

DAIHATSU

F300

[HD-ENGINE]

CHARGING SYSTEM

PRECAUTIONS	CH- 2
TROUBLE SHOOTING	CH- 2
IN-VEHICLE INSPECTION	CH- 4
ALTERNATOR	CH-12

WN88E-CH001

CH

CHARGING SYSTEM

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.

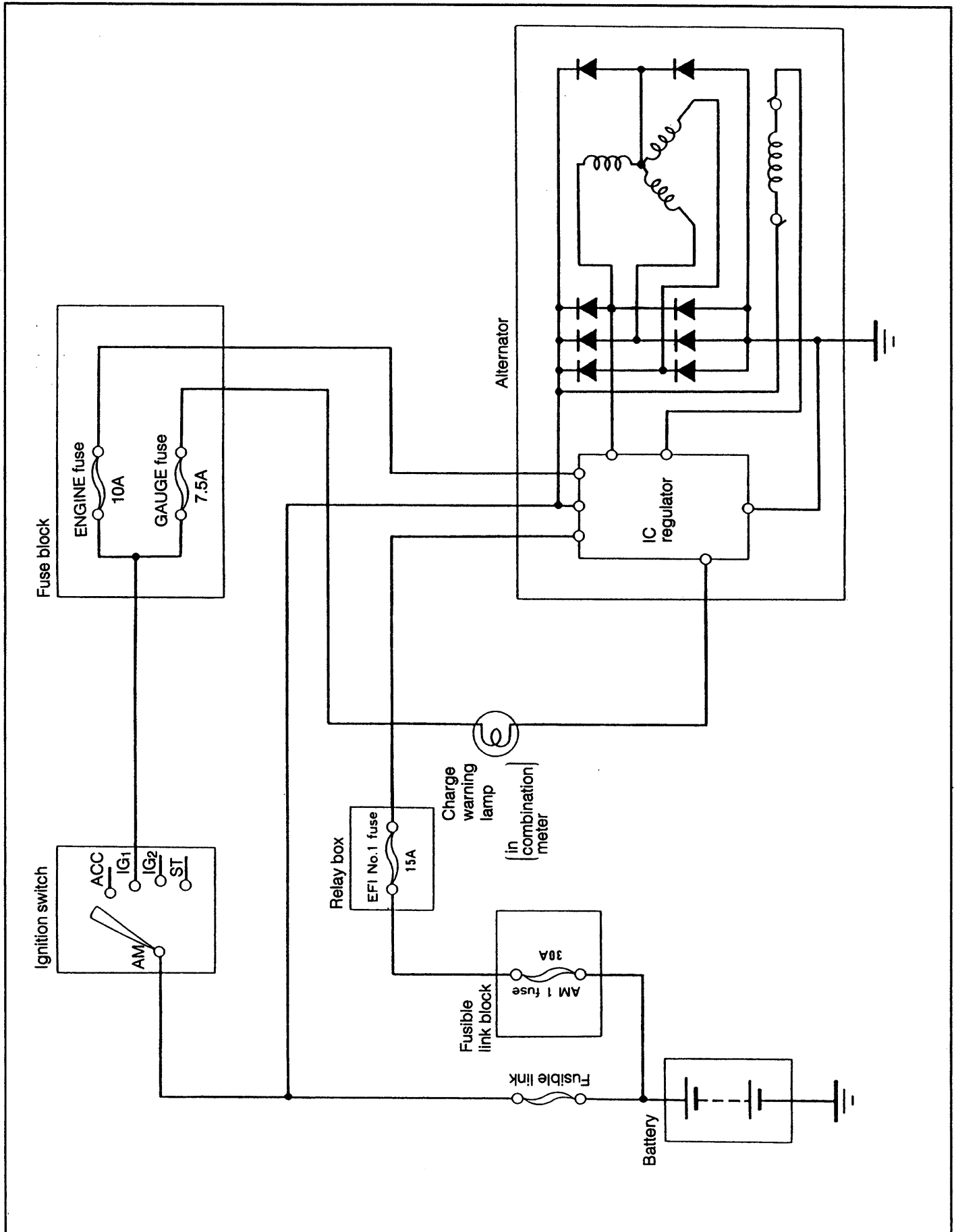
WR88-CH002

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 Open wire IC regulator faulty	Check gauge fuse. Replace bulb. Repair poor connection of wiring. Repair or replace. Replace regulator assembly.	CH-7
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.	CH-5 CH-5 CH-7

WN88E-CH002

CHARGING SYSTEM CIRCUIT



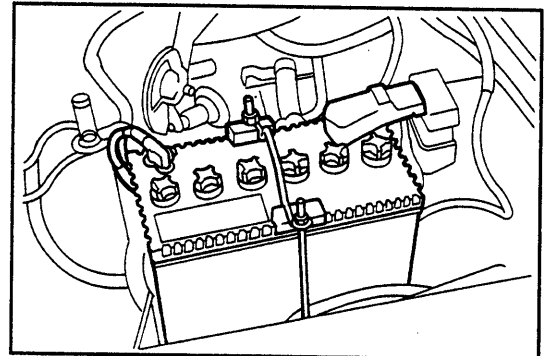
IN-VEHICLE INSPECTION

CAUTION:

- Never touch at the battery terminals immediately after the vehicle has been operated.
- Be certain to turn OFF the ignition key switch during the inspection.

WR88-CH005

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

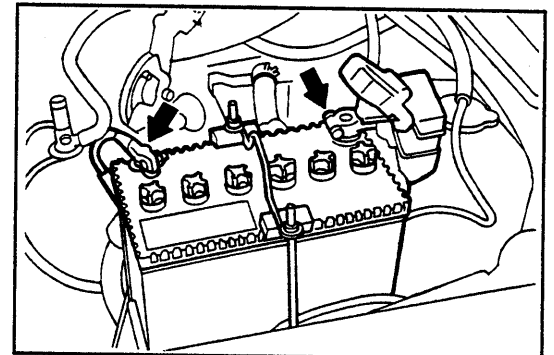


WR88-CH006

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

NOTE:

After the battery terminals have been cleaned, make sure that no rust particle remains on the terminals.



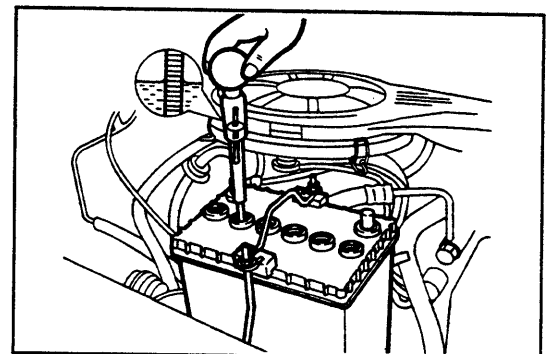
WR88-CH008

3. Check of specific gravity of battery electrolyte
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:

When fully charged at 20 °C (68 °F)

1.25 or more



WR88-CH009

If the specific gravity is not within the specified value, check the electrolyte level and/or replenish distilled water. Then, charge the battery until the specific gravity reaches the specified value. (See page CH-4.)

<Reference>

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

CAUTION:

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

WN88-CH004

- First-aid treatment for dilute sulfuric acid

Nature of accident	First-aid treatment
Acid gets to vehicle body.	Immediately flush the affected area using a large amount of clean running water, until no acid content remains any more.
* Acid gets into your eyes.	Immediately flush your eyes using a large amount of clean running water for at least 15 minutes with your eyes in open state.
* Acid gets to your skin or clothes.	Immediately flush the affected area using a large amount of clean running water, until no acid content remains any more. Afterwards, neutralize them with a soap. Finally flush them with water.
Acid is spilled.	Immediately flush the affected area using a large amount of water, until no acid content remains any more. Afterwards, neutralize the area with slaked lime, sodium or the like.
* Acid is swallowed.	Immediately flush the mouth with clean water. Let him drink raw eggs, milk or a large amount of water. Let him lie quietly.

* After the aforesaid first-aid treatment has been done, call a physician immediately.

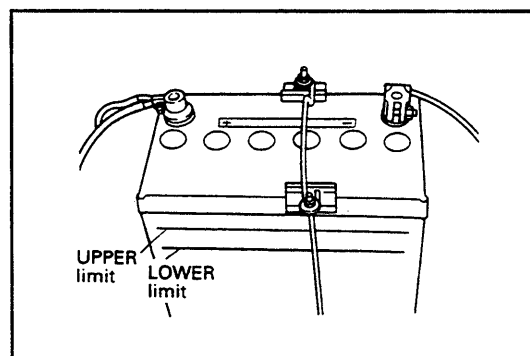
WR88-CH011

4. Inspection of battery electrolyte level

Ensure that the battery electrolyte level is the highest level. If the battery electrolyte level of any cell is not the highest level, replenish distilled water to the highest level.

NOTE:

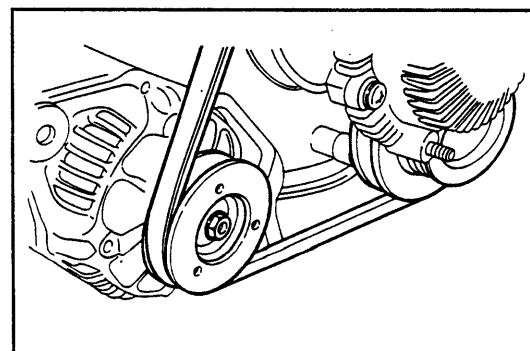
- Never add city tap water or sulfuric acid, etc. instead of distilled water.
- If the electrolyte level of each battery cell differs greatly, it is advisable to inspect to see if any electrolyte leakage is present.



WR88-CH012

5. Inspection of drive belt

- (1) Visually check the belt for separation of the adhesive rubber above and below the core, core separation from the adhesive rubber, cracking or separation of the ribs, torn or worn ribs or cracks in the inner ridges of the ribs. If necessary replace the drive belt.



WR88-CH013

CHARGING SYSTEM

(2) Measurement of amount of belt deflection

Push the midpoint of the drive belt between the alternator pulley and the water pump pulley by applying a force of 10 kg (22 lb). Measure the deflection of the drive belt.

Specified Belt Deflection

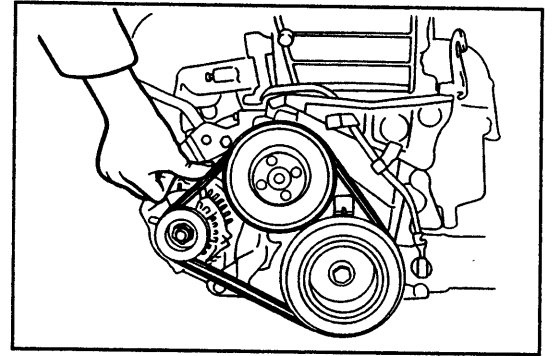
New belt: 5.0 - 7.0 mm (0.20 - 0.28 inch)

(With a pressed force of 10 kg (22 lb) applied to a point indicated in figure)

Used belt: 6.0 - 8.0 mm (0.24 - 0.31 inch)

(With a pressed force of 10 kg (22 lb) applied to a point indicated in figure)

Adjust the drive belt tension, if necessary.



WR88-CH014

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 for 5 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 5 minutes and then recheck the tension.

6. Check of fuses for continuity

Fusible link

Fusible link block

EFI No.1 fuse

Engine fuse

Gauge fuse

7. 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.

WR88-CH015

8. Check of charge warning lamp circuit

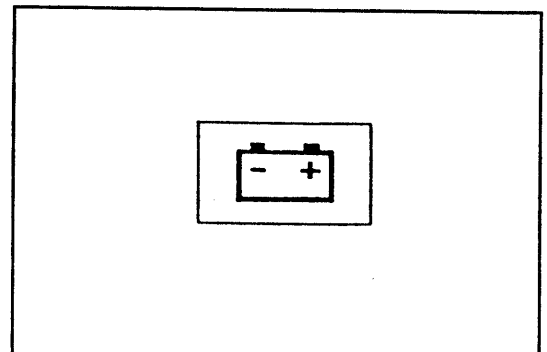
(1) Turn OFF all accessory switches.

(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.



WR88-CH016

9. 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

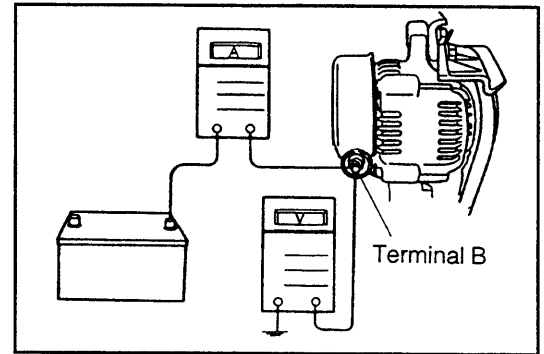
Standard Voltage: Standard Amperage 14.2 - 14.8 V

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

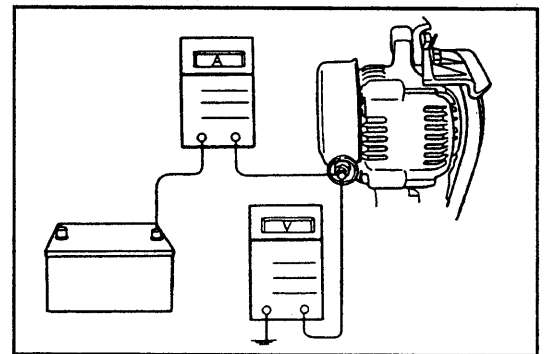
If the voltage reading is less than the standard voltage, ground the terminal F as indicated in the right figure. Proceed to start the engine.

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

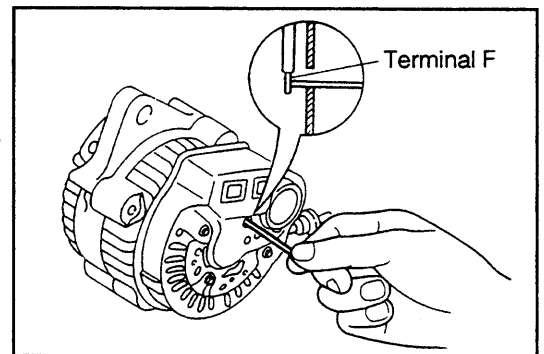
If the voltage reading is still less than the standard voltage under this setting, check the alternator.



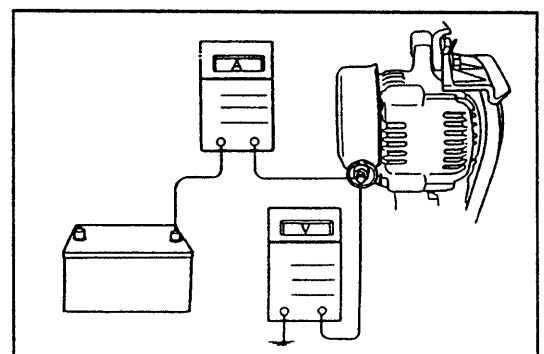
WR88-CH017



WR88-CH018



WR88-CH019



WR88-CH020

10. 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 30A, repair the alternator. (See page CH-15.)

NOTE:

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

CHARGING SYSTEM

BATTERY REMOVAL

CAUTION:

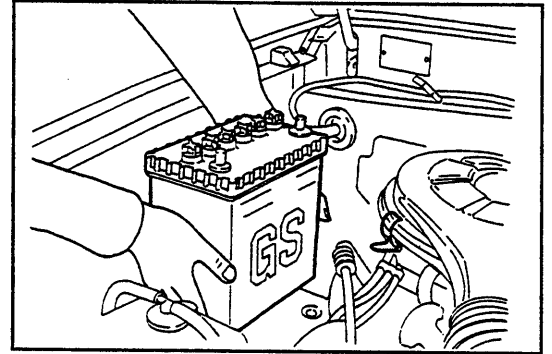
- Never touch at the battery terminals immediately after the vehicle has been operated.
- Be certain to turn OFF the ignition key.
- Never allow any fire to be brought near the battery.

NOTE:

Be very careful not to drop the battery or apply strong vibration to the battery.

WR88-CH021

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Disconnect the positive terminal from the positive (+) terminal of the battery.
3. Remove the battery hold-down clamp.
4. Remove the battery.



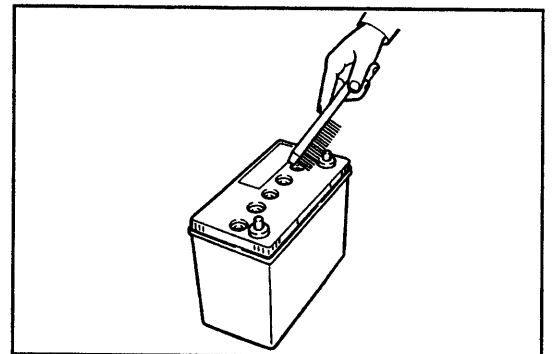
WR88-CH022

CLEANING, INSPECTION & CHARGING OF BATTERY

1. Remove any rust from the battery terminals by means of a wire brush or a fine abrasive paper, or sodium water and a soft brush.

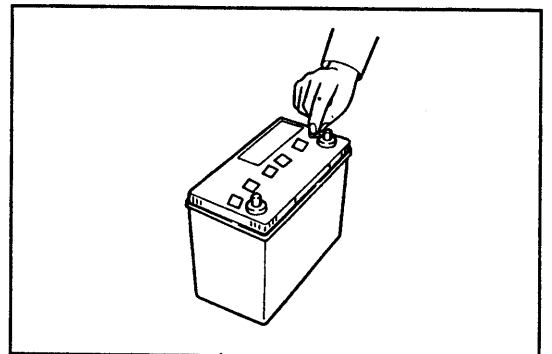
NOTE:

After the battery terminals have been cleaned, make sure that no rust particle remains on the terminals.



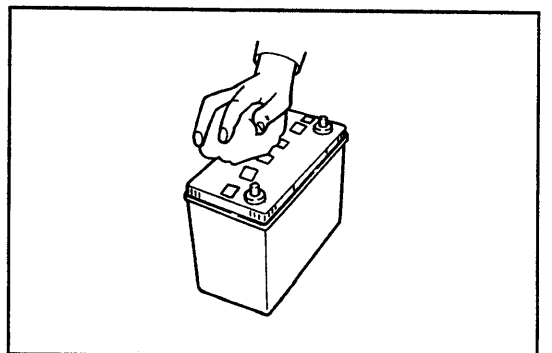
WR88-CH023A

2. Using adhesive tape or the like, seal the vent hole of each cell plug. Flush the battery with clean water, using a soft brush.



WR88-CH023B

3. Wipe off the battery surface using a cloth dampened by clean water. Proceed to dry the battery.



WR88-CH024A

4. Battery capacity check

(1) Check by hydrometer

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:

When fully charged at 20 °C (68 °F)

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

If the battery is prone to be discharged (the specific gravity drops) even after the battery has been charged, despite the fact that the charging system of the vehicle has no malfunction, it is necessary to replace the battery. However, make sure that the wiring harness of the vehicle has no defect.

Reference

Specific gravity at standard temperature = **Measured specific gravity** + 0.0007

[Temperature of electrolyte at time of measurement : 20 °C (68 °F)]

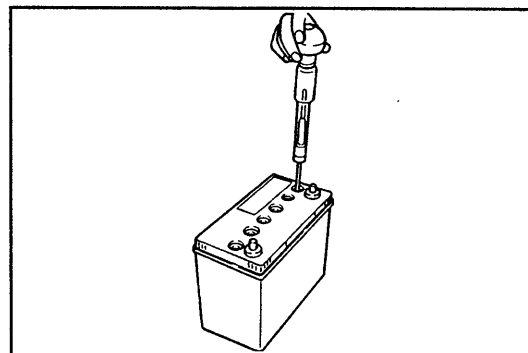
(2) Reserve capacity check by battery tester

Connect a battery tester to the battery so as to check the capacity.

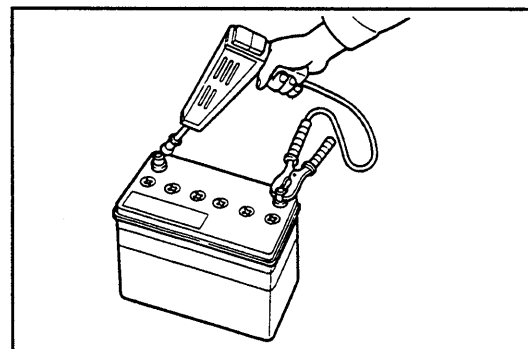
NOTE:

The battery tester should be operated in accordance with the operating instructions set forth by the manufacturer.

If the battery capacity is not within the specified value, check the electrolyte level and/or replenish distilled water. Then, charge the battery until the battery capacity reaches the specified level. (See page CH-4.)



WR88-CH024



WR88-CH025

CHARGING SYSTEM

5. Battery recharging

CAUTION:

- Never perform quick charging for the MF (Maintenance Free) battery.
- Care must be exercised to ensure that the electrolyte temperature will not rise above 45 °C (113 °F) during the charging. If the electrolyte temperature will likely exceed this level, suspend the charging or reduce the charging current to a half level.
- Never allow any fire to be brought near the battery.
- Make sure that the charging side is well ventilated during the charging or immediately after the charging.
- If the battery is charged with the battery mounted on the vehicle, be certain to turn OFF the ignition switch. Then, disconnect the battery ground cable from the battery negative (-) terminal.
- The switch of the battery charger should be turned OFF first, whenever it is connected or disconnected from the battery.
- Do not use a battery tester or a hydrometer during the charging.
- If it is necessary to approach the battery during the charging or immediately after the charging, be sure to wear goggles. Also, keep your face away from the battery, whenever possible. As for the removal type battery cell plugs, remove them. Care must be exercised not to lose them.
- If the electrolyte level is low, be sure to replenish distilled water. (See page CH-5.)
- Under no circumstances should the battery charger be connected to the battery reversely. Upon completion of the charging, positively install each cell plug. Flush the battery with clean water.

(1) Determination of charging current

The charging should be carried out using a current that is one tenth of the five-hour rate capacity.

Example:

50 AH(5-hour rate)

$$\text{Charging current (A)} = \frac{\text{Battery capacity (5-hour rate)}}{10}$$

WR88-CH027

(2) Determination of charging time

The charging time can be determined, using the following formula given below:

$$\text{Charging time (hour)} = \frac{\text{Discharge amount (AH)}}{\text{Charging current (A)}}$$

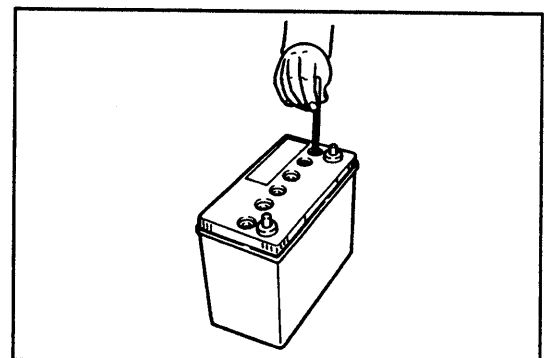
WR88-CH028

(3) Connection of battery charger

- (1) Ensure that the charger switch is turned OFF.
- (2) Insert a thermometer into the battery.
- (3) Connect the charger to the battery.
- (4) Set the timer of the charger. Turn ON the switch.

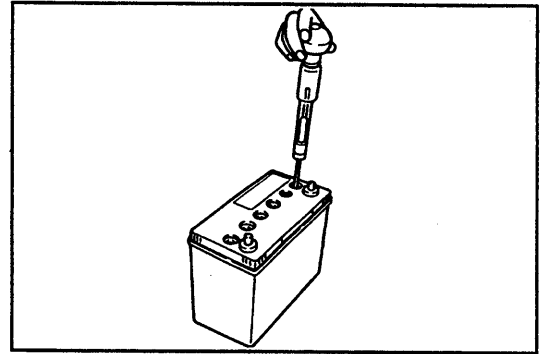
CAUTION

Care must be exercised to ensure that the electrolyte temperature will not rise above 45 °C (113 °F) during the charging.



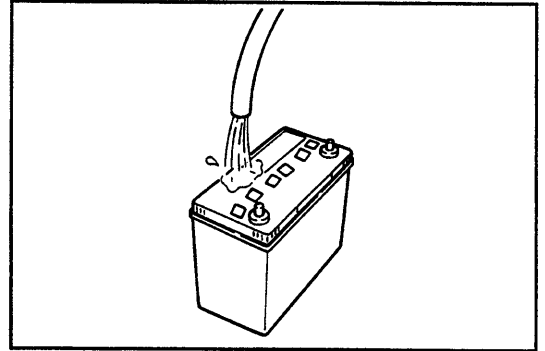
WR88-CH029

- (4) Check the battery capacity.
(See page CH-9.)
If the battery fails to reach the specified specific gravity even after the battery has been recharged several times, replace the battery.



WR88-CH030

- (5) Flush the battery with water.
(See page CH-8.)



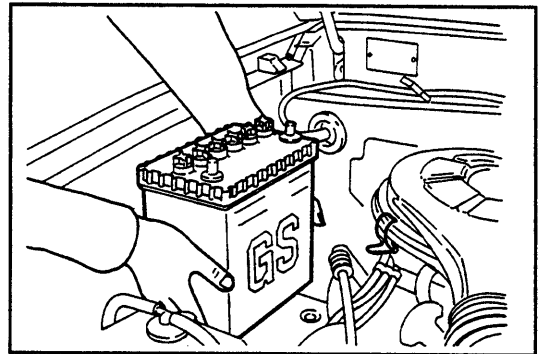
WR88-CH031

BATTERY INSTALLATION

1. Remove any dust from the battery carrier.
2. Install the battery on the battery carrier in such a direction that the negative (-) terminal of the battery may come at the front side of the vehicle.
3. Install the battery hold-down clamp.

NOTE:

- Be very careful not to tighten the hold-down clamp excessively.
- Install the battery carrier in such a direction that the claw of the hold-down clamp faces toward the front of the vehicle.



WN88E-CH005

4. Connect the positive terminal to the positive (+) terminal of the battery.

NOTE:

Ensure that the terminal at the wiring exhibits no rust or the like. If any rust is present, remove the rust using a wire brush or a fine abrasive paper.

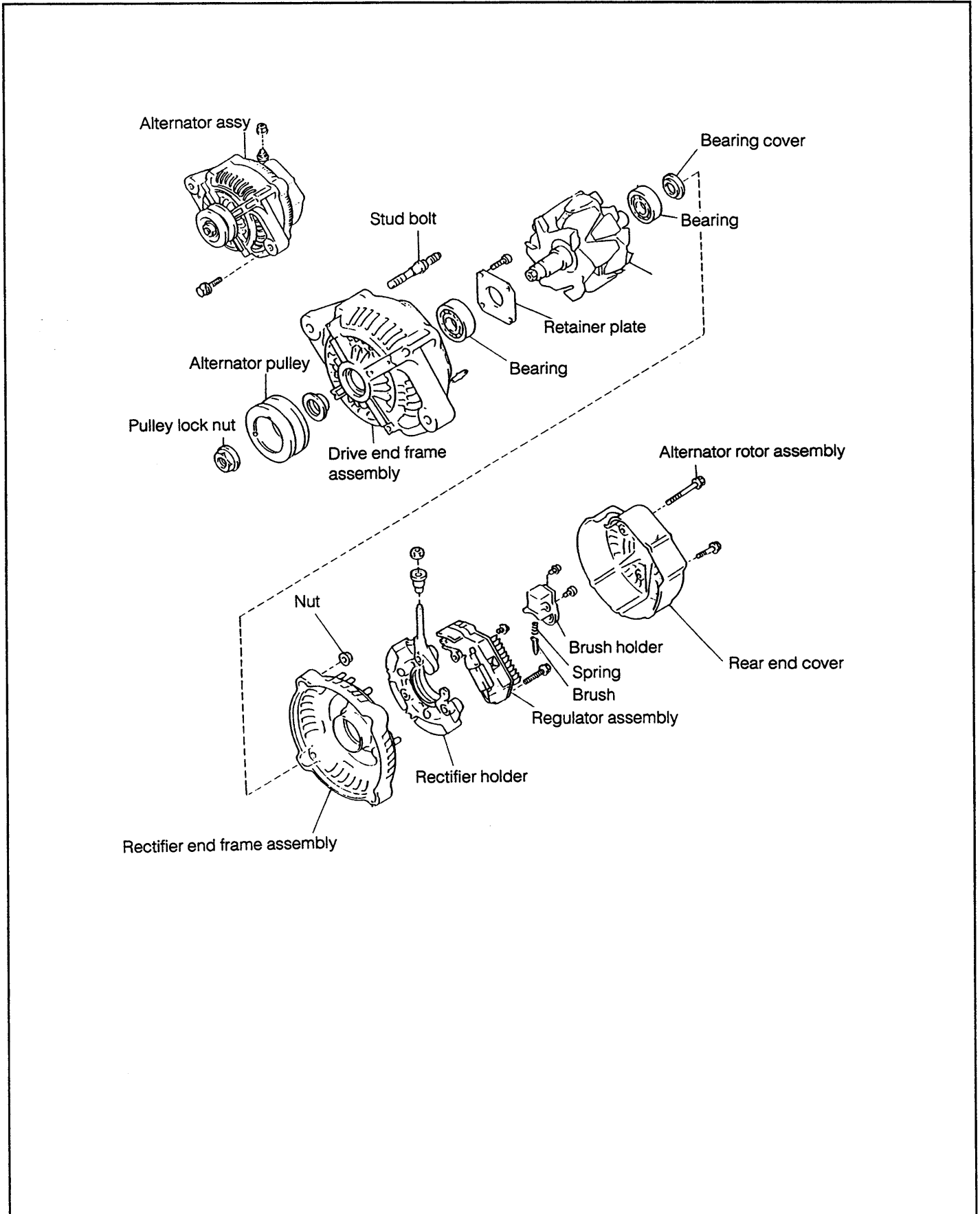
5. Connect the ground cable terminal to the negative (-) terminal of the battery.

NOTE:

Ensure that the terminal at the wiring exhibits no rust or the like. If any rust is present, remove the rust using a wire brush or a fine abrasive paper.

WR88-CH032

ALTERNATOR
COMPONENTS

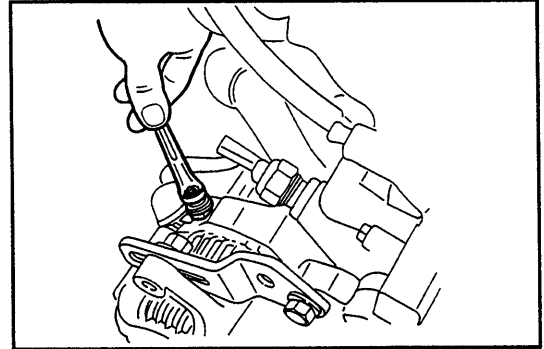


REMOVAL OF ALTERNATOR

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.

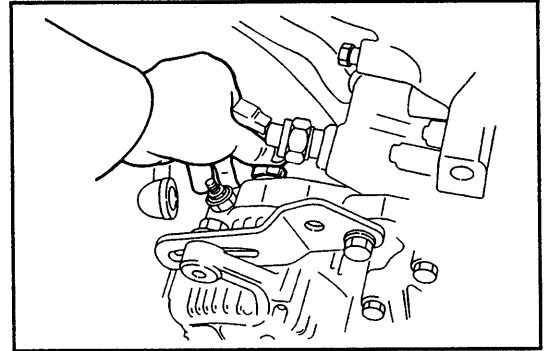
WR88-CH034

2. Disconnection of wires from alternator
 - (1) Remove the nut and wire from the alternator.



WR88-CH035

- (2) Disconnect the connector from the alternator.



WR88-CH036

3. Removal of alternator drive belt
Loosen the alternator attaching bolts. Remove the drive belt.
4. Removal of alternator
 - (1) Remove the alternator attaching bolts.

WR88-CH037

- (2) Remove the alternator from the engine compartment.

WR88-CH038

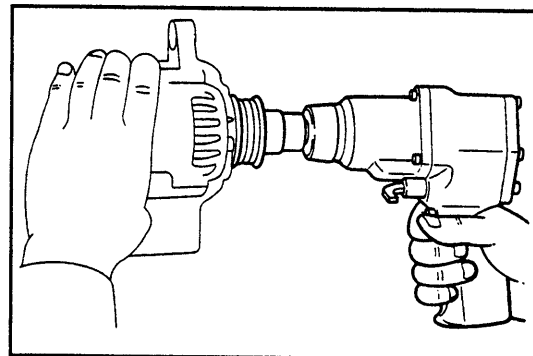
CHARGING SYSTEM

DISASSEMBLY OF ALTERNATOR

1. Remove the alternator pulley lock nut by means of an impact wrench.

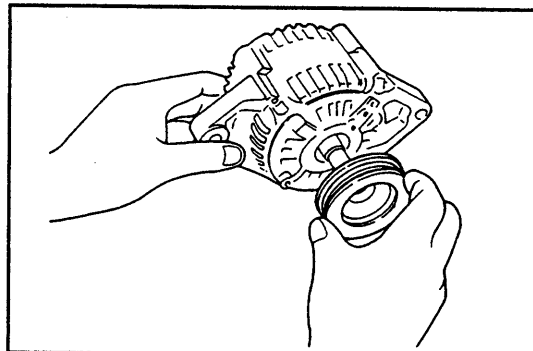
NOTE:

Be sure to use an impact wrench having a hexagonal hole.



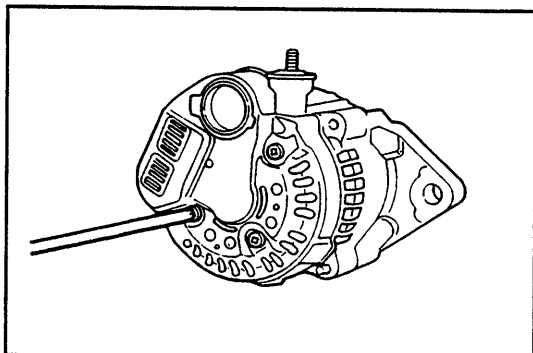
WR88-CH039

2. Remove the alternator pulley.



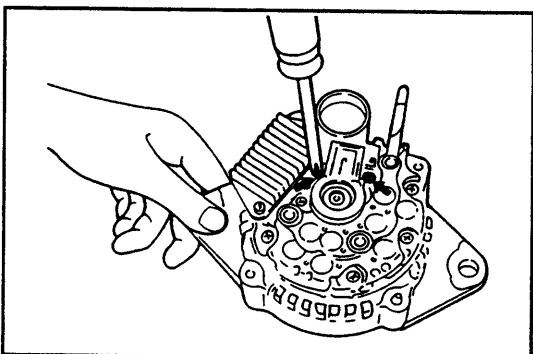
WR88-CH040

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



WR88-CH041

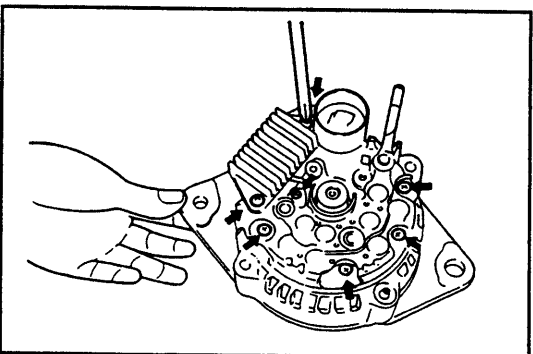
4. Remove the brush holder.



WR88-CH042

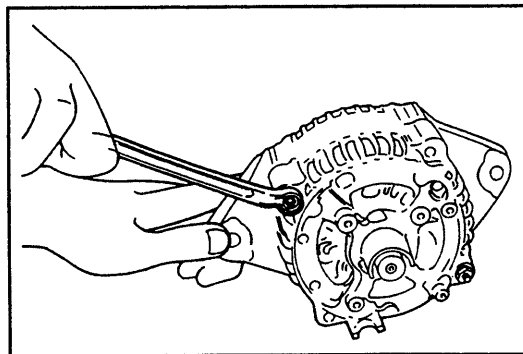
5. Remove the rectifier holder and regulator assembly.

NOTE:
Before the rectifier holder is removed, be sure to straighten the stator wire.



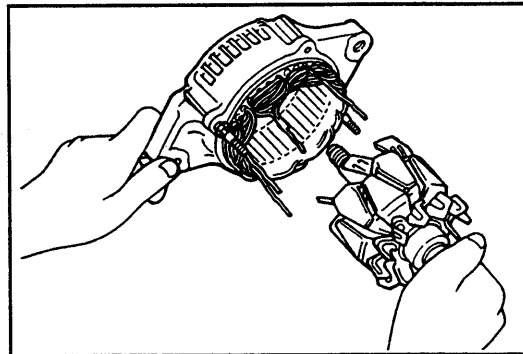
WR88-CH043

- Remove the rectifier end frame assembly.



WR88-CH044

- Remove the rotor from the drive end frame assembly.



WR88-CH045

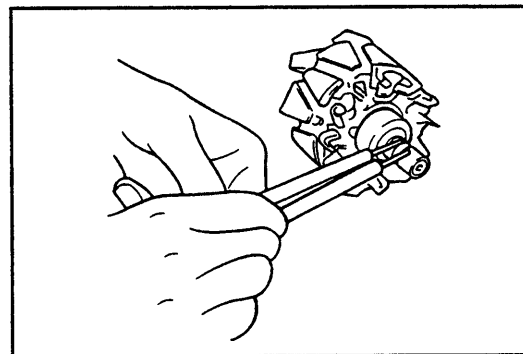
INSPECTION OF ALTERNATOR

Rotor

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

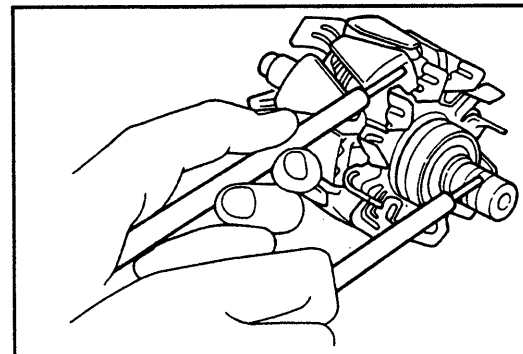
Standard Resistance: $2.9 \pm 0.2 \Omega$

If no specified resistance exists, replace the rotor.



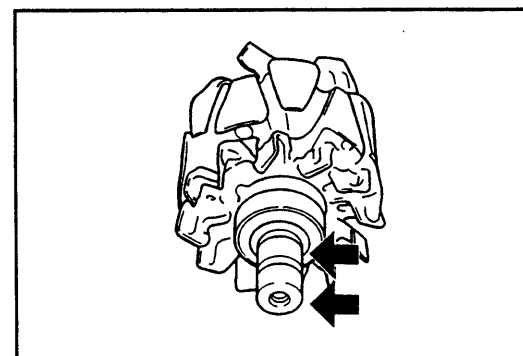
WR88-CH046

- 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.



WR88-CH047

- 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.



WR88-CH048

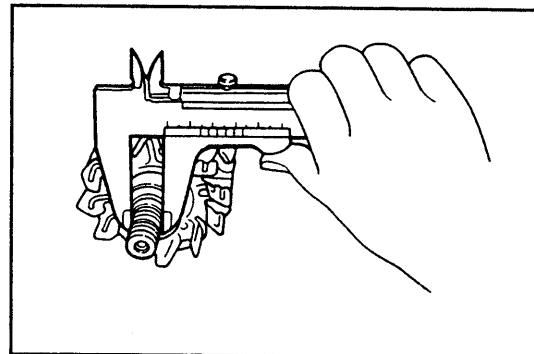
CHARGING SYSTEM

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

Standard diameter: 14.4 mm (0.57 inch)

Minimum diameter: 14 mm (0.55 inch)

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



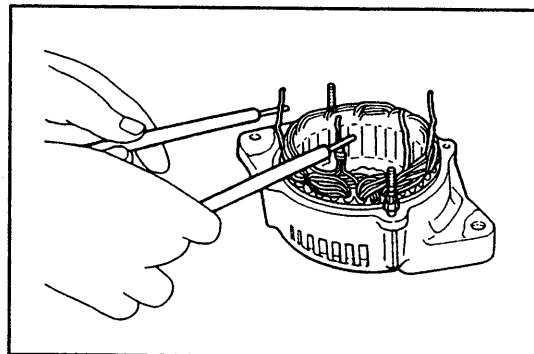
WR88-CH049

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.

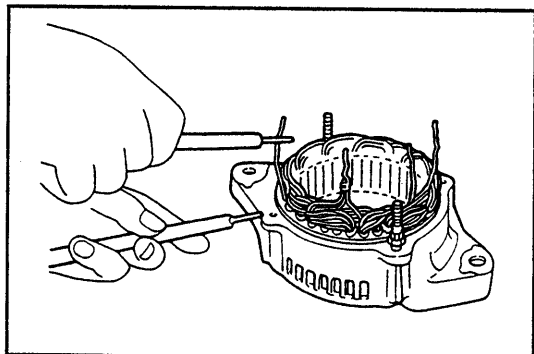


WR88-CH050

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.



WR88-CH051

Brush and Brush Holder

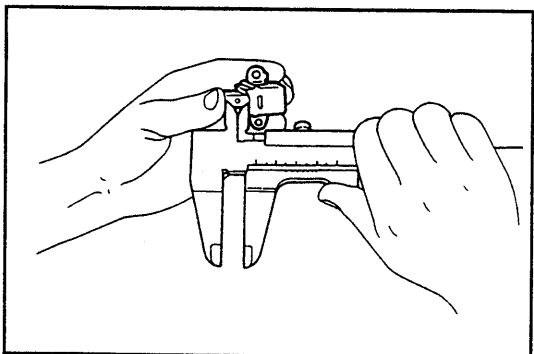
1. Measurement of exposed brush length

Measure the exposed brush length, using a scale.

Standard exposed length: 10.5 mm (0.41 inch)

Minimum exposed length: 1.5 mm (0.06 inch)

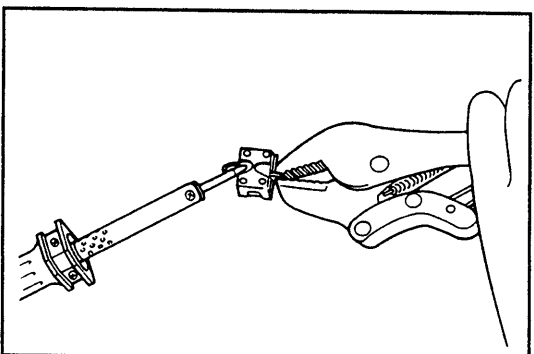
If the exposed length is less than the minimum requirement, replace the brushes.



WR88-CH052

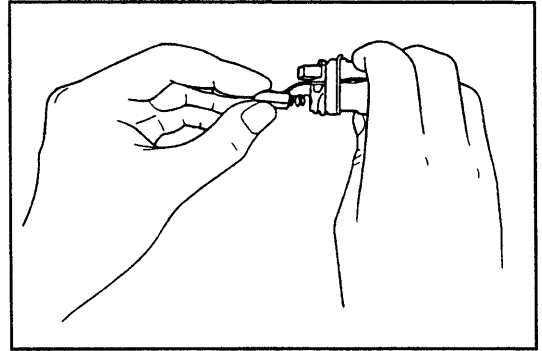
2. Replacement of brushes (If necessary)

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



WR88-CH053

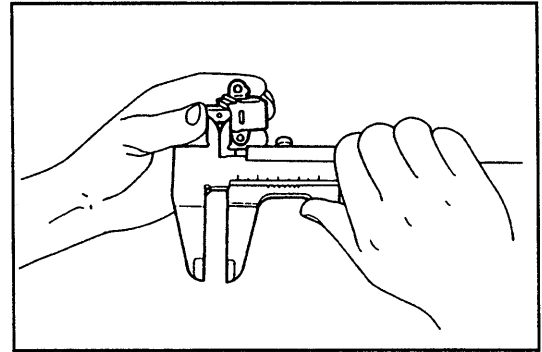
- (2) Install the brush cord in the brush holder with the spring fitted in place.



WR88-CH054

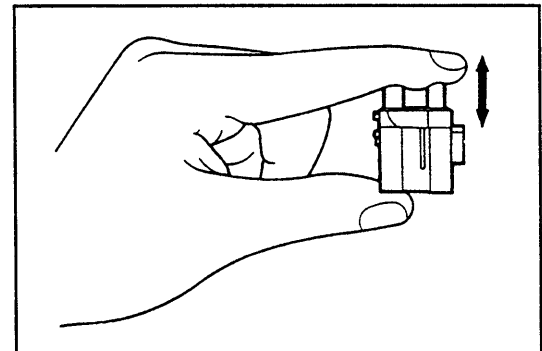
- (3) Solder the brush cord in the brush holder in such a way that the exposed length of the brush meets the specification.

Standard exposed length: 10.5 mm (0.41 inch)



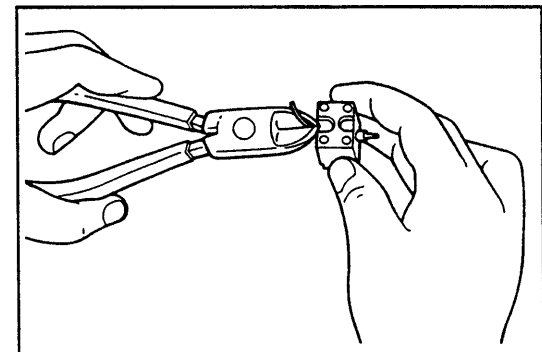
WR88-CH055

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



WR88-CH056

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

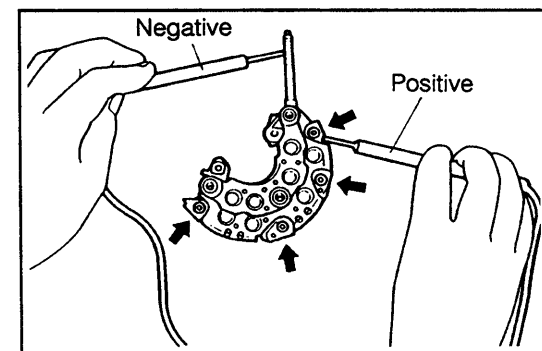


WR88-CH057

Rectifier

1. Inspection of rectifier at positive side

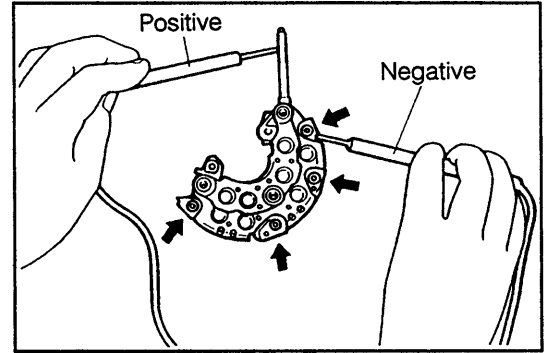
- (1) Ensure that continuity exists between the positive stud bolt of the rectifier holder and the rectifier terminal by connecting an ohmmeter as indicated in the right figure. If no continuity exists, replace the rectifier holder.



WR88-CH058

CHARGING SYSTEM

- (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.

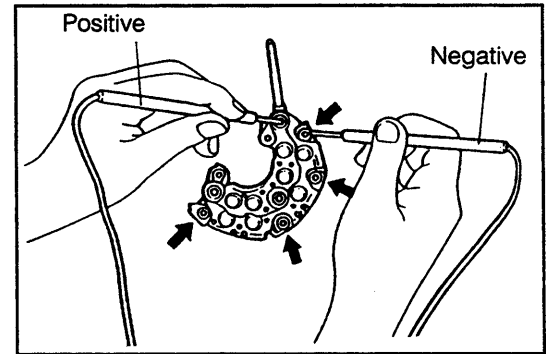


WR88-CH059

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. If no continuity exists, replace the rectifier holder.

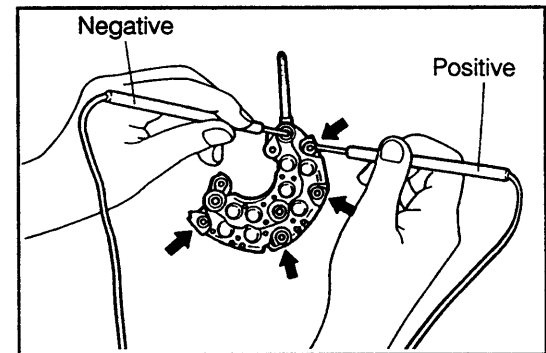
REFERENCE

Resistance about 900 k Ω



WR88-CH060

- (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.

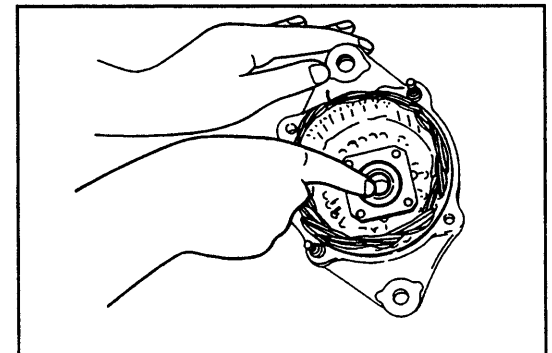


WR88-CH061

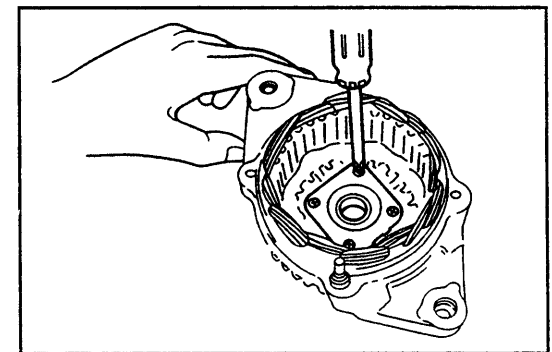
Bearings

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.

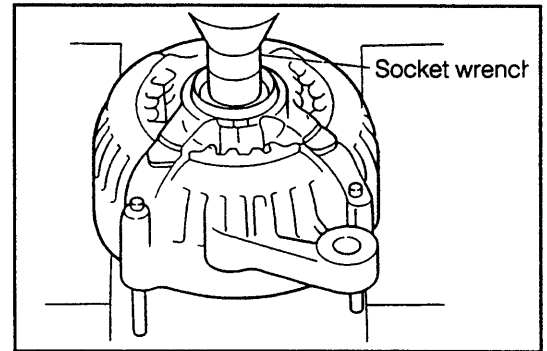


WR88-CH062



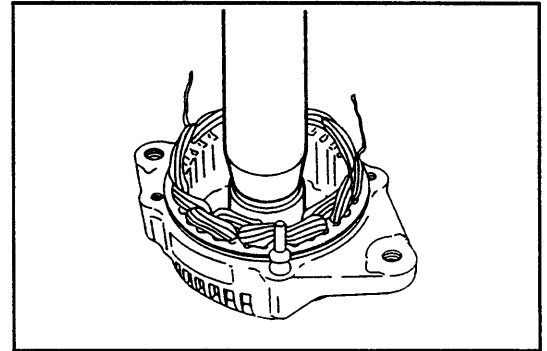
WR88-CH063

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



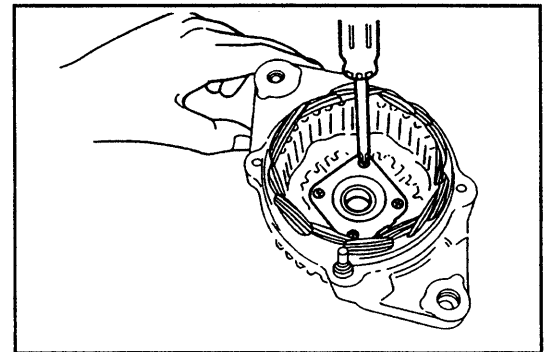
WR88-CH064

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



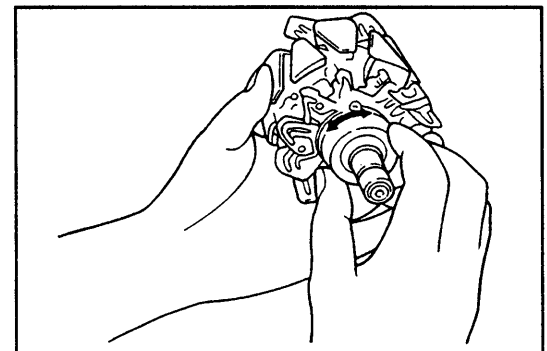
WR88-CH065

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



WR88-CH066

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

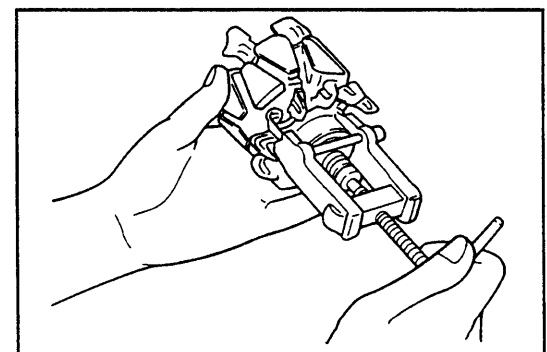


WR88-CH067

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

NOTE:

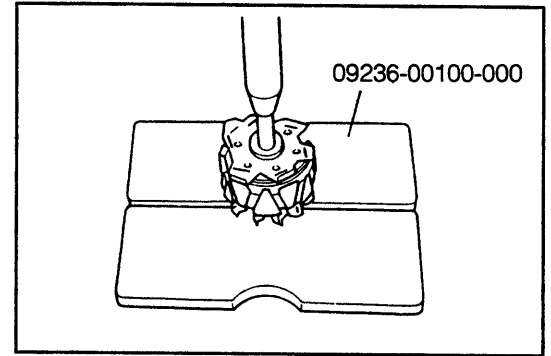
Be very careful not to damage the fan during the removal.



WR88-CH068

CHARGING SYSTEM

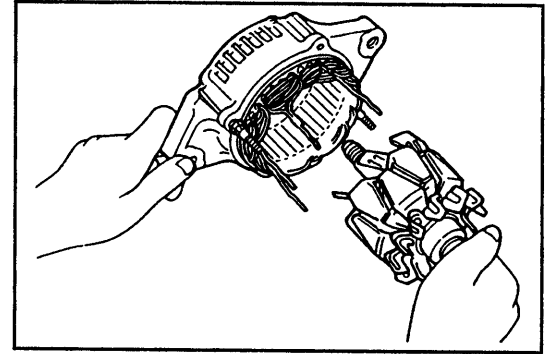
- (2) Press a new rear bearing and bearing cover, using a hydraulic press in combination with the following SST.
SST: 09236-00100-000



WR88-CH069

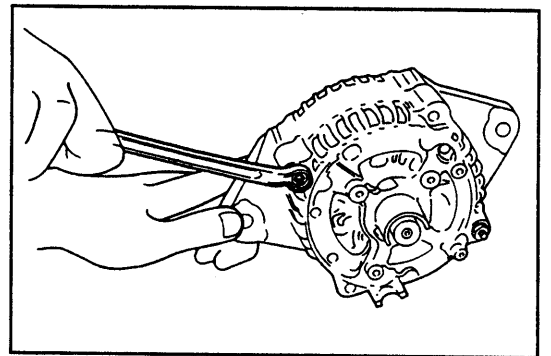
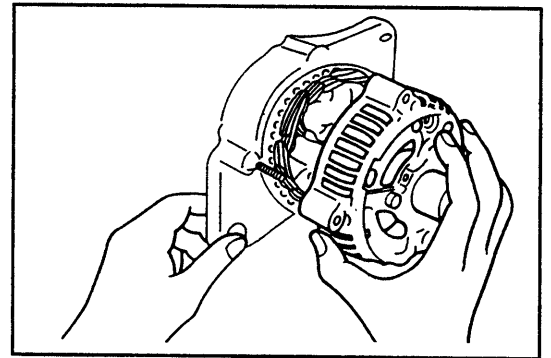
ASSEMBLY OF ALTERNATOR

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



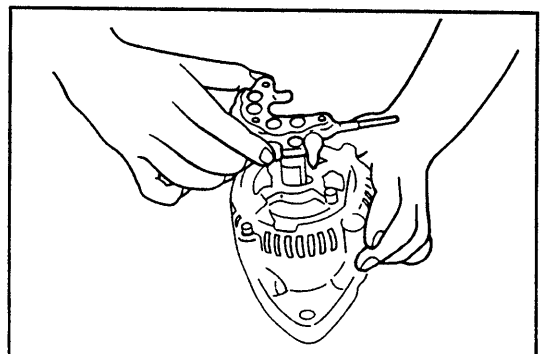
WR88-CH070

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.



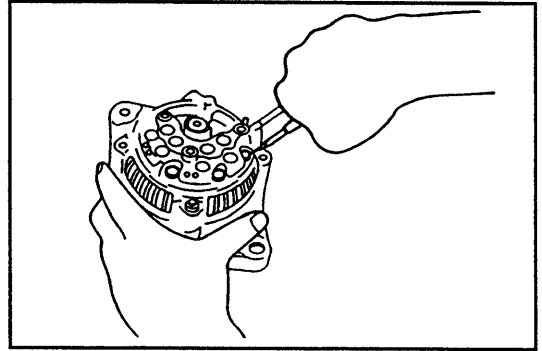
WR88-CH071

3. 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.



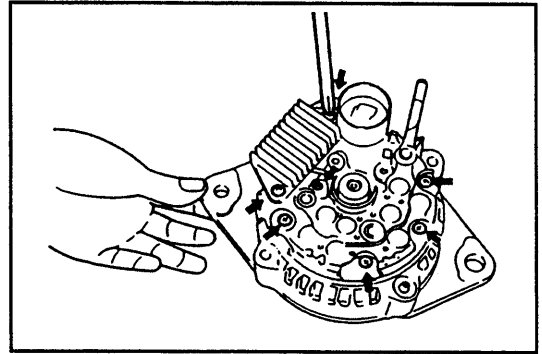
WR88-CH072

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



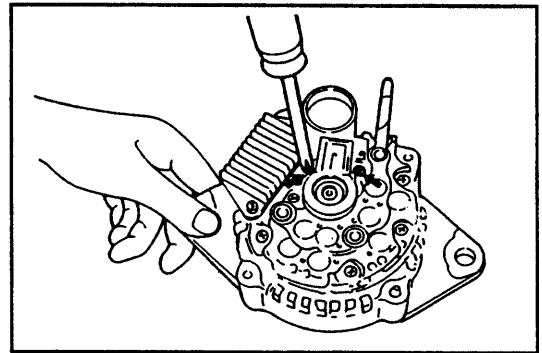
WR88-CH073

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



WR88-CH074

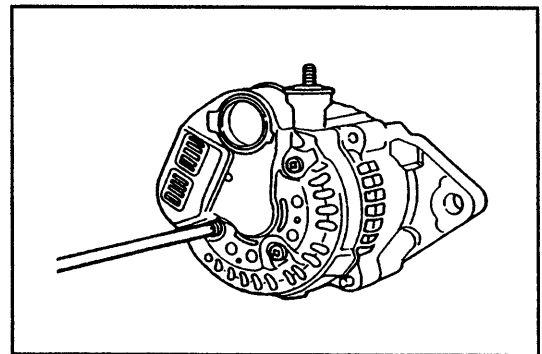
- (4) Install the brush holder in such a way that a gap of at least 1 mm (0.04 inch) is provided between the brush holder and the regulator assembly. Secure the brush holder with the two screws.



WR88-CH075

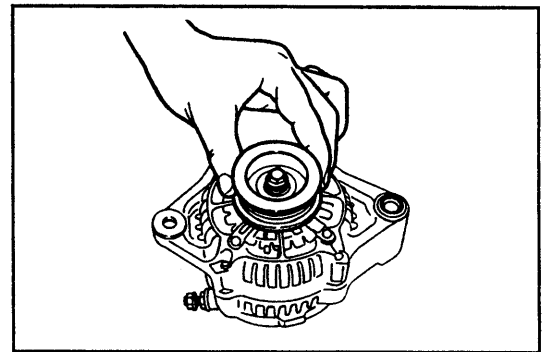
4. Installation of rear end cover

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



WR88-CH076

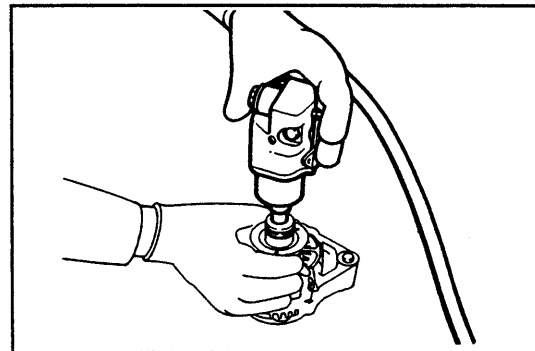
5. Attach the pulley to the rotor shaft.



WR88-CH077A

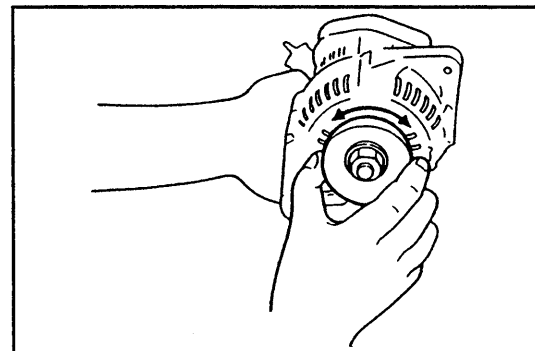
CHARGING SYSTEM

6. Install the pulley lock nut by means of an impact wrench.
NOTE:
Be sure to use an impact wrench having a hexagonal hole.



WR88-CH077B

7. Ensure that the rotor turns smoothly.



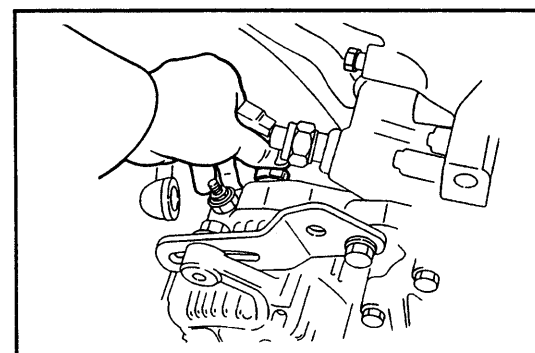
WR88-CH078

INSTALLATION OF ALTERNATOR

1. Installation of alternator on vehicle
Install the alternator on the engine with the two attaching bolts.

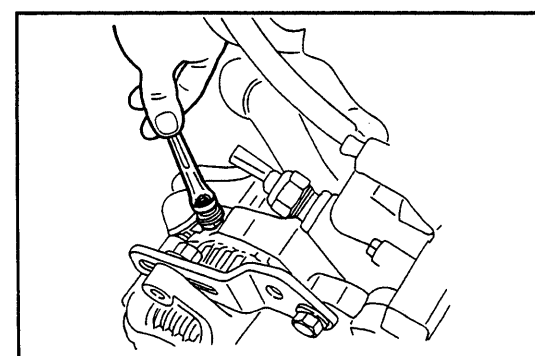
WR88-CH079A

2. Connection of wire to alternator
(1) Connect the connectors to the alternator.



WR88-CH079B

- (2) Install the wire and nut to the alternator.

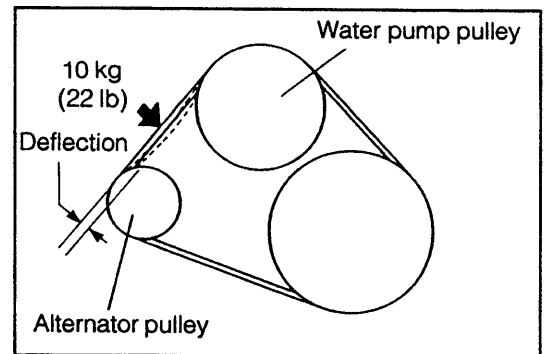


WR88-CH079C

3. Installation of alternator drive belt

- (1) Install the alternator drive belt properly.
- (2) 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 kg (22 lb).



WN88E-CH006

Specified Belt Deflection

New belt: 5.0 - 7.0 mm (0.20 - 0.28 inch)

(With a pressed force of 10 kg (22 lb) applied to a point indicated in figure)

Used belt: 6.0 - 8.0 mm (0.24 - 0.31 inch)

(With a pressed force of 10 kg (22 lb) applied to a point indicated in figure)

NOTE:

- "New belt" refers to a belt with 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.

WR88-CH082

4. Reconnect the ground cable terminal to the negative (-) terminal of the battery.

WR88-CH083