the 2 bolts and generator.



DISASSEMBLY

1. REMOVE GENERATOR PULLEY

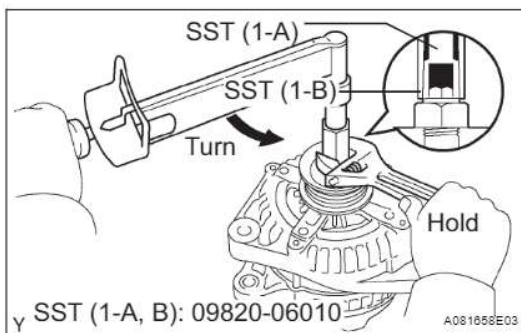
- (a) Hold SST (1-A) with a torque wrench, and tighten SST (1-B) clockwise to the specified torque.

SST 09820-63010 (09820-06010, 09820-06020)

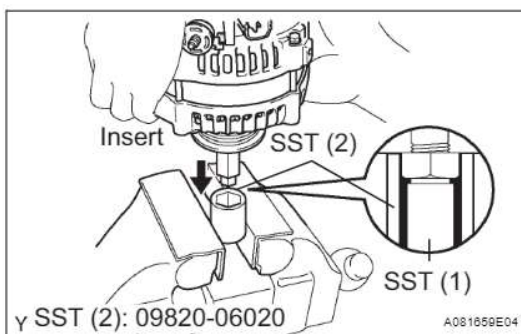
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

NOTICE:

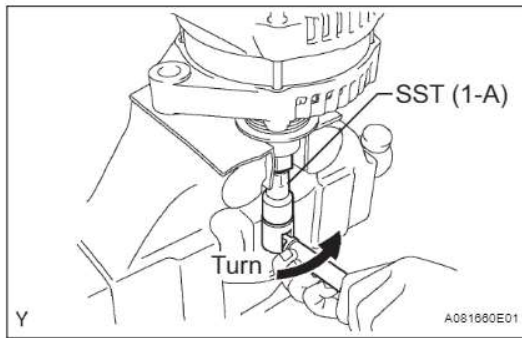
Check that SST is secured to the rotor shaft.



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



3MZ-FE CHARGING – GENERATOR

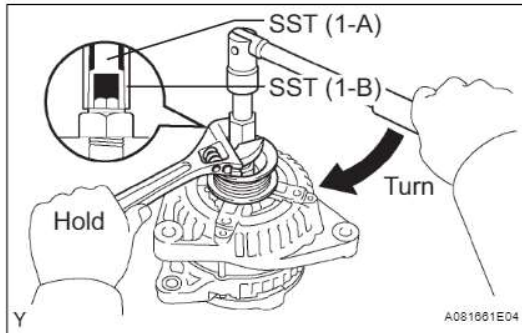


- (d) To loosen the pulley nut, turn SST (1-A) in the direction shown in the illustration.

NOTICE:

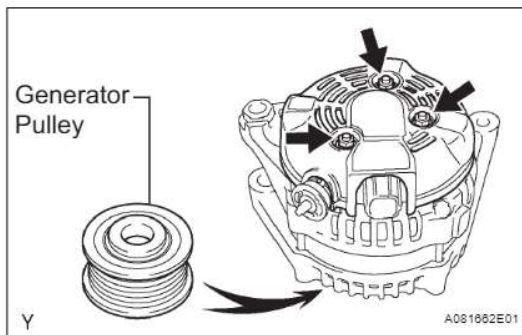
To prevent damage to the rotor shaft, do not loosen the pulley nut more than one-half turn.

- (e) Remove the generator from SST (2).

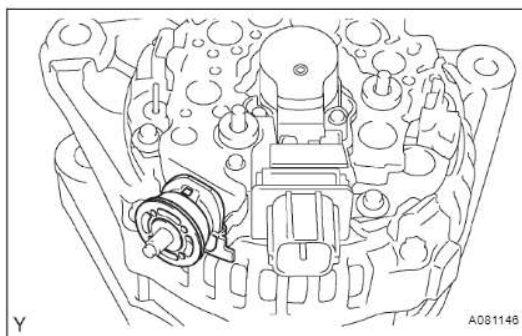


- (f) Turn SST (1-B) and remove SST (1-A, B).

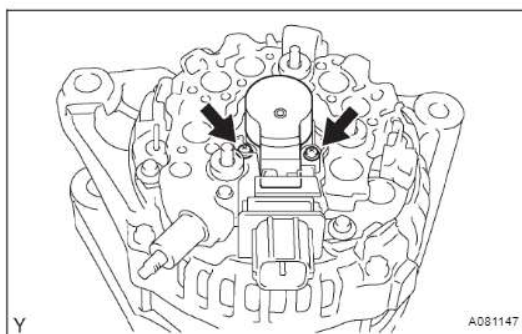
- (g) Remove the pulley nut and generator pulley.

**2. REMOVE GENERATOR REAR END COVER**

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

**3. REMOVE TERMINAL INSULATOR**

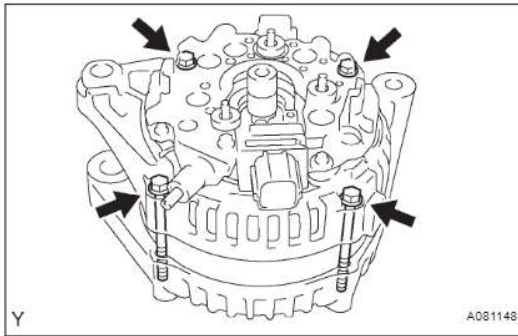
- (a) Remove the terminal insulator from the generator rectifier end frame.

**4. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY**

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

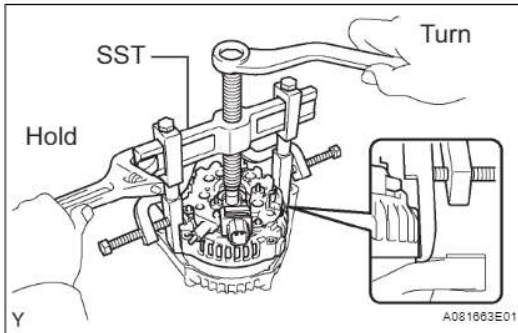
CH-10

3MZ-FE CHARGING – GENERATOR



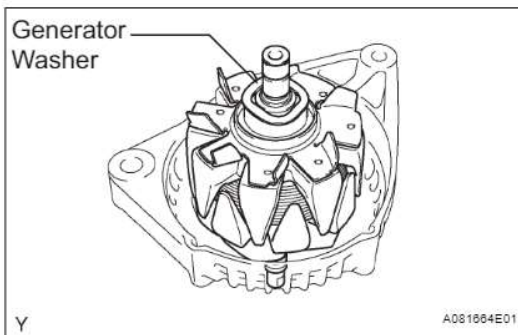
5. REMOVE GENERATOR RECTIFIER END FRAME

(a) Remove the 4 bolts.



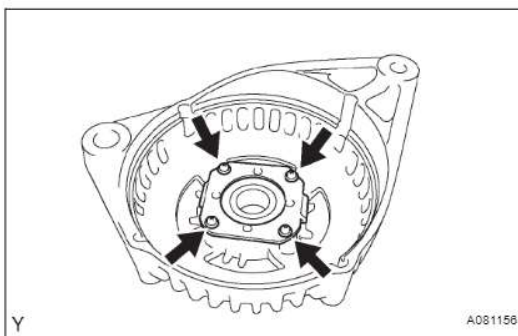
(b) Using SST, remove the generator rectifier end frame.

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



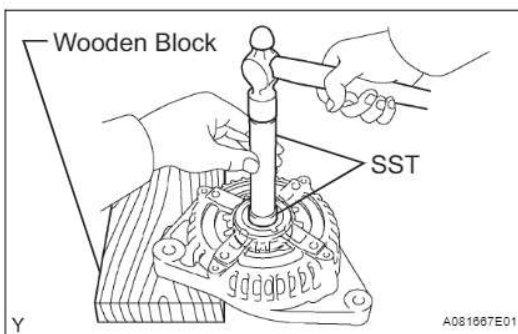
6. REMOVE GENERATOR ROTOR ASSEMBLY

(a) Remove the generator washer and generator rotor.



7. REMOVE GENERATOR DRIVE END FRAME BEARING

(a) Remove the 4 screws and retainer.



(b) Using SST, tap out the bearing.

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