# **CHARGING SYSTEM**

# PRECAUTION

- 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.

CH03A-01











# **ON-VEHICLE INSPECTION**

#### 1. REMOVE BATTERY CLAMP COVER

2. CHECK BATTERY ELECTROLYTE LEVEL

Check the electrolyte quantity of each cell. Maintenance–Free Battery:

If under the lower level, replace the battery (or add distilled water if possible). and check the charging system. Except Maintenance–Free Battery: If under the lower level, add distilled water.

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#### 3. Except Maintenance–Free Battery: CHECK BATTERY SPECIFIC GRAVITY

Check the specific gravity of each cell.

Standard specific gravity: 1.25 – 1.29 at 20°C (68°F) If the specific gravity is less than specification, charge the battery.

#### 4. Maintenance–Free Battery: CHECK BATTERY VOLTAGE

Measure the battery voltage between the negative (–) and positive (+) terminals of the battery.

#### Standard voltage: 12.2 – 14.8 V at 20°C (68°F) HINT:

- Before measuring the voltage, turn the ignition switch OFF and turn off the electrical systems (headlight, blower motor, rear defogger etc.) to remove the surface charge.
- If the vehicle has been running, wait 20 minutes or more after the vehicle stops before measuring the battery voltage.

If the voltage is less than specification, charge the battery. HINT:

Check the indicator as shown in the illustration.

- 5. CHECK BATTERY TERMINALS AND FUSES
- (a) Check that the battery terminals are not loose or corroded.
- (b) Check the fuses for continuity.

# REMOVE AIR CLEANER INLET INSPECT DRIVE BELT

#### HINT:

A belt tensioner is used, so checking the belt tension is not necessary.

(a) Visually check the drive belt for excessive wear, frayed cords etc.

If necessary, replace the drive belt.

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HINT:

- Cracks on the rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.
- The drive belt tension can be released by turning the belt tensioner counterclockwise. The pulley bolt for the belt tensioner has a left-hand thread.
- (b) Check the belt tensioner operation.
  - Check that the belt tensioner moves downward when the drive belt is pressed down at the points indicated in the illustration with approx. 98 N (10 kgf, 22.0 lbf) of force.
  - Check the alignment of the belt tensioner pulley to make sure the drive belt has not slipped off the pulley.

If necessary, replace the belt tensioner.

 Check that the arrow mark on the belt tensioner falls within area A of the scale.

If it is outside area A, replace the drive belt. HINT:

- When a new belt is installed, it should lie within area B. If not, the drive belt is not correct.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- 8. REMOVE OIL PAN PROTECTOR
- 9. REMOVE ENGINE UNDER COVER
- 10. VISUALLY CHECK GENERATOR WIRING AND LISTEN FOR ABNORMAL NOISES
- (a) Check that the wiring is in good condition.
- (b) Check that there is no abnormal noise from the generator while the engine is running.
- 11. CHECK CHARGE WARNING LIGHT CIRCUIT
- (a) Warm up the engine and then turn it off.
- (b) Switch off all accessories.
- (c) Turn the ignition switch ON, and check that the charge warning light is lit.
- (d) Start the engine, and check that the light goes off.

If the light does not go off as specified, troubleshoot the charge light circuit.







#### **12. INSPECT CHARGING CIRCUIT WITHOUT LOAD** HINT:

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

- (a) If a tester is not available, connect a voltmeter and ammeter to the charging circuit as follows:
  - Disconnect the wire from terminal B of the generator, and connect it to the negative (–) tester probe of the ammeter.
  - Connect the positive (+) tester probe of the ammeter to terminal B of the generator.
  - Connect the positive (+) tester probe of the voltmeter to terminal B of the generator.
  - Ground the negative (–) tester probe of the voltmeter.
- (b) Check the charging circuit as follows:

With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.

#### Standard amperage:

10 A or less

#### Standard voltage:

- 13.7 14.8 V at 25°C (77°F)
- 13.2 14.0 V at 115°C (239°F)

If the voltmeter reading is more than standard voltage, replace the voltage regulator.



If the voltmeter reading is less than standard voltage, check the voltage regulator and generator as follows:

- With terminal F grounded, start the engine and check the voltmeter reading of terminal B.
- If the voltmeter reading is more than standard voltage, replace the voltage regulator.
- If the voltmeter reading is less than standard voltage, check the generator.

#### 13. INSPECT CHARGING CIRCUIT WITH LOAD

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

#### Standard amperage: 30 A or more

If the ammeter reading is less than the standard amperage, repair the generator.

HINT:

If the battery is fully charged, the indication will sometimes be less than standard amperage.

- 14. REINSTALL ENGINE UNDER COVER
- 15. REINSTALL OIL PAN PROTECTOR
- 16. REINSTALL AIR CLEANER INLET
- 17. REINSTALL BATTERY CLAMP COVER

**GENERATOR** 

# **COMPONENTS** Battery Clamp Cover Air Cleaner Inlet PS Pump Generator Drive Belt **Generator Connector** Generator Wire Generator 44 39 (400, 29) PS Oil Cooler Pipe - x 7 - x 11 Engine Under Cover Oil Pan Protector ∲\_ x 8

B01055

CH03C-01



1496





## REMOVAL

- 1. REMOVE BATTERY CLAMP COVER
- 2. REMOVE AIR CLEANER INLET
- 3. REMOVE GENERATOR DRIVE BELT

Loosen the belt tension by turning the belt tensioner counterclockwise, and remove the drive belt. HINT:

The pulley bolt for the belt tensioner has a left – hand thread.

- 4. REMOVE OIL PAN PROTECTOR
- 5. REMOVE ENGINE UNDER COVER
- 6. DISCONNECT PS OIL COOLER PIPE FROM OIL PAN
- 7. REMOVE PS PUMP (See page EM-77)
- 8. **REMOVE GENERATOR**
- (a) Disconnect the generator connector.
- (b) Remove the rubber cap and nut, and disconnect the generator wire.
- (c) Disconnect the generator wire clamp from the cord clip on the generator.
- (d) Disconnect the heated oxygen sensor wire clamp from the cord clip on the generator.
- (e) Remove the bolt, nut and generator.

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СН1022







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.
- 5. REMOVE RECTIFIER END FRAME
- (a) Remove the 3 nuts and cord clip.





- (b) Using SST, remove the rectifier end frame. SST 09286–46011
- (c) Remove the generator washer.
- 6. REMOVE ROTOR FROM DRIVE END FRAME



Ohmmete

B02105

# INSPECTION

#### 1. INSPECT ROTOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the slip rings.

Standard resistance: 2.1 – 2.5  $\Omega$  at 20°C (68°F) If there is no continuity, replace the rotor.

#### 2. INSPECT ROTOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

If there is continuity, replace the rotor.



No Continuity

#### 3. INSPECT SLIP RINGS

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

(b) Using vernier calipers, measure the slip ring diameter.
 Standard diameter: 14.2 – 14.4 mm (0.559 – 0.567 in.)
 Minimum diameter: 12.8 mm (0.504 in.)

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





If there is no continuity, replace the drive end frame assembly.



#### 5. INSPECT STATOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the coil lead and drive end frame.

If there is continuity, replace the drive end frame assembly.

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#### 6. INSPECT EXPOSED BRUSH LENGTH

Using vernier calipers, measure the exposed brush length. Standard exposed length: 10.5 mm (0.413 in.) Minimum exposed length: 1.5 mm (0.059 in.)

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





#### 7. INSPECT POSITIVE RECTIFIER

- (a) Using an ohmmeter, connect one tester probe to the positive (+) terminal and the other to each rectifier terminal.
- (b) Reverse the polarity of the tester probes and repeat step (a).
- (c) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.

#### 8. INSPECT NEGATIVE RECTIFIER

- Using an ohmmeter, connect one tester probe to each negative (–) terminal and the other to each rectifier terminal.
- (b) Reverse the polarity of the tester probes and repeat step (a).
- (c) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.

#### 9. INSPECT FRONT BEARING

Check that the bearing is not rough or worn. If necessary, replace the front bearing.

### 10. INSPECT REAR BEARING

Check that the bearing is not rough or worn.

If necessary, replace the rear bearing.

CH03G-01



- REPLACEMENT
- 1. **REPLACE FRONT BEARING**
- (a) Remove the 4 screws and bearing retainer.



SST

P21010

Using SST and a press, press out the bearing. (b) SST 09950-60010 (09951-00260, 09952-06010)

(C) Using SST and a press, press in a new bearing. SST 09950-60010 (09951-00500) (d) Install the bearing retainer with the 4 screws. Torque: 3.0 N·m (31 kgf·cm, 27 in.-lbf)

- SST N00581
- 2. **REPLACE REAR BEARING**
- Using SST, remove the bearing cover (outside) and bear-(a) ing.
  - SST 09820-00021

NOTICE:

#### Be careful not to damage the fan.

- (b) Remove the bearing cover (inside).
- Place the bearing cover (inside) on the rotor. (C)



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(d) Using SST and a press, press in a new bearing. SST 09820–00030





(e) Using SST, push in the bearing cover (outside). SST 09285–76010



# REASSEMBLY

PLACE DRIVE END FRAME ON PULLEY
 INSTALL ROTOR TO DRIVE END FRAME

- CH1030
- 3. INSTALL RECTIFIER END FRAME

the rectifier end frame.

(a) Place the generator washer on the rotor.

Using a 29 mm socket wrench and press, slowly press in

- 29 mm Socket Wrench
- Y BOO814



<sup>.</sup> INSTALL PULLEY

(c)

4.

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

Temporarily install the cord clip and 3 nuts.

(b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
 SST 09820–63010

#### Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(c) Check that SST (A) is secured to the pulley shaft.

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5.



- (d) As shown in the illustration, mount SST (C) in a vise, and install the generator to SST (C).
- (e) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.

## Torque: 110.5 N·m (1,128 kgf·cm, 81 ft·lbf)

- (f) Remove the generator from SST (C).
- (g) Turn SST (B), and remove SST (A and B).

#### INSTALL RECTIFIER HOLDER

(a) Install the 4 rubber insulators on the lead wires.



(b) Install the rectifier holder while pushing it with the 4 screws.

Torque: 2.94 N·m (30 kgf·cm, 26 in.-lbf)

(c) Install the cord clip and nut. Tighten the 4 nuts.
Torque:
A: 4.5 N-m (46 kgf·cm, 40 in.-lbf)
B: 5.4 N-m (55 kgf·cm, 48 in.-lbf)



<sub>Y</sub>B00817

- 6. INSTALL VOLTAGE REGULATOR AND BRUSH HOLDER
- (a) Place the seal plate on the rectifier end frame.

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(b) Place the voltage regulator and brush holder on the rectifier end frame.

NOTICE:

- Be careful of the holder installation direction.
- (c) Install the 5 screws.
  - Torque: 2.0 N·m (20 kgf·cm, 17 in.·lbf)
- (d) Place the brush holder cover on the brush holder.





Y B00811

- INSTALL REAR END COVER
- (a) Install the end cover and plate terminal with the 3 nuts and bolt.

Torque:

Bolt: 3.8 N·m (39 kgf·cm, 34 in.-lbf) Nut: 4.4 N·m (45 kgf·cm, 39 in.-lbf)

(b) Install the terminal insulator with the nut. Torque: 6.5 N·m (66 kgf·cm, 58 in.-Ibf)
8. CHECK THAT ROTOR ROTATES SMOOTHLY





# INSTALLATION

#### 1. INSTALL GENERATOR

- (a) Install the generator with the bolt and nut.Torque: 39 N-m (400 kgf-cm, 29 ft-lbf)
- (b) Connect the generator connector.
- (c) Connect the generator wire with the nut and rubber cap.

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- (d) Install the generator wire clamp to the cord clip on the generator.
- (e) Install the heated oxygen sensor wire clamp to the cord clip on the generator.
- 2. INSTALL PS PUMP (See page EM-82)
- 3. INSTALL PS OIL COOLER PIPE
- 4. INSTALL GENERATOR DRIVE BELT

Install the belt by turning the belt tensioner counterclockwise. HINT:

The pulley bolt for the belt tensioner has a left – hand thread.

- 5. PERFORM ON-VEHICLE INSPECTION (See page CH-2)
- 6. INSTALL ENGINE UNDER COVER
- 7. INSTALL OIL PAN PROTECTOR
- 8. INSTALL AIR CLEANER INLET
- 9. INSTALL BATTERY CLAMP COVER