

Engine Electrical System

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GENERAL**SPECIFICATIONS** EBJB0010**IGNITION**

	2.4 I4 Engine	2.7 V6 Engine
Type	Molded coil	Molded coil
Primary coil resistance	$0.86 \pm 0.09 \text{ } (\Omega)$	$0.74 \pm 10\% \text{ } (\Omega)$
Secondary coil resistance	$12.1 \pm 1.8 \text{ } (K\Omega)$	$13.3 \pm 15\% \text{ } (K\Omega)$

SPARK PLUG

	2.4 I4	2.7 V6
Type	PGR5C-11	PFR5N-11
Champion	RN10PYP4	RC10PYP4
Plug gap	1.0-1.1 mm (0.039-0.043 in.)	

STARTER MOTOR

	All Engines
Type	Reduction drive (with planetary gear)
Voltage	12V
Output	1.2 KW
No-load characteristics	
Terminal voltage	11V
Amperage	90A or below
Speed	2,800 RPM
Number of pinion teeth	8
Pinion gap	0.5-2.0 mm (0.0197-0.079 in.)

GENERATOR

	All Engines
Type	Battery voltage sensing
Rated output	13.5V / 95A
Voltage regulator type	Electronic built-in
Regulator setting voltage	$14.4 \pm 0.3 \text{ V}$
Temperature compensated	$-10 \pm 3 \text{ mV}^{\circ}\text{C}$

BATTERY

	2.4 I4 Engine	2.7 V6 Engine
Type	MF60AH	MF 68 AH
Ampere hours 5HR	48 AH or more	55 AH or more
Cold cranking [at -17.8°C (0°F)]	550 A or more	540 AH or more
Reserve capacity	92 min.	122 min.
Specific gravity [at 25°C (77°F)]	1.280 ± 0.01	1.280 ± 0.01

NOTE

COLD CRANKING AMPERAGE is the amperage a battery can deliver for 30 seconds and maintain a terminal voltage of 7.2 or greater at a specified temper-

ature. **RESERVE CAPACITY RATING** is the amount of time a battery can deliver 25A and maintain a minimum terminal voltage of 10.5 at 26.7°C (80°F).

CRUISE CONTROL SYSTEM

Speed control module	DC 10 - 16V -30 - +75°C (-22 - +167°F) 0.4V Low speed limit : 40 ± 3 km/h (25 ± 2 mph) High speed limit : 145 ± 5 km/h (90 ± 3 mph)
Actuator	DC 12V -30 - +90°C (-22 - +194°F) 3A or less (at 12V 20°C) 1MΩ or less (at 500V)
Cruise main switch	DC 12V 0.3 - 1.0 kg 0.15 V or less
Stop lamp switch	DC 12V 27 x 5W (lamp load) 0.1 - 0.5A (relay load) Min 3 MΩ (by 500V)

TIGHTENING TORQUE

Items	Nm	Kg·cm	lb·ft
Generator terminal (B+)	5-7	50-70	3.6-5.1
Starter motor terminal (B+)	10-12	100-120	7.3-8.8
Battery terminal	4-6	40-60	2.9-4.3
Spark plug	20-30	200-300	15-22

TROUBLESHOOTING

EBJB0030

IGNITION SYSTEM

Trouble symptom	Probable cause	Remedy
Engine will not start or is hard to start (Crank OK)	Ignition lock switch faulty Ignition coil faulty Power transistor faulty Spark plugs faulty Ignition wiring disconnected or broken Spark plugs faulty	Replace ignition lock switch Inspect ignition coil Inspect power transistor Replace plugs Inspect wiring Replace plugs
Rough idle or stalls	Ignition wiring faulty Ignition coil faulty Spark plug cable faulty	Inspect wiring Replace ignition coil Replace spark plug cable
Engine hesitates/poor acceleration	Spark plugs faulty Ignition wiring faulty	Replace plugs Inspect ignition coil and wires
Poor mileage	Spark plugs faulty	Replace plugs

CHARGING SYSTEM

Trouble symptom	Probable cause	Remedy
Charging warning indicator does not light with ignition switch "ON" and engine off	Fuse blown Light burned out Wiring connection loose Electronic voltage regulator faulty	Check fuses Replace light Tighten loose connections Replace voltage regulator
Charging warning indicator does not go out with engine running (Battery requires frequent recharging)	Drive belt loose or worn Battery cables loose, corroded or worn Fuse blown Fusible link blown Electronic voltage regulator or generator faulty Wiring faulty	Adjust tension or replace drive belt Repair or replace cables Check fuses Replace fusible link Test generator Repair wiring

Trouble symptom	Probable cause	Remedy
Engine hesitates/poor acceleration Overcharge	Drive belt loose or worn Wiring connection loose or open circuit Fusible link blown Poor grounding Electronic voltage regulator or generator faulty Faulty battery Electronic voltage regulator faulty Voltage sensing wire faulty	Adjust tension or replace drive belt Tighten loose connection or repair wiring Replace fusible link Repair Test generator, if faulty, repair or replace. Replace battery Replace voltage regulator Repair wire

STARTING SYSTEM

Trouble symptom	Probable cause	Remedy
Engine will not crank	Battery discharged Battery cables loose, corroded or worn out Transaxle range switch faulty (Vehicle with automatic transaxle only) Fusible link blown Starter motor faulty Ignition switch faulty Ignition lock switch faulty	Charge or replace battery Repair or replace cables Adjust or replace switch Replace fusible link Repair starter motor Replace ignition switch Replace ignition lock switch
Engine cranks slowly	Battery discharged Battery cables loose, corroded or worn out Starter motor faulty	Charge or replace battery Repair or replace cables Repair starter motor
Starter keeps running	Starter motor faulty Ignition switch faulty	Repair starter motor Replace ignition switch
Starter spins but engine will not crank	Short in wiring Pinion gear teeth broken or starter motor faulty Ring gear teeth broken	Repair wiring Repair starter motor Replace flywheel ring gear or torque converter

**CRUISE CONTROL SYSTEM
PRE-TROUBLESHOOTING****PRE-TROUBLESHOOTING**

Before starting troubleshooting, inspect each of the following sections, and if there is an abnormality, carry out a repair.

1. Check if the installation and connection routes of the cables and vacuum hoses of the cruise vacuum pump assembly, actuator and pulley assembly are all normal.
2. Check if the pulley assembly and the movement of cables are working smoothly.
3. Check if there is excessive play or tension in each cable.

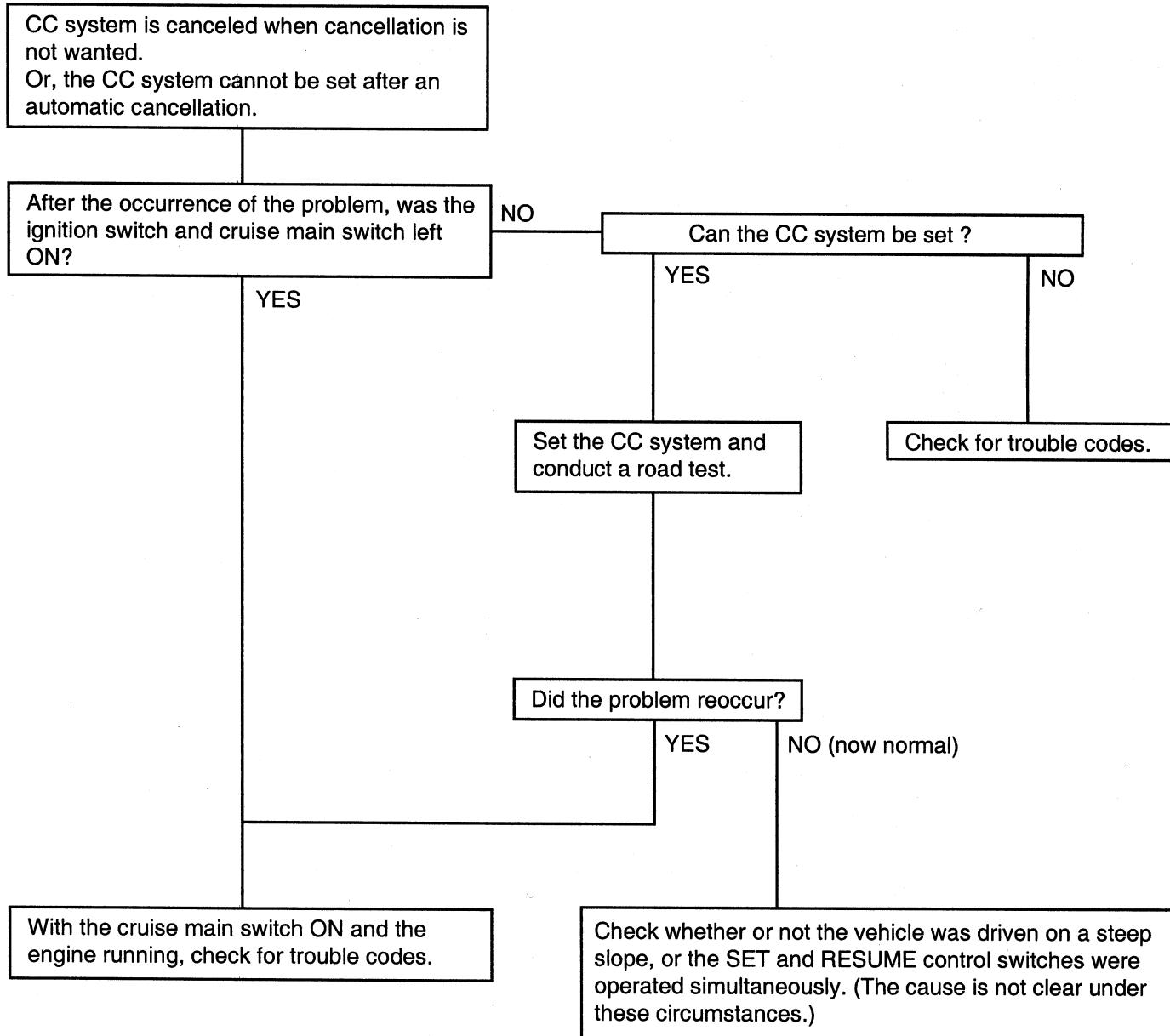
TROUBLESHOOTING PROCEDURES

First, select the applicable malfunction symptom from the "TROUBLE SYMPTOM CHARTS" shown on the next pages. Determine the condition of all circuits.

1. Make the following preliminary inspections :
 - Check that the installation of the actuator and accelerator cable are correct, and that the cables and links are securely connected.
 - Check that the accelerator pedal moves smoothly.
 - Adjust the cable so there is no excessive tension or excessive play on the accelerator cable.
 - Check that the actuator and unit assembly, cruise main, control switch and the connector of each cancel switch are all connected securely.
2. Check in the sequence indicated in the "TROUBLE SYMPTOM CHARTS".
3. If all components test good, replace the cruise control module.

TROUBLE SYMPTOM CHARTS

TROUBLE SYMPTOM 1



CC : Cruise Control

TROUBLE SYMPTOM 2

Trouble symptom	Probable cause	Remedy
The set vehicle speed varies greatly upward or downward "Surging" (repeated alternating acceleration and deceleration) occurs after setting	Malfunction of the vehicle speed sensor circuit	Repair the vehicle speed sensor system, or replace the unit
	Malfunction of the speedometer cable or speedometer drive gear	
	Cruise vacuum pump circuit poor contact	Repair the actuator system, or replace the part
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 3

Trouble symptom	Probable cause	Remedy
The CC system is not canceled when the brake pedal is depressed	Damaged or disconnected wiring to the stop lamp switch	Repair the harness or replace the stop lamp switch
	Cruise vacuum pump drive circuit short-circuit	Repair the harness or replace the vacuum pump
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 4

Trouble symptom	Probable cause	Remedy
The CC system is not canceled when the shift lever is moved to the "N" position (It is canceled, however, when the brake pedal is depressed)	Damaged or disconnected wiring of inhibitor switch input circuit	Repair the harness or repair or replace the inhibitor switch
	Improper adjustment of inhibitor switch	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 5

Trouble symptom	Probable cause	Remedy
Cannot decelerate (coast) using the SET switch	Temporarily damaged or disconnected wiring of SET switch input circuit	Repair the harness or replace the SET switch
	Actuator circuit poor contact	Repair the harness or replace the actuator
	Malfunction of the actuator	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 6

Trouble symptom	Probable cause	Remedy
Cannot accelerate or resume speed by using the RESUME switch	Damaged or disconnected wiring, short circuit, or faulty RESUME switch	Repair the harness or replace the RESUME switch
	Actuator circuit poor contact	Repair the harness or replace the actuator
	Malfunction of the actuator	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 7

Trouble symptom	Probable cause	Remedy
CC system can be set while driving at a vehicle speed of less than 40km/h (25mph), or there is no automatic cancellation at that speed	Malfunction of the vehicle speed sensor circuit	Repair the vehicle speed sensor system, or replace the part
	Malfunction of the speedometer cable or the speedometer drive gear	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 8

Trouble symptom	Probable cause	Remedy
The cruise main switch indicator lamp does not illuminate (But CC system is normal)	Damaged or disconnected bulb	Repair or replace the harness or replace the bulb.
	Harness damaged or disconnected	

TROUBLE SYMPTOM 9

Trouble symptom	Probable cause	Remedy
Malfunction of control function by ON/OFF switching of idle switch	Malfunction of circuit related to idle switch function	Repair the harness or replace the part
	Malfunction of the actuator and unit	

TROUBLE SYMPTOM 10

Trouble symptom	Probable cause	Remedy
Overdrive is not canceled during cruise	Malfunction of circuit related to overdrive cancelation, or malfunction of actuator and unit	Repair the harness or replace the part

IGNITION SYSTEM

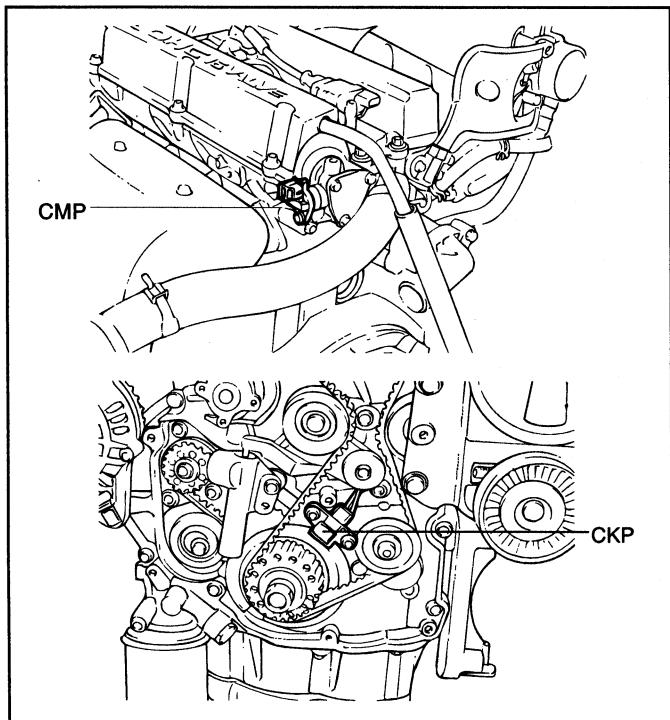
GENERAL INFORMATION EBA90040

Ignition timing is controlled by the Engine control module (ECM). The ignition timing data for the engine operating conditions are programmed in the memory of the ECM.

Engine operating conditions (speed, load, warm-up condition, etc.) are detected by the various sensors. Based upon these sensor signals and the data stored in the ECM, signals to interrupt the primary current are sent to the power transistor. The ignition coil is activated and timing is controlled at the optimum point.

*CKP : Crankshaft Position

*CMP : Camshaft Position



EBA9004A

IGNITION SYSTEM (I4)

IGNITION COIL (2.4 I4 ENGINE : POWER TRANSISTOR BULILT-IN)

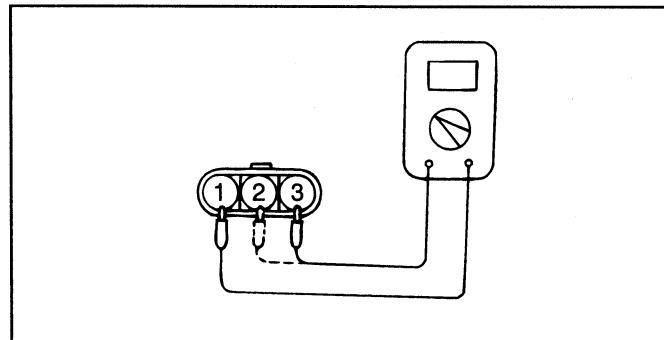
EBJB0070

1. Measurement of the primary coil resistance

Connect the negative (-) terminal of a 3V power supply to terminal 2 of the power transistor; then check whether there is continuity between terminal 3 and terminal 2 when terminal 1 and the positive (+) terminal are connected and disconnected.

Terminal 3 and (+) terminal	Terminal 1 and (+) terminal 2
Connected	Continuity (Approximately 0.86Ω)
Disconnected	Non continuity

Replace the power transistor if there is malfunction.

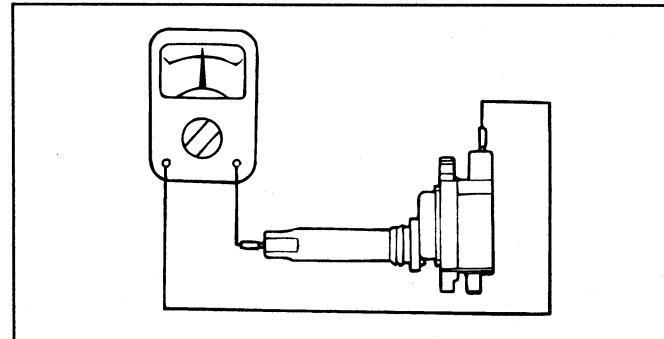


EBHA007A

2. Measurement of the secondary coil resistance

Measure the resistance between the high-voltage terminals of the ignition coil.

Standard value: Approximately $12.1\text{ k}\Omega$



EBHA009D

IGNITION SWITCH

EBA90070

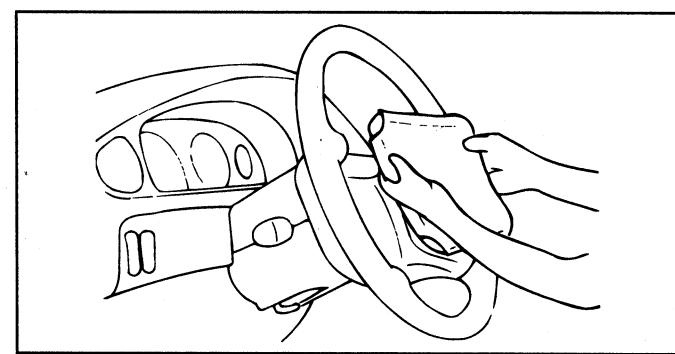
REMOVAL AND INSTALLATION

1. Disconnect the negative battery terminal.
2. Remove the air bag module.

CAUTION

The SRS system is designed to retain enough power to deploy air bag for about 30 seconds even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if service is done on the SRS system immediately after the battery cable is disconnected.

3. Remove the self-tapping screw and lift up horn pad and remove.
4. Remove the lock nut and the washer.
5. Pulling the dynamic damper forward, lift it up and remove it.

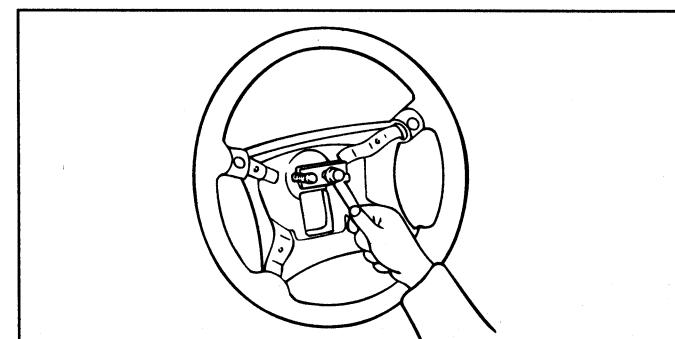


EBA9010A

6. Install the special tool (09561-11001) and remove the steering wheel.

CAUTION

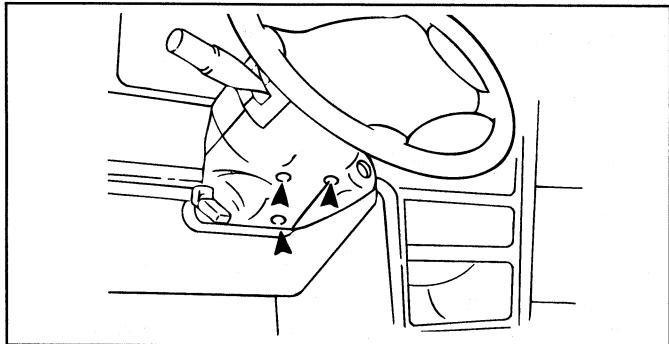
Do not hammer on the steering wheel to remove it.



EBA9010B

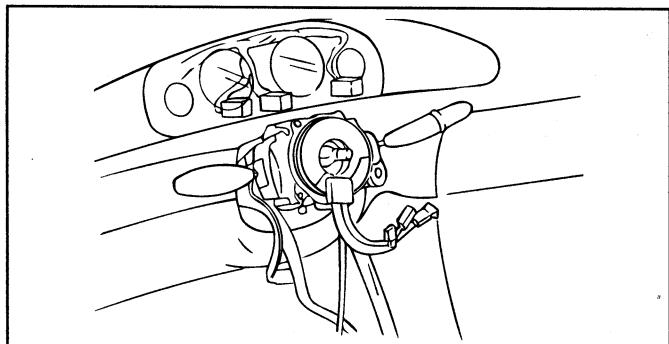
7. Remove the steering column lower and upper shrouds.

8. Remove the lower cover.



EBA9010C

9. Disconnect the connectors and remove the multi-function switch.
 10. Remove the mounting bolts and separate the ignition switch from steering column.



EBA9010D

INSPECTION

EBHA0080

1. Separate the connector located under the steering column.
2. Inspect the switch continuity between the terminals.
3. If continuity is not as specified, replace the switch.

Position	Key	Ignition switch						Door warning switch and key illumination				Lock	
		6	5	4	3	2	1	4	3	2	1	RO	RE
LOCK	Removed											O—O	L L
ACC					O		O						L F
ON1				O	O	O	O						F F
START					O	O	O						F F
ON2			O				O						F F

NOTE

O—O indicates that there is continuity between the terminal.

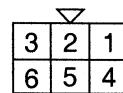
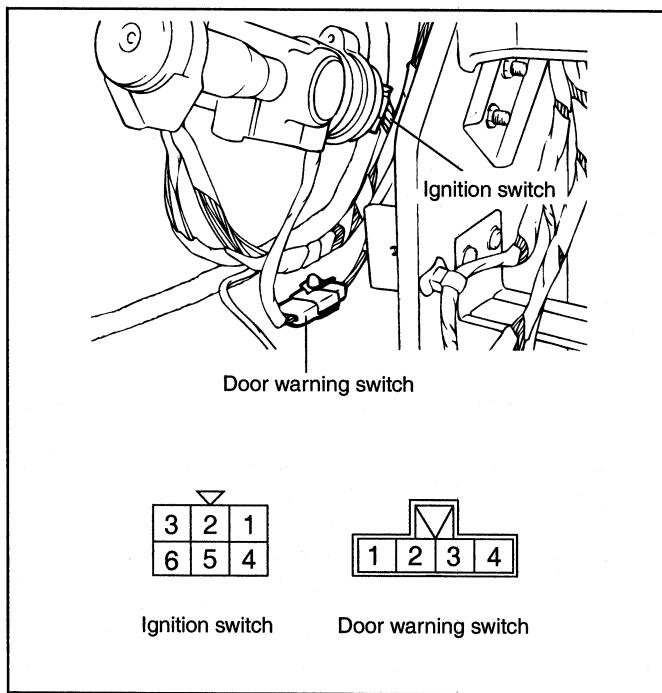
RO : Round the locking bar

RE : Return the locking bar

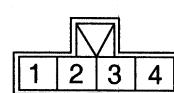
L : Lock

F : Free

EBHA080A



Ignition switch



Door warning switch

EBHA080B

HINTS

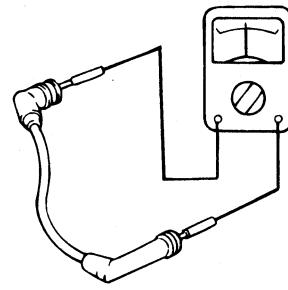
If the engine will not crank, determine whether the condition exists with the transaxle range switch in the "PARK" or in the "NEUTRAL" position.

If the "NO-CRANK" condition occurs in one shift lever position but not the other, a more probable cause is a misadjusted or faulty transaxle range switch.

SPARK PLUG TEST

EBHA0090

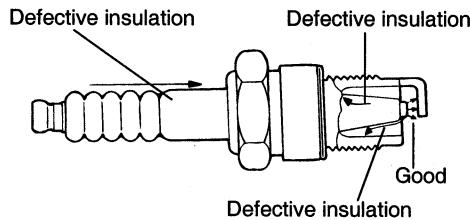
1. Remove the spark plug and reconnect it to the spark plug cable.
2. Ground the spark plug outer electrode and crank the engine.
3. Verify that there is an electrical discharge between the electrodes.



EBA9009G

CAUTION

When replacing the spark plug, use a resistor type.



EBA9009F

SPARK PLUG CABLES TEST

1. Disconnect one at a time each of the spark plug cables while the engine is idling to check whether the engine's running performance changes or not.
2. Spray a fine mist of water on the secondary wires to observe any flashover.

CAUTION

Wear rubber gloves while operating.

3. If the engine performance does not change, check the resistance of the spark plug, and check the spark plug itself.
4. Check the cap and outer shell for cracks.
5. Measure the resistance.

FOR 2.7 LITER ENGINE

Spark plug cable (KΩ)					
No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
4.39 ~6.59	2.28 ~ 3.43	3.49 ~5.24	1.9 ~2.86	3.25 ~ 4.87	1.3 ~ 1.95

NOTE

Resistance should not be higher than 10,000Ω-per foot of cable. If resistance is higher, replace the cable.

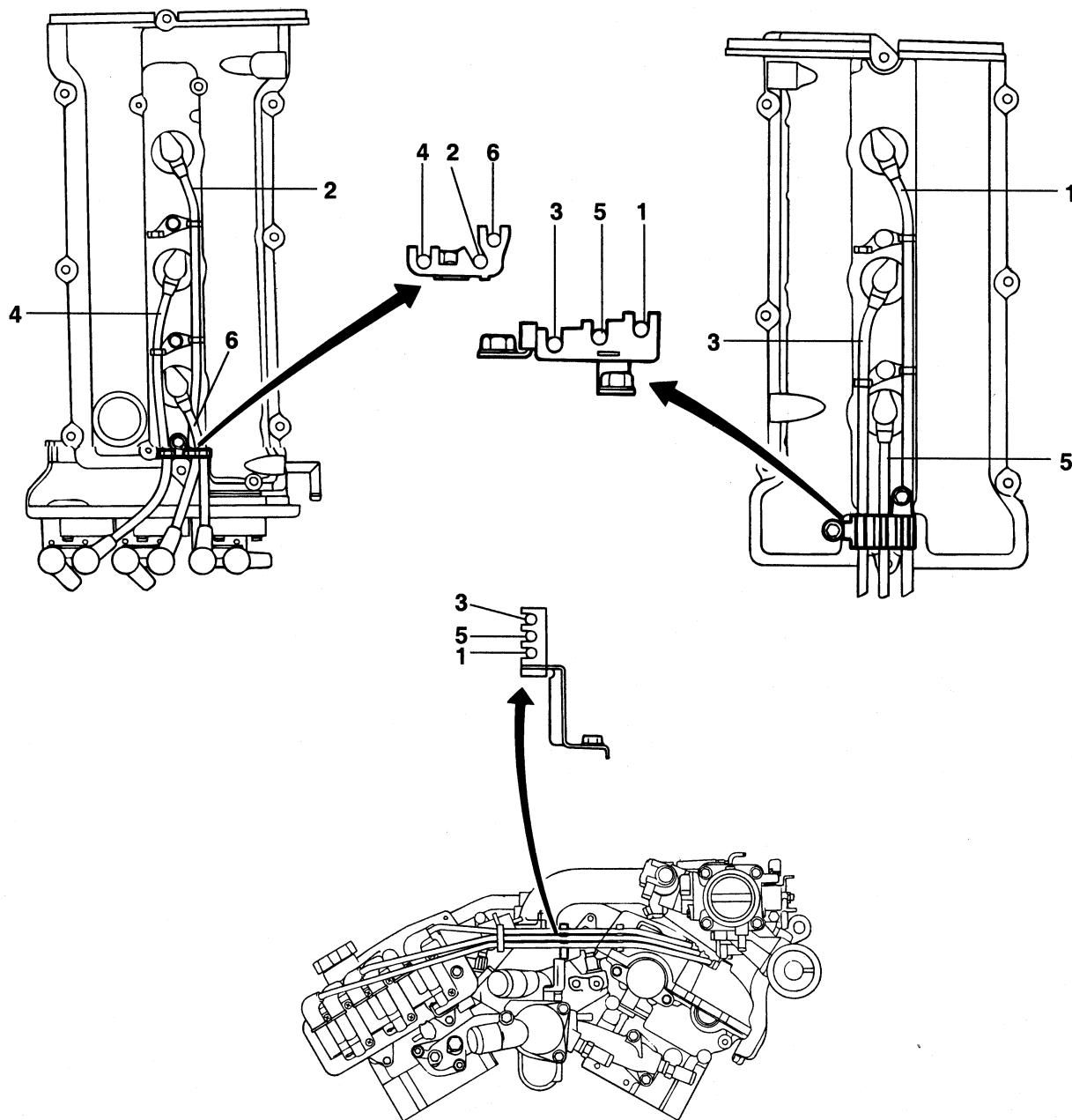
IGNITION SYSTEM (V6)

INSTALLATION OF SPARK PLUG CABLE (V6 2.7 LITER ENGINE)

EBHA0100

Improper arrangement of spark plug cables will induce flashover between the cables, causing misfiring and surging at acceleration in high-speed operations.

Therefore, be careful to arrange the spark plug cables properly as shown in the illustration.



EBA9010E

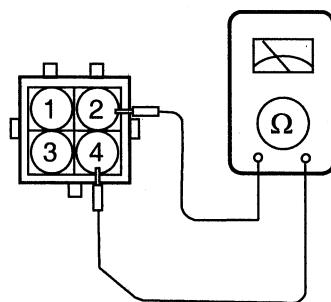
IGNITION COIL (2.7L V6 ENGINE)

EBHA0060

1. Measurement of the primary coil resistance

Measure the resistance between connector terminals 1 and 2 (the coils at the No. 3 and No. 6 cylinder sides) of the ignition coil, and between terminals 2 and 4 (the coils at the No. 1 and No. 4 cylinder sides), and between terminals 2 and 3 (the coils at the No.2 and No.5 cylinder sides).

Standard value : $0.74 \pm 10\% (\Omega)$



EBHA006A

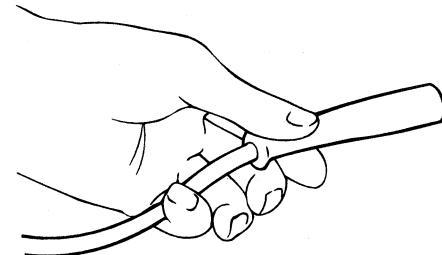
NOTE

Pull on the spark plug cable boot when removing the spark plug cable, not the cable, as it may be damaged.

- Using the spark plug wrench, remove all of the spark plugs from the cylinder head.

NOTE

Take care not to allow contaminants to enter through the spark plug holes.



EBA9015A

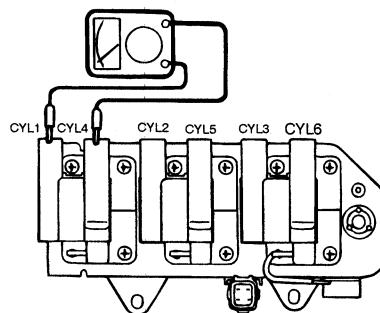
2. Measurement of the secondary coil resistance

Measure the resistance between the high-voltage terminal for the No. 3 and No. 6 cylinders, between the high-voltage terminals for the No. 1 and No. 4 cylinders and between the high-voltage terminals for the No.2 and No.5 cylinders.

Standard value : $13.3 \pm 15\% (K\Omega)$

CAUTION

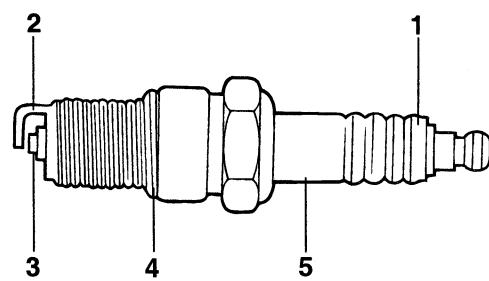
When measuring the resistance of the secondary coil, be sure to disconnect the connector of the ignition coil.



EBA9009B

- Check the spark plugs for the following:

- Broken insulator
- Worn electrode
- Carbon deposits
- Damaged or broken gasket
- Condition of the porcelain insulator at the tip of the spark plug (carbon tracking)



EBA9015B

INSPECTION AND CLEANING

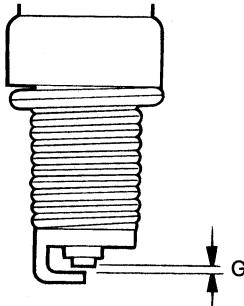
EBHA0110

- Disconnect the spark plug cable from the spark plug.

4. Check the spark plug gap using a wire gap gauge, and adjust if necessary.

Standard value

Spark plug gap : 1.0-1.1 mm (0.039-0.043 in.)



EBA9015C

5. Re-insert the spark plug and tighten to the specified torque. If it is overtightened, damage to the threaded portion of cylinder head may result.

Tightening torque

Spark plug : 20-30Nm (200-300kg·cm, 15-22 lb·ft)

NOTE

When replacing the spark plug, use resistance plugs.

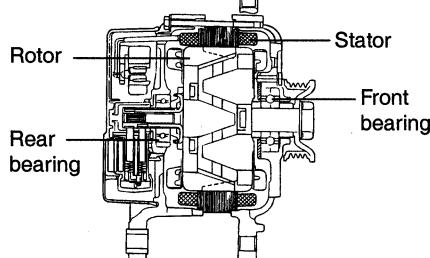
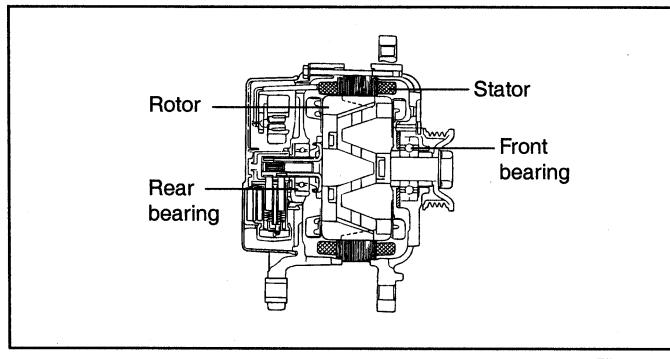
CHARGING SYSTEM (I4 AND V6)

GENERAL INFORMATION

EBA90120

The charging system includes a battery, generator with a built-in regulator, the charging indicator light and connecting wiring. The generator has six built-in diodes (three positive and three negative), each rectifying AC current to DC current. Therefore, DC current appears at generator "B" terminal.

In addition, the charging voltage of the generator is regulated by the battery voltage detection system. The main components of the generator are the rotor, stator, rectifier, capacitor brushes, bearings and V-ribbed belt pulley. The brush holder contains a built-in electronic voltage regulator.



EBA9130A

INSPECTION

EJB0130

VOLTAGE DROP TEST OF GENERATOR OUTPUT

This test determines whether or not the wiring between the generator "B" terminal and the battery (+) terminal is good using the voltage drop method.

PREPARATION

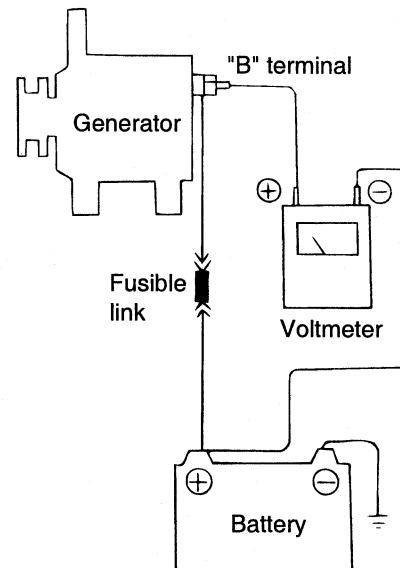
1. Turn the ignition switch to "OFF".

NOTE

To identify any abnormal conditions test the two terminals and each connection before making any repairs.

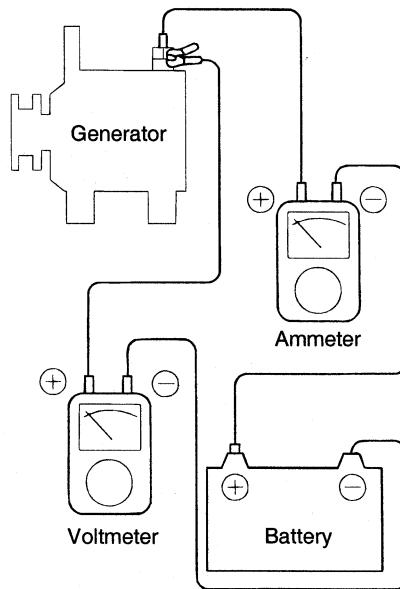
2. Connect a digital voltmeter between the generator "B" terminal and battery (+) lead wire at the battery. Connect the (+) lead wire of the voltmeter to the "B" terminal and the (-) lead wire to the battery (+) terminal.

[2.4 I4]



EJB013A

[2.7 V6]



EBHA013B

CONDITIONS FOR THE TEST

1. Start the engine.
2. Switch on the headlamps, blower motor and other accessories. Then, read the voltmeter.

RESULT

1. The voltmeter should indicate the standard value. Standard value : 0.2V max.

- If the value of the voltmeter is higher than expected (above 0.2V max.), poor wiring is suspected. In this case, check the wiring from the generator "B" terminal to the fusible link to the battery (+) terminal. Check for loose connections, color change due to an overheated harness, etc. Correct any conditions before testing again.
- Upon completion of the test, let the engine idle. Turn off the head lamps, blower motor and the ignition switch.

OUTPUT CURRENT TEST

This test determines whether or not the generator gives the correct output current.

PREPARATION

- Prior to the test, check the following items and correct as necessary.
 - Check the battery installed in the vehicle to ensure that it is in good condition. The battery checking method is described in "BATTERY" page EE-33.

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

- Check the tension of the generator drive belt. The belt tension check method is described in the section "COOLING".
- Turn off the ignition switch.
- Disconnect the battery ground cable.
- Disconnect the generator output wire from the generator "B" terminal.
- Connect a DC ammeter (0 to 100A) in series between the "B" terminal and the disconnected output wire. Be sure to connect the (-) lead wire of the ammeter to the disconnected output wire.

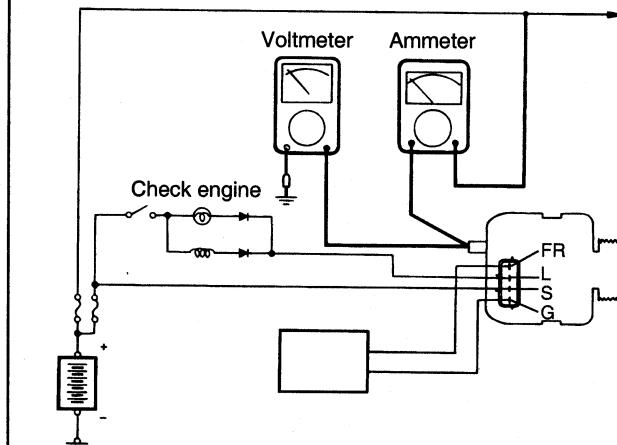
NOTE

Tighten each connection securely, as a heavy current will flow. Do not rely on clips.

- Connect a voltmeter (0 to 20V) between the "B" terminal and ground. Connect the (+) lead wire to the generator "B" terminal and the (-) lead wire to a good ground.
- Attach an engine tachometer and connect the battery ground cable.

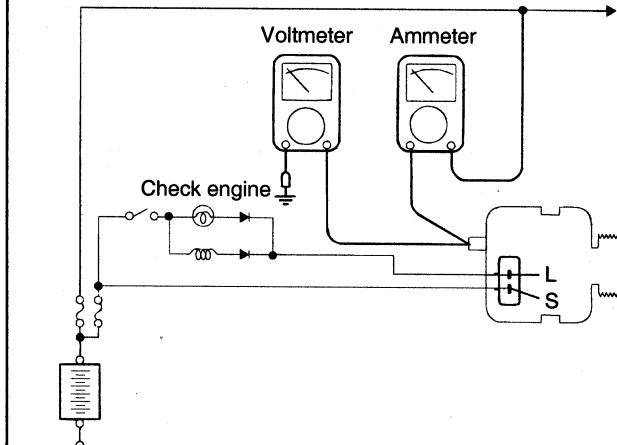
- Leave the engine hood open.

[2.4 14]



EBJB013B

[2.7 V6]



EBHA203B

TEST

- Check to see that the voltmeter reads the same value as the battery voltage. If the voltmeter reads 0V, there is an open circuit in the wire between the generator "B" terminal and battery (-) terminal. Check for a blown fusible link or poor ground.
- Start the engine and turn on the headlights.

- Set the headlights to high beam and the heater blower switch to 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 starts up, the charging current will quickly drop. Therefore, the above operation must be done quickly to read the maximum current value correctly.

RESULT

- The ammeter reading must be higher than the limit value. If it is lower, but the generator output wire is in good condition, remove the generator from the vehicle and test it.

Limit value (95A generator) : 63A min.

NOTE

- The nominal output current value is shown on the nameplate affixed to the generator body.
- The output current value changes with the electrical load and the temperature of the generator itself. Therefore, the nominal output current may not be obtained. If such is the case, keep the headlights on to discharge the battery. The nominal output current may not be obtained if the temperature of the generator itself or the ambient temperature is too high. In such a case, reduce the generator's temperature before testing again.

- Upon completion of the output current test, lower the engine speed to idle and turn off the ignition switch.
- Disconnect the battery ground cable.
- Remove the ammeter, voltmeter and the engine tachometer.
- Connect the generator output wire to the generator "B" terminal.
- Connect the battery ground cable.

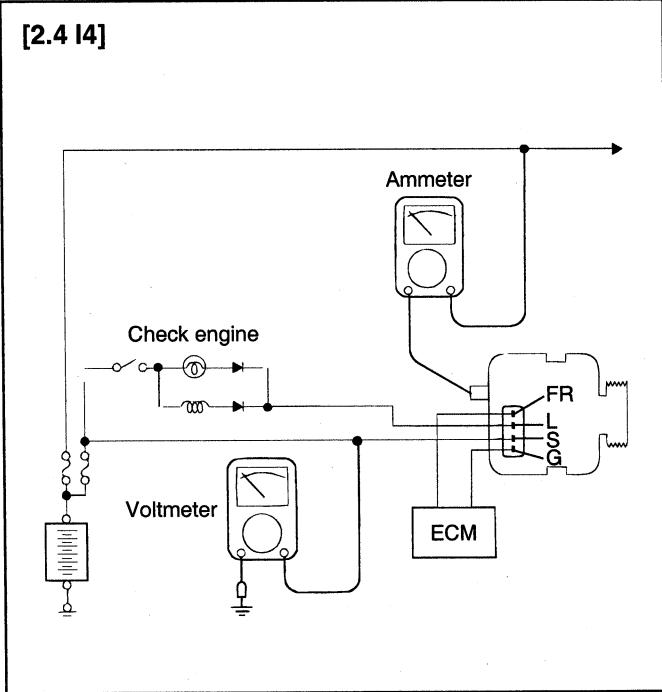
REGULATED VOLTAGE TEST

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

PREPARATION

- Prior to the test, check the following items and correct if necessary.

- Check that the battery installed on the vehicle is fully charged. For battery checking method, see "BATTERY."
- Check the generator drive belt tension. For belt tension check, see "COOLING" section.
- Turn the ignition switch to "OFF."
- Disconnect the battery ground cable.
- Connect a digital voltmeter between the "S(L)" terminal of the generator and ground. Connect the (+) lead of the voltmeter to the "S(L)" terminal of the generator. Connect the (-) lead to a good ground or the battery (-) terminal.
- Disconnect the generator output wire from the generator "B" terminal.
- Connect a DC ammeter (0 to 100A) in series between the "B" terminal and the disconnected output wire. Connect the (-) lead wire of the ammeter to the disconnected output wire.
- Attach an engine tachometer and connect the battery ground cable.



EBJB013C

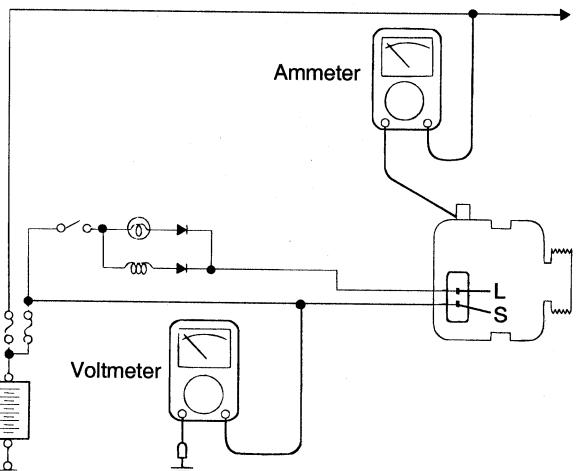
[2.7 V6]

60 (140)

13.4-14.6

80 (176)

13.1-14.5



EBHA204B

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

TEST

1. Turn on the ignition switch and check to see that the voltmeter indicates the following value.

Voltage : Battery voltage

If it reads 0V, there is an open circuit in the wire between the generator "S(L)" terminal and the battery 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 generator output current drops to 10A or less.

RESULT

1. If the voltmeter reading agrees with the value listed in the Regulating Voltage Table, the voltage regulator is functioning correctly. If the reading is other than the indicated value, the voltage regulator or the generator 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

GENERATOR OUTPUT LINE VOLTAGE**DROP TEST** EBA90140

This test determines the condition of the wiring from the generator "B" terminal to the battery (+) terminal (including the fusible link).

1. Be sure to check the following before testing:
 - Generator installation and wiring connections
 - Generator drive belt tension
 - Fusible link
 - Abnormal noises from the generator while the engine is running.
2. Turn the ignition switch to the OFF position.
3. Disconnect the negative battery cable.
4. Disconnect the generator output wire from the generator "B" terminal. Connect a DC test ammeter with a range of 0-100A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal. Connect the (-) lead of the ammeter to the disconnected output wire.)

NOTE

An inductive-type ammeter which enables measurements to be taken without disconnecting the generator output wire is recommended. Using this equipment will lessen the possibility of a voltage drop caused by a loose "B" terminal connection.

5. Connect a digital-type voltmeter between the generator "B" terminal and the battery (+) terminal. (Connect the (+) lead of the voltmeter to the "B" terminal. Connect the (-) lead of the voltmeter to the battery (+) cable.)
6. Reconnect the negative battery cable.

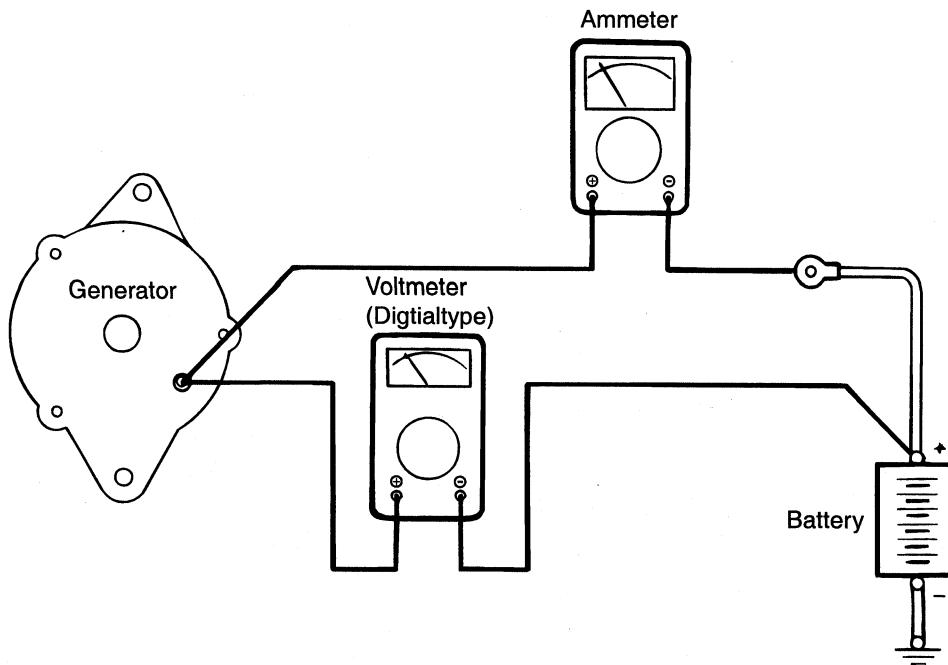
7. Connect a tachometer or the scan tool.
8. Start the engine.
9. With the engine running at approx. 2500 rpm, turn the headlights and other lights on and off to adjust the generator load on the ammeter slightly above 30A.

Limit: max. 0.3V

NOTE

When the generator output is high and the value displayed on the ammeter does not decrease to 30A, set the value to 40A. Read the value displayed on the voltmeter. In this case the limit becomes max. 0.4V.

10. If the value displayed on the voltmeter is still above the limit, a fault in the generator output wire may exist. Check the wiring between the generator "B" terminal and the battery (+) terminal (including fusible link). If a terminal is not sufficiently tight or if the harness has become discolored due to overheating, repair, then test again.
11. After the test, run the engine at idle.
12. Turn off all lights and turn the ignition switch to the OFF position.
13. Disconnect the tachometer or the scan tool.
14. Disconnect the negative battery cable.
15. Disconnect the ammeter and voltmeter.
16. Connect the generator output wire to the generator "B" terminal.
17. Connect the negative battery cable.



EBA9020C

OUTPUT CURRENT TEST

This test determines if the generator output current is normal.

1. Before testing, be sure to check the following :
 - Generator installation and wiring connections
 - Battery
 - Generator drive belt tension
 - Fusible link
 - Abnormal noise from the generator while the engine is running

NOTE

The battery used should be slightly discharged. The load needed by a fully-charged battery is insufficient for an accurate test.

2. Turn the ignition switch to the OFF position.
3. Disconnect the negative battery cable.
4. Disconnect the generator output wire from the generator "B" terminal. Connect a DC test ammeter with a range of 0-100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal. Con-

nect the (-) lead of the ammeter to the disconnected output wire.)

CAUTION

Never use clips. Use bolts and nuts to connect the line. Otherwise, loose connections (e.g. using clips) may lead to a serious accident because of high current.

NOTE

An inductive-type ammeter which enables measurements to be taken without disconnecting the generator output wire is recommended.

5. Connect a voltmeter with a range of 0-20V between the generator "B" terminal and the ground. (Connect the (+) lead of the voltmeter to the "B" terminal, and then connect the (-) lead of the voltmeter to the ground.)
6. Connect the negative battery cable.
7. Connect a tachometer or the scan tool.
8. Leave the hood open.

9. Check that the reading on the voltmeter is equal to battery voltage.

NOTE

If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the generator "B" terminal and the battery (+) terminal.

10. Start the engine, and turn the headlights on.
11. Switch the headlights to high beam, turn the heater blower switch to high, increase the engine speed to approx. 2,500 rpm, and read the maximum current output displayed on the ammeter.

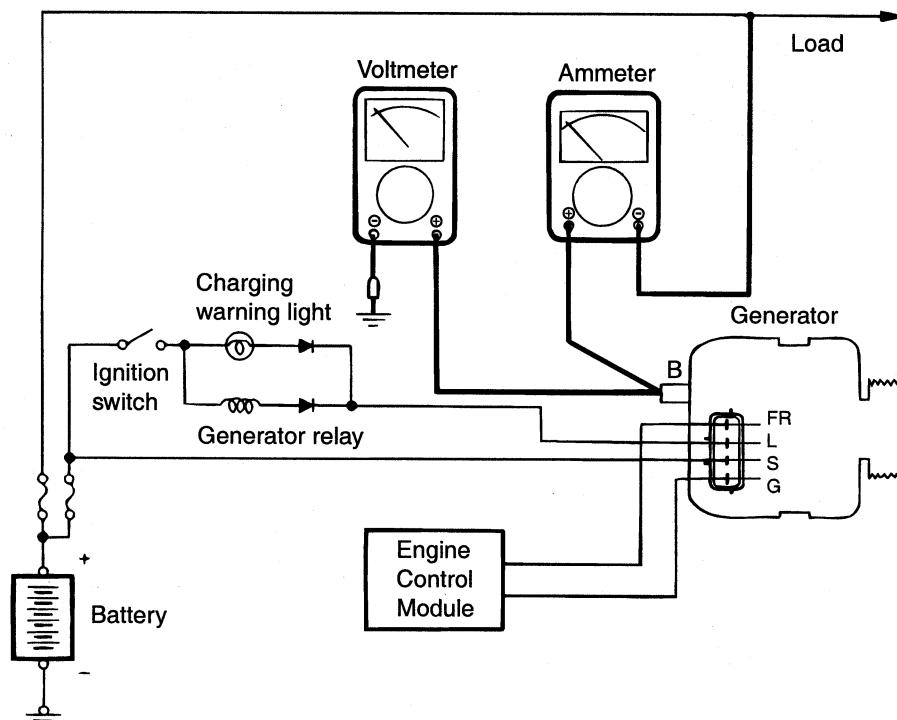
Limit : 70% of nominal output current

NOTE

- For the nominal current output, refer to the Generator Specifications page EE-2.
- Because the current from the battery will drop soon after the engine is started, steps 10 and 11 should be carried out as quickly as possible in order to obtain the maximum current output value.
- The current output value will depend on the electrical load and the temperature of the generator body.
- If insufficient electrical load is used while testing, the specified level of current may not be

output, even though the generator is normal. In such a case, increase the electrical load by leaving the headlights on with the engine off to discharge the battery before testing.

- The specified level of current may not be output if the temperature of the generator body and/or ambient temperature is too high. In such a case, allow the generator to cool before testing.
- 12. The reading on the ammeter should be above the limit value. If the reading is below the limit value and the generator output wire is OK, remove the generator from the engine and check the generator.
- 13. Run the engine at idle speed after the test.
- 14. Turn the ignition switch to the OFF position.
- 15. Disconnect the tachometer or the scan tool.
- 16. Disconnect the negative battery cable.
- 17. Disconnect the ammeter and voltmeter.
- 18. Connect the generator output wire to the generator "B" terminal.
- 19. Connect the negative battery cable.



EBA9020B

REGULATED VOLTAGE TEST

This test determines if the voltage regulator is correctly controlling the generator output voltage.

1. Be sure to check the following:
 - Generator installation and wiring connections
 - Battery fully charged
 - Generator drive belt tension
 - Fusible link
 - Abnormal noise from the generator while the engine is running
2. Turn the ignition switch to the OFF position.
3. Disconnect the negative battery cable.
4. Connect a digital-type voltmeter between the generator "S" terminal and the ground. (Connect the (+) lead of the voltmeter to the "S" terminal. Connect the (-) lead of the voltmeter to a secure ground or to the battery (-) terminal.)
5. Disconnect the generator output wire from the generator "B" terminal.

6. Connect a DC test ammeter with a range of 0-100A in series between the "B" terminal and the disconnected output wire.

(Connect the (+) lead of the ammeter to the "B" terminal. Connect the (-) lead of the ammeter to the disconnected output wire.)

7. Reconnect the negative battery cable.
8. Connect a tachometer or the scan tool. Check that the reading on the voltmeter is equal to the battery voltage.

NOTE

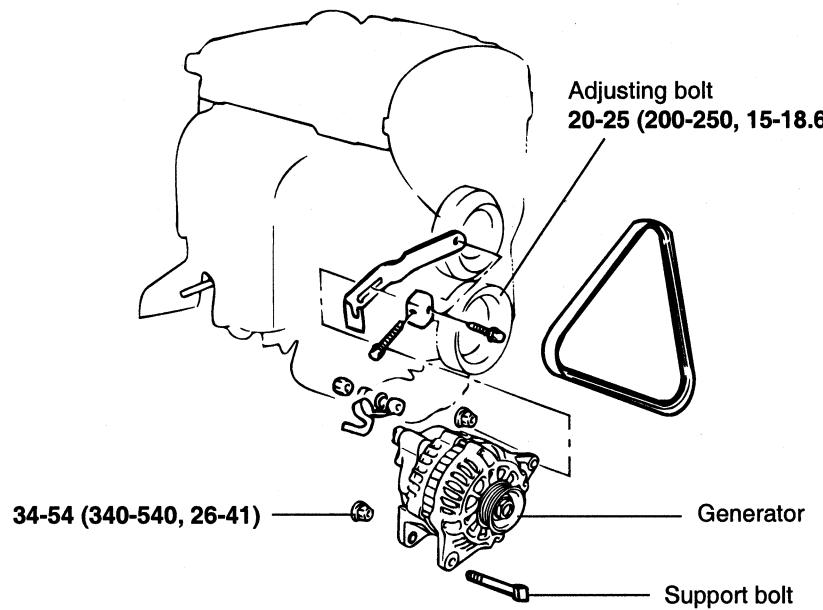
If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the generator "S" terminal and the battery (+) terminal.

9. Make sure all lights and accessories are off.
10. Start the engine.
11. Increase the engine speed to approx. 2,500 rpm.
12. Read the voltmeter when the current output of the generator becomes 10 A or less.

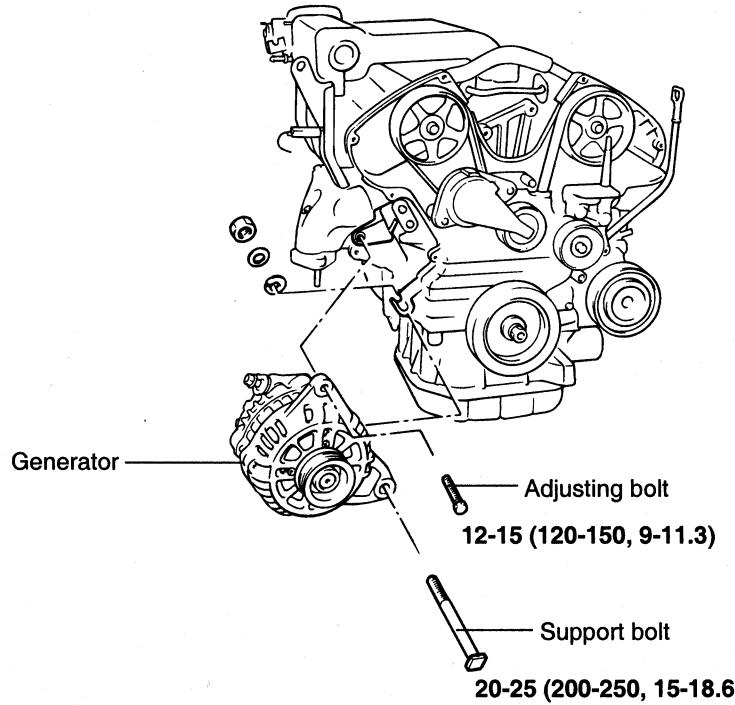
13. If the voltage reading conforms to the value in the voltage regulation table, the voltage regulator is operating normally. If the voltage is not within the standard value, a malfunction of the voltage regulator or of the generator exists.

REMOVAL AND INSTALLATION EBJB0150

[2.4 I4]



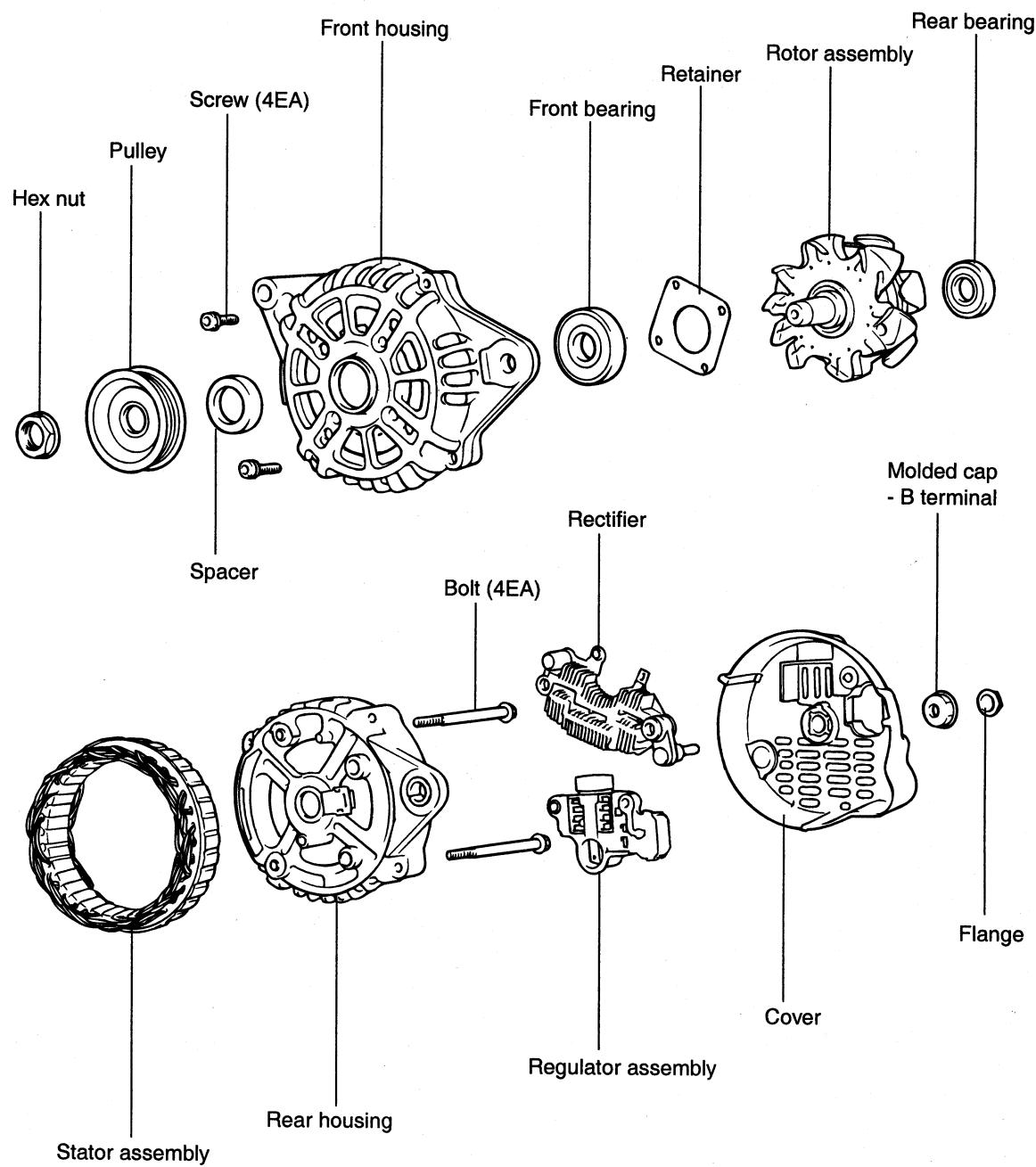
[2.7 V6]



TORQUE : Nm (kg·cm, lb·ft)

DISASSEMBLY AND REASSEMBLY

EJB0160

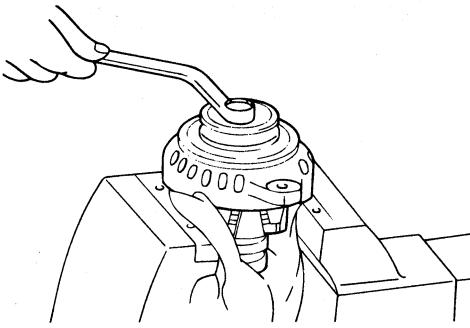


DISASSEMBLY [2.4 I4]

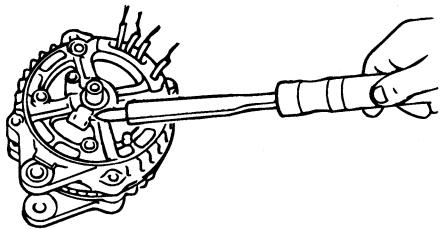
1. Remove the four through bolts.
2. Insert a flat screwdriver between the front bracket and stator core, and pry downward.

CAUTION

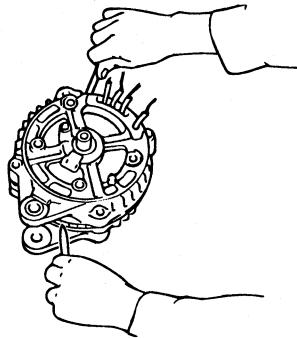
1. Do not insert the screwdriver too deeply, as there is a danger of damaging the stator coil.
2. The rear cover may be hard to remove because a ring is used to lock the outer race of the rear bearing. To facilitate removal of rear cover, heat just the bearing box section with a 200-watt soldering iron. Do not use a heat gun as it may damage the diode assembly.



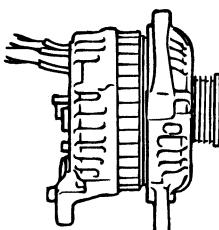
EBA9016D



EBHA206A



EBHA206B



EBHA206C

3. Secure the rotor in a soft-jaw vise with the pulley side up.

CAUTION

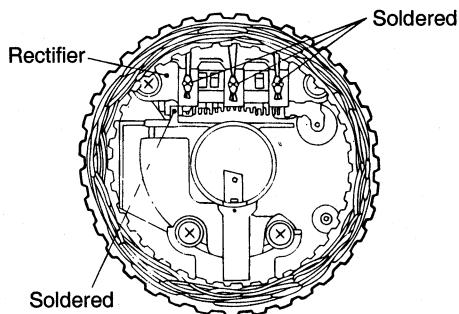
Be careful that the vise jaws do not damage the rotor.

4. Remove the pulley nut, spring washer, pulley, and spacer.
5. Remove the front bracket and two seals.
6. Remove the rotor from the vise.
7. Remove the brush holder screws, rectifier screws, and nut from the "B" terminal.
8. Remove the stator assembly from the rear bracket.
9. Detach the slinger from the brush holder.
10. If the stator is to be removed, unsolder the three stator leads to the main diodes on the rectifier.

CAUTION

1. When soldering or unsoldering, make sure that heat from soldering iron is not transmitted to the diodes for a long period.
2. Do not exert excessive force on the leads of the diodes.

11. When separating the rectifier from the brush holder, unsolder the two plates soldered to the rectifier.



EBA9016E

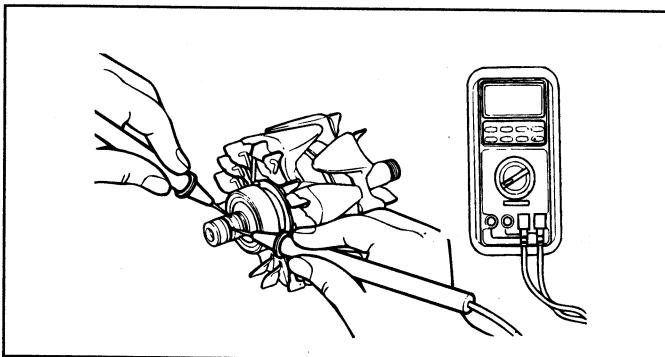
INSPECTION

ROTOR

1. Check the rotor coil for continuity. Make sure there is continuity between the slip rings.

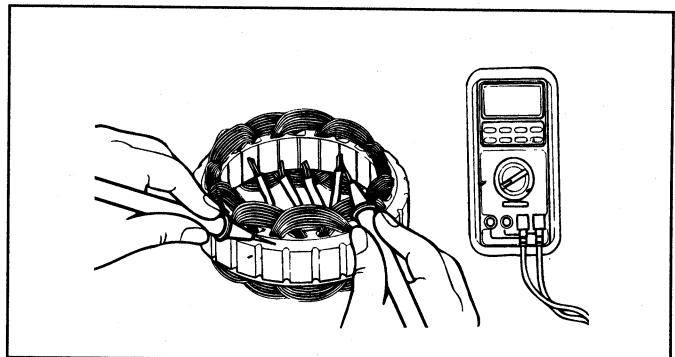
If resistance is extremely low, there is a short. If there is no continuity or if there is a short circuit, replace the rotor assembly.

Resistance value : Approx. 3.1Ω



KFW2021A

2. Check the coil for grounding. Check that there is no continuity between the coil and the core. If there is continuity, replace the stator assembly.

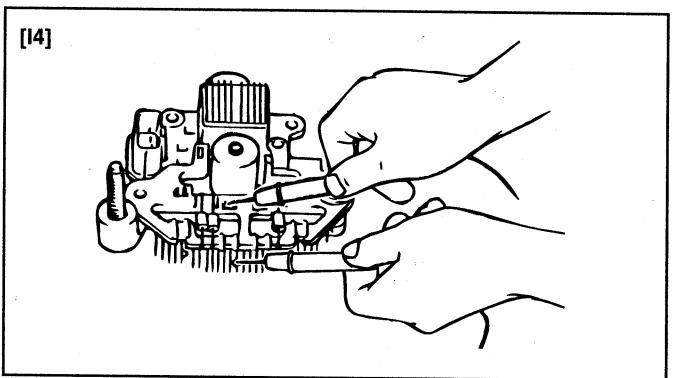


KFW2024A

RECTIFIERS

Positive rectifier test

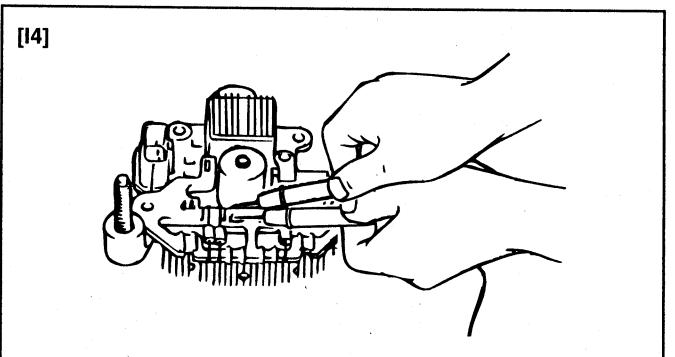
Check for continuity between the positive rectifier and stator coil lead connection terminal with an ohmmeter. The ohmmeter should read continuity in only one direction. If there is continuity in both directions, a diode is shorted. Replace the rectifier assembly.



EBHA206E

Negative rectifier test

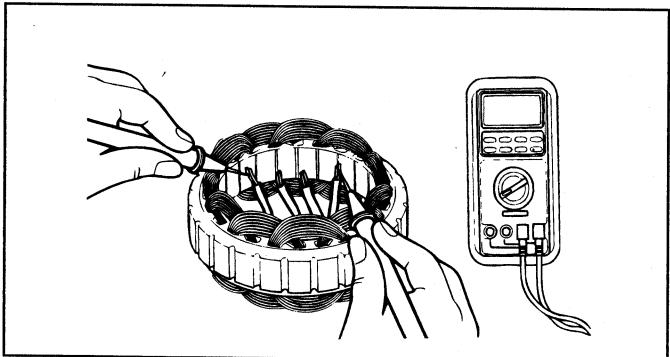
Check for continuity between the negative rectifier and the stator coil lead connection terminal. The ohmmeter should read continuity in only one direction. If there is continuity in both directions, the diode is shorted, and the rectifier assembly must be replaced.



EBHA206F

STATOR

1. Make a continuity check on the stator coil. Check that there is continuity between the coil leads. If there is no continuity, replace the stator assembly.



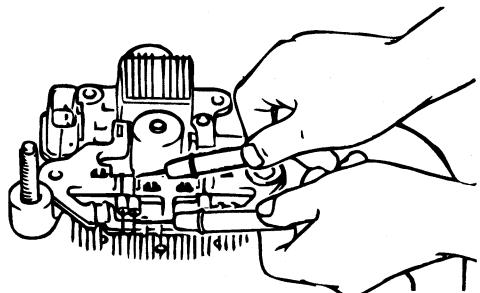
KFW2023A

Diode trio test

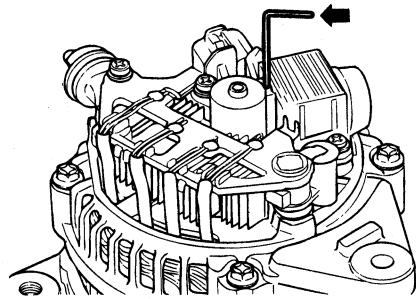
Check the three diodes for continuity by connecting an ohmmeter to both ends of each diode. Each diode should have continuity in only one direction.

If continuity is present in both directions, the diode is defective and the heatsink assembly must be replaced.

[I4]



EBHA206G



KFW2029A

BATTERY EBA90170

DESCRIPTION

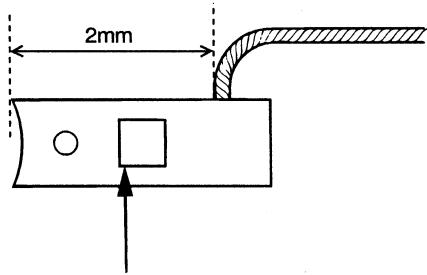
1. The maintenance-free battery is, as the name implies, totally maintenance free and has no removable battery cell caps. The battery is completely sealed, except for small vent holes in the cover.
2. Water is never added to the maintenance-free battery.

BRUSH REPLACEMENT

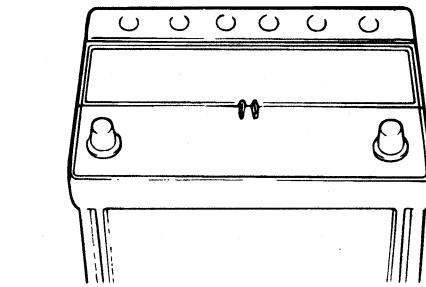
1. Measure the length of the brush protrusion shown in the illustration, and replace the brush if the measured value is below the limit value.

Limit : 2mm (0.8 in.) or less

[I4]



KFW2028A



EBA9017D

2. The brush can be removed if the solder of the brush lead wire is removed.
3. When installing a new brush, insert the brush into the holder, and then solder the lead wire.

REASSEMBLY

Reassembly is the reverse of disassembly. Pay attention to the following:

Before the rotor is attached to the rear bracket, insert a wire through the small hole in the rear bracket to hold the brush. After the rotor has been installed, the wire can be removed.

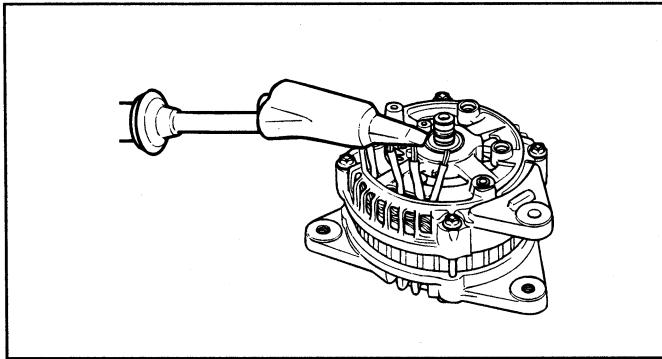
DISASSEMBLY [2.7 V6]

EBHA0180

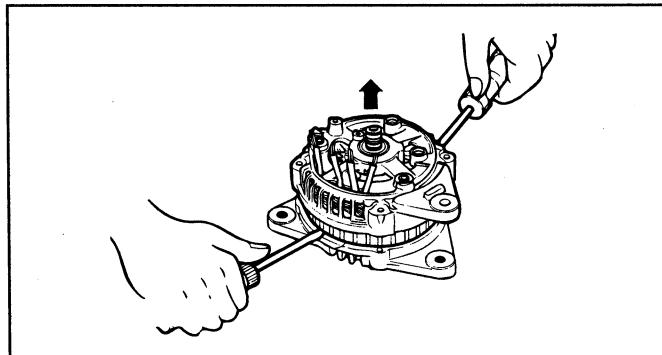
1. Remove the four through bolts.
2. Insert a flat screwdriver between the front bracket and stator core, and pry downward.

CAUTION

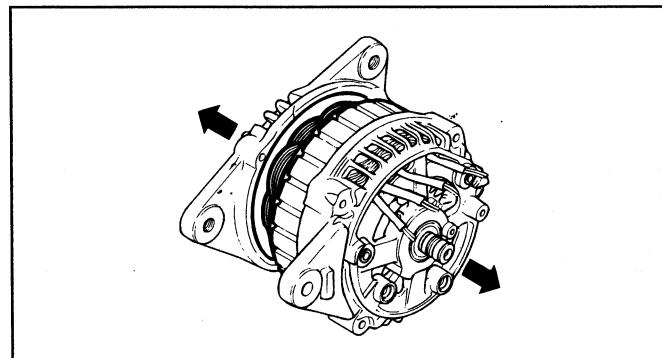
1. Do not insert the screwdriver too deeply, as there is a danger of damaging the stator coil.
2. The rear cover may be hard to remove because a ring is used to lock the outer race of the rear bearing. To facilitate removal of rear cover, heat just the bearing box section with a 200-watt soldering iron. Do not use a heat gun as it may damage the diode assembly.



KFW2018A



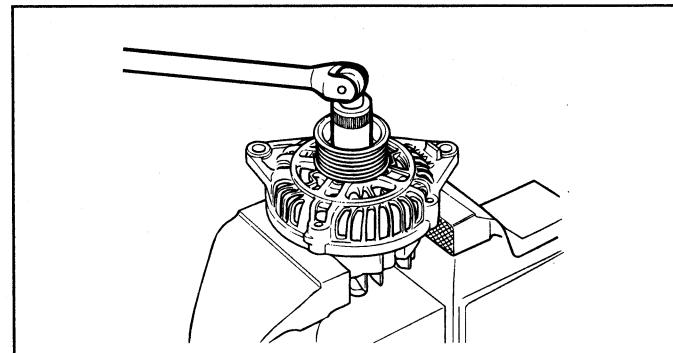
KFW2017A



KFW2019A

CAUTION

Be careful that the vise jaws do not damage the rotor.



KFW2020A

4. Remove the pulley nut, spring washer, pulley, and spacer.
5. Remove the front bracket and two seals.
6. Remove the rotor from the vise.
7. Remove the brush holder screws, rectifier screws, and nut from the "B" terminal.
8. Remove the stator assembly from the rear bracket.
9. Detach the slinger from the brush holder.
10. If the stator is to be removed, unsolder the three stator leads to the main diodes on the rectifier.

CAUTION

1. When soldering or unsoldering, make sure that heat from soldering iron is not transmitted to the diodes for a long period.
2. Do not exert excessive force on the leads of the diodes.
11. When separating the rectifier from the brush holder, unsolder the two plates soldered to the rectifier.

INSPECTION

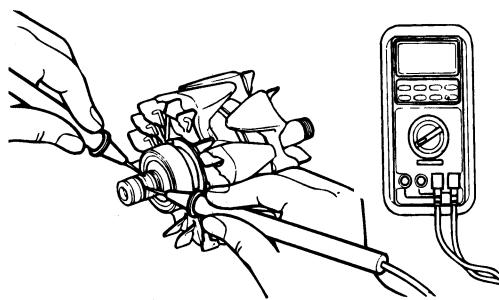
ROTOR

1. Check the rotor coil for continuity. Make sure there is continuity between the slip rings.

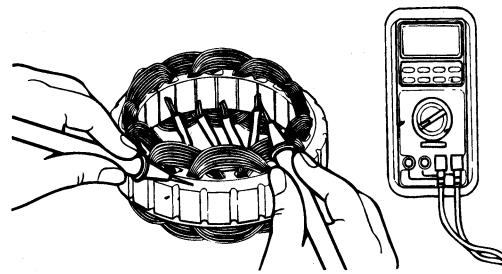
If resistance is extremely low, there is a short. If there is no continuity or if there is a short circuit, replace the rotor assembly.

Resistance value : Approx. 3.1Ω

3. Secure the rotor in a soft-jaw vise with the pulley side up.

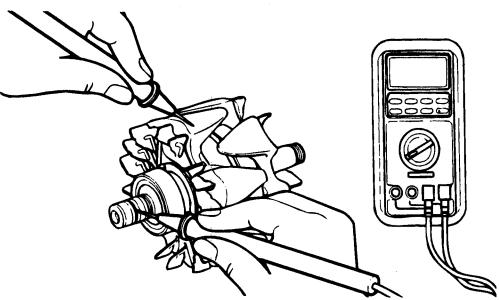


KFW2021A



KFW2024A

- Check the rotor coil for a ground. Check that there is no continuity between the slip ring and the core. If there is continuity, replace the rotor assembly.

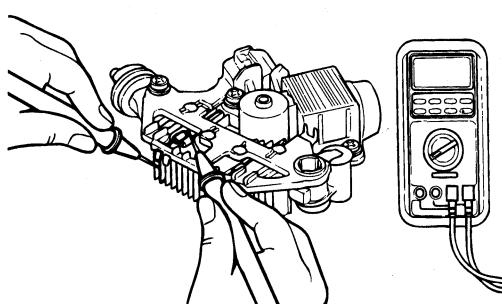


KFW2022A

RECTIFIERS

Positive rectifier test

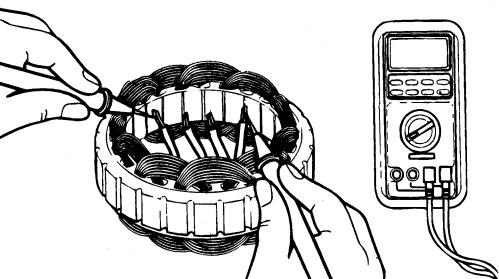
Check for continuity between the positive rectifier and stator coil lead connection terminal with an ohmmeter. The ohmmeter should read continuity in only one direction. If there is continuity in both directions, a diode is shorted. Replace the rectifier assembly.



KFW2025A

STATOR

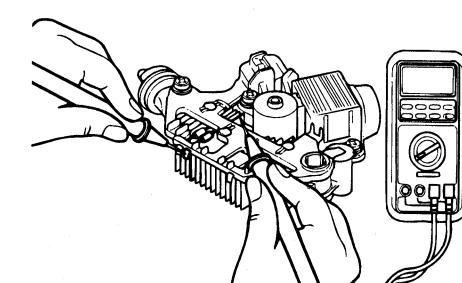
- Make a continuity check on the stator coil. Check that there is continuity between the coil leads. If there is no continuity, replace stator assembly.



KFW2023A

Negative rectifier test

Check for continuity between the negative rectifier and the stator coil lead connection terminal. The ohmmeter should read continuity in only one direction. If there is continuity in both directions, the diode is shorted, and the rectifier assembly must be replaced.



KFW2026A

- Check the coil for grounding. Check that there is no continuity between the coil and the core. If there is continuity, replace the stator assembly.

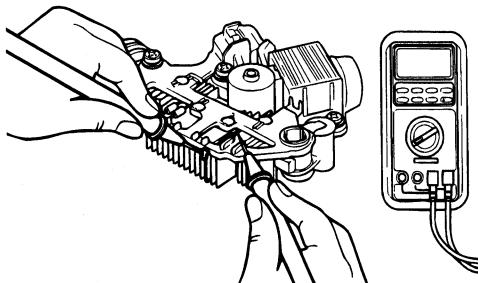
[V6]

Diode trio test

Check the three diodes for continuity by connecting an ohmmeter to both ends of each diode. Each diode should have continuity in only one direction.

If continuity is present in both directions, the diode is defective and the heatsink assembly must be replaced.

[V6]



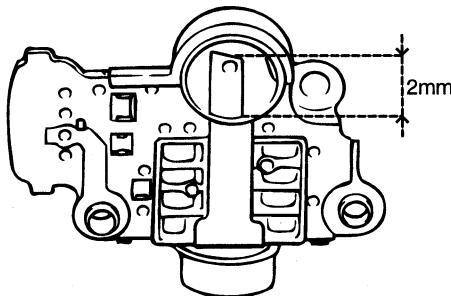
KFW2027A

BRUSH REPLACEMENT

1. Measure the length of the brush protrusion shown in the illustration, and replace the brush if the measured value is below the limit value.

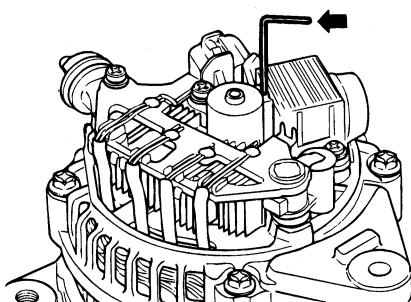
Limit : 2mm (0.8 in.) or less

[V6]



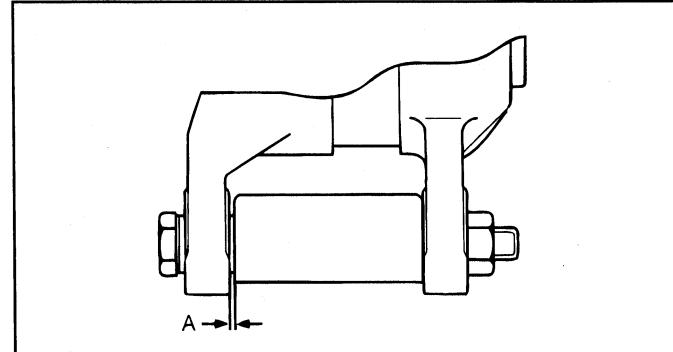
EBA9030E

2. The brush can be removed if the solder of the brush lead wire is removed.



KFW2029A

3. When installing a new brush, insert the brush into the holder, and then solder the lead wire.



KFW2009A

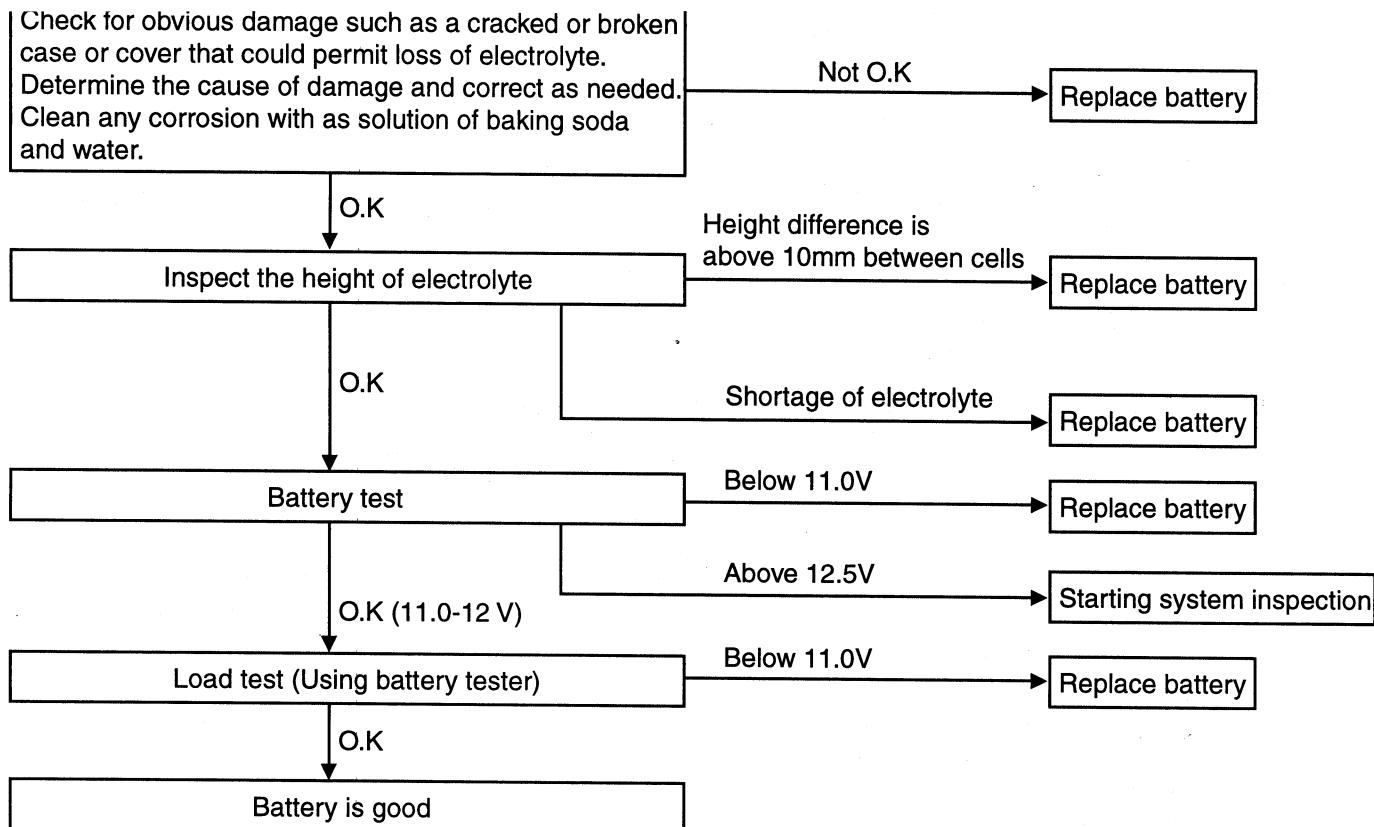
REASSEMBLY

Reassembly is the reverse of disassembly. Pay attention to the following:

Before the rotor is attached to the rear bracket, insert a wire through the small hole in the rear bracket to hold the brush. After the rotor has been installed, the wire can be removed.

BATTERY VISUAL INSPECTION (1)

1. CHECKING FLOW



EBA9018B

2. CHECKING SHEET

Item	Trouble	Cause	Remedy	Responsibility	
				User	Manufacturer
1. Visual inspection	* Battery terminal damage	* Carelessness * Over tightening the battery cable	Replace	O	
	Cover Breakage	* Carelessness	Replace	O	
	* Electrolyte leakage - Cover breakage - Cover leakage	* Carelessness * Bad cover seal	Replace Replace	O	O
2. Electrolyte height inspection	* Electrolyte height between cells is over 10mm * Shortage of electrolyte	* Cell shorted electrically * Vaporization caused by excessive temperature * Electrolyte loss caused by over-charge	Replace Replace Replace	O O	O

Item	Trouble	Cause	Remedy	Responsibility	
				User	Manufacturer
3. Voltage inspection	1. Battery voltage >13.2V	1. Over charge	Replace * Check the electric system	O	
	2. 12.5V < Battery voltage < 12.9	2. Normal			
	3. 12.0V < Battery voltage < 12.4V (Simple discharge)	1. Insufficient charge	* Battery Load Test (Refer to Load Test below)	O	
	4. 11.0 V < Battery voltage <12.0 (Over discharge)	2. Internal failure		O	
	5. Battery voltage : 11.0V or less	1. Charge condition failure 2. Battery discharged for a long period 3. Internal circuit open	Replace	O O	O

3. LOAD TEST

- When discharging the battery during 15 seconds at half currency of Cold Cranking Power (CCP), the voltage of the battery should be as shown below.

REGULATING VOLTAGE TABLE

Ambient Temperature	Voltage
above 20°C	9.6V
~ 18°C	9.5V
~ 10°C	9.4V
~ 4°C	9.3V
~ -1°C	9.1V
~ -7°C	8.9V
~ -12°C	8.7V

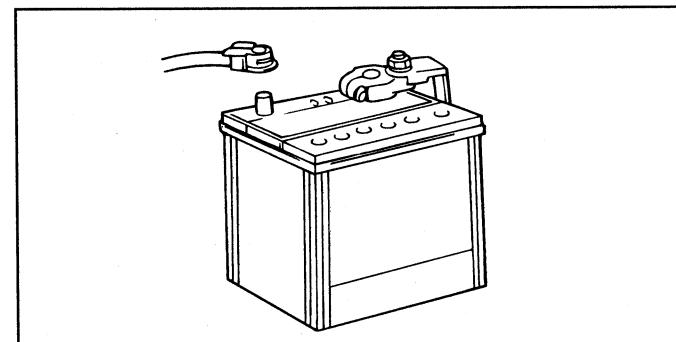
- When the voltage is not within specification, repeat the load test again, and re-charge.
- If the battery is left alone for 2 hours after re-charging and its output is over 12.5V, and the voltage after a load test is over the standard value, the battery can be used.

BATTERY VISUAL INSPECTION (2)

- Make sure the ignition switch and all accessories are in the OFF position.
- Disconnect the battery cables (negative first).
- Remove the battery from the vehicle.

CAUTION

Care should be taken in the event the battery case is cracked or leaking, to protect your skin from the electrolyte. Heavy rubber gloves (not the household type) should be worn when removing the battery.



EBA9018C

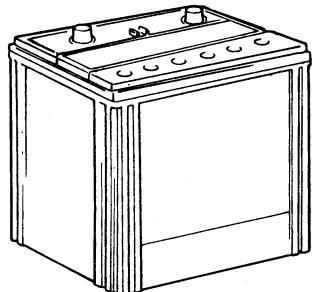
- Inspect the battery carrier for damage caused by the loss of electrolyte. If acid damage is present, it will be necessary to clean the area with a solution of clean warm water and baking soda. Scrub the area

with a stiff brush and wipe off with a cloth moistened with baking soda and water.

5. Clean the top of the battery with the same solution as described in Step(4).
6. Inspect the battery case and cover for cracks. If cracks are present, the battery must be replaced.
7. Clean the battery posts with a suitable battery post tool.
8. Clean the inside surface of the terminal clamps with a suitable battery cleaning tool. Replace damaged or frayed cables and broken terminal clamps.
9. Install the battery in the vehicle.
10. Connect the cable terminals to the battery post, making sure the tops of the terminals are flush with the tops of the posts.
11. Tighten the terminal nuts securely.
12. Coat all connections with light mineral grease after tightening.

CAUTION

When batteries are being charged, an explosive gas forms beneath the cover of each cell. Do not smoke near batteries being charged or which have recently been charged. Do not break live circuits at the terminals of batteries being charged. A spark will occur when the circuit is broken. Keep open flames away from the battery.



EBA9018D

STARTING SYSTEM

GENERAL INFORMATION

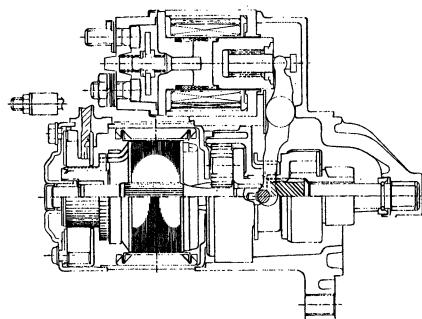
EBJB0190

The starting system includes the battery, starter motor, solenoid switch, ignition switch, inhibitor switch (A/T only), connecting wires and the battery cables.

When the ignition key is turned to the start position, current flows and energizes the starter motor's solenoid coil. The solenoid plunger and clutch shift lever are activated, and the clutch pinion engages the ring gear. The contacts close and the starter motor cranks.

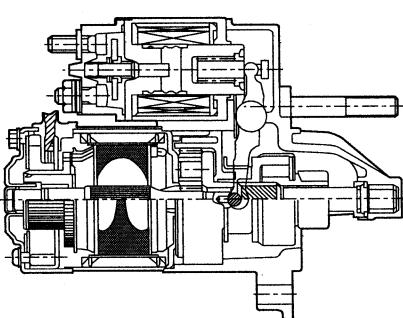
In order to prevent damage caused by excessive rotation of the starter armature when the engine starts, the clutch pinion gear has overrun protection.

[2.4 I4]



EBJB019A

[2.7 V6]

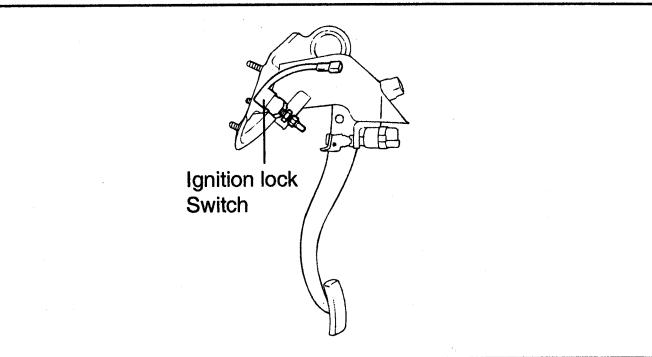


KFW2010A

EBHA0200

CHECK CLUTCH PEDAL (M/T)

Check that pedal height, pedal freeplay and clutch pedal clevis pin play are correct. (Refer to clutch group)



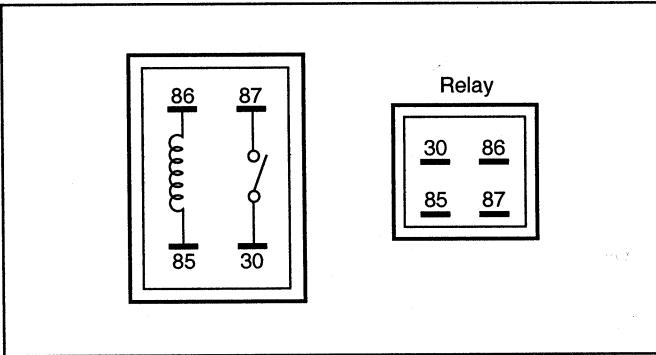
EBA9020D

CHECK STARTER RELAY

Remove the starter relay and check continuity between the terminals. If the continuity is not as specified, replace the relay.

Condition \ Terminal No.	85	86	87	30
When de-energized	<input type="circle"/>	<input type="circle"/>		
When energized	<input type="circle"/>	<input type="circle"/>	<input type="circle"/>	<input type="circle"/>

EBA9020E



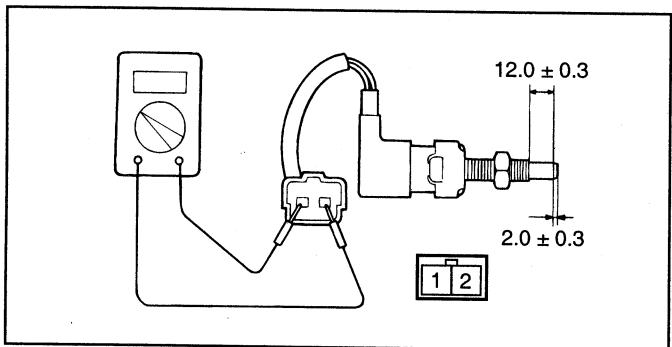
EBA9020F

CHECK IGNITION LOCK SWITCH

Remove the ignition lock switch and check continuity between the terminals. If the continuity is not as specified, replace the switch.

Condition	Terminal	1	2
Pushed		○	○
Free			

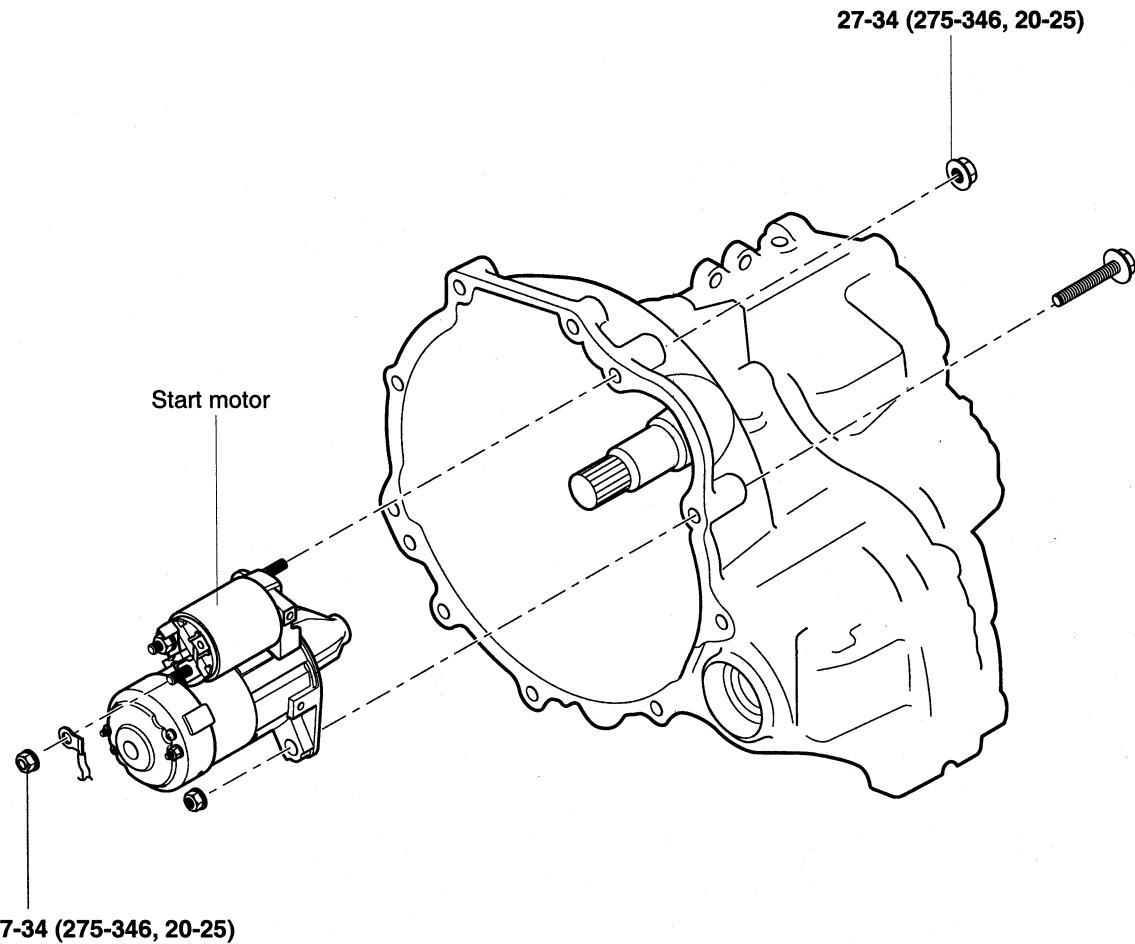
EBA9020G



EBHA020A

REMOVAL AND INSTALLATION

EBHA0210

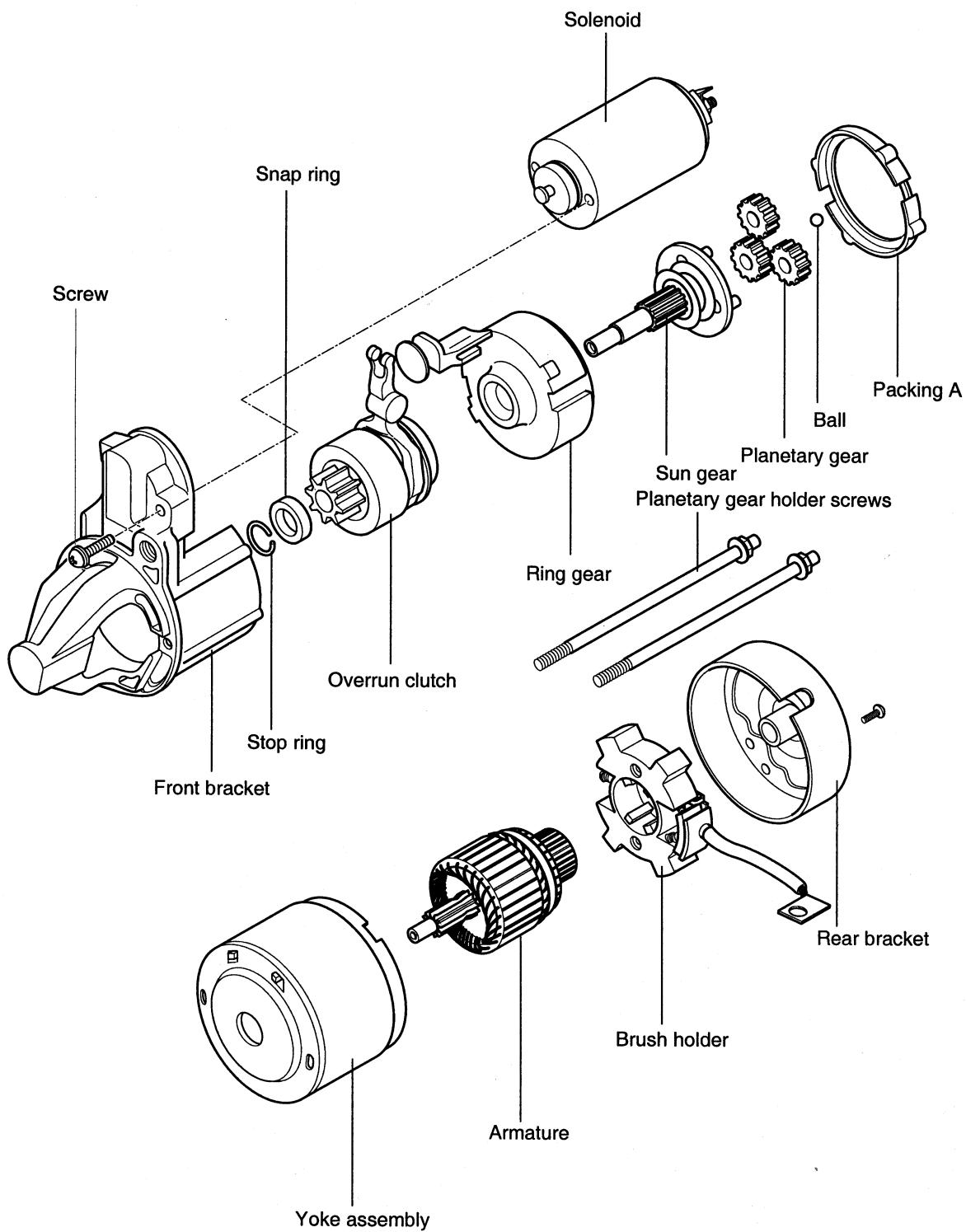


TORQUE : Nm (kg.cm, lb.ft)

KFW2011A

1. Disconnect the battery ground cable.
2. Remove the speedometer cable and the shift cable.
3. Disconnect the starter motor connector and terminal.
4. Remove the starter motor assembly.
5. Installation is the reverse of removal.

COMPONENTS EBHA0220

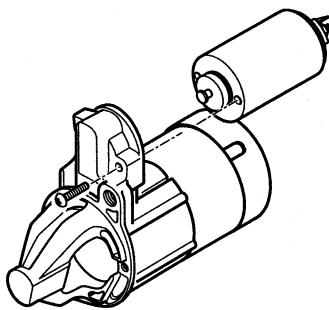


CHECKING FOR OPERATION

EBHA0230

SERVICE ADJUSTMENT PROCEDURES FOR PINION GAP ADJUSTMENT

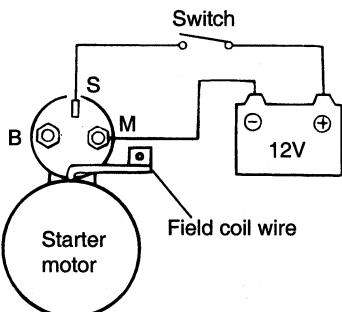
1. Disconnect the field coil wire from the M-terminal of the solenoid.
2. Connect a 12V battery the S-terminal and the M-terminal.
3. The pinion should move out.



EBHA306D

CAUTION

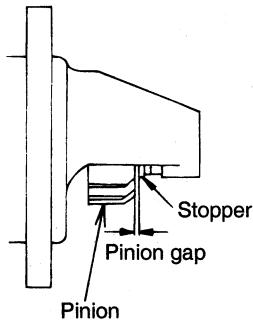
This test must be performed quickly (in less than 10 seconds) to prevent the coil from overheating.



EBA9023A

4. Check the pinion for stopper clearance (pinion gap) with a feeler gauge.

Pinion gap : 0.5-2.0 mm (0.02-0.079 in.)



EBA9023B

5. If the pinion gap is out of specification, adjust by adding or removing gaskets between the solenoid and the front bracket.

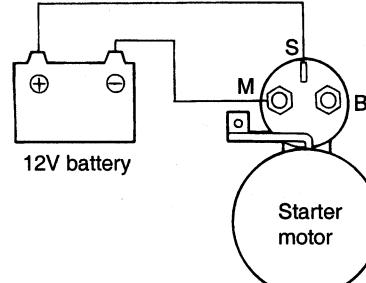
MAGNETIC SWITCH PULL-IN TEST

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

CAUTION

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

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



EBA9023D

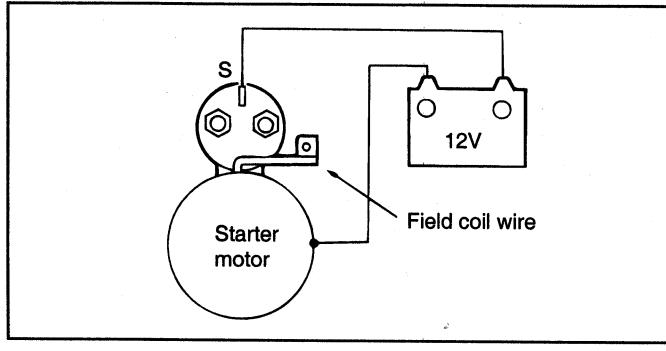
MAGNETIC SWITCH HOLD-IN TEST

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

CAUTION

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

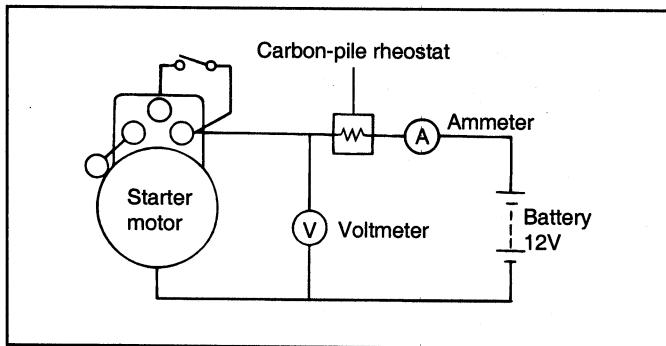
3. If the pinion moves out, everything is in order. If the pinion moves back and forth repeatedly, the hold-in circuit is open. If it is open, replace the magnetic switch.



EBA9023E

FREE RUNNING TEST

1. Place the starter motor in a vise equipped with soft jaws and connect a fully-charged 12-volt battery to the starter motor as follows:
2. Connect a test ammeter (100-ampere scale) and carbon pile rheostat as shown in the illustration.



EBA9023F

3. Connect a voltmeter (15-volt scale) across the starter motor.
4. Rotate the carbon pile to the off position.
5. Connect the battery cable from battery's negative post to the starter motor body.
6. Adjust the carbon pile until battery voltage reads 11 volts.
7. Confirm that the maximum amperage is within the specifications and that the starter motor turns smoothly and freely:

Current : Max. 90 Amps

Speed : Min. 3,000 rpm

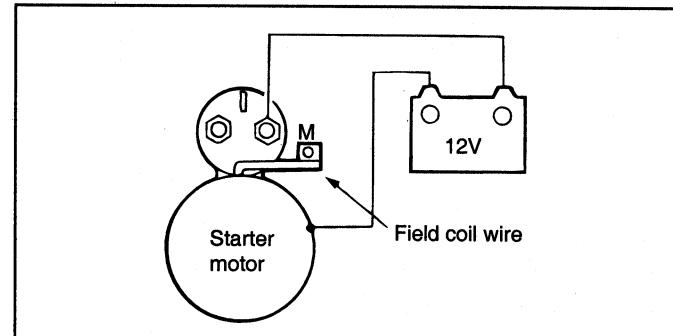
MAGNETIC SWITCH RETURN TEST

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

NOTE

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

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



EBA9023G

INSPECTION EBHA0240

CHECKING THE COMMUTATOR

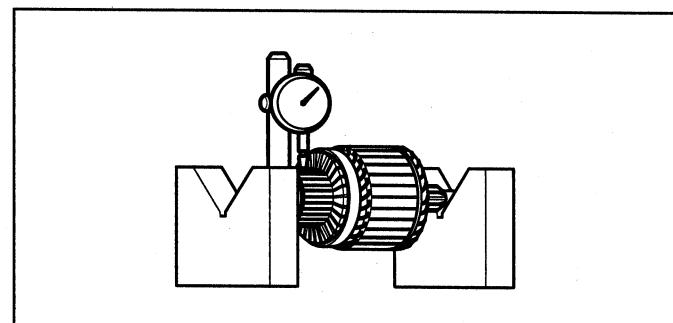
1. Place the armature on a pair of V-blocks, and check the run - out by using a dial gauge.

Standard value

Armature run - out : 0.05 mm (0.002 in.)

Limit

Armature run - out : 0.1 mm (0.0039 in.)



KFW2033A

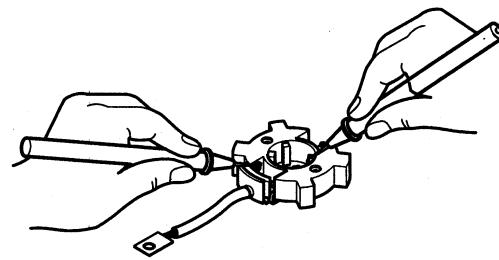
2. Check the outer diameter of the commutator.

Standard value

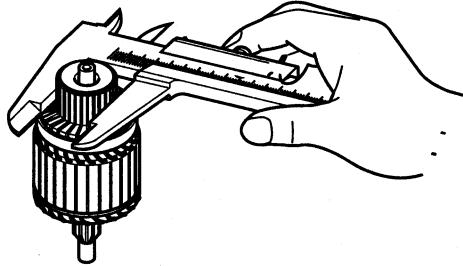
Outer diameter of the commutator : 29.4 mm (1.157 in.)

Limit

Outer diameter of the commutator : 28.4 mm (1.118 in.)



KFW2036A



KFW2034A

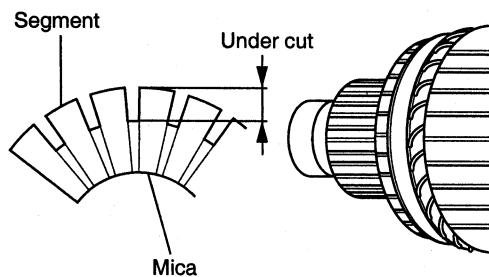
3. Check the depth of the undercut between segments.

Standard value

Depth of the undercut between segments : 0.5mm (0.020 in.)

Limit

Depth of the undercut between segments : 0.2mm (0.079 in.)



KFW2035A

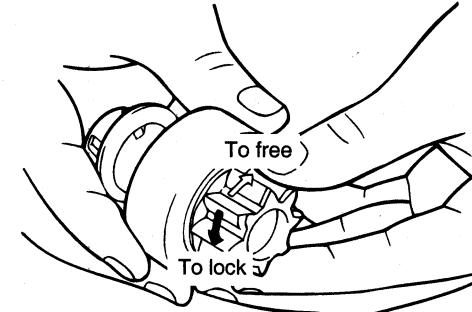
BRUSH HOLDER

Check for continuity between the brush holder plate and the brush holder.

The normal condition is no continuity.

OVERRUNNING CLUTCH

1. While holding the clutch housing, rotate the pinion. The drive pinion should rotate smoothly in one direction, but should not rotate in the opposite direction. If the clutch does not function properly, replace the overrun clutch assembly.
2. Inspect the pinion for wear or burrs. If the pinion is worn or burred, replace the overrun clutch assembly. If the pinion is damaged, also inspect the ring gear for wear or burrs.



EBA9024E

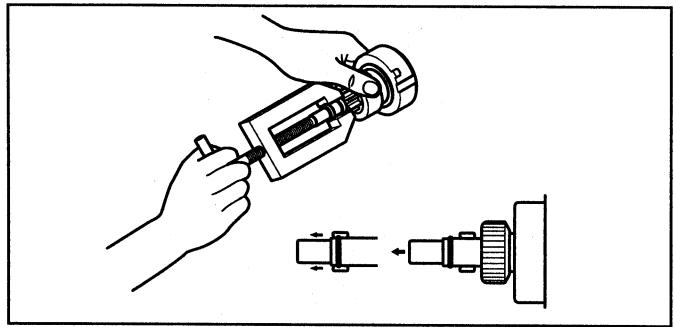
FRONT AND REAR BRACKET BUSHING

Inspect the bushing for wear or burrs. If the bushing is worn or burred, replace the front bracket assembly or the rear bracket assembly.

REASSEMBLY OF THE STOP RING AND SNAP RING

EBHA0250

Using a suitable pulling tool, pull the overrunning clutch stop ring over the snap ring.



KFW2043A

CLEANING THE STARTER MOTOR PARTS

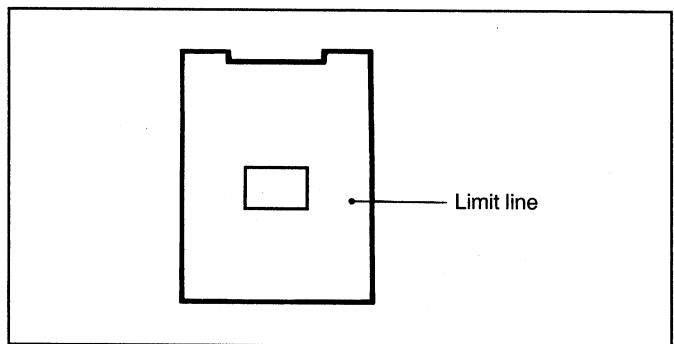
EBHA90260

1. Do not immerse parts in cleaning solvent. Immersing the yoke and field coil assembly and/or armature will damage the insulation. Wipe these parts with a cloth only.
2. Do not immerse the drive unit in cleaning solvent. The overrun clutch is pre-lubricated at the factory and solvent will wash lubrication from the clutch.
3. The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.

REPLACEMENT OF BRUSHES AND SPRINGS

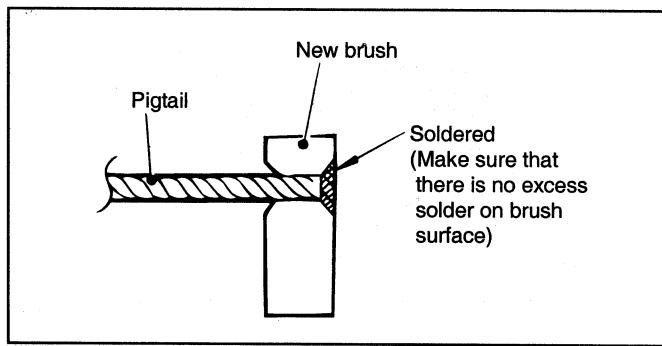
EBHA90270

1. Brushes that are worn out, or oil-soaked, should be replaced.
2. When replacing field coil brushes, crush worn out brushes with pliers, taking care not to damage the pigtail.



EBA9027A

3. Sand the pigtail end with sandpaper to ensure good soldering.
4. Insert the pigtail into the hole provided in the new brush and solder it. Make sure that the pigtail and excess solder do not come out onto the brush surface.
5. When replacing the ground brush, slide the brush from the brush holder by prying the retaining spring back.



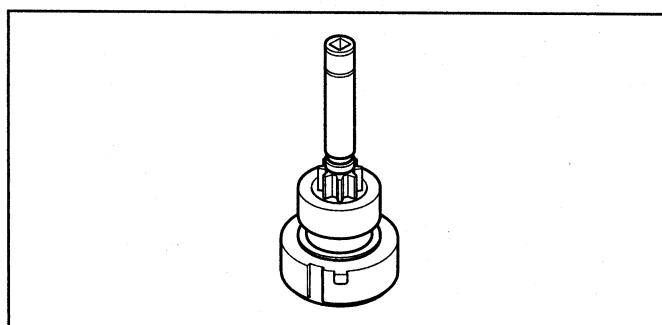
EBA9027B

DISASSEMBLY

EBHA0280

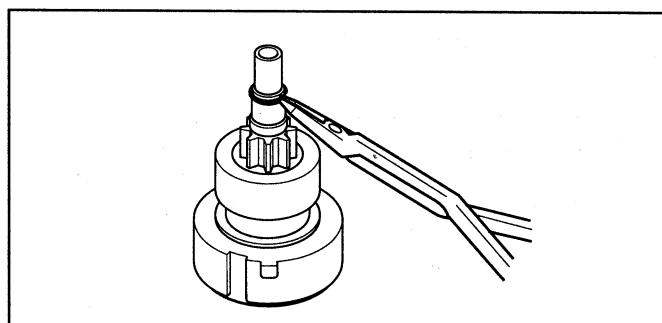
REMOVAL OF THE SNAP RING AND STOP RING

1. Press the stop ring using a socket.



KFW2031A

2. After removing the snap ring (using snap-ring pliers), remove the stop ring and the overrunning clutch.

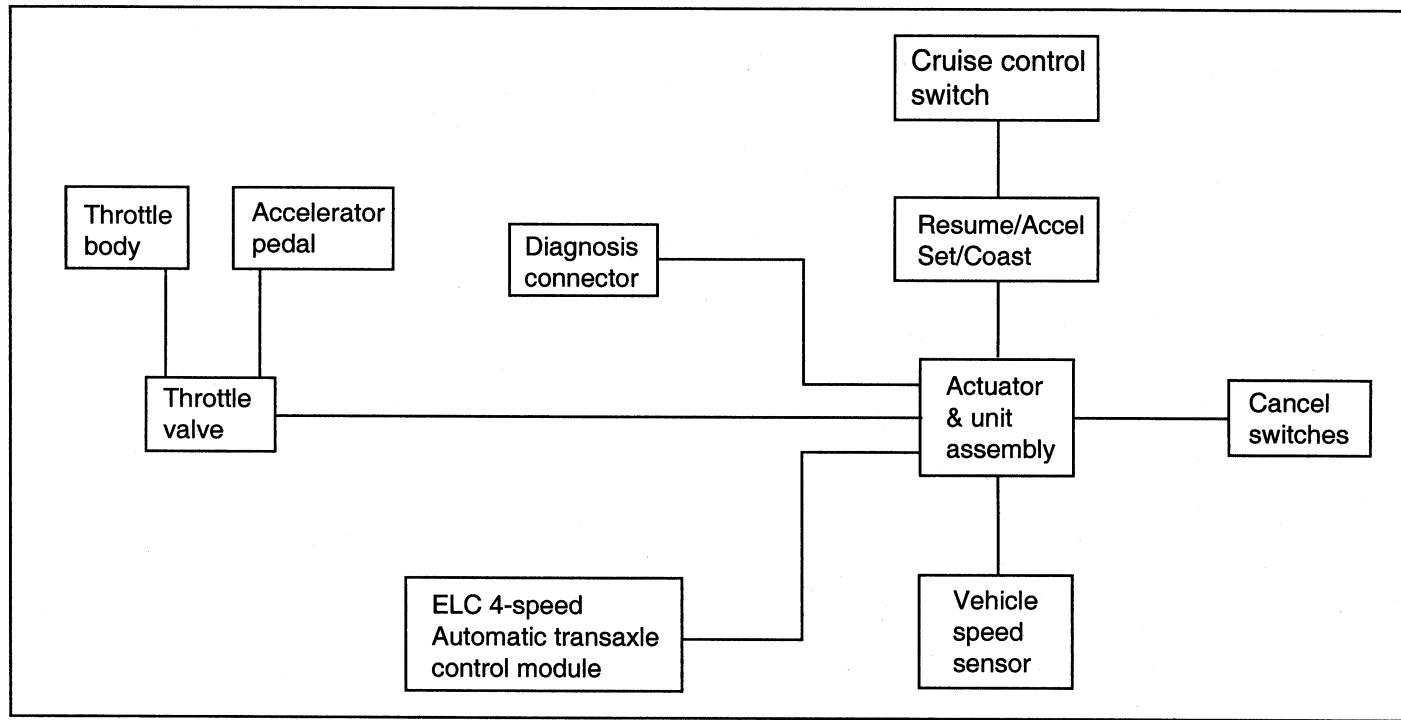


KFW2032A

CRUISE CONTROL SYSTEM

SYSTEM BLOCK DIAGRAM

EBA90290



EBA9029A

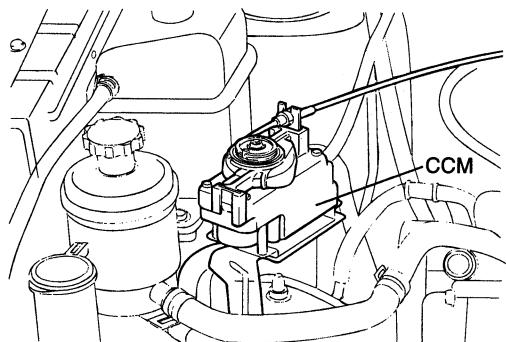
COMPONENT PARTS AND FUNCTION OUTLINE

COMPONENT PART	FUNCTION
Vehicle speed sensor	Converts vehicle speed to pulses.
Cruise control module (CCM)	Receives signals from sensor and control switch; CCM controls all automatic speed control function.
Actuator	Regulates the throttle valve to the set opening by signals from the CCM.
Control switch	
CRUISE main switch	Switch for automatic speed control power supply.
SET/RESUME switch	Controls automatic speed control functions by SET (COAST) and RESUME (ACCEL).
CRUISE main switch indicator	Illuminates when CRUISE main switch is ON (Built into cluster).
Cancel switch	Sends cancel signals to the CCM
Stop lamp switch/Clutch switch (M/T)	Cancels cruise
Transaxle range switch	Controls the overdrive ON and OFF, based on signals from the CCM for the CC.
Data link connector	By connecting the voltmeter or scan tool, control module diagnostic codes may be read.

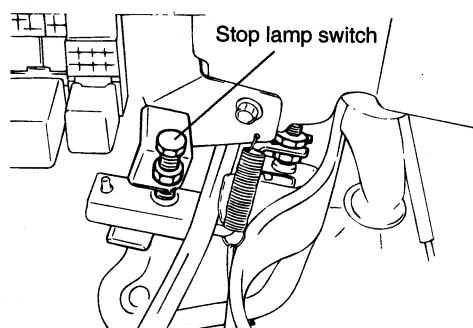
*CC : Cruise Control

COMPONENTS LOCATION

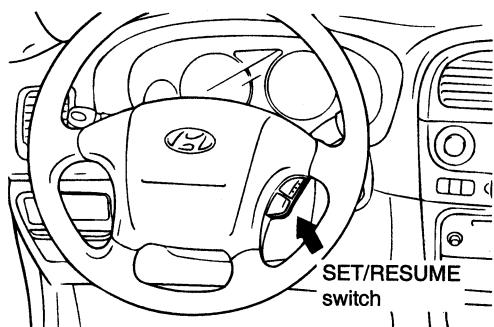
EBHA0300



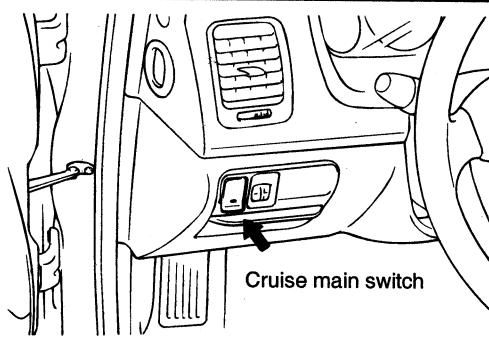
EBHA031C



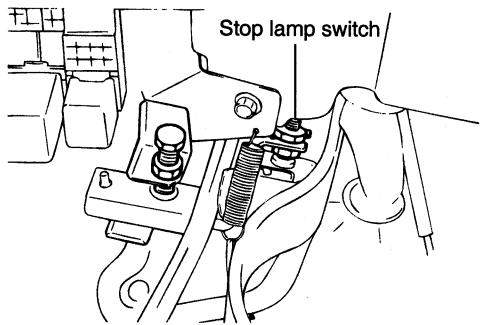
EBA9030G



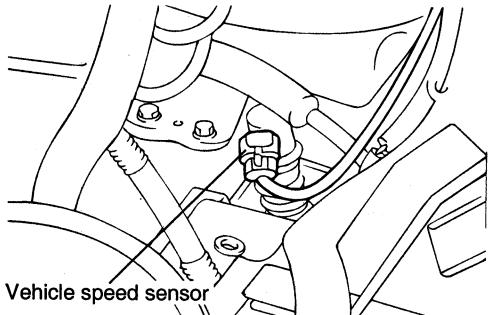
EBAA030B



EBAA030C



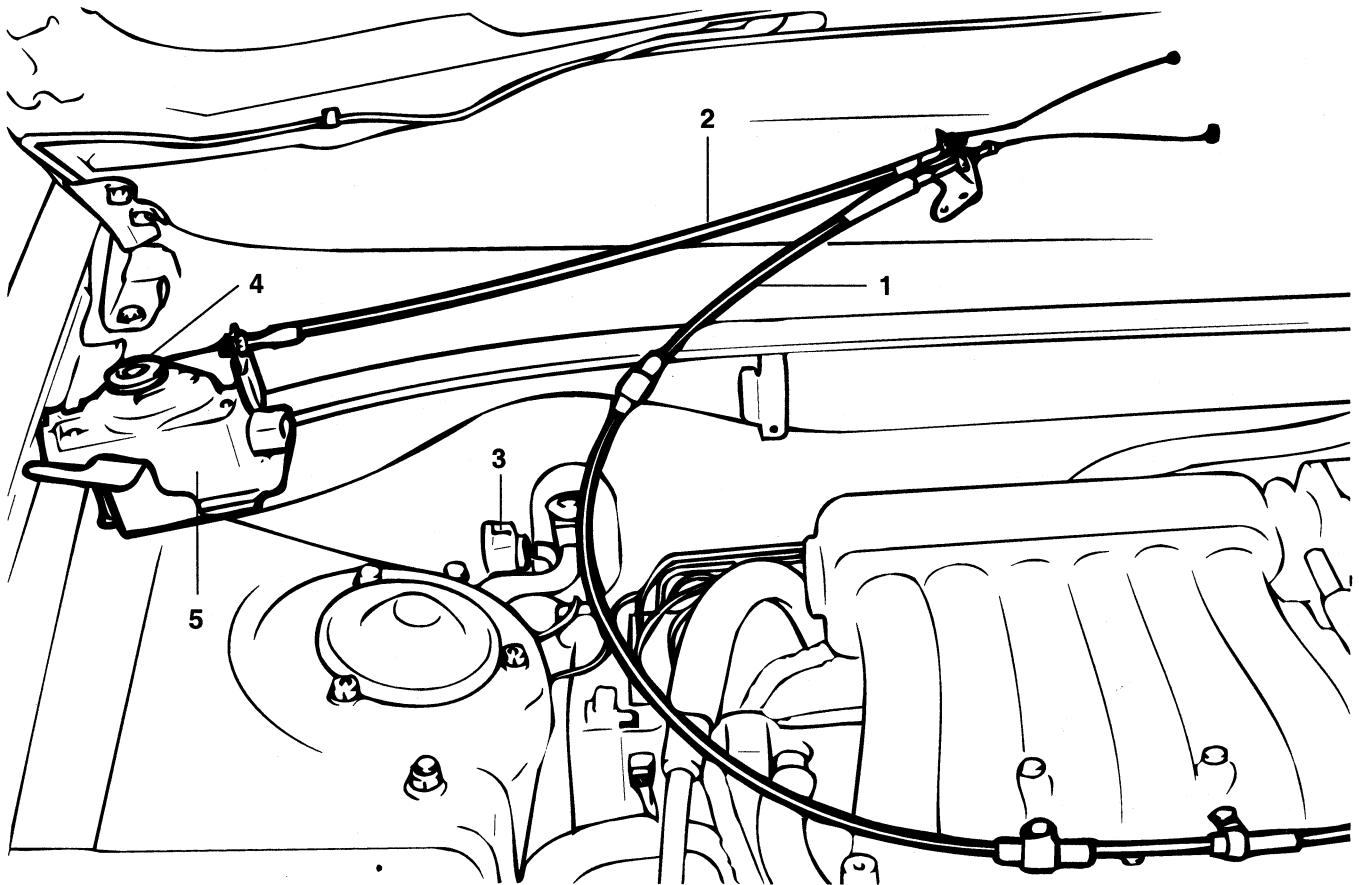
EBA9030L



EBA9030N

COMPONENTS

EBHA0310

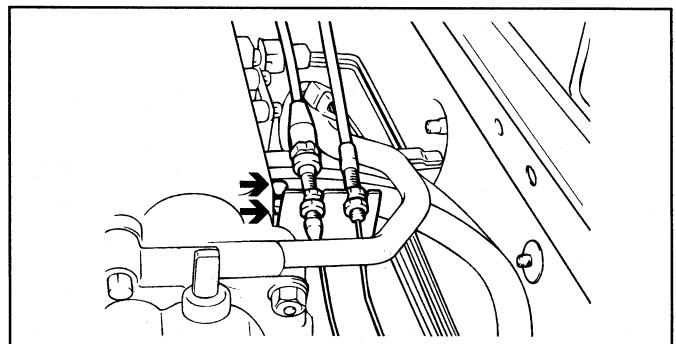


1. Accelerator cable and throttle assembly connection
2. Cruise control cable and pulley assembly connection
3. Actuator unit connector
4. Pulley assembly
5. Actuator unit

EBAA031A

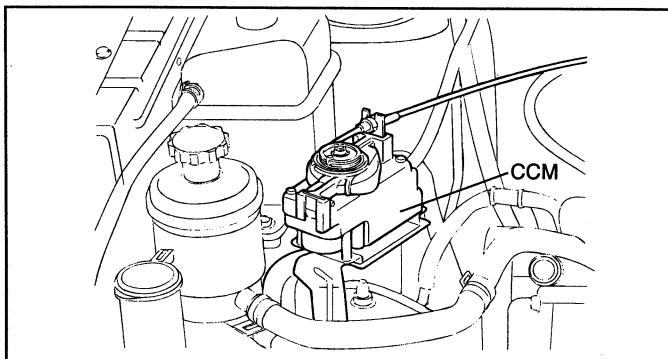
REMOVAL AND INSTALLATION

1. Remove the battery negative terminal.
2. Disconnect the accelerator cable and cruise control cable from throttle assembly by turning the throttle bellcrank to full open position.
3. Disconnect the accelerator cable from the accelerator pedal connection.
4. Remove the accelerator cable mounting bolts.



EBAA031B

- Remove the actuator unit mounting bolt.
- Installation is the reverse of removal.



EBHA031C

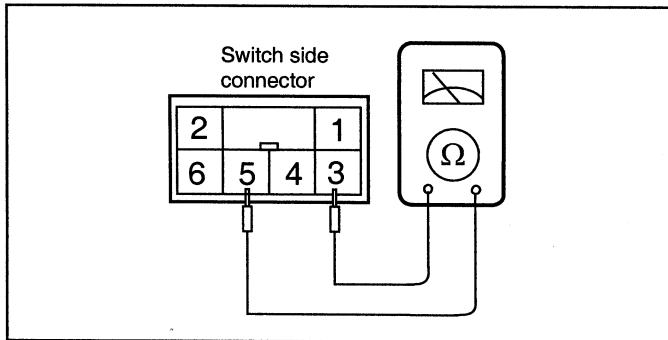
PARTS INSPECTION EBAA0320

CRUISE CONTROL MAIN SWITCH

- Operate the switch and check for continuity between the terminals.
- If continuity is not as specified, replace the switch.

Terminal Position	1	2	3	4	5	6
ON			○	—	○	
OFF	○	—		○	—	

EBAA032A



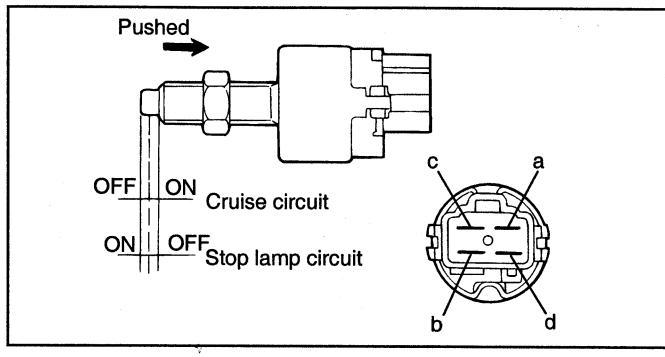
EBAA032B

STOP LAMP SWITCH

After operating the stop lamp switch, check for continuity between the terminals.

Terminal Position	1	2	3	4
Not pushed			○	—
Pushed	○	—		

EBAA032C



EBAA032C

INSPECTION EBAA0330

CONDITION

- Turn A/C and all lights OFF. Inspect and adjust at no load.
- Warm the engine until idle is stabilized. Confirm that the idle speed is at the specified RPM.
- Turn the ignition switch OFF.

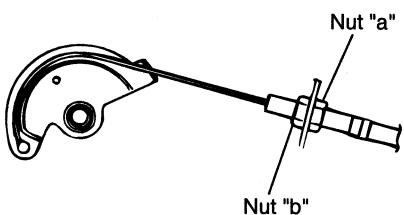
- Confirm there are no sharp bends in the cables.
- Depress the accelerator pedal and check if the throttle lever moves smoothly from fully closed to fully open.
- Check the inner cables for correct slack.
- If there is too much slack or no slack, adjust the play by the following procedures :

SERVICE HINT

- If the cable is very loose, the loss of speed going uphill will be large.
- If the cable is too tight, idle RPM will be high.

CABLE ADJUSTMENT

1. Assemble the cable to actuator and unit assembly.
2. Tighten nut "b" after pulling the cable tightly.
3. Back nut "b" off one turn.
4. Tighten nut "a".
5. Cable should have approximately 1mm of slack with the actuator and unit against the stop.



EBAA033A