

ENGINE ELECTRICAL SYSTEM

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GENERAL SPECIFICATIONS

Distributor

Type

Advance mechanism
Ignition order

Contact pointless type

Controlled by engine control module

1-3-4-2

Ignition coil

Type

Primary coil resistance
Secondary coil resistance

Mold dual-coil

 $0.8 \pm 0.09 \Omega$ $12.1 \pm 1.8 K\Omega$

Spark plug

Type

NGK

Champion

Plug gap

BPR6ES-11

RN9YC4

1.0-1.1 mm (0.039-0.043 in.)

Starter motor

Type

Voltage
output
No-load characteristics
Terminal voltage
Amperage
Speed
Number of pinion teeth
Pinion gap

Reduction drive (with planetary gear)

12V

1.2KW

11V

90 A

3,000 RPM

8**0.5-2.0** mm (0.0197-0.079 in.)

Generator

Type	Battery voltage sensing
Rated output	13.5 V
Voltage regulator type	Electronic built-in type
Regulator setting voltage	14.4 \pm 0.3V
Temperature compensation	-10 \pm 3 mV/°C

Battery

Type	60AH-B
Ampere hours (5HR)	48 Ah or more
(20HR)	60 Ah or more
Cold cranking [at -17.8°C(0°F)]	420 A or more
Reserve capacity	92 min.
Specific gravity [at 25°C(77°F)]	1.270 \pm 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 temperature.

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).

IGNITION SYSTEM

GENERAL INFORMATION

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

The engine conditions (speed, load, warm-up condition, etc.) are detected by the various sensors. Based upon these sensor signals and the ignition timing data, 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.

TROUBLE SHOOTING

Trouble condition	Probable cause	Remedy
Engine will not start or is hard to start. (Crank OK)	Incorrect ignition timing	Adjust ignition timing
	Ignition coil faulty	Inspect ignition coil
	Power transistor faulty	Inspect power transistor
	Crankshaft position sensor faulty	Replace crankshaft position sensor
	High tension cable faulty	Inspect high tension cable
	Spark plugs faulty	Replace plugs
	Ignition wiring disconnected or broken	Inspect wiring
Rough idle or stalls	Spark plugs faulty	Replace plugs
	Ignition wiring faulty	Inspect wiring
	Incorrect ignition timing	Adjust ignition timing
	Ignition coil faulty	Inspect ignition coil
	Power transistor faulty	Inspect power transistor
Engine hesitates/poor acceleration	Spark plugs faulty	Replace plugs
	Ignition wiring faulty	Inspect wiring
	Incorrect ignition timing	Adjust timing
Poor mileage	Spark plugs faulty	Replace plugs
	Incorrect ignition timing	Adjust ignition timing
Engine overheats	Incorrect ignition timing	Adjust ignition timing

IGNITION TIMING

Adjustment conditions:

Coolant temperature: 80-95°C (170-205°F)

Lamps, cooling fan, and all accessories: Off

Transaxle range : Neutral (N or P for A/T)

Parking brake : ON

Steering wheel : Neutral position

Adjustment Procedures

1. Install a tachometer and a timing light.
2. Run the engine for more than 5 seconds at an engine speed of 2,000 to 3,000 rpm.
Run the engine at idle for 2 minutes.
3. Read the idling rpm. If it is not within the specified value, check the idle speed control system.

Idle speed : 750 ± 100 rpm (For 1.6L)

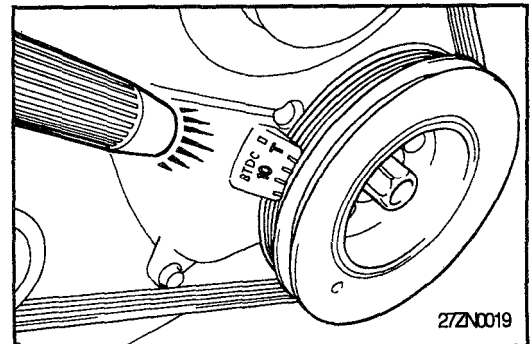
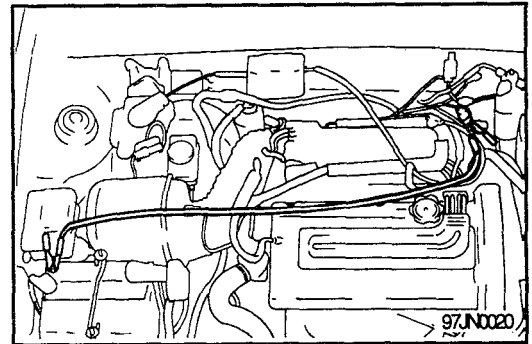
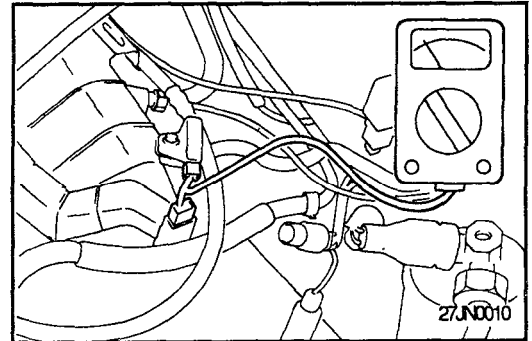
700 ± 100 rpm (For 1.8L)

Refer to 31 GROUP - Idle speed adjustment section.

NOTE

- 1) Do not use the scan tool.
If tested with the scan tool connected to the data link connector, the ignition timing will not be the basic timing, but be ordinary timing.
 - 2) The engine speed indicated is a second of actual speed.
In other words, the reading of the tachometer times 2 is actual speed.
4. Ground the ignition timing adjustment terminal.
 5. Check the basic ignition timing.

Basic ignition timing : 5° ± 2° BTDC (at idle)



6. If the timing is incorrect, loosen the crankshaft position sensor mounting nut, and rotate the crankshaft position sensor until the timing is correct.

NOTE

The ignition timing will be retarded, if the crankshaft position sensor is turned to the left and advanced if it is turned to the right.

7. After adjustment, securely tighten the mounting nut.
Tightening torque : 10-13Nm (100-130 kg.cm, 7-9 lb.ft)

NOTE

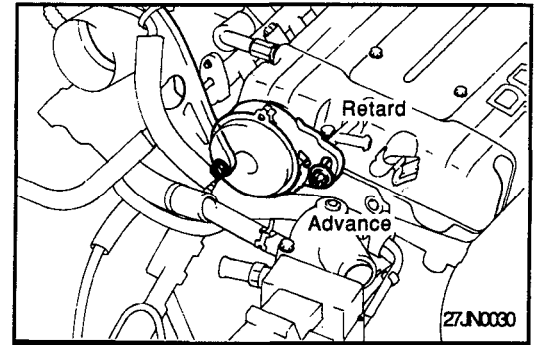
Be careful, when tightening the nut, that the crankshaft position sensor does not move.

8. Stop the engine.
9. Disconnect the lead wire connected at step 4.
10. Start and run the engine at curb idle speed.
11. Check to be sure that the idling ignition timing is the correct timing.

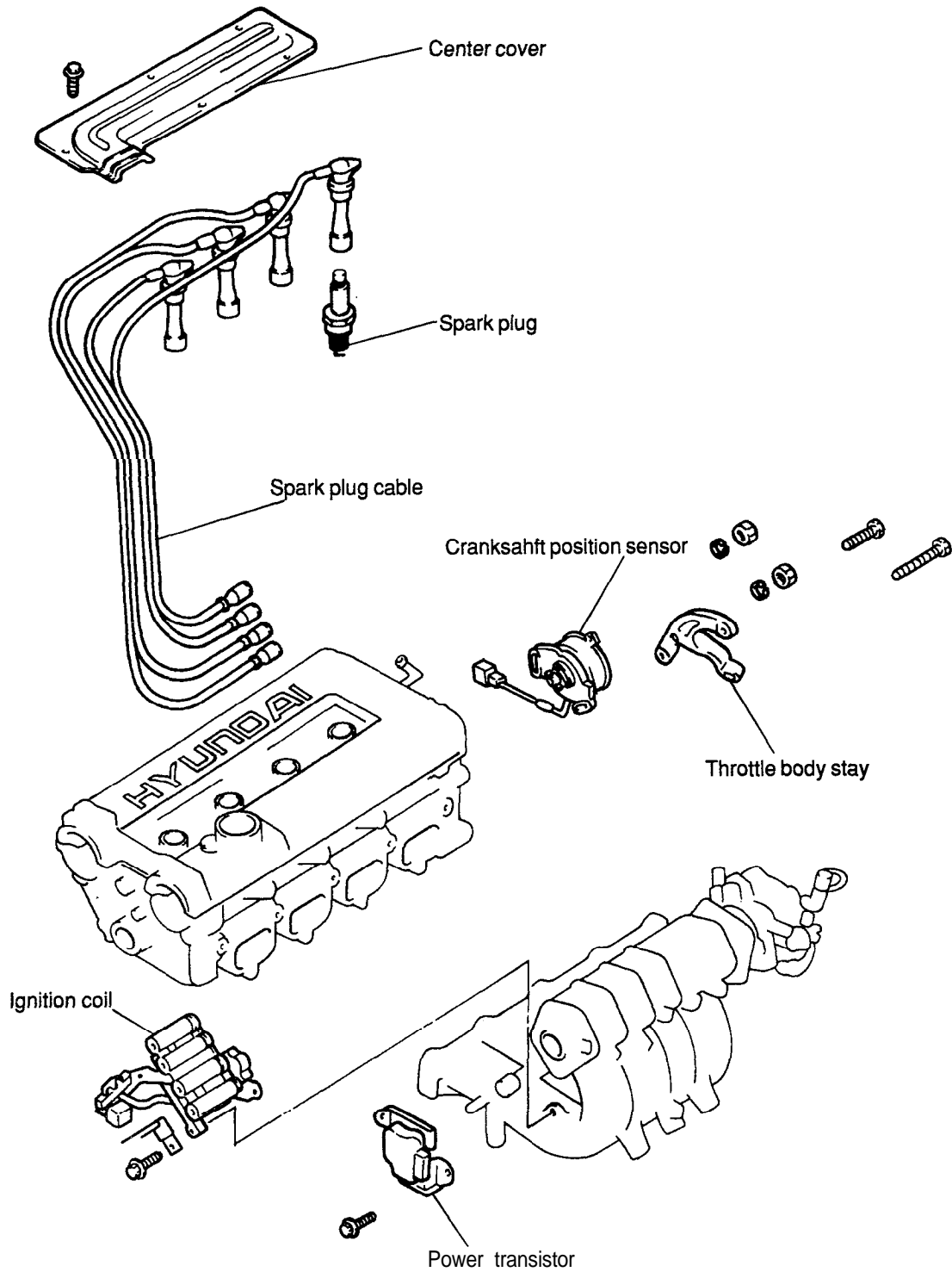
**Actual ignition timing : 8° BTDC (For 1.6L)
14° BTDC (For 1.8L)**

NOTE

1. Actual ignition timing may vary, depending on the control mode of the engine control module. In such a case, re-check the basic ignition timing. If there is no deviation, the ignition timing is functioning normally.
2. At high altitudes more than approximately 700 m (2,300 ft.) above sea level, the actual ignition timing is farther advanced to ensure good combustion.



REMOVAL AND INSTALLATION

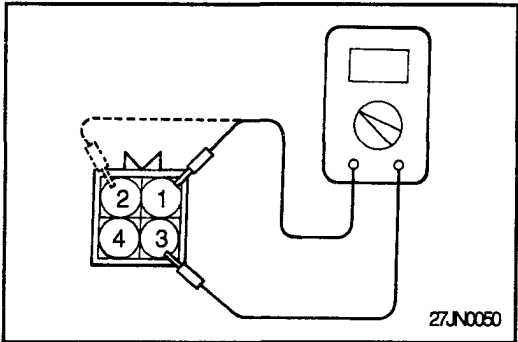


IGNITION COIL

Measurement of the primary coil resistance

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

Standard value: 0.77 - 0.95Ω



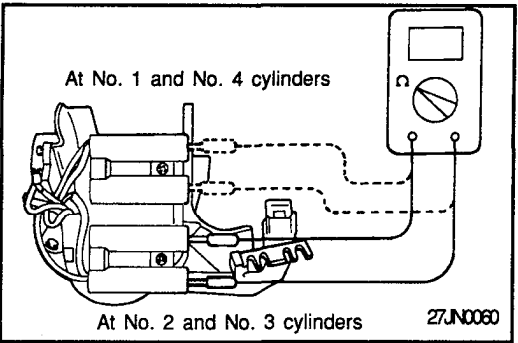
Measurement of the secondary coil resistance

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

Standard value: 10.3 - 13.9KΩ

CAUTION

Be sure, when measuring the resistance of the secondary coil, to disconnect the connector of the ignition coil.



POWER TRANSISTOR

NOTE

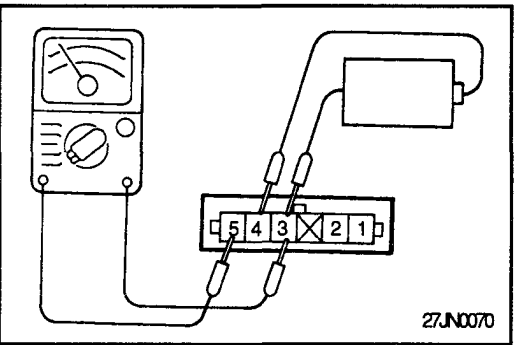
An analog-type ammeter should be used.

Power transistor for coil No. 1 and No. 4 cylinders

- 1. Connect the negative (-) terminal of the 1.5V power supply to terminal No.3 of the power transistor; then check whether there is continuity between terminal No.5 and terminal No.3 when terminal No.4 and the positive (+) terminal are connected and disconnected.

NOTE

Connect the negative (-) probe of the ammeter to terminal No.5.



Terminal 4 and (+) terminal	Terminal 5 and terminal 3
Connected	Continuity
Disconnected	No continuity

Power transistor for coil No.2 and No.3 cylinders

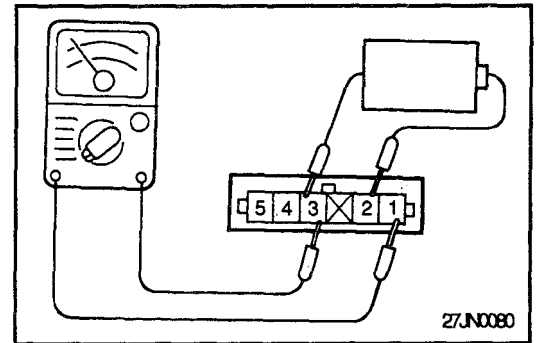
1. Connect the negative (-) terminal of the 1.5V power supply to terminal No.3 of the power transistor; then check whether there is continuity between terminal No.1 and terminal No.3 when terminal No.2 and the positive (+) terminal are connected and disconnected.

NOTE

Connect the negative (-) probe of the ammeter to terminal No.1.

Terminal 2 and (+) terminal	Terminal 1 and terminal 3
Connected	Continuity
Disconnected	No continuity

If the problem is still evident after checking as described above, replace the power transistor.



CHECKING SPARK PLUG

Inspection and Cleaning

1. Disconnect the spark plug cable from the spark plug.

NOTE

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

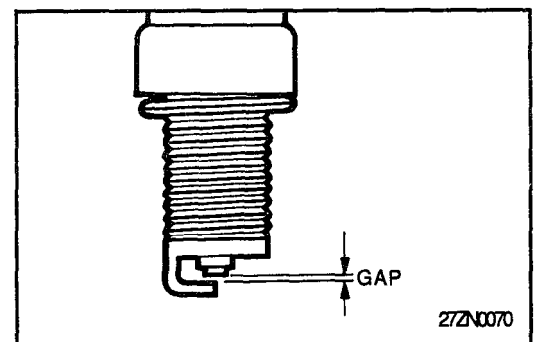
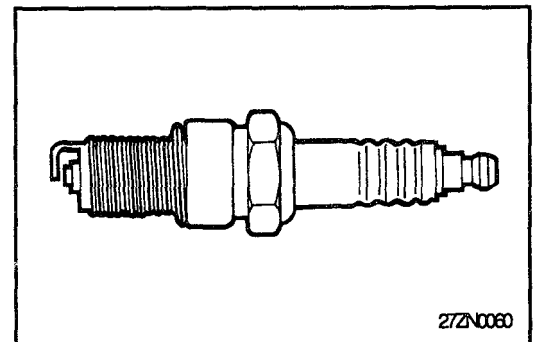
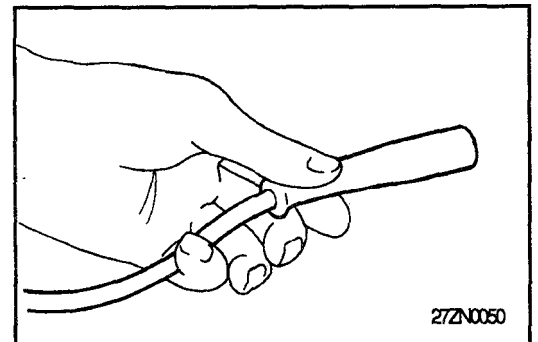
2. Using spark plug wrench, remove all of the spark plugs from the cylinder head.

NOTE

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

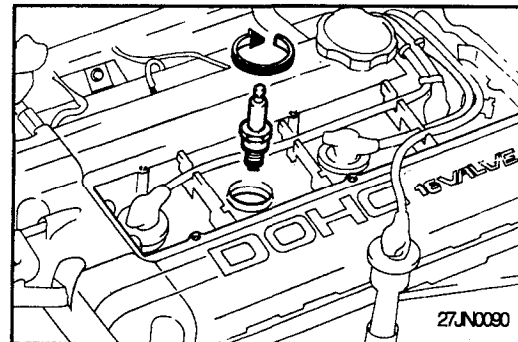
3. Check the spark plugs for the following:
 - 1) Broken insulator
 - 2) Worn electrode
 - 3) Carbon deposits
 - 4) Damaged or broken gasket
 - 5) Condition of the porcelain insulator at the tip of the spark-plug
4. Check the spark plug gap using a wire gap gauge, and adjust if necessary.

Standard value: 1.0-1.1 mm (0.039-0.043 in.)



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

Spark plug: 20-30 Nm (204-309 kg.cm, 15-21 lb.ft)



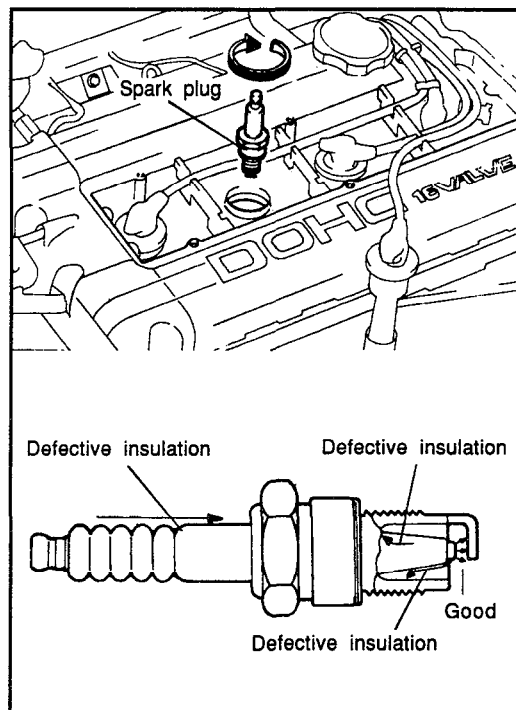
Analyzing Spark Plug

Engine conditions can be analyzed by the tip deposits near the electrode.

Condition	Dark deposits	White deposits
Description	<ul style="list-style-type: none"> o Too rich a fuel mixture o Low air intake 	<ul style="list-style-type: none"> o Too lean a fuel mixture o Advanced ignition timing o Insufficient plug tightening

SPARK PLUG TEST

1. Remove the spark plug and connect to the spark plug cable.
2. Ground the spark plug outer electrode, and crank the engine.
3. Check to be sure that there is an electrical discharge between the electrodes at this time.



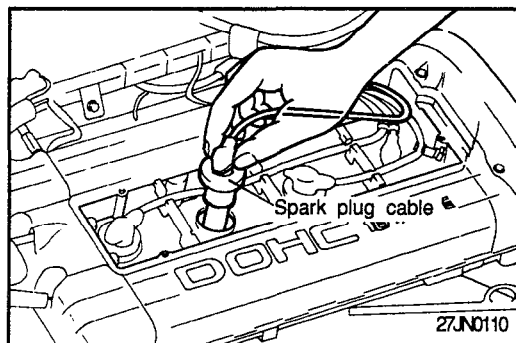
SPARK PLUG CABLES TEST

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.

Caution

Wear rubber gloves while doing so.

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

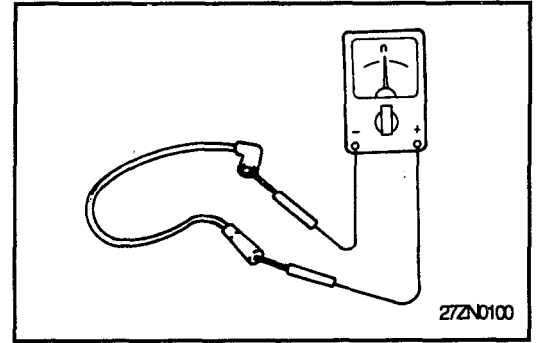


4. Measure the resistance.

Spark plug cable			
No. 1	No. 2	No. 3	No. 4
5.8	8.4	10.6	9.7

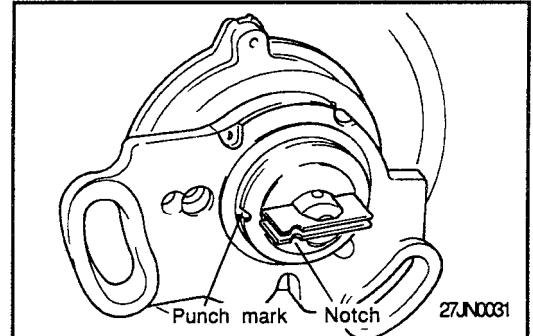
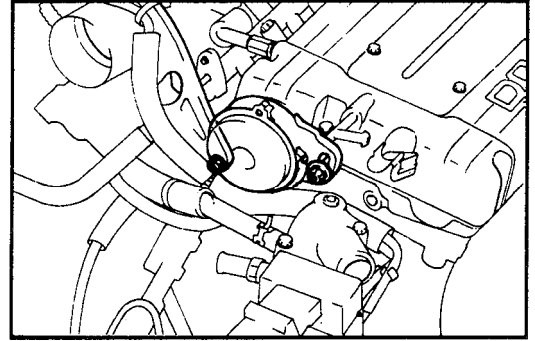
NOTE

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



CRANKSHAFT POSITION SENSOR

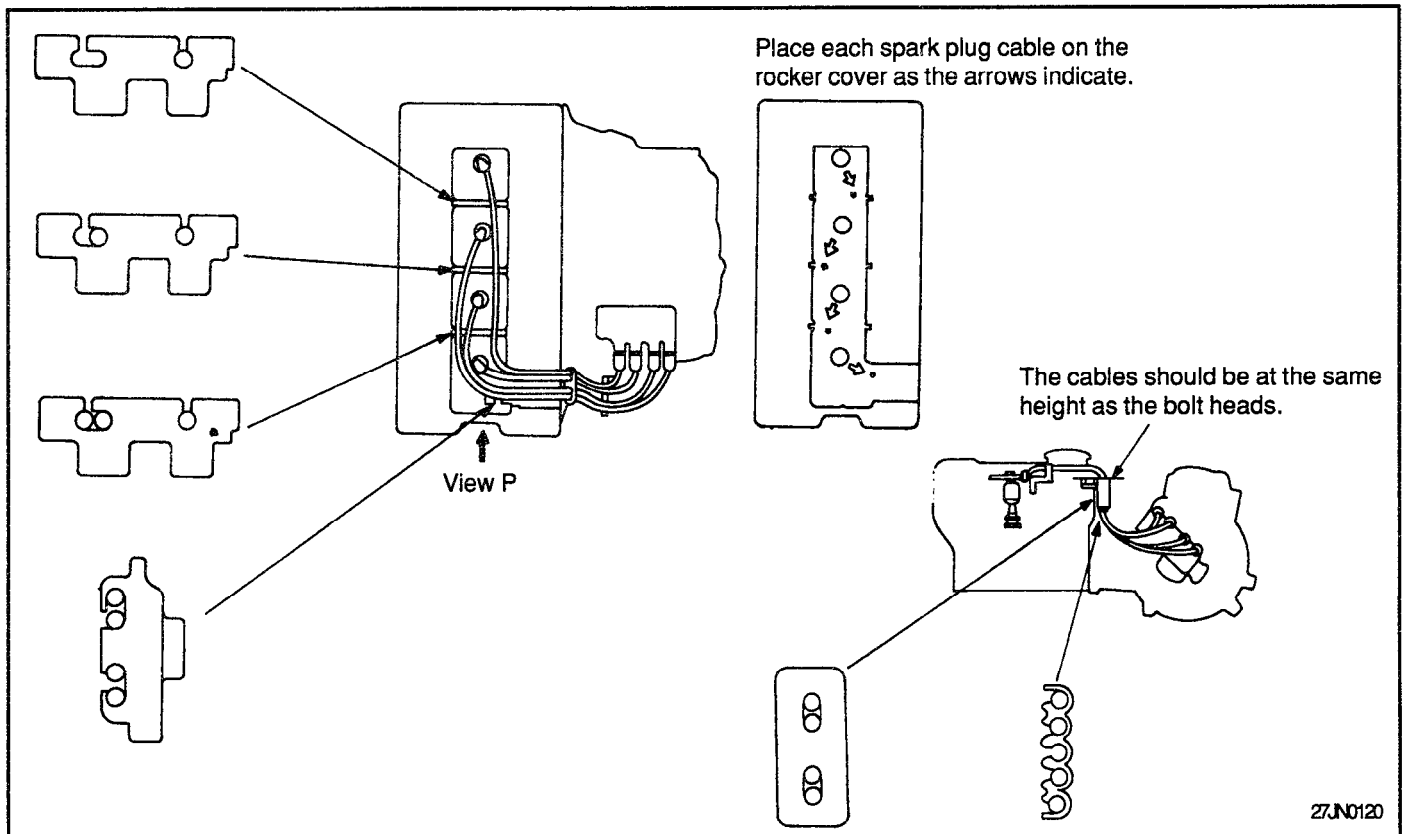
1. Remove the battery ground cable
2. Remove the crankshaft position sensor mounting bolt (2 EA).
3. Pull out the crankshaft position sensor from cylinder head.
4. Turn the crankshaft so that the No. 1 cylinder is at top dead center.
5. Align the punch mark on the crankshaft position sensor housing with the notch in plate.
6. install the crankshaft position sensor on the cylinder head.



INSTALLATION OF SPARK PLUG CABLE

Improper arrangement of spark plug cables will induce voltage between the cables, causing miss firing and developing a surge at acceleration in high-speed operation.

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

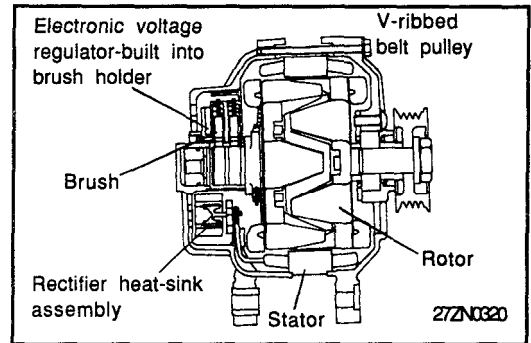


CHARGING SYSTEM

GENERAL INFORMATION

The charging system includes a battery, an generator with a built-in regulator, and the charging indicator light and wires. 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 this 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.



TROUBLESHOOTING

Symptom	Probable cause	Remedy
Charging warning indicator does not light with ignition switch "ON" and engine off.	Fuse blown.	Check fuses.
	Bulb burned out.	Replace bulb.
	Wiring connection loose.	Tighten loose connections.
	Electronic voltage regulator faulty.	Replace voltage regulator.
Charging warning indicator does not go out with engine running. (Battery requires frequent recharging).	Drive belt loose or worn.	Adjust tension or replace drive belt.
	Battery cables loose, corroded or worn.	Repair or replace cables.
	Fuse blown.	Check fuses.
	Fusible link blown.	Replace fusible link.
	Electronic voltage regulator or generator faulty.	Test generator.
	Wiring faulty.	Repair wiring.
Discharge battery.	Drive belt loose or worn.	Adjust tension or replace drive belt.
	Wiring connection loose or open circuit.	Tighten loose connection or repair wiring.
	Fusible link blown.	Replace fusible link.
	Poor grounding.	Repair.
	Electronic voltage regulator or generator faulty.	Test generator.
	Worn battery	Replace battery.
Overcharge	Electronic voltage regulator faulty	Replace voltage regulator.
	Voltage sensing wire faulty	Repair wire.

INSPECTION OF CHARGING SYSTEM

VOLTAGE DROP TEST OF GENERATOR OUTPUT WIRE

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

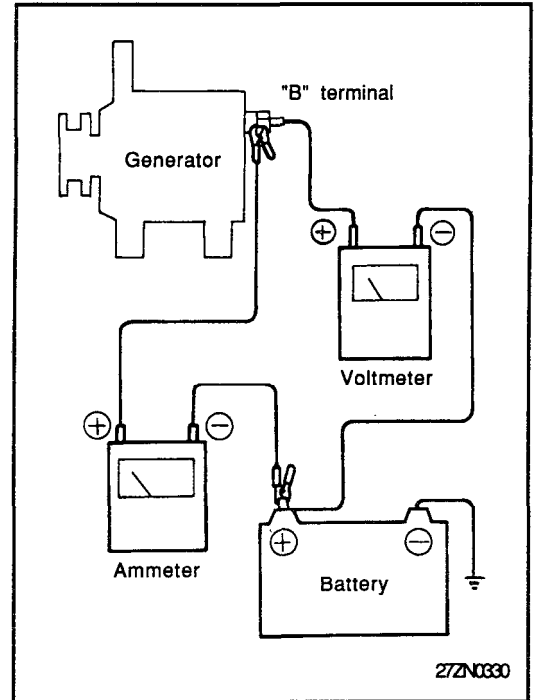
Preparation

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

NOTE

Using a clamp type ammeter is the best method of measuring current. It will allow you to check the system with out disconnecting any of the terminals.

5. Connect a voltmeter between the generator "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 the headlights and adjust the engine speed so that the ammeter reads 20A and then read the voltmeter.

Result

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

Standard value: 0.2V Max.

2. If the voltmeter indicates a value that is larger than the standard value, 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 them before testing again.

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

OUTPUT CURRENT TEST

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

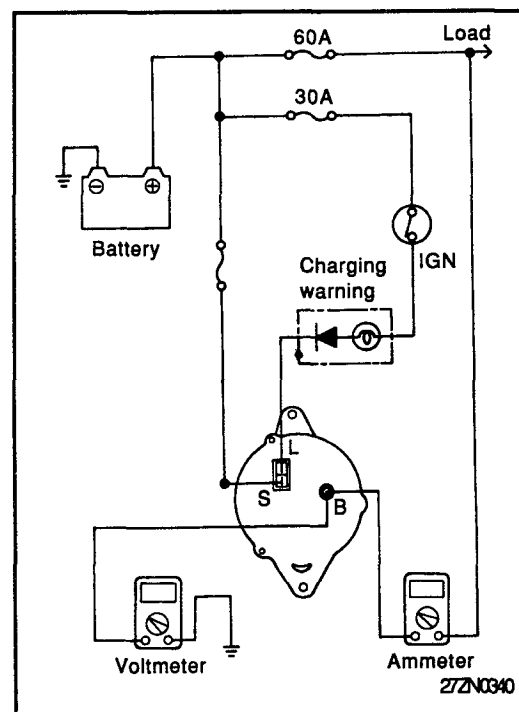
Preparation

1. Prior to the test, check the following items and correct as necessary.
 - 1) Check the battery installed in the vehicle to ensure that it is in good condition*. 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 partially discharged. With a fully charged battery, the test may not be conducted correctly due to an insufficient load.

- 2) Check the tension of the generator drive belt. The belt tension check method is described in the section "COOLING".



2. Turn off the ignition switch.
3. Disconnect the battery ground cable.
4. Disconnect the generator output wire from the generator "B" terminal.
5. 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.

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

Test

1. Check to see that the voltmeter reads the same value as the battery voltage.
If the voltmeter reads 0 V, and open circuit in the wire between the generator "B" terminal and battery (-) terminal, a blown fusible link or poor grounding is likely.
2. Start the engine and turn on the headlights.
3. 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 start up, the charging current quickly drops, therefore, the above operation must be done quickly to read the maximum current value correctly.

Result

1. 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 : 52.5A

NOTE

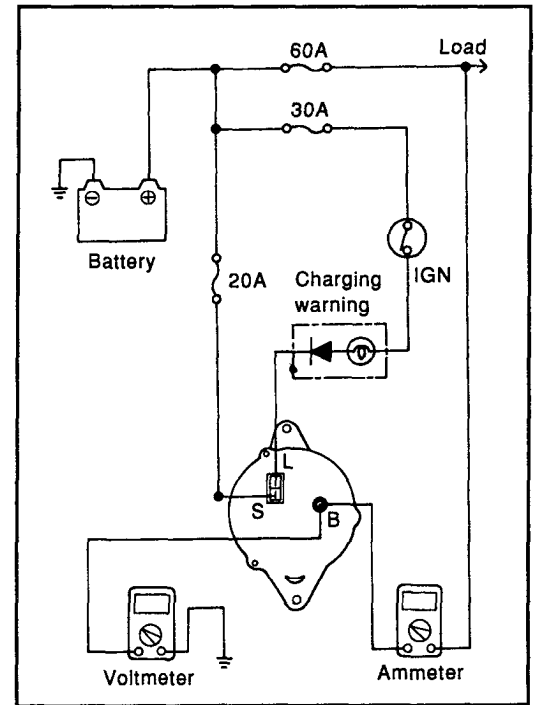
- 1) **The nominal output current value is shown on the nameplate affixed to the generator body.**
 - 2) **The output current value changes with the electrical load and the temperature of the generator itself. Therefore, the nominal output current may not be obtained. If such is the case, use a carbon pile to increase the load on the generator. The nominal output current may not be obtained if the temperature of the generator itself or ambient temperature is too high.**
2. Upon completion of the output current test, lower the engine speed to idle and turn off the ignition switch.
 3. Disconnect the battery ground cable.
 4. Remove the ammeter and voltmeter and the engine tachometer.
 5. Connect the generator output wire to the generator "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 voltage correctly.

Preparation

1. Prior to the test, check the following items and correct if necessary.
 - 1) Check the battery installed on the vehicle to see that it is fully charged. For battery checking method, see "BATTERY".
 - 2) Check the generator drive belt tension. For belt tension check, see section, "COOLING".
2. Turn ignition switch to "OFF".
3. Disconnect the battery ground cable.
4. Connect a digital voltmeter between the "S" terminal of the generator and ground. Connect the (+) lead of the voltmeter to the "S(L)" terminal of the generator. Connect the (-) lead to good ground or the battery (-) terminal.
5. Disconnect the generator output wire from the generator "B" terminal.
6. 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.
7. Attach the engine tachometer and 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 0 V, there is an open circuit in the wire between the generator "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 generator output current drops to 10 A or less.

Result

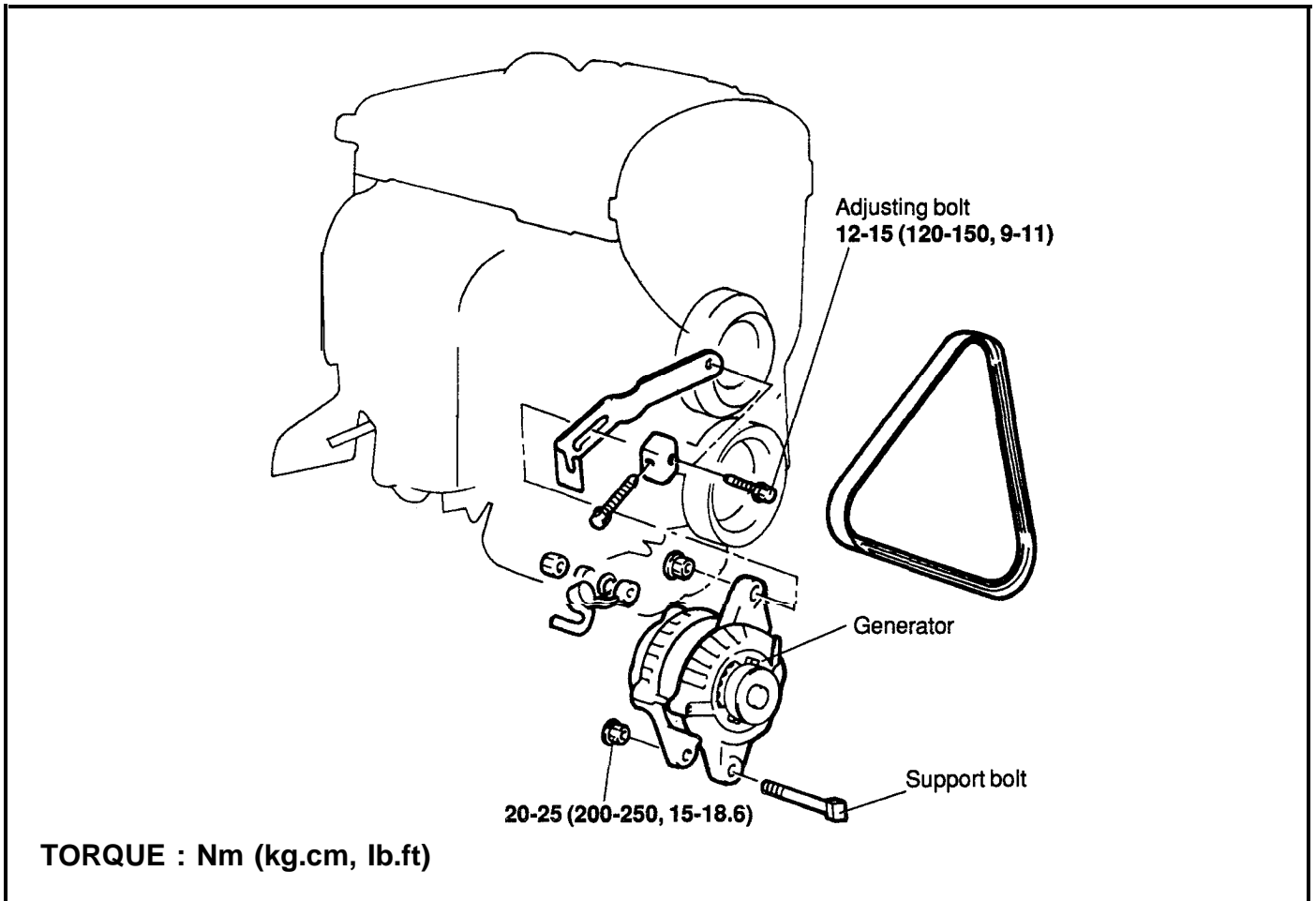
1. If the voltmeter reading agrees with the value listed in the Regulating Voltage Table below, the voltage regulator is functioning correctly. If the reading is other than the standard value, the voltage regulator or the generator is faulty.

Regulating Voltage Table

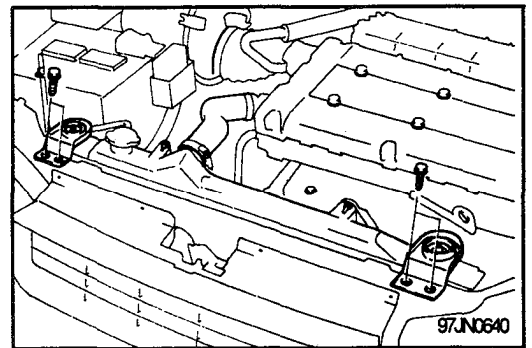
Voltage regulator ambient temperature °C(°F)	Regulating voltage V
-20 (-4)	14.2-15.4
20 (68)	13.9-14.9
60 (140)	13.4-14.6
80 (176)	13.1-14.5

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 and ammeter and the engine tachometer.
5. Connect the generator output wire to the generator "B" terminal.
6. Connect the battery ground cable.

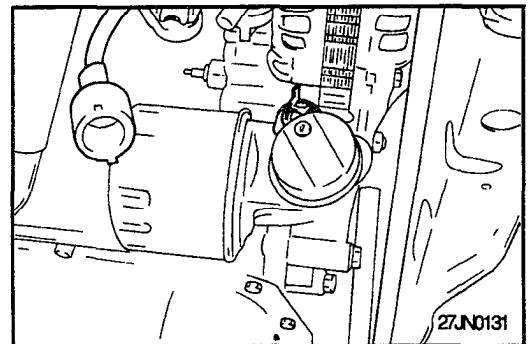
GENERATOR REMOVAL AND INSTALLATION



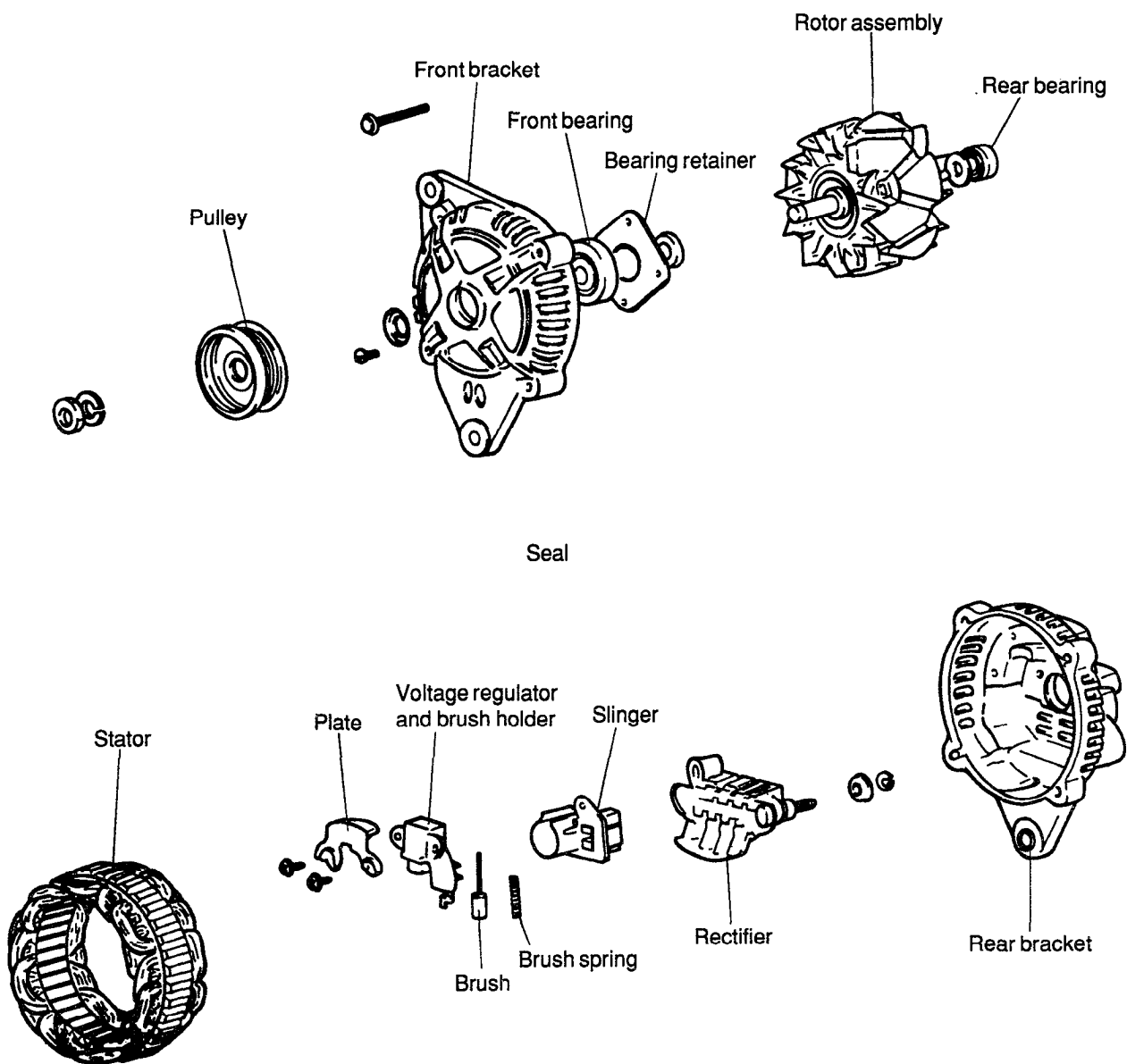
1. Disconnect the negative terminal from the battery.
2. Remove the radiator mounting bolt.
3. Disconnect the reservoir hose and fan motor connectors.
4. Raise the vehicle.
5. Remove the mud guard-LH.



6. Disconnect the connector pin of oil pressure switch.
7. Loosen the belt tension and remove the belt.
8. Remove the terminal nut and the wire from the B terminal.
9. With lifting up the radiator, remove the generator.
10. Installation is the reverse of the removal procedure.



COMPONENTS

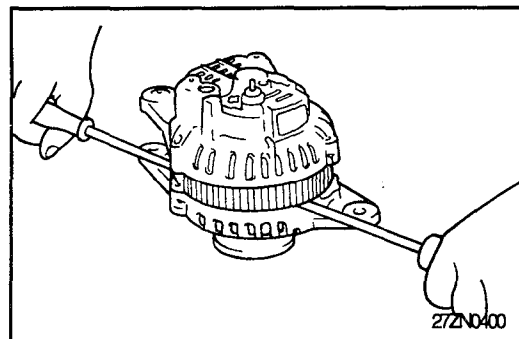


DISASSEMBLY

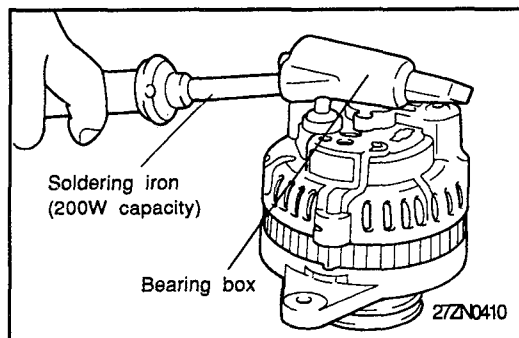
1. Remove the three through bolts.
2. Insert a flat screwdriver between the front bracket and stator core, and pry downward.

NOTE

- 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.

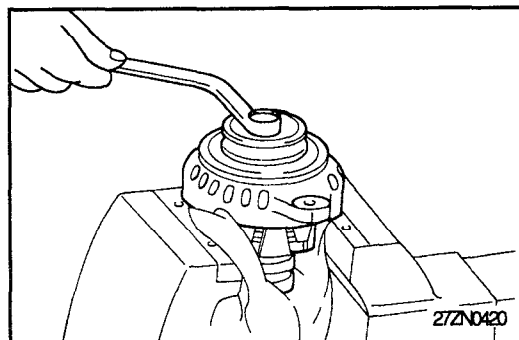


3. Secure the rotor in a vise with the pulley side up.

NOTE

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

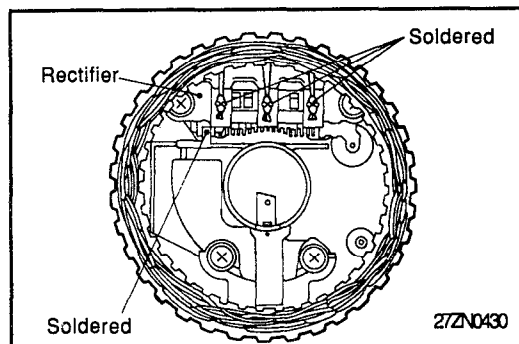
4. Remove the pulley nut, then remove the spring washer, then the pulley, and then the spacer.
5. Remove the front bracket and two seals.
6. Remove the rotor from the vise.
7. Remove the brush holder screws, the rectifier screws, and the nut from the "B" terminal.
8. Remove the stator assembly from the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



NOTE

- 1) When soldering or unsoldering, use care to make sure that heat of soldering iron is not transmitted to the diodes for a long period.
- 2) Use care that excessive force is not exerted on the leads of the diodes.

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

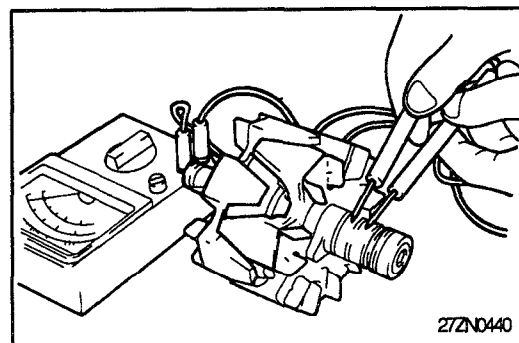


INSPECTION

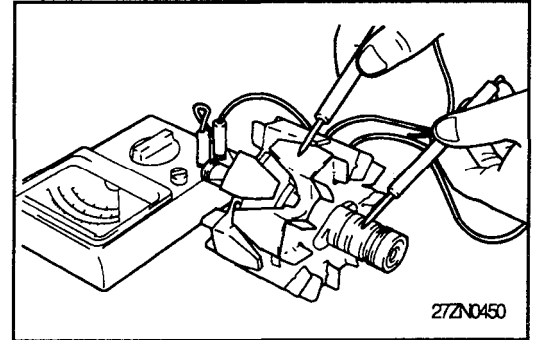
Rotor

1. Check the rotor coil for continuity. Check to make sure that there is continuity between the slip rings. If resistance is extremely low, it means that 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

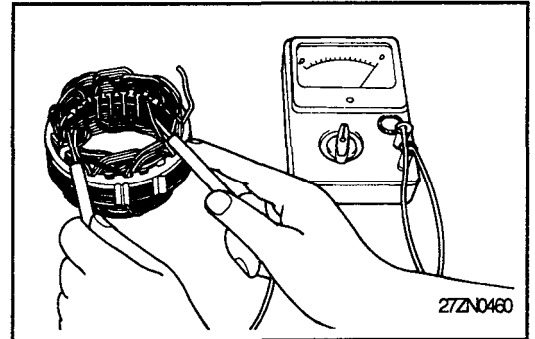


2. Check the rotor coil for a ground. Check to make sure that there is no continuity between slip the ring and the core. If there is continuity, replace rotor assembly.

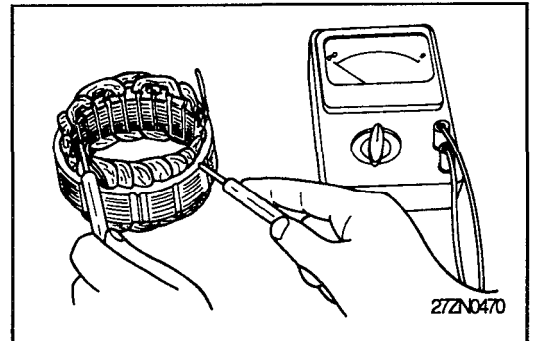


Stator

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



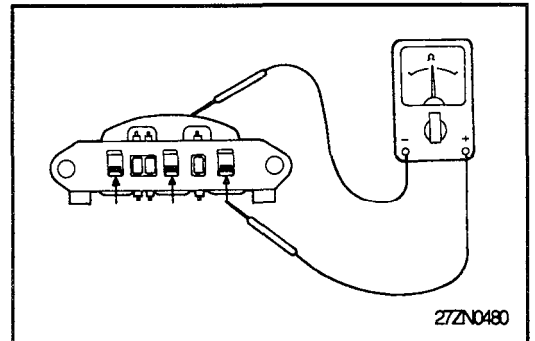
2. Check the coil for grounding. Check to make sure that there is no continuity between the coil and the core. If there is continuity, replace the stator assembly.



Rectifiers

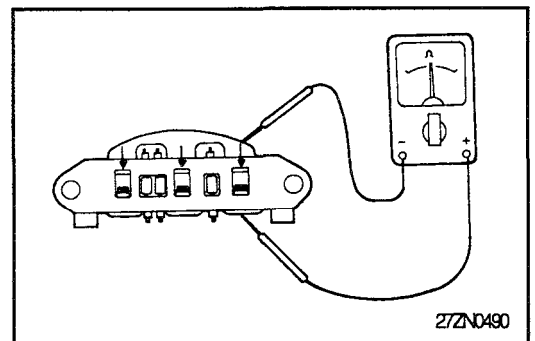
Positive rectifier test

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.



Negative rectifier test

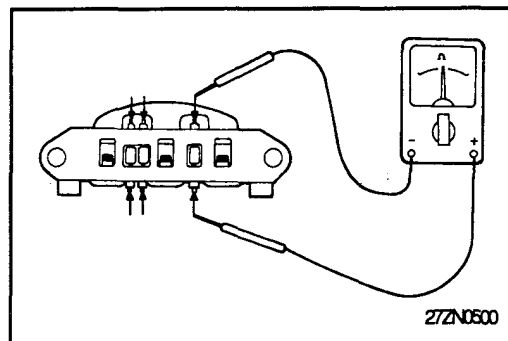
Check for continuity between the negative rectifier and the stator coil lead connection terminal. The ohmmeter should read continuity in only one direction. If there is continuity in both directions, a diode is shorted, and the rectifier assembly must be replaced.



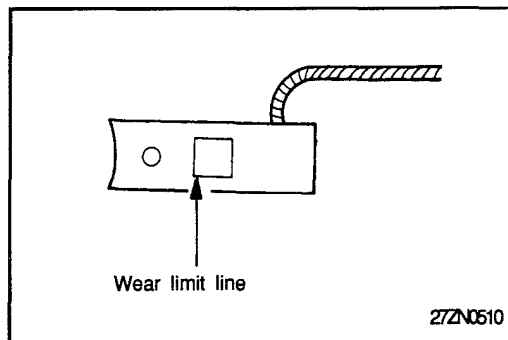
Diode trio test

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.

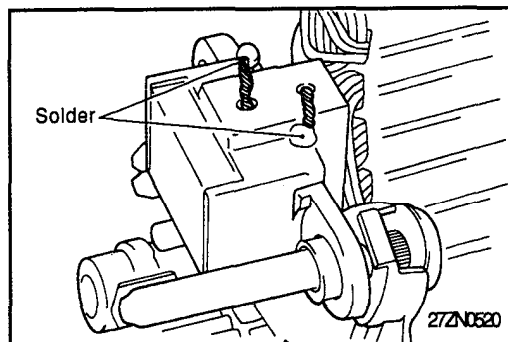
If continuity is present in both directions, a diode is defective and the heatsink assembly must be replaced.

**BRUSH REPLACEMENT**

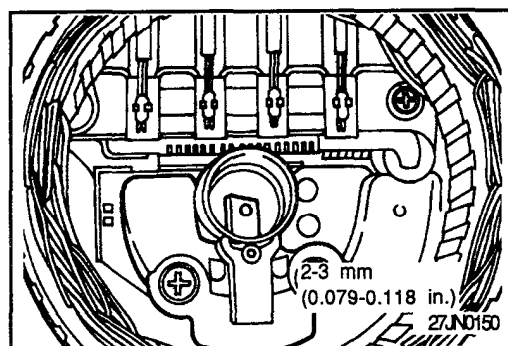
Replace the brushes if they are worn to limit line.



1. Unsolder the pigtail and remove the old brush and spring.

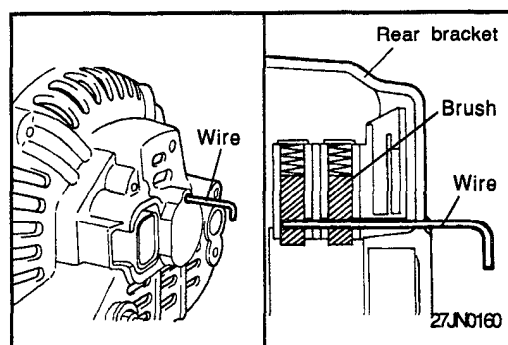


2. Install the brush spring and a new brush in the brush holder.
3. Insert the brush to where there is a space 2 to 3 mm (0.079 to 0.118 in.) between the limit line and the end of the brush holder.
4. Solder the pigtail to the brush holder.

**REASSEMBLY**

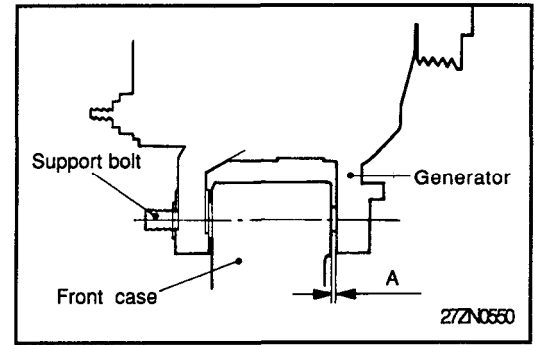
Perform reassembly in the reverse procedure of disassembly. Pay attention to the following:

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



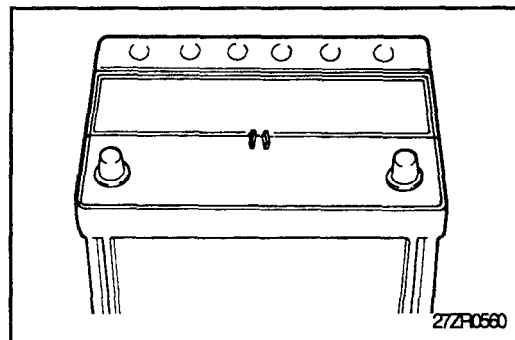
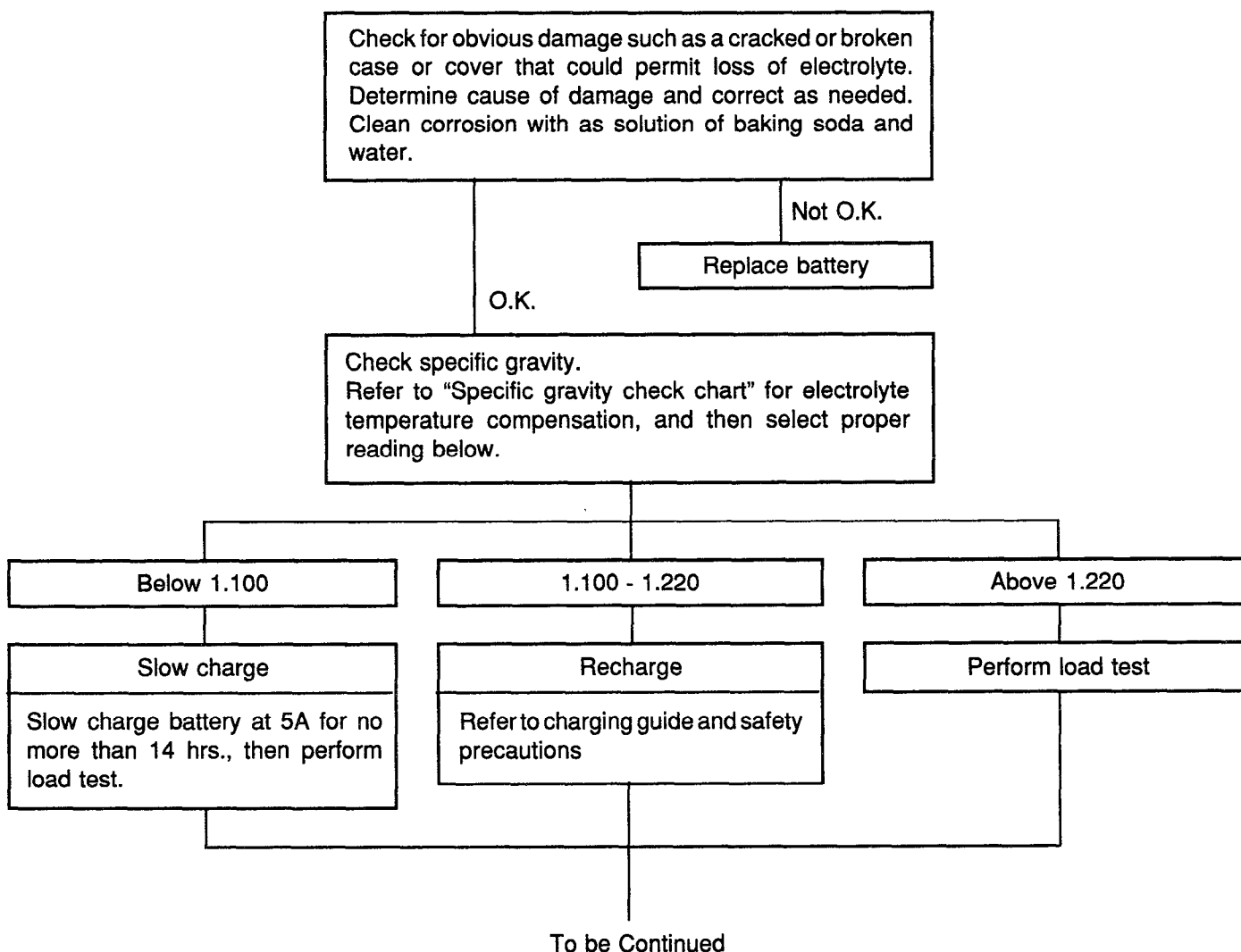
INSTALLATION

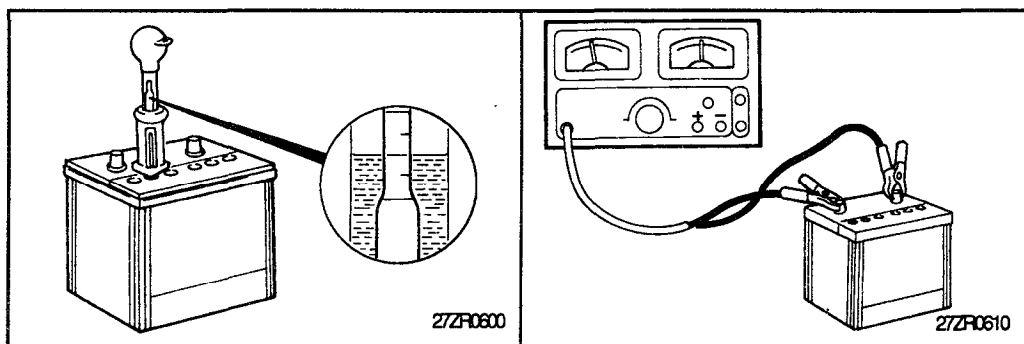
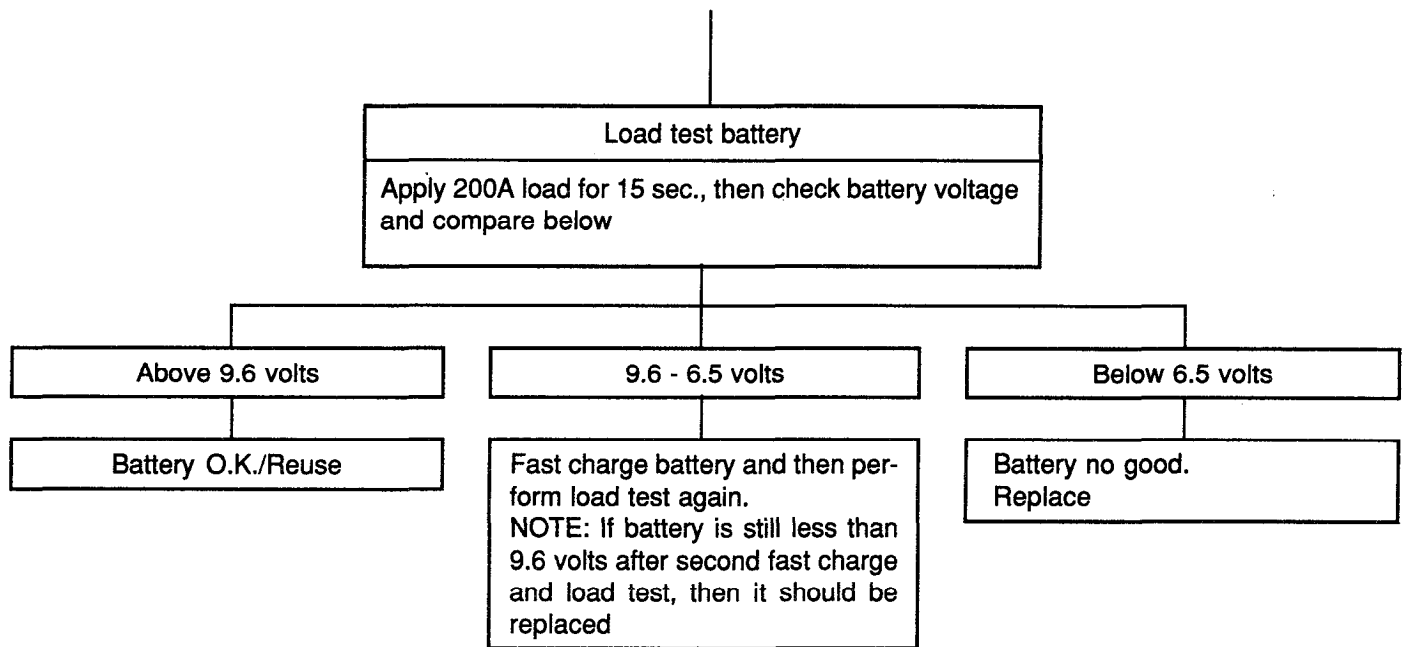
1. Position the generator and insert the support bolt. (Do not attach the nut.)
2. Push the generator forward and determine how many spacers (thickness: 0.198 mm) should be inserted between the front leg of the generator and the front case (space A in the illustration). (There should be enough spacers so that they do not fall out when you let go of them.)
3. Insert the spacers (space A in the illustration), attach the nut, and complete the installation.



BATTERY

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

**BATTERY VISUAL INSPECTION (1)**



SPECIFIC GRAVITY CHECK CHART

The specific gravity of battery electrolyte changes with temperature. Heat thins the solution and lowers the specific gravity. Cold thickens the solution and raises the specific gravity.

A fully charged battery should have a specific gravity between 1.260 and 1.280, with the electrolyte temperature at 80°F, the specific gravity reading must be corrected by adding 4 points (.004) for each 10° above 80°F or subtracting 4 points for every 10° below 80°F.

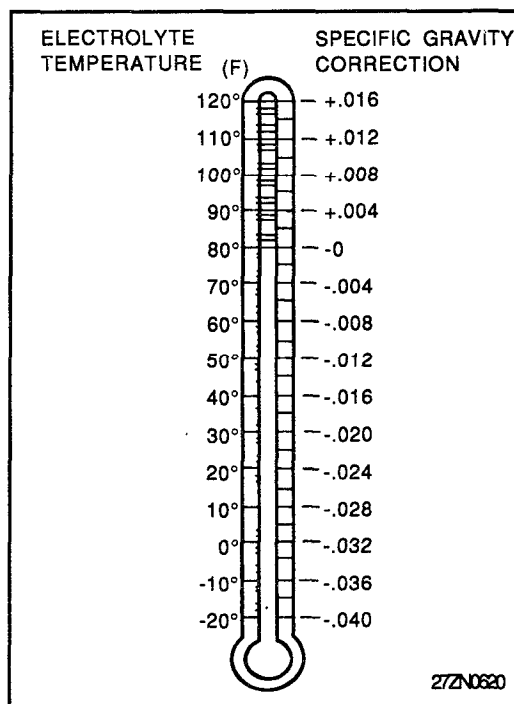
For example : The hydrometer reading is 1.280, and the electrolyte temperature reading is 10°F. By using the chart, the specific gravity must be lowered by 0.028 points. The true corrected reading is 1.252.

$$1.280 - 0.028 = 1.252$$

You should never take a hydrometer reading immediately after water has been added. The water and electrolyte must be mixed by either charging for a few minutes at a low rate or by allowing the battery to sit for an hour.

NOTE

A difference of 50 points (0.050) or more between one or more cells indicates a defective battery. It should be replaced.



BATTERY CHARGE RATE

Specific gravity	Charge method	Slow charge (5A)	Fast charge (20A)
Below 1.100		14 hours	4 hours
1.100 - 1.130		12 hours	3 hours
1.130 - 1.160		10 hours	2.5 hours
1.160 - 1.190		8 hours	2.0 hours
1.190 - 1.220		6 hours	1.5 hours
Above 1.220		4 hours	1.0 hours

BATTERY VISUAL INSPECTION (2)

1. Make sure ignition switch is in the Off position and all accessories are Off.
2. Disconnect the battery cables (negative first)
3. Remove the battery from the vehicle.

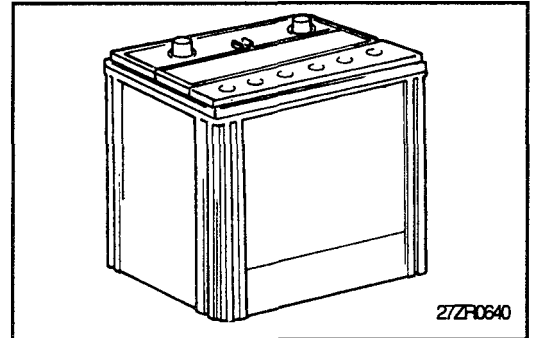
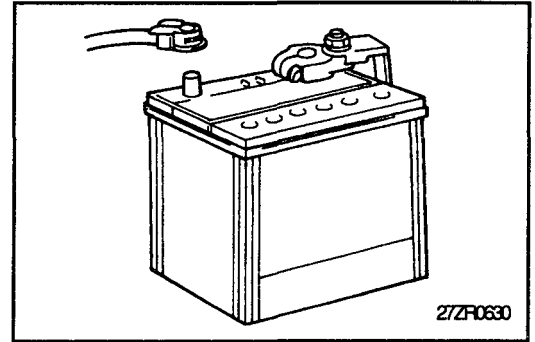
CAUTION

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

4. Inspect the battery carrier for damage caused by the loss of acid from the battery. 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 bristle 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 cleaner.
8. Clean the inside surface of the terminal clamps with a suitable battery terminal 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 top of the terminals are flush with the top of the post.
11. Tighten the terminal nut 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 the batteries being charged. A spark will occur where the circuit is broken. Keep all open flames away from the battery.

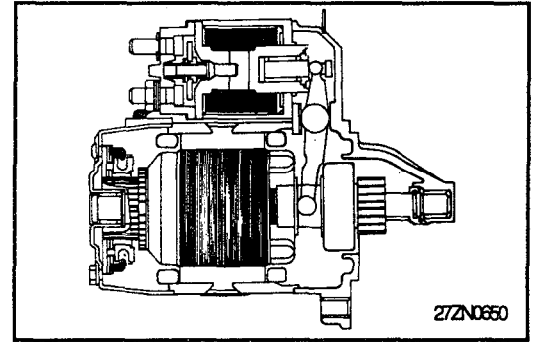


GENERAL INFORMATION

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

When the ignition key is turned to the start position, current flows and energizes the coil of the starter motor's solenoid. When this happens, the solenoid plunger and the 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 overruns.



TROUBLESHOOTING

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

SERVICE ADJUSTMENT PROCEDURES

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 will move out.

NOTE

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

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

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

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.

NOTE

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, replace the magnetic switch.

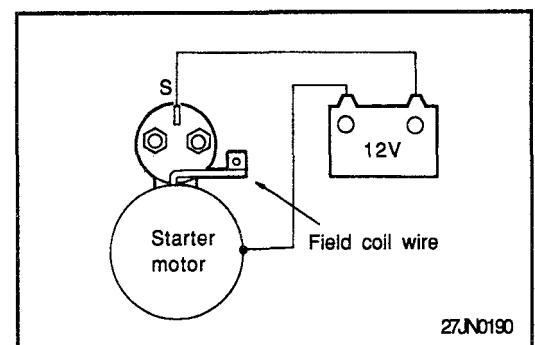
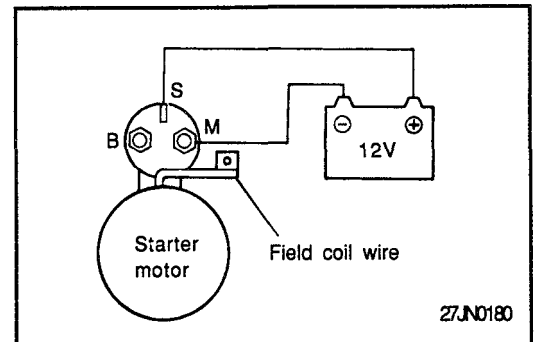
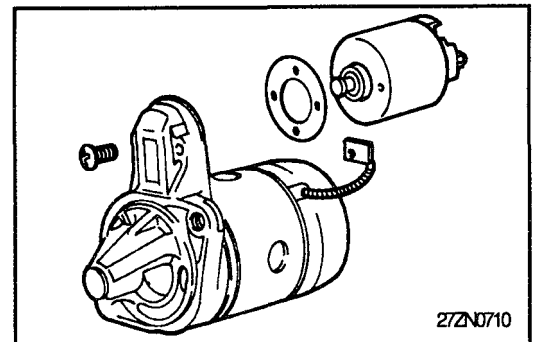
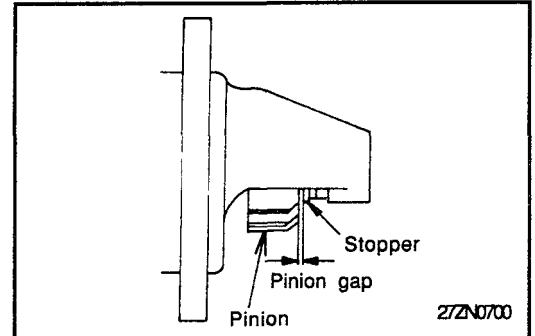
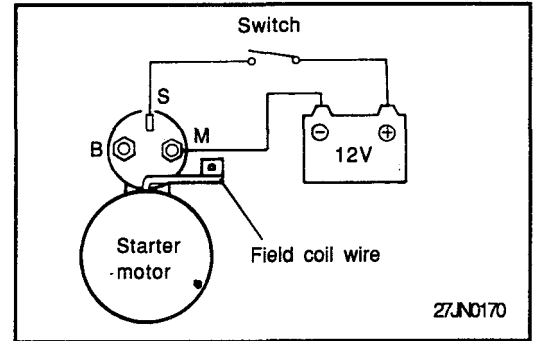
MAGNETIC SWITCH HOLD-IN TEST

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.

NOTE

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, the hold-in circuit is open. Replace the magnetic switch.

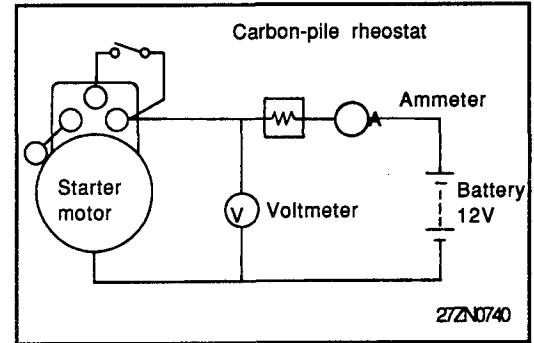


FREE RUNNING TEST

1. Place the 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 as shown in the illustration.
3. Connect a voltmeter (15-volt scale) across starter motor.
4. Rotate carbon pile to the off position.
5. Connect battery cable from battery negative post to starter motor body.
6. Adjust until battery voltage shown on the voltmeter 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 (reduction drive type)

Speed: Min. 3,000 rpm

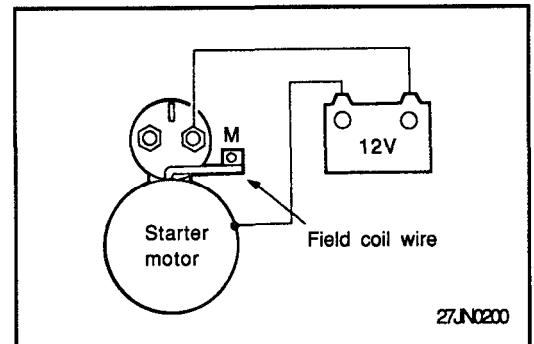
**MAGNETIC SWITCH RETURN TEST**

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

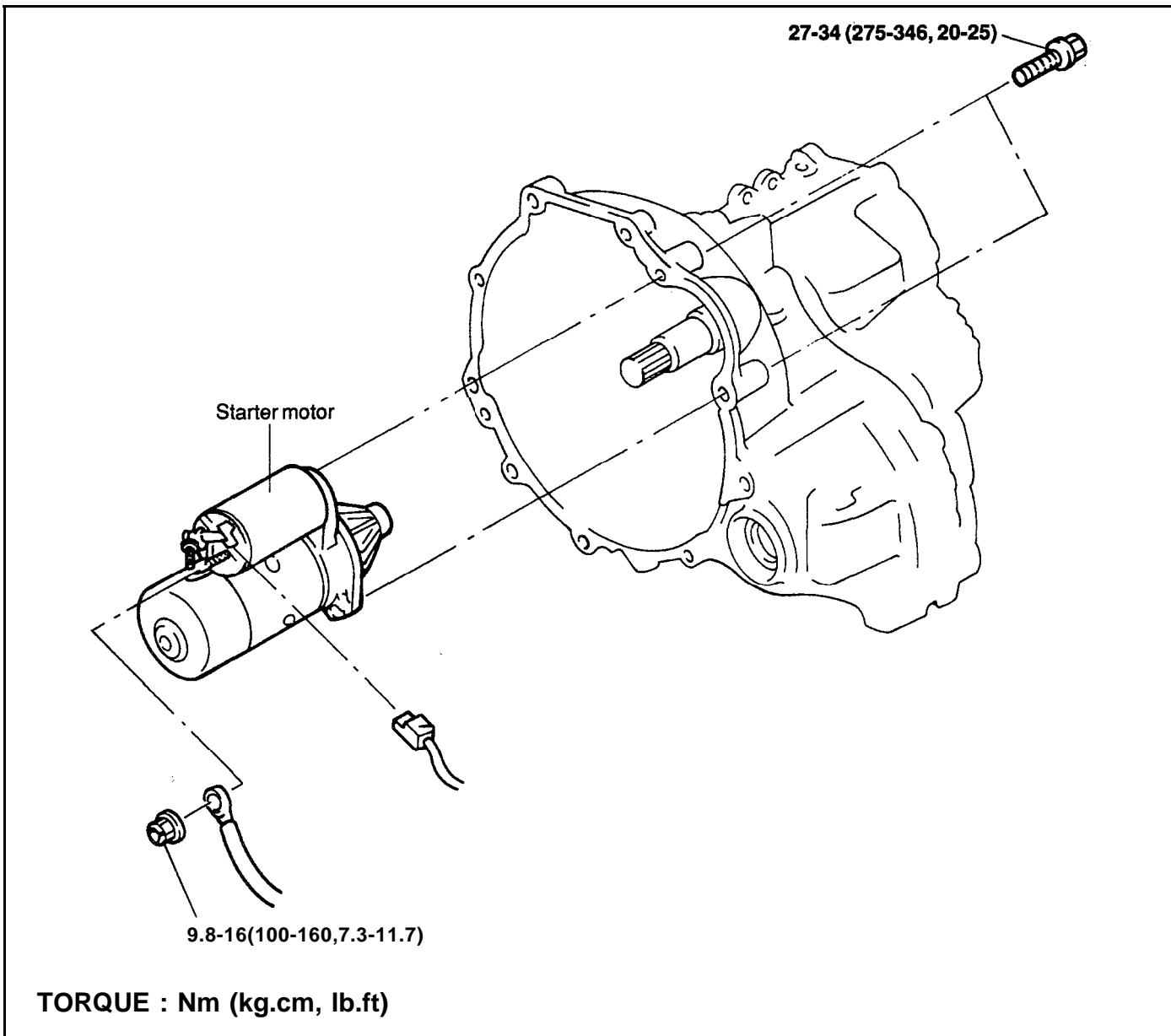
NOTE

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

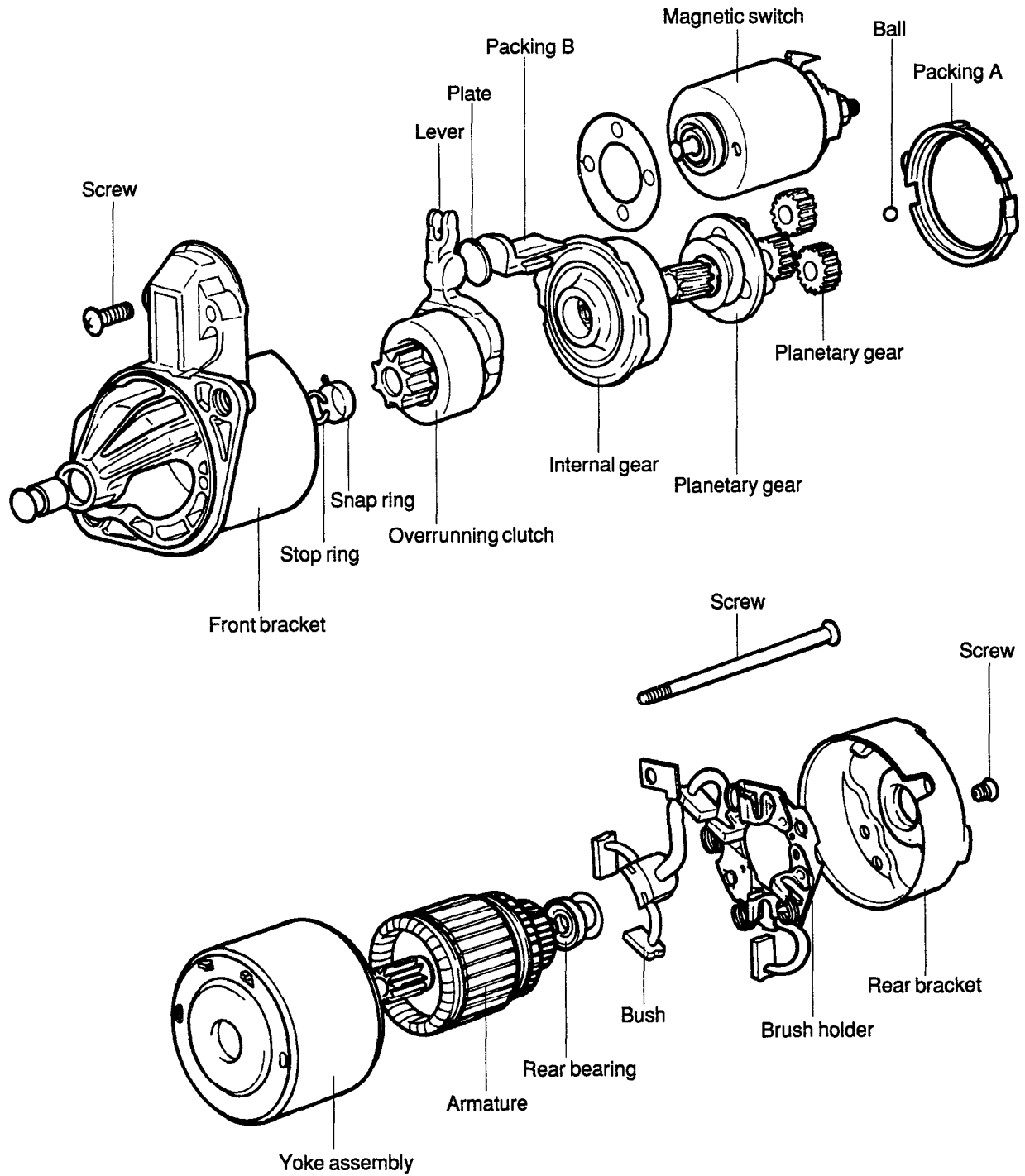
3. Pull pinion out and release. If pinion returns quickly to its original position, everything is in order. If it doesn't, replace the magnetic switch.



STARTER MOTOR REMOVAL AND INSTALLATION



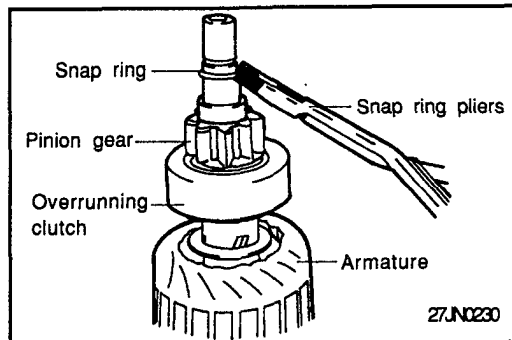
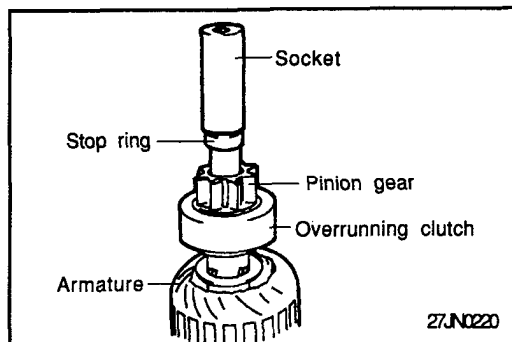
COMPONENTS



DISASSEMBLY

REMOVAL OF SNAP RING AND STOP RING

1. Press the stop ring, by using an appropriate socket wrench, to the snap ring side.
2. After removing the snap ring (by using snap-ring pliers), remove the stop ring and the overrunning clutch.



CLEANING STARTER MOTOR PARTS

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

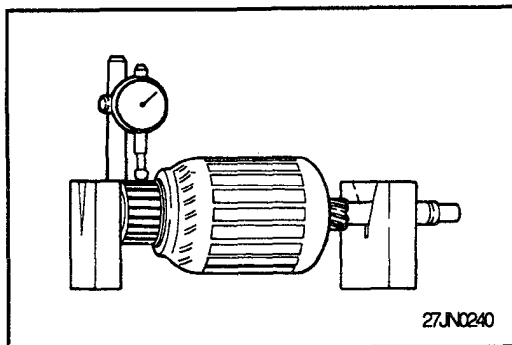
INSPECTION

CHECKING THE COMMUTATOR

1. Place the armature on a pair of V-blocks, and check the deflection by using a dial gage.

Standard value: 0.05 mm (0.002 in.)

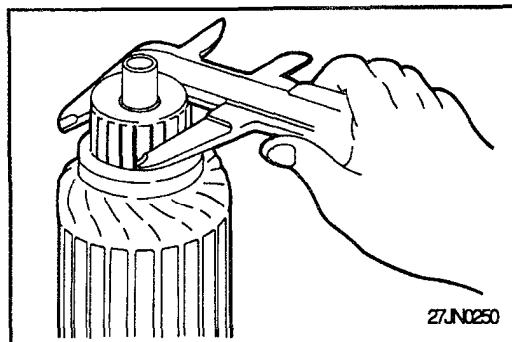
Limit: 0.1 mm (0.0039 in.)



2. Check the outer diameter of the commutator.

Standard value: 29.4 mm (1.157 in.)

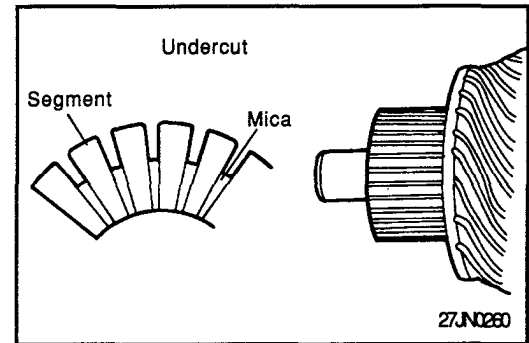
Limit: 29.4 mm (1.118 in.)



3. Check the depth of the undercut between segments.

Standard value: 0.5 mm (0.020 in.)

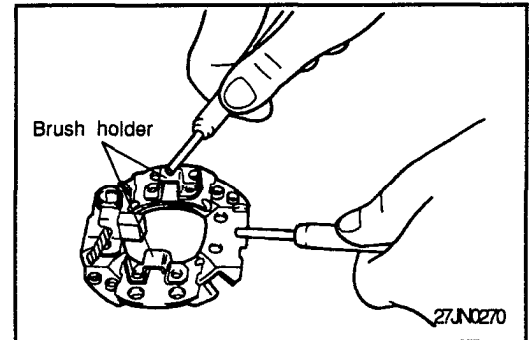
Limit: 0.2 mm (0.0079 in.)



BRUSH HOLDER

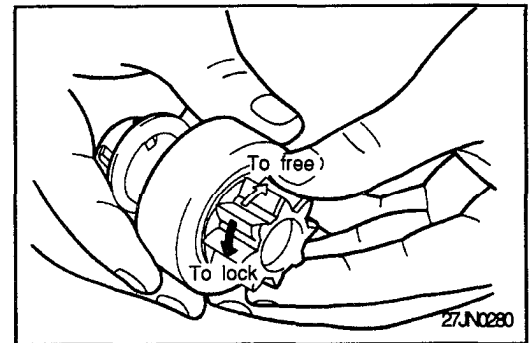
Check for continuity between the brush holder plate and the brush holder.

The normal condition is no continuity.



OVERRUNNING CLUTCH

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

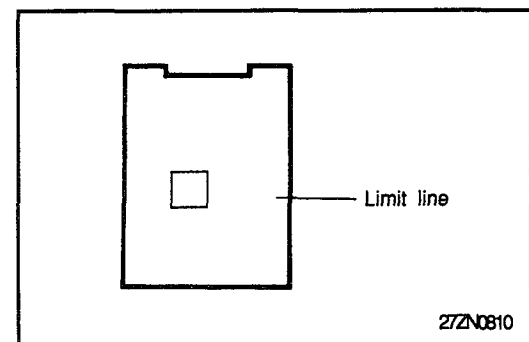


FRONT AND REAR BRACKET BUSHING

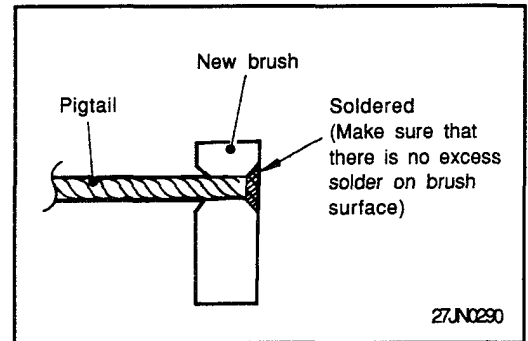
Inspect bushing for wear or burrs. If bushing is worn or burred, replace front bracket assembly or rear bracket assembly.

REPLACEMENT OF BRUSHES AND SPRINGS

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



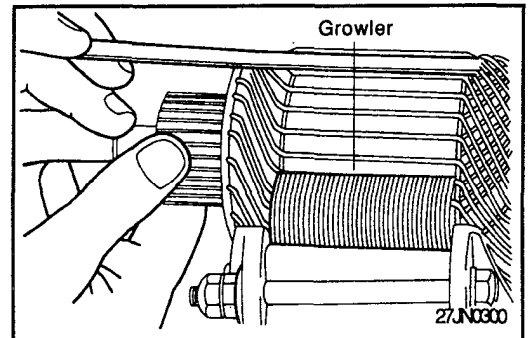
3. Sand pigtail end with sandpaper to ensure good soldering.
4. Insert pigtail into hole provided in new brush and solder it. Make sure that pigtail and excess solder do not come out onto brush surface.
5. When replacing ground brush, slide the brush from brush holder by prying retaining spring back.



TESTING ARMATURE

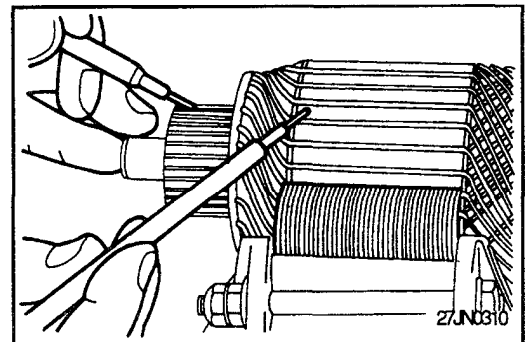
TESTING ARMATURE FOR SHORT-CIRCUIT

1. Place armature in a growler.
2. Hold a thin steel blade parallel and just above while rotating armature slowly in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace shorted armature.



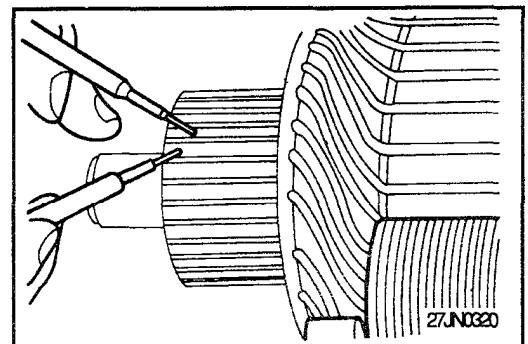
TESTING ARMATURE FOR GROUNDING

Check the insulation between the armature coil cores and the commutator segments. They are normal if there is no continuity.



CHECKING FOR ARMATURE COIL WIRING DAMAGE/DISCONNECTION

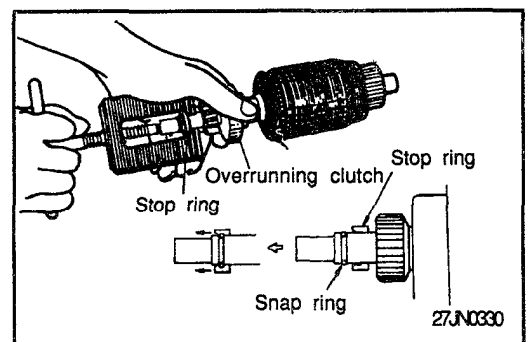
Check for continuity between segments. The condition is normal if there is continuity.



SERVICE POINTS OF ASSEMBLY

INSTALLATION OF THE STOP RING AND SNAP RING

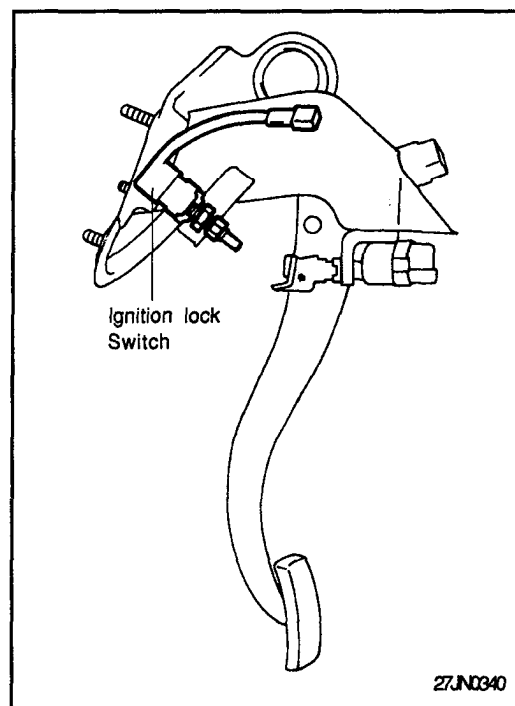
Using a suitable pulling tool, pull overrunning clutch stop ring over snap ring.



INSPECTION OF CLUTCH START SYSTEM (IGNITION LOCK SYSTEM)

Check clutch pedal

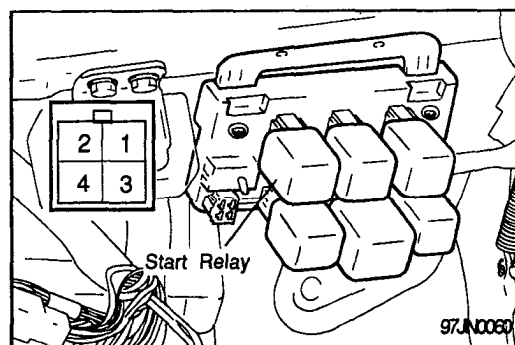
Check that pedal height, pedal freeplay and clutch pedal clevis pin play are correct. (Refer to clutch group)



Check starter relay

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

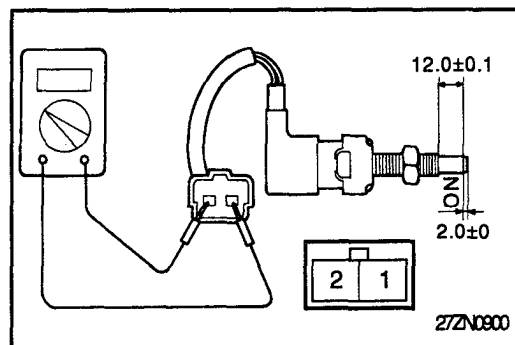
Terminal Condition	S ₁ ⁽¹⁾	S ₂ ⁽³⁾	L ⁽²⁾	B ⁽⁴⁾
When de-energized	○	○		
When energized	○	○	○	○



Check ignition lock switch

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

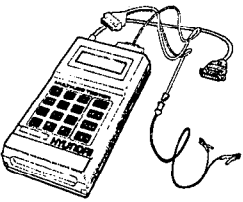
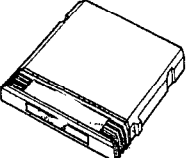
Terminal Condition	1	2
Free		
Push	○	○



CRUISE CONTROL SPECIFICATIONS

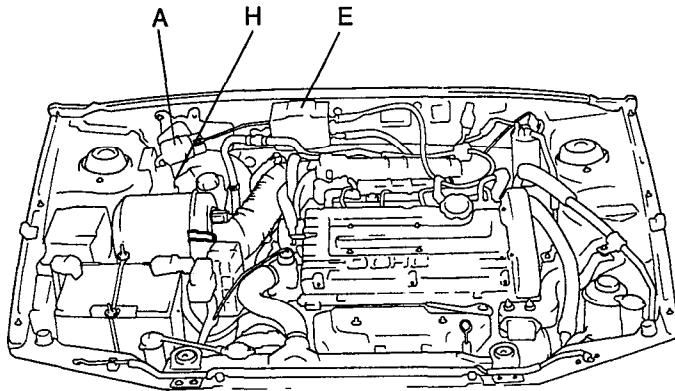
Items	Specifications
Speed control module	
Operating voltage range	DC 10 ~ 16V
Operating temperature	-30 ~ +100°C (-22 ~ +167°F)
Voltage drop between module and actuator	0.4 V
Operating speed range	Low speed limit : 40±3 km/h (25±2 mph) High speed limit : 160 ± 5 km/h (90 ± 3 mph)
Vacuum pump	
Type	Diaphragm type
Actuator	
Drive system	Vacuum type
Stroke mm (in.)	38-42 (1.5-1.7)
Cruise main switch	
Rated voltage	DC 12 V
Operating force	0.3 - 1.0 kg
Voltage drop	0.15 V or less
Stop lamp switch	
Rated voltage	DC 12 V
Rated load	
Stop lamp	21 x 5 W (lamp load)

SPECIAL SERVICE TOOL

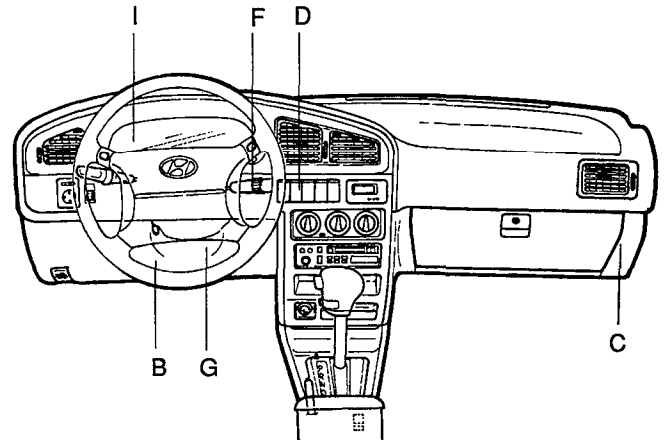
Tool (Number and name)	Illustration	Use
09391-33100 Scan tool		ROM PACK HRP-B
ROM PACK 09391-33452		Reading diagnosis code with scan tool

COMPONENTS LOCATION

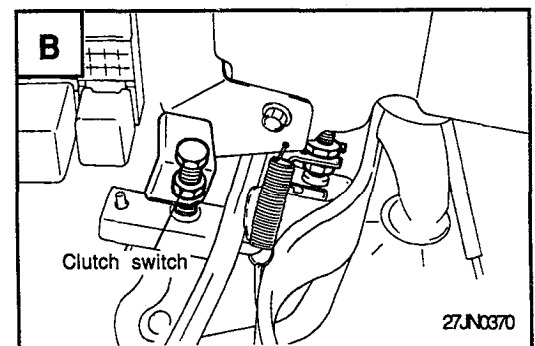
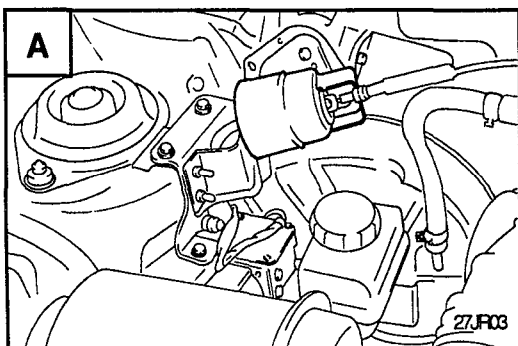
Engine compartment

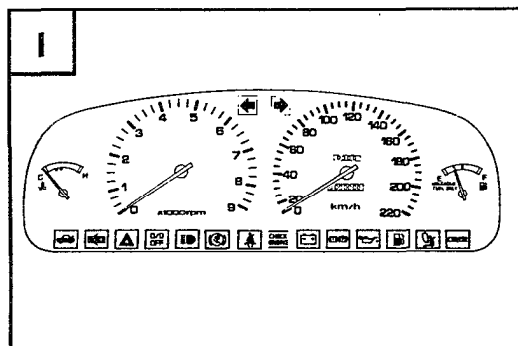
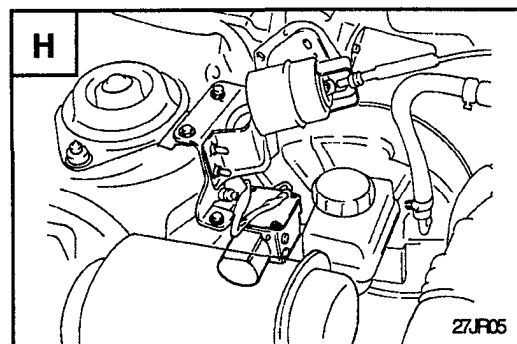
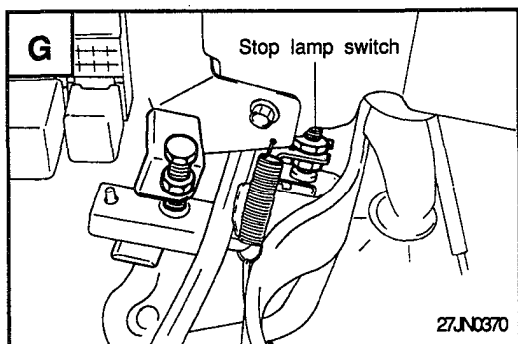
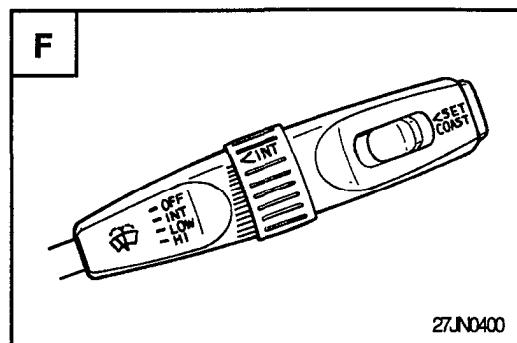
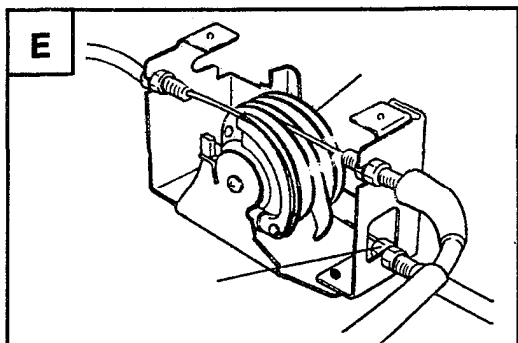
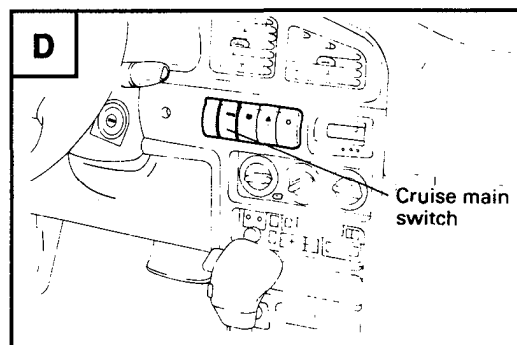
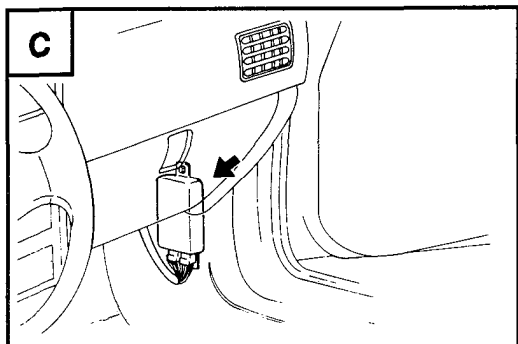


Interior

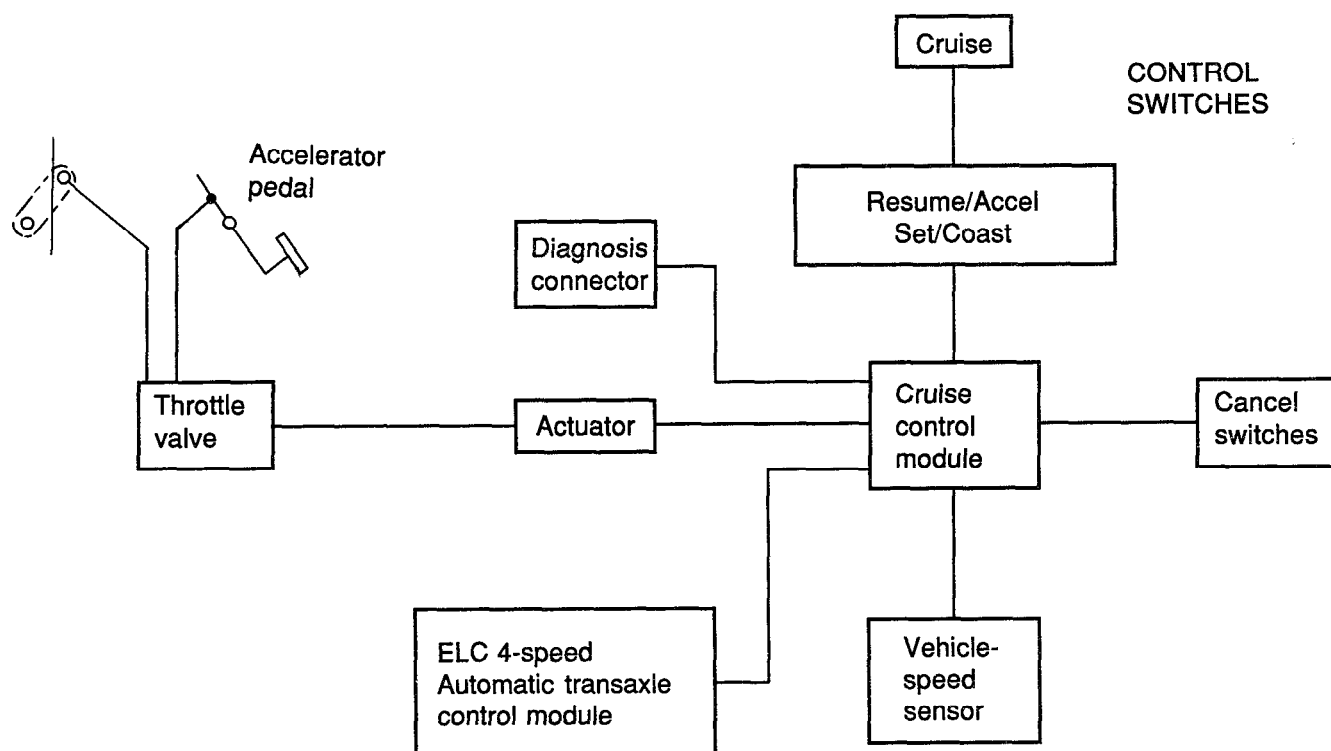


Name	Symbol	Name	Symbol
Actuator	A	Speed control switch (in multi function switch)	F
Clutch switch	B	Stop lamp switch	G
Cruise control module	C	Vacuum motor	H
Cruise main switch	D	Vehicle speed sensor	I
Pulley assembly	E		





System Block Diagram



Component parts and function outline

COMPONENT PART		FUNCTION
Vehicle-speed sensor		Converts vehicle speed to pulse.
Cruise control module (CCM)		Receives signals from sensor and control switches; CCM controls all automatic speed control functions.
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 switch 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).

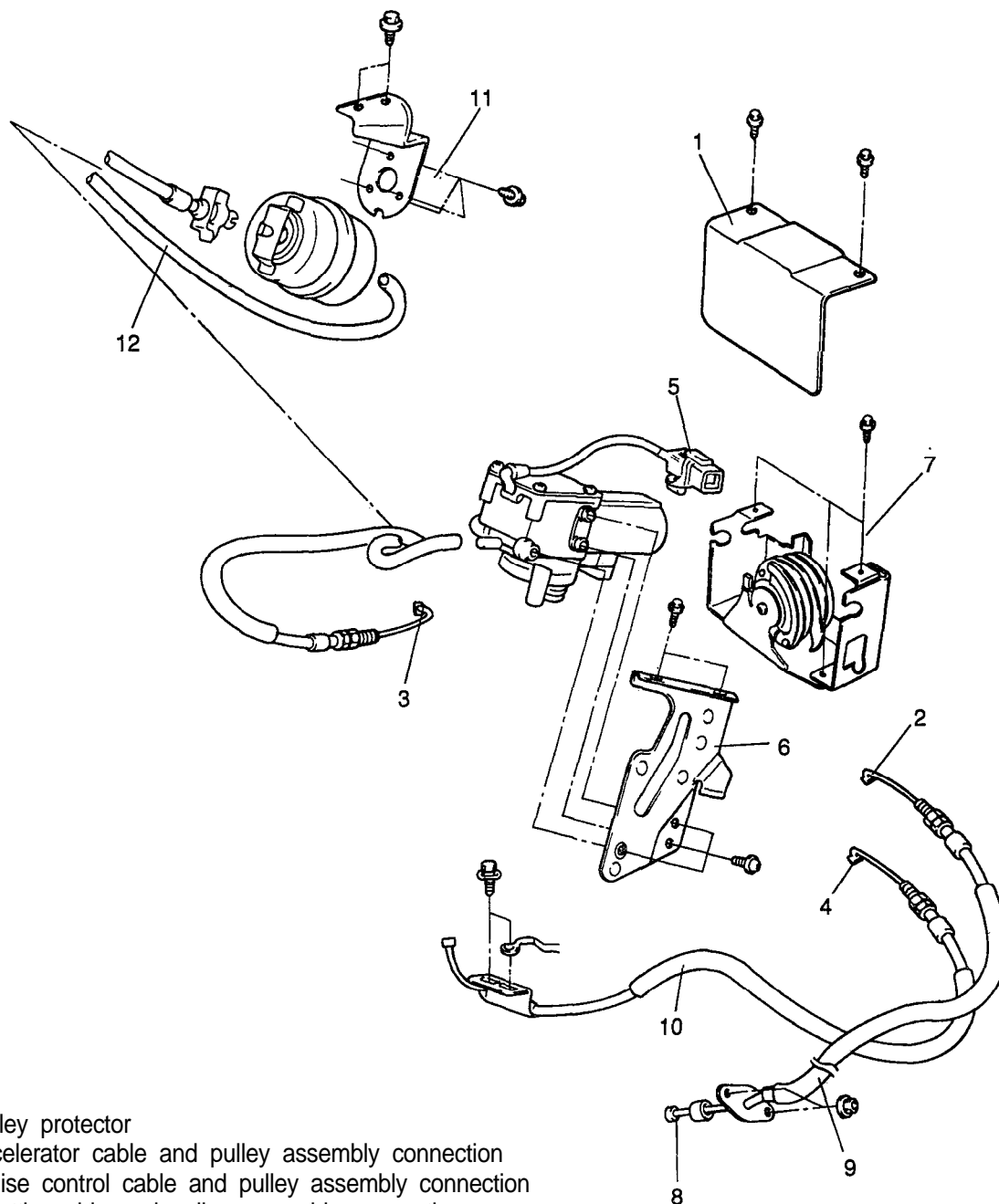
* CCM : Cruise Control Module

COMPONENT PART		FUNCTION
Cancel switch	Stop lamp switch/Clutch switch (M/T)	Sends cancel signals to the CCM.
	Inhibitor switch	
ELC 4-speed automatic transaxle control module		Controls the overdrive ON and OFF, based on signals from the CCM for the CC.
Data link connector		By connecting the check light or scan tool, control unit diagnostic codes can be read.

* CC : Cruise Control

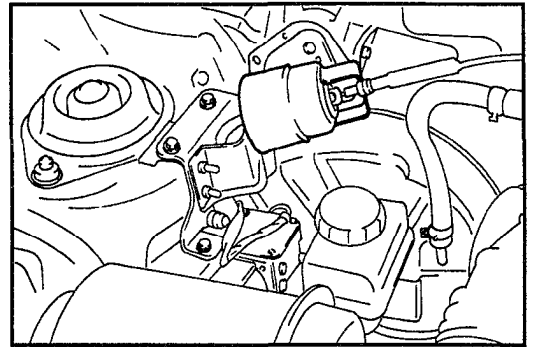
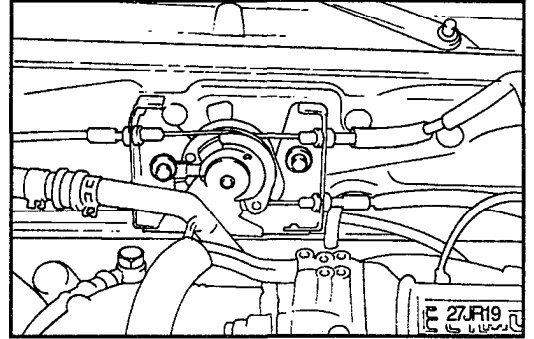
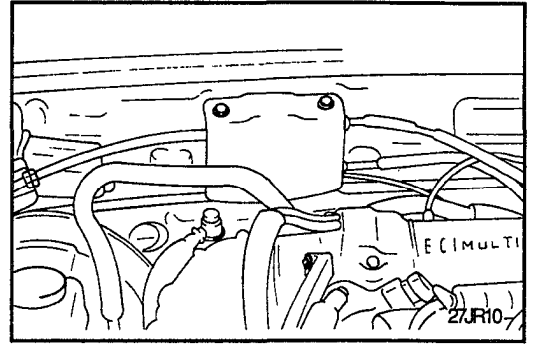
REMOVAL AND INSTALLATION

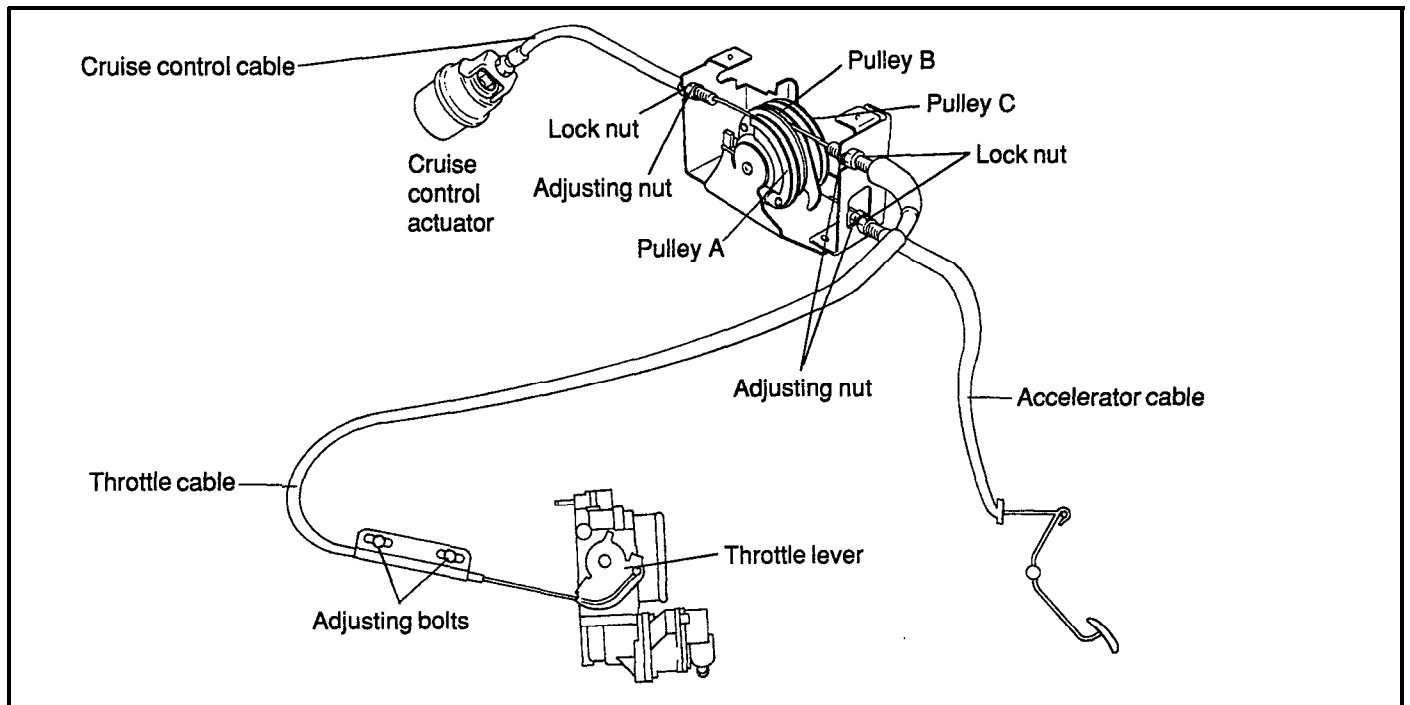
COMPONENTS



1. Pulley protector
2. Accelerator cable and pulley assembly connection
3. Cruise control cable and pulley assembly connection
4. Throttle cable and pulley assembly connection
5. Vacuum pump connector
6. Pump bracket and pump assembly
7. Pulley assembly
8. Accelerator cable and pedal connection
9. Accelerator cable
10. Throttle cable
11. Actuator
12. Vacuum hose

1. Remove the battery negative terminal.
 2. Remove the pulley cover.
 3. Disconnect the accelerator cable and pulley assembly connection.
 4. Disconnect the cruise control cable and pulley assembly connection.
-
5. Disconnect the throttle body cable and pulley assembly connection with turning throttle lever to full open position.
 6. Disconnect the vacuum pump connector and remove the vacuum pump assembly.
-
7. Remove the actuator bracket and disconnect vacuum hose.
 8. Installation is the reverse order of removal.



CRUISE CONTROL CABLES INSPECTION AND ADJUSTMENT**Adjustment conditions**

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

Inspection

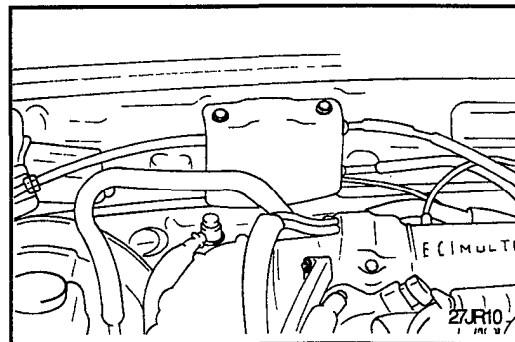
1. Confirm there are no sharp bends in cables.
2. Depress the accelerator pedal and check if the throttle lever moves smoothly from fully closed to fully open.
3. Check inner cables for correct slack.
4. If there is too much slack or no slack, adjust play by the following procedures.

SERVICE HINT

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

ADJUSTMENT

1. Remove the cover of actuator.
2. Loosen the adjusting nuts and lock nuts of the throttle lever and intermediate pulley A, B and C, so that the intermediate pulley A, B and C and the throttle lever can move freely.



3. Turn the ignition switch to the ON position (without starting the engine).
4. Rotate the intermediate pulley C in the direction shown in the diagram, and while keeping it touching the stopper, tighten the adjusting nut C in the direction to lessen the inner cable play of the accelerator cable. Then unscrew the adjusting nut C the specified number of turns just before the intermediate pulley C begins to move.

Amount to unscrew the adjusting nut C:

<A/T> 2-3 mm (0.08-0.12 inch)

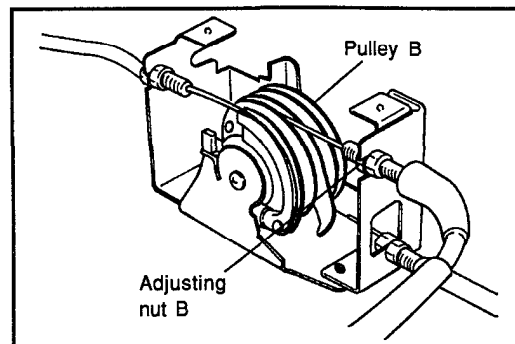
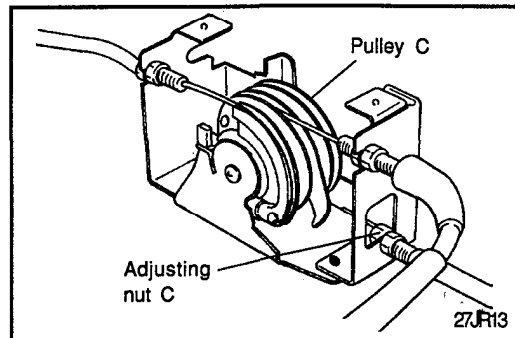
Approx. 1 1/2 turns

<M/T> 0-1 mm (0-0.04 inch)

5. Fix the accelerator cable with lock nut.
6. Tighten the adjusting nut B in the direction to lessen the inner cable play of the throttle cable. At the position where the intermediate pulley B lever touches the intermediate pulley C, unscrew the adjusting nut B the specified number of turns.

Amount to unscrew the adjusting nut B:

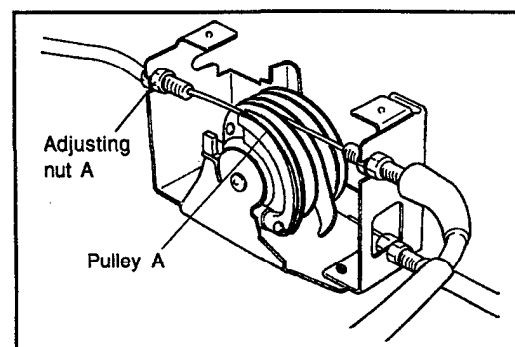
Approx. 1 turn [inner cable play 1-2 mm (.04-.08)]



7. Fix the throttle cable with the lock nut.
8. Tighten the adjusting nut A in the direction to lessen the inner cable play of the cruise control cable. At the position where the intermediate pulley A lever touches the intermediate pulley B, unscrew the adjusting nut A the specified number of turns.

Amount to unscrew the adjusting nut A:

Approx. 1 turn [inner cable play 1-2 mm (.04-.08 in.)]



9. Fix the cruise cable with the lock nut.
10. After adjusting, check if the end of the fixed SAS is touching the throttle lever stopper.

TROUBLESHOOTING BEFORE TROUBLESHOOTING

Before commencing 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 all cables are all working smoothly.
- (3) Check if there is no excessive play or tension in each cable.

SELF-DIAGNOSIS CHECKING

Self-diagnosis checking is performed when there has been an automatic cancellation, without cancel switch operation.

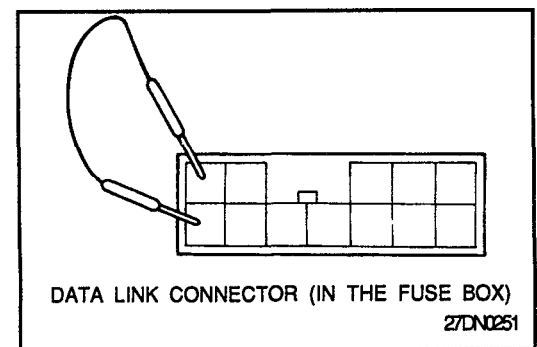
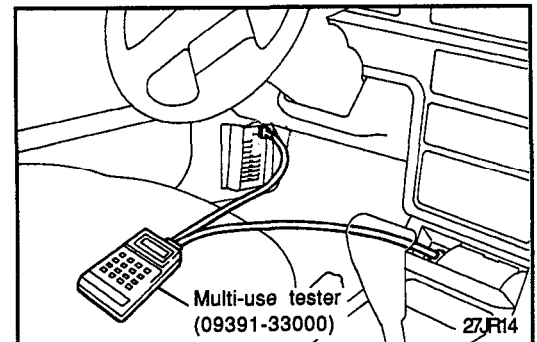
1. The following two methods can be used for checking the diagnosis. Note that the data link connector is located in the fuse box.
 - 1) If a multi-use tester is used.
Connect the scan socket and connector to the cigarette lighter socket and the data link connector, and set the scan tool.
Use the scan tool according to its operation instructions; display the diagnosis code number and then check.
 - 2) If an indicator lamp is used.
Connect directly between the ground terminal and the terminal for CC of the data link connector.
It is possible to discover which circuit is the cause of the cancellation by verifying the indication shown by the indicator lamp with the display patterns shown on the next page.

CAUTION


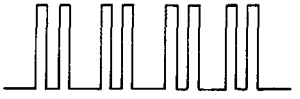





The ignition switch should be turned OFF when connecting and disconnecting the scan tool.

2. All diagnostic trouble codes are stored so that it is possible to check if a problem occurred in the past or not until disconnecting the battery terminals, even when the ignition key is turned to OFF.

CC : Cruise Control



3. Diagnosis display patterns and codes

CODE NO.	DISPLAY PATTERNS (Use with check light)	PROBABLE CAUSE	CHECK ITEMS
01 (Vacuum pump)		Abnormal condition of auto cruise vacuum pump drive system	1. Vacuum pump assembly 2. Cruise CCM 3. Relevant wiring
02 (Speed sensor)		Abnormal condition of vehicle speed signal system	1. Vehicle speed sensor 2. Relevant wiring
03 (Low speed limit)		Vehicle speed less than 40km/h	
04 (Redundant brake)		Vehicle speed less than memory speed by 15km/h	
05 (Control switch)		SET and RESUME switches on simultaneously	
06 (Control module)		Abnormal condition of cruise CCM	1. Cruise CCM 2. Relevant wiring
07 (Cancel signal)		Cancel switch ON	1. Brake switch 2. P/N position switch 3. Clutch switch 4. Relevant wiring

TROUBLESHOOTING PROCEDURES

First, select the applicable malfunction symptom from the Trouble Symptom Charts. Conduct the self-diagnostic test following the directions on the charts.

Determine the condition of all function circuits.

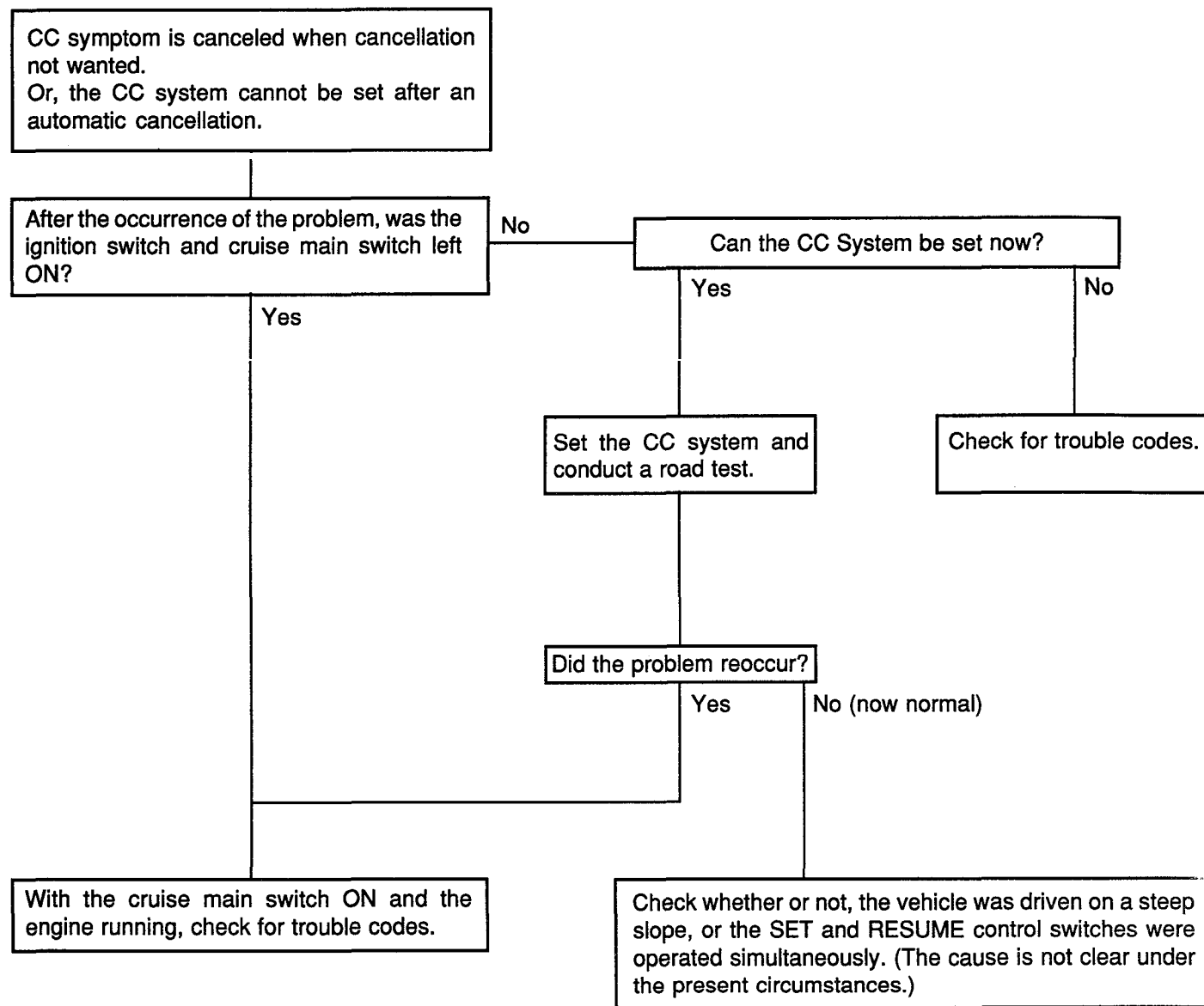
CAUTION

Because the computer (self-diagnosis) memory data will be erased, when the system is unintentionally canceled during fixed-speed driving, the ignition switch and/or the cruise main switch of the ASC system should not be switched OFF, and the battery should not be disconnected.

1. Make the following preliminary inspections.
 - 1) Check that the installation of the actuator, accelerator cables are correct, and that the cables and links are securely connected.
 - 2) Check that the accelerator pedal moves smoothly.
 - 3) Adjust the cable so there is no excessive tension or excessive play on the accelerator cable.
 - 4) Check that the CCM, actuator, cruise main and control switch and the connector of each cancel switch are connected securely.
2. Check in the sequence indicated in the Trouble Symptom Chart.
3. If these checks indicate a normal condition, replace the cruise control unit.

TROUBLE SYMPTOM CHARTS

Trouble Symptom 1



CC : Cruise Control

Trouble Symptom 2

Trouble symptom	Probable cause	Remedy
<ul style="list-style-type: none"> o The set vehicle speed varies greatly upward or downward o "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 part
	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 CCM	Replace the CCM

Trouble Symptom 3

Trouble symptom	Probable cause	Remedy
The CC system is not canceled when the brake pedal is depressed	Damaged or disconnected wiring of 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 CCM	Replace the CCM

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 CCM	Replace the CCM

Trouble Symptom 5

Trouble symptom	Probable cause	Remedy
Cannot decelerate (coast) by using the SET switch	Temporary 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 CCM	Replace the CCM

Trouble Symptom 6

Trouble symptom	Probable cause	Remedy
Cannot accelerate or resume speed by using the RESUME switch	Damaged or disconnected wiring, or short circuit, or RESUME switch input circuit	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 CCM	Replace the CCM

Trouble Symptom 7

Trouble symptom	Probable cause	Remedy
CC system can be set while driving at a vehicle speed of less than 40 km/h (25 mph), 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 CCM	Replace the CCM

Trouble Symptom 6

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

Trouble Symptom 10

Trouble symptom	Probable cause	Remedy
Overdrive is not canceled during fixed speed driving.	Malfunction of circuit related to overdrive cancelation, or malfunction of CCM	Repair the harness or replace the part
No shift to overdrive during manual driving.		

PARTS INSPECTION**CRUISE CONTROL MAIN SWITCH**

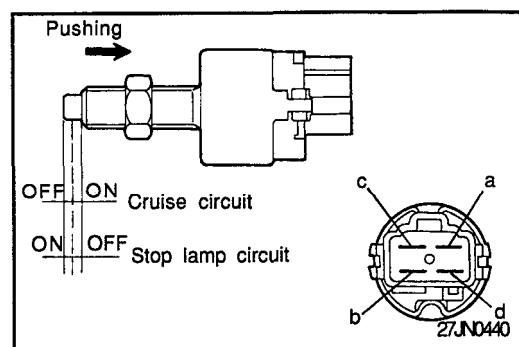
1. Operate the switch, and check for the continuity between the terminals.
2. If continuity is not as specified, replace the switch.

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

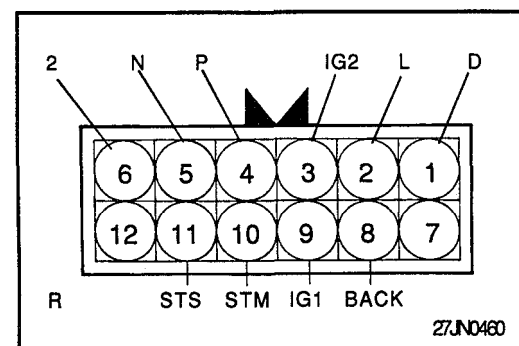
STOP LAMP SWITCH

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

Terminal Position	a	b	c	d
Pushing			○	○
Not pushing	○	○		

**P/N POSITION SWITCH**

1. Disconnect the connector.
2. Check that there is continuity between connector terminals 10 and 11 when the shift lever is moved to the "N" range.



CRUISE VACUUM PUMP INSPECTION OF SOLENOID VALVE (CONTROL VALVE, RELEASE VALVE)

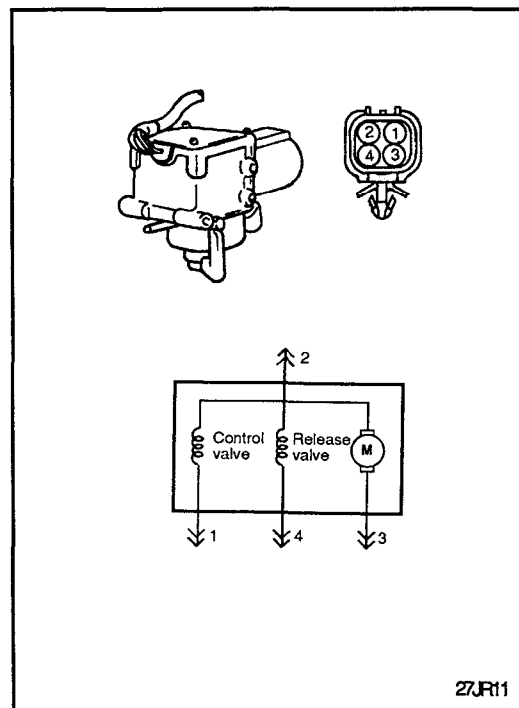
1. Remove the auto-cruise vacuum pump connector.
2. Measure the resistance value between connector terminal 1 and 2, and connector terminals 2 and 4.

Standard value : 50-60Ω

3. Check that the solenoid valve makes an operating noise when battery voltage is impressed between terminals 2 and 1, and connector terminals 2 and 4.
4. If there is a malfunction of the solenoid valve, replace the cruise vacuum pump assembly.

MOTOR INSPECTION

1. Remove the cruise vacuum pump connector.
2. Check that the motor revolves when battery voltage applied between connector terminals 2 and 3.



ACTUATOR

1. Remove the actuator.
2. Apply negative pressure to the actuator with the vacuum pump and check that the holder moves more than 35 mm (1.38 in.). In addition, check that there is no change in the position of the holder when negative pressure is maintained in that condition.
3. First install the actuator and then inspect and adjust the cruise control cable.

