
DAIHATSU

G202

CB-Engine

CHARGING SYSTEM

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G2CH00001-00000

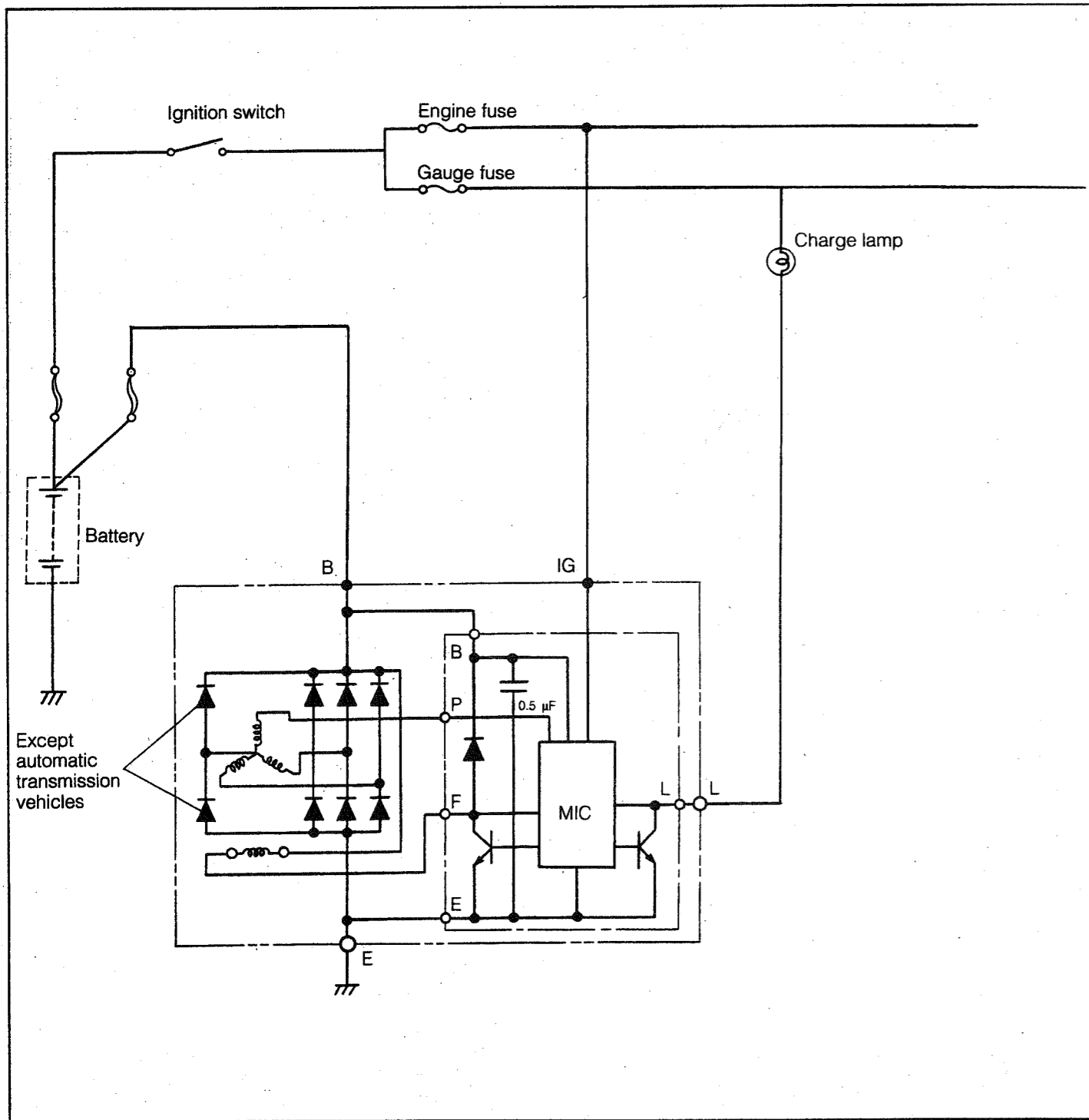
CH

PRECAUTIONS

1. Prior to the inspection, make sure that the battery cables are connected securely.
2. When a quick charging operation is carried out, first be sure to disconnect the battery cables.
3. Never use a high-voltage insulation resistance tester for the purpose of conducting this inspection.
4. Under no circumstances should the battery cables be disconnected while the engine is rotating.

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CHARGING SYSTEM CIRCUIT



G2CH00003-99999

1. Inspection of the battery

WARNING:

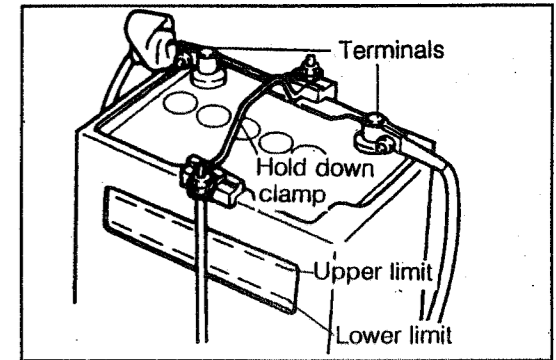
- Never touch at the battery terminals immediately after the engine is stopped.
- Be certain to turn OFF the ignition key switch during the inspection.

(1) Check the battery terminal case for proper installing condition and cracks. If battery case exhibits improper installing condition or cracks, replace or repair the battery, as required.

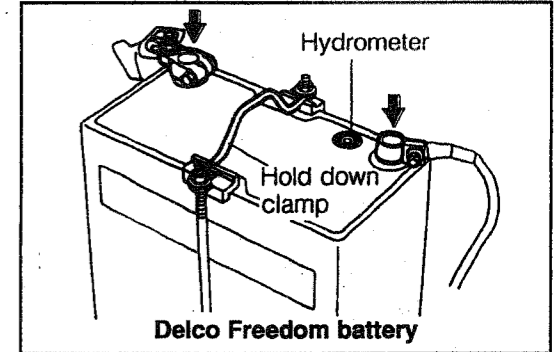
(2) Check to see if the battery terminals exhibit corrosion and loose connection. If the battery terminal exhibit corrosion and loose condition, disconnect the battery cable terminal which connected to the battery terminals. Remove the any rust, using a wire brush or a fine abrasive paper. After the battery cable terminals have been connected, coat these terminal with a thin film of lithium grease.

CAUTION:

- After the battery terminals have been cleaned, make sure that no rust particle remains on the terminals.
- Do not shorten the terminals of the battery with tools of metal objects. If the battery terminals are shorted, it will cause the battery to overheat and can cause damage or explosion.



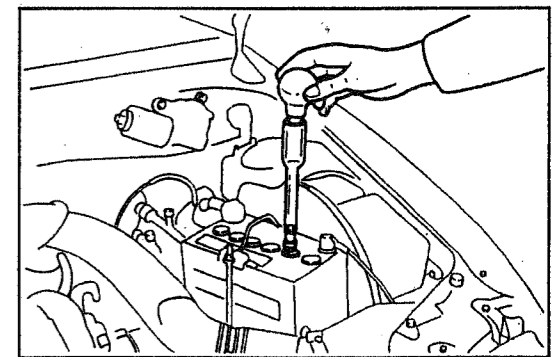
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(3) Check of specific gravity of battery electrolyte (Except Delco Freedom Battery) Measure the specific gravity of the electrolyte of each cell, using a hydrometer. Ensure that the specific gravity is within the specified value.

Standard Specific Gravity: 1.25 or more
When fully charged at 20°C (68°F)



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If the specific gravity is not within the specified value, check the electrolyte level and replenish distilled water. Then, charge the battery until the specific gravity reaches the specified value.

<Reference>

$$\text{Specific gravity at standard temperature} = \text{Measured specific gravity} + 0.0007 \times \left(\text{Electrolyte temperature at time of measurement } ^\circ\text{C} - 20 \right)$$

CAUTION:

- Utmost care must be exercised as to the handling of electrolyte. Be careful not to allow the electrolyte to touch to your skin, clothes or any parts of the vehicle.

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(4) Inspection of battery electrolyte level
(Except Delco Freedom Battery)

Ensure that the battery electrolyte level is in the upper limit level.
If the battery electrolyte level of any cell is not at the upper limit level, replenish distilled water to the upper limit level.

WARNING:

- Tighten the battery vent caps securely after adding distilled water. Otherwise the battery electrolyte may be splashed out and damage your vehicle or even cause serious bodily injury.
- Battery contains sulfuric acid which is poisonous and corrosive. Therefore, be careful not to splash battery fluid on yourself or clothes and wash the part immediately if it happen. Furthermore, wear protective safety glasses to protect the eyes.
- If you have swallowed battery fluid, drink as much water or milk as possible and immediately see a doctor.
- Keep fire away from the battery. It could cause battery explosion.
- Keep children away from the battery.

CAUTION:

- Wash splashed battery fluid away from paint finish immediately.

NOTE:

- Never add city tap water or sulfuric acid, etc. instead of distilled water.
- If the electrolyte level of each battery cell differs greatly, it is advisable to inspect to see if any electrolyte leakage is present.

(5) Check battery specific gravity and electrolyte level.
(For Delco Freedom Battery)

Check battery specific gravity and electrolyte level by the color of the hydrometer.

Green Dot is Visible:

The battery is adequately charged.

Dark (The Green Dot is Invisible.):

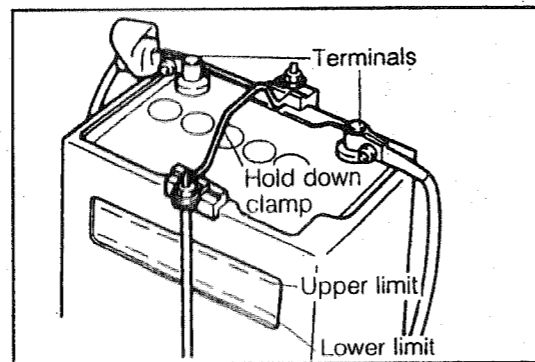
The battery must be charged.

Clear of Light Yellow:

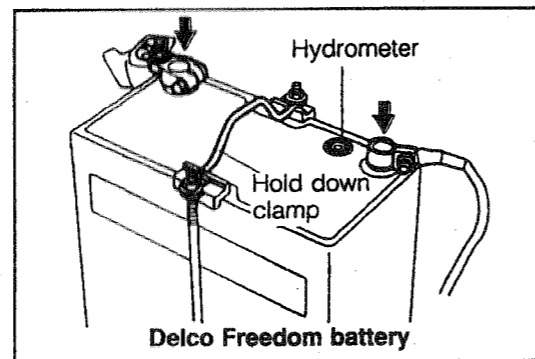
Replace the battery.

NOTE:

- On the Delco Freedom Battery, it is impossible to add the electrolyte, for it is permanently sealed.
- If the battery is required the charging, be sure to consult with the agent of Delco Freedom Battery for correct charging procedure.



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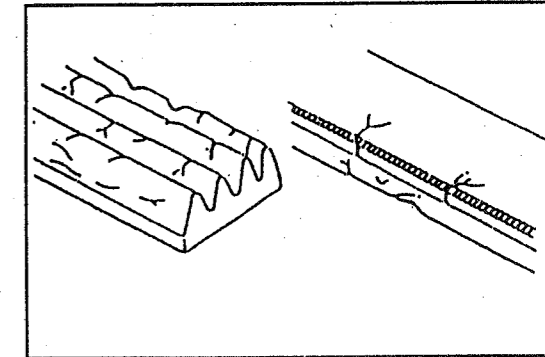
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2. Inspection of drive belt

(1) Visual inspection of the drive belt

Visually check the belt for separation of the adhesive rubber above and below the core, core separation from the belt side, severed core, separation of the rib from the adhesive rubber, cracks or separation of the ribs, torn or ribs or cracks in the inner ridges of the ribs. Replace the drive belt, if necessary.



G2CH00010-99999

(2) Inspection of the drive belt tension

Measure the amount of the drive belt deflection when the midpoint of the drive belt between the alternator and the water pump pulley is pushed with a force of 98 N (10 kgf, 22 lb).

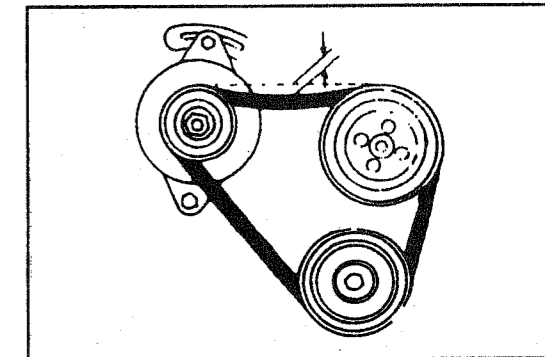
Specified Belt Deflection

New Belt: 5 - 7 mm (0.197 - 0.276 inch)

[With a force of 10 kgf (22 lb) applied at the point shown in the figure.]

Used Belt: 7.5 - 9.5 mm (0.295 - 0.374 inch)

[With a force of 10 kgf (22 lb) applied at the point shown in the figure.]



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If necessary, adjust the drive belt tension.

NOTE:

- "New belt" refers to a belt which has been used on a running engine for less than five minutes.
- "Used belt" refers to a belt which has been used on a running engine for more than five minutes or more.
- After replacing the drive belt, check that it fits properly in the ribbed grooves, especially in the places difficult to see.
- After installing a new belt, run the engine for about five minutes and then recheck the tension.

(3) Adjustment of drive belt tension

- ① Ensure that the ignition switch turned OFF.
- ② Slacken the alternator attaching bolts.

NOTE:

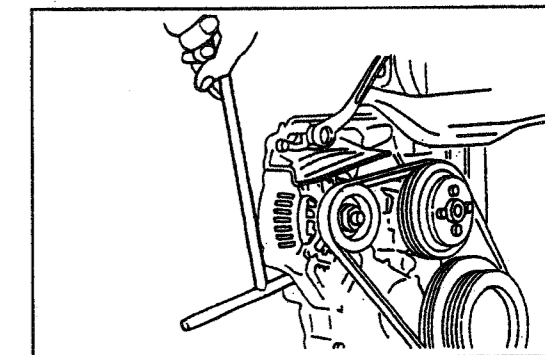
- Slacken the attaching bolts only for alternator moves.

- ③ Apply the specified tension to the alternator drive belt, using a T-shaped wrench or the like.

NOTE:

- As for the specification refer to the step (2).

- ④ Tighten the alternator attaching bolts.



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3. Check of fuses for continuity
 - Fusible link
 - Engine fuse
 - Gauge fuse
4. Checking alternator wiring and listening for abnormal noises
 - (1) Check to see if the alternator wire is connected properly to the alternator.
 - (2) Ensure that the alternator emits no abnormal noise while the engine is running.

5. Check of charge warning lamp circuit
 - (1) Turn OFF all accessory switches.
 - (2) Start the engine and warm up the engine thoroughly. Turn OFF the ignition switch.
 - (3) When the ignition switch is turned ON, ensure that the charge warning lamp goes on.
 - (4) After the engine has started, ensure that the charge warning lamp goes out. If the warning lamp does not function as specified, troubleshoot the warning lamp circuit.

6. Check of charging circuit under no-loaded state

NOTE:

- If a battery/alternator tester is available, connect such tester to the charging circuit according to the manufacturer's instructions.

- (1) If such a tester is not available, connect a voltmeter and an ammeter to the alternator wiring and alternator as follows:

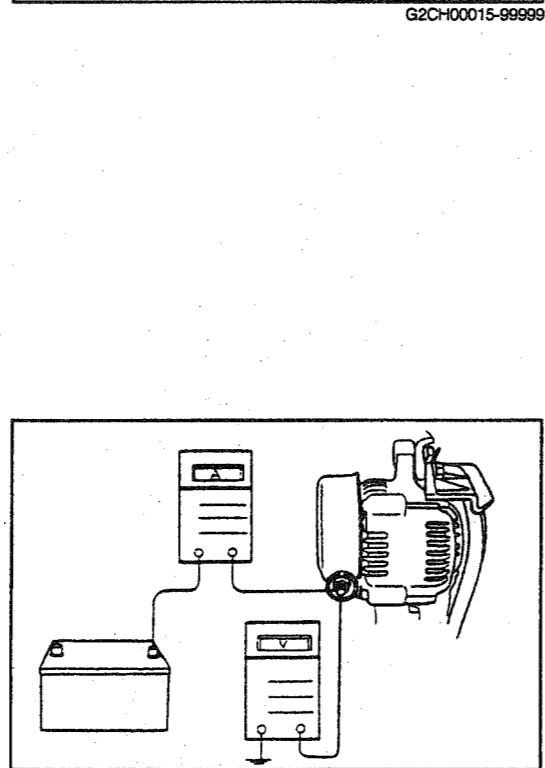
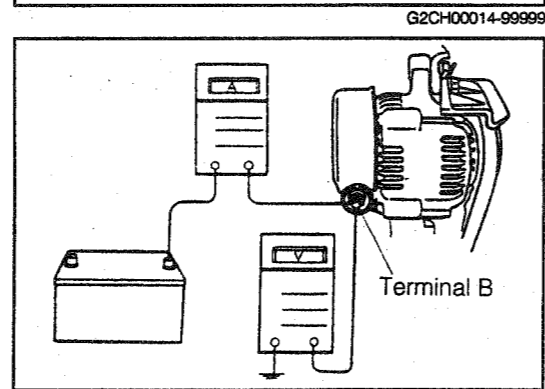
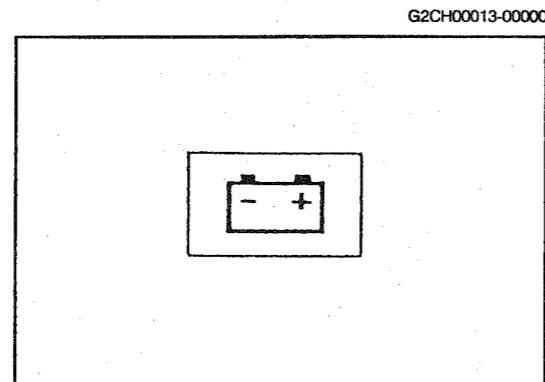
- Disconnect the battery ground cable from the negative (-) terminal of the battery.
- Connect an ammeter in series between the alternator wire terminal B and the alternator as indicated in the right figure.
- Connect the positive (+) terminal of a voltmeter to the terminal B as indicated in the right figure.
- Connect the negative (-) terminal of the voltmeter to the engine ground.
- Wind vinyl tape around each connection section so as to prevent short.
- Reconnect the battery ground cable to the negative (-) terminal of the battery.

- (2) Check the charging circuit as follows:

- ① Start the engine and warm it up.
- ② Raise the engine speed from the idle speed to 2000 rpm. Take the readings of the ammeter and voltmeter.

Standard Amperage: Not to exceed 10 A
Standard Voltage: 13.5 - 15.1 V

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



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If the voltage reading is less than the standard voltage, ground the terminal F as indicated in the right figure. Proceed to start the engine.

If the voltage reading becomes greater than the standard voltage under this setting, replace the IC regulator.

If the voltage reading is still less than the standard voltage under this setting, check the alternator.

7. Check of charging circuit under loaded state

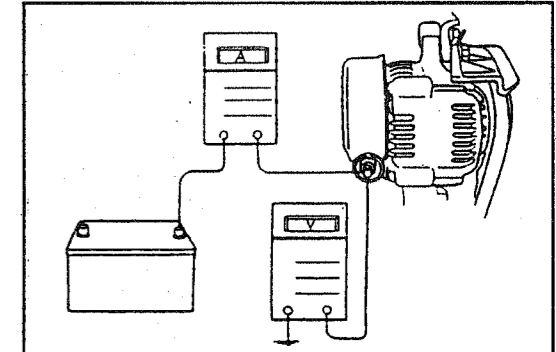
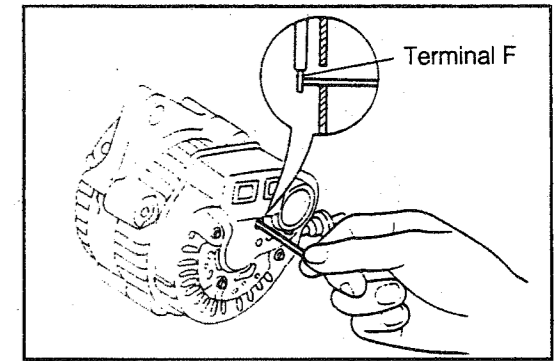
- (1) Start the engine. Maintain the engine speed at 2000 rpm. Turn ON the high beams of the headlamps and set the blower fan motor switch to the Hi position. Take the reading of the ammeter.

Standard Amperage: 30 A or more

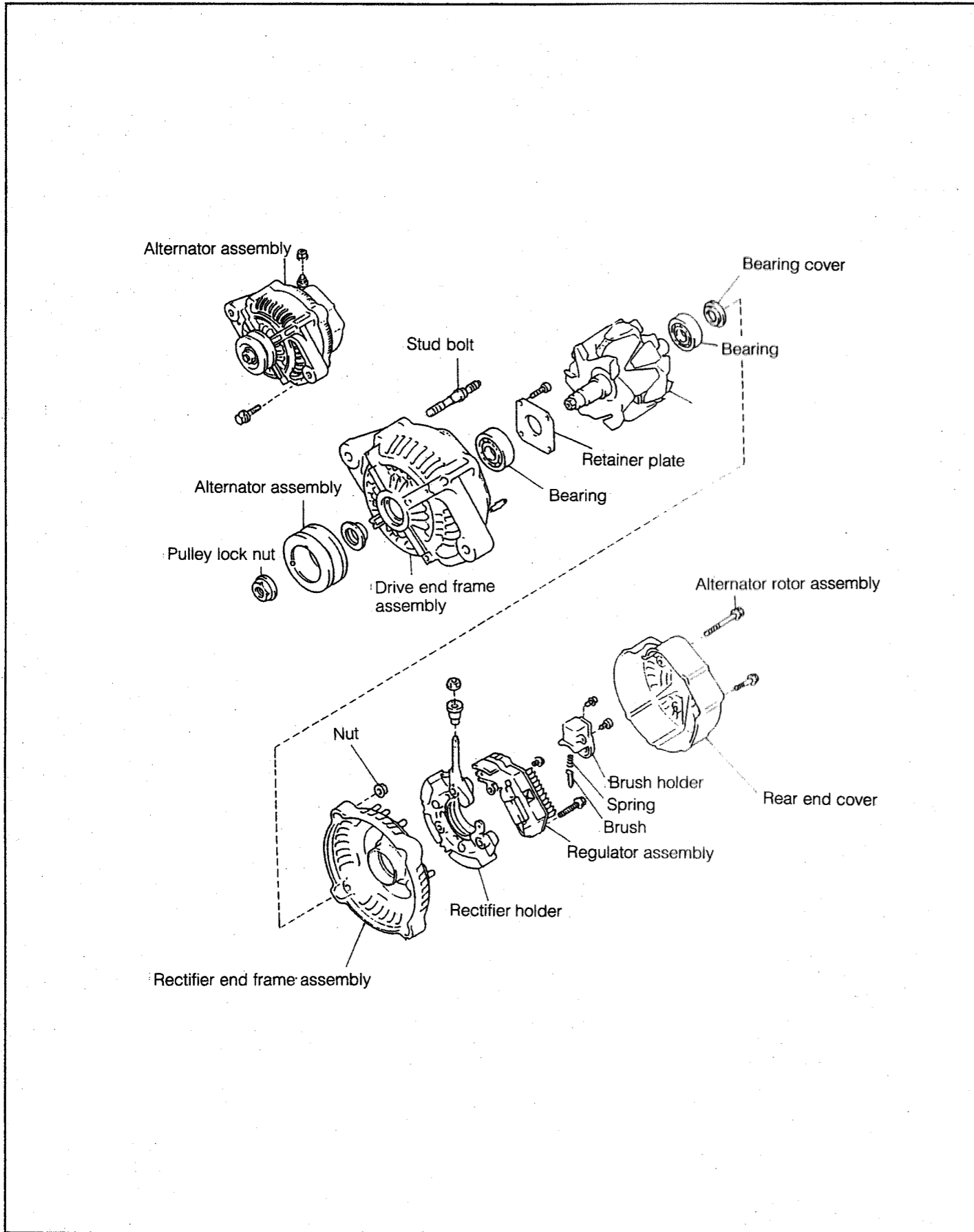
If the ammeter reading is less than 30 A, repair the alternator. (See page CH-9.)

NOTE:

- When the battery is in a fully charged state, the ammeter reading may be less than 30 A during the aforesaid test.



ALTERNATOR COMPONENTS



REMOVAL OF ALTERNATOR

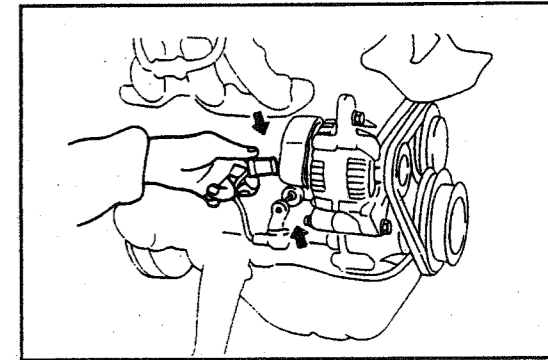
1. Disconnect the ground cable terminal from the negative terminal of the battery.
2. Remove the generator cap.
3. Disconnect the terminal B of the alternator wire from the alternator.
4. Disconnect the alternator connector of the alternator wire from the alternator.

NOTE:

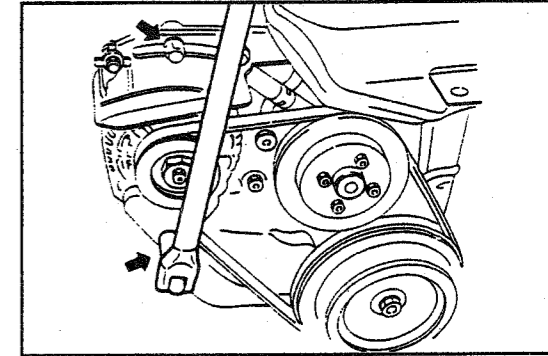
- Be sure to disengage the lock of the connector before disconnection.

5. Removal of alternator drive belt
 - (1) Remove the air conditioner drive belt.
 - (2) Remove the upper attaching bolt of alternator.

- (3) Remove the lower attaching bolt of the alternator.
- (4) Take out the alternator from the vehicle.



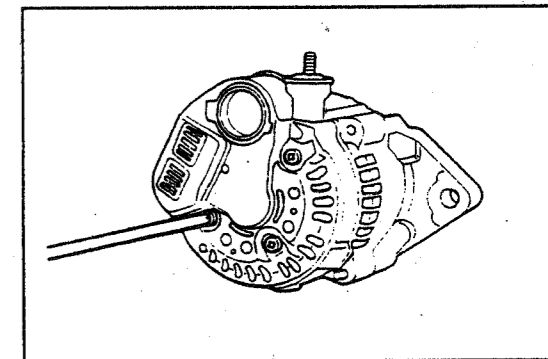
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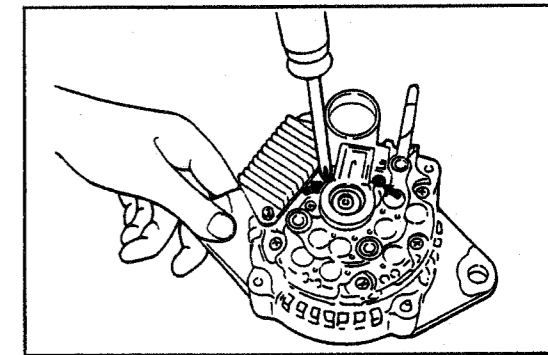
DISASSEMBLY OF ALTERNATOR

1. Removal of rear end cover
 - (1) Remove the nut and terminal insulator.
 - (2) Remove the three nuts and cover.



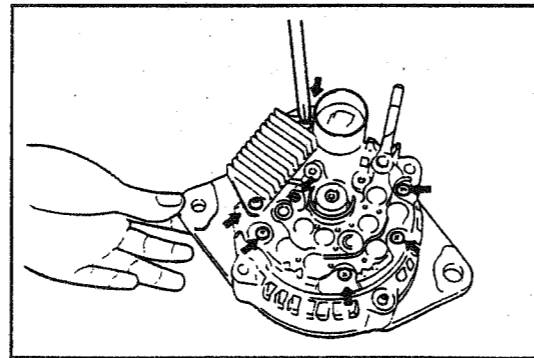
G2CH00023-99999

2. Remove the brush holder.



G2CH00024-99999

3. Remove the rectifier holder and regulator assembly.

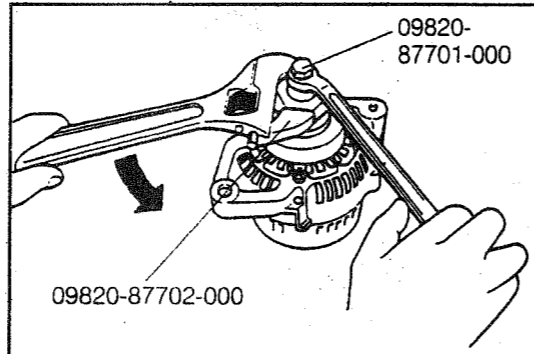


G2CH00025-99999

4. Removal of pulley

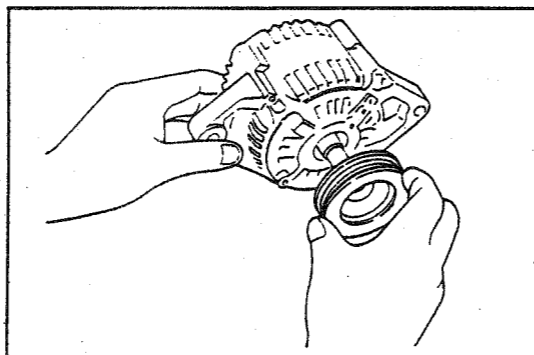
(1) With the SST installed in place, loosen the lock nut while the rotor shaft is held stationary.

SST: 09820-87701-000
09820-87702-000



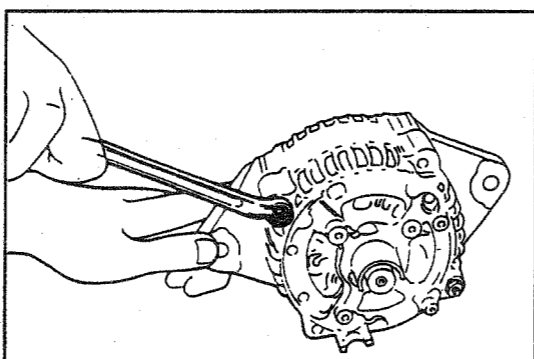
G2CH00026-99999

(2) Remove the lock nut and pulley.



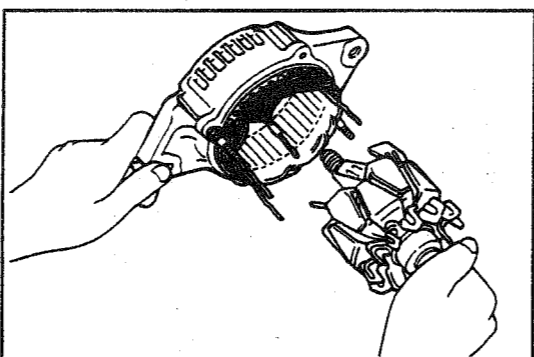
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5. Remove the rectifier end frame assembly.



G2CH00028-99999

6. Remove the rotor from the drive end frame assembly.



G2CH00029-99999

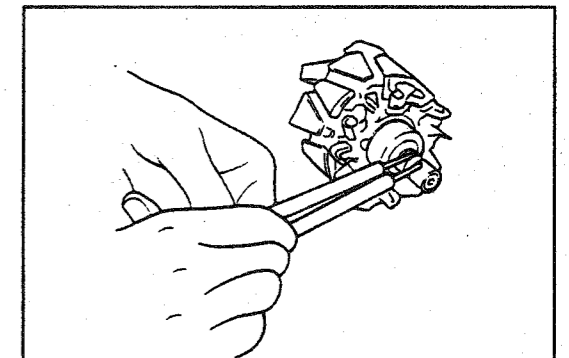
INSPECTION OF ALTERNATOR

Rotor

1. Inspection of rotor for open circuit
Using an ohmmeter, check to see if continuity exists between the rotor slip rings.

Standard Resistance: Not to exceed 3Ω

If continuity exists, replace the rotor.

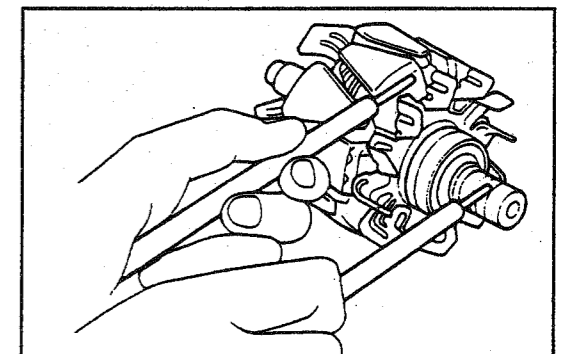


G2CH00030-99999

2. Inspection of rotor for ground

Ensure that no continuity exists between the rotor slip rings and the rotor core.

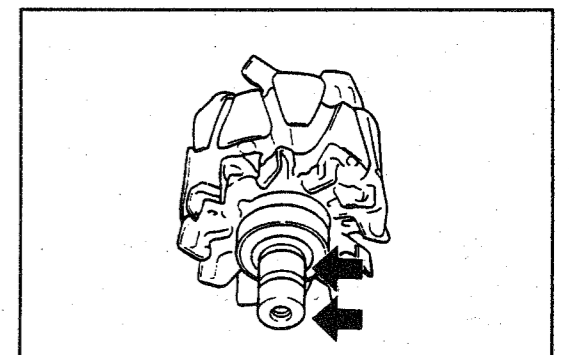
If continuity exists, replace the rotor.



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3. Inspection of slip rings

(1) Check to see if the slip ring surface exhibits roughness, abnormal wear and/or burning. Replace the rotor, if necessary.



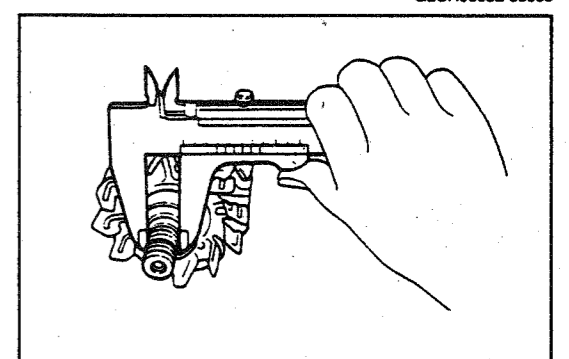
G2CH00032-99999

(2) Measure the outer diameter of the slip ring, using vernier calipers.

Standard Diameter: 14.4 mm (0.567 inch)

Minimum Diameter: 14 mm (0.551 inch)

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



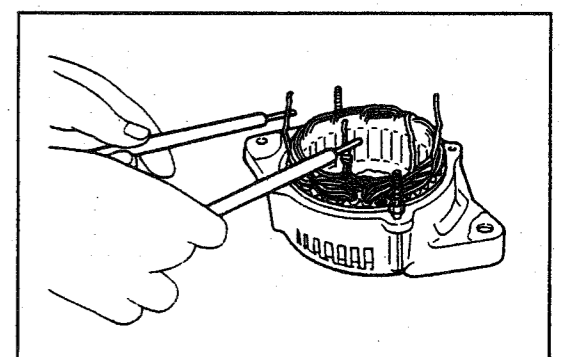
G2CH00033-99999

Stator

1. Inspection of stator for open circuit

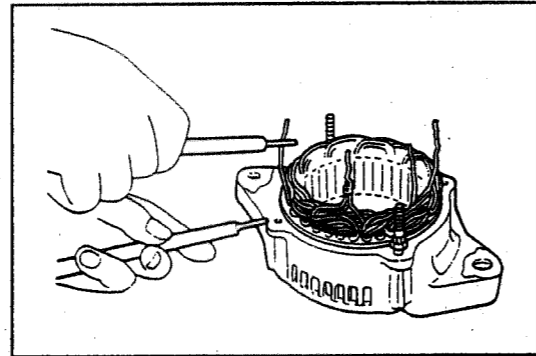
Using an ohmmeter, check to see if any open circuit of the stator coil is present between the leads.

If no continuity exists, replace the end frame assembly.



G2CH00034-99999

2. Inspection of stator for short circuit
Using an ohmmeter, check to see if any short circuit of the stator coil is present between the coil lead and the drive end frame.
If continuity exists, replace the drive end frame assembly.

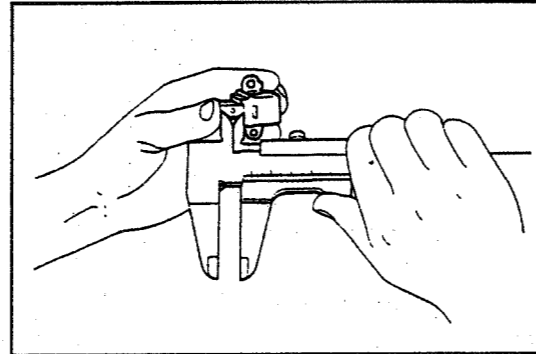


G2CH00035-99999

Brush and brush holder

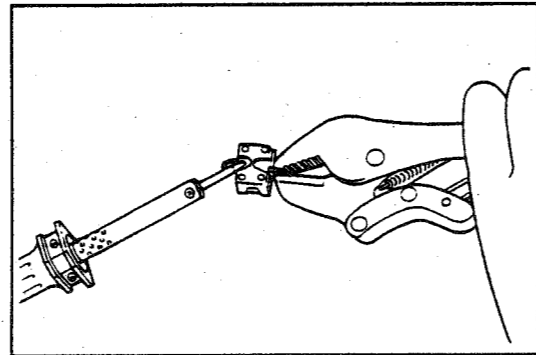
1. Measurement of exposed brush length
Measure the of exposed brush length, using a scale.
Standard Exposed Length: 10.5 mm (0.413 inch)
Minimum Exposed Length: 1.5 mm (0.059 inch)

If the exposed length is less than the minimum requirement, replace the brushes.



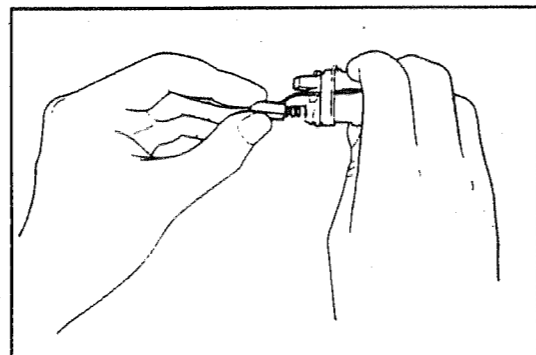
G2CH00036-99999

2. Replacement of brushes (If necessary)
 - (1) Remove the brush and spring from the brush holder by melting the solder by means of a soldering iron.



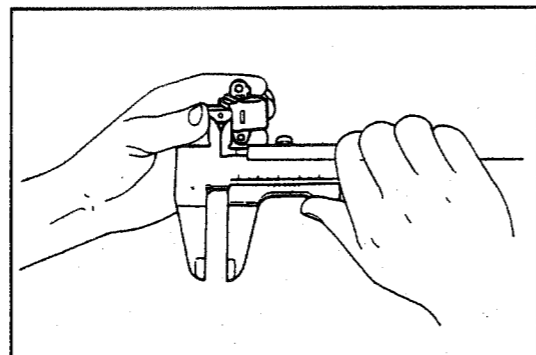
G2CH00037-99999

- (2) Install the brush cord in the brush holder with the spring fitted in place.



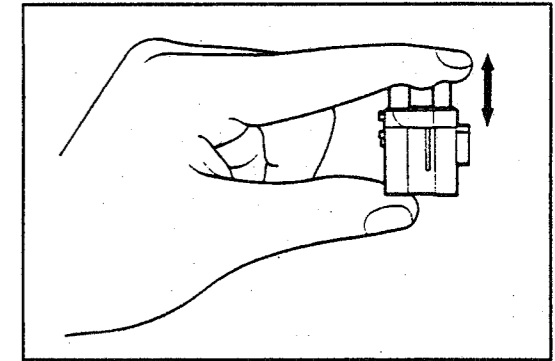
G2CH00038-99999

- (3) Solder the brush cord in the brush holder in such a way that the exposed length of the brush meets the specification.
Standard Exposed Length: 10.5 mm (0.413 inch)



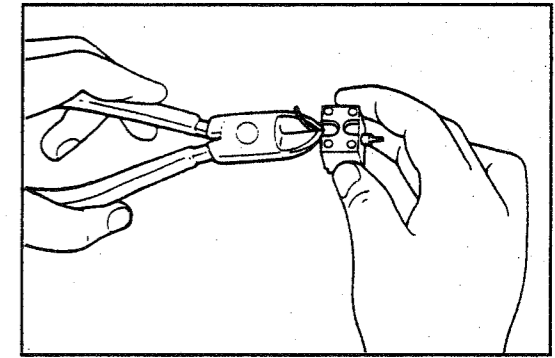
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- (4) Ensure that the brush moves freely in the brush holder.



G2CH00040-99999

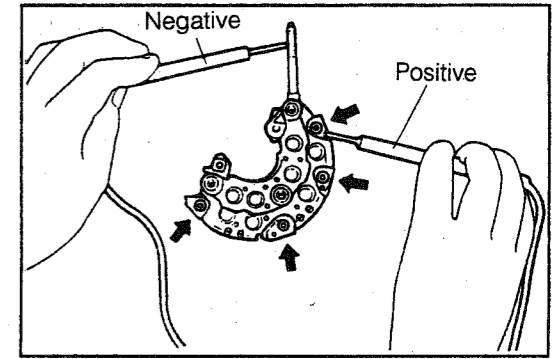
- (5) Cut off any excess remaining wire and apply an insulation paint.



G2CH00041-99999

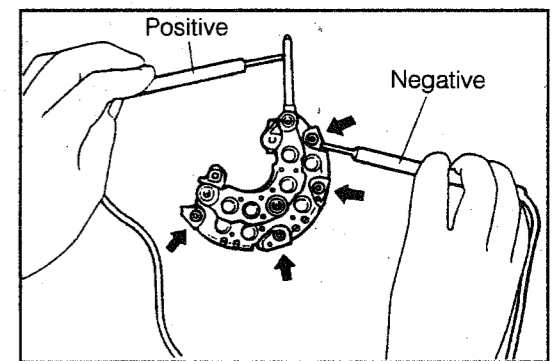
Rectifier

1. Inspection of rectifier at positive side
 - (1) Ensure that continuity exists between the positive stud bolt of the rectifier holder and the rectifier terminal by connecting an ohmmeter as indicated in the right figure.
If no continuity exists, replace the rectifier holder.



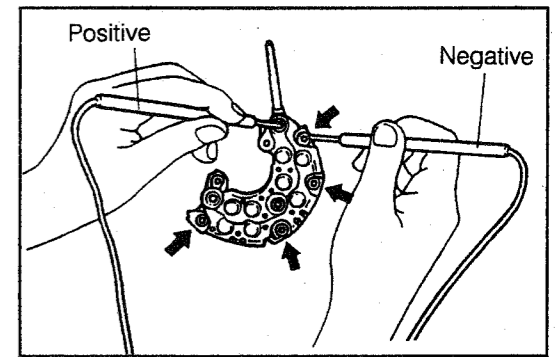
G2CH00042-99999

- (2) Ensure that no continuity exists between the positive stud bolt of the rectifier holder and the rectifier terminal by connecting an ohmmeter as indicated in the right figure.
If continuity exists, replace the rectifier holder.



G2CH00043-99999

2. Inspection of rectifier at negative side
 - (1) Ensure that continuity exists between each of the negative terminals of the rectifier holder and each rectifier terminal by connecting an ohmmeter as indicated in the right figure.



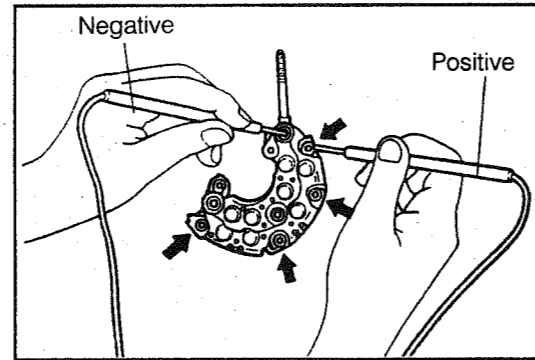
G2CH00044-99999

If no continuity exists, replace the rectifier holder.

REFERENCE:

Resistance about 900 kΩ

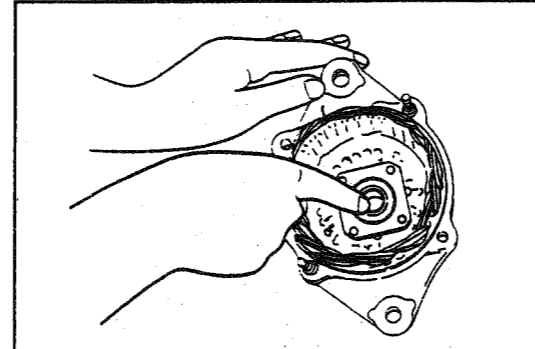
- (2) Ensure that no continuity exists between each of the negative terminals of the rectifier holder and each rectifier terminal by connecting an ohmmeter as indicated in the right figure.
If continuity exists, replace the rectifier holder.



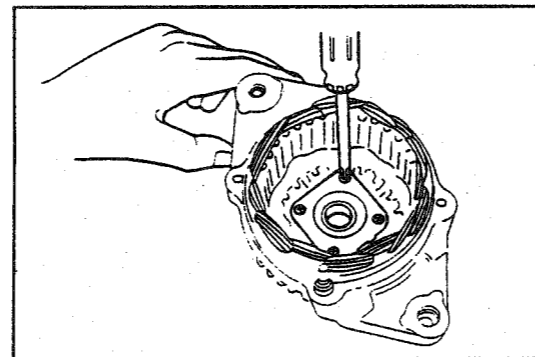
G2CH00045-99999

Bearings

1. Inspection of front bearing
Ensure that the bearing turns smoothly.
Replace the bearing, if necessary.
2. Replacement of front bearing (If necessary)
 - (1) Remove the four screws and retainer plate.

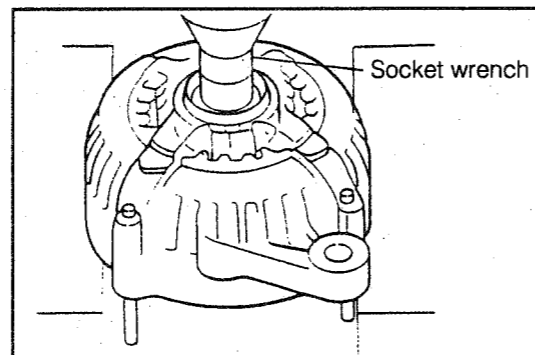


G2CH00046-99999



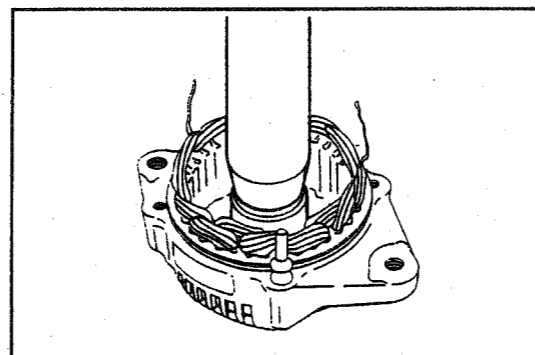
G2CH00047-99999

- (2) Remove the front bearing from the drive end frame, using a socket wrench in conjunction with a press.



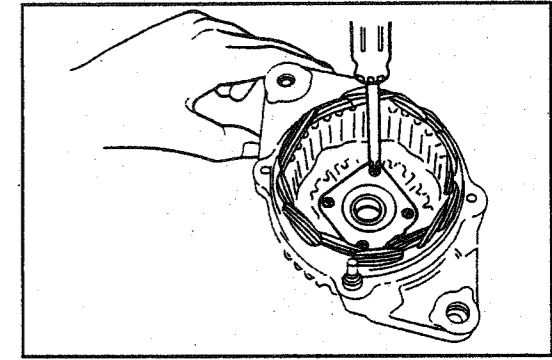
G2CH00048-99999

- (3) Press the new front bearing into the drive end frame, using suitable socket wrench.



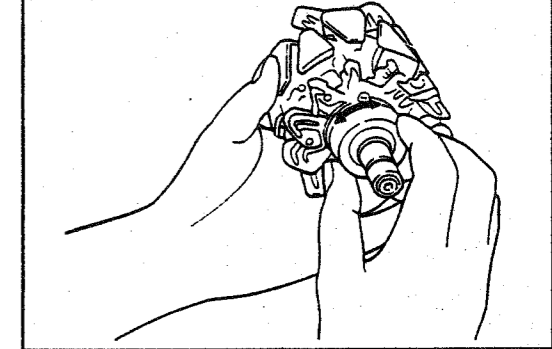
G2CH00049-99999

- (4) Attach the retainer plate to the drive end frame with the four screws.



G2CH00050-99999

3. Inspection of rear bearing
Ensure that the bearing turns smoothly.
Replace the bearing, if necessary.

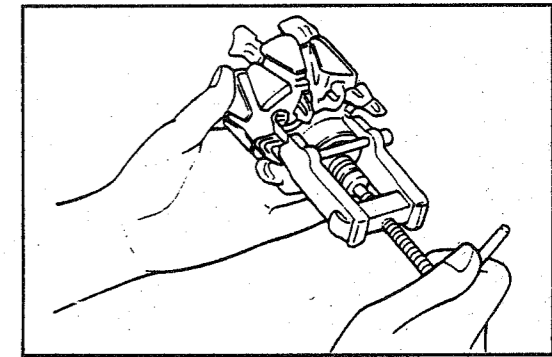


G2CH00051-99999

4. Replacement of rear bearing (If necessary)
 - (1) Remove the rear bearing and bearing cover from the rotor, using the armature bearing puller.

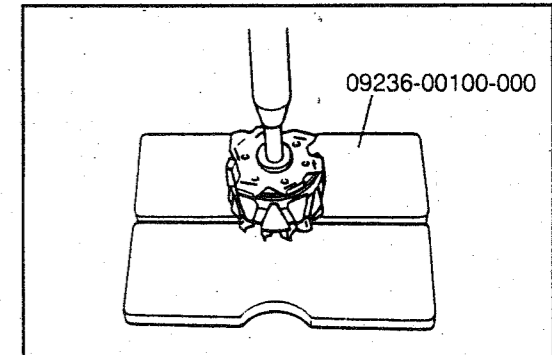
NOTE:

 - Be very careful not to damage the fan during the removal.



G2CH00052-99999

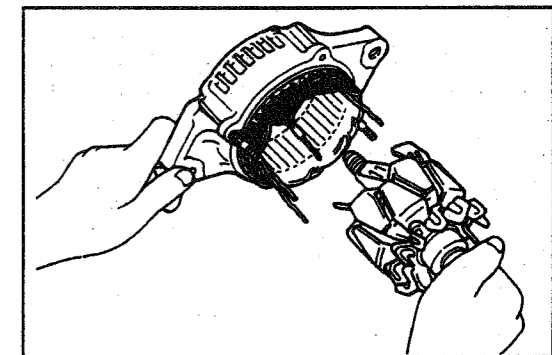
- (2) Press a new rear bearing and bearing cover, using a hydraulic press in combination with the following SST.
SST: 09236-00100-000



G2CH00053-99999

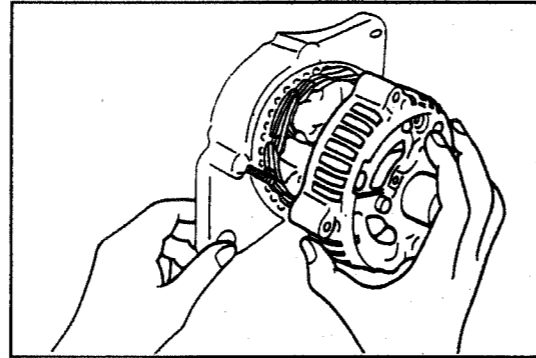
ASSEMBLY OF ALTERNATOR

1. Install the rotor in the drive end frame assembly.

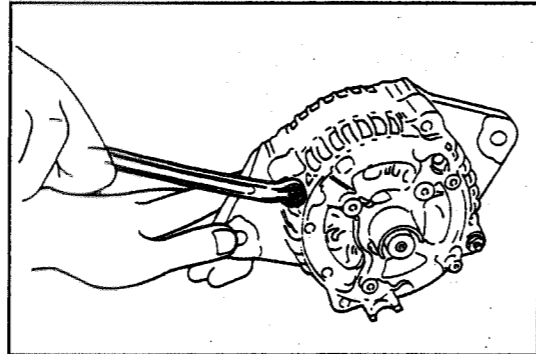


G2CH00054-99999

2. Installation of rectifier end frame on drive end frame
 Install the rectifier end frame on the drive end frame with the two bolts and two nuts.
 Be very careful not to damage the coil cord during the installation.

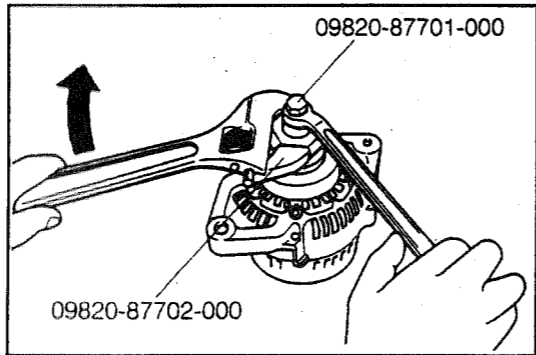


G2CH00055-99999



G2CH00000-99999

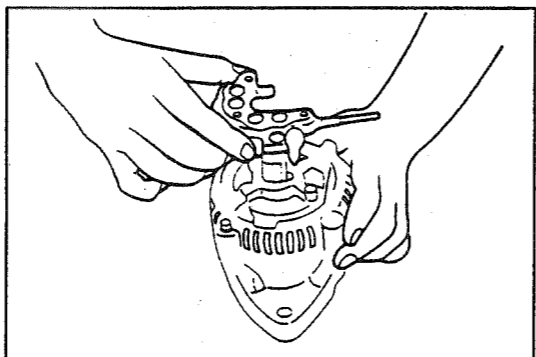
3. Installation of pulley
 Install the pulley on the rotor shaft. Tighten the lock nut, using the SST.
 SST: 09820-87701-000
 09820-87702-000
 Tightening Torque: 93.2 - 127.4 N·m
 (9.5 - 13.0 kgf·m, 68.7 - 94.0 ft·lb)



09820-87702-000

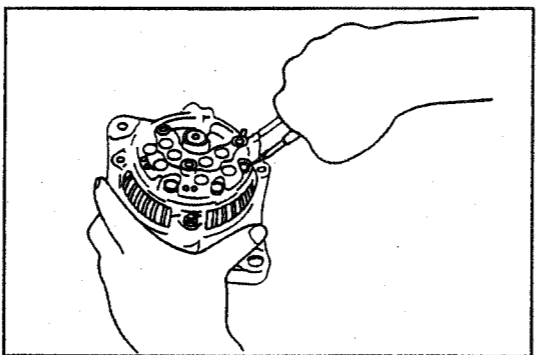
G2CH00056-99999

4. Installation of rectifier holder, regulator assembly and brush holder
 (1) Attach the rectifier holder to the end frame with the coil wires passed through the aperture of the rectifier holder.



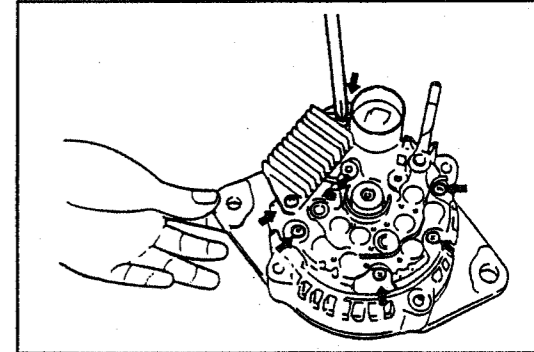
G2CH00057-99999

- (2) Wind the coil wire around the installing section of the rectifier attaching bolt.



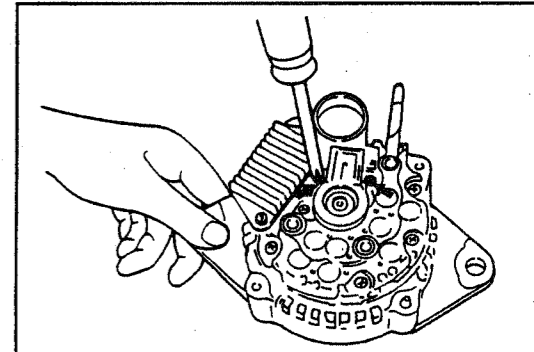
G2CH00058-99999

- (3) Install the regulator assembly and rectifier holder.
 Secure them with the attaching screws.



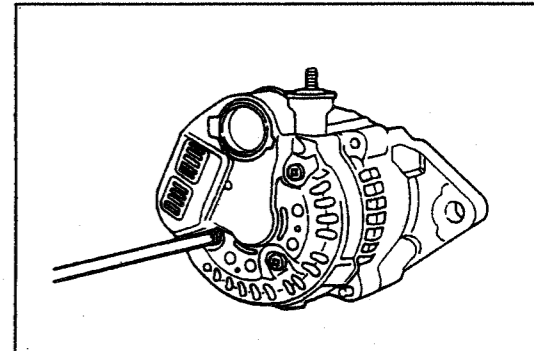
G2CH00059-99999

- (4) Install the brush holder in such a way that a gap of at least 1 mm (0.04 inch) is provided between the brush holder and the regulator assembly. Secure the brush holder with the two screws.



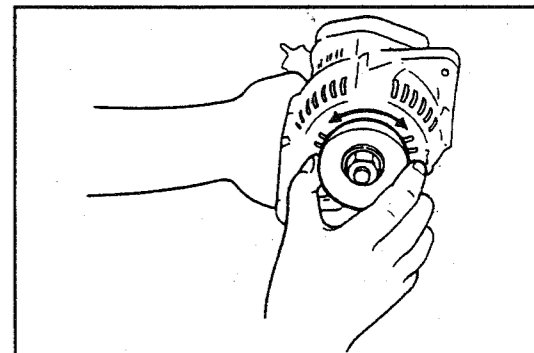
G2CH00060-99999

5. Installation of rear end cover
 (1) Install the rear end cover with the three nuts.
 (2) Install the terminal insulator and tighten it with the nut.



G2CH00061-99999

6. Ensure that the rotor turns smoothly.



G2CH00062-99999

INSTALLATION OF ALTERNATOR

1. Install the alternator to the alternator bracket temporarily with the attaching bolt.
2. Install the upper attaching bolt of the alternator temporarily.
3. Installation of alternator drive belt
 Install the alternator drive belt to the engine properly.

CAUTION:

- Make sure that the alternator drive belt is properly engaged in the groove of each pulley.



Correct

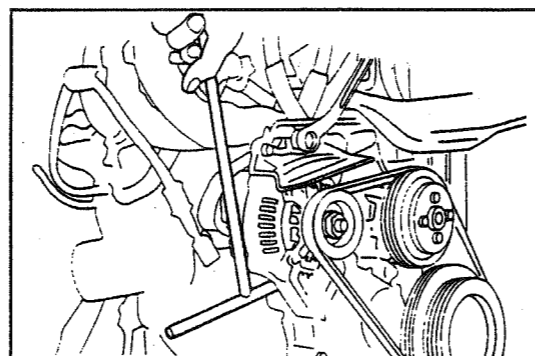
Wrong

Wrong

G2CH00063-99999

4. Tension adjustment of drive belt

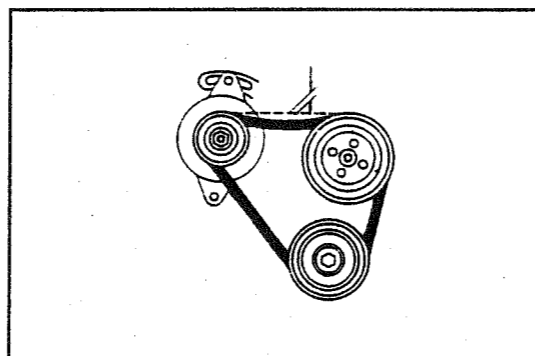
Adjust the belt tension in such a way that the deflection of the drive belt meets the specification when you push the midpoint of the drive belt between the alternator pulley and the water pump pulley by applying a force of 10 kgf (22 lb).



G2CH00064-99999

Specified Belt Deflection

- New Belt: 5 - 7 mm (0.197 - 0.276 inch)
[With a pressed force of 10 kgf (22 lb) applied to a point indicated in figure]
- Used Belt: 7.5 - 9.5 mm (0.295 - 0.374 inch)
[With a pressed force of 10 kgf (22 lb) applied to a point indicated in figure]



G2CH00065-99999

NOTE:

- "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 5 minutes or more.
- If belt replaced with new one, run the engine for about 5 minutes and then recheck the tension.

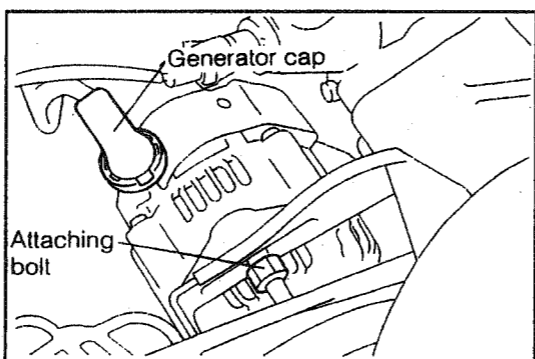
5. Tighten the alternator attaching bolts to the specified torque.

Tightening Torque: 34.3 - 54.9 N-m
(3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)

6. Connect the alternator connector of the alternator wire to the alternator.

NOTE:

- Make sure that the lock of the connector is locked properly after connection.



G2CH00066-99999

7. Connect the terminal B of the alternator wire to the alternator with the attaching nut.
8. Install the generator cap.
9. Reconnect the ground cable terminal to the negative terminal of the battery.
10. Perform the in-vehicle inspection.
11. Install the air conditioner drive belt.

SSTs

Shape	Part number and Part name	Purpose	Remarks
	09236-00100-000 Water pump overhaul tool	Installation of rear bearing	
	09820-87701-000 Alternator rotor shaft wrench	Removal and installation of alternator pulley	
	09820-87702-000 Alternator pulley set nut wrench	Removal and installation of alternator pulley	

G2CH00067-99999

SERVICE SPECIFICATIONS

Battery specific gravity (Except Delco Freedom battery)	1.25 - 1.27	
Rated output	Amperage	50A
Rotor coil resistance	Resistance	2.9 0.2 ohm at 20°C (68°F)
Slip ring diameter	Standard	14.4 mm (0.57 inch)
	Minimum	14.0 mm (0.55 inch)
Brush exploded length	Standard	10.5 mm (0.41 inch)
	Minimum	1.5 mm (0.06 inch)
IC regulating voltage	13.6 - 14.4 volts	

G2CH00068-00000

TROUBLE SHOOTING

Problem	Possible causes	Remedies	Page
Charge warning lamp will not glow even if ignition switch is turned ON.	Fuse blown Lamp bulb burnt Poor connection of wiring	Check gauge fuse. Replace bulb. Repair poor connection of wiring. Repair or replace. Replace regulator assembly.	BE Section BE Section BE Section CH-6
Charge warning lamp will not go out even if engine has started.	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. Repair or replace cables. Check gauge fuse. Replace fusible link. Check charging system. Repair or Replace.	MA Section BE Section CH-6 BE Section

G2CH00069-00000