# ENGINE ELECTRICAL

## CONTENTS

N08AA--

# CHARGING SYSTEM

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

N08EB--

| Items | Specifications |
|---|---|
| Alternator | |
| Type | Alternative current type with voltage regulator |
| Rated output VIA | |
| <U.S.A. - M/T - Non-Turbo> | 12/65 |
| <U.S.A. - AA, U.S.A. - Turbo, CANADA -1.8L Engine, CANADA -2.0L Engine - M/T - Non-Turbo> | 12/75 |
| <CANADA -2.0L Engine - A/T, CANADA -2.0L Engine-Turbo> | 12/90 |
| Voltage regulator | Electronic built-in type |

### SERVICE SPECIFICATIONS

N08EC--

| Items | | Specifications |
|---|---|---|
| Alternator | | |
| Standard value | | |
| Regulated voltage V | | 14.2–15.4 at –20°C (–4°F)<br>13.9-14.9 at 20°C (68°F)<br>13.4-14.6 at 60°C (140°F)<br>13.1–14.5 a t 80°C (176°F) |
| Slip ring O.D. mm (in.) | | 22.7 (.894) |
| Rotor coil resistance Ω | | 3-5 |
| Limit | | |
| Output current A | 65 A<br>75 A<br>90 A | Min. 45.5<br>Min. 52.5<br>Min. 63 |
| Slip ring O.D. mm (in.) | | 22.1 (.870) |

### TORQUE SPECIFICATIONS

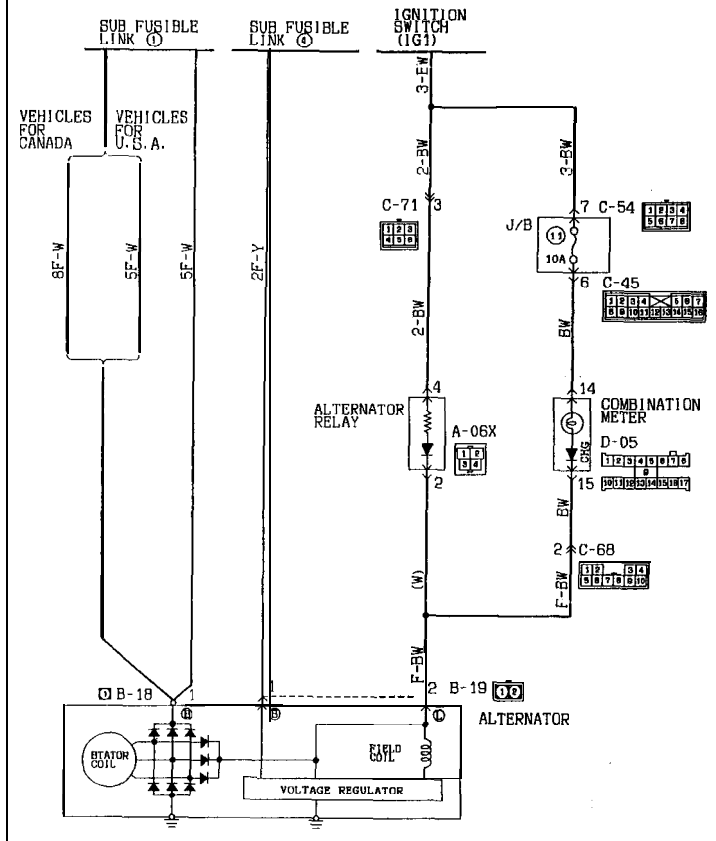
N08ED--

| Items | Nm | ft.lbs. |
|---|---|---|
| Lock bolt | 12–15 | 9-11 |
| Alternator brace mounting bolt | 15–22 | 11–16 |
| Adjust bolt | 8-12 | 6-9 |
| Alternator pivot nut | 20–25 | 15-18 |
| Water pump pulley bolt | 8–10 | 6-7 |
| Alternator wiring harness connector mounting nut | 4-6 | 3-4 |

# TROUBLESHOOTING

- H A L

## CIRCUIT DIAGRAM




## OPERATION

### When engine is stopped

When the ignition switch is switched to the ''ON'' position, electricity flows from the "L" terminal, of the alternator to the field coil, and at the same time the charging warning light illuminates.

### When engine is being started/has started

When the engine is started, charging voltage is applied to the "L" terminal of the alternator, with the result that the charging warning light is extinguished. In addition, because battery voltage is applied to the "S" terminal of the alternator, this battery voltage is monitored at the IC voltage regulator, thus switching ON and OFF the current to the field coil and thereby controlling the amount of generation by the alternator.

Power is supplied to each load from the ''B'' terminal of the alternator.

NOTE

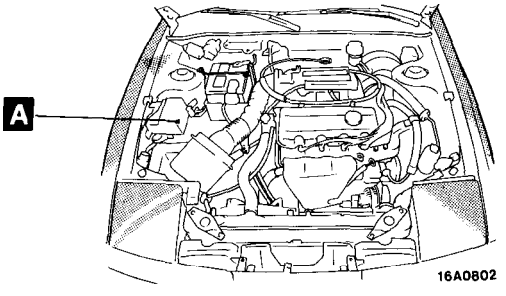
The alternator relay functions as a back-up for the flow of electricity to the field coil if there is a disconnection or damaged wiring of the charging warning light.

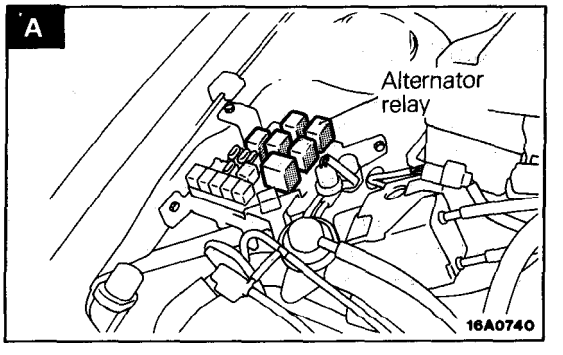
## TROUBLESHOOTING HINTS

1. Charging indicator light does not go on when the ignition switch is turned to "ON", before the engine starts.
   - Check the bulb
2. Charging indicator light fails to go off once the engine starts.
   - Check the IC voltage regulator (located within the alternator).
3. Discharged or overcharged battery.
   - Check the IC voltage regulator (located within the alternator).
4. The charging warning light illuminates dimly.
   - Check the diode (within the combination meter) for a short-circuit.

## COMPONENT LOCATION

| Name | Symbol |
|---|---|
| Alternator relay | A |



# SERVICE ADJUSTMENT PROCEDURES

## CHARGING SYSTEM INSPECTION N08EIAO

### VOLTAGE DROP TEST OF ALTERNATOR OUTPUT WIRE

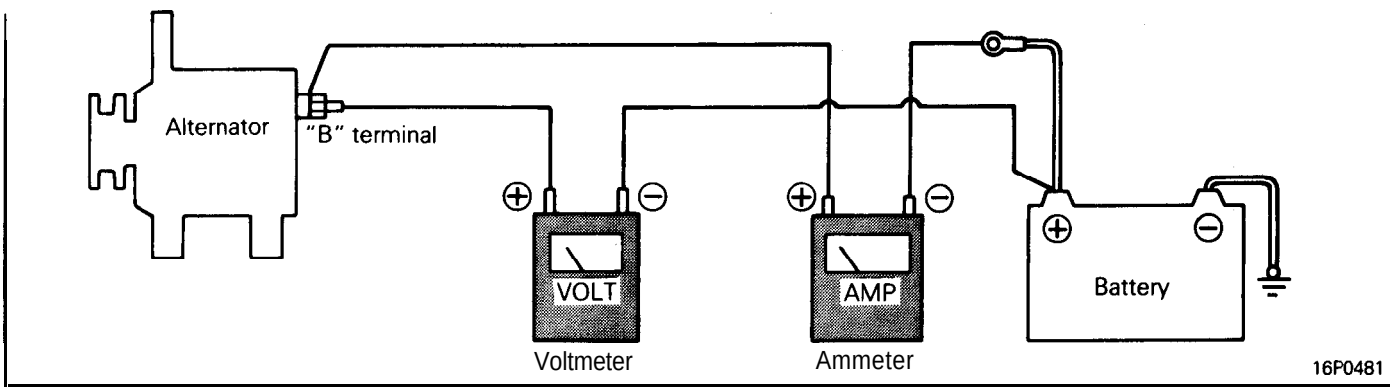
This test judges whether or not the wiring (including the fusible link) between the alternator B terminal and the battery (+) terminal is sound by the voltage drop method.

**Preparation**

(1) Turn the ignition switch to "OFF".
(2) Disconnect the battery ground cable.
(3) Disconnect the alternator output lead from the alternator "B" terminal.
(4) Connect a DC ammeter (0 to 100A) in series to the "B" terminal and the disconnected output lead. Connect the (+) lead of the ammeter to the ''B'' terminal and the (−) lead to the disconnected output wire.

NOTE
Use of a clamp type ammeter that can measure current without disconnecting the harness' is preferred. The reason is that when checking a vehicle that has a low output current due to poor connection of the alternator "B" terminal, such poor connection is corrected as the "B" terminal is loosened and a test ammeter is connected in its place and as a result, causes for the trouble may not be determined.

(5) Connect a digital voltmeter between the alternator "B" terminal and battery (+) terminal. Connect the (+) lead wire of the voltmeter to the "B" terminal and the (−) lead wire to the battery (+) terminal.
(6) Connect the battery ground cable.
(7) Leave the hood open.




**Test**

(1) Start the engine.
(2) Turn on or off the headlights and small lights and adjust the engine speed so that the ammeter reads 20 A and read off the voltmeter indication under this condition.

**Result**

(1) It is okay if the voltmeter indicates the standard value.

**Standard value: 0.2 V max.**

(2) If the voltmeter indicates a value that is larger than the standard value, poor wiring is suspected, in which case check the wiring from the alternator "B" terminal to fusible link to battery (+) terminal. Check for loose connection, color change due to overheated harness, etc. and correct them before testing again.

(3) Upon completion of the test, set the engine speed at idle.
Turn off the lights and turn off the ignition switch.
(4) Disconnect the battery ground cable.
(5) Disconnect the ammeter and voltmeter that have been connected for the test purpose.
(6) Connect the alternator output wire to the alternator "B" terminal.
(7) Connect the battery ground cable.

## OUTPUT CURRENT TEST

This test judges whether or not the alternator gives an output current that is equivalent to the nominal output.

### Preparation

(1) Prior to the test, check the following items and correct as necessary.
   (a) Check the battery installed in the vehicle to ensure that it is in sound state*. The battery checking method is described in "BATTERY".

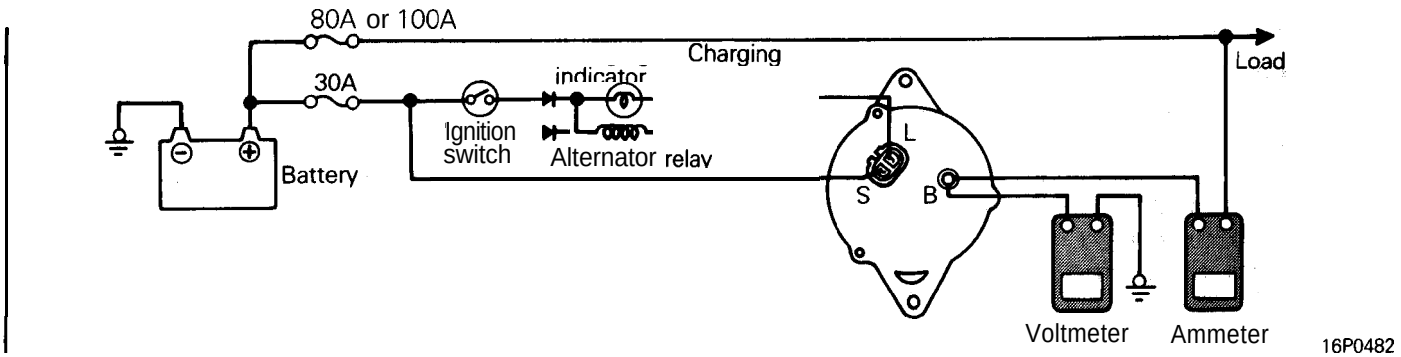
   NOTE
   "The battery that is used to test the output current should be one that has been rather discharged. With a fully charged battery, the test may not be conducted correctly due to an insufficient load.

   (b) Check tension of the alternator drive belt. The belt tension check method is described in "GROUP O-Maintenance Service".

(2) Turn off the ignition switch.
(3) Disconnect the battery ground cable.
(4) Disconnect the alternator output wire from the alternator "B" terminal.
(5) Connect a DC ammeter (0 to 100A) in series between the "B" terminal and the disconnected output wire. Connect the (+) lead of the ammeter to the "B" terminal and connect the (–) lead wire to the disconnected output wire.

   NOTE
   Tighten each connection by bolt and nut securely as a heavy current will flow. Do not relay on clips.

(6) Connect a voltmeter (0 to 20V) between the "B" terminal and ground. Connect the (+) lead wire to the alternator "B" terminal and (–) lead wire to a sound ground.
(7) Set the engine tachometer and connect the battery ground cable.
(8) Leave the engine hood open.




### Test

(1) Check to see that the voltmeter reads the same value as the battery voltage.
   If the voltmeter reads OV, an open circuit in the wire between the alternator ''B'' terminal and battery (–) terminal, a blown fusible link or poor grounding is suspected.
(2) Turn on the headlight switch and start the engine.
(3) Set the headlight at high beam and the heater blower switch at HIGH, quickly increase the engine speed to 2,500 rpm and read the maximum output current value indicated by the ammeter.

   NOTE
   After the engine start up, the charging current quickly drops, therefore, above operation must be done quickly to read maximum current value correctly.

**Result**

(1) The ammeter reading must be higher than the limit value. If it is lower but the alternator output wire is normal, remove the alternator from the vehicle and check it.

**Limit value:**

| | |
|---|---|
| **45.5A min** | **65A** |
| **52.5A min** | **75A** |
| **63A min** | **90A** |

**Caution**

**(a) The nominal output current value is shown on the nameplate affixed to the alternator body.**

**(b) The output current value changes with the electrical load and the temperature of the alternator itself.**
**Therefore, the nominal output current may not be obtained if the vehicle electrical load at the time of test is small.**
**In such a case, keep the headlights on to cause discharge of the battery or use lights of another vehicle as a load to increase the electrical load. The nominal output current may not be obtained if the temperature of the alternator itself or ambient temperature is too high. In such a case, reduce the temperature before testing again.**

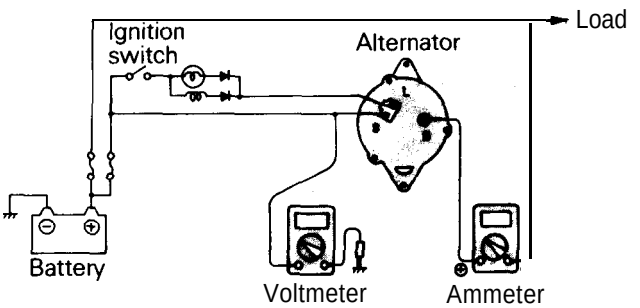
(2) Upon completion of the output current test, lower the engine speed to the idle speed and turn off the ignition switch.
(3) Disconnect the battery ground cable.
(4) Remove the test ammeter and voltmeter and the engine tachometer.
(5) Connect the alternator output wire to the alternator "B" terminal.
(6) Connect the battery ground cable.

## REGULATED VOLTAGE TEST

The purpose of this test is to check that the electronic voltage regulator controls the voltage correctly.

**Preparation**

(1) Prior to the test, check the following items and correct if necessary.
(a) Check the battery installed on the vehicle to see that it is fully charged. For battery checking method, see "BATTERY".
(b) Check the alternator drive belt tension. For belt tension check, see "GROUP 0– Maintenance Service".
(2) Turn the ignition switch to "OFF".
(3) Disconnect the battery ground cable.
(4) Connect a digital voltmeter between the "S" terminal of the alternator and ground. Connect the (+) lead of the voltmeter to the "S" terminal of the alternator, inserting from the wire side of the 2-way connector and connect the (–) lead to sound ground or battery (–) terminal.



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(5) Disconnect the alternator output wire from the alternator "B" terminal.
(6) Connect a DC ammeter (0 to 100A) in series between the "B" terminal and the disconnected output wire. Connect the (+) lead of the ammeter to the "B" terminal and connect the (–) lead wire to the disconnected output wire.
(7) Set the engine tachometer and connect the battery ground cable.

**Test**

(1) Turn on the ignition switch and check that the voltmeter indicates the following value.

**Voltage: Battery voltage**

If it reads OV, there is an open circuit in the wire between' the alternator "S" terminal and the battery (+) or the fusible link is blown.
(2) Start the engine. Keep all lights and accessories off.
(3) Run the engine at a speed of about 2,500 rpm and read the voltmeter when the alternator output current drops to 10A or less.

Result

(1) If the voltmeter reading agrees with the value listed in' the regulating voltage table below, the voltage regulator is functioning correctly. If the reading is other than the standard value, the voltage regulator or the alternator is faulty.

**Regulating voltage table**

| Voltage regulator ambient temperature °C (°F) | Regulating voltage V |
|---|---|
| -20 (-4) | 14.2-15.4 |
| 20 (68) | 13.9-14.9 |
| 60 (140) | 13.4-14.6 |
| 80 (176) | 13.1-14.5 |

(2) Upon completion of the test, set the engine speed at idle and turn off the ignition switch.
(3) Disconnect the battery ground cable.
(4) Remove the test voltmeter and ammeter and the engine tachometer.
(5) Connect the alternator output wire to the alternator "B" terminal.
(6) Connect the battery ground cable.

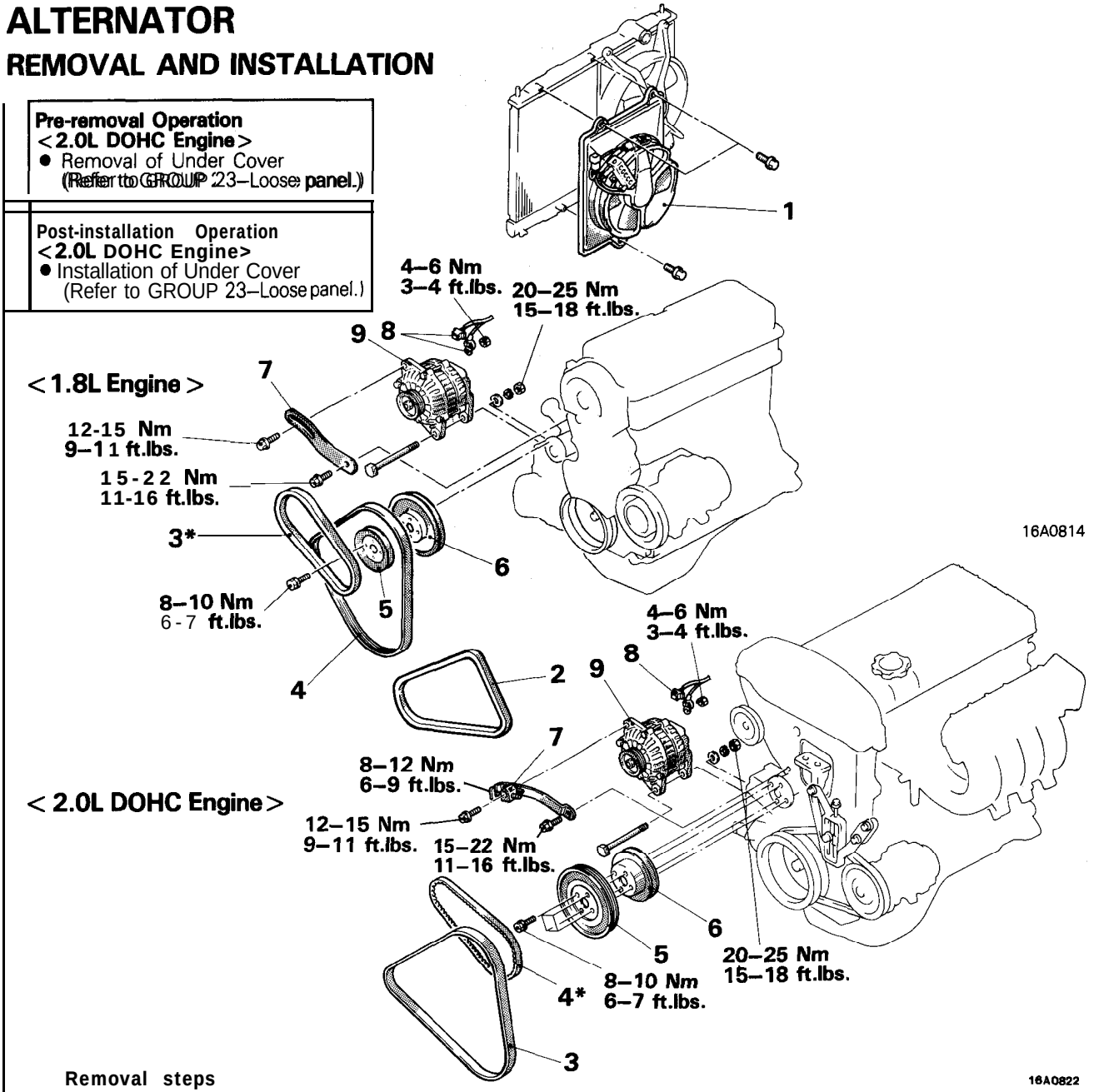
# ALTERNATOR

## REMOVAL AND INSTALLATION

N08EJAR

**Pre-removal Operation**
**<2.0L DOHC Engine>**
- Removal of Under Cover
(Refer to GROUP 23–Loose panel.)

**Post-installation Operation**
**<2.0L DOHC Engine>**
- Installation of Under Cover
(Refer to GROUP 23–Loose panel.)




**Removal steps**

1. Condenser fan motor (air conditioner equipped models)
- ● + 2. Air conditioner drive belt <1.8L Engine>
- ● + 3. Drive belt
- ● * 4. Drive belt
5. Water pump pulley
6. Water pump pulley
7. Alternator brace
8. Alternator wiring harness connector connection
9. Alternator

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ● +: Refer to "Service Points of Installation".
(3) *: Power steering drive belt

## SERVICE POINTS OF INSTALLATION

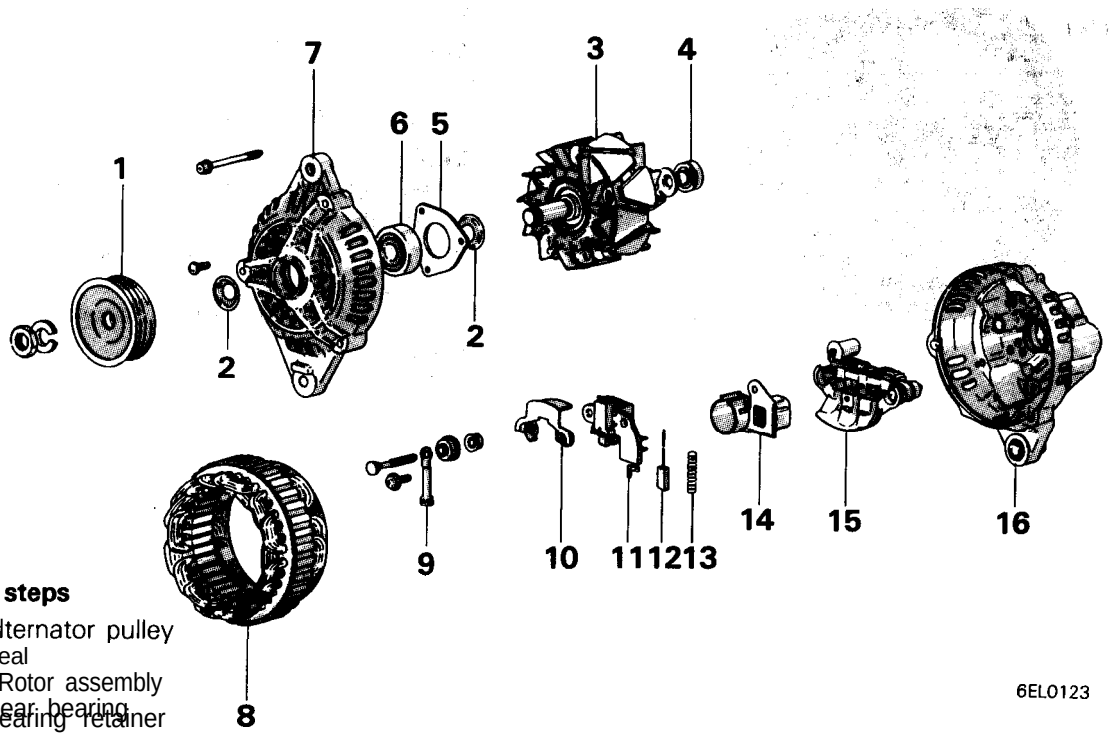
### 4./3. ADJUSTMENT OF DRIVE BELT TENSION

Refer to GROUP 7–Service Adjustment Procedures.
Refer to GROUP 19–Steering Oil Pump.

### 2. ADJUSTMENT OF DRIVE BELT TENSION

Refer to GROUP 24–Compressor.

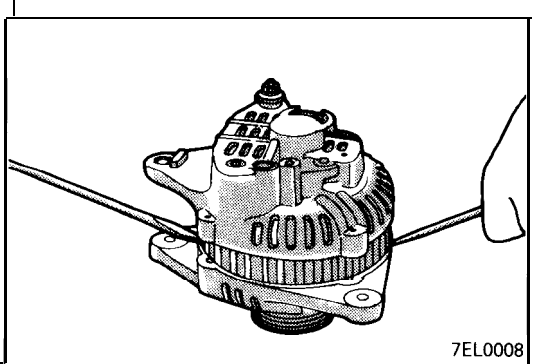
## DISASSEMBLY AND REASSEMBLY

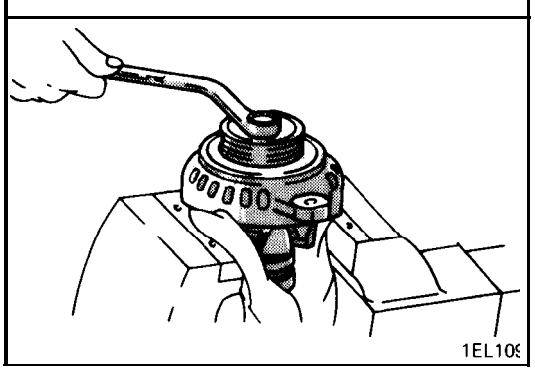



**Disassembly steps**

◆◆ 1. Alternator pulley
2. Seal
● a 3. Rotor assembly
4. Rear bearing
5. Bearing retainer
6. Front bearing
7. Front bearing
◆ ☒ 8. Stator
9. Terminal
10. Plate
11. Regulator and brush holder
12. Brush
13. Brush spring
14. Slinger
15. Rectifier
16. Rear bracket

NOTE
(1) Reverse the disassembly procedures. to reassemble.
(2) ◆◆: Refer to "Service Points of Disassembly".
(3) ● 4 : Refer to "Service Points of Reassembly".




## SERVICE POINTS OF DISASSEMBLY

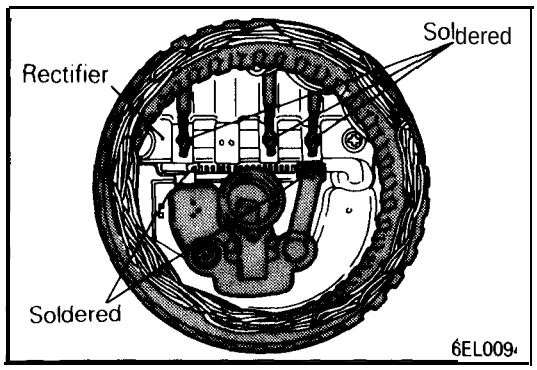
### SEPARATION OF THE STATOR AND FRONT BRACKET

Insert plain screwdriver between front bracket and stator core and pry downward.

**Caution**
**Do not insert screwdriver too deep, as there is danger of damage to stator coil.**

### 1. REMOVAL OF ALTERNATOR PULLEY

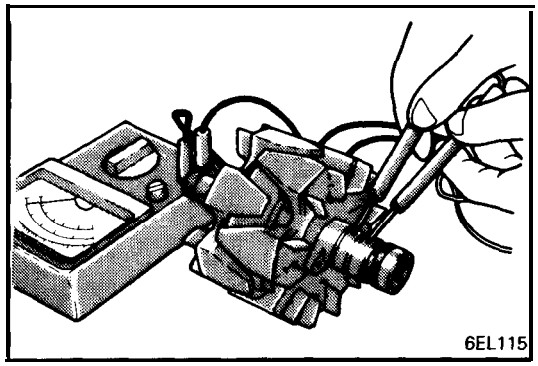
(1) Clamp the rotor in a vise with soft jaws.,,
(2) After removing the nut, remove the pulley and front bracket from the rotor.




## 8. REMOVAL OF STATOR

(1) When removing stator, unsolder three stator leads soldered to main diodes on rectifier.
(2) When removing rectifier from brush holder, unsolder two soldered points to rectifier.

**Caution**
**When soldering or unsoldering, use care to make sure that heat of soldering iron is not transmitted to diodes for a long period. Finish soldering or unsoldering in as short a time as possible.**
**Use care that no undue force is exerted to leads of diodes.**

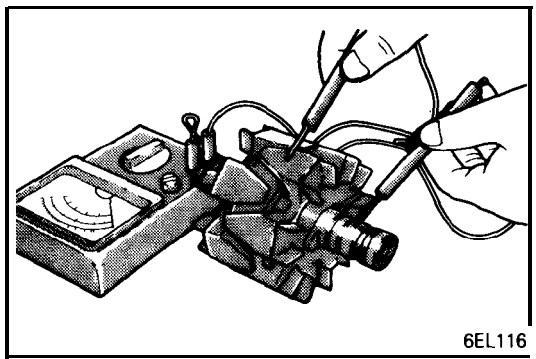



## INSPECTION

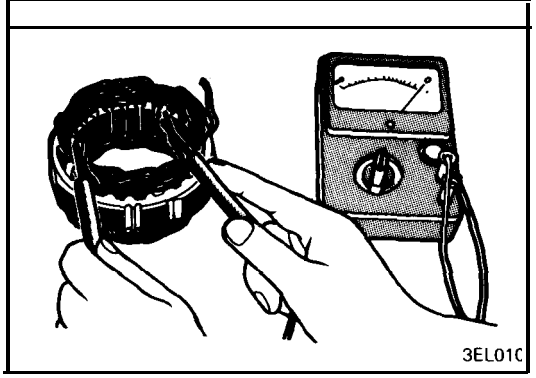
### ROTOR

(1) Check rotor coil for continuity. Check to ensure that there is continuity between slip rings.
If resistance is extremely small, it means that there is a short. If there is no continuity or if there is short circuit, replace rotor assembly.

**Resistance value: 3–5 Ω**




(2) Check rotor coil for grounding. Check to ensure that there is no continuity between slip ring and core. If there is continuity, replace rotor assembly.




### STATOR

(1) Make continuity test on stator coil. Check to ensure that there is continuity between coil leads.
If there is no continuity, replace stator assembly.