

CHARGING SYSTEM

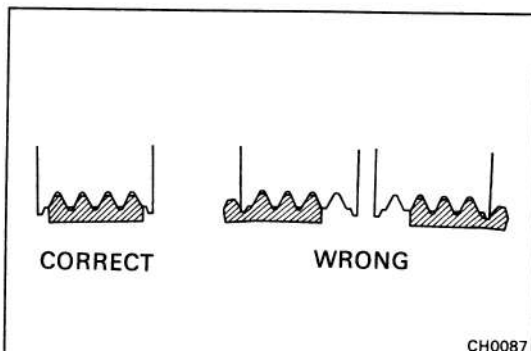
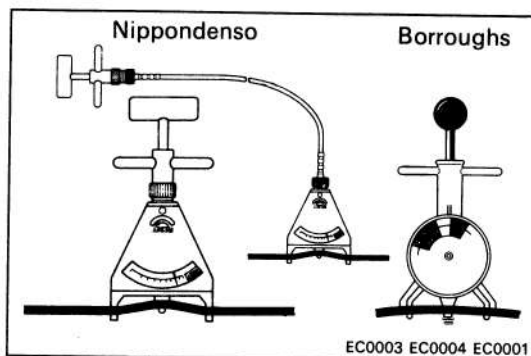
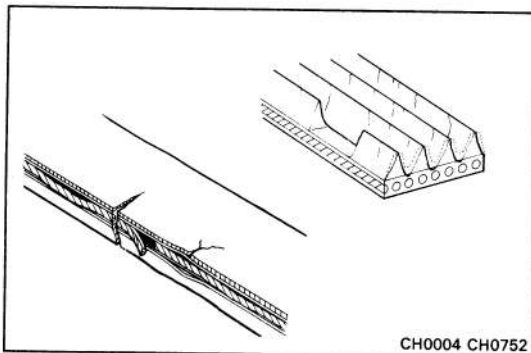
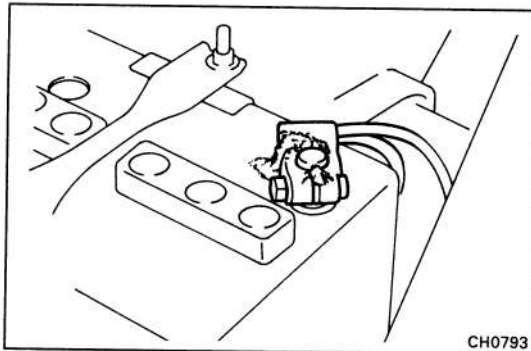
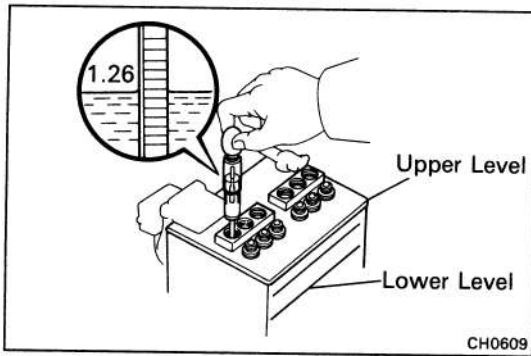
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PRECAUTIONS

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 when the engine is running.

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Discharge warning light does not light with ignition ON and engine not	Fuse blown Light burned out Wiring connections loose Ignition main relay IC regulator faulty	Check "AM2" fuse Replace light Tighten loose connections Check relay Replace IC regulator	CH-8
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 "ECU-IG" fuse Replace fusible link Check charging system Repair wiring	CH-3 CH-4



ON-VEHICLE INSPECTION

1. INSPECT BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL

(a) Check the specific gravity of each cell.

Standard specific gravity:

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

If not within specification, 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.

Fusible link:	MAIN	2.0L
	ALT	120A
	AM1	50A
	AM2	40A

Fuse:	ECU-IG	15A
	ALT SENCING	7.5A
	AM2	7.5A

3. INSPECT ALTERNATOR DRIVE BELT

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

If necessary, replace the drive belt.

HINT: Cracks on rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.

(b) Using a belt tension gauge, measure the drive belt tension.

Belt tension gauge:

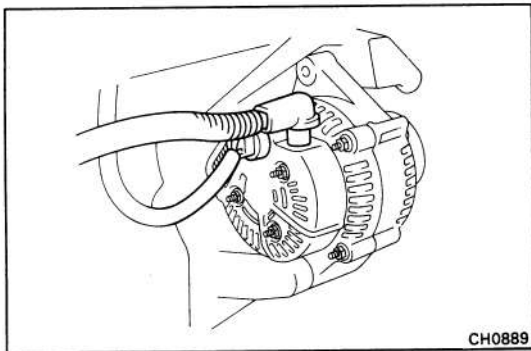
Nippondenso	BTG-20 (95506-00020)
Borroughs	No. BT-33-73F

Drive belt tension:	New belt	120 ± 20 lb
	Used belt	104 ± 20 lb

If the belt tension is not as specified, adjust it.

HINT:

- "New belt" refer to a belt which has been used 5 minutes or less 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 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.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.



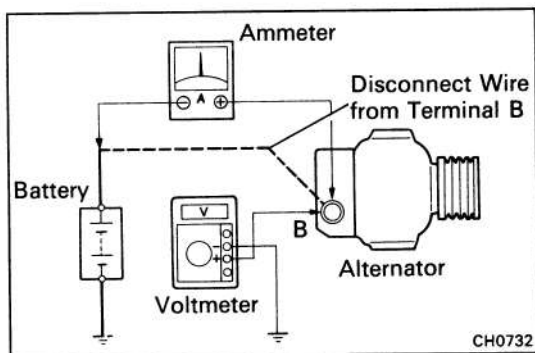
4. VISUALLY CHECK ALTERNATOR WIRING AND LISTEN FOR ABNORMAL NOISES

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

5. INSPECT CHARGE 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 charge warning light is lit.
- (d) Start the engine. Check that the light goes out.

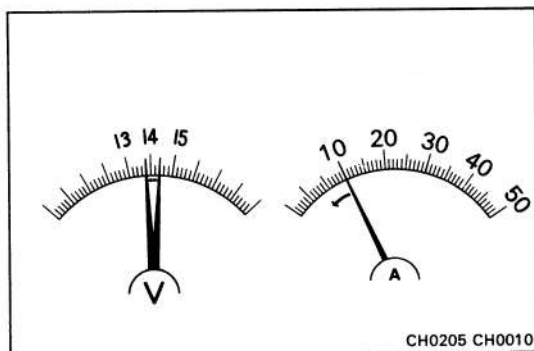
If the light does not go off as specified, troubleshoot the charge light circuit.



6. INSPECT CHARGING CIRCUIT WITHOUT LOAD

HINT: If a battery/alternator 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 alternator and connect it to the negative (–) probe of the ammeter.
 - Connect the positive (+) probe of the ammeter to terminal B of the alternator.
 - Connect the positive (+) probe of the voltmeter to terminal B of the alternator.
 - Ground the negative (–) probe of the voltmeter.



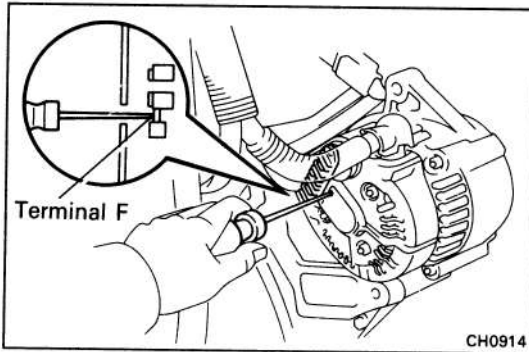
- (b) Check the charging circuit as follows:

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

Standard amperage: 10 A or less

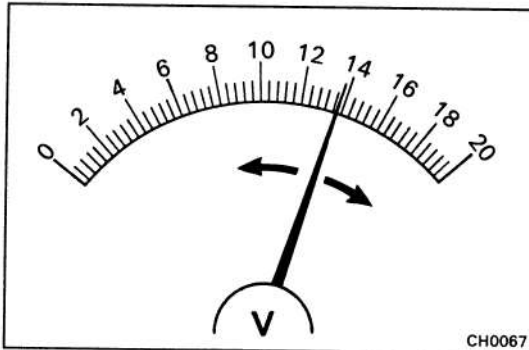
Standard voltage: 13.9 – 15.1 V at 25°C (77°F)
13.5 – 14.3 V at 115°C (239°F)

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

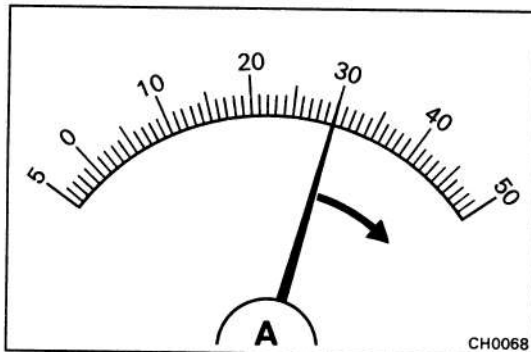


If the voltmeter reading is less than standard voltage, check the IC regulator and alternator as follows:

- With terminal F grounded, start the engine and check the voltmeter reading of terminal B.



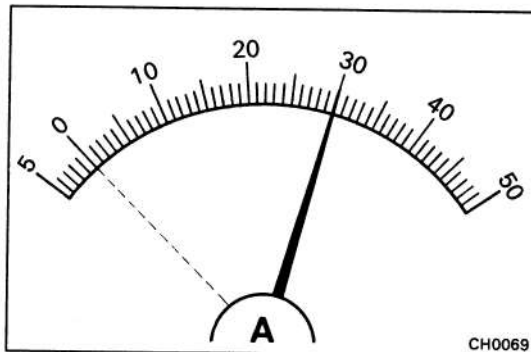
- If the voltmeter reading is greater than standard voltage, replace the IC regulator.
- If the voltmeter reading is less than standard voltage, check the alternator.



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

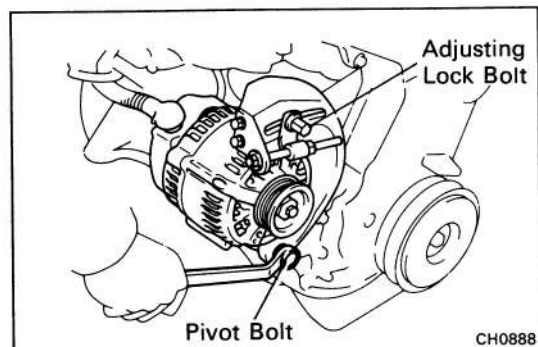
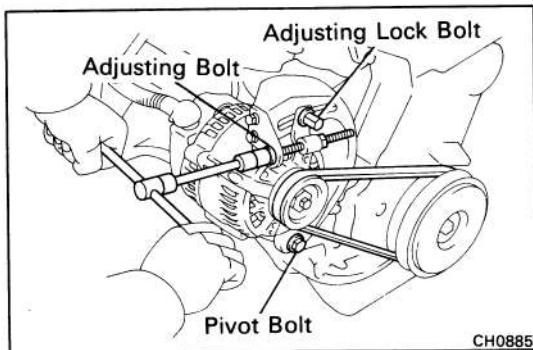
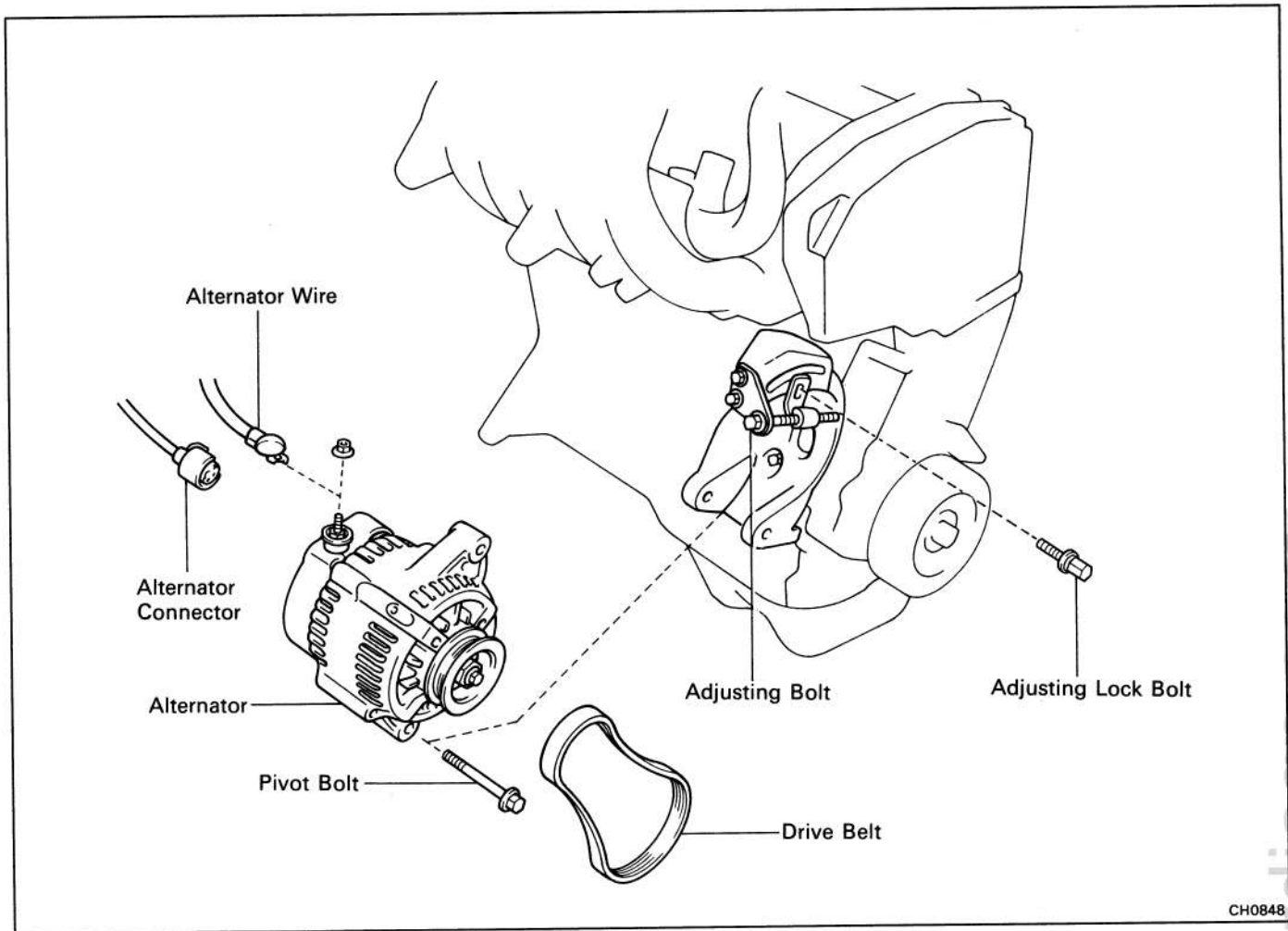


If the ammeter reading is less than standard amperage, repair the alternator. (See page CH-8)

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

ALTERNATOR

REMOVAL OF ALTERNATOR



1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.

2. REMOVE DRIVE BELT

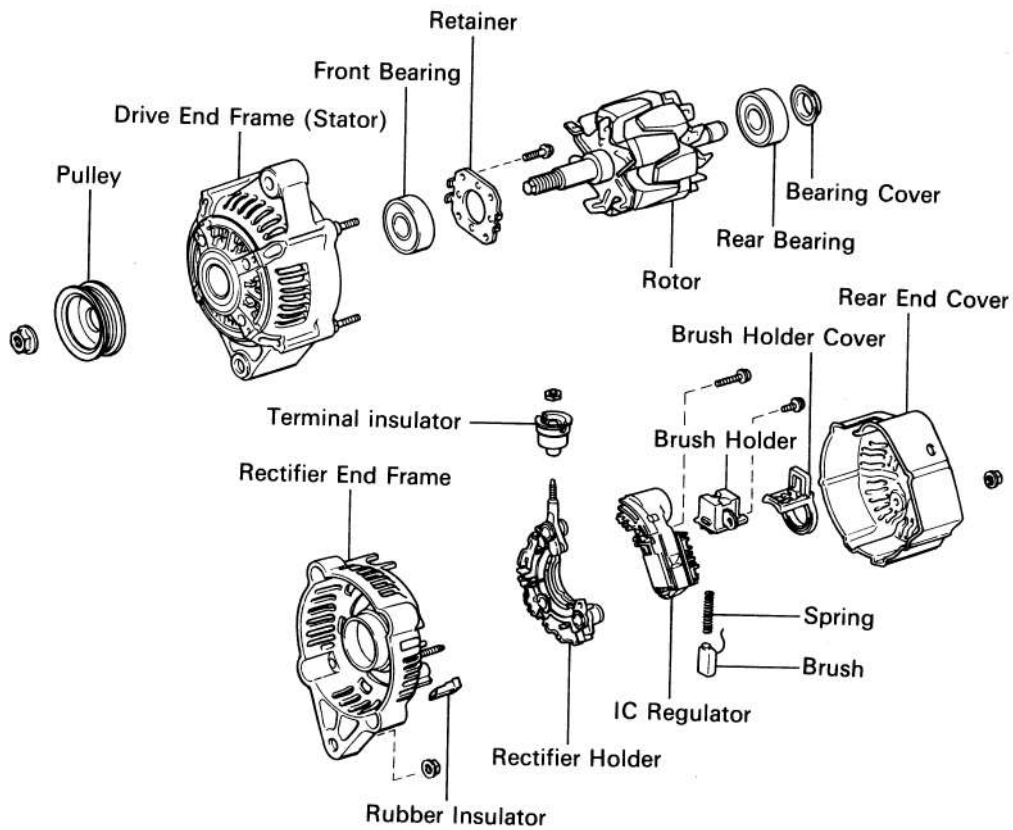
- Loosen the pivot bolt and adjusting lock bolt.
- Loosen the adjusting bolt, and disconnect the drive belt from the alternator.

3. REMOVE ALTERNATOR

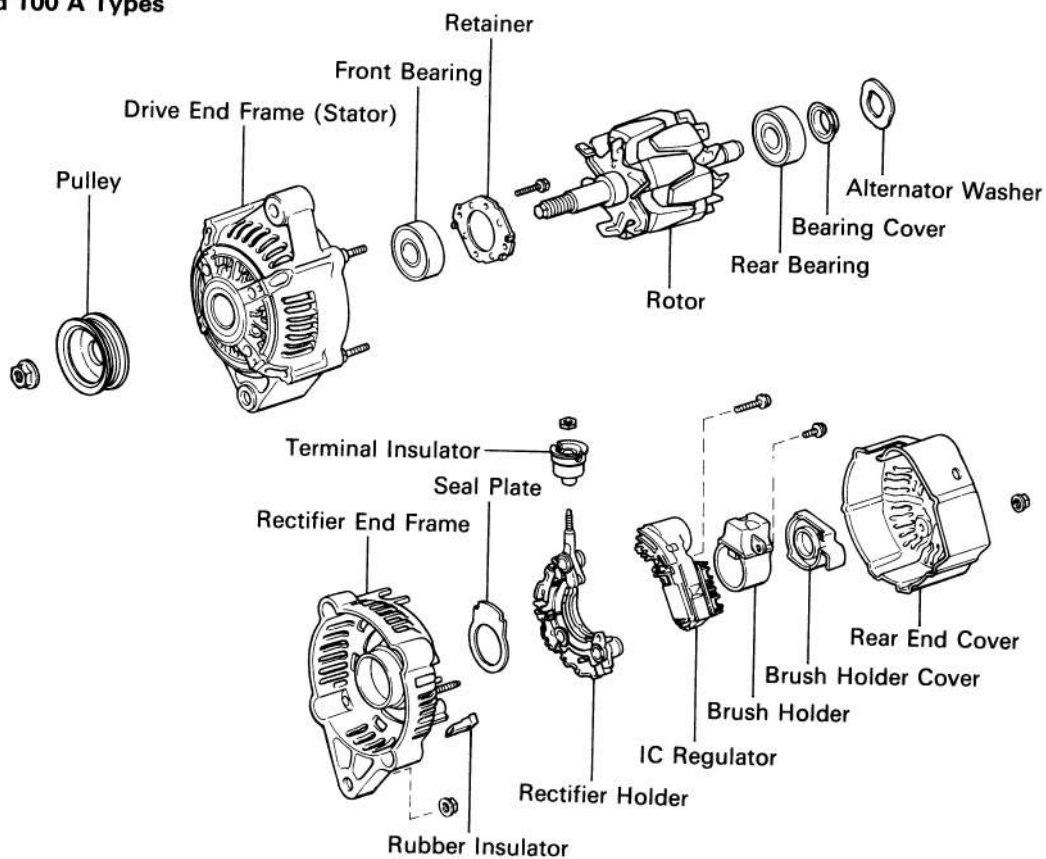
- Disconnect the alternator connector.
- Remove the nut, and disconnect the alternator wire.
- Remove the pivot bolt, adjusting lock bolt and alternator.

COMPONENTS

70 A Type



80 A and 100 A Types

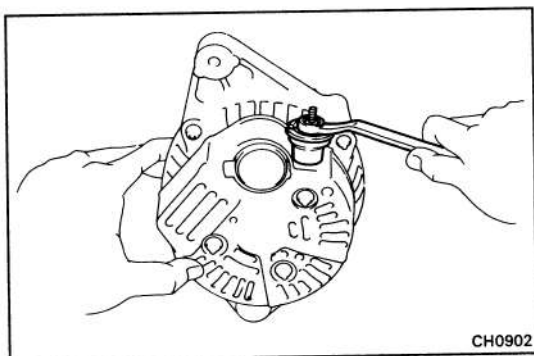


DISASSEMBLY OF ALTERNATOR

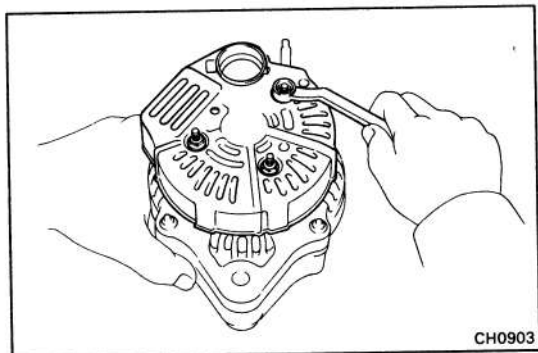
(See page CH-7)

1. REMOVE REAR END COVER

(a) Remove the nut and terminal insulator.

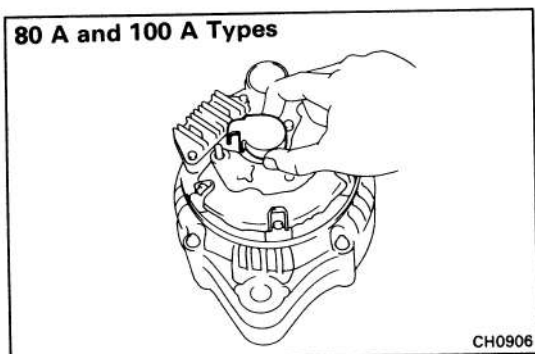


(b) Remove the three nuts and end cover.

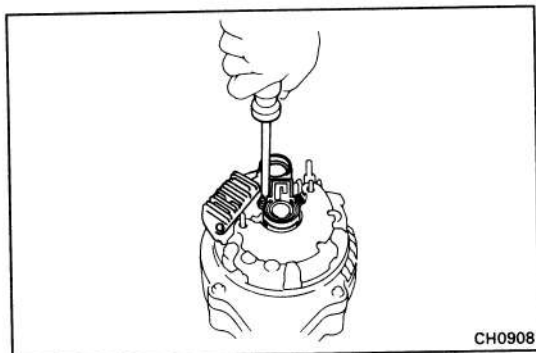
**80 A and 100 A Types****2. REMOVE BRUSH HOLDER AND IC REGULATOR**

(a) (80 A and 100 A Types)

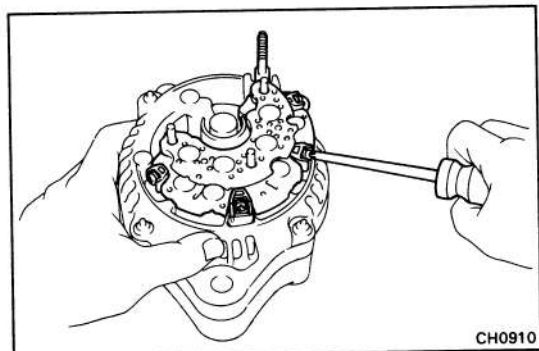
Remove the brush holder cover from the brush holder.

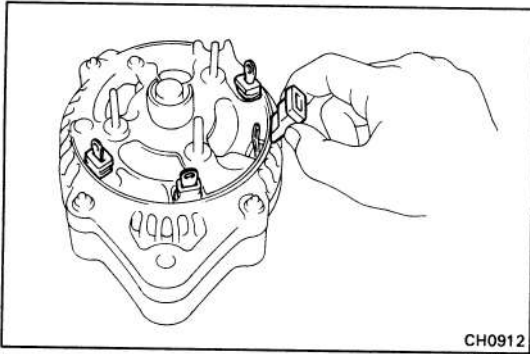


(b) Remove the five screws, brush holder and IC regulator.

**3. REMOVE RECTIFIER HOLDER**

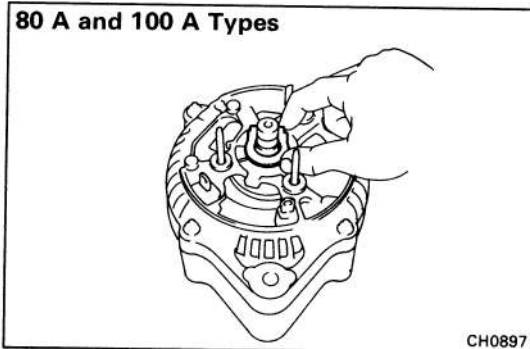
(a) Remove the four screws and rectifier holder.



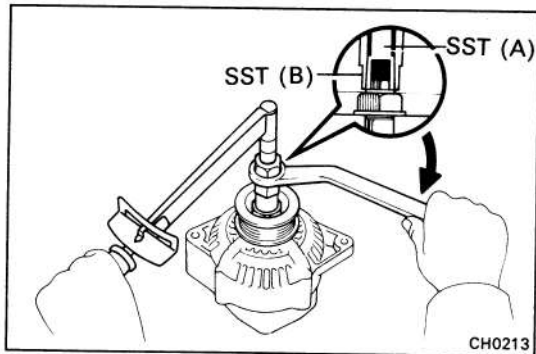


- (b) Remove the four rubber insulators.

80 A and 100 A Types



- (c) (80 A and 100 A Types)
Remove the seal plate.



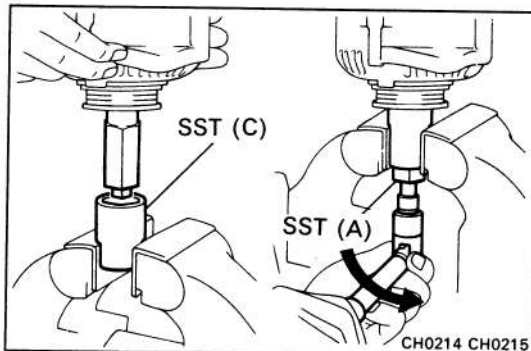
4. REMOVE PULLEY

- (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).

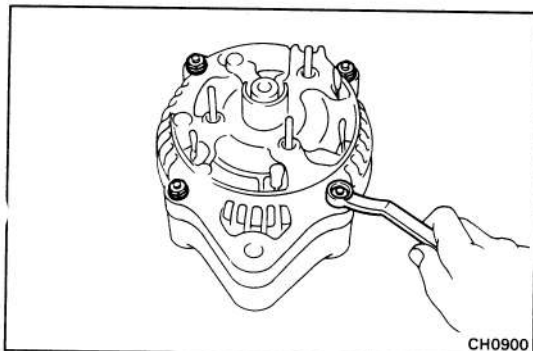
- (d) To loosen the pulley nut turn SST (A) in the direction shown in the figure.

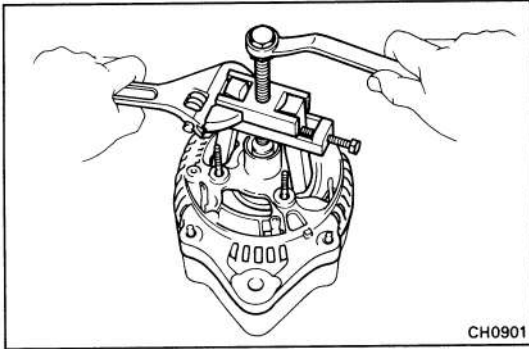
NOTICE: To prevent damage to the rotor shaft, do not loosen the pulley nut more than one-half of a turn.

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

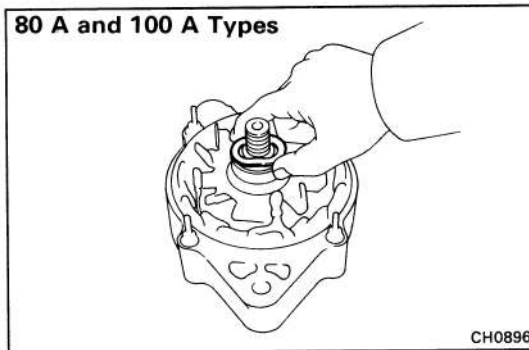
5. REMOVE RECTIFIER END FRAME

- (a) Remove the four nuts.

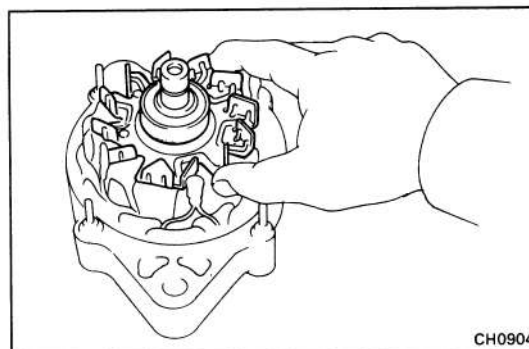




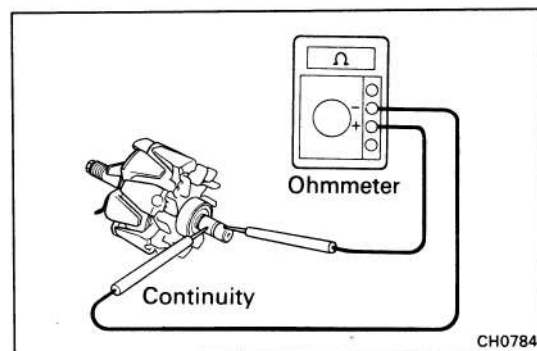
(b) Using SST, remove the rectifier end frame.
SST 09286-46011



(c) (80 A and 100 A Types)
Remove the alternator washer.



6. REMOVE ROTOR FROM DRIVE END FRAME



INSPECTION AND REPAIR OF ALTERNATOR

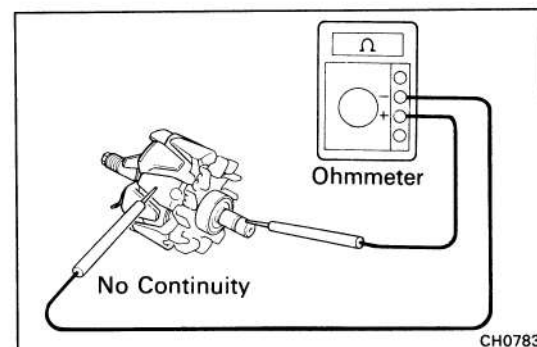
Rotor

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

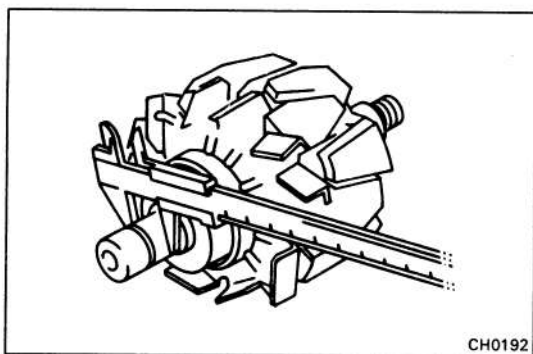
If there is no continuity, replace the rotor.



2. INSPECT ROTOR FOR GROUND

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

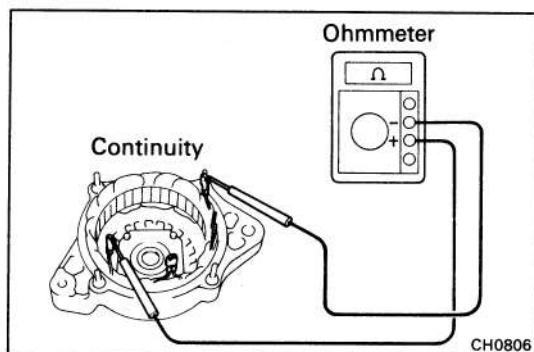
If the diameter is less than minimum, replace the rotor.

Stator (Drive End Frame)

1. INSPECT STATOR FOR OPEN CIRCUIT

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

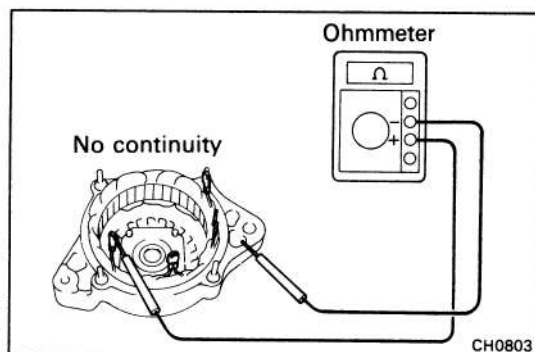
If there is no continuity, replace the drive end frame assembly.



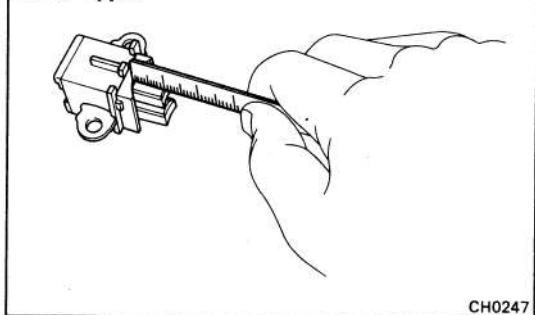
2. INSPECT STATOR FOR GROUND

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

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



70 A Type



Brushes

1. INSPECT EXPOSED BRUSH LENGTH

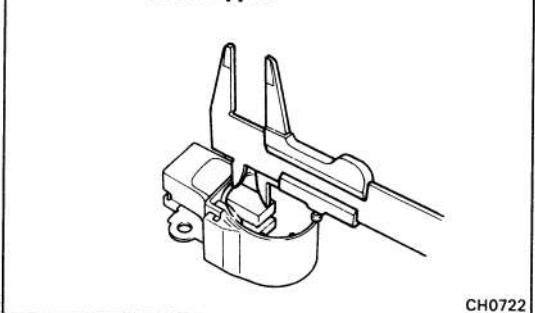
Using scale or vernier calipers, measure the exposed brush length.

Standard exposed length: 10.5 mm (0.413 in.)

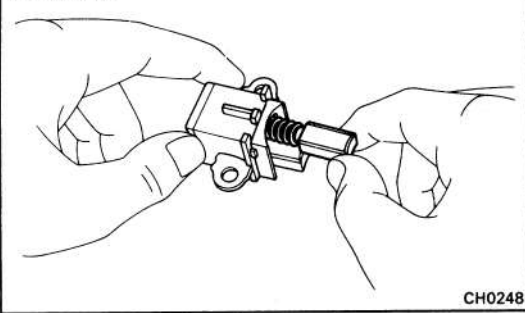
Minimum exposed length: 1.5 mm (0.059 in.)

If the exposed length is less than minimum, replace the brushes (70 A type) or brushes and brush holder assembly (80 A and 100 A types).

80 A and 100 A Types

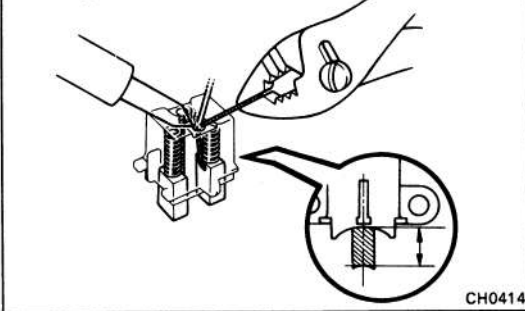


70 A Type



CH0248

70 A Type



CH0414

2. (70 A TYPE) IF NECESSARY, REPLACE BRUSHES

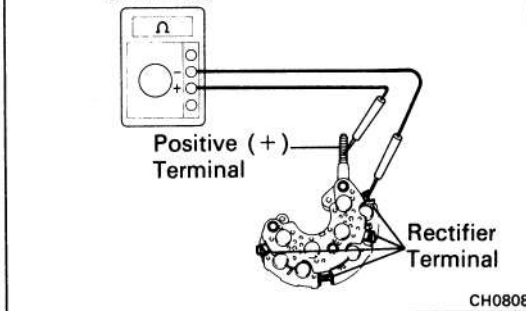
- Unsolder and remove the brush and spring.
- Run the wire of a new brush through the hole in the brush holder, and insert the spring and brush into the brush holder.

- Solder the brush wire to the brush holder at specified exposed length.

Exposed length: 10.5 mm (0.413 in.)

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

Ohmmeter



CH0808

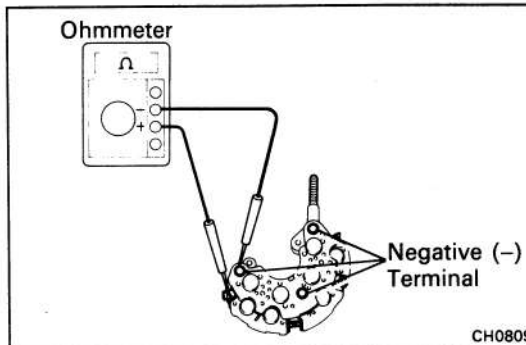
Rectifiers (Rectifier Holder)

1. INSPECT POSITIVE RECTIFIER

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

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

Ohmmeter



CH0809

2. INSPECT NEGATIVE RECTIFIER

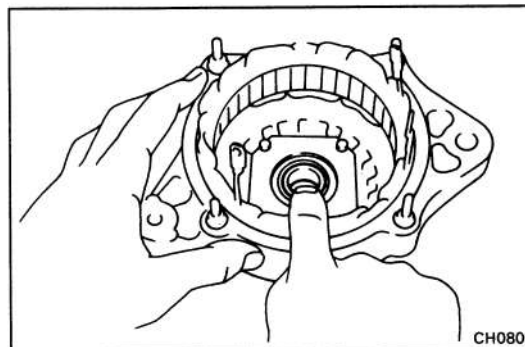
- Using an ohmmeter, connect one test probe to each negative (-) terminal and the other to each rectifier terminal.
- Reverse the polarity of the tester probes and repeat (a).
- Check that one shows continuity and the other shows no continuity.

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

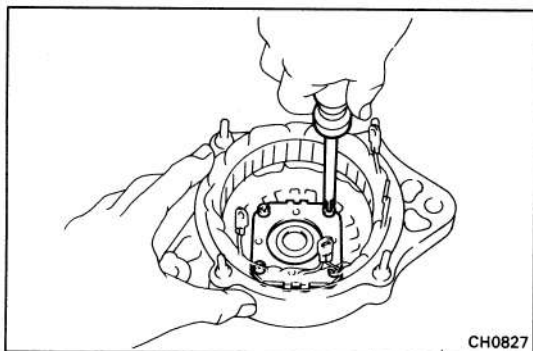
Bearings

1. INSPECT FRONT BEARING

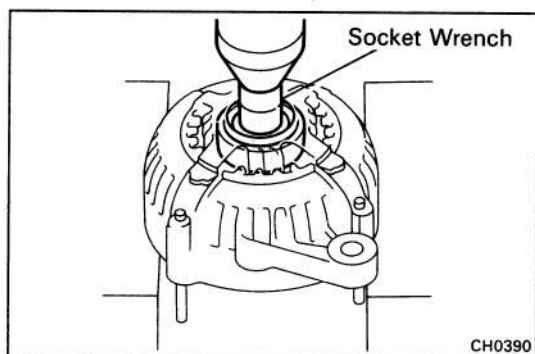
Check that the bearing is not rough or worn.



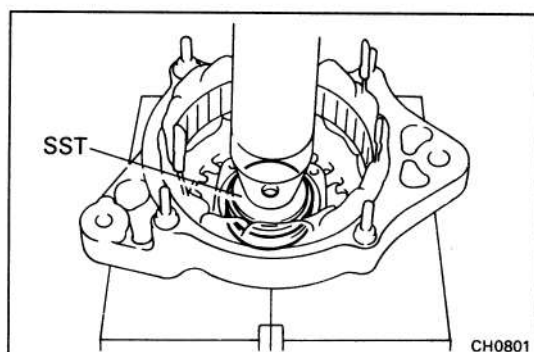
CH0800

**2. IF NECESSARY, REPLACE FRONT BEARING**

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

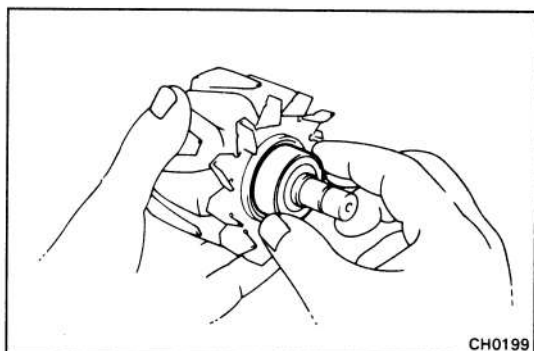


- (b) Using socket wrench and press, press out the bearing.

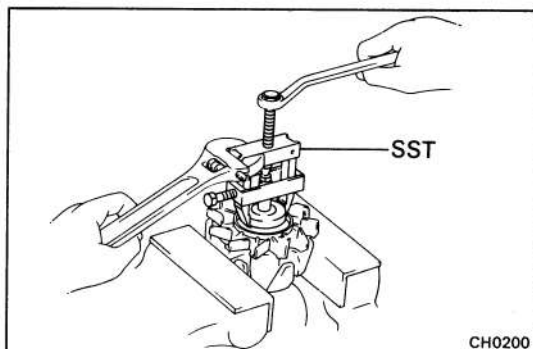


- (c) Using SST and a press, press in a new bearing.
SST 09608-20012 (09608-00030)

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

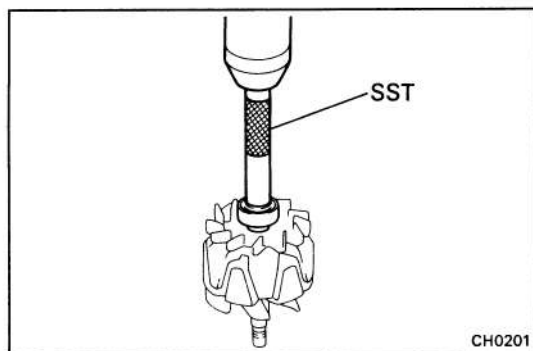
**3. INSPECT REAR BEARING**

Check that the bearing is not rough or worn.

**4. IF NECESSARY, REPLACE REAR BEARING**

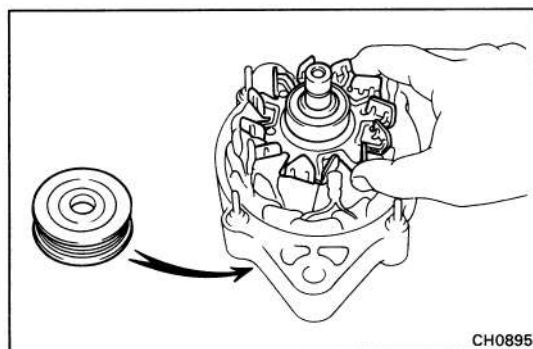
- (a) Using SST, remove the bearing cover and bearing.
SST 09820-00021

NOTICE: Be careful not to damage the fan.



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

SST 09285-76010



ASSEMBLY OF ALTERNATOR

(See page CH-7)

1. INSTALL ROTOR TO RECTIFIER END FRAME

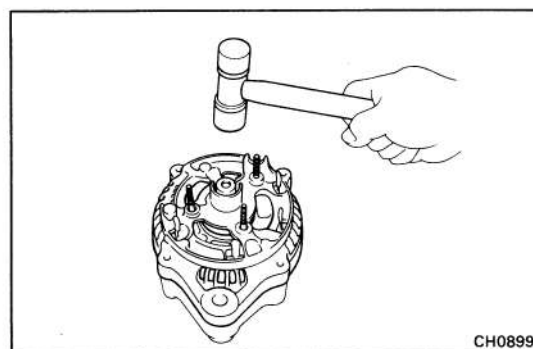
- (a) Place the rectifier end frame on the pulley.
- (b) Install the rotor to the rectifier end frame.

80 A and 100 A Types

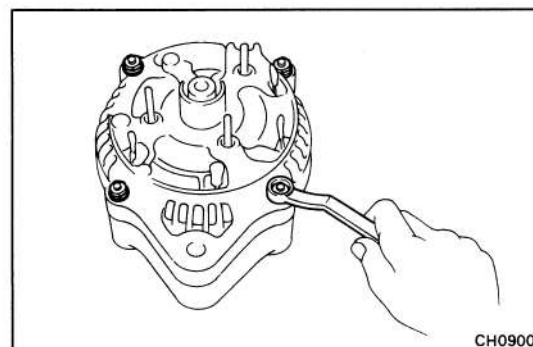


2. INSTALL RECTIFIER END FRAME

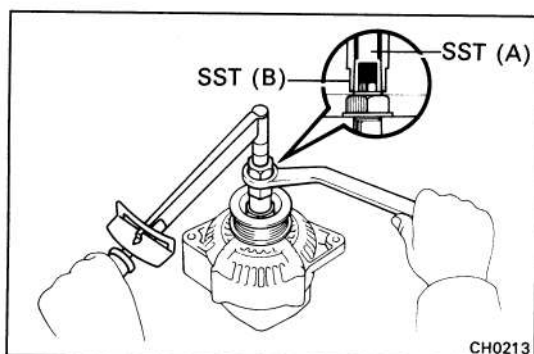
- (a) (80 A and 100 A Types)
Place the alternator washer on the rotor.



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



- (c) Install the four nuts.



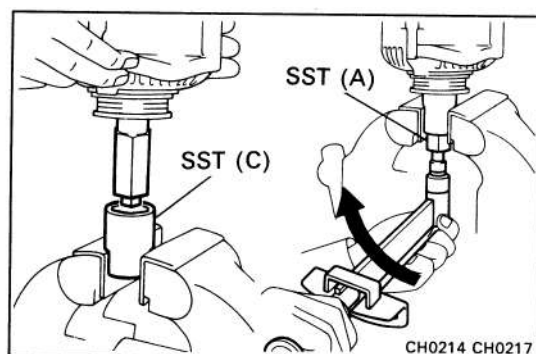
3. INSTALL PULLEY

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

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



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

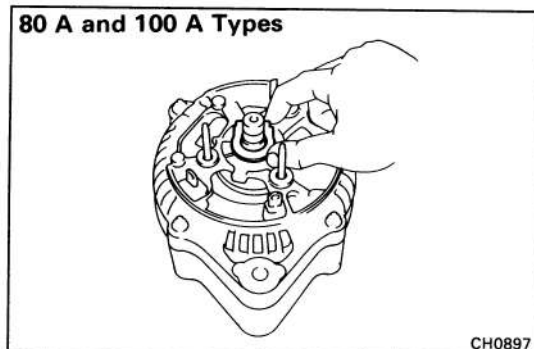
- To torque the pulley nut turn SST (A) in the direction shown in the figure.

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

- Remove the alternator from SST (C).

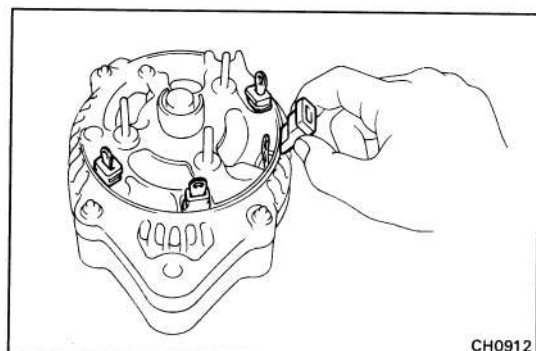
- Turn SST (B) and remove SST (A and B).

80 A and 100 A Types

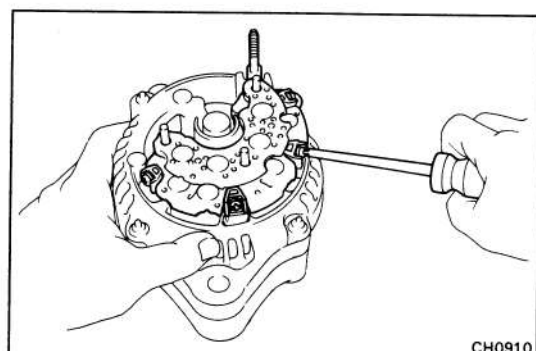


4. INSTALL RECTIFIER HOLDER

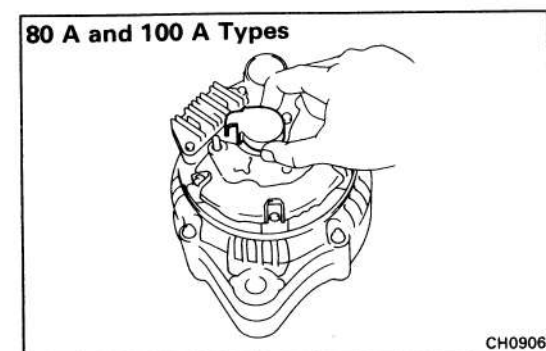
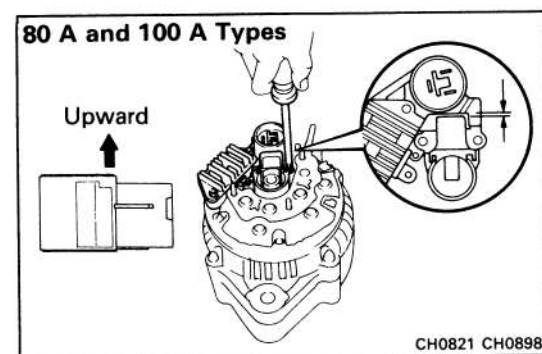
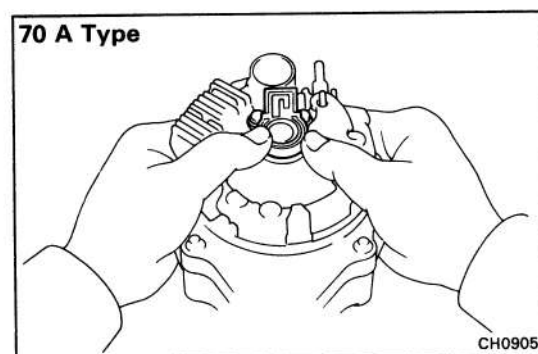
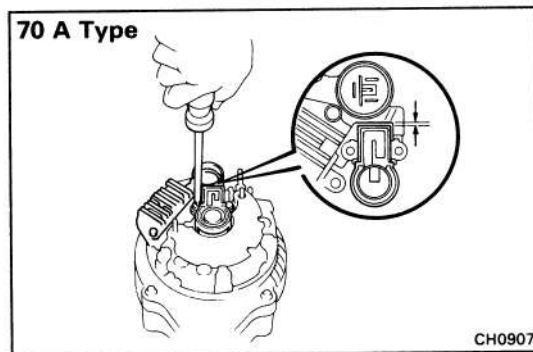
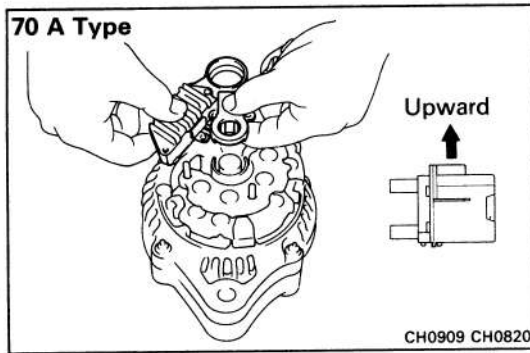
- (80 A and 100 A Types)
Place the seal plate on the rectifier end frame.



- Install the four rubber insulators on the lead wires.



- Install the rectifier holder with the four screws.



5. INSTALL IC REGULATOR AND BRUSH HOLDER (70 A Type)

- (a) Install the brush holder cover to the brush holder.
NOTICE: Be careful about the holder installation direction.

- (b) Place the IC regulator together with the brush holder horizontally on the rectifier end frame.

- (c) Install the five screws until there is a clearance of approx. 1 mm (0.04 in.) between the brush holder and connector.

- (d) Fit the brush holder cover.

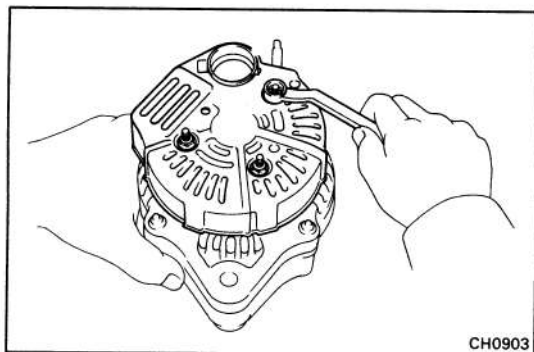
(80 A and 100 A Types)

- (a) Place the IC regulator together and brush holder on the rectifier end frame.

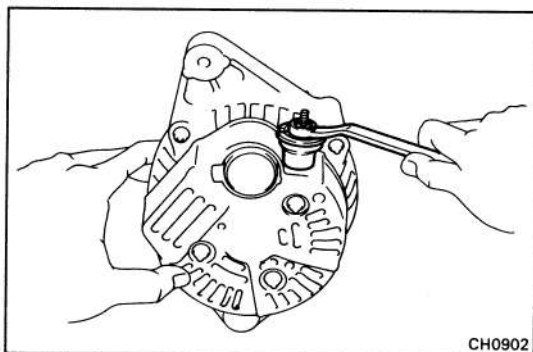
NOTICE: Be careful about the holder installation direction.

- (b) Install the five screws until there is a clearance of approx. 1 mm (0.04 in.) between the brush holder and connector.

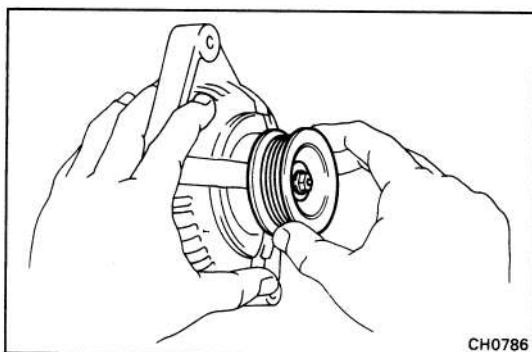
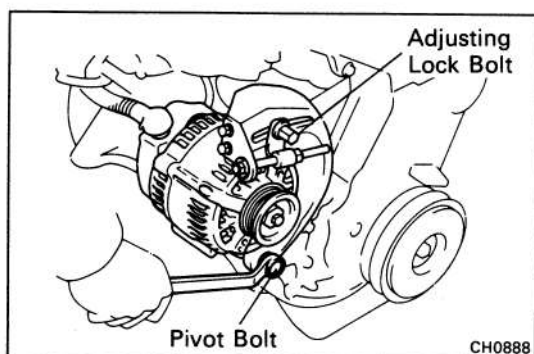
- (c) Place the brush holder cover on the brush holder.

**6. INSTALL REAR END COVER**

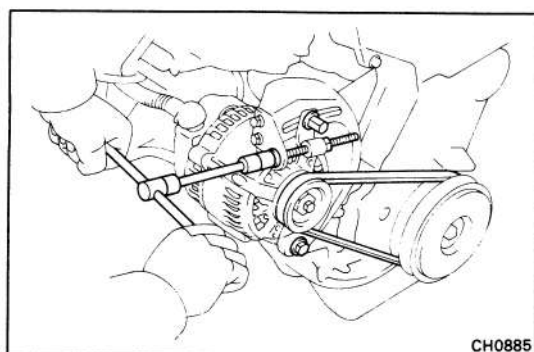
- (a) Install the end cover with the three nuts.



- (b) Install the terminal insulator with the nut.

**7. CHECK THAT ROTOR ROTATES SMOOTHLY****INSTALLATION OF ALTERNATOR****1. INSTALL ALTERNATOR**

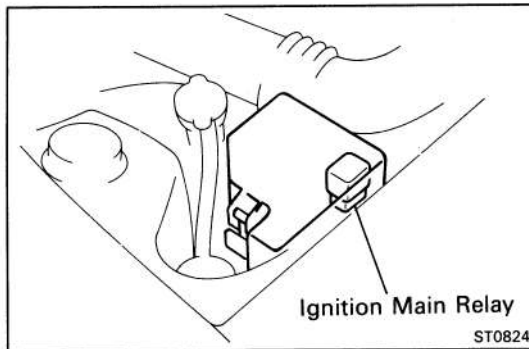
- (a) Mount the alternator on the alternator brackets with the pivot bolt and adjusting lock bolt. Do not tighten the bolts yet.
- (b) Connect the alternator connector.
- (c) Connect the alternator wire with the nut.

**2. INSTALL DRIVE BELT**

Adjust the drive belt tension.
(See step 3 on page CH-3)

Drive belt tension: New belt 120 ± 20 lb
 Used belt 104 ± 20 lb

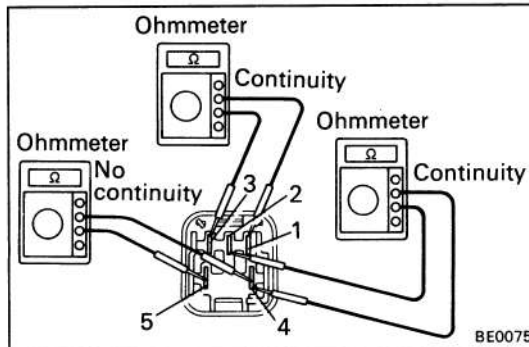
3. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**4. PERFORM ON-VEHICLE INSPECTION**
(See steps 5 to 7 on pages CH-4 and 5)



IGNITION MAIN RELAY "IGN"

INSPECTION OF IGNITION MAIN RELAY

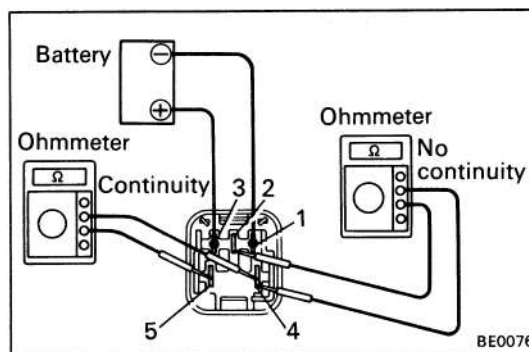
LOCATION: In the engine compartment relay box.



1. INSPECT RELAY CONTINUITY

- Using an ohmmeter, check that there is continuity between terminals 1 and 3.
- Check that there is continuity between terminals 2 and 4.
- Check that there is no continuity between terminals 4 and 5.

If continuity is not as specified, replace the relay.



2. INSPECT RELAY OPERATION

- Apply battery voltage across terminals 1 and 3.
- Using an ohmmeter, check that there is no continuity between terminals 2 and 4.
- Check that there is continuity between terminals 4 and 5.

If operation is not as specified, replace the relay.