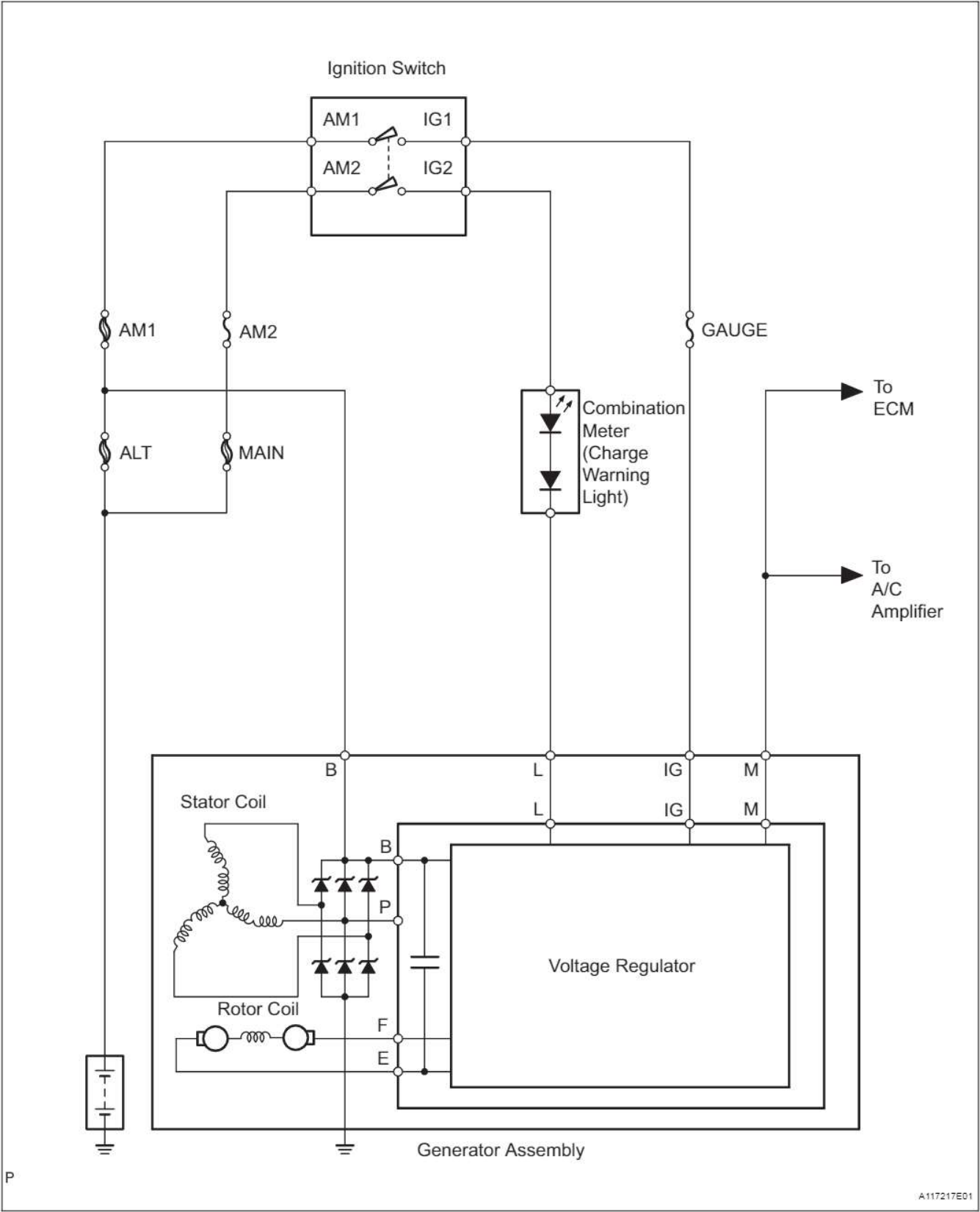


1NZ-FE CHARGING – CHARGING SYSTEM

CH-3

SYSTEM DIAGRAM



CH

CH-4

1NZ-FE CHARGING – CHARGING SYSTEM

ON-VEHICLE INSPECTION

1. CHECK BATTERY CONDITION

NOTICE:

If the battery is weak or if the engine is difficult to start, perform the following procedures.

- (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.

- (1) For maintenance-free batteries:

- If the electrolyte quantity is below the lower line, replace the battery.
- If the electrolyte quantity 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 the electrical systems (headlights, blower motor, rear defogger, etc.).

- (2) For non-maintenance-free batteries:

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

Standard specific gravity:

1.25 to 1.29 at 20°C (68°F)

- If the electrolyte quantity 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 the electrical systems (headlights, blower motor, rear defogger, etc.).

2. CHECK BATTERY TERMINALS AND FUSES

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

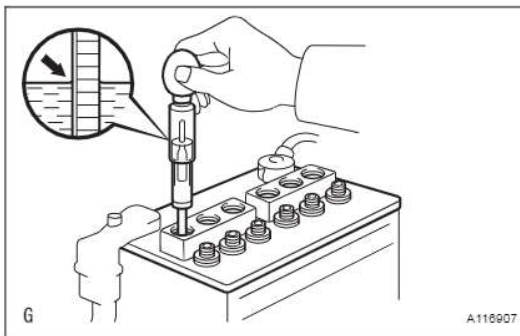
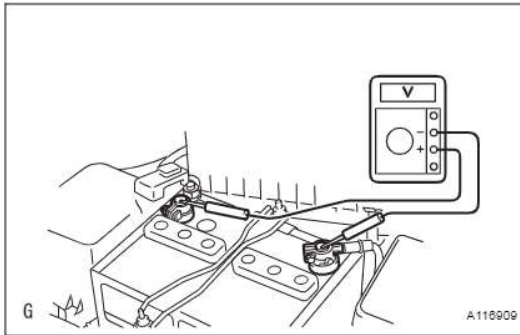
If the terminals are corroded, clean the terminals.

- (b) Measure the resistance of the fusible links, H-fuse and fuses.

Standard resistance:

Below 1 Ω

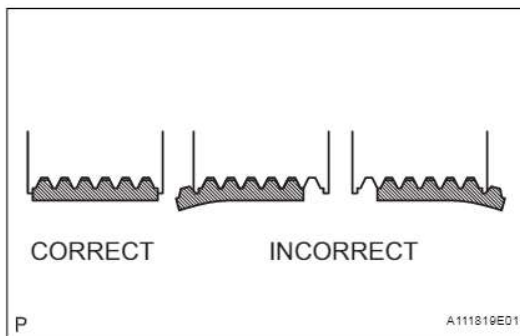
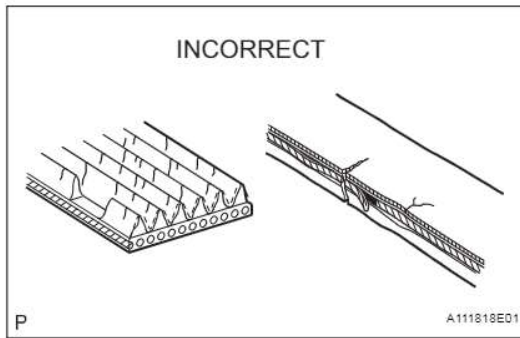
If the results are not as specified, replace the fuses as necessary.



CH

1NZ-FE CHARGING – CHARGING SYSTEM

CH-5

**3. CHECK V-RIBBED 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:

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

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

HINT:

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

4. VISUALLY CHECK GENERATOR WIRING

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

5. LISTEN FOR ABNORMAL NOISE FROM GENERATOR

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

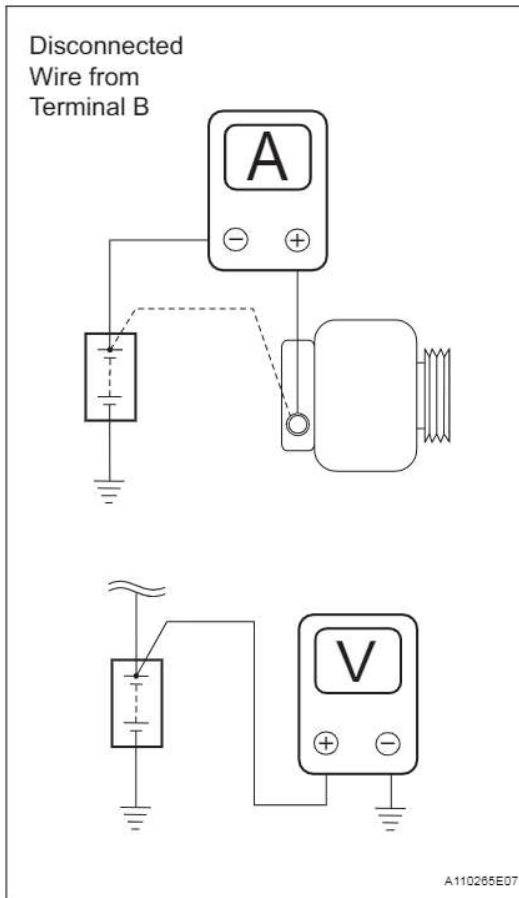
6. CHECK CHARGE WARNING LIGHT CIRCUIT

- (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.

CH

CH-6

1NZ-FE CHARGING – CHARGING SYSTEM



7. CHECK CHARGING CIRCUIT WITHOUT LOAD

- (a) Connect a voltmeter and 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.

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

12.9 to 14.9 V

HINT:

- If the voltmeter reading is more than the standard voltage, replace the voltage regulator.
- If the voltmeter reading is less than the standard voltage, check the voltage regulator and generator.

8. CHECK CHARGING CIRCUIT WITH LOAD

- (a) With the engine running 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

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.

CH

1NZ-FE CHARGING – GENERATOR

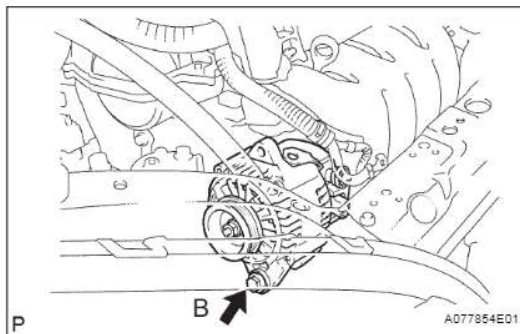
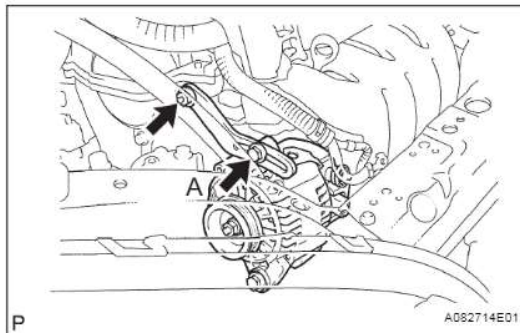
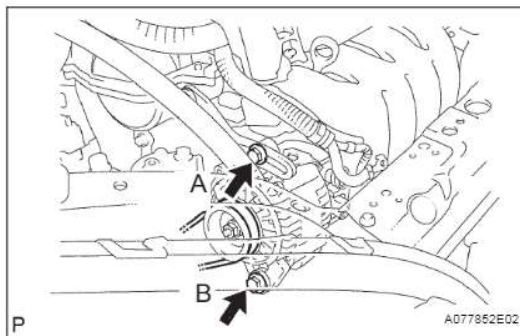
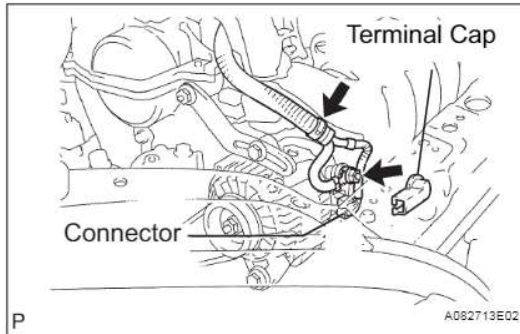
CH-9

REMOVAL**1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL****CAUTION:**

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE GENERATOR ASSEMBLY

- (a) Remove the terminal cap.
- (b) Remove the nut and generator wire.
- (c) Disconnect the generator connector.
- (d) Remove the wire harness clamp.



- (e) Loosen bolts A and B.
- (f) Release the fan and generator V-belt tension, and remove the fan and generator V-belt.

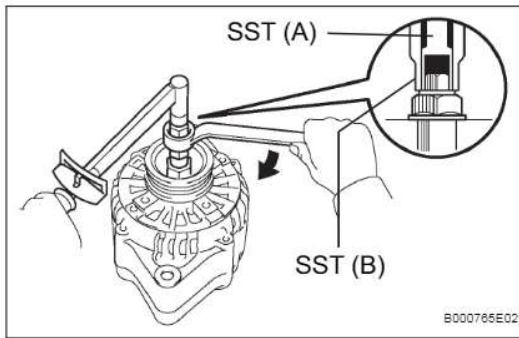
- (g) Remove bolt A, the nut and the adjusting bar.

- (h) Remove bolt B and the generator.

CH

CH-10

1NZ-FE CHARGING – GENERATOR



DISASSEMBLY

1. REMOVE GENERATOR PULLEY

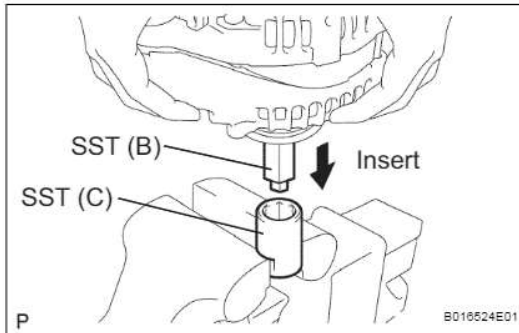
- (a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.

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

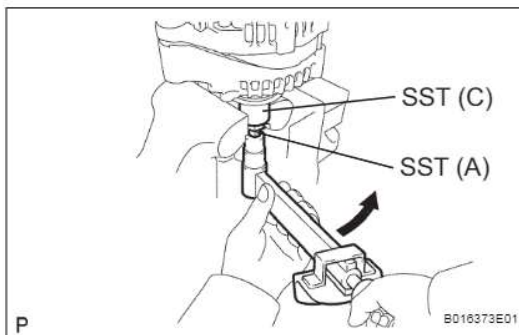
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

NOTICE:

Check that SST is secured to the rotor shaft.



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

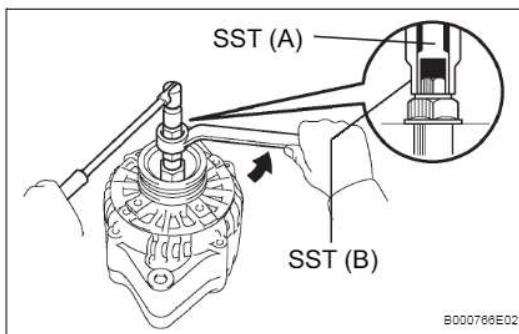


- (d) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.

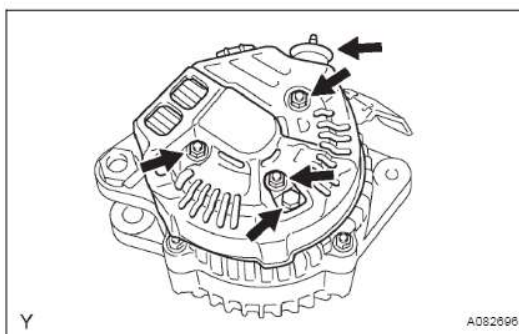
NOTICE:

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

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



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

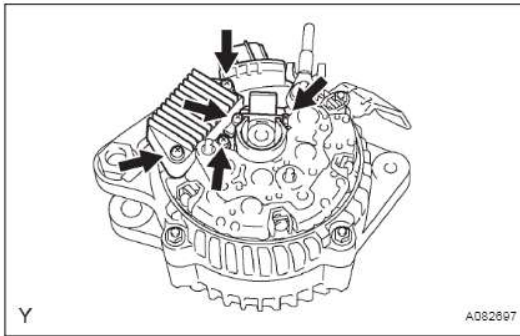


2. REMOVE REAR END COVER

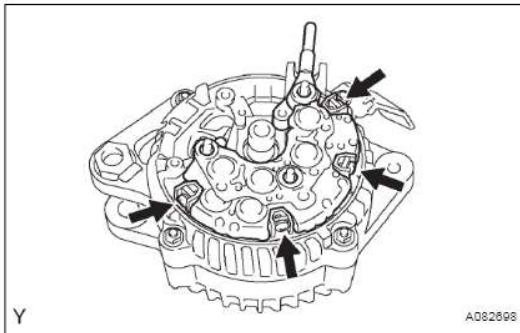
- (a) Remove the nut and terminal insulator.
(b) Remove the bolt, 3 nuts, plate terminal and end cover.

1NZ-FE CHARGING – GENERATOR

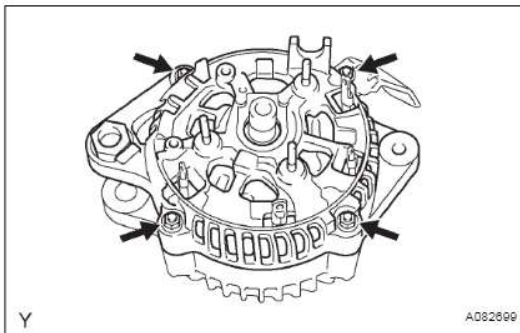
CH-11

**3. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY**

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

**4. REMOVE GENERATOR REGULATOR ASSEMBLY**

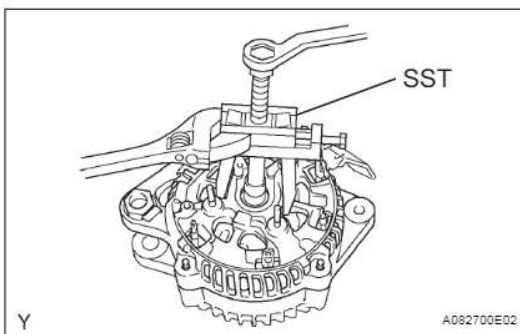
- (a) Remove the 3 screws and generator regulator.

**5. REMOVE GENERATOR HOLDER WITH RECTIFIER**

- (a) Remove the 4 screws and holder with rectifier.

6. REMOVE GENERATOR RECTIFIER END FRAME

- (a) Remove the 4 rubber insulators.
- (b) Remove the seal plate.
- (c) Remove the 4 nuts and cord clip.



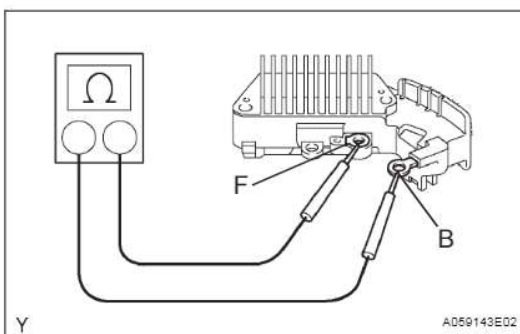
- (d) Using SST, remove the rectifier end frame.
SST 09286-46011

7. REMOVE GENERATOR ROTOR ASSEMBLY

- (a) Remove the generator washer from the rotor.
- (b) Remove the rotor from the drive end frame.

NOTICE:

Do not drop the rotor.

**INSPECTION****1. INSPECT GENERATOR REGULATOR ASSEMBLY**

- (a) Measure the resistance between the regulator terminals (F) and (B).

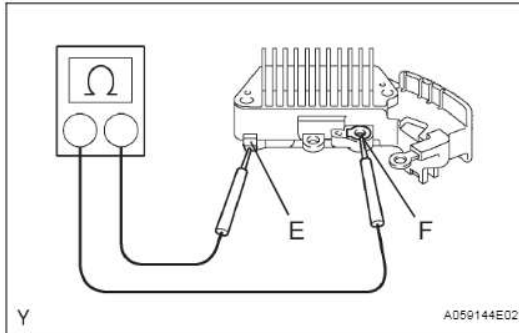
Standard resistance:**Below 1 Ω or more than 10 k Ω** **HINT:**

When the ohmmeter's leads are initially touched to the regulator, one of the above values will be output. When the leads are reversed, the reading will change to the other reading.

CH

CH-12

1NZ-FE CHARGING – GENERATOR



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

- (b) Measure the resistance between the regulator terminals (F) and (E).

Standard resistance:

Below 1 Ω or more than 10 k Ω

HINT:

When the ohmmeter's leads are initially touched to the regulator, one of the above values will be output. When the leads are reversed, the reading will change to the other reading.

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

2. INSPECT GENERATOR ROTOR ASSEMBLY

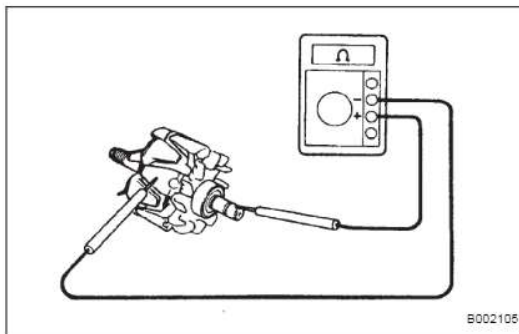
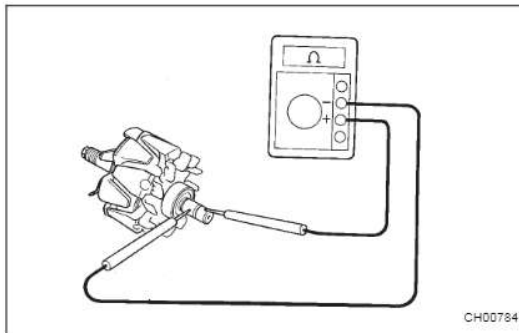
- (a) Check the rotor for an open circuit.

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

Standard resistance:

2.1 to 2.5 Ω at 20°C (68°F)

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



- (b) Check if the rotor is grounded.

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

Standard resistance:

10 k Ω or higher

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

- (c) Check that the slip rings are not rough or scored. If rough or scored, replace the rotor assembly.

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

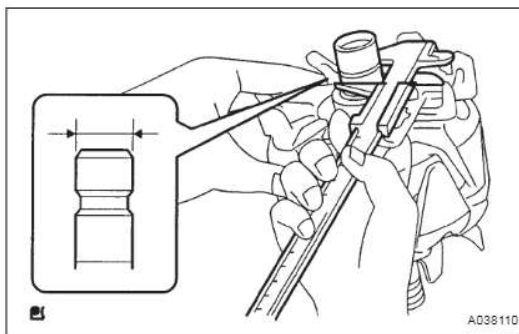
Standard diameter:

14.2 to 14.4 mm (0.559 to 0.567 in.)

Minimum diameter:

12.8 mm (0.504 in.)

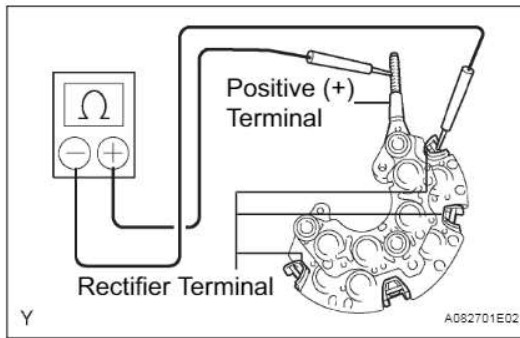
If the diameter is less than the minimum, replace the rotor assembly.



CH

1NZ-FE CHARGING – GENERATOR

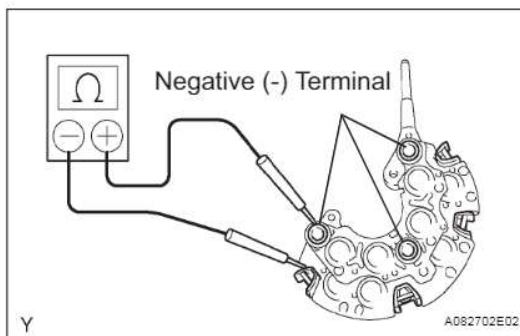
CH-13



3. INSPECT GENERATOR HOLDER WITH RECTIFIER

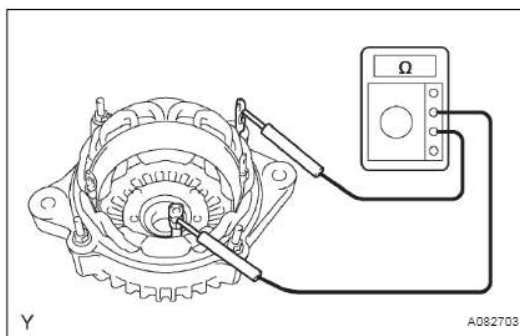
(a) Inspect the positive (+) rectifier.

- (1) Using an ohmmeter, connect one tester probe to the positive (+) terminal and the other to each rectifier terminal.
- (2) Reverse the polarity of the tester probes and repeat the step above.
- (3) Check that one shows a resistance of below 1 Ω and the other shows a resistance of 10 k Ω or higher.
If the result is not as specified, replace the rectifier holder.



(b) Inspect the negative (-) rectifier.

- (1) Using an ohmmeter, connect one tester probe to each negative (-) terminal and the other to each rectifier terminal.
- (2) Reverse the polarity of the tester probes and repeat the step above.
- (3) Check that one shows a resistance of below 1 Ω and the other shows a resistance of 10 k Ω or higher.
If the result is not as specified, replace the rectifier holder.



4. INSPECT DRIVE END FRAME

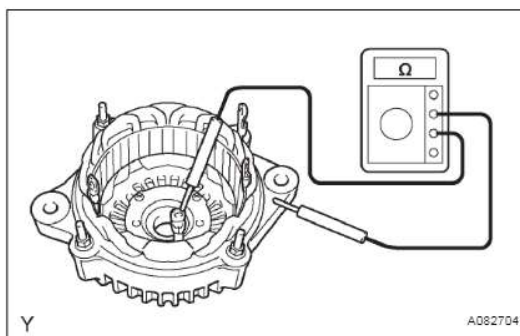
(a) Check the stator coil for an open circuit.

- (1) Measure the resistance between the coil leads.
Standard resistance:

Below 1 Ω

If the result is not as specified, replace the drive end frame.

CH



(b) Check the stator for ground.

- (1) Measure the resistance between the coil lead and drive end frame.

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

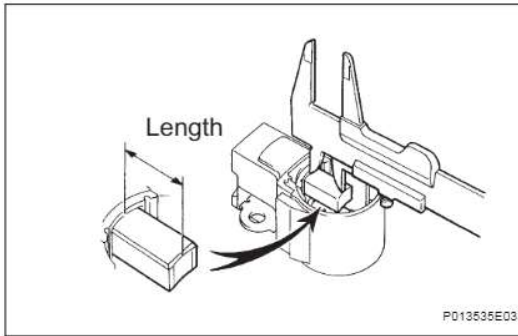
If the result is not as specified, replace the drive end frame.

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

If necessary, replace the generator assembly.

CH-14

1NZ-FE CHARGING – GENERATOR

**5. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY**

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

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.

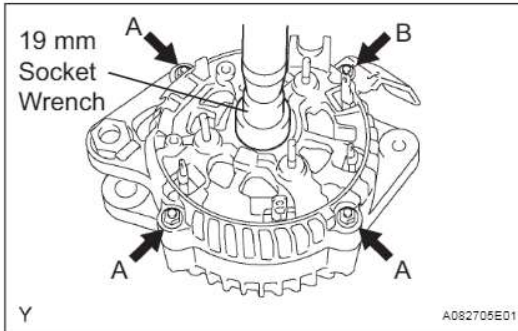
1NZ-FE CHARGING – GENERATOR

CH-15

REASSEMBLY

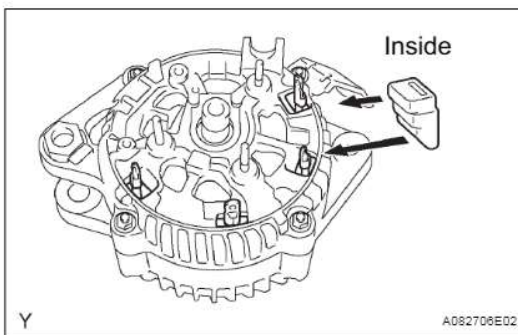
1. INSTALL GENERATOR ROTOR ASSEMBLY

- (a) Install the generator rotor.
- (b) Install the generator washer onto the rotor.



2. INSTALL GENERATOR RECTIFIER END FRAME

- (a) Using a 19 mm socket wrench and press, slowly press in the rectifier end frame.
- (b) Install the 4 nuts and cord clip.
Torque: 4.5 N*m (46 kgf*cm, 40 in.*lbf) for nut A
5.4 N*m (55 kgf*cm, 48 in.*lbf) for nut B
- (c) Install the seal plate onto the rectifier end frame.



- (d) Install the 4 rubber insulators onto the lead wires.

NOTICE:

Be careful that the rubber insulators are in the right direction.

3. INSTALL GENERATOR HOLDER WITH RECTIFIER

- (a) Install the rectifier holder while pushing it with the 4 screws.
Torque: 2.9 N*m (30 kgf*cm, 26 in.*lbf)

4. INSTALL GENERATOR REGULATOR ASSEMBLY

- (a) Install the 3 screws and generator regulator.
Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)

5. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY

- (a) Install the brush holder with the 2 screws.
Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)

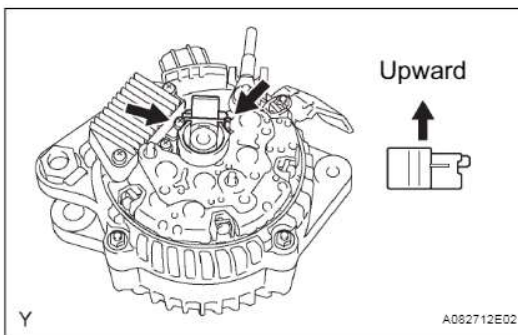
NOTICE:

Be careful that the holder is in the right direction when installing.

- (b) Install the brush holder cover.

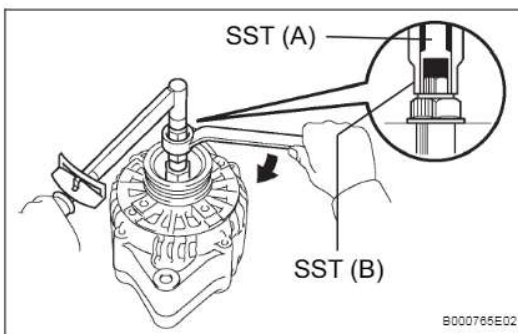
6. INSTALL REAR END COVER

- (a) Install the end cover and plate terminal with the bolt and 3 nuts.
Torque: 3.9 N*m (40 kgf*cm, 34 in.*lbf) for bolt
4.4 N*m (45 kgf*cm, 39 in.*lbf) for nut
- (b) Install the terminal insulator with the nut.
Torque: 4.1 N*m (42 kgf*cm, 36 in.*lbf)



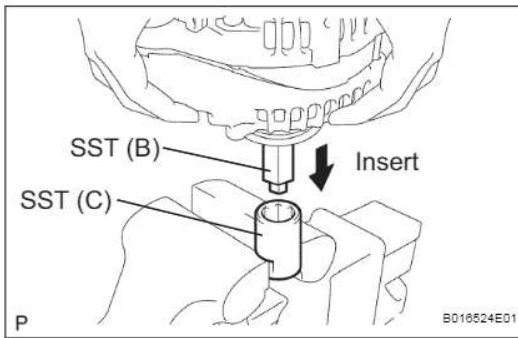
7. INSTALL GENERATOR PULLEY

- (a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.
- (b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820-63010 (09820-06010, 09820-06020)
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)
- (c) Check that SST (A) is secured to the pulley shaft.

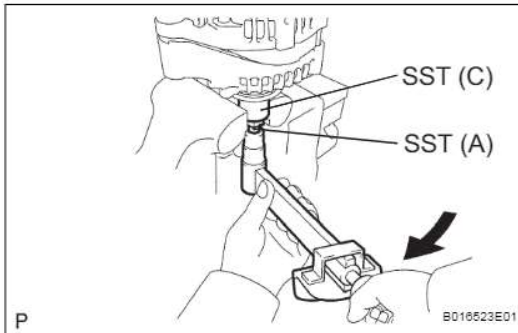


CH-16

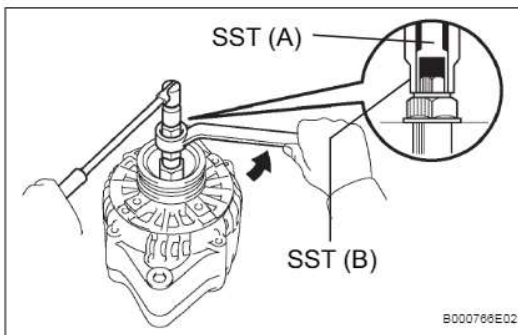
1NZ-FE CHARGING – GENERATOR



- (d) Mount SST (C) in a vise.
- (e) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

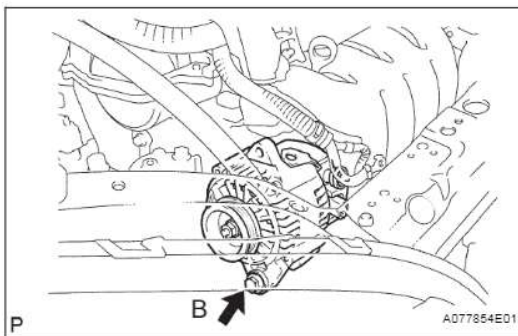


- (f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 133 N*m (1,356 kgf*cm, 98 ft.*lbf)
- (g) Remove the generator from SST (C).



- (h) Turn SST (B), and remove SST (A and B).

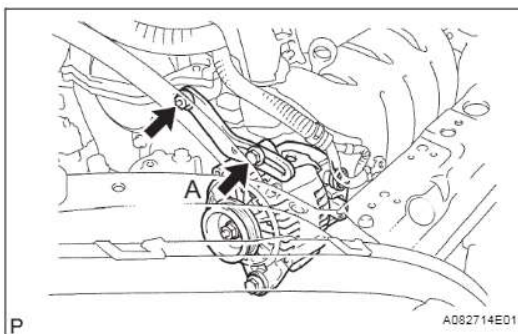
CH



INSTALLATION

1. INSTALL GENERATOR ASSEMBLY

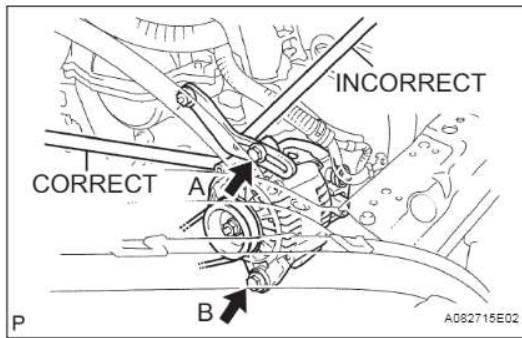
- (a) Temporarily install the generator with bolt B.



- (b) Temporarily install the adjusting bar with bolt A, and tighten the nut to the specified torque.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

1NZ-FE CHARGING – GENERATOR

CH-17



- (c) Temporarily install the fan and generator V-belt onto each pulley.
- (d) Insert the adjusting bar between the engine mounting bracket and generator. Push the adjusting bar towards the vehicle front to adjust the V-belt tension.

NOTICE:

Do not insert the adjusting bar between the oil control valve and generator because it could damage the oil control valve.

- (e) First tighten bolt A, and then tighten bolt B.
Torque: 18.5 N*m (189 kgf*cm, 14 ft.*lbf) for bolt A
54 N*m (551 kgf*cm, 40 ft.*lbf) for bolt B
- (f) Install the wire harness clamp.
- (g) Connect the generator connector.
- (h) Install the generator wire with the nut.
Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)
- (i) Install the terminal cap.

2. **INSPECT GENERATOR V BELT** (See page [EM-7](#))3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**4. **PERFORM INITIALIZATION**

- (a) Perform initialization (see page).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

CH

CHARGING SYSTEM

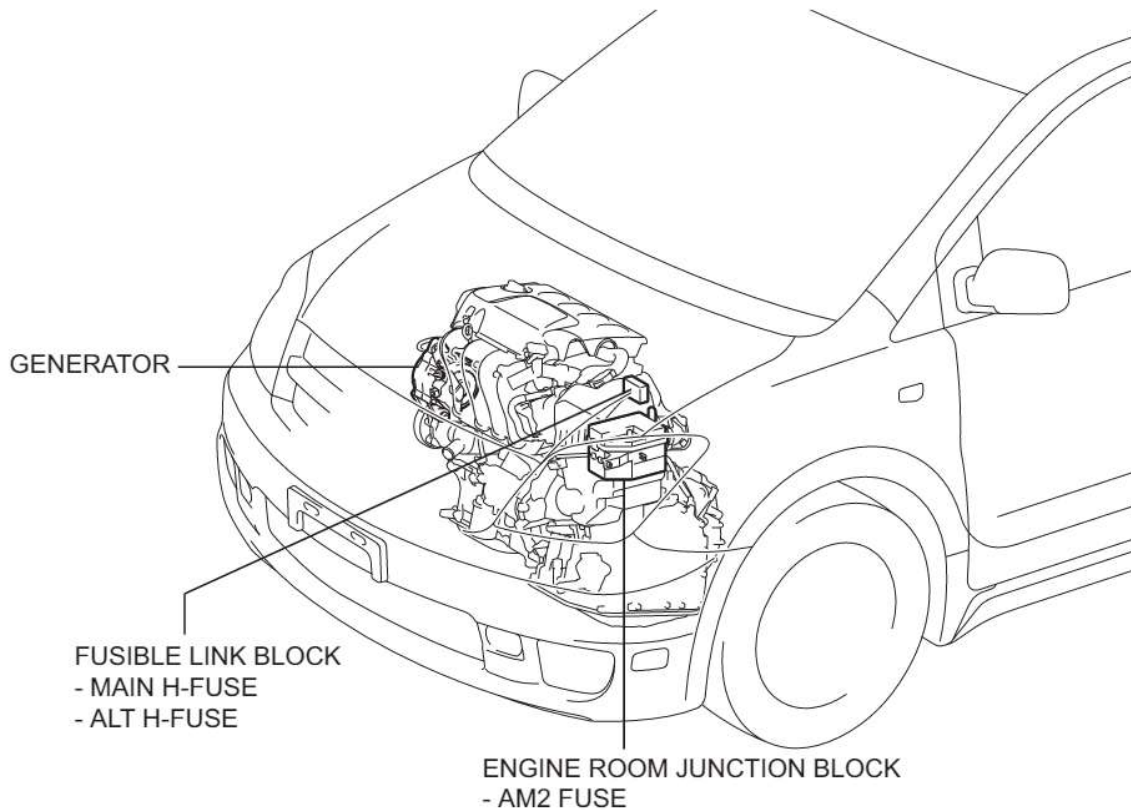
PRECAUTION

1. Check that the battery cables are connected to the correct terminals.
2. Disconnect the battery cables when the battery is quickly charged.
3. Do not perform tests with a high voltage insulation resistance tester.
4. Never disconnect the battery cable while the engine is running.
5. Check that the charging cable nut is tightened on terminal B of the generator and the fuse box.
6. If the generator is installed to the vehicle, do not perform checks on terminal F.

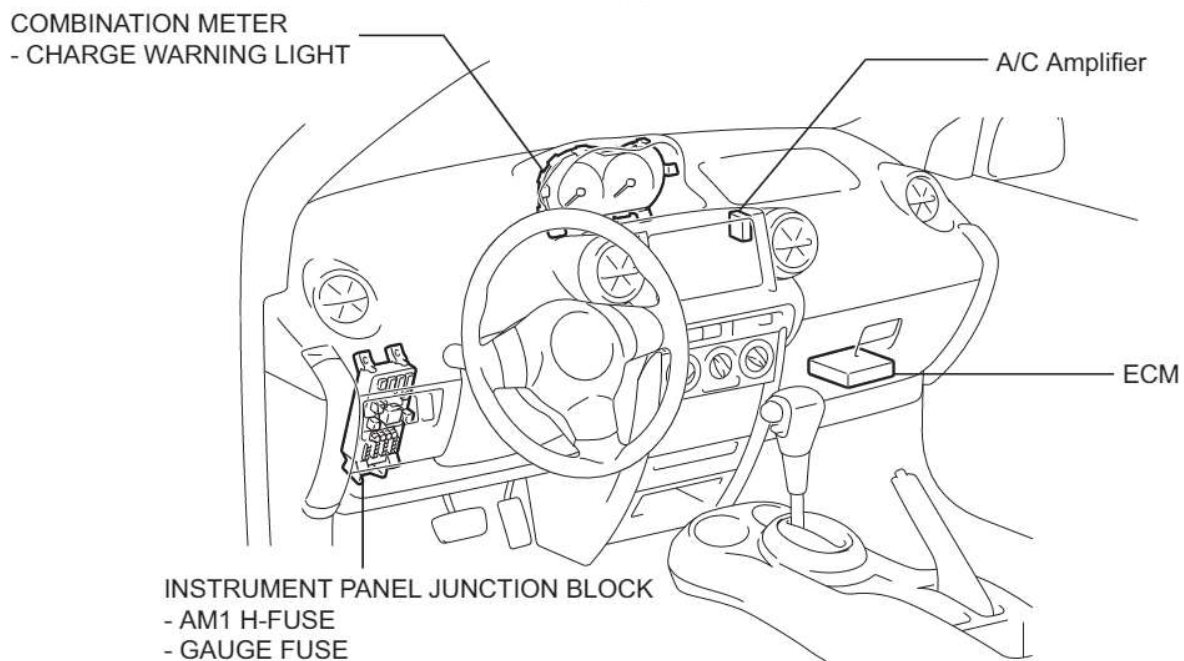
CH-2

1NZ-FE CHARGING - CHARGING SYSTEM

PARTS LOCATION



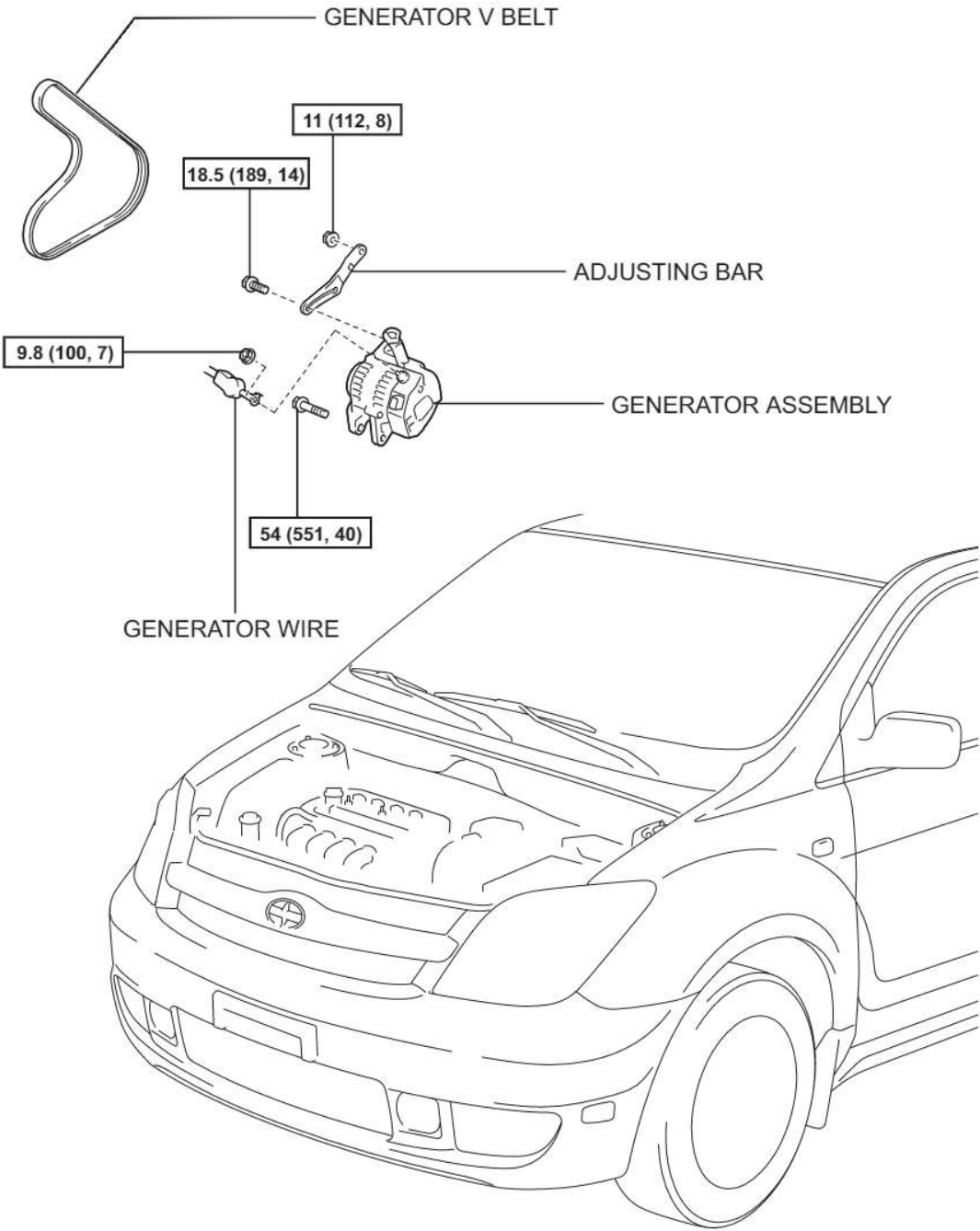
CH



P

A117218E01

GENERATOR
COMPONENTS



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

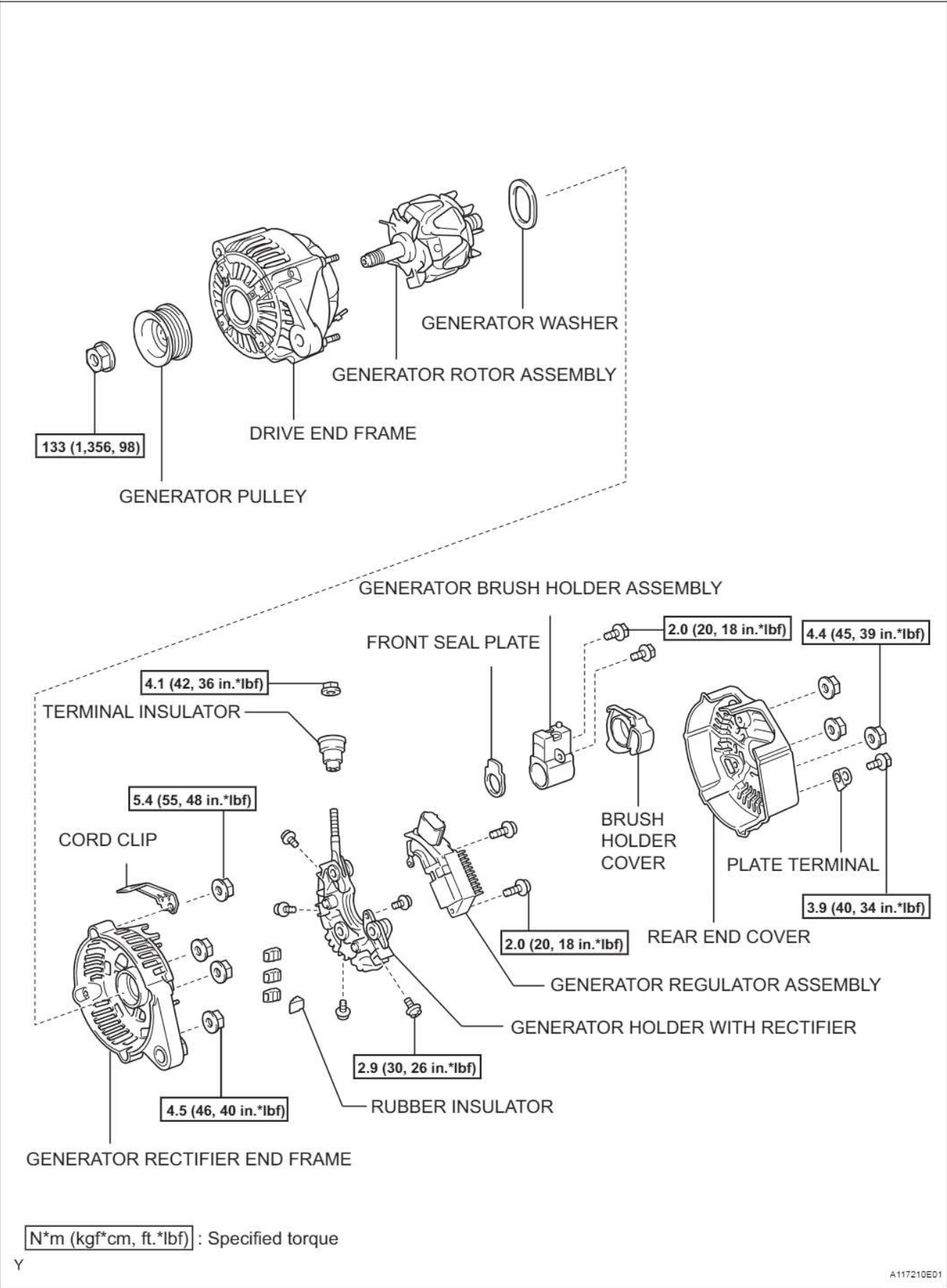
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CH

CH-8

1NZ-FE CHARGING – GENERATOR



A117210E01