

Last Modified: 9-7-2011	6.4 G	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VF01YX
Title: 2AR-FE CHARGING: CHARGING SYSTEM: ON-VEHICLE INSPECTION (2011 RAV4)		

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 or 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.).

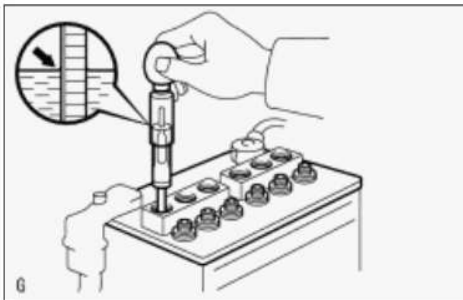
- (2) For non-maintenance-free batteries:

- 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.



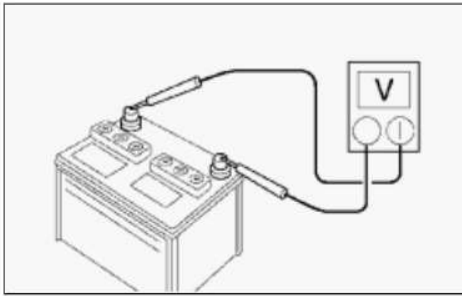
HINT:

Before checking the battery voltage, turn off all the electrical systems (headlights, blower motor, rear defogger, etc.).

- (c) Turn the ignition switch off and turn on the headlights for 20 to 30 seconds. This will remove the surface charge from the battery.

- (d) 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)

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

2. INSPECT BATTERY TERMINAL AND FUSE

(a) Visually check the battery terminals.

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

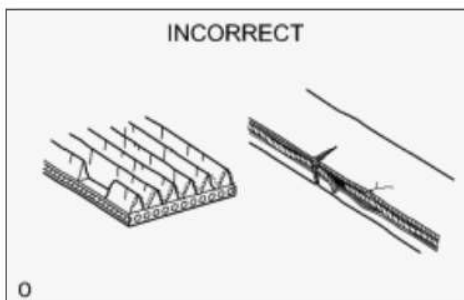
(b) Measure the resistance of the H-fuses and fuses.

Standard resistance:

Below 1 Ω

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

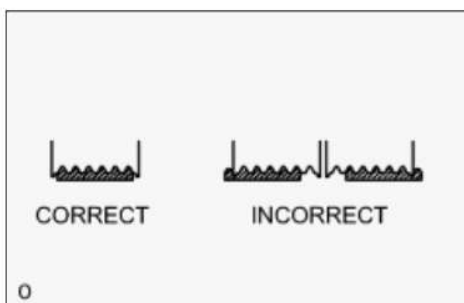
3. INSPECT V-RIBBED BELT



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

If any of the following defects is found, replace the fan and generator V belt.

- The belt is cracked.
- The belt is worn out to the extent that the cords are exposed.
- The belt has chunks missing from the ribs.



(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 grooves on the bottom of the pulley. If it has slipped out, replace the fan and generator V belt. Install a new fan and generator V belt correctly.

4. INSPECT GENERATOR WIRING

(a) Visually check the generator wiring.

(1) Check that the wiring is in good condition.

5. CHECK FOR 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 to 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) Connect a voltmeter and ammeter to the charging circuit as follows.

(1) Disconnect the wire from terminal B of the generator, and 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 the positive (+) terminal of the battery.

(4) Ground the negative (-) lead of the voltmeter.

(b) Check the charging circuit.

(1) Keep the engine speed at 2000 rpm and check the reading on the ammeter and voltmeter.

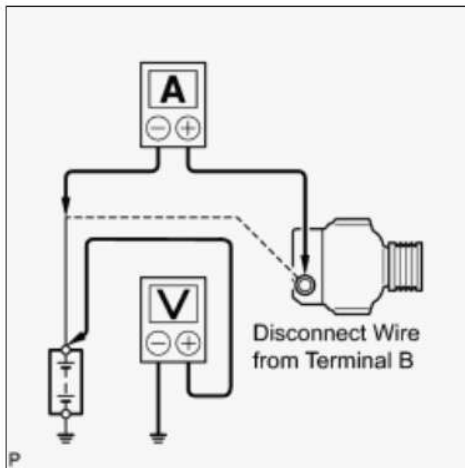
Standard amperage:

10 A or less

Standard voltage:

13.2 to 14.8 V

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



HINT:

If the battery is not fully charged, the ammeter reading will sometimes be more than the standard amperage.

8. INSPECT CHARGING CIRCUIT WITH LOAD

(a) With the engine running at 2000 rpm, turn the high beam headlights on 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, repair the generator.

HINT:

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

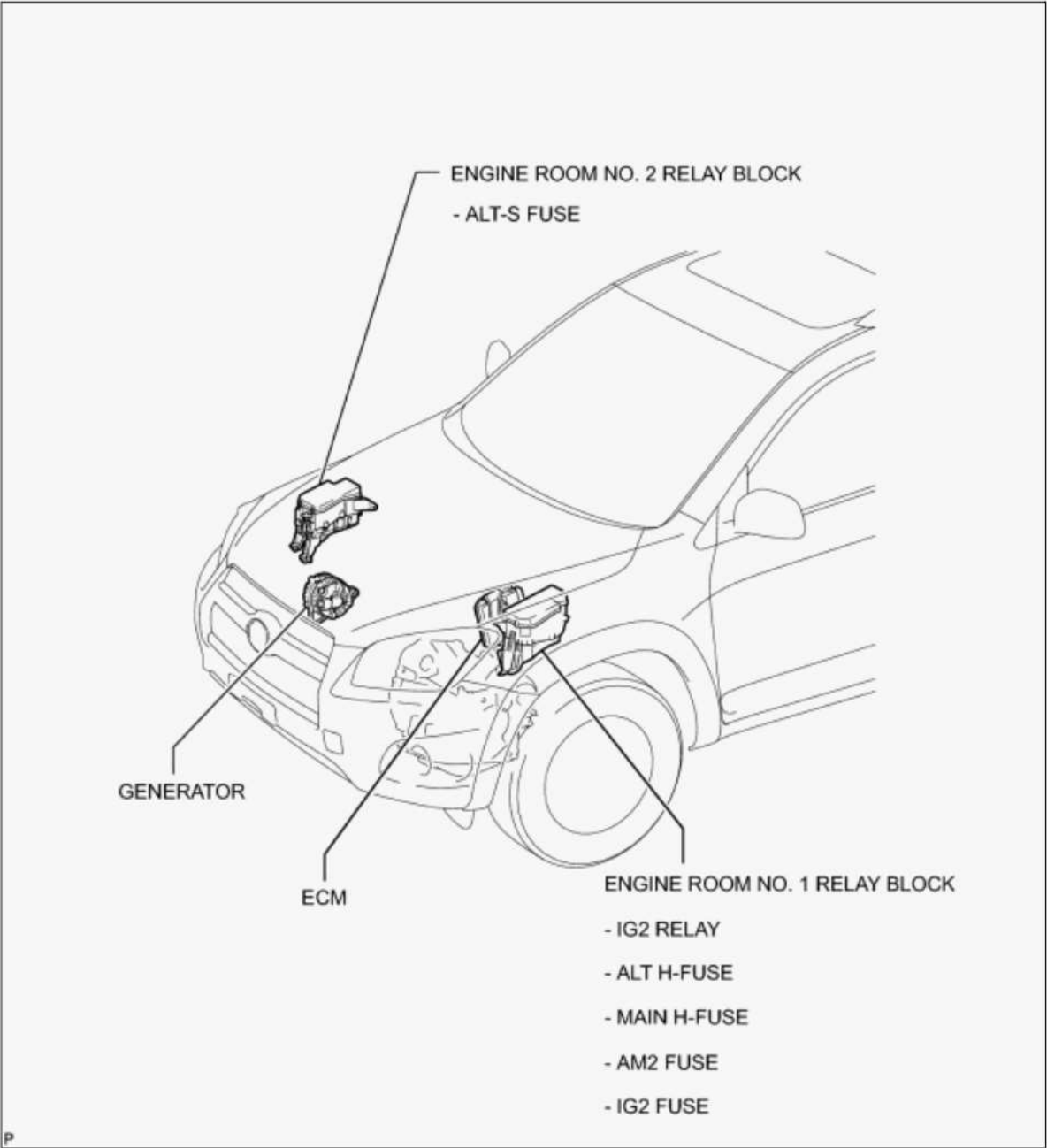
case, add more electrical load (operate the wipers, rear window defogger, etc.) and check the reading on the ammeter again.



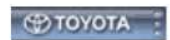
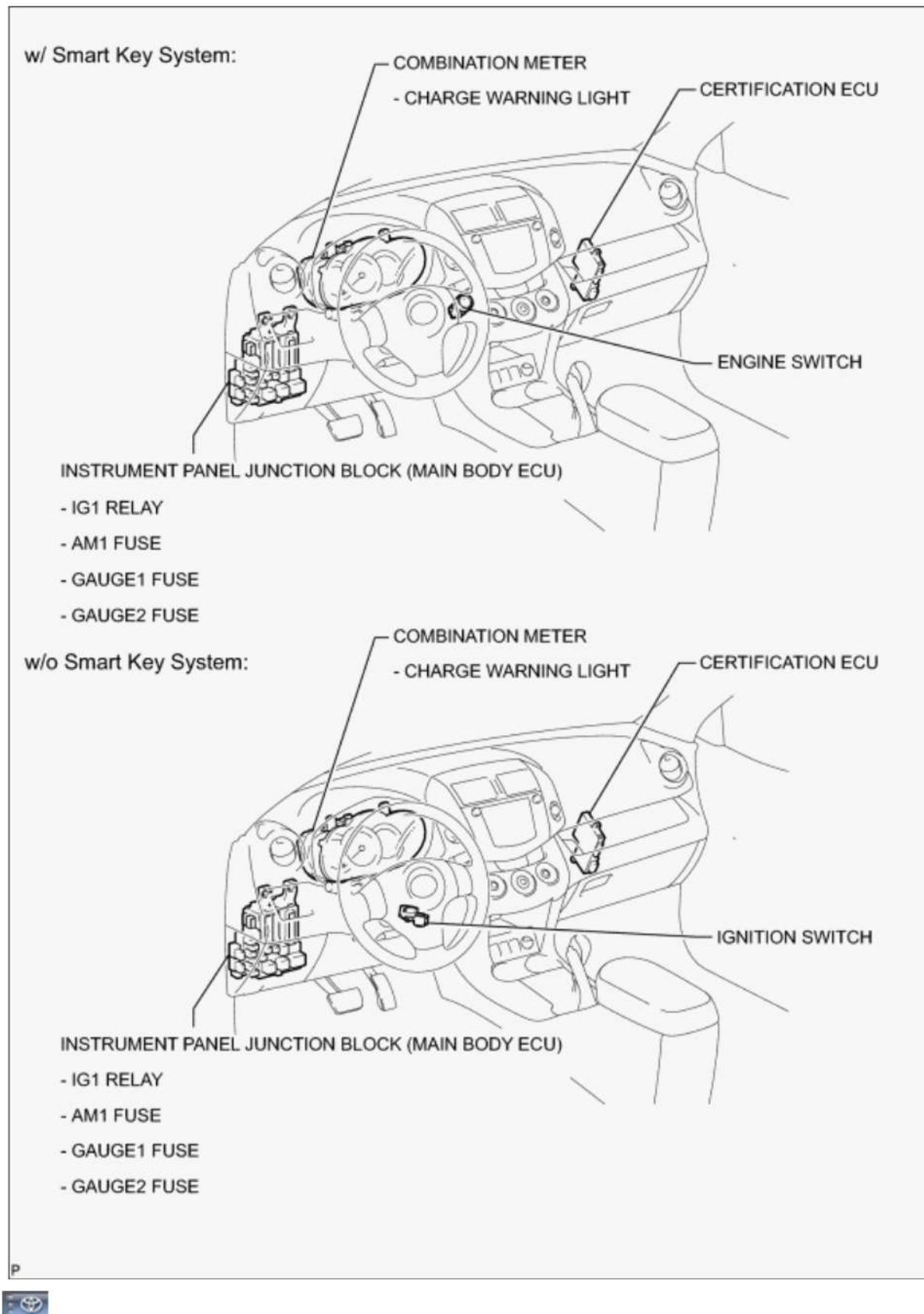
Last Modified: 9-7-2011	6.4 R	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VD00UX
Title: 2AR-FE CHARGING: CHARGING SYSTEM: PARTS LOCATION (2011 RAV4)		

PARTS LOCATION

ILLUSTRATION



ILLUSTRATION



Last Modified: 9-7-2011	6.4 L	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VC00XX
Title: 2AR-FE CHARGING: CHARGING SYSTEM: PRECAUTION (2011 RAV4)		

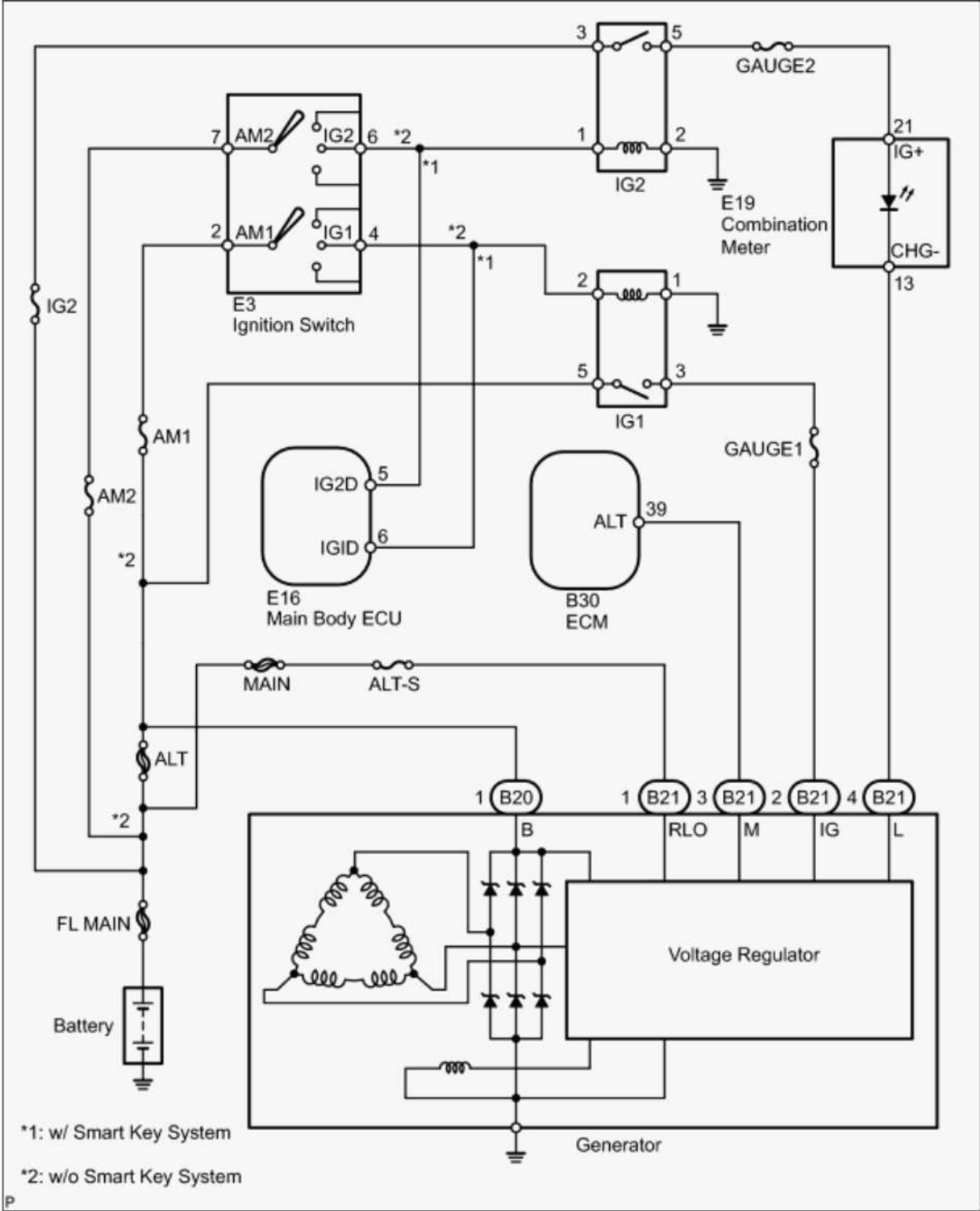
PRECAUTION

- 1. Check that the battery cables are connected to the correct terminals.**
- 2. Disconnect the battery cables when a quick charge is given to the battery.**
- 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 is securely connected to terminal **B** of the generator and the fuse box.**
- 6. Do not check whether the generator generates current or not while terminal **F** is connected to the other terminals.**



Last Modified: 9-7-2011	6.4 U	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VE00VX
Title: 2AR-FE CHARGING: CHARGING SYSTEM: SYSTEM DIAGRAM (2011 RAV4)		

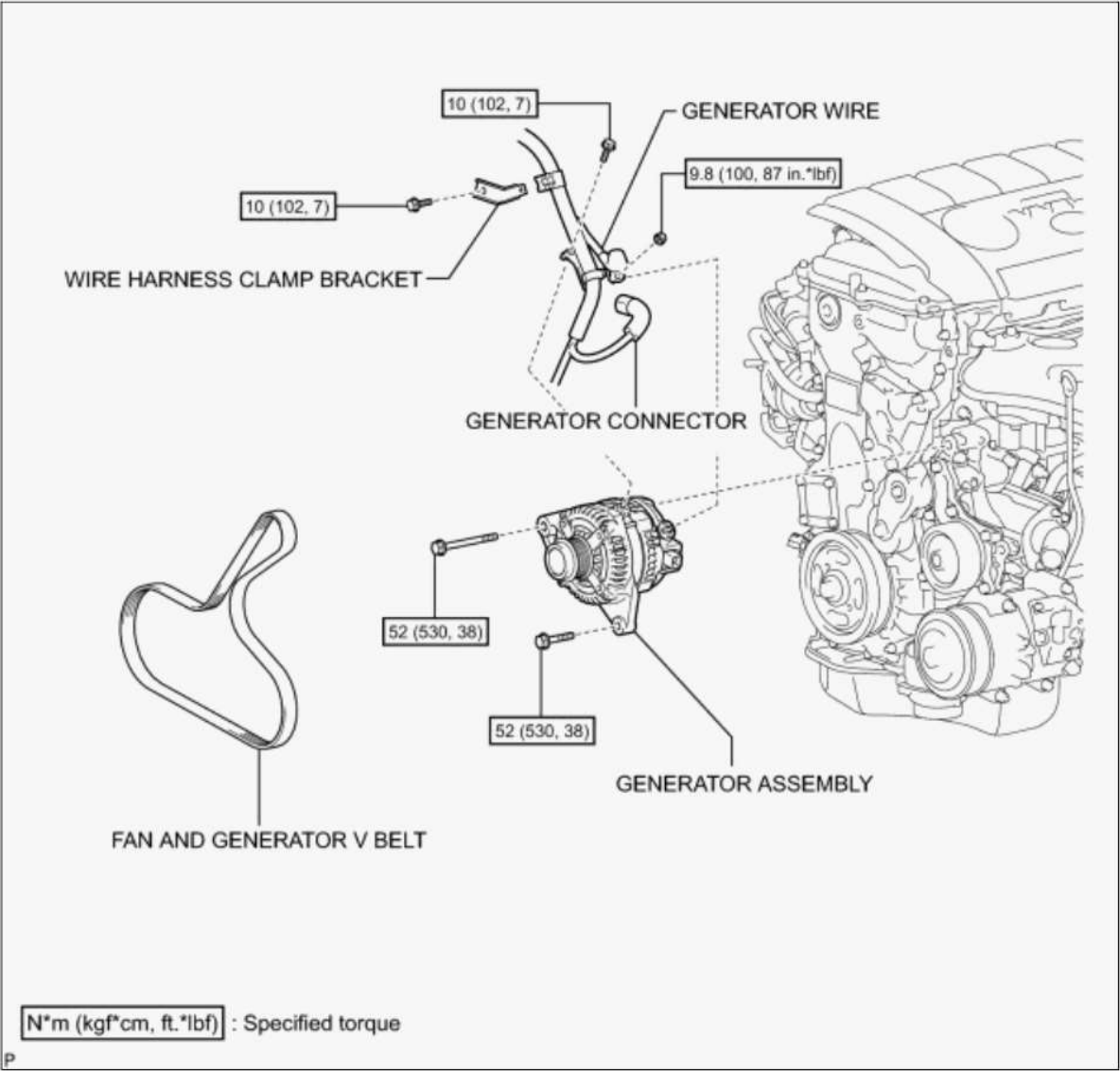
SYSTEM DIAGRAM



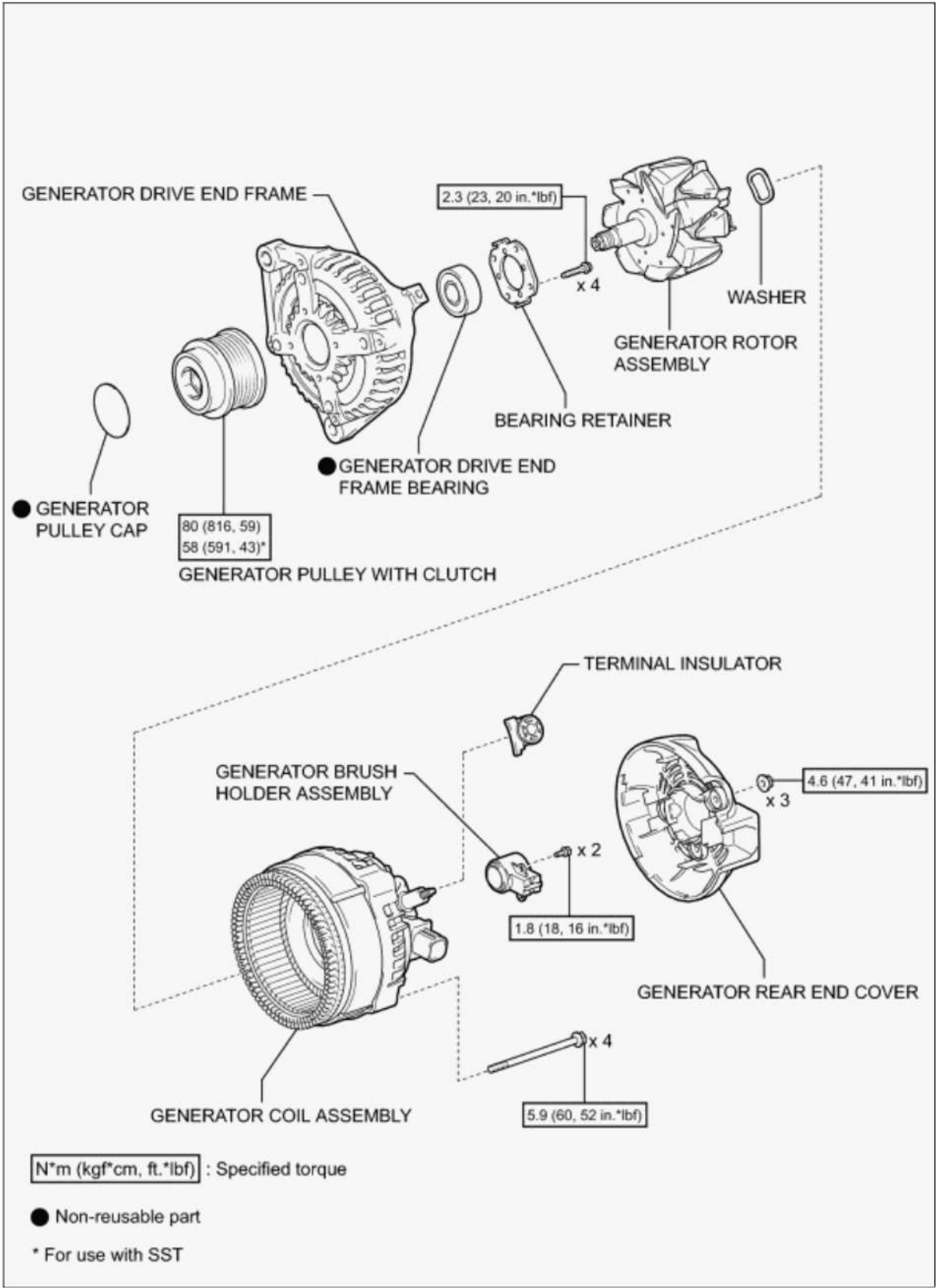
Last Modified: 9-7-2011	6.4 K	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VI00TX
Title: 2AR-FE CHARGING: GENERATOR: COMPONENTS (2011 RAV4)		

COMPONENTS

ILLUSTRATION



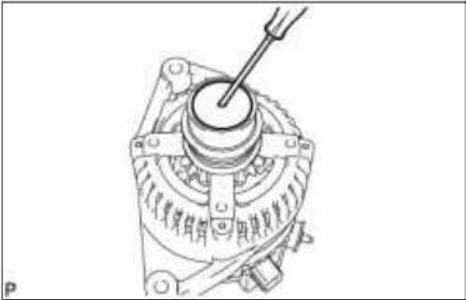
ILLUSTRATION



Last Modified: 9-7-2011	6.4 A	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VK01VX
Title: 2AR-FE CHARGING: GENERATOR: DISASSEMBLY (2011 RAV4)		

DISASSEMBLY

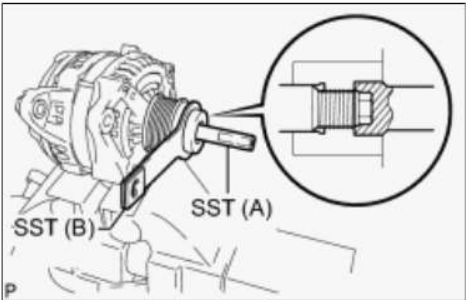
1. REMOVE GENERATOR PULLEY CAP



(a) Using a screwdriver, puncture the center of the generator pulley cap and pry it off.

NOTICE:
Do not reuse the generator pulley cap.

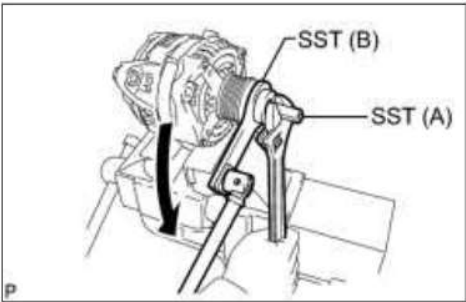
2. REMOVE GENERATOR PULLEY WITH CLUTCH



(a) Mount the generator in a vise.

(b) Install SST (A) and (B) to the pulley as shown in the illustration.

SST: 09820-63021

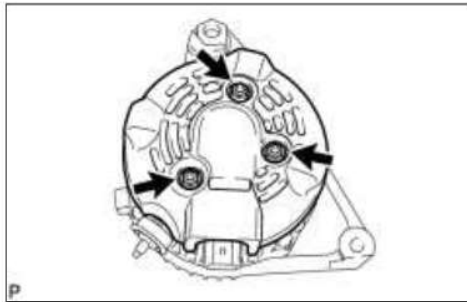


(c) Use a wrench to hold SST (A), and turn SST (B) counterclockwise to loosen the generator pulley.

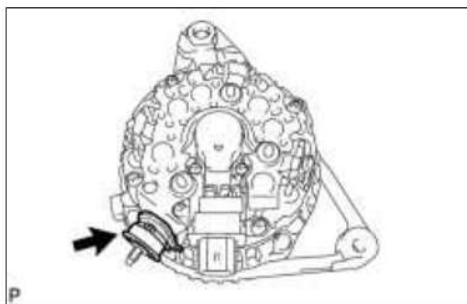
(d) Remove the generator pulley.

3. REMOVE GENERATOR REAR END COVER

(a) Place the generator on the generator pulley.

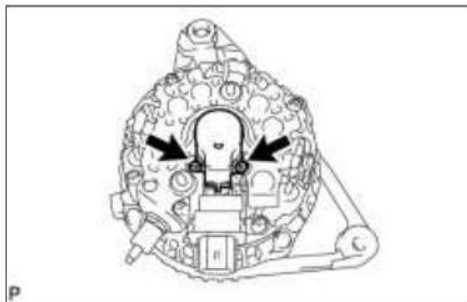


(b) Remove the 3 nuts and generator rear end cover.



(c) Remove the terminal insulator.

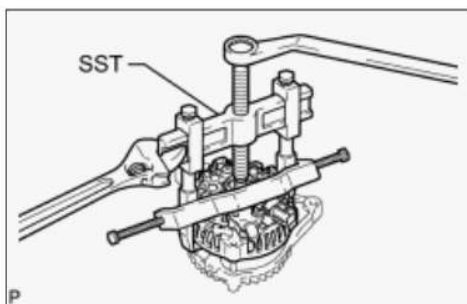
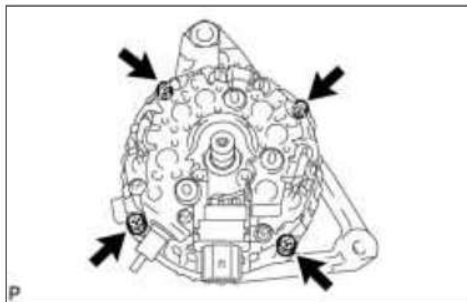
4. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY



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

5. REMOVE GENERATOR COIL ASSEMBLY

(a) Remove the 4 bolts.



(b) Using SST, remove the generator coil.

SST: 09950-40011

09951-04020

09952-04010

09953-04020

09954-04010

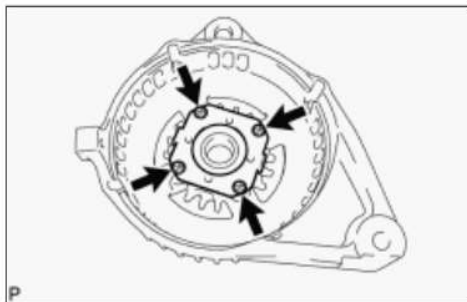
09955-04071

09957-04010

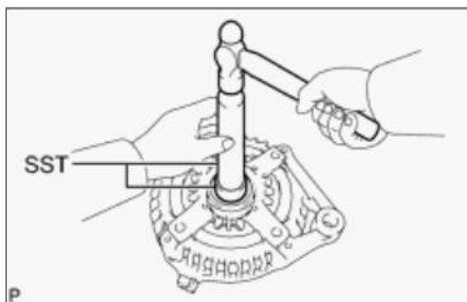
(c) Remove the washer.

6. REMOVE GENERATOR ROTOR ASSEMBLY

7. REPLACE GENERATOR DRIVE END FRAME BEARING



(a) Remove the 4 screws and bearing retainer.



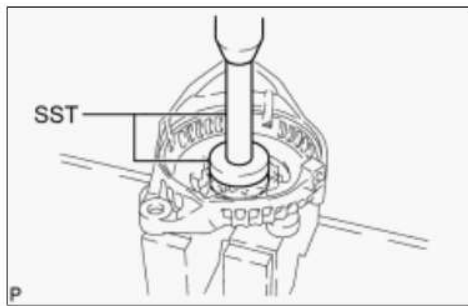
(b) Using SST and a hammer, tap out the bearing.

SST: 09950-60010

09951-00250

SST: 09950-70010

09951-07100



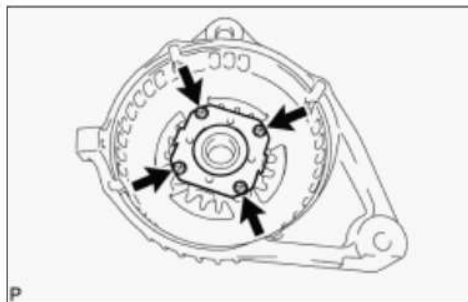
(c) Using SST and a press, press in a new bearing.

SST: 09950-60010

09951-00520

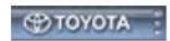
SST: 09950-70010

09951-07100



(d) Install the bearing retainer with the 4 screws.

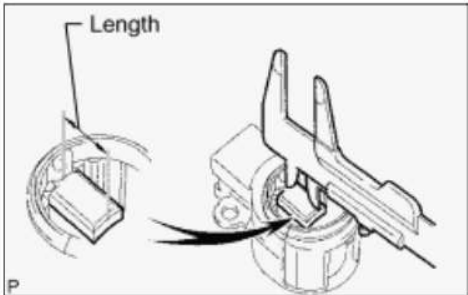
Torque: 2.3 N·m (23 kgf·cm, 20in·lbf)



Last Modified: 9-7-2011	6.4 G	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VH01SX
Title: 2AR-FE CHARGING: GENERATOR: INSPECTION (2011 RAV4)		

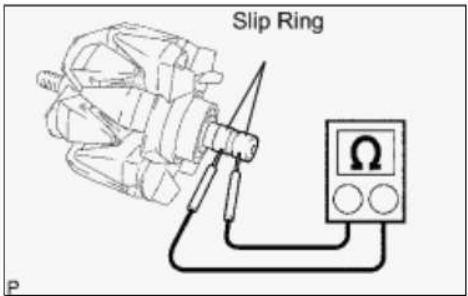
INSPECTION

1. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY



- (a) Using a vernier caliper, 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.

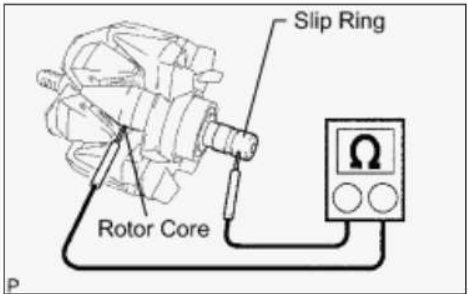
2. INSPECT GENERATOR ROTOR ASSEMBLY



- (a) Check the rotor for an open circuit.
- (1) Measure the resistance according to the value(s) in the table below.
- Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Slip ring - Slip ring	20°C (68°F)	2.3 to 2.7 Ω

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

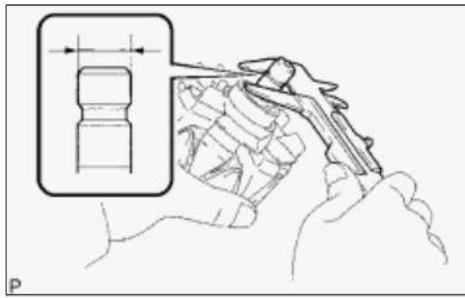


- (b) Check if the rotor is grounded.
- (1) Measure the resistance according to the value(s) in the table below.
- Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Slip ring - Rotor core	Always	10 kΩ or higher

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

- (c) Check the slip ring diameter.



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

Standard diameter:

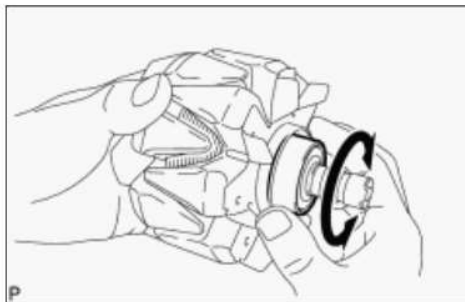
14.2 to 14.4 mm (0.559 to 0.567 in.)

Minimum diameter:

14 mm (0.551 in.)

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

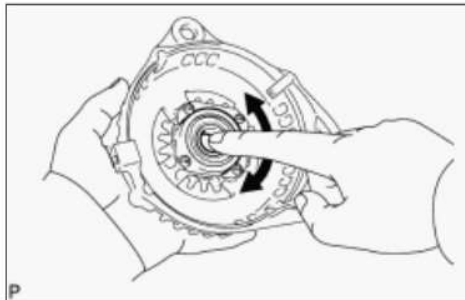
- (d) Check the appearance.



- (1) Check that the bearing is not rough or worn and that it rotates smoothly.

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

3. INSPECT GENERATOR DRIVE END FRAME BEARING



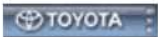
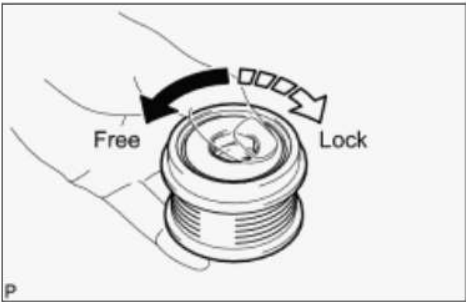
- (a) Check that the bearing is not rough or worn and that it rotates smoothly.

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

4. INSPECT GENERATOR PULLEY WITH CLUTCH

- (a) Hold the center of the pulley, and confirm that the outer ring turns counterclockwise and does not turn clockwise.

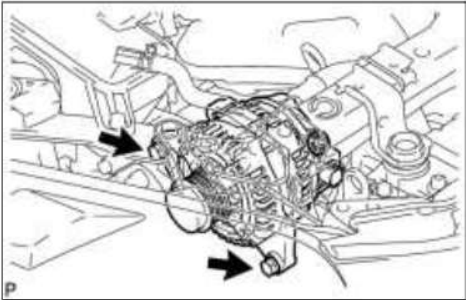
If the result is not as specified, replace the generator pulley with clutch.



Last Modified: 9-7-2011	6.4 A	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VG00YX
Title: 2AR-FE CHARGING: GENERATOR: INSTALLATION (2011 RAV4)		

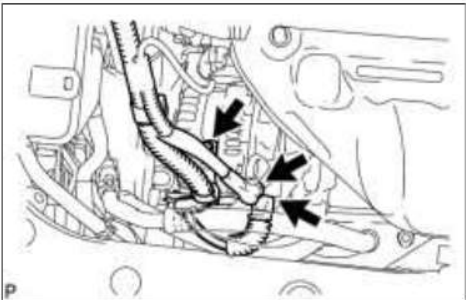
INSTALLATION

1. INSTALL GENERATOR ASSEMBLY



(a) Install the generator with the 2 bolts.

Torque: 52 N·m (530 kgf·cm, 38ft·lbf)



(b) Install the wire harness clamp bracket with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

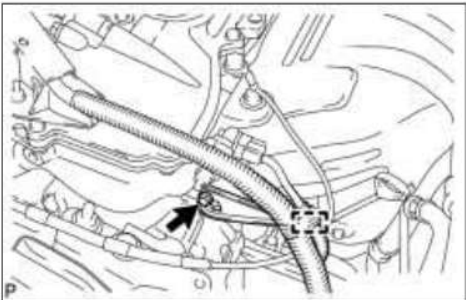
(c) Connect the generator wire with the nut.

Torque: 9.8 N·m (100 kgf·cm, 87in·lbf)

(d) Install the terminal cap.

(e) Connect the generator connector.

2. INSTALL WIRE HARNESS CLAMP BRACKET



(a) Install the clamp bracket with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(b) Attach the wire harness clamp to the clamp bracket.

3. INSTALL FAN & GENERATOR V BELT

(a) Install the belt  .

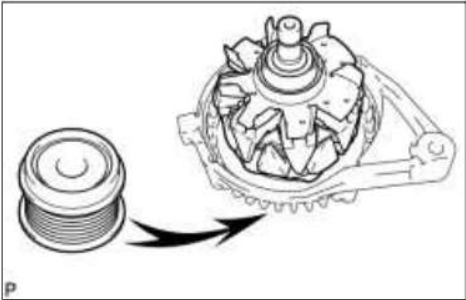
4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL



Last Modified: 9-7-2011	6.4 A	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VL01XX
Title: 2AR-FE CHARGING: GENERATOR: REASSEMBLY (2011 RAV4)		

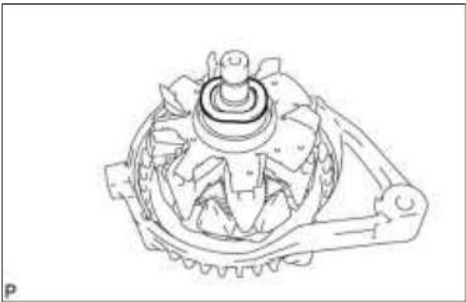
REASSEMBLY

1. INSTALL GENERATOR ROTOR ASSEMBLY



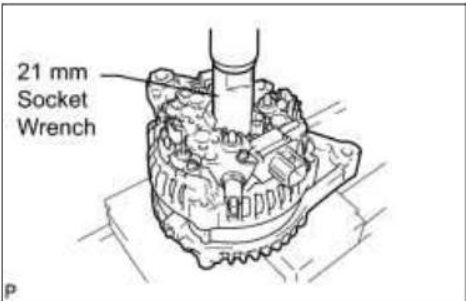
(a) Place the generator drive end frame on the generator pulley.

(b) Install the generator rotor to the generator drive end frame.



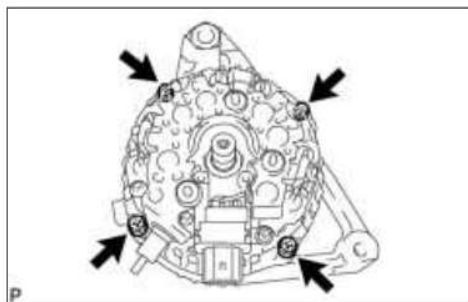
(c) Place the washer on the generator rotor.

2. INSTALL GENERATOR COIL ASSEMBLY



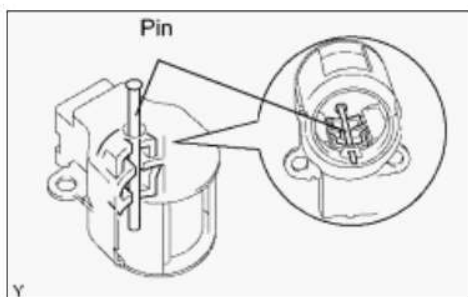
(a) Using a 21 mm socket wrench and press, slowly press in the generator coil.

(b) Install the 4 bolts.

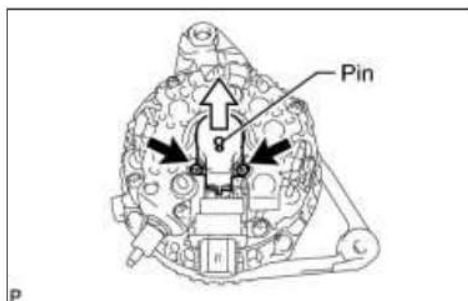


Torque: 5.9 N·m (60 kgf·cm, 52in·lbf)

3. 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.

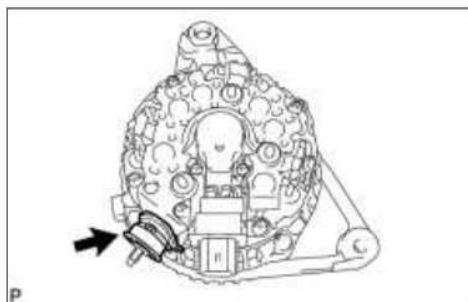


- (b) Install the generator brush holder with the 2 screws.

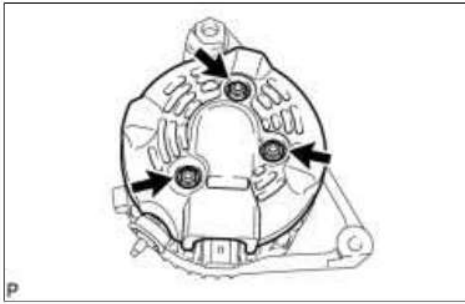
Torque: 1.8 N·m (18 kgf·cm, 16in·lbf)

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

4. INSTALL GENERATOR REAR END COVER



- (a) Install the terminal insulator onto the generator coil assembly.



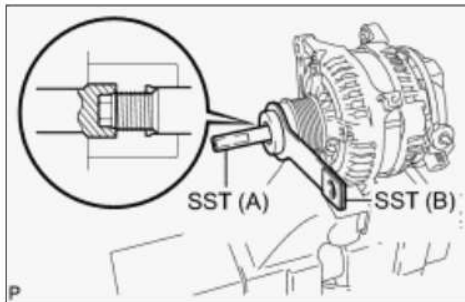
(b) Install the generator rear end cover with the 3 nuts.

Torque: 4.6 N·m (47 kgf·cm, 41in·lbf)

5. INSTALL GENERATOR PULLEY WITH CLUTCH

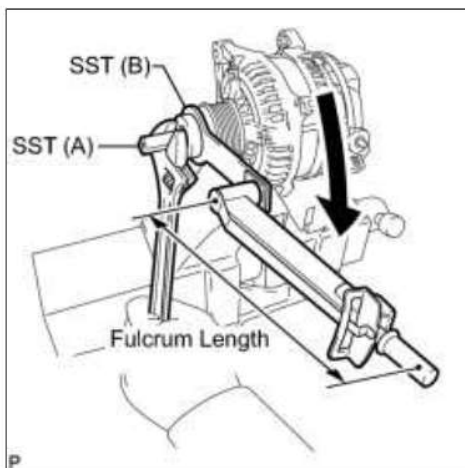
(a) Temporarily install the generator pulley by hand.

(b) Mount the generator in a vise.



(c) Install SST (A) and (B) to the generator pulley as shown in the illustration.

SST: 09820-63021



(d) Using a wrench to hold SST (A), turn SST (B) clockwise to tighten the generator pulley.

without SST - Torque: 80 N·m (816 kgf·cm, 59ft·lbf)

with SST - Torque: 58 N·m (591 kgf·cm, 43ft·lbf)

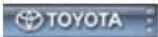
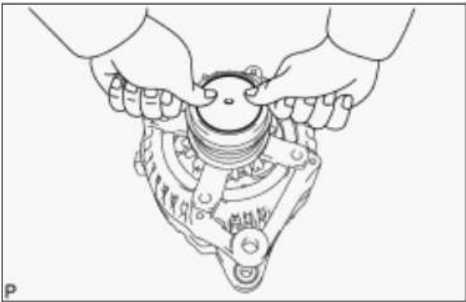
NOTICE:

- Use a torque wrench with a fulcrum length of 260 mm (10.24in.).
- This torque value is effective when SST is parallel to a torque wrench.

(e) Check that the generator pulley rotates smoothly.

6. INSTALL GENERATOR PULLEY CAP

(a) Install a new generator pulley cap to the pulley.



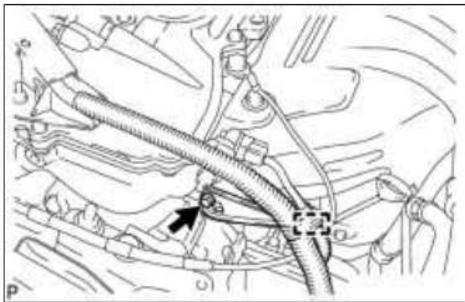
Last Modified: 9-7-2011	6.4 A	From: 201008
Model Year: 2011	Model: RAV4	Doc ID: RM0000017VJ00TX
Title: 2AR-FE CHARGING: GENERATOR: REMOVAL (2011 RAV4)		

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE FAN & GENERATOR V BELT

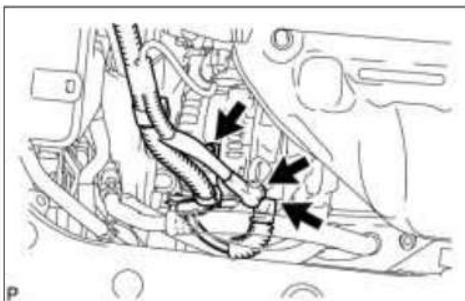
- (a) Remove the belt .



3. REMOVE WIRE HARNESS CLAMP BRACKET

- (a) Detach the wire harness clamp from the clamp bracket.
(b) Remove the bolt and clamp bracket.

4. REMOVE GENERATOR ASSEMBLY



- (a) Disconnect the generator connector.

- (b) Remove the terminal cap.
(c) Remove the nut and disconnect the generator wire.
(d) Remove the bolt and wire harness clamp bracket.

- (e) Remove the 2 bolts and generator.

