

ENGINE ELECTRICAL

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N08AA-

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CHARGING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

NO8EB--

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

NO8EC--

Items	Specifications
Alternator	
Standard value	
Regulated voltage V	14.2–15.4 at –20°C (–4°F) 13.9–14.9 at 20°C (68°F) 13.4–14.6 at 60°C (140°F) 13.1–14.5 at 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 Min. 45.5 75 A Min. 52.5 90 A Min. 63
Slip ring O.D. mm (in.)	22.1 (.870)

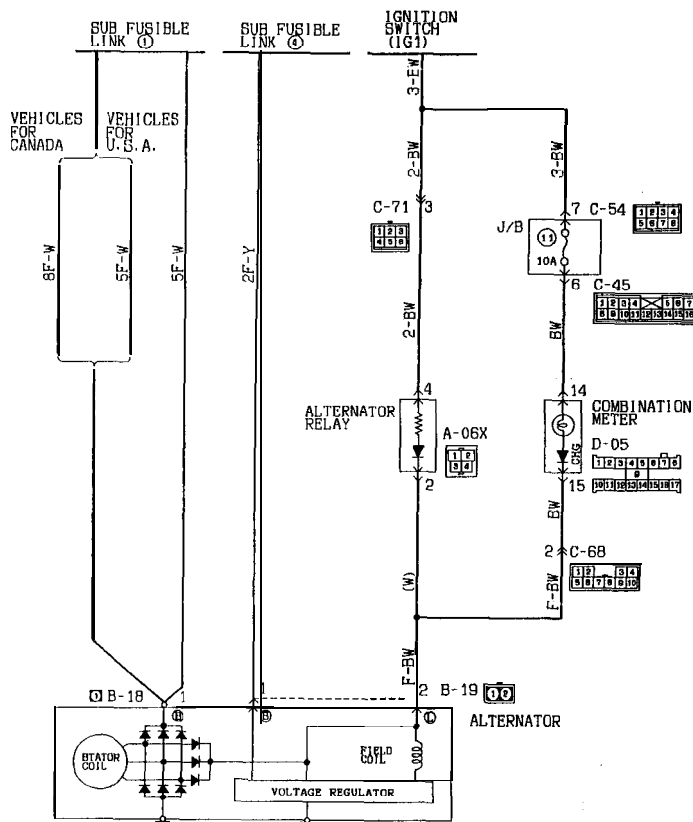
TORQUE SPECIFICATIONS

NO8ED--

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

CIRCUIT DIAGRAM



135-AC-10405-NC

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

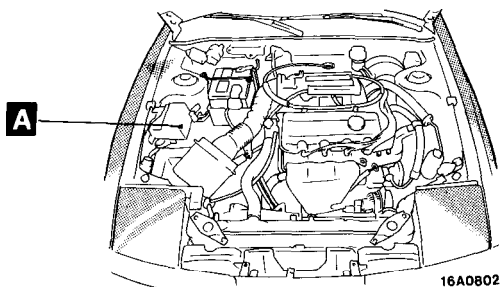
The alternator relay functions as a back-up for the flow of electricity to the field coil if there is a disconnection or damaged wiring of the charging warning light.

TROUBLESHOOTING HINTS

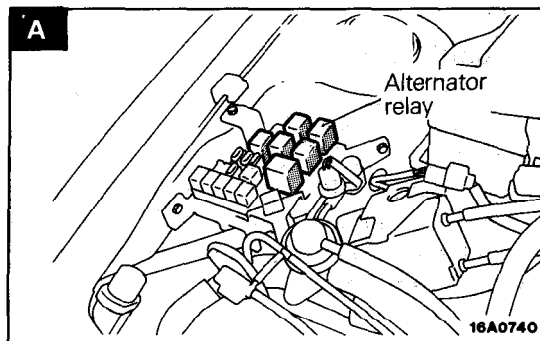
1. Charging indicator light does not go on when the ignition switch is turned to "ON", before the engine starts.
 - Check the bulb
2. Charging indicator light fails to go off once the engine starts.
 - Check the IC voltage regulator (located within the alternator).
3. Discharged or overcharged battery.
 - 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



16A0802



16A0740

SERVICE ADJUSTMENT PROCEDURES

CHARGING SYSTEM INSPECTION NO8E1AO

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.

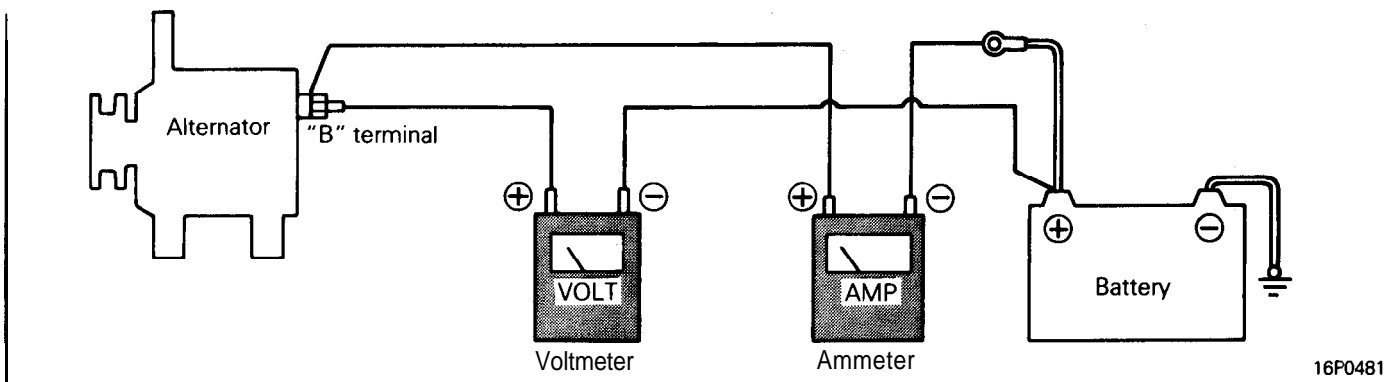
Preparation

- (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.

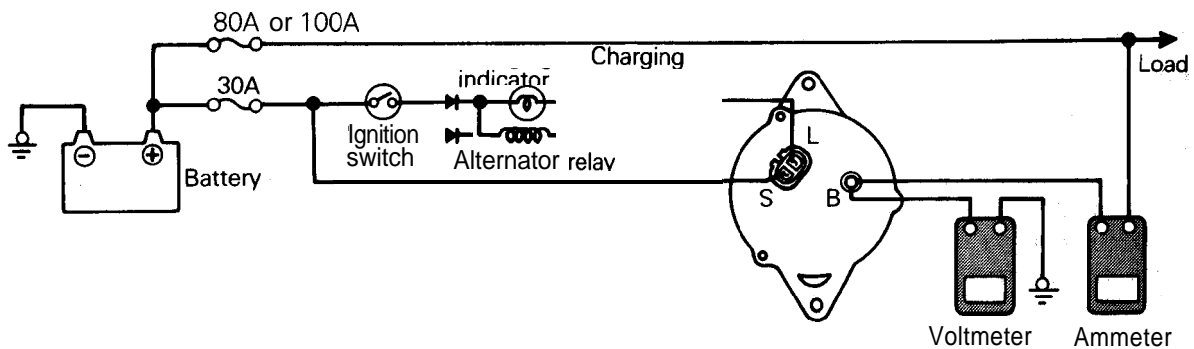
NOTE

Tighten each connection by bolt and nut securely as a heavy current will flow. Do not rely 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.



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Test

(1) Check to see that the voltmeter reads the same value as the battery voltage.

If the voltmeter reads 0V, 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.

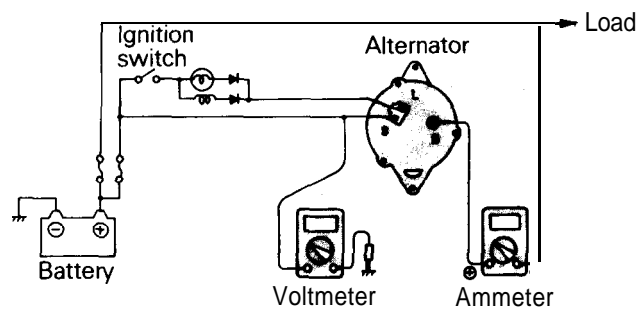
REGULATED VOLTAGE TEST

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 0V, 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

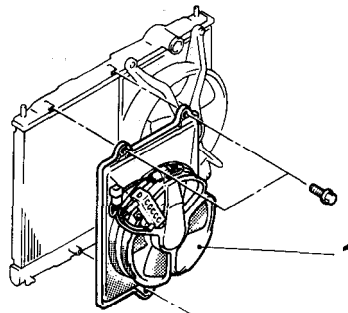
Voltage regulator ambient temperature °C (°F)	Regulating voltage V
- 20 (- 4)	14.2-15.4
20 (68)	13.9-14.9
60 (140)	13.4-14.6
80 (176)	13.1-14.5

- (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

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.)



< 1.8L Engine >

12-15 Nm
9-11 ft.lbs.

15-22 Nm
11-16 ft.lbs.

8-10 Nm
6-7 ft.lbs.

4-6 Nm
3-4 ft.lbs. 20-25 Nm
15-18 ft.lbs.

16A0814

< 2.0L DOHC Engine >

12-15 Nm
9-11 ft.lbs.

8-12 Nm
6-9 ft.lbs.

15-22 Nm
11-16 ft.lbs.

8-10 Nm
6-7 ft.lbs.

4-6 Nm
3-4 ft.lbs.

20-25 Nm
15-18 ft.lbs.

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

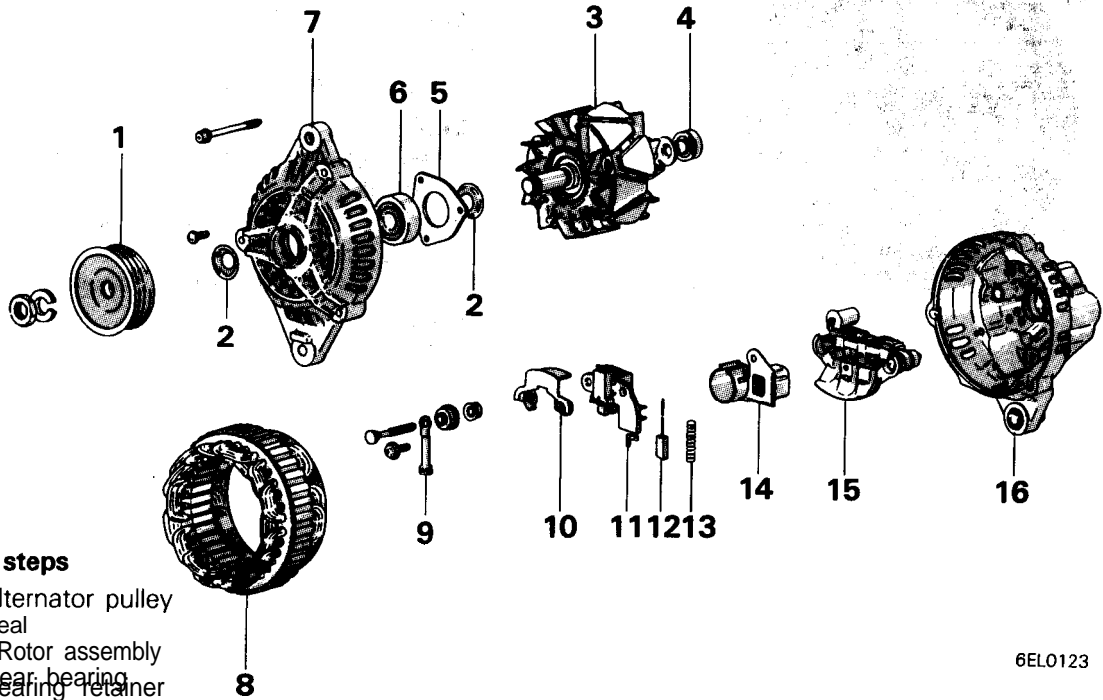
4./3. ADJUSTMENT OF DRIVE BELT TENSION

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



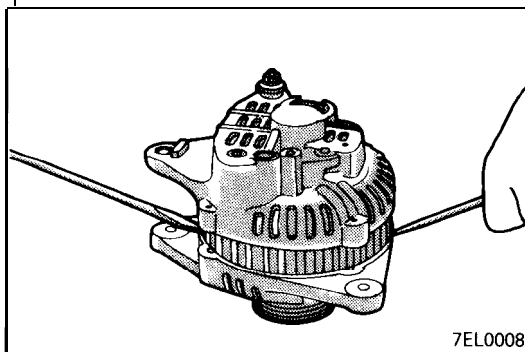
Disassembly steps

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

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NOTE

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



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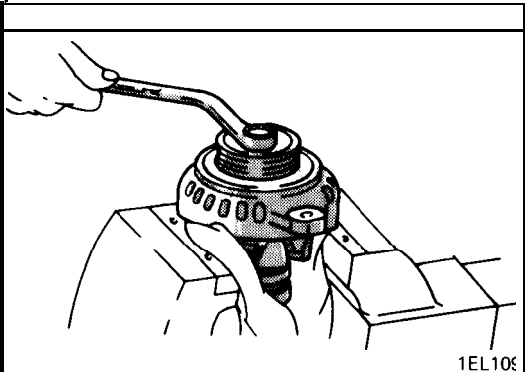
SERVICE POINTS OF DISASSEMBLY

SEPARATION OF THE STATOR AND FRONT BRACKET

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

Caution

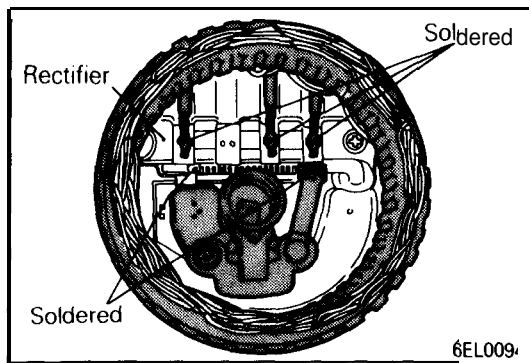
Do not insert screwdriver too deep, as there is danger of damage to stator coil.



1EL106

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.



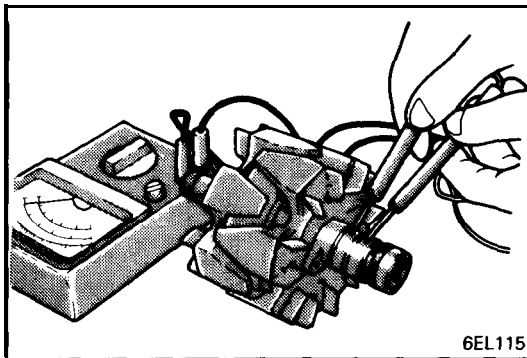
8. REMOVAL OF STATOR

- (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.

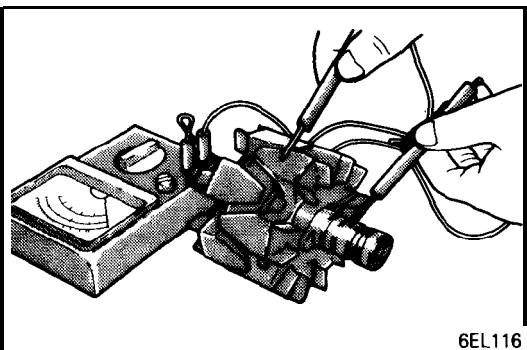


INSPECTION

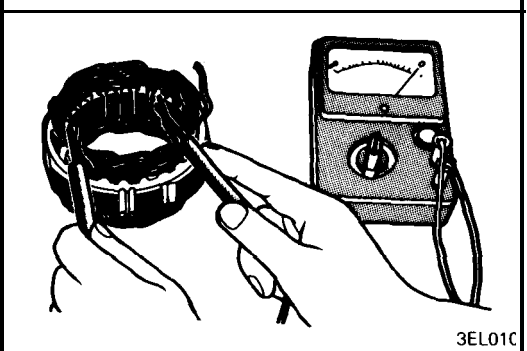
ROTOR

- (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

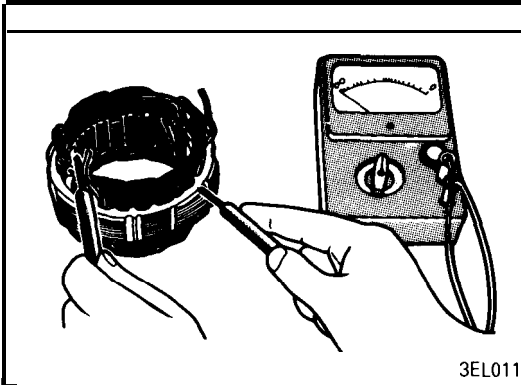


- (2) Check rotor coil for grounding. Check to ensure that there is no continuity between slip ring and core. If there is continuity, replace rotor assembly.

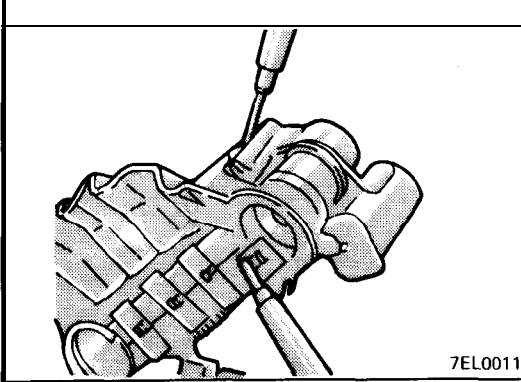


STATOR

- (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.



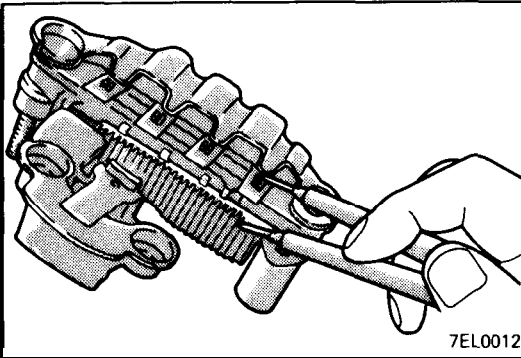
- (2) Check coil for grounding. Check to ensure that there is no continuity between coil and core. If there is continuity, replace stator assembly.



RECTIFIERS

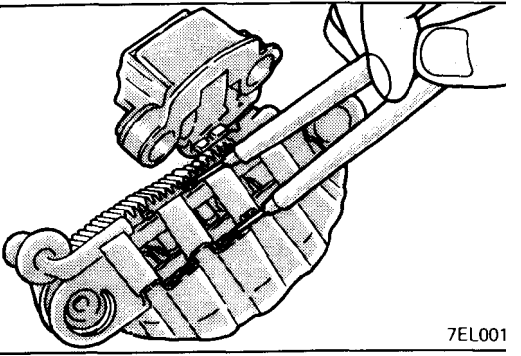
(1) Positive Rectifier Test

Check for continuity between positive rectifier and stator coil lead connection terminal with a circuit tester. If there is continuity in both directions, diode is shorted. Replace rectifier assembly.



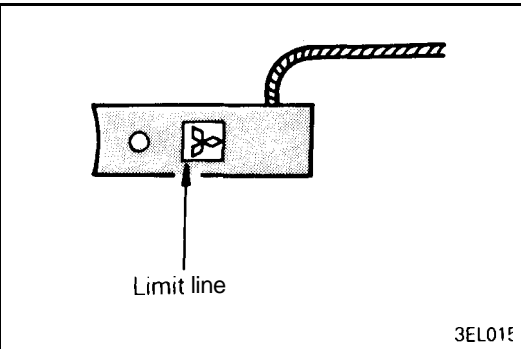
(2) Negative Rectifier Test

Check for continuity between negative rectifier and stator coil lead connection terminal. If there is continuity in both direction, diode is shorted, and rectifier assembly must be replaced.



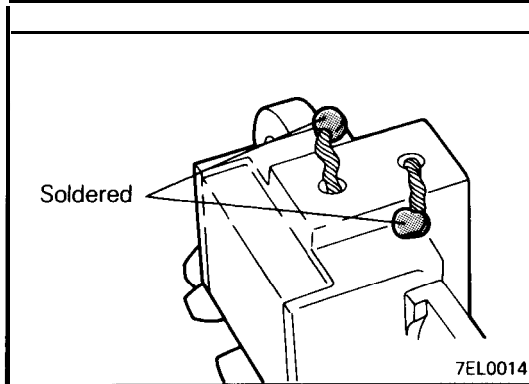
(3) Diode Trio Test

Check three diodes for continuity by connecting a circuit tester to both ends of each diode. If there is no continuity in both directions, diode is faulty and heatsink assembly must be replaced.

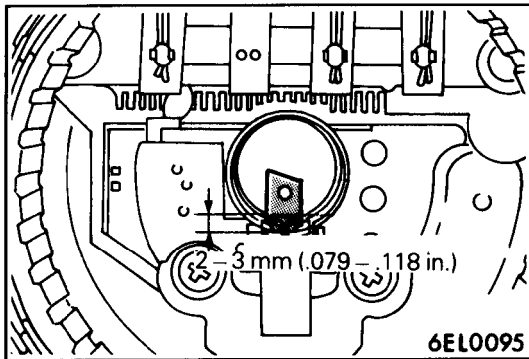


BRUSH REPLACEMENT

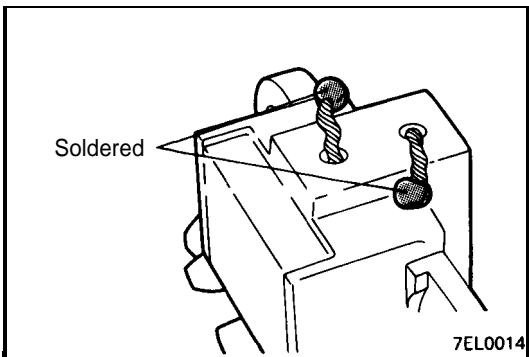
- (1) Replace brush by the following procedures if it has been worn to limit line.



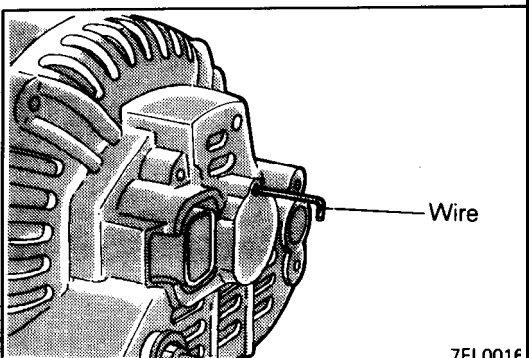
(2) Unsolder pigtail and remove old brush and spring.



(3) Install brush spring and new brush in brush holder.
 (4) insert the brush to where there is a space 2 to 3 mm (.079 to .118 in.) between the limit line and the end of the brush holder.



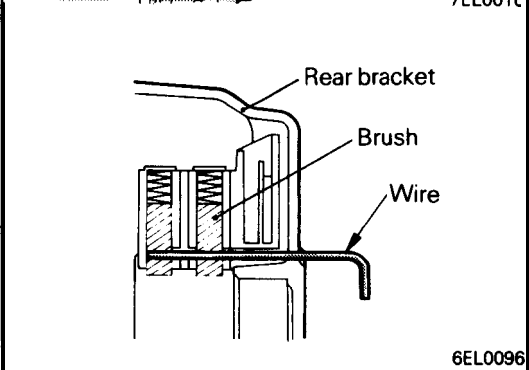
(5) Solder pigtail to brush holder as shown in the illustration.



SERVICE POINTS OF REASSEMBLY

3. INSTALLATION OF ROTOR ASSEMBLY

Before rotor is attached to rear bracket, insert wire through small hole made in rear bracket to lift brush. After rotor has been installed, remove the wire.



STARTING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

NO8FB-

Items	1.8L Engine	2.0L DOHC Engine
Starter motor		
Type	Direct drive	Reduction drive
Rated output kW/V	0.9/12	1.2/12
No. of pinion teeth	8	8

SERVICE SPECIFICATIONS

NO8FC-

Items	Specifications
Standard value	
Starter motor	
Direct drive type	
Free running characteristics	
Terminal voltage V	11.5
Current A	60 or less
Speed rpm	6,600 or more
Pinion gap mm (in.)	0.5–2.0 (.020–.079)
Commutator runout mm (in.)	0.05 (.002)
Commutator diameter mm (in.)	32 (1.26)
Undercut depth mm (in.)	0.5 (.020)
Reduction drive type	
Free running characteristics	
Terminal voltage V	11
Current A	90 or less
Speed rpm	3,000 or more
Pinion gap mm (in.)	0.5–2.0 (.020–.079)
Commutator runout mm (in.)	0.05 (.002)
Commutator diameter mm (in.)	29.4 (1.158)
Undercut depth mm (in.)	0.5 (.020)
Limit	
Direct drive type	
Commutator runout mm (in.)	0.1 (.004)
Commutator diameter mm (in.)	31 (1.22)
Reduction drive type	
Commutator runout mm (in.)	0.1 (.004)
Commutator diameter mm (in.)	28.4 (1.118)

TORQUE SPECIFICATIONS

N08FD--

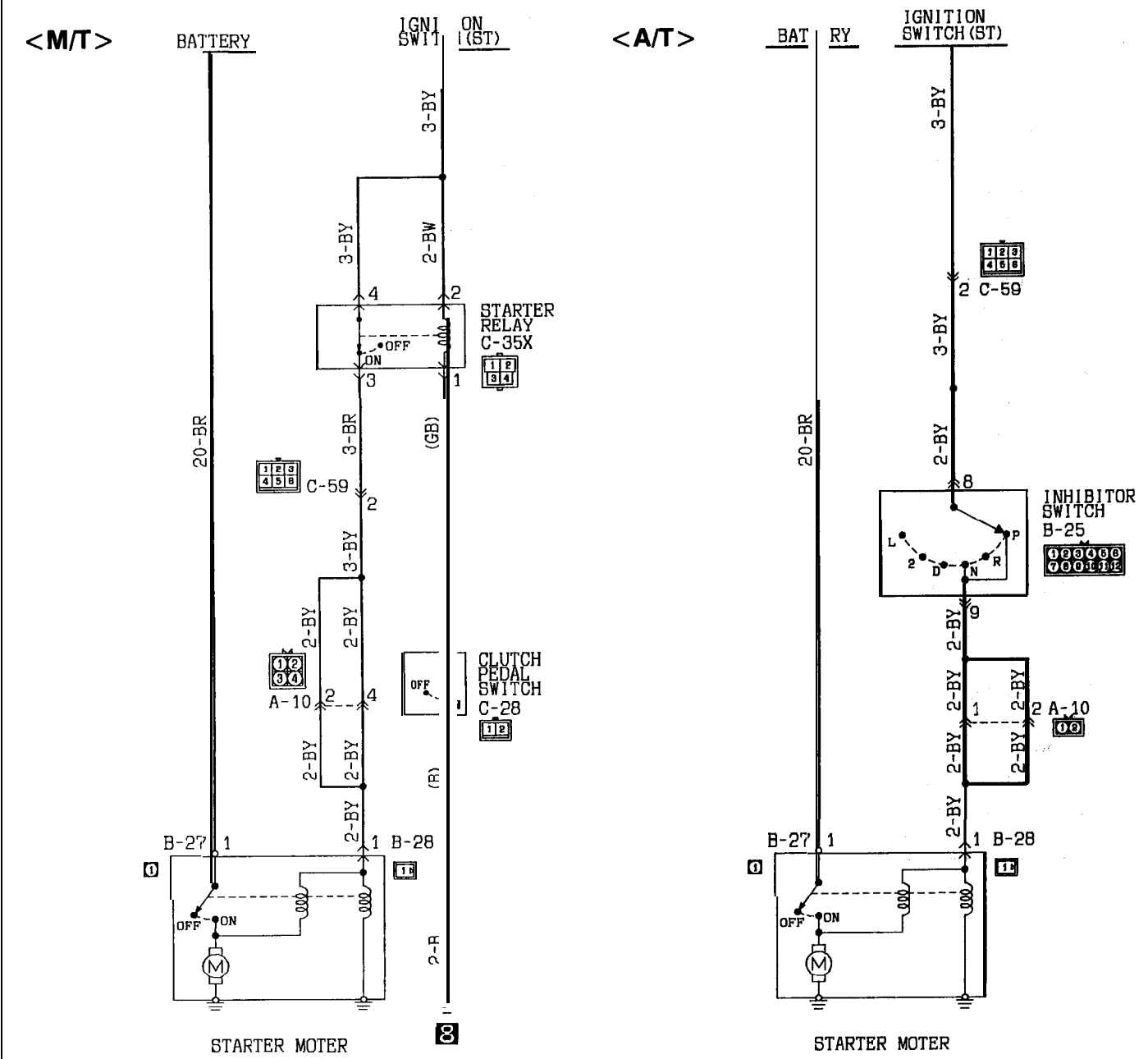
Items	Nm	ft.lbs.
Starter motor mounting bolts	27-34	20-25
Starter wiring harness connector mounting nut	10-16	7-11
Battery holder mounting bolts	2-3	1.5-2
Battery tray mounting bolts	9-14	6-10
Intake manifold stay mounting bolts	18-25	1 3 - 1 8

TROUBLESHOOTING

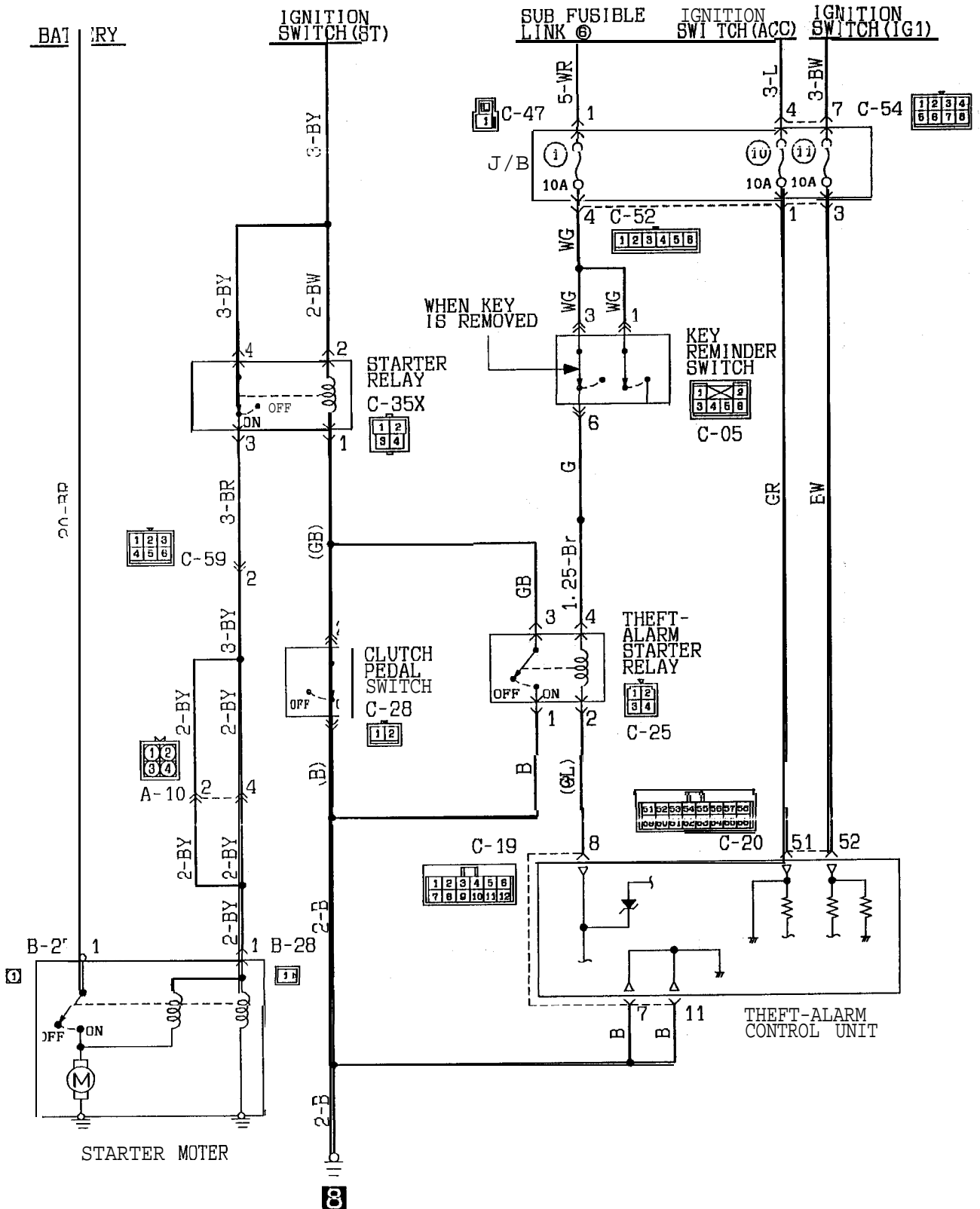
N08FHA#

CIRCUIT DIAGRAM

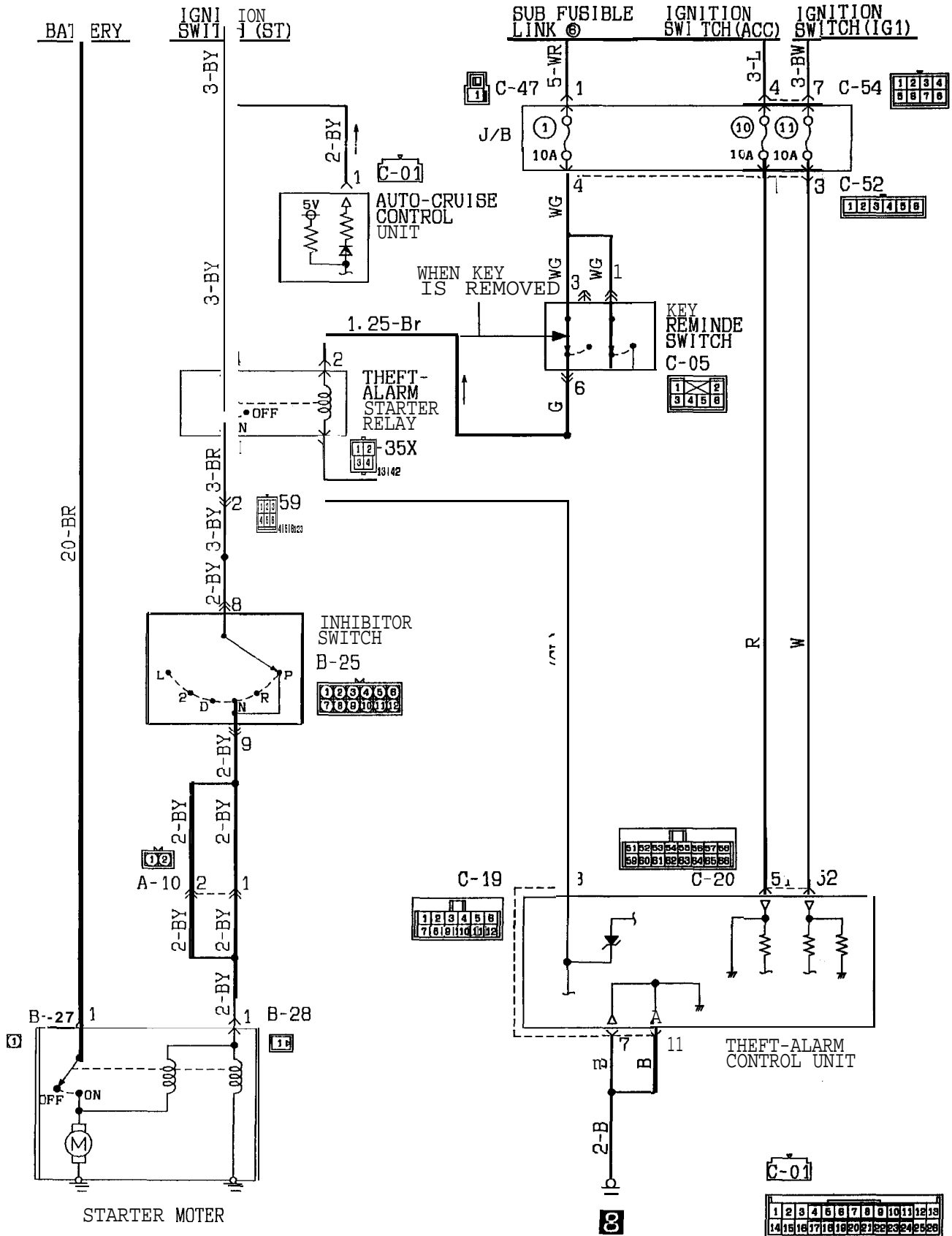
Vehicles without theft-alarm system



Vehicles with theft-alarm system <M/T>



Vehicles with theft-alarm <A/T>



OPERATION

- For models equipped with the M/T, the clutch pedal switch contact is switched OFF when the clutch pedal is depressed; when the ignition switch is then switched to the “ST” position, electricity flows to the starter relay and the starter motor, the contact (magnetic switch) of the starter is switched ON and the starter motor is activated.

NOTE

If the ignition switch is switched to the “ST” position without the clutch pedal being depressed, electricity flows to the starter relay (coil), the clutch switch (contacts) and to ground, with the result that the contacts of the starter relay are switched OFF, and, because the power to the starter motor is thereby interrupted, the starter motor is not activated.

- For models equipped with the A/T, when the ignition switch is switched to the “ST” position while the selector lever is at the “P” or “N” position, the contact (magnetic switch) of the starter is switched ON and the starter motor is activated.

TROUBLESHOOTING HINTS

1. The starter motor does not operate at all.
 - Check the starter (coil).
 - Check for poor contact at the battery terminals.
2. The starter motor doesn't stop.
 - Check the starter (magnetic switch).

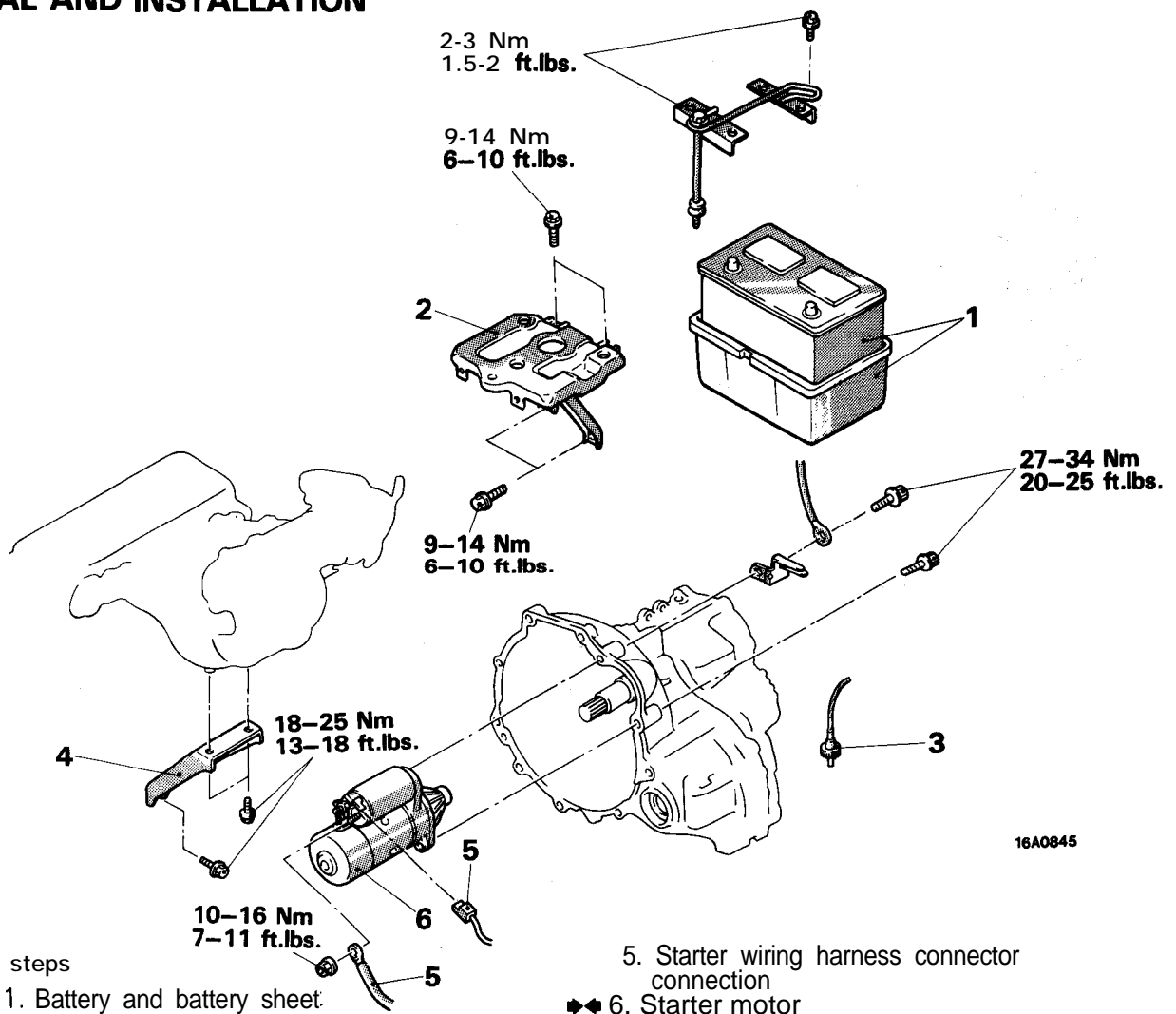
NOTE

For information concerning the starter relay and theft-alarm starter relay, refer to P.8-159,160 and for the theft-alarm system, refer to P.8-300.

N08FJAQ

STARTER MOTOR

REMOVAL AND INSTALLATION



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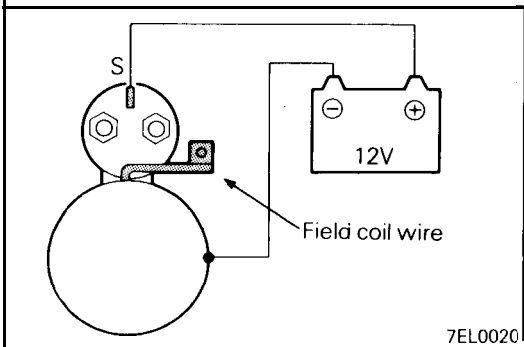
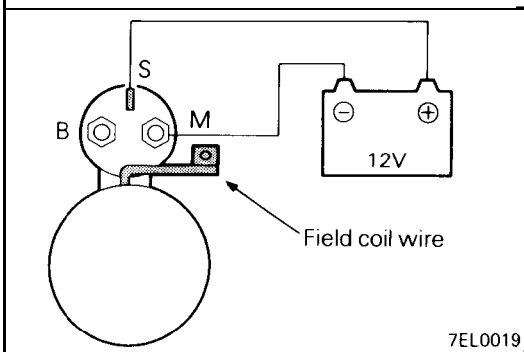
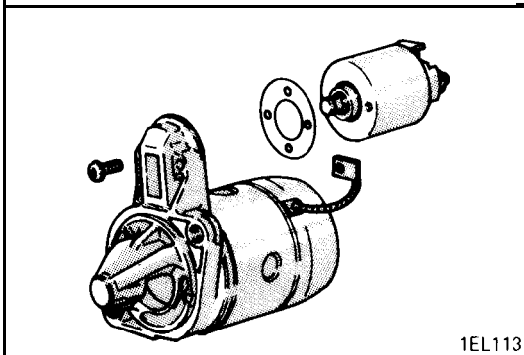
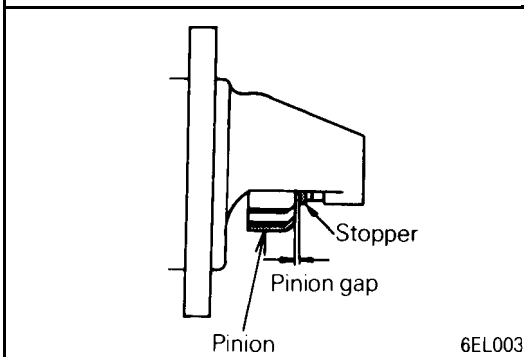
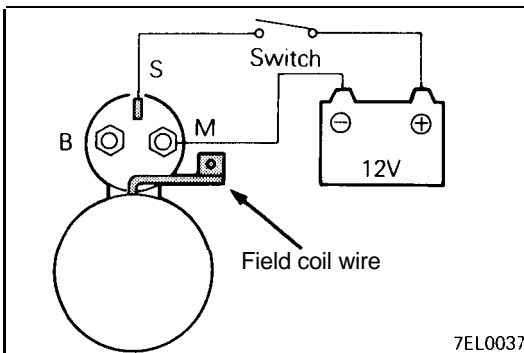
Removal steps

1. Battery and battery sheet.
2. Battery tray
3. Connection on the transaxle side of the speedometer cable
4. Intake manifold stay <1.8L Engine>

5. Starter wiring harness connector connection
6. Starter motor

NOTE

Reverse the removal procedures to reinstall.



INSPECTION

PINION GAP ADJUSTMENT

- (1) Disconnect field coil wire from M-terminal of magnetic switch.
- (2) Connect a 12V battery between S-terminal and M-terminal.
- (3) Set switch to "ON", and pinion will move out.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

- (4) Check pinion to stopper clearance (pinion gap) with a feeler gauge.

Pinion gap: 0.5–2.0 mm (.020–.079 in.)

- (5) If pinion gap is out of specification, adjust by adding or removing gaskets between magnetic switch and front bracket.

PULL-IN TEST OF MAGNETIC SWITCH

- (1) Disconnect field coil wire from M-terminal of magnetic switch.
- (2) Connect a 12V battery between S-terminal and M-terminal.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

- (3) If pinion moves out, then pull-in coil is good. If it doesn't, replace magnetic switch.

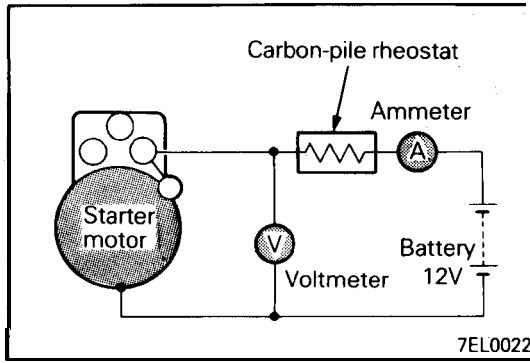
HOLD-IN TEST OF MAGNETIC SWITCH

- (1) Disconnect field coil wire from M-terminal of magnetic switch.
- (2) Connect a 12V battery between S-terminal and body.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

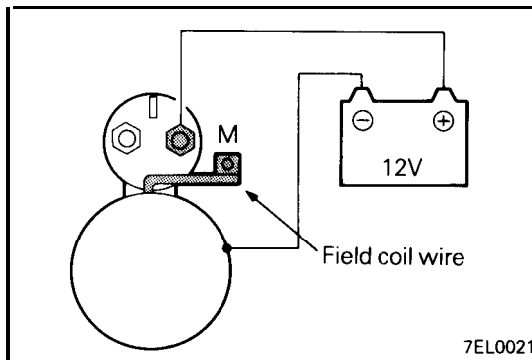
- (3) If pinion remains out, everything is in order. If pinion moves in, hold-in circuit is open. Replace magnetic switch.



FREE RUNNING TEST

- (1) Place starter motor in a vise equipped with soft jaws and connect a fully-charged 12-volt battery to starter motor as follows:
- (2) Connect a test ammeter (100-ampere scale) and carbon pile rheostat in series with battery/ positive post and starter motor terminal.
- (3) Connect a voltmeter (15-volt scale) across starter motor.
- (4) Rotate carbon pile to full-resistance position.
- (5) Connect battery cable from battery negative post to starter motor body.
- (6) Adjust the rheostat until the battery voltage shown by the voltmeter is 11.5V (for the direct drive type) or 1 IV (for the reduction-drive type).
- (7) Confirm that the maximum amperage is within the specifications and that the starter motor turns smoothly and freely.

**Current: Max. 60 Amps (Direct drive type)
Max. 90 Amps (Reduction drive type)**



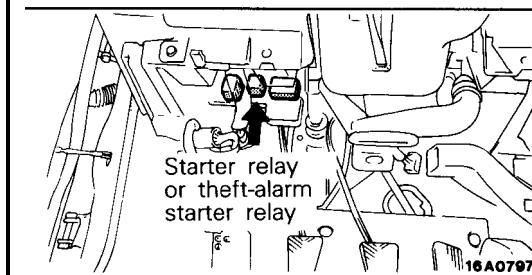
RETURN TEST OF MAGNETIC SWITCH

- (1) Disconnect field coil wire from M-terminal of magnetic switch.
- (2) Connect a 12V battery between M-terminal and body.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

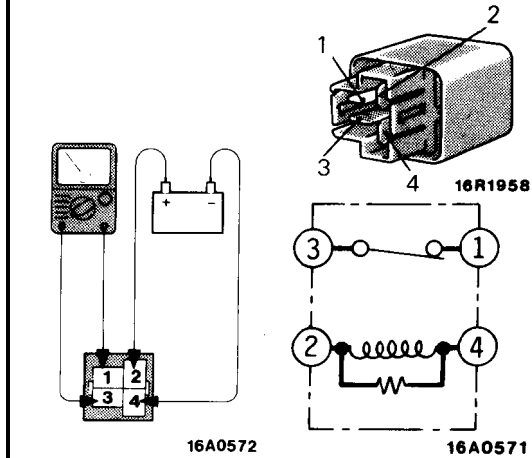
- (3) Pull pinion out and release. If pinion quickly returns to its original position, everything is in order. If it doesn't, replace magnetic switch.



STARTER RELAY <M/T>

THEFT-ALARM STARTER RELAY <A/T>

- (1) Remove the knee protector.
(Refer to GROUP 23–Instrument Panel.)
- (2) Remove the relay from the underside of the relay box.
- (3) Connect battery to terminal 2 and check continuity between terminals with terminal 4 grounded.



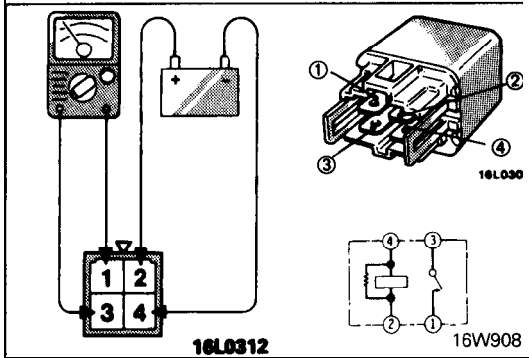
Power is supplied	1–3 terminals	No continuity
Power is not supplied	1–3 terminals	Continuity
	2-4 terminals	Continuity



THEFT-ALARM STARTER RELAY <M/T>

- (1) Remove the floor console.
(Refer to GROUP 23—Floor Console.)
- (2) Take out the theft-alarm starter relay.
- (3) Connect battery to terminal 2 and check continuity between terminals with terminal 4 grounded.

Power is supplied	1-3 terminals	Continuity
Power is not supplied	1-3 terminals	No continuity
	2-4 terminals	Continuity



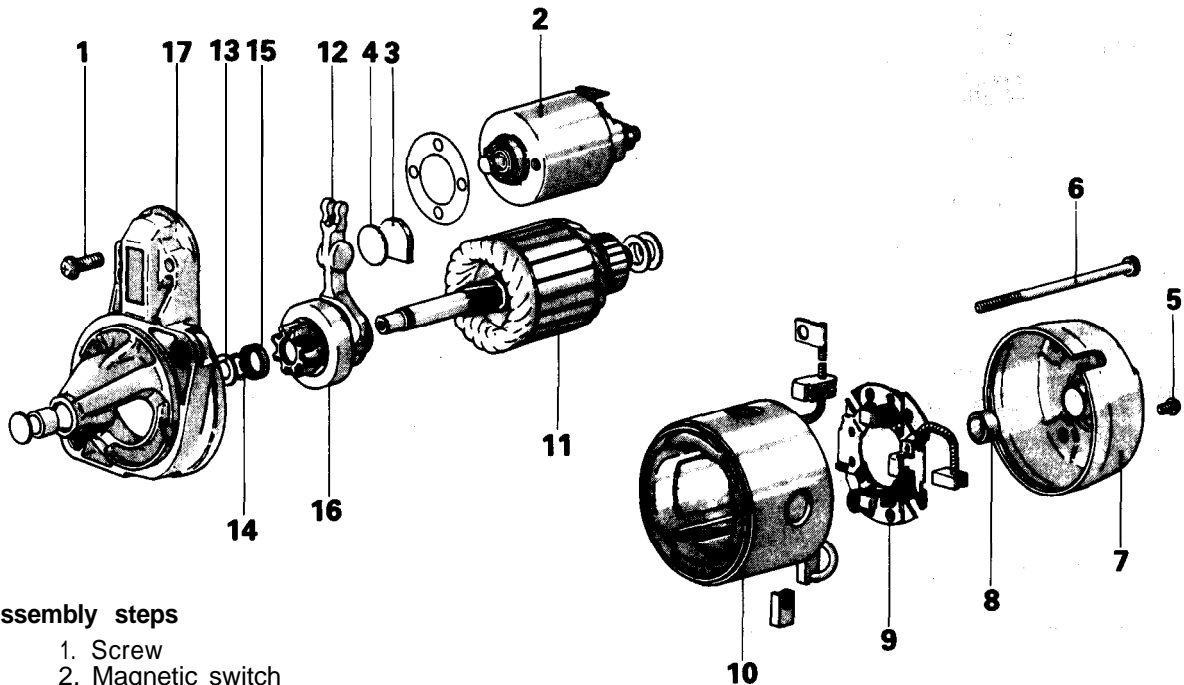
SERVICE POINTS OF INSTALLATION

6. INSTALLATION OF STARTER MOTOR

Clean both surfaces of starter motor flange and rear plate.

STARTER MOTOR (DIRECT DRIVE TYPE)

DISASSEMBLY AND REASSEMBLY



Disassembly steps

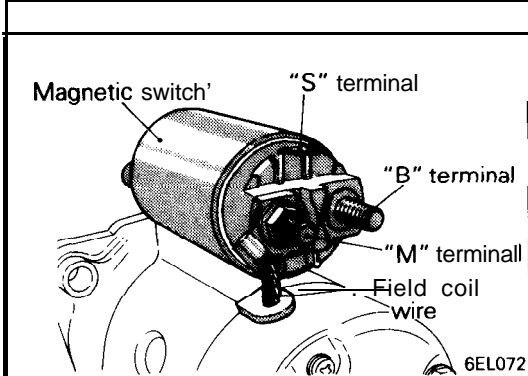
- 1. Screw
- ↔ 2. Magnetic switch
- ↔ 3. Packing
- 4. Plate
- 5. Screw
- 6. Through bolt
- 7. Rear bracket
- 8. Rear bearing
- ↔ 9. Brush holder assembly
- 10. Yoke assembly
- 11. Armature
- 12. Lever
- 13. Washer

- ↔ ◆ ◆ ◆ 14. Snap ring
- ↔ ● * 15. Stop ring
- 16. Overrunning clutch
- 17. Front bracket

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NOTE

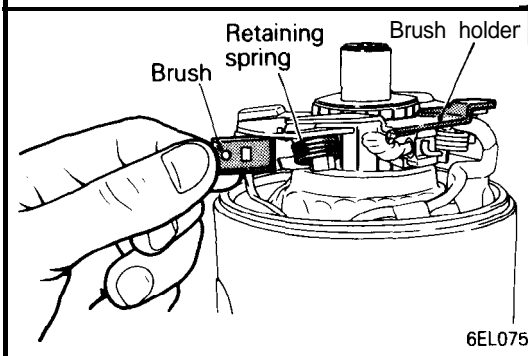
- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆ ◆ ◆: Refer to "Service Points of Disassembly".
- (3) ● O: Refer to "Service Points of Reassembly".



SERVICE POINTS OF DISASSEMBLY

2. REMOVAL OF MAGNETIC SWITCH

Disconnect field coil wire from "M" terminal of magnetic switch.



9. REMOVAL OF BRUSH HOLDER ASSEMBLY

Slide the two brushes from brush holder by prying retaining springs back.