

CHARGING SYSTEM

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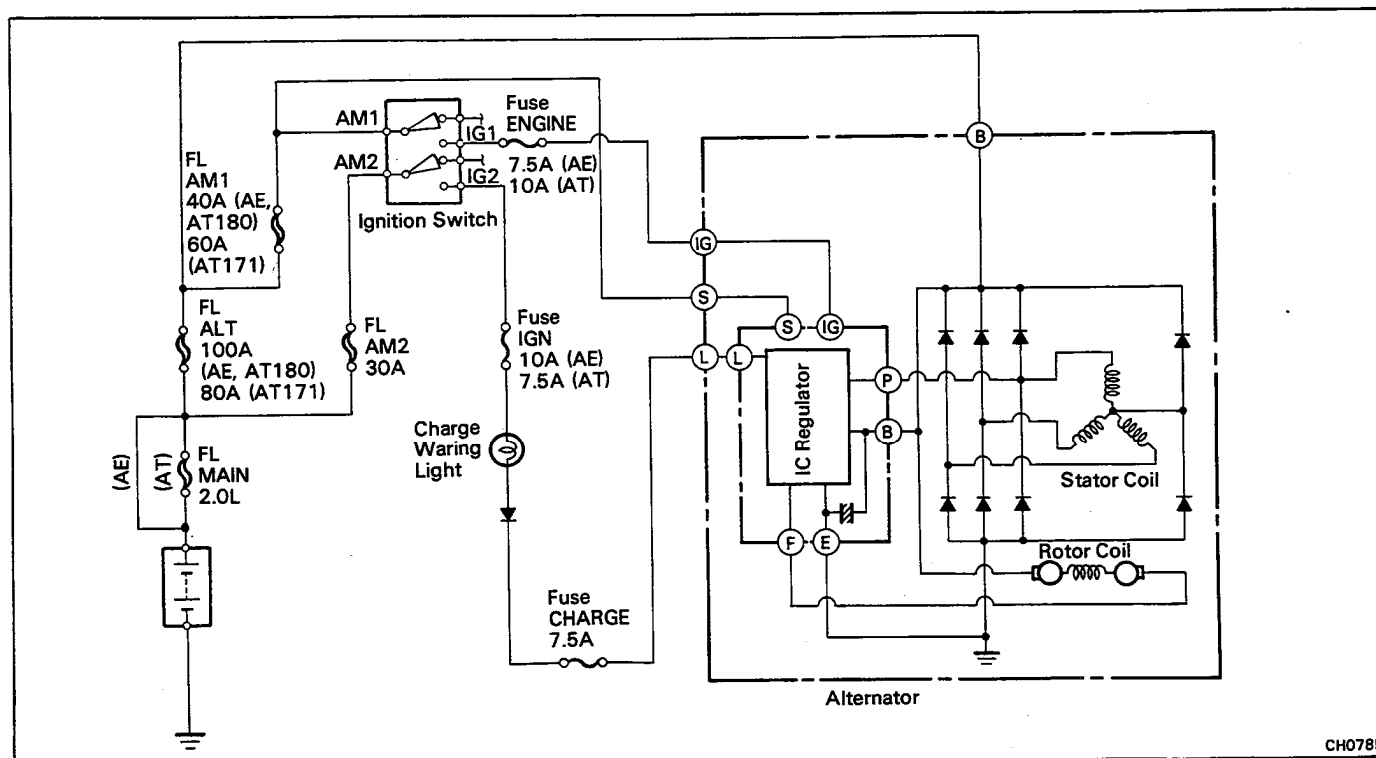
PRECAUTIONS

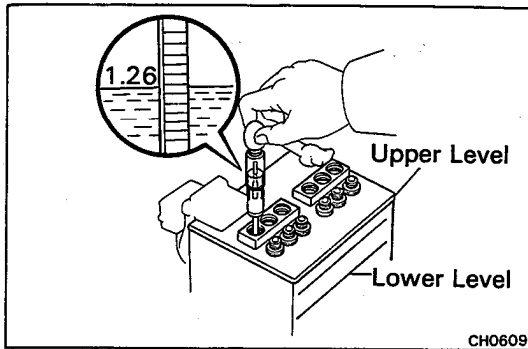
1. Check that the battery cables are connected to the correct terminals.
2. Disconnect the battery cables when the battery is given a quick charge.
3. Do not perform tests with a high voltage insulation resistance tester.
4. Never disconnect the battery while the engine is running.

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Discharge warning light does not light with ignition ON and engine off	Fuse blown Light burned out Wiring connection loose IC regulator faulty	Check "CHARGE" and "IGN" fuses Replace light Tighten loose connections Replace IC regulator	CH-7
Discharge warning light does not go out with engine running (battery requires frequent recharging)	Drive belt loose or worn Battery cables loose, corroded or worn Fuse blown Fusible link blown IC regulator or alternator faulty Wiring faulty	Adjust or replace drive belt Repair or replace cables Check "CHARGE" or "ENGINE" fuse Replace fusible link Check charging system Repair wiring	CH-3 CH-2

CHARGING CIRCUIT





ON-VEHICLE INSPECTION

1. INSPECT BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL

- (a) Check the specific gravity of each cell.

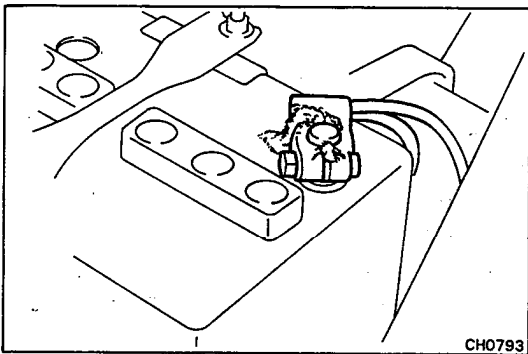
Standard specific gravity

when fully charged at 20°C (68°F): 1.25 – 1.27

If not within specifications, charge the battery.

- (b) Check the electrolyte quantity of each cell.

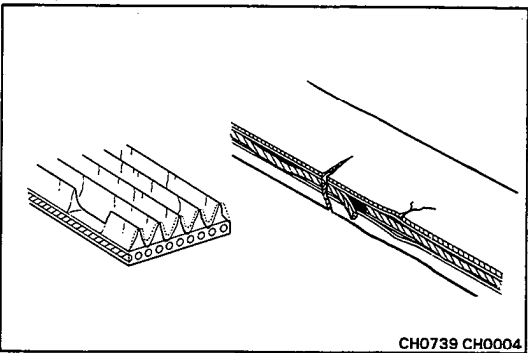
If insufficient, refill with distilled (or purified) water.



2. CHECK BATTERY TERMINALS, FUSIBLE LINKS AND FUSES

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

- (b) Check the fusible links and fuses for continuity.



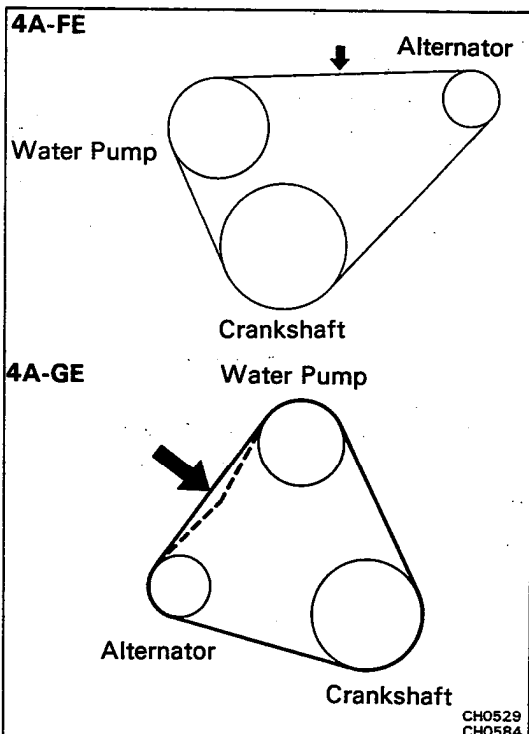
3. INSPECT DRIVE BELT

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

If necessary, replace the drive belt.

HINT: Cracks on the rib side of a belt are considered acceptable.

If the belt has chunks missing from the ribs, it should be replaced.



- (b) Check the drive belt deflection of pressing on the belt at the points indicated in the figure with 10 kg (22.0 lb, 98 N) pressure.

Drive belt deflection:

4A-FE

New belt 8.5 – 10.5 mm (0.335 – 0.413 in.)

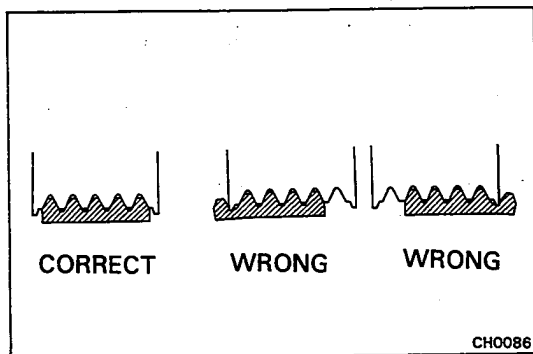
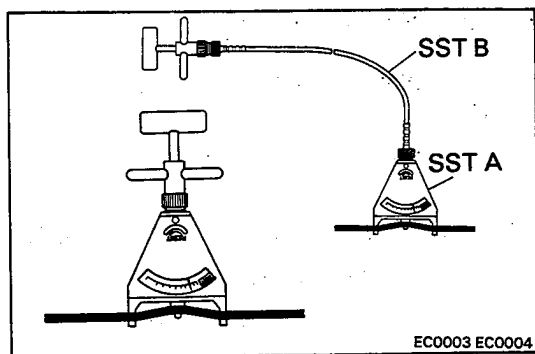
Used belt 10.0 – 12.0 mm (0.39 – 0.47 in.)

4A-GE

New belt 4 – 5 mm (0.16 – 0.20 in.)

Used belt 6 – 7 mm (0.24 – 0.28 in.)

If necessary, adjust the drive belt deflection.

**(Reference)**

Using SST, check the drive belt tension.

SST A 09216-00020

SST B 09216-00030

Drive belt tension:**4A-FE**

New belt 60 – 70 kg

Used belt 40 – 55 kg

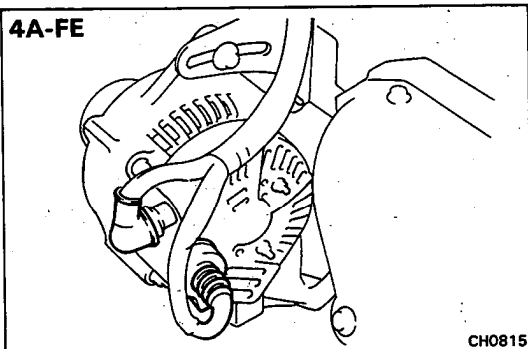
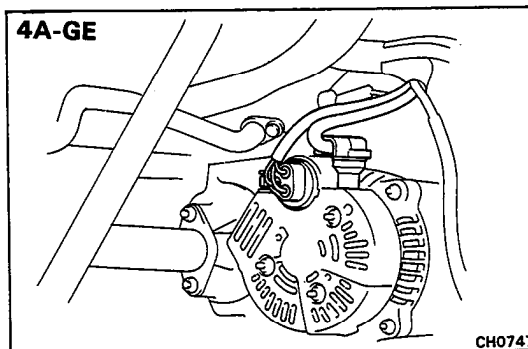
4A-GE

New belt 70 – 80 kg

Used belt 30 – 45 kg

HINT:

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing the drive belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the crank pulley.
- After installing the belt, run the engine for approx. 5 minutes and recheck the deflection or tension.

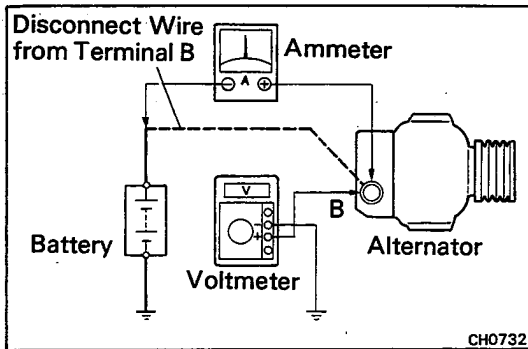
4A-FE**4A-GE****4. VISUALLY CHECK ALTERNATOR WIRING AND LISTEN FOR ABNORMAL NOISES**

- (a) Check that the wiring is in good condition.
- (b) Check that there are no abnormal noise from the alternator while the engine is running.

5. CHECK DISCHARGE WARNING LIGHT CIRCUIT

- (a) Warm up the engine and then turn it off.
- (b) Turn off all accessories.
- (c) Turn the ignition switch to ON. Check that the discharge warning light is lit.
- (d) Start the engine. Check that the light goes out.

If the light does not function as specified, troubleshoot the warning light circuit.

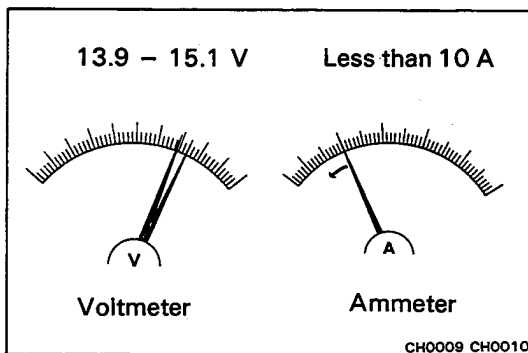


6. CHECK CHARGING CIRCUIT WITHOUT LOAD

HINT: If a battery/alternator 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 and ammeter to the charging circuit as follows:

- Disconnect the wire from terminal B of the alternator and connect the wire to the negative (–) terminal of the ammeter.
- Connect the test lead from the positive (+) terminal of the ammeter to terminal B of the alternator.
- Connect the positive (+) lead of the voltmeter to terminal B of the alternator.
- Ground the negative (–) lead of the voltmeter.



(b) Check the charging circuit as follows:

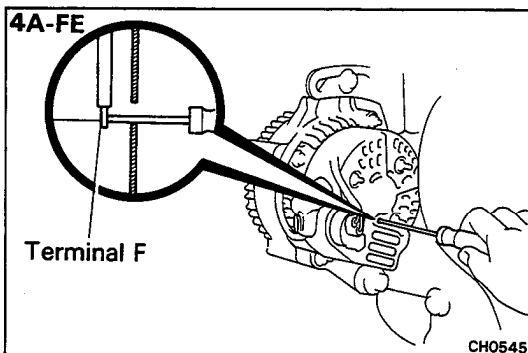
With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.

Standard amperage: Less than 10 A

Standard voltage: 13.9 – 15.1 V at 25°C (77°F)

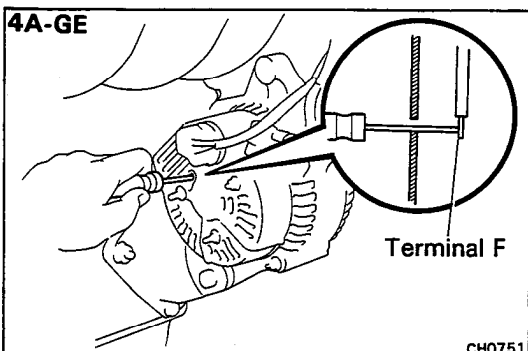
13.5 – 14.3 V at 115°C (239°F)

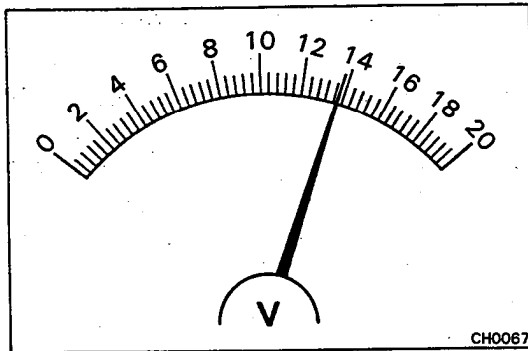
If the voltage reading is greater than standard voltage, replace the IC regulator.



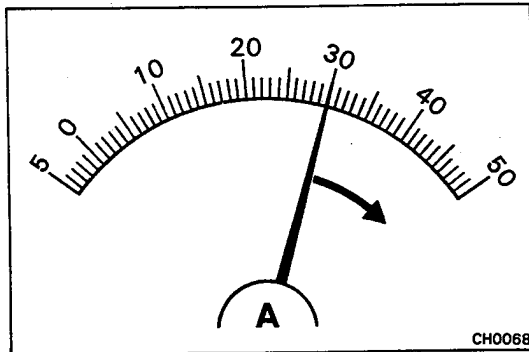
If the voltage reading is less than standard voltage, check the IC regulator and alternator as follows:

- With terminal F grounded, start the engine and check the voltage reading of terminal B.
- If the voltage reading is higher than standard voltage, replace the IC regulator.
- If the voltage reading is less than standard voltage, repair the alternator.





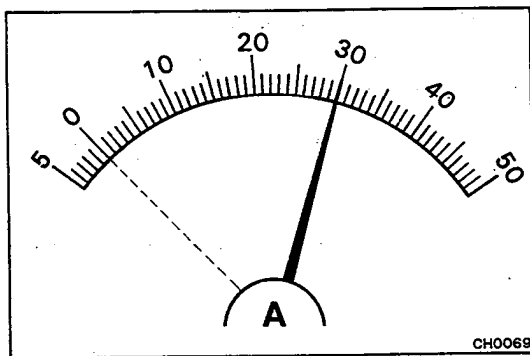
- If the voltmeter reading is greater than standard voltage, replace the IC regulator.
- If the voltmeter reading is less than standard voltage, check the alternator.



7. INSPECT CHARGING CIRCUIT WITH LOAD

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

Standard amperage: 30 A or more

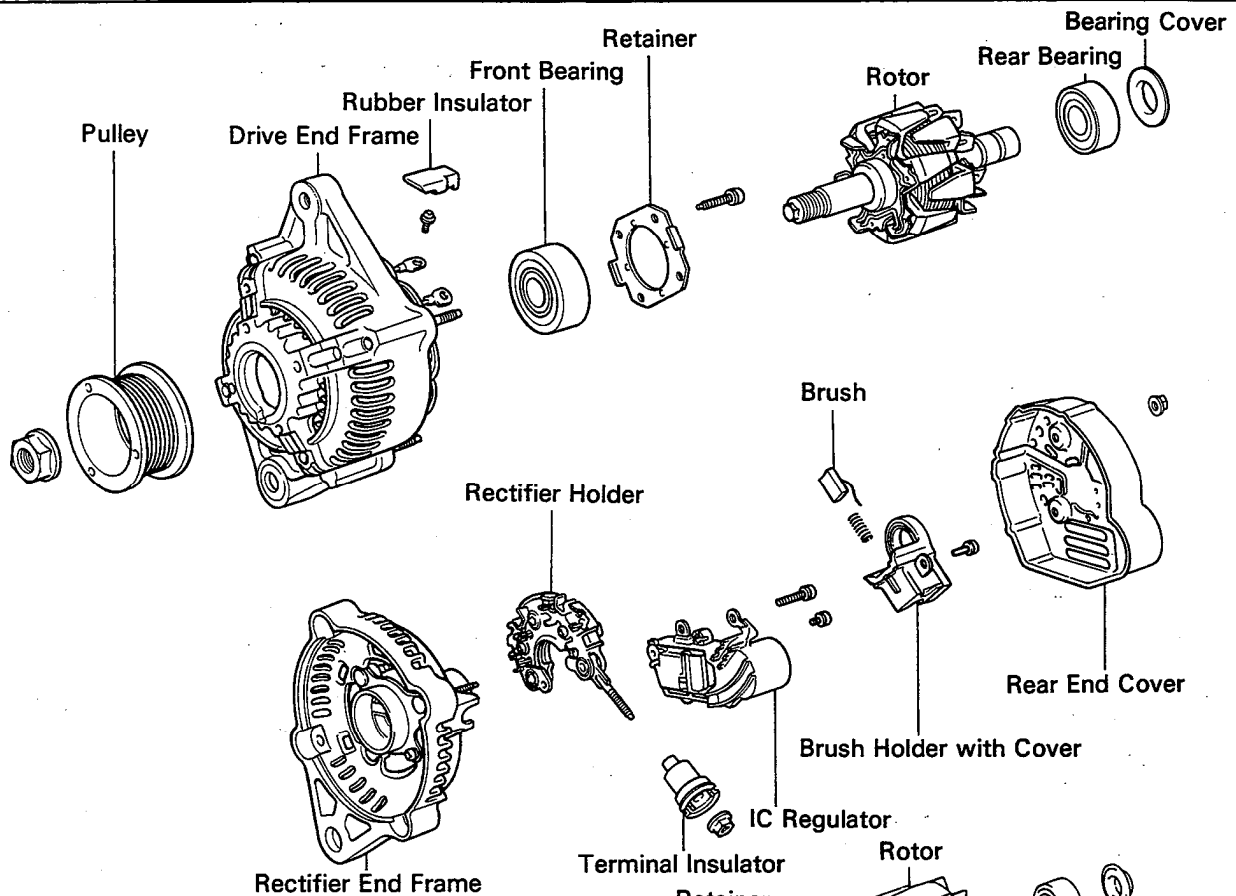


If the ammeter reading is less than standard amperage, repair the alternator. (See page CH-7)

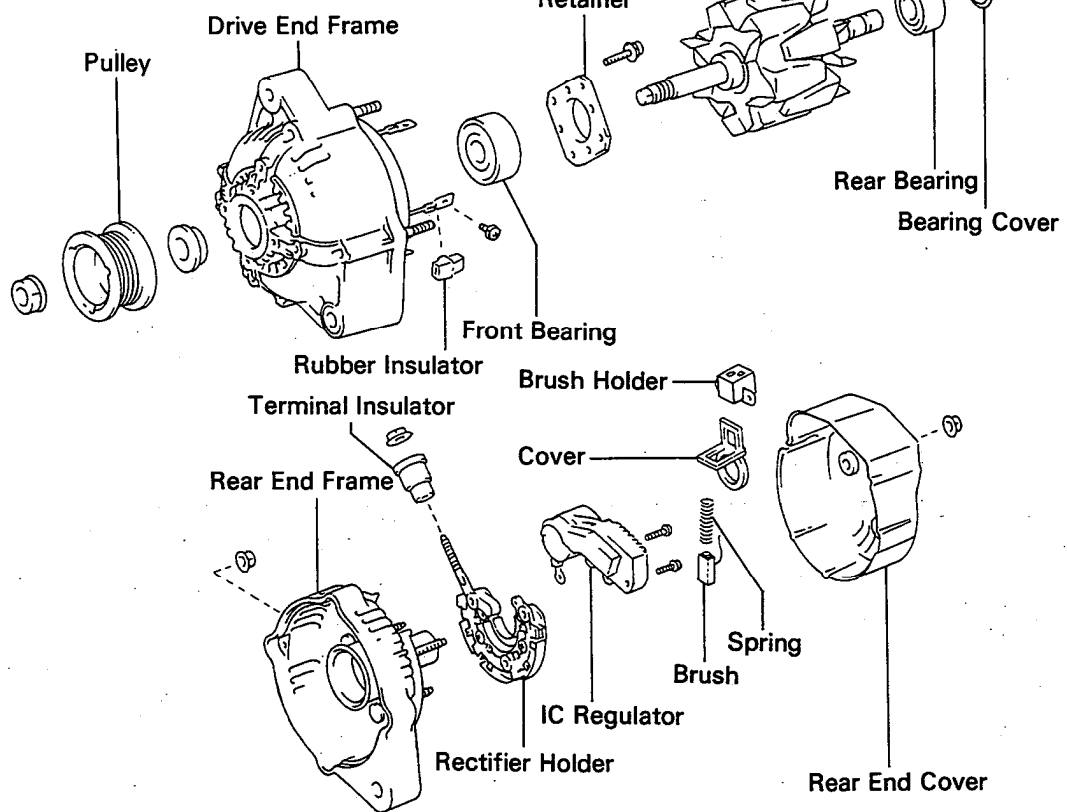
HINT: With the battery fully charged, the indication will sometimes be less than standard amperage.

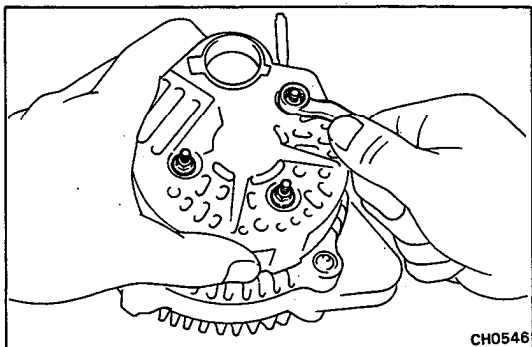
ALTERNATOR COMPONENTS

4A-FE



4A-GE



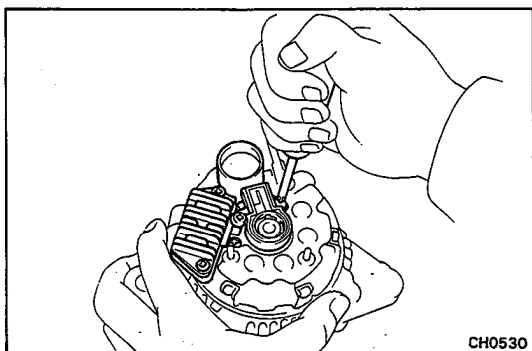


DISASSEMBLY OF ALTERNATOR

(See page CH-7)

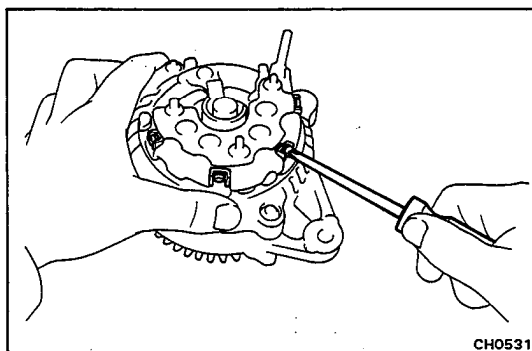
1. REMOVE REAR END COVER

- (a) Remove the nut and terminal insulator.
- (b) Remove the three nuts and end cover.



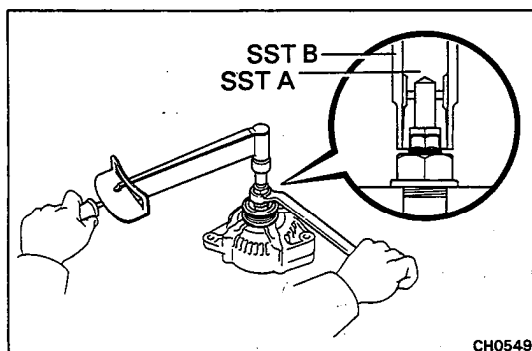
2. REMOVE BRUSH HOLDER AND IC REGULATOR

Remove the five screws, brush holder and IC regulator.



3. REMOVE RECTIFIER HOLDER

- (a) Remove the four screws and rectifier holder.
- (b) Remove the four rubber insulators.



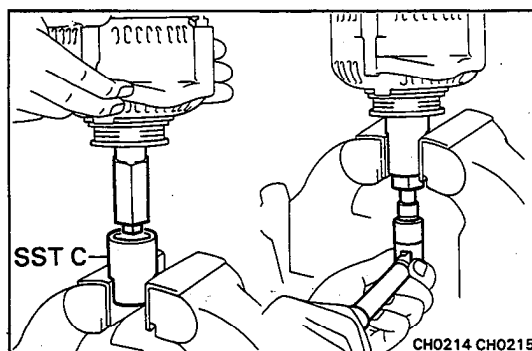
4. REMOVE PULLEY

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

SST 09820-63010

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

- (b) Check that SST A is secured to the rotor shaft.

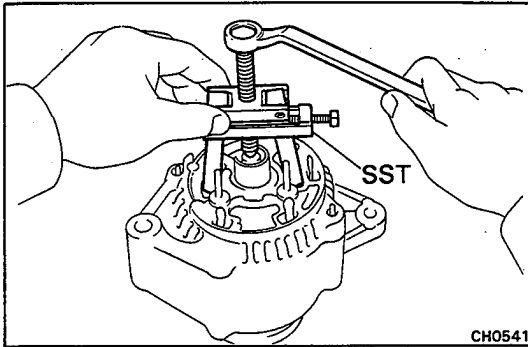


- (c) As shown in the figure, mount SST C in a vise, and install the alternator to SST C.

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

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

- (e) Remove the alternator from SST C.
- (f) Turn SST B and remove SSTs A and B.
- (g) Remove the pulley nut and pulley.



5. REMOVE RECTIFIER END FRAME

- (a) Remove the four nuts.
- (b) Using SST, remove the rectifier end frame.
SST 09286-46011

6. REMOVE ROTOR FROM DRIVE END FRAME

INSPECTION AND REPAIR OF ALTERNATOR

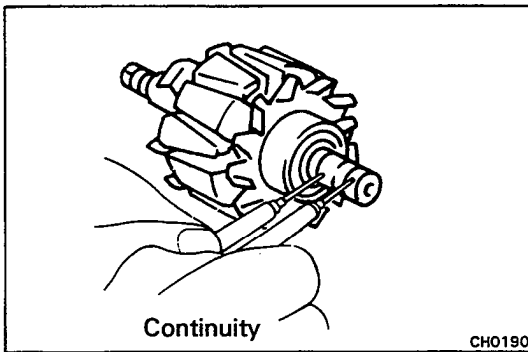
Rotor

1. INSPECT ROTOR FOR OPEN CIRCUIT

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

Standard resistance (cold): 2.8 – 3.0 Ω

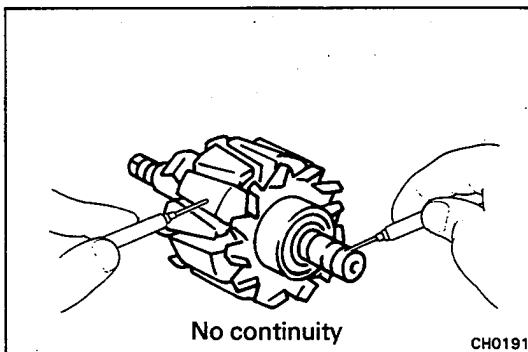
If there is no continuity, replace the rotor.



2. INSPECT ROTOR FOR GROUND

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

If there is continuity, replace the rotor.



3. INSPECT SLIP RINGS

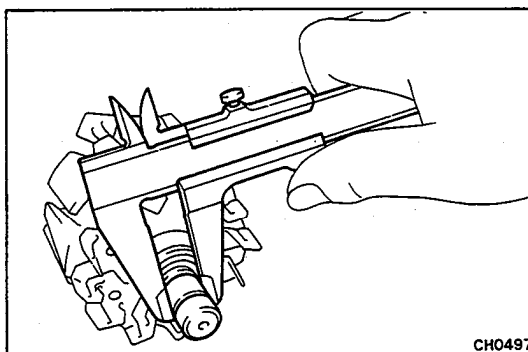
- (a) Check that the slip rings are not rough or scored. If rough or scored, replace the rotor.

- (b) Using calipers, measure the slip ring diameters.

Standard diameter: 14.2 – 14.4 mm
(0.559 – 0.567 in.)

Minimum diameter: 14.0 mm (0.551 in.)

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

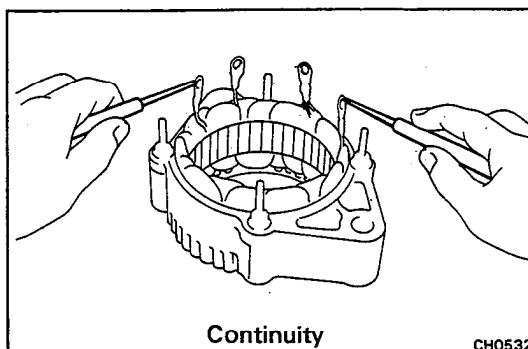


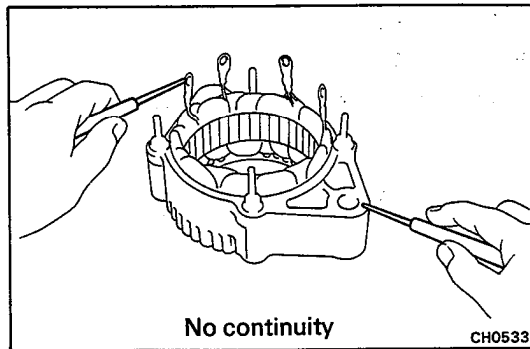
Stator

1. INSPECT STATOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the coil leads.

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

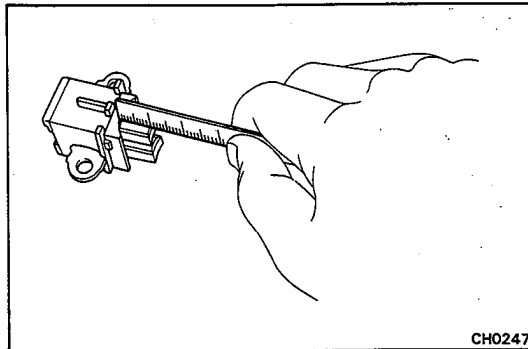




2. INSPECT STATOR FOR GROUND

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

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

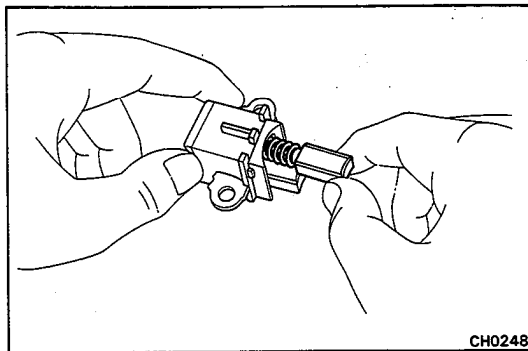


Brushes

1. MEASURE EXPOSED BRUSH LENGTH

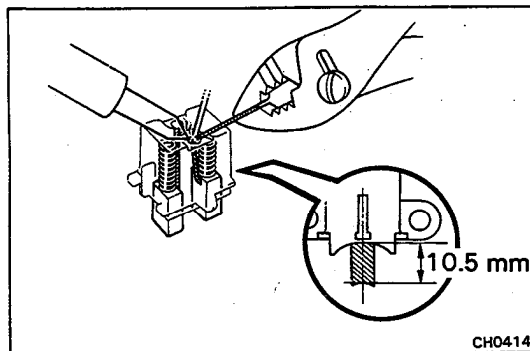
Minimum exposed length: 4.5 mm (0.177 in.)

If the brush length is less than minimum, replace the brushes.



2. IF NECESSARY, REPLACE BRUSHES

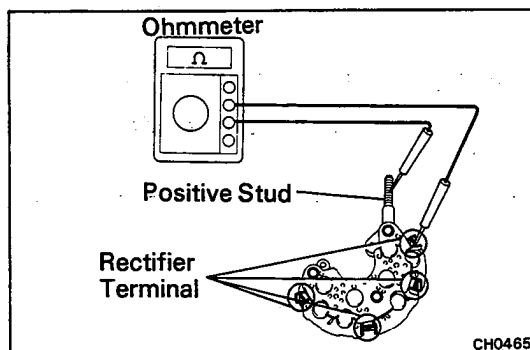
- (a) Unsolder and remove the brush and spring.
- (b) Run the wire of the brush through the hole in the brush holder, and insert the spring and brush into the brush holder.



- (c) Solder the brush wire to the brush holder at the exposed length.

Exposed length: 10.5 mm (0.413 in.)

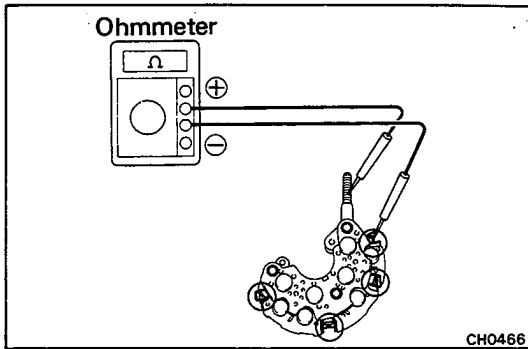
- (d) Check that the brush moves smoothly in the brush holder.
- (e) Cut off the excess wire.
- (f) Apply insulation paint to the soldered point.



Rectifier

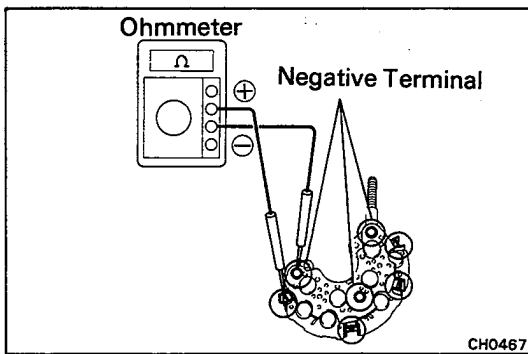
1. INSPECT POSITIVE SIDE RECTIFIER

- (a) Using an ohmmeter, connect one tester probe to the positive stud and the other to each rectifier terminal.



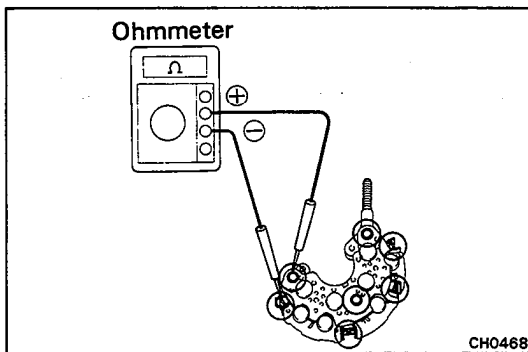
- (b) Reverse the polarity of the tester probes.
- (c) Check that one shows continuity and the other shows no continuity.

If not, replace the rectifier holder.



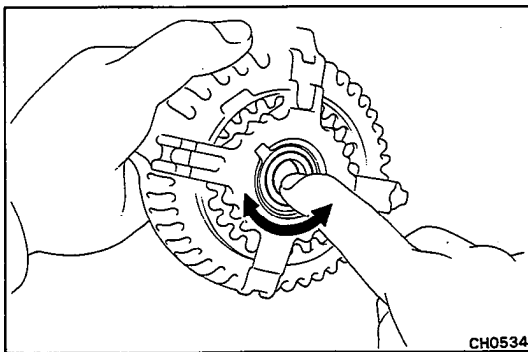
2. INSPECT NEGATIVE SIDE RECTIFIER

- (a) Connect one tester probe to each rectifier terminal and the other to each rectifier negative terminal.



- (b) Reverse the polarity of the tester probes.
- (c) Check that one shows continuity and the other shows no continuity.

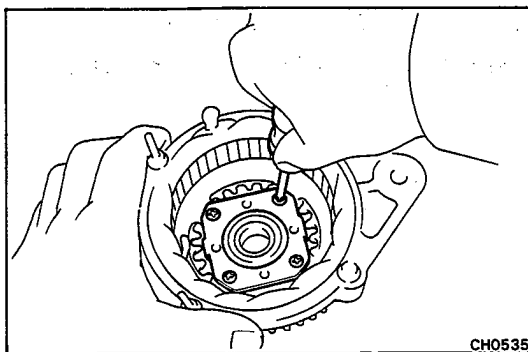
If not, replace the rectifier holder.



Bearings

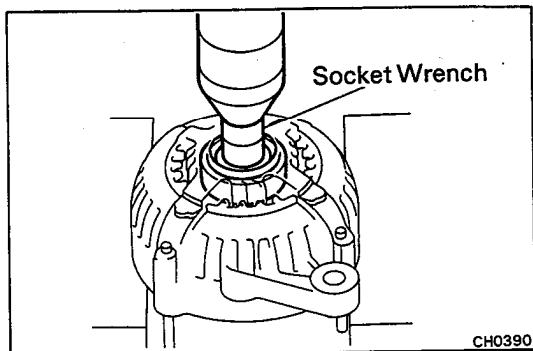
1. INSPECT FRONT BEARING

Check that the bearing is not rough or worn.

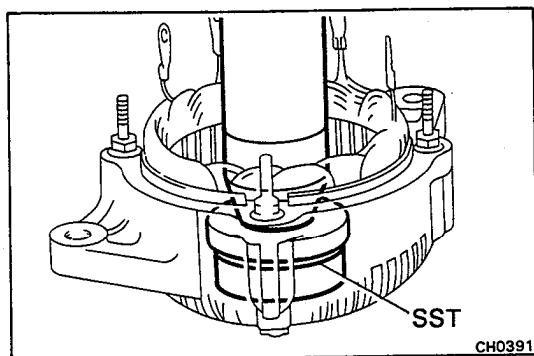


2. IF NECESSARY, REPLACE FRONT BEARING

- (a) Remove the four screws and bearing retainer.

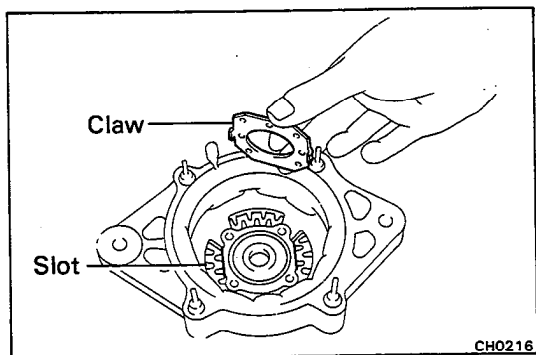


- (b) Using a press and socket wrench, press out the front bearing.



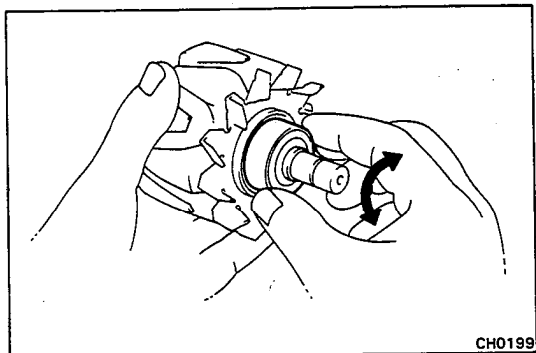
- (c) Using SST and a press, press in a new front bearing into the drive end frame.

SST 09608-20012 (09608-00030)



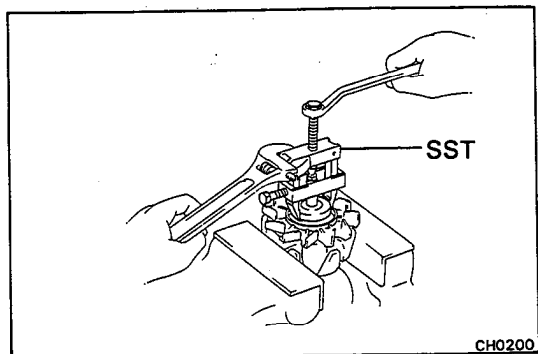
- (d) Align the claws of the bearing retainer with the slots of the drive end frame.

- (e) Install the bearing retainer with the four screws.



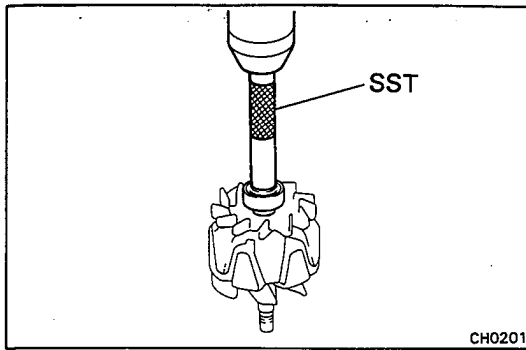
3. INSPECT REAR BEARING

Check that the bearing is not rough or worn.



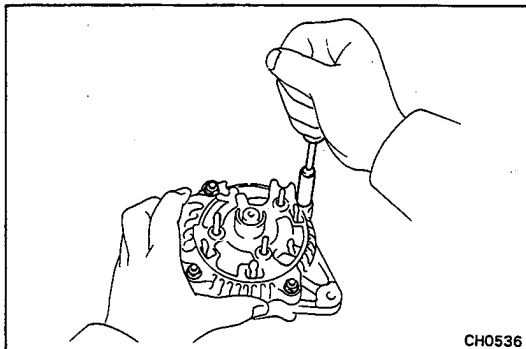
4. IF NECESSARY, REPLACE REAR BEARING

- (a) Using SST, remove the bearing cover and bearing.
SST 09820-00021



- (b) Using SST and a press, press in a new bearing and the bearing cover.

SST 09285-76010



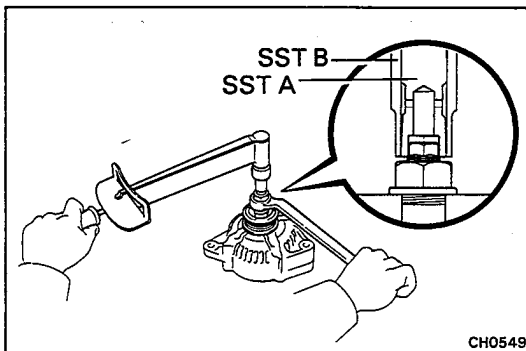
ASSEMBLY OF ALTERNATOR

(See page CH-7)

1. INSTALL ROTOR TO DRIVE END FRAME

2. INSTALL RECTIFIER END FRAME

- (a) Using a plastic-faced hammer, lightly tap in the end frame.
(b) Install the four nuts.



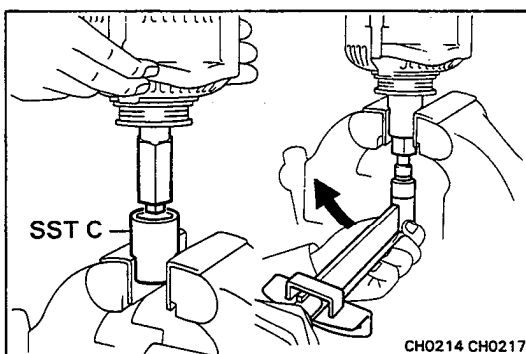
3. INSTALL PULLEY

- (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

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

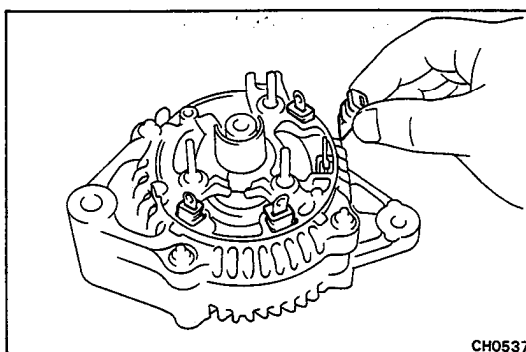
- (c) Check that SST A is secured to the pulley shaft.



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

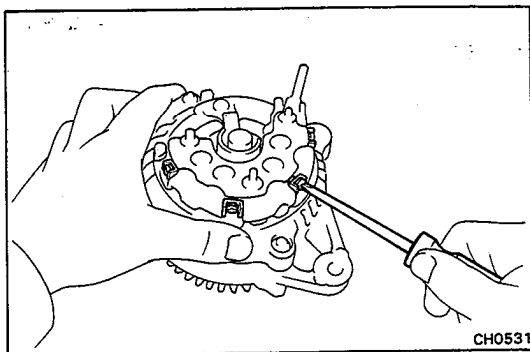
Torque: 1,125 kg-cm (81 ft-lb, 110 N·m)

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

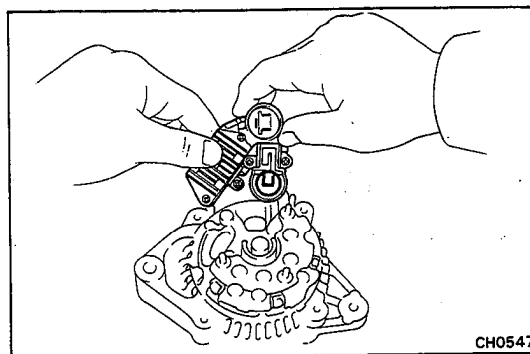


4. INSTALL RECTIFIER HOLDER

- (a) Install the four rubber insulators on the lead wires.



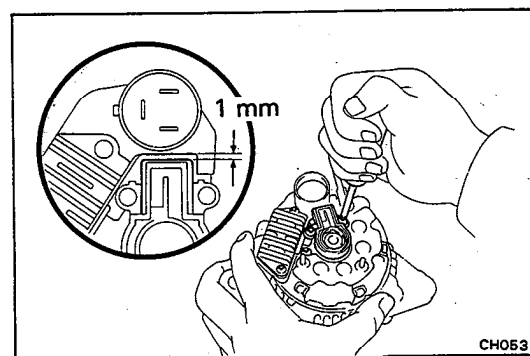
- (b) Install the rectifier holder with the four screws.



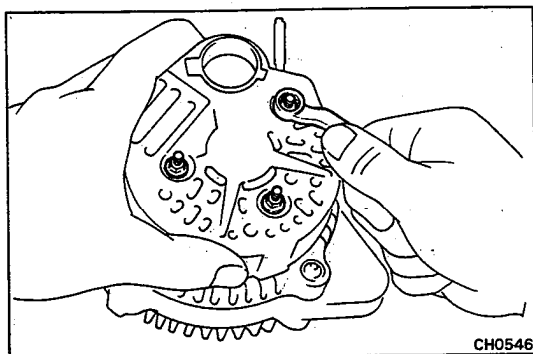
5. INSTALL BRUSH HOLDER AND IC REGULATOR

- (a) Place the brush holder cover to the brush holder.
(b) Install the IC regulator and brush holder to the rear end frame horizontally as shown in the figure.

HINT: Make sure the brush holder's cover doesn't slip to one side during installation.

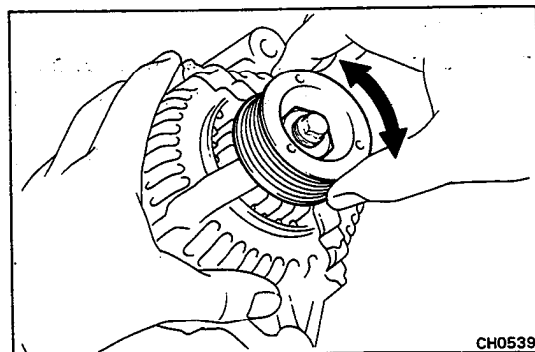


- (c) Tighten the five screws until there is a clearance of at least 1 mm (0.04 in.) between the brush holder cover and connector.



6. INSTALL REAR END COVER

- (a) Install the end cover with the three nuts.
(b) Install the terminal insulator with the nut.



7. MAKE SURE ROTOR ROTATES SMOOTHLY