

Foreword	-1	5.4 Parking Brake	5-83
Cautions and Notices	-3	5.5 Anti-lock brake system (if equipped)	5-95
0. General Information	0-1	6. Engine	6-1
0.1 General Information	0-3	6.1 Engine Mechanical	6-5
0.2 Maintenance and Lubrication	0-15	6.2 Engine Cooling System	6-149
0.3 Vibration Diagnosis and Correction	0-21	6.3 Engine Electrical	6-183
1. Heating, Ventilation and Air Conditioning System	1-1	6.4 Engine Controls	6-201
1.1.1 Specifications	1-3	6.5 Engine Exhaust	6-379
1.1.2 Schematic and Wiring Diagram ..	1-4	7. Clutch and transmission	7-1
1.1.3 Component Locator	1-4	7.1 Manual transmission	7-3
1.1.4 Diagnostic Information and Procedures	1-15	7.2 Automatic transmission (if equipped)	7-75
1.1.5 Repair guidance	1-31	8. Body and Attachments	8-1
1.1.6 Description and Operation	1-89	8.1 Lighting System	8-9
1.1.7 Special tools	1-98	8.2 Wiper/Washer System	8-71
2. Steering System	2-1	8.3 Exterior Trim	8-99
2.1 Power Steering System	2-3	8.4 Water Leakage	8-135
2.2 Steering wheel and Steering Column	2-47	8.5 Air/Wind Noise	8-143
3. Suspension system	3-1	8.6 Squeaks and Rattle	8-147
3.1 Wheel alignment	3-3	8.7 Stationary Windows	8-149
3.2 Front suspension	3-11	8.8 Body Front End	8-189
3.3 Rear suspension	3-43	8.9 Door	8-189
3.4 Tyres and wheels	3-71	8.10 Horn	8-273
4. Driveline/ shaft	4-1	8.11 Body Rear End	8-283
4.1.1 Specification	4-3	8.12 Underbody	8-333
4.1.2 Visual Identification	4-4	8.13 Painting/Coating	8-339
4.1.3 Diagnostic Information and Procedure	4-5	8.14 Collision repair	8-347
4.1.4 Repair Guidance	4-6	8.15 Instrument Panel, Gauges, and Console	8-351
4.1.5 Description & Operation	4-14	8.16 Seats	8-413
4.1.6 Special Tools	4-15	8.17 Interior Trim	8-459
5. Brake	5-1	8.18 Plastic Panel Information and Repair	8-503
5.1 Hydraulic brake	5-3	8.19 Entertainment	8-537
5.2 Disc brake	5-49	8.20 Wiring System	8-567
5.3 Shoe-type brake	5-67	8.21 Data Link Communications	8-695
		8.22 Central controlled keyless entry system	8-703

8.23B	Roof (if equipped)	8-713
9.	Safeguard Device	9-1
9.1	Safety Belt	9-3
9.2	Safety Guard Air Bag system	9-23

Notices specific to the fasteners

Notice: Use the correct fasteners in the correct positions. The part number of the replacement fastener must be correct. Those fasteners requiring the use of the screw lock up glue, lubrication oil, anti corrosion proof agent or sealant or fasteners requiring the replacement parts should be indicated distinctly in the service procedure. It is not permitted to use paint, lubricant or corrosion proof agent on the fasteners or connecting surface of the fasteners unless specified otherwise. The said coatings will affect the torque and binding force of the fasteners and damage the fasteners. In the installation of the fasteners, do use the correct tightening sequence and torque, to prevent the damage to the parts and systems.

Special cautions specific to the fuel pressure

Notice: The fuel pressure is not permitted to exceed the stipulated value. Otherwise, the fuel pressure regulator or manometer of the fuel will be damaged.

Notices specific to the fasteners of the fuel box yoke

Notice: Tighten gradually and alternatively the yoke fasteners until the stipulated torque is reached. If the yoke fastener failed to be tightened to the stipulated torque, the bottom of the fuel box will be curved upward. In this way, the fuel meter will indicate the availability of fuel even if there is no fuel in the fuel tank.

Note specific to the treatment of the parts sensitive to the electrostatic discharge

Notice: The electrostatic discharge (ESD) will damage a lot of solid state electric parts. The parts easily affected by the electrostatic discharge are not all indicated with the symbol of electrostatic discharge. All the electric parts are to be treated carefully. Abide by the following safety notice, to prevent the damage by the electrostatic discharge:

- Before the service of any electric part, first touch the metal grounding point to discharge the electrostatic electricity from the body, especially after sliding on the seat.
- Never touch the exposed terminal. The terminal may be connected with the circuit easily affected by the electrostatic discharge.
- When the joint is to be maintained, the tools are not permitted to be in contact with the exposed terminal.
- It is not permitted to dismantle any part from the protective case unless such operation is requested.

- Avoid the following operations unless it is specially required by the diagnostic procedure.
 - Bridge connection of the joint or part or grounding
 - Connect the probe of the test equipment to the part or joint. When the probe is to be tested, first the grounding line is to be connected.
- Before opening the protective case of the part, it is to be grounded first. It is not permitted to put the solid state parts on the metal operational bench, television set, radio or the top of other electric equipment.

Note specific to the treatment of the idle air control valve.

Notice: If the idle speed air control valve is being used, it is not permitted to push pull the pivot of the idle speed air control valve. The force required to shift the pivot will damage the threads on the worm drive. Additionally, the idle speed air control valve is not permitted to be immersed in any liquid cleaner or solvent. Otherwise, it will be damaged.

Note specific to the closing of the ignition switch when the battery is to be disconnected.

Notice: The ignition switch must be off when the cable of the battery, charger of the battery or the jumper cable is to be connected or disconnected. Otherwise, it will damage the control module of the power system or other electric parts.

Note specific to untwisted or bent installation of the hose

Notice: When the inlet or outlet hose is installed, no kink is permitted. It is not permitted to bend or kind the inlet or outlet hose for the convenience of installation. Violation of the said procedures will cause damage to the parts.

Special cautions specific to the nylon fuel pipe.

Notice: It is not permitted to attempt the straightening of the kink nylon fuel pipe. Any kink nylon oil inlet pipe or return pipe is to be replaced, to prevent the vehicle from being damaged.

Notices specific to the description of system II OBD (on board diagnosis)

Notice: The symbol of OBD II is used on the electric circuit diagram to remind the technicians that the said electric circuit is mainly used for the correct operation of the control circuit for OBD II exhaust. Any electric circuit for malfunction and causing the lighting of the

1.1.4.10 Leak Testing

Caution: Don't operate the detector in an inflammable environment, for its sensor works at high temperature. It may cause personnel injuries or equipment damage.

Once a leakage is suspected, a refrigerant leak test should be conducted to the system. If the system is found to be insufficiently charged, or whenever any repair work affecting the following components has been performed, the existence of a leakage should be suspected.

- The components
- Pipelines
- Fittings

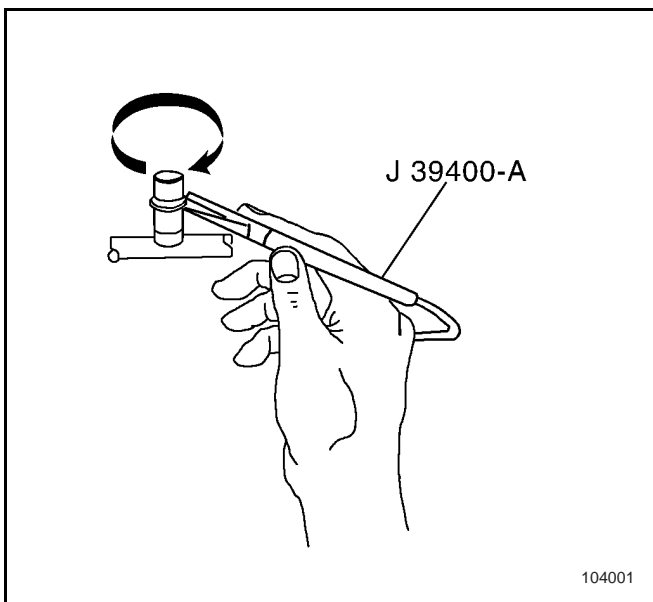
Halogen Leak Detector

Tools required

- J39400-A Halogen Leak Detector
- J39183-CR134A Manifold measuring apparatus
- J39500-5023 kg Refillable recovery tank

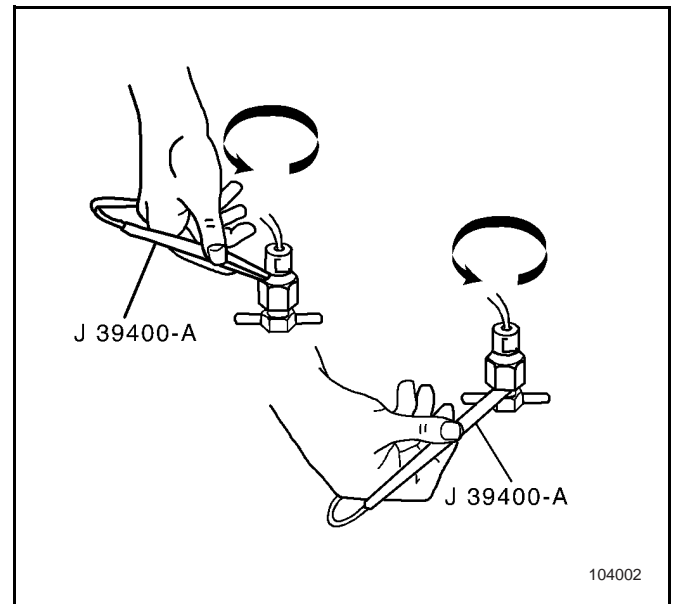
Halogen leak detector is a most effective tool used to detect the leakage of refrigerant. J39400-A is a packaged unit working with a DC of 12 volt, and when R-12 or R-134a is detected, it will generate an audible signal of high frequency. It has three settings:

- R-12
- R-134a
- Severe leakage (complete leakage)

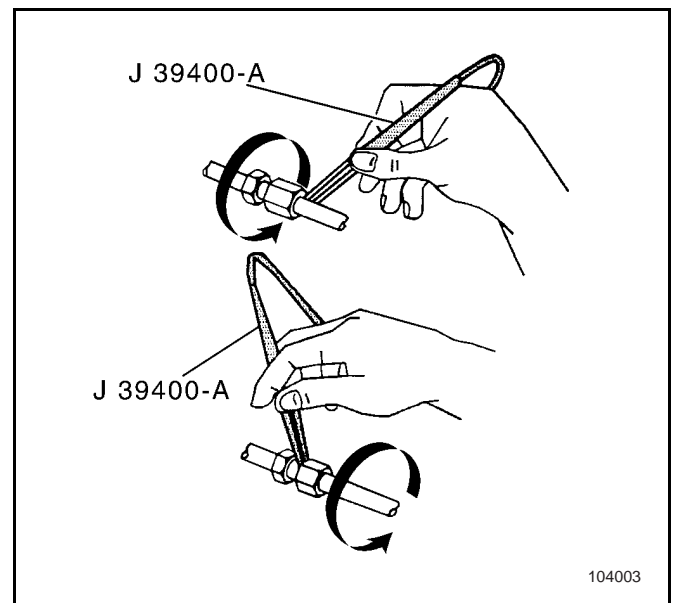


Use Severe Leakage setting to distinguish any mass leakage detected in the other two settings.

Ensure the instrument has been calibrated according to its instructions. Ensure the detector has been correctly set to the type of the refrigerating system to be tested.



Before commencing the test, make sure the refrigerating system has been sufficiently charged for the leak test, which can be confirmed by the measured static pressure on the pressure gauge. A reading between 413 and 689 kPa will be suitable for the leak test.



The most common leakage occurs at refrigerating accessories or the connection. The leakage may be caused by the following reasons:

- Improper torque
- Damaged O-rings
- Lack of lubricant on the O-rings
- Dirt/debris across the O-ring

Even the smallest piece of lint from cotton gloves or a towel can create a leak path across an O-ring.

2.1.3.2 Clattering Noise in Steering System

Status	Measures
Pipelines of power steering system are worn.	Make sure pipelines in power steering system are properly arranged. See Replacement of Hydraulic Pipeline.
The steering gear is loose.	Tighten the nut of steering gear to the required torque. See Tightening Torque of Fasteners.
One end or both ends of the steering knuckle tie rod are loose.	If necessary, repair or replace any end of the steering knuckle tie rod. See Replacement of the End of Steering Knuckle Tie Rod.
Steering universal joint assembly is loose.	If necessary, repair or replace the steering universal joint assembly. See Replacement of Power Steering Gear and Replacement of Steering Column Assembly.

2.1.3.4 Diagnosis of Steering Gear

Hissing noise

- Under normal conditions, some noises might be heard when steering in place.
- Inspect hydraulic system for any leakage.
- Inspect power steering system for any air.

When rapidly turning the steering wheel, a larger force will be needed for an instant.

- Inspect internal pressure for any leakage.
- Inspect steering pump for any under pressure.
- Inspect liquid level to make sure it is not too low.

2.1.3.5 Leakage in Power Steering Gear and Power Steering Pump

The following signs indicate possible leakage of power steering system.

- Visible oily liquid appears on steering gear or steering pump.
- Rumbling noise can be heard when parking the car or when the engine is cool.
- Power steering is lost when parking.
- Heavy steering.

Inspection Procedures

The following steps need to be completed when inspecting power steering system for any external leakage.

1. Dry any suspicious region.
2. Inspect liquid reserve tank of power steering system for any excess of steering liquid.
3. Inspect power steering system for any of the following conditions:
 - Aeration of power steering liquid.
 - Overflow

4. Inspect the following components:
 - Hose connection
 - O-ring

5. Determine the exact leaking position. Positions with dripping oily liquid are not always leaking positions of the system. Use the following method to determine any position of penetrating leakage:
 - 5.1 Turn off the engine.
 - 5.2 Dry the whole power steering system.
 - 5.3 Inspect the liquid level of steering liquid reserve tank. If necessary, add steering liquid.
 - 5.4 Start the engine.

Note: The steering wheel should not be turned to and hold at the extreme position for a long time. The power steering pump will be damaged in this way.

- 5.5 Ask your assistant to turn the steering wheel left and right to the limiting position for several times.
- 5.6 Operate according to Diagnosis Procedures for Power Steering Gear, and determine the exact position of leakage and fix it.
6. If necessary, the repair work should be conducted according to the following procedures.
 - 6.1 Clean the position of leakage before disassembly.
 - 6.2 Replace the leaking seal.
 - 6.3 Inspect the sealing surface for any damage.
 - 6.4 Tighten the bolt to the required torque. See Tightening Torque of Fasteners.

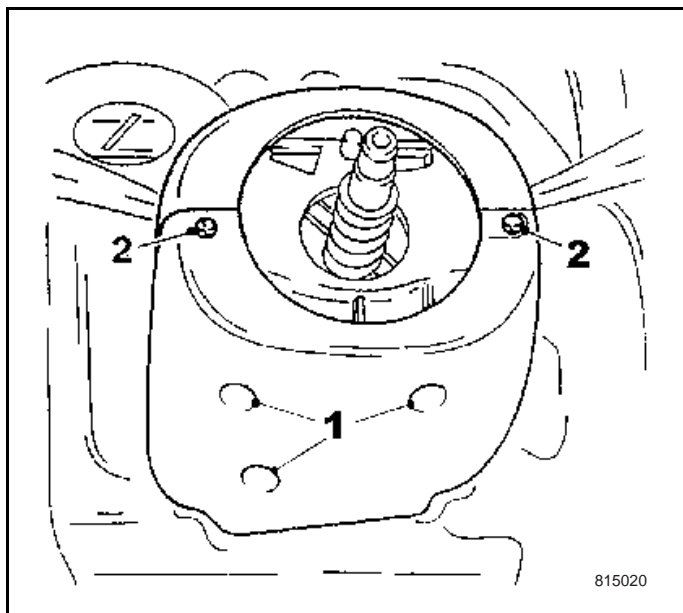
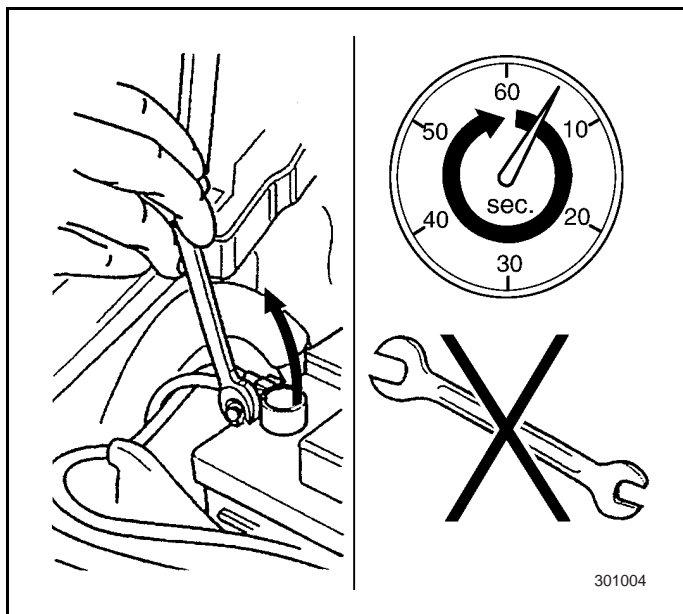
3.1.3 Repair guidance

3.1.3.1 Alignment of steering wheel at central position

Caution: When handling safety airbag system, airbag safety regulations should be followed.

Disassembly procedures

1. Disconnect the earth wire of battery and cover the negative pole.

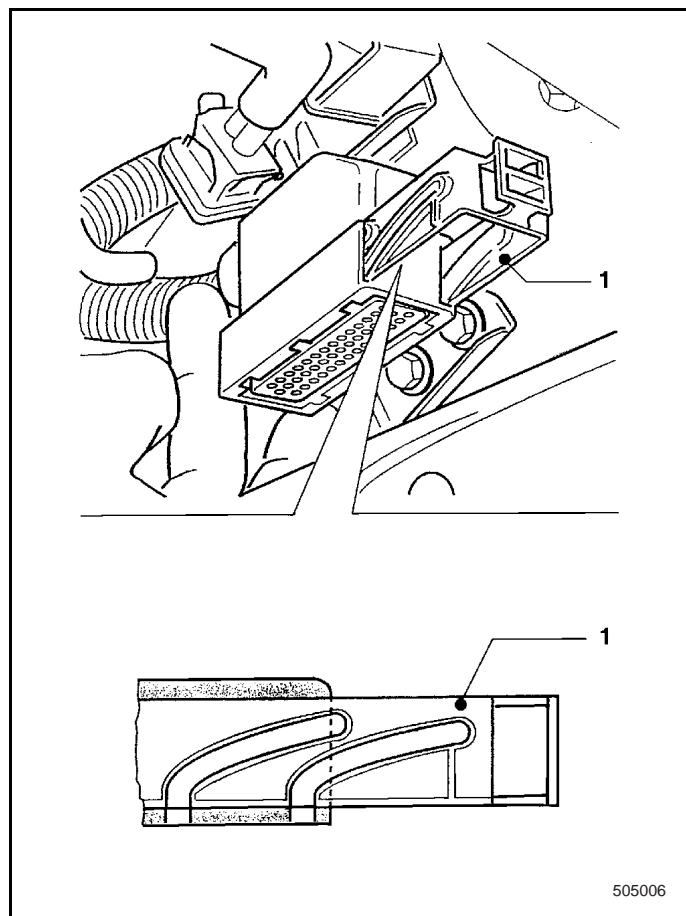


2. Wait one minute before starting operation until condenser discharge is completed.
3. Remove signal control board. Loosen binding bolt (1) and (2).
4. The right graphic representation is a signal control board with steering wheel removed.

5.1.4 Diagnostic Information and Procedures

5.1.4.1 Hydraulic Brake Diagnostic System Check

step	action	Normal Result(s)	Abnormal result(s) *
1	Inspect the brake fluid level in the reservoir.	Brake fluid level is normal.	Brake fluid level is too low.
2	<ul style="list-style-type: none"> Turn off ignition switch. Ensure that the parking brake is released. Start the engine. 	<ul style="list-style-type: none"> Brake system malfunction indicator lights when the engine is started. Brake system malfunction indicator is off when the engine is started. 	<ul style="list-style-type: none"> When the engine is started, brake system malfunction indicator does not light. When the engine is started, brake system malfunction indicator lights.
3	Press the brake pedal all the way down.	<ul style="list-style-type: none"> The brake pedal moves steadily towards the floor. Brake pedal stops against the pressure. 	<ul style="list-style-type: none"> Brake pedal moves unsteadily (hard or unsteady) Brake pedal is too soft (too near the floor)
4	Release the brake pedal.	Brake pedal returns to the original position.	<ul style="list-style-type: none"> Brake pedal fails to return to the original position.
5	Hydraulic brake system test.	<ul style="list-style-type: none"> When the brake is stepped down, brake effect takes on immediately. The brake operates steadily and normally without jam or lock-Brake pedal does not tremble. When the brake pedal is stepped down, the steering wheel and pedal does not vibrate (tremble). The vehicle may stop with not too much braking force. The vehicle will not run out during brake. The front and rear brake works at the same time. Not much noise heard when the brake operates. After the brake pedal is released, the brake does not click. 	<ul style="list-style-type: none"> When the brake is stepped down, there is delay in braking. The brake operates roughly when the brake pedal is stepped down slightly. When the brake pedal is stepped down, the steering wheel and pedal trembles. Brake pedal must be stepped forcefully or hard to brake. The vehicle runs out during braking. Front brake and rear brake works unevenly. Brake produces noises. After the brake pedal is released, the brake clicks.
<ul style="list-style-type: none"> * To verify the correct test result, if possible, compare the result with that of the operating vehicle/ system of the same type. Refer to the relevant diagnostic table for the results of operation. 			



Installation Procedure

1. Insert the hydraulic module with vibration absorber into the bracket and Tighten it. The flat area (2) in the Tightening pin must be vertical.

Tightening

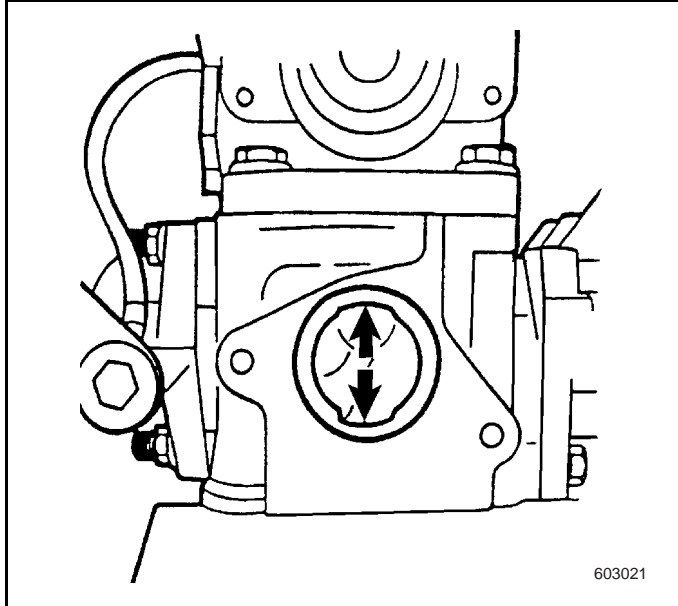
Tighten the hydraulic module with vibration absorber to the bracket to 10N•m.

2. Install all brake hard pipe. Tighten connecting bolt M10 and M12. Pay attention to different thread sizes while replacing the brake hard pipes.

Tightening

Tighten connecting bolt M10 and M12 to 10 N•m.

3. Adjust the position of lock slip (1). Refer to illustration figures. Connect the wiring plug, press the lock slip into the harness connector.
4. Discharge air in the brake system and inspect if there is leakage. Refer to Discharge air in the hydraulic braking system.



Installation Procedure

1. Install the thermostat and the new gasket (if needed), and screw down the bolts.

Note: Put the gasket in place correctly and take care the re-entry port.

2. Screw down the bolts.

Tightening

Tighten the thermostat outside bolts to 11 ± 3 N•m.

3. Connect the hose to the thermostat.
4. Connect the inlet hose to the thermostat housing.
5. Install the rear timing belt cover.
6. Install the camshaft timing belt pulley. Refer to Camshaft Timing Belt Pulley and Seal Ring Replacement.
7. Install the timing belt. Refer to Timing Belt Replacement.

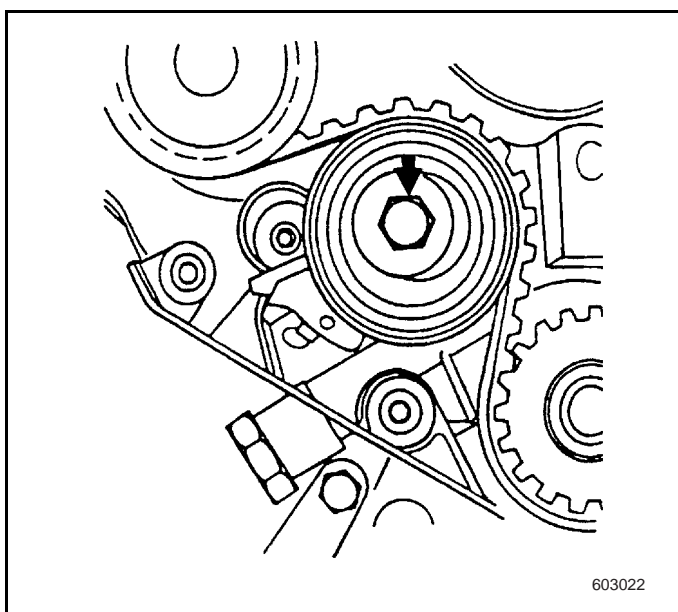
Note:

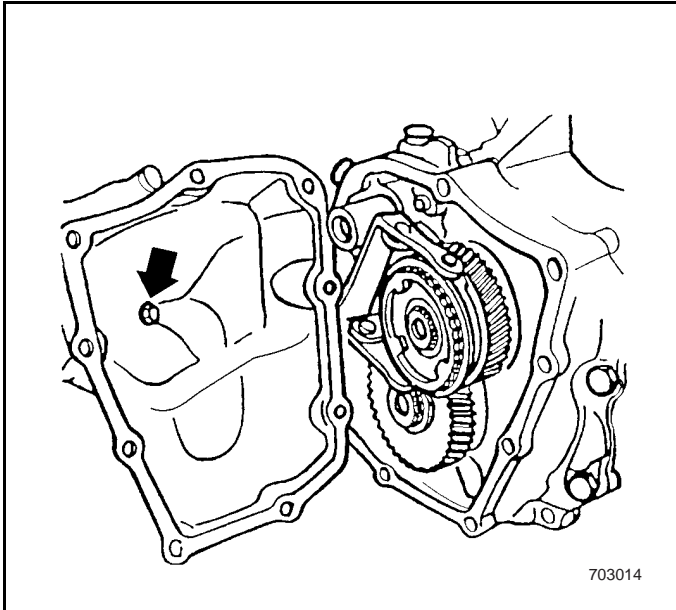
- Fill the system with drinkable water and 3.3L radiator protective fluid, P/N 9985451.
- Remove the water temperature bulb at the top of temperature control valve, and drain the air out of the engine block.
- After the system resumes, start the engine, allowing it to idle run at 900 rpm.
- After the air is drained, replace the bulb and continue to supply the coolant.

6.2.5.12 Water Pump Replacement

Removal Procedure

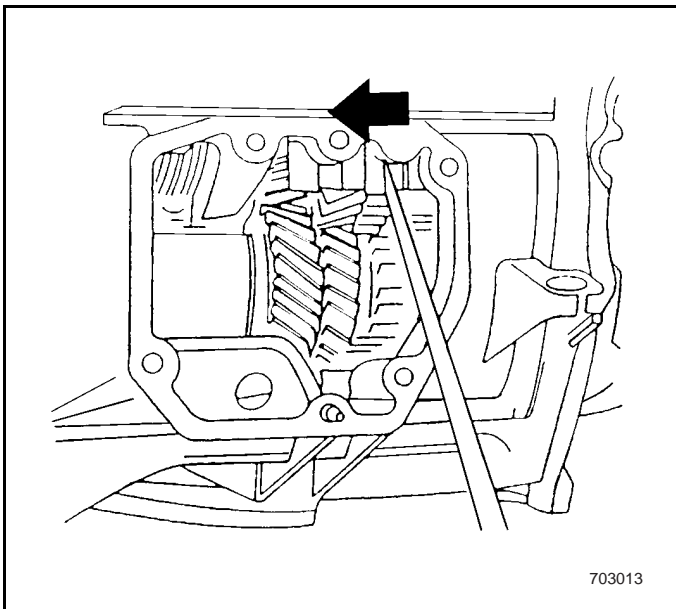
1. Remove the timing belt. Refer to Timing Belt Replacement.
2. Remove the camshaft timing belt pulley. Refer to Camshaft Timing Belt Pulley and Seal Ring Replacement.
3. Remove the crankshaft timing pulley from the crankshaft. Refer to Crankshaft Timing Pulley Replacement.
4. Screw off the timing belt tensioner pulley bolts, and remove the timing belt tensioner pulley.



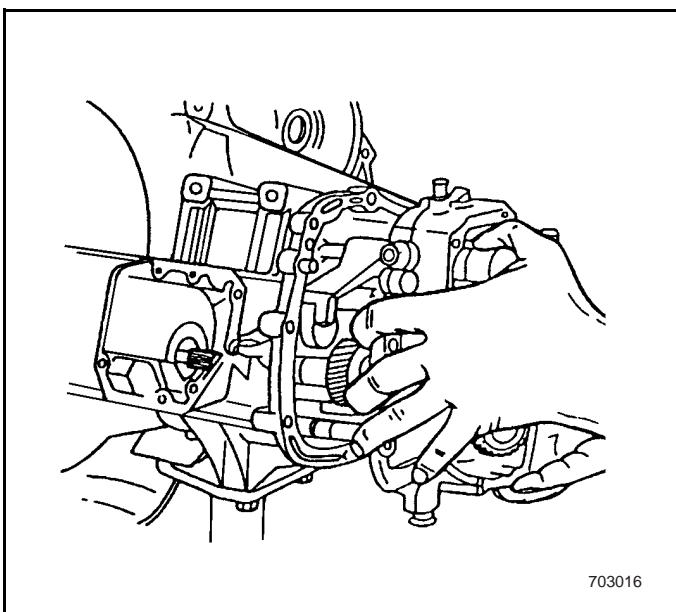


1. Remove the transmission.
2. Remove the bearing plate end cover and the bolt.

Note: Pay attention to the bushing of the cover (as shown by arrow in the figure).

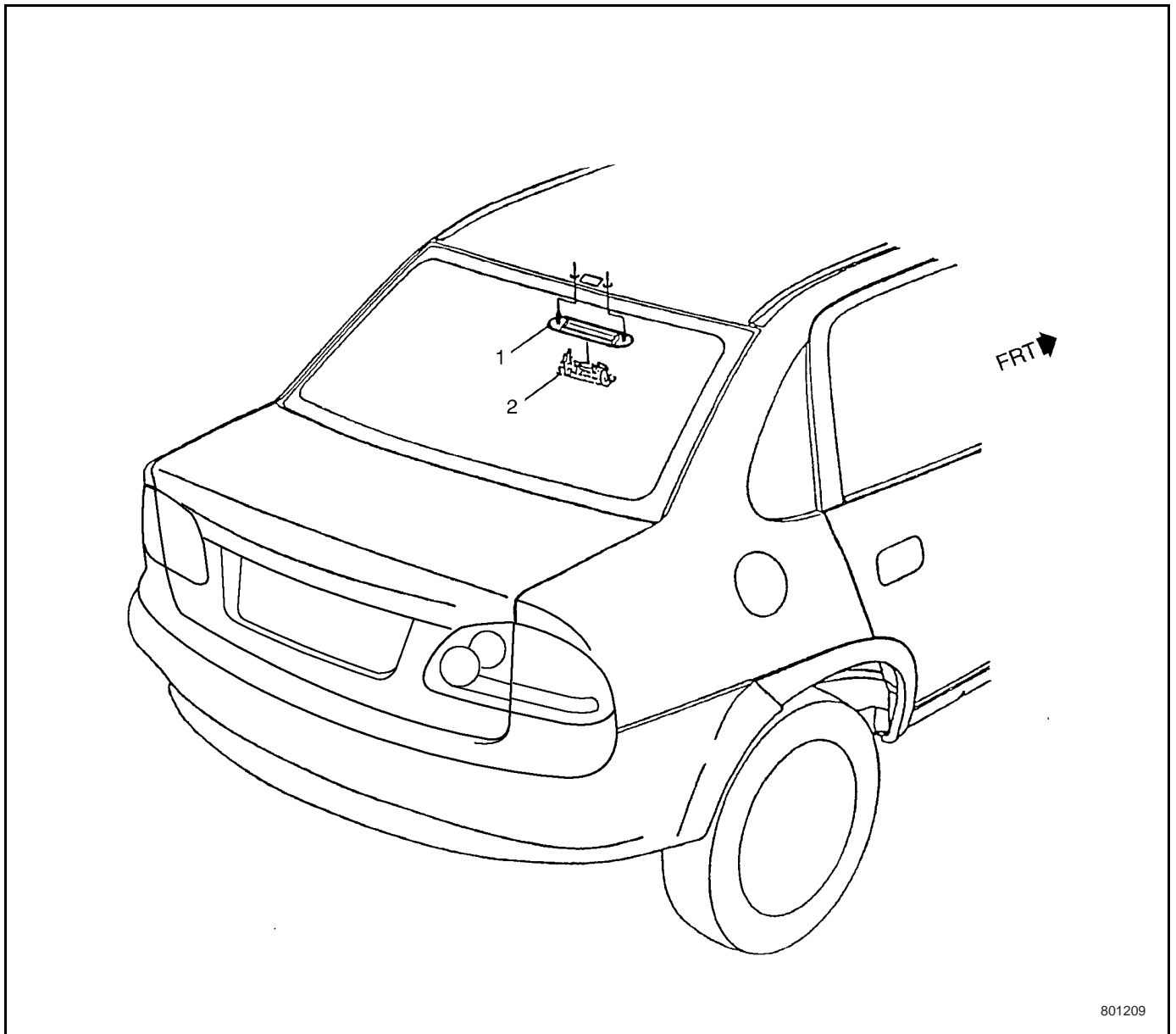


3. Remove the shift control cover.
- Note: Direct the shift fork to the designated direction, switch to 2nd gear.
4. Remove the bolt connecting the transmission case to the bearing plate.



5. Remove the transmission case assembly.

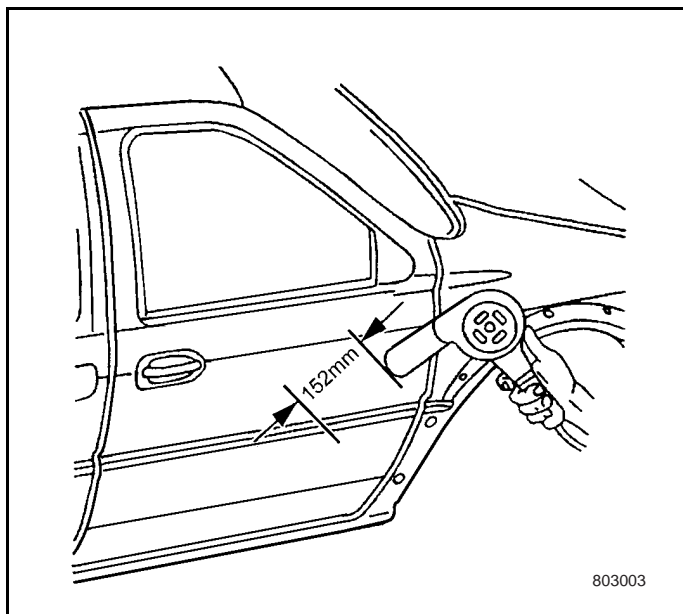
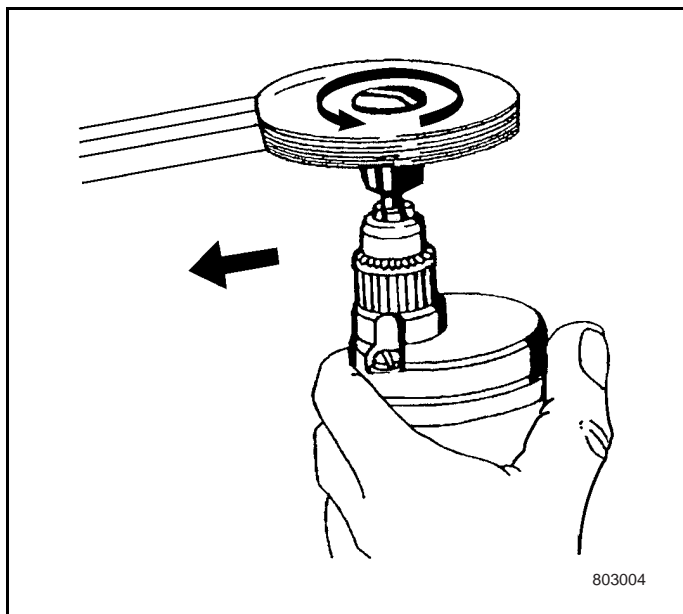
8.1.3.9A Reading Lamp



Legend

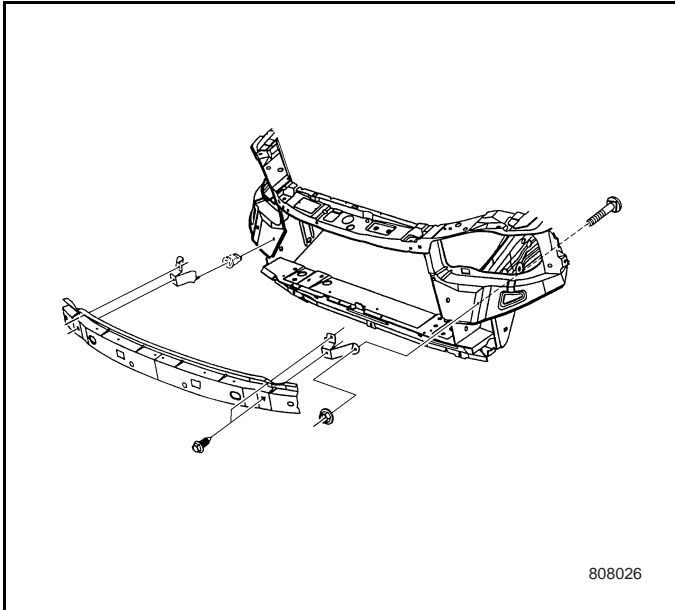
(1) Bezel

(2) Reading Lamp



Completely remove the attached rubbing strip.

1. Use 3MTM P/N 0750 of similar objects to remove all taps from the body side board and the back of the trim.
2. Wash with soap and water the concerned area, and wipe dry.
3. Use Varnish Makers and Painters (VMP)naphtha to remove all traces of the tap from the body outer board and from the back of the trim.
4. Use a certain length of tap to mark the correct position of the trim. With the adjacent trim as the reference.
5. Use the heating lamp or blower to heat the body exterior board to about 27°C-41°C.



3. Install the front bumper impact bar on the front impact bar bracket.

Tightening

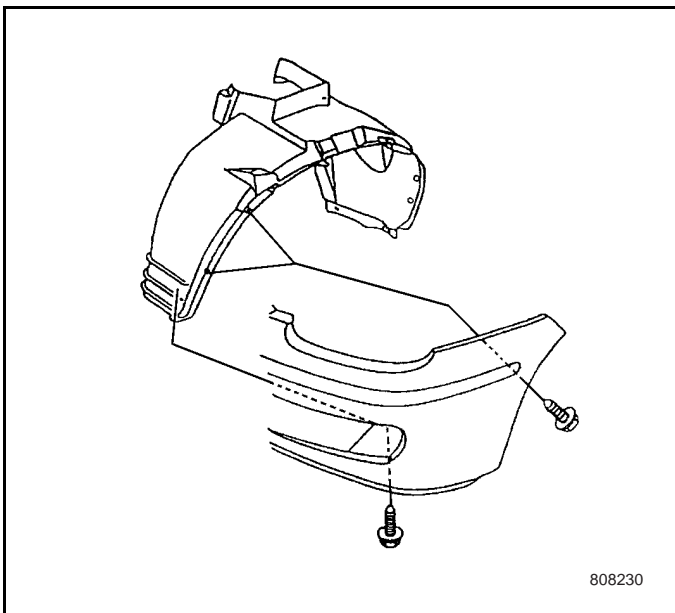
Tighten the front impact bar to 8-12 N•m.

4. Install the front bumper fascia assembly. Refer to Front Bumper Fascia ASM Replacement of Exterior Trim.

8.8.2.14 Front Wheelhouse Replacement

Removal Procedure

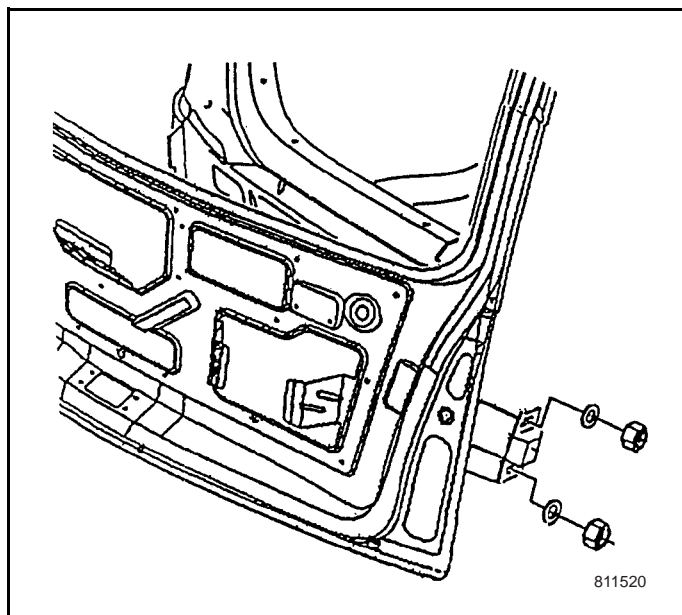
1. Remove the three thrust pins on the front wheelhouse.



8.11.4.19B Adjustable Buffer Replacement ñ Rear Lift Gate

Removal Procedure

1. Open the rear lift gate.
2. Remove the buffer nuts from the adjustable buffer of rear lift gate.
3. Remove the adjustable buffer of rear lift gate.



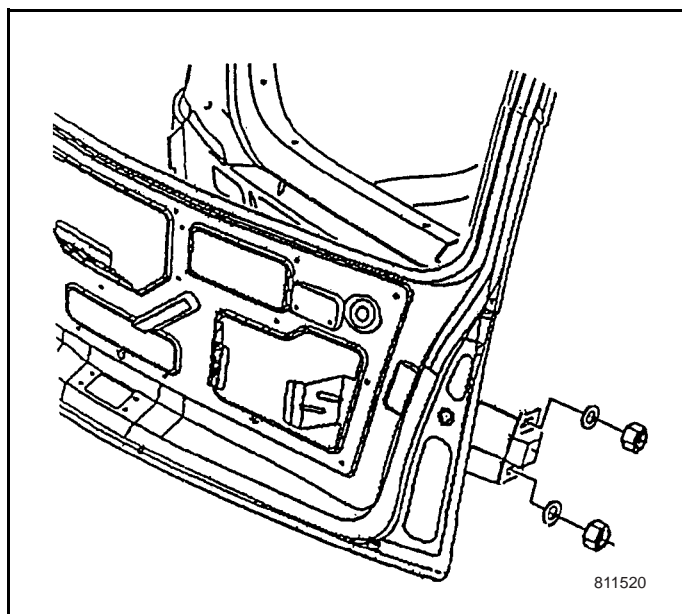
Installation Procedure

1. Install the adjustable buffer of rear lift gate on the retaining bolt of lift gate.
2. Tighten the buffer nut onto the adjustable buffer of rear lift gate.

Tightening

Tighten the buffer nut to 3.5-5.0 N•m.

3. Close the rear lift gate.



8.20.1.3 General Electrical Diagnostic Information

Basic Knowledge Required

In no basic knowledge of electricity, it is very hard to use this section to present the diagnostic procedure. You should understand the basic theory of electricity and know the meaning of potential (voltage), current (amperes), and resistance (ohms). You should understand what happens in a circuit with an open or shorted wire. You should be able to read and understand a wiring diagram.

Refer to Diagnostic Strategy in General Information so as to correct diagnosis and service of customer concerns.

8.20.1.4 Checking Aftermarket Accessories

Aftermarket accessories may not be connected in the following circuit:

- Airbag System Circuit

Do always first check aftermarket accessories (non original) at the time of diagnosis of electrical failures. If the vehicle is equipped with aftermarket accessories, disconnect the system and verify that the aftermarket accessories are not the cause of the failure.

Possible cause related to aftermarket accessories include:

- Power supply connection point is not the battery.
- Antenna Position
- Emitter wire is too close to the vehicle electronic module or wire.
- Poor shielding or poor connectors on antenna feed line.
- Check the detailed installation instructions presented in the latest service bulletin for aftermarket accessories.

8.20.1.5 Circuit Test

The following diagnostic test information is presented in the section of Circuit Test. Use the information in conjunction with diagnostic procedures to identify the cause of electrical function failures.

- Use the connector to test the joint.
- Probe the electrical connector.
- Use a DMM to clear the problem.
- Use the test lamp to rectify the problem.
- Use fused jumper wire.
- Test for voltage

- Measure the pressure drop
- Continuity Test
- Test for a short to ground
- Test for a short to voltage

Use the connector to test the joint.

Note: The probe on the test equipment shall not be inserted into any connector or fuse box terminal. The probe diameter can cause most terminals to be deformed. Poor contact will be resulted in after terminal deformation, causing system failures. Always use J 35616-A connector test splice kit or J 42675 flat head wire probe connector kit, to probe the terminal from the front. Avoid using clips or other substitutes, or terminal damage and measuring error will be caused.

Probe the electrical connector.

Note: When reconnecting the connector or replacing the terminals, always to reinstall the connector position assurance (CPA) and terminal position assurance (TPA)

Front Probe

Disconnect the connector and probe the matching surface (front) of the connector.

Note: The probe on the test equipment shall not be inserted into any connector or fuse box terminal. The probe diameter can cause most terminals to be deformed. Poor contact will be resulted in after terminal deformation, causing system failures. Always use J 35616-A connector test splice kit or J 42675 flat head wire probe connector kit, to probe the terminal from the front. Avoid using clips or other substitutes, or terminal damage and measuring error will be caused.

Back Probe

Do not disconnect the connector, and the terminal should be probed from the wiring harness side (back) of the connector.

Note:

- Probe the connector terminal from the back only when it is specially required by the diagnostic procedure.
- Do not back probe the sealing (Weather Pack(r)) connector, less than a 280 series Metirc-Pack connector, a Micro-Pack connector or a flat wire (dock and lock) connector.
- Back probing may possibly damage the connector terminal. You must be specially careful at the time of operation, and avoid resulting terminal deformation due to test probe inserting the hole too deep or the used test probe dimension too large.
- Check the terminal for damage after back probing of any connectors. If the terminal damage is suspected, test for proper terminal contact.