

MAINTENANCE AND REPAIR

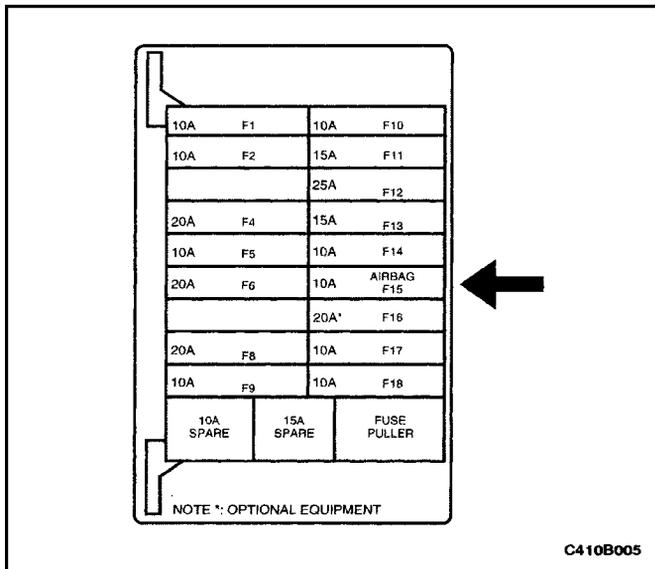
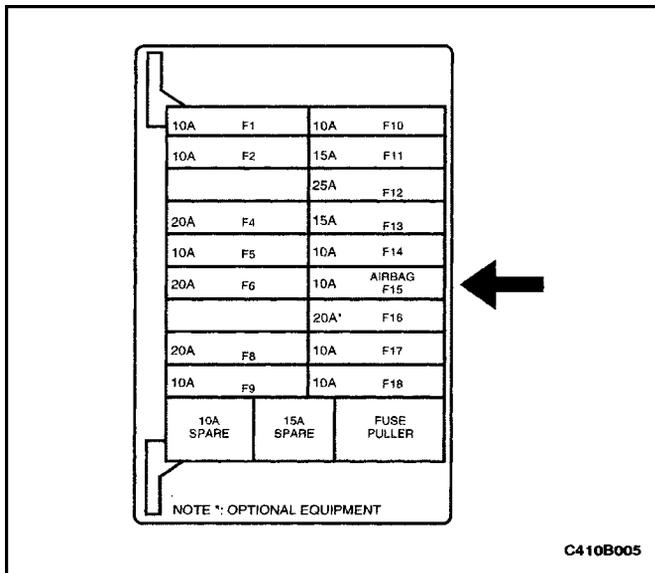
ON-VEHICLE SERVICE

SERVICE PRECAUTIONS

CAUTION : The sensing and diagnostic module (SDM) can maintain sufficient voltage to deploy the airbags for 10 minutes after the ignition is OFF and the AIRBAG fuse has been removed. If the airbags are not disconnected, do not begin service until 10 minutes have passed after disconnecting power to the SDM. If the airbags are disconnected, do begin immediately without waiting for the 10-minute time period to expire. Failure to temporarily disable the SIR system during servicing can result in unexpected deployment, personal injury, and otherwise unneeded SIR system repairs.

DISABLING THE SIR SYSTEM

1. Turn the ignition to LOCK and remove the key.
2. Remove the airbag fuse F15.
3. Wait 10 minutes for the supplemental inflatable restraints (SIR) capacitor to discharge.



ENABLING THE SIR SYSTEM

Reinstall the airbag fuse F15.

HANDLING, INSTALLATION, AND DIAGNOSIS

- Airbag modules should not be subjected to temperatures above 65°C (149°F).
- An airbag module or a sensing and diagnostic module (SDM) should not be used if it has been dropped from a height of 0.9 meters (3 feet) or greater.
- When a SDM is replaced, it must be oriented with the arrow on the sensor pointing toward the front of the vehicle.
- It is very important for the SDM to be installed flat on the mounting surface, parallel to the vehicle's longitudinal axis.
- To avoid setting diagnostic trouble codes (DTCs), do not apply power to the supplemental inflatable restraints (SIR) system unless all components are connected or a diagnostic chart requests it.
- The SIR Diagnostic System Check must be the starting point of any SIR diagnostics. The SIR Diagnostic System Check will verify proper AIRBAG indicator operation and will lead you to the correct chart to diagnose any SIR malfunctions. Bypassing these procedures may result in extended diagnostic time and incorrect parts replacements.

REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT

CAUTION : Any repairs to the vehicle's structure must return it to the original production configuration. Deployment requires replacement of the sensing and diagnostic module (SDM) and the inflator modules, and a dimensional inspection of the steering column.

- If any supplemental inflatable restraints (SIR) system components are damaged, they must be replaced. If SIR component mounting points are damaged, they must be repaired or replaced.
- Never use SIR parts from another vehicle. This does not include remanufactured parts purchased from an authorized source.
- Do not attempt to service the SDM, the clock spring, or the airbag modules. These items must be replaced if they are defective.
- Verify the part number of replacement airbag modules. Some inflator modules look identical but contain different internal components.

ACCIDENT WITH DEPLOYMENT – COMPONENT REPLACEMENT AND INSPECTIONS

Certain supplemental inflatable restraints (SIR) components must be replaced or inspected for damage after a frontal crash involving airbag deployment. Replace the following SIR components:

- The sensing and diagnostic module (SDM).
- Inflator modules.

Inspect the clock spring and replace it if necessary. Inspect the wiring and the connector for any signs of scorching, melting, or damage due to excessive heat.

ACCIDENT WITH OR WITHOUT DEPLOYMENT – COMPONENT INSPECTIONS

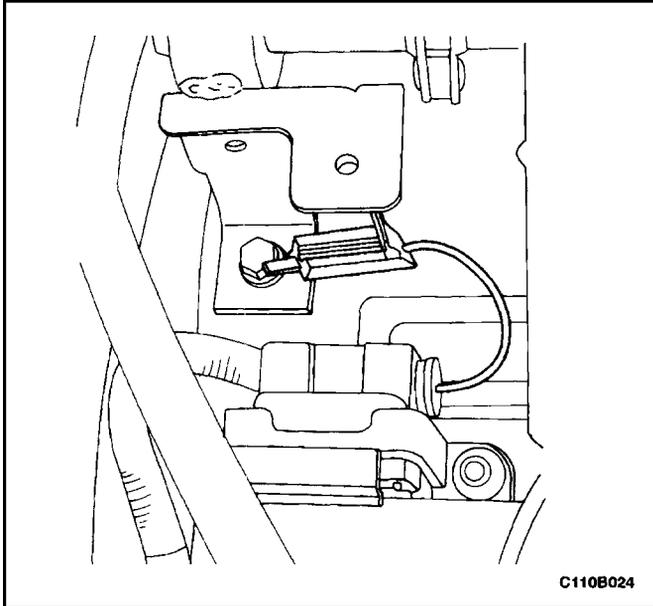
The following inspections must be performed after any crash, whether the airbag has deployed or not:

- The steering column must be dimensionally inspected.
- Inspect the knee bolsters and mounting points for distortion, bending, cracking, or other damage.
- Inspect the instrument panel (I/P) steering column reinforcement plate for distortion, bending, cracking, or other damage.
- Inspect the I/P braces for distortion, bending, cracking, or other damage.
- Inspect the seat belts and mounting points. Refer to *Section 8A, Seat Belts*.

SENSING AND DIAGNOSTIC MODULE (SDM)

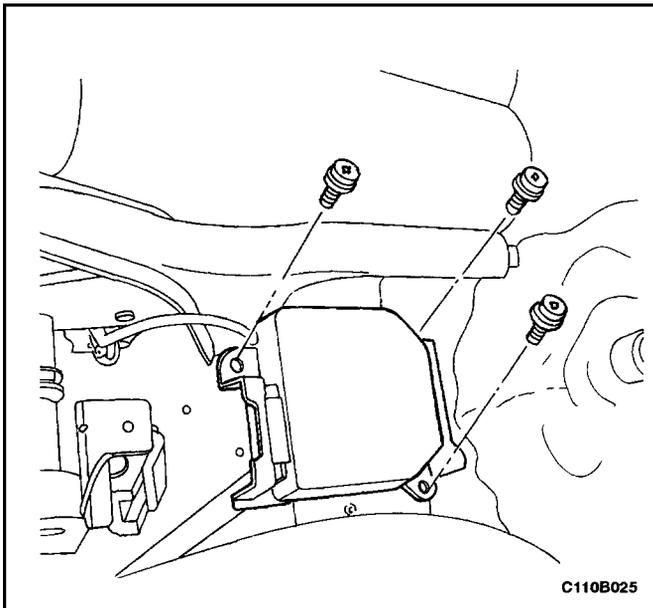
CAUTION : During service procedures, be very careful when handling the sensing and diagnostic module (SDM). Never strike or jar the SDM. Never power the supplemental inflatable restraints (SIR) system when the SDM is not rigidly attached to the vehicle. All SDM mounting bolts must be carefully tightened, and the SDM arrow must be pointing toward the front of the vehicle to ensure proper operation of the SIR system. The SDM could be activated if it is powered while not rigidly attached to the vehicle, resulting in unexpected deployment and possible injury.

Important : If the vehicle interior has been exposed to extensive water intrusion such as waterleaks, driving through high water, flooding, or other causes, the sensing and diagnostic module (SDM) and the SDM connector may need to be replaced. With the ignition OFF, inspect the area around the SDM, including the carpet. If any significant soaking or evidence of previous soaking is detected, the water must be removed, the water damage repaired, and the SDM and SDM connector must be replaced. Before attempting any of these repairs, the supplemental inflatable restraint (SIR) system must be disabled. Refer to "Disabling the SIR System" in this section.

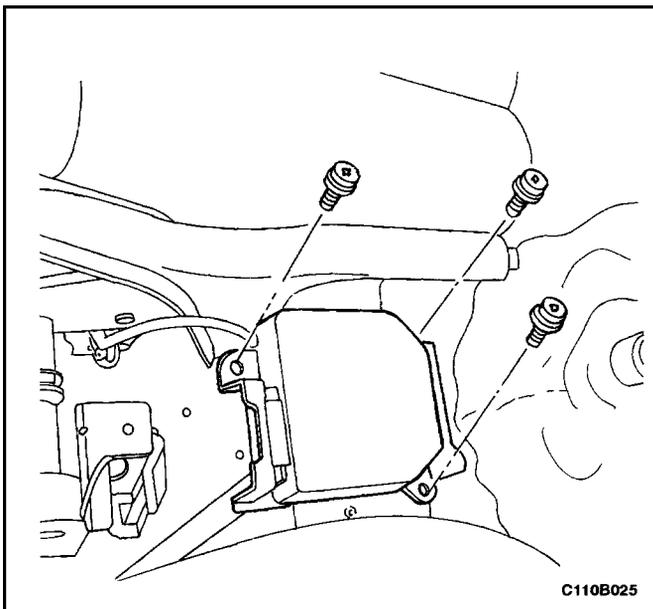


Removal Procedure

1. Disable the SIR system. Refer to "Disabling the SIR System" in this section.
2. Remove the floor console. Refer to *Section 9G, Interior Trim*.
3. Remove the connector position assurance lock, which is tethered to the SDM connector.



4. Disconnect the SDM electrical connector.
5. Remove the SDM mounting bolts.
6. Remove the SDM.

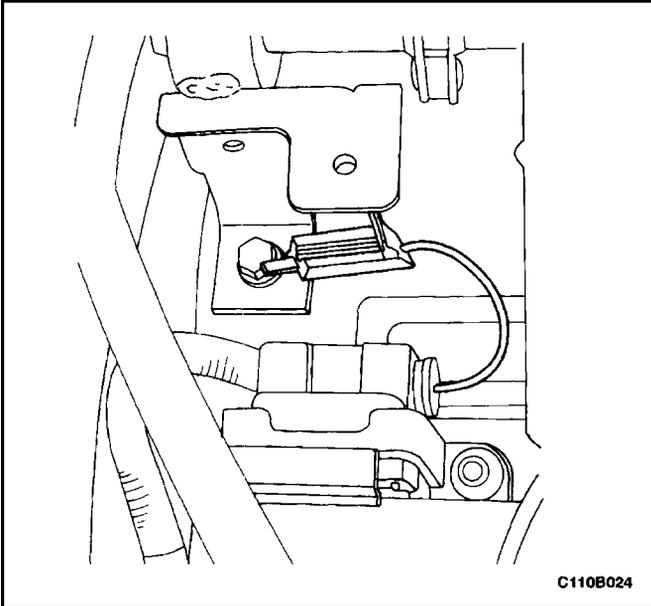


Installation Procedure

1. Install the SDM with the arrow pointing toward the front of the vehicle.
2. Install the SDM mounting bolts.

Tighten

Tighten the sensing and diagnostic module mounting bolts to 10 N•m (89 lb-in).



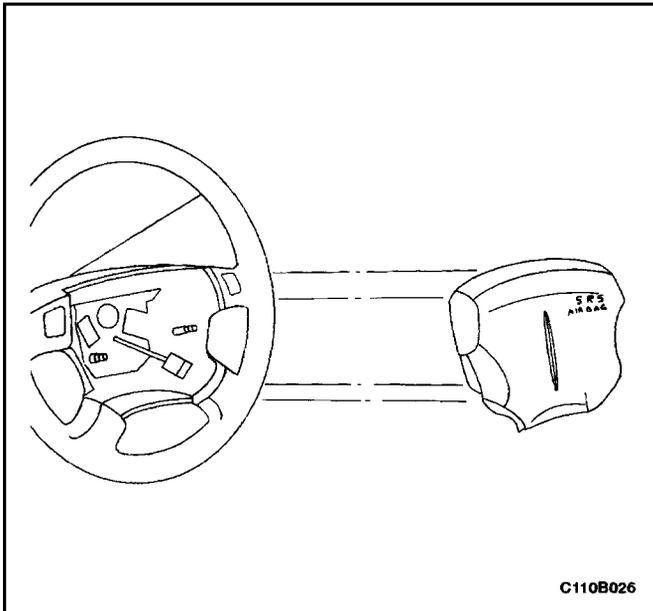
3. Connect the SDM electrical connector.
4. Install the connector position assurance lock.
5. Install the floor console. Refer to *Section 9G, Interior Trim*.
6. Reinstall the airbag fuse F15 which was removed when disabling the SIR system.

DRIVER AIRBAG MODULE

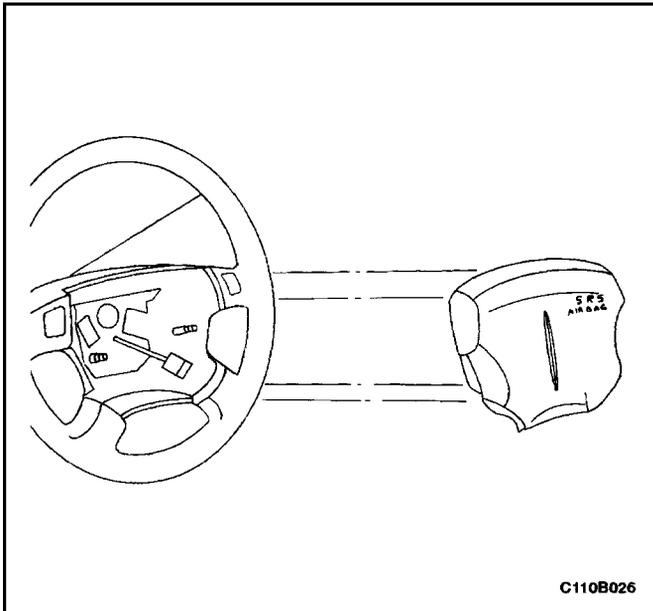
CAUTION : *After deployment, a powdery residue may be on the surface of the airbag. The powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. Sodium hydroxide dust (similar to lye soap) is produced as a by-product of the deployment reaction. The sodium hydroxide then quickly reacts with atmospheric moisture and is converted to sodium carbonate and sodium bicarbonate (also known as baking soda). Therefore, it is unlikely that sodium hydroxide will be present after deployment. To avoid personal injury, wear gloves and safety glasses during the disposal procedure. Refer to "Deployed Airbag Module Disposal Procedure" in this section.*

Removal Procedure

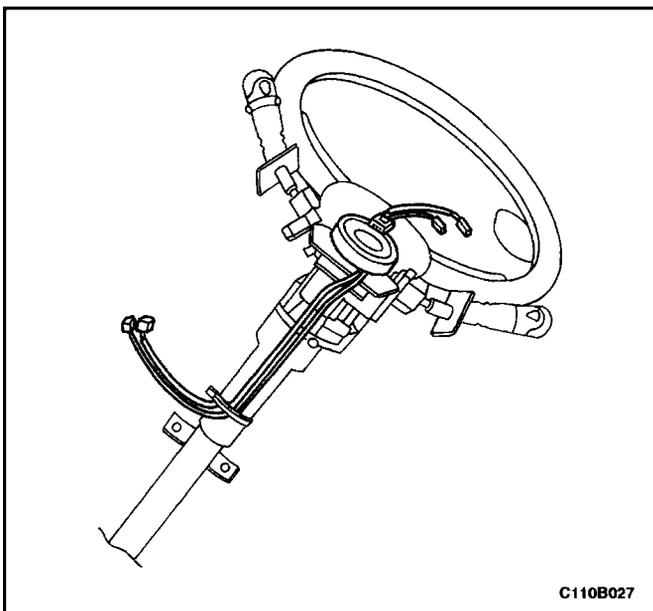
1. Disable the SIR system. Refer to "Disabling the SIR System" in this section.
2. If the airbag has not been deployed, remove the knee bolster and disconnect the yellow clock spring connector near the lower steering column.
3. Position the steering wheel straight ahead.
4. Remove the driver airbag module mounting bolts.



C110B026



C110B026



C110B027

CAUTION : When handling an airbag module, always keep the top of the unit facing upward. This leaves room for the airbag to expand if the module unexpectedly deploys. Without room for expansion, a module suddenly propelled toward a person or object can cause injury or vehicle damage.

5. Remove the connectors from the horn terminal and the driver airbag module.
6. Remove the driver airbag module.

Installation Procedure

CAUTION : When removing an airbag module or handling a new airbag module, always keep the top of the unit facing upward. This leaves room for the airbag to expand if the module unexpectedly deploys. Without room for expansion, a module suddenly propelled toward a person or object can cause injury or vehicle damage.

1. Install the connectors to the horn terminal and the driver airbag module.
2. Install the driver airbag module.
3. Install the driver airbag module mounting bolts.

Tighten

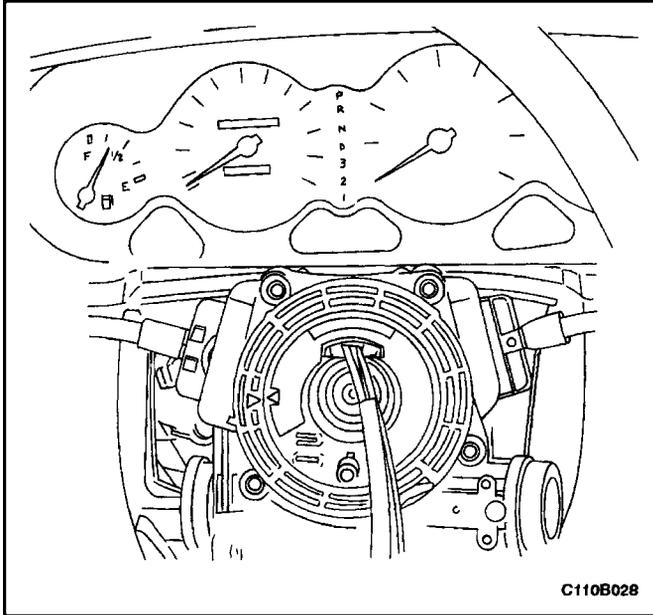
Tighten the driver airbag module mounting bolts to 4.6 N•m (41 lb-in).

4. Reinstall the airbag fuse F15 which was removed when the supplemental inflatable restraints system was disabled.

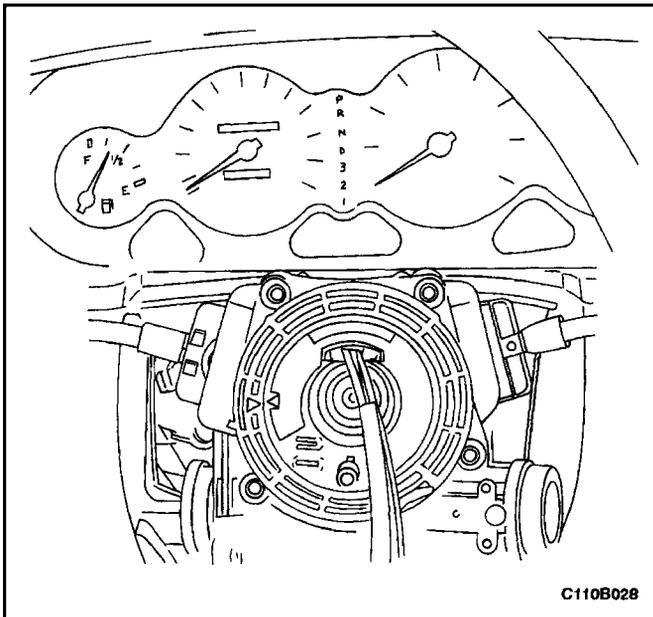
CLOCK SPRING

Removal Procedure

1. Disable the supplemental inflatable restraints (SIR) system. Refer to "Disabling the SIR System" in this section.
2. Turn the front wheels straight ahead.
3. Remove the driver side airbag module. Refer to "Driver Airbag Module" in this section.
4. Remove the steering wheel. Refer to Section 6E, *Steering Wheel and Column*.
5. Remove the driver knee bolster trim panel and the knee bolster. Refer to Section 9G, *Interior Trim*.
6. Disconnect the connectors at the lower steering column.



7. Remove the screws and the clock spring from the steering shaft.



Installation Procedure

CAUTION : *If the clock spring is not properly aligned, the steering wheel may not be able to rotate completely during a turn. Restricted turning ability can cause the vehicle to crash. Improper alignment of the clock spring also may make the SIR system inoperative, preventing the airbags from deploying during a crash. Both of these outcomes can result in injury.*

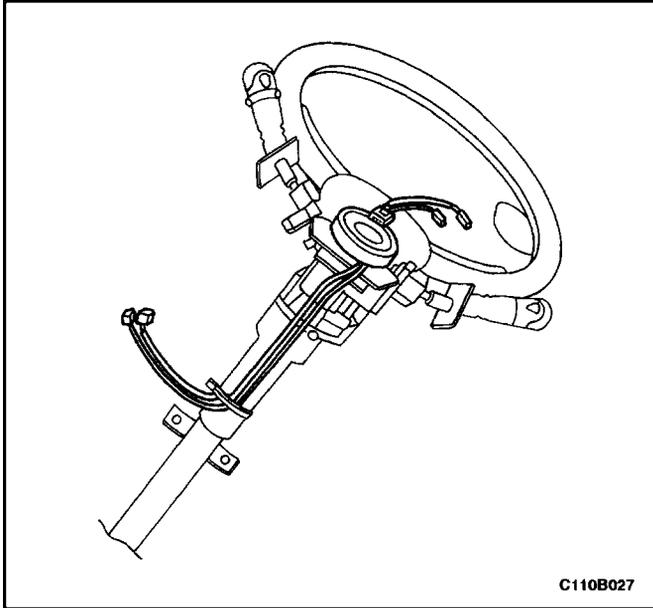
Notice : Turning the clock spring more than three turns clockwise or more than three turns counterclockwise can damage the spring.

1. Turn the front wheels straight ahead.
2. Install the clock spring with the screws.

Tighten

Tighten the clock spring mounting screws to 1.25 N•m (11 lb-in).

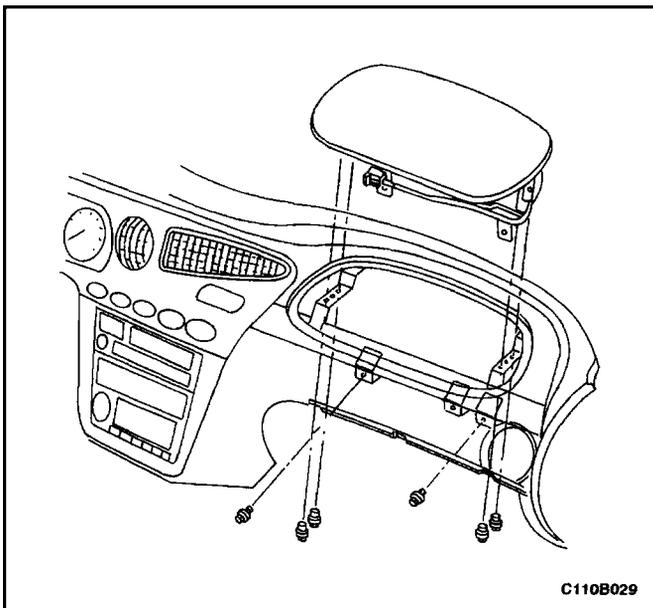
Important : The clock spring may come packed in material used to prevent damage to the spring during shipping or storage. Avoid installing any of the packing material with the clock spring.



3. Turn the lobe of the clock spring clockwise to lock.
4. Turn the lobe of the clock spring counterclockwise approximately three turns to the neutral position, with the front wheels straight ahead.
5. Properly align the pointed marks on the components of the clock spring.
6. Connect the electrical connectors on the lower steering column.
7. Install the driver knee bolster trim panel and the knee bolster. Refer to *Section 9G, Interior Trim*.
8. Install the steering wheel. Refer to *Section 6E, Steering Wheel and Column*.
9. Connect the driver airbag module and the horn connectors.
10. Install the driver airbag module. Refer to "Driver Airbag Module" in this section.
11. Reinstall the airbag fuse F15 which was removed when disabling the SIR system.

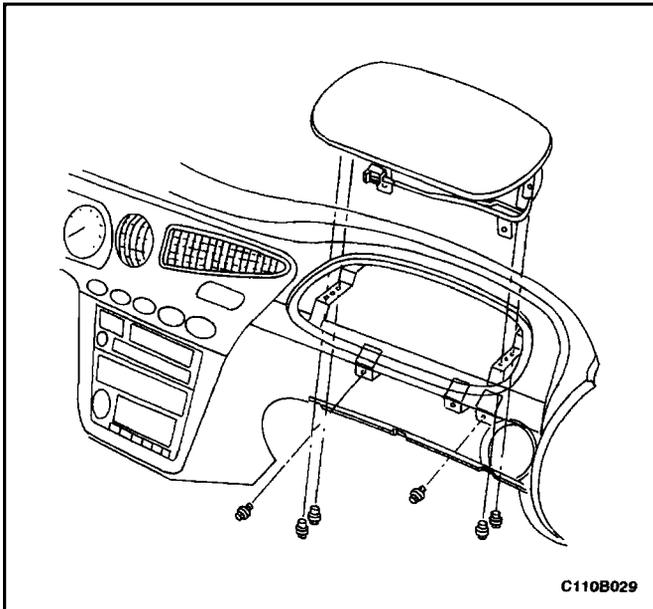
PASSENGER AIRBAG MODULE

CAUTION : After deployment, a powdery residue may be on the surface of the airbag. The powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. Sodium hydroxide dust (similar to lye soap) is produced as a by-product of the deployment reaction. The sodium hydroxide then quickly reacts with atmospheric moisture and is converted to sodium carbonate and sodium bicarbonate (also known as baking soda). Therefore, it is unlikely that sodium hydroxide will be present after deployment. To avoid possible injury, wear gloves and safety glasses during the disposal procedure. Refer to "Deployed Airbag Module Disposal Procedure" in this section.



Removal Procedure

1. Disable the supplemental inflatable restraints (SIR) system. Refer to "Disabling the SIR System" in this section.
2. Remove the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Disconnect the passenger airbag yellow electrical connector.
4. Remove the passenger airbag mounting bolts.
5. Remove the passenger airbag module from the instrument panel.



Installation Procedure

1. Install the passenger airbag module in the instrument panel.
2. Install the passenger airbag mounting bolts.

Tighten

Tighten the passenger airbag mounting bolts to 10 N•m (89 lb–in).

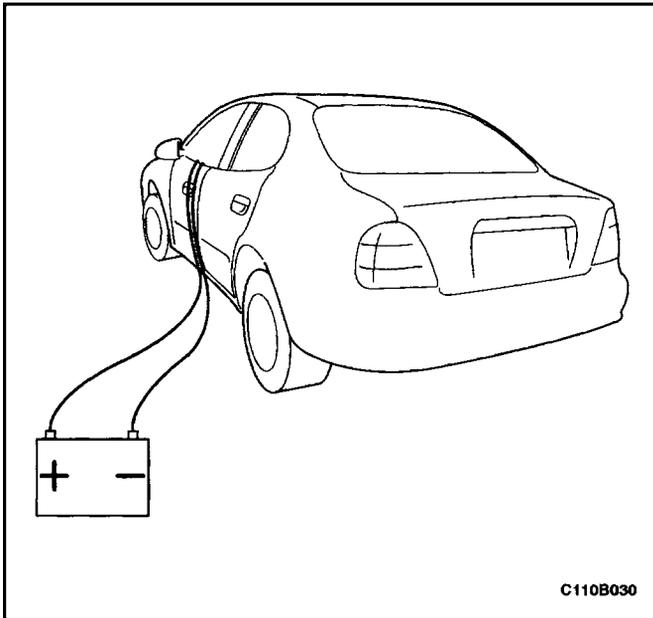
3. Connect the passenger airbag electrical connector.
4. Install the glove box. Refer to Section 9E, *Instrumentation/Driver Information*.
5. Reinstall the airbag fuse F15 which was removed when the SIR system was disabled.
6. Perform the SIR Diagnostic System Check in this section.

AIRBAG MODULE DEPLOYMENT (IN VEHICLE)

Deploy airbags before disposing of them. If a vehicle is to be scrapped, the airbags may be deployed inside the vehicle.

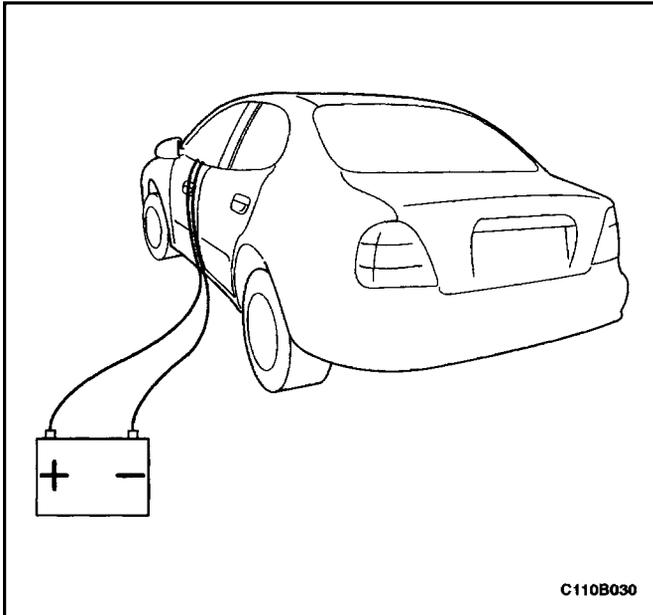
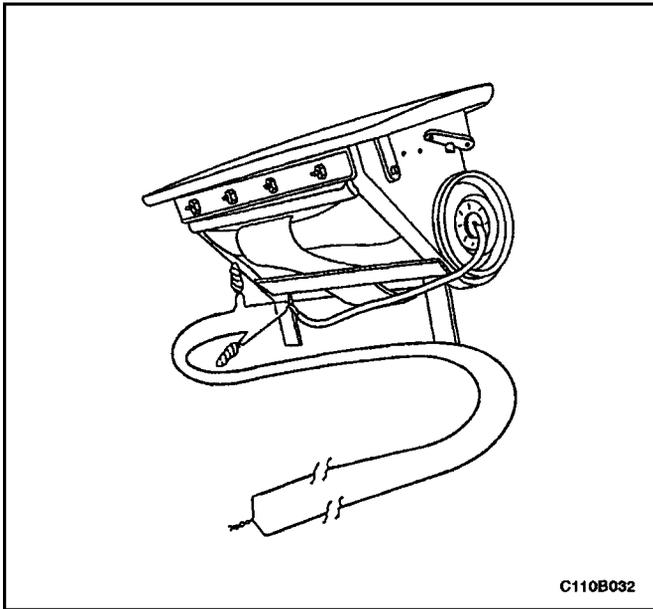
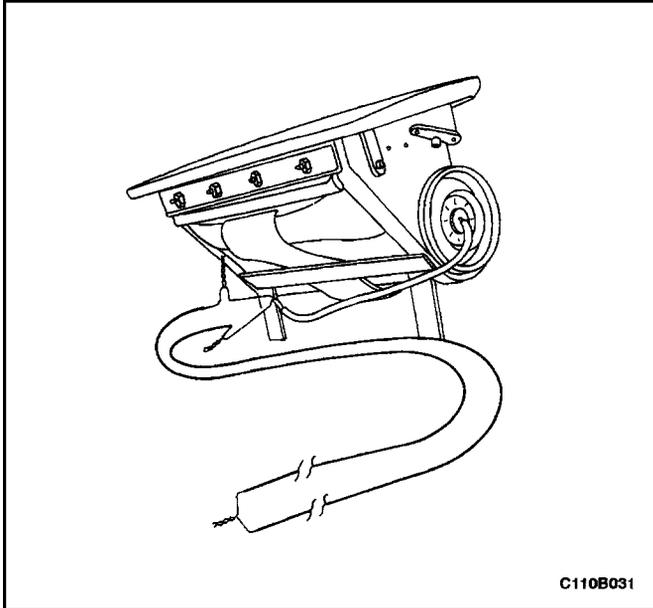
CAUTION : *To avoid injury while deploying an airbag module in the vehicle, chance the following precautions:*

- Before deploying the airbags, remove all loose objects from the airbag's expansion area.
- Deploy the airbags with the vehicle doors closed and the side windows open.
- Deploy the airbags only in an evacuated area. Service personnel who must be present during the deployment should be at least 10 meters (33 feet) in front of the vehicle.
- Do not connect the voltage source until after having completed all other preparations for the deployment of the airbags.
- Allow a deployed airbag module to cool for at least 30 minutes before handling.
- Wear gloves and eye protection during the disposal process.
- If the deployment fails, disconnect the voltage source and wait 5 minutes before approaching the vehicle.



Deployment Procedure

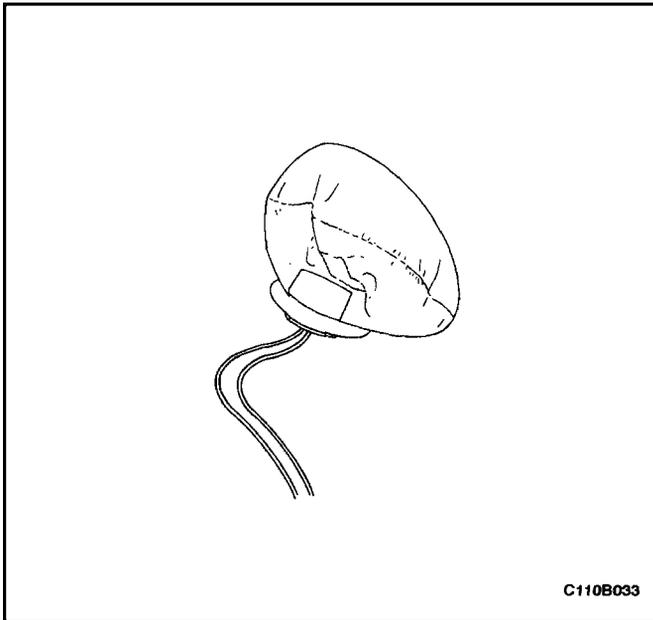
1. Disconnect both battery cables and place the battery at least 10 meters (33 feet) from the vehicle.
CAUTION : The sensing and diagnostic module (SDM) can maintain sufficient voltage to deploy the airbags for 10 minutes after the ignition is OFF and the AIRBAG fuse has been removed. If the airbags are not disconnected, do not begin until 10 minutes have passed after disconnecting power to the SDM. If the airbags are disconnected, do begin immediately without waiting for the 10-minute time period to expire. Failure to temporarily disable the supplemental inflatable restraints (SIR) system during servicing can result in unexpected deployment, personal injury, and otherwise unneeded SIR system repairs.
2. Remove the knee bolster from the steering column. Refer to Section 9E, Instrumentation/Driver Information.
3. At the lower steering column, cut the two wires leading from the SIR harness to the clock spring.
4. Strip 13 mm (0.5 inch) of insulation from the ends of the wires leading to the clock spring.
5. Use two additional wires, each at least 10 meters (33 feet) long, to reach from the deployment battery to the inflator module.
6. Strip 13 mm (0.5 inch) of insulation from the ends of these two additional wires.
7. Twist the two wires together at one end.
8. Place the twisted ends of the two wires near the deployment battery. Do not connect the wires to the battery at this time.
9. Using the free ends of the 10-meter (33-foot) wires leading to the clock spring, make two splices, one at each wire from the airbag module.
10. Wrap the splices with insulating tape.
11. Now that the free ends of the 10-meter (33-foot) wires are spliced to the airbag module wires, and the ends that are twisted together are near the deployment battery, clear the area.
12. Untwist the wires that are near the deployment battery.
13. Touch one wire to the positive battery terminal and touch the other wire to the negative battery terminal. The airbag will deploy.



14. Repeat the procedure for the passenger airbag, cutting the wires to the passenger airbag module instead of the wires leading to the clock spring.
15. Strip 13 mm (0.5 inch) of insulation from the ends of the wires leading to the passenger airbag module.
16. Use two additional wires, each at least 10 meters (33 feet) long, to reach from the deployment battery to the passenger airbag module.
17. Strip 13 mm (0.5 inch) of insulation from the ends of these two additional wires.
18. Twist the two wires together at one end.
19. Place the twisted ends of the two wires near the deployment battery. Do not connect the wires to the battery at this time.
20. Using the free ends of the 10-meter (33-foot) wires to the passenger airbag module, make two splices, one at each wire from the airbag module.

21. Wrap the splices with insulating tape.

22. Now that the free ends of the 10-meter (33-foot) wires are spliced to the passenger airbag module wires, and the ends that are twisted together are near the deployment battery, clear the area.
23. Untwist the wires that are near the deployment battery.
24. Touch one wire to the positive battery terminal and touch the other wire to the negative battery terminal. The passenger airbag will deploy.
25. Using the proper precautions, dispose of the deployed airbag. Refer to "Deployed Airbag Module Disposal Procedure" in this section.



AIRBAG MODULE DEPLOYMENT (OUTSIDE OF VEHICLE)

If the vehicle is within the warranty period, contact the Daewoo regional service manager for approval or special instructions before deploying the airbag modules. Deploy airbag modules in the following situations:

- If a vehicle is to be scrapped. Refer to "Airbag Module Deployment (In Vehicle)" in this section.
- If an airbag module is damaged during transit, storage, or service.

CAUTION : To avoid injury while deploying an airbag module outside the vehicle, observe the following precautions.

- Deploy the airbags only in an evacuated area. Service personnel who must be present during the deployment should be at least 10 meters (33 feet) in front of the vehicle.
 - Do not connect the voltage source until completing all other preparations for the deployment of the airbags.
 - Allow a deployed airbag module to cool for at least 30 minutes before removing it from the vehicle.
 - Wear gloves and eye protection during the disposal process.
 - If the deployment fails, disconnect the voltage source and wait 5 minutes before approaching the vehicle.
1. Position the airbag module face up, on flat ground outdoors, at least 10 meters (33 feet) from any obstacles or people.
 2. Place a vehicle battery at least 10 meters (33 feet) away from the airbag module.
 3. Deploy the airbag module using the deployment tool.
 4. Using the proper precautions, dispose of the deployed airbag. Refer to "Deployed Airbag Module Disposal Procedure" in this section.

DEPLOYED AIRBAG MODULE DISPOSAL PROCEDURE

CAUTION : After deployment, a powdery residue may be on the surface of the airbag. The powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. Sodium hydroxide dust (similar to lye soap) is produced as a by-product of the deployment reaction. The sodium hydroxide then quickly reacts with atmospheric moisture and is converted to sodium carbonate and sodium bicarbonate (also known as baking soda). Therefore, it is unlikely that sodium hydroxide will be present after deployment.

CAUTION : To avoid possible injury, wear gloves and safety glasses during the disposal procedure.



CAUTION : After deployment, the metal surfaces of the airbag module will be hot. In order to avoid the risk of an injury or a fire, do not place the deployed airbag modules near any flammable objects. Allow the airbag modules to cool for 30 minutes before handling them.

Deploy an airbag before disposing of it. This includes those in a whole vehicle being scrapped. If the vehicle is still within the warranty period, contact the Daewoo regional service manager for approval or special instructions before deploying an airbag module. Deployed airbag modules should be disposed of in the same manner as any other scrap parts, with the addition of the following steps:

1. Place the deployed airbag in a sturdy plastic bag.
2. Seal the plastic bag securely.
3. Wash your hands and rinse them with water after handling a deployed airbag.

SIR WIRING REPAIR

Connector Repair

CAUTION : Before attempting any repairs, the supplemental inflatable restraints (SIR) system must be disabled. Refer to "Disabling the SIR System" in this section.

The terminals in the SIR system are made of a special metal to provide necessary contact integrity for the sensitive, low-energy circuits. These terminals are available only in the connector repair assembly packs. Do not substitute any other terminals for those in the assembly packs.

Wire Repair

CAUTION : Before attempting any repairs, the SIR system must be disabled. Refer to "Disabling the SIR System" in this section.

Do not repair wires or connectors attached to the passenger airbag module or the clock spring. If the wires or connectors on the clock spring or passenger airbag are damaged, the clock spring or passenger airbag must be replaced. If any other wire is damaged, the wire should be repaired by splicing in a new section of wire of the same gauge. To protect the repair, spliced wires must be sealed with heat-shrink tubing. If the splices are not made correctly, the result will be a high-resistance connection, and the AIRBAG indicator will turn on.

GENERAL DESCRIPTION AND SYSTEM OPERATION

SIR SYSTEM

The supplemental inflatable restraints (SIR) system is a safety device used in conjunction with the seat belts.

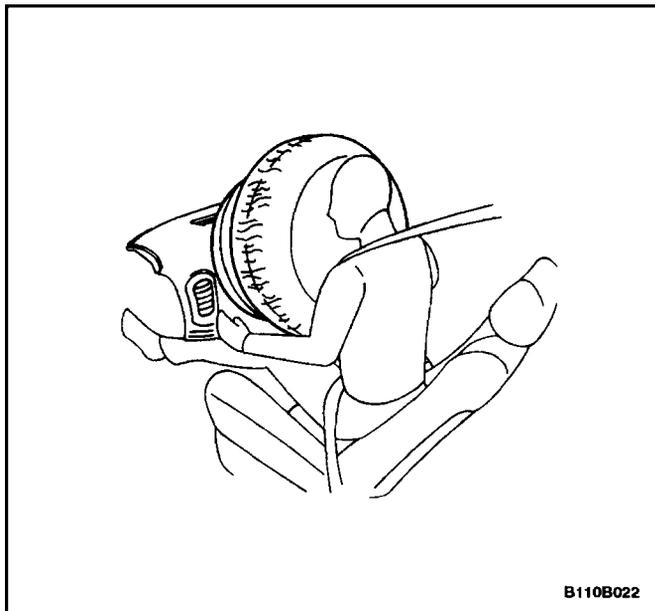
The airbag does not replace the function of the seat belt. The driver and the passengers must always fasten their seat belts and adjust them for a proper fit.

The SIR is designed to protect the driver and the front seat passenger in the event of a significant frontal impact to the vehicle. The airbags deploy if the force is applied from a direction within 30 degrees of the vehicle's centerline.

The SIR system consists of the following components:

- Driver airbag module.
- Passenger airbag module.
- Sensing and diagnostic module (SDM).
- Clock spring.
- Wire harness and connectors.
- AIRBAG indicator on the instrument cluster.

There are two separate deployment loops in the SIR system. The term "loop" is used because current leaves the SDM and returns to the SDM during deployment or testing. One loop is the circuit from the SDM to the driver airbag and back to the SDM. The other loop is the circuit from the SDM to the passenger airbag and back to the SDM.



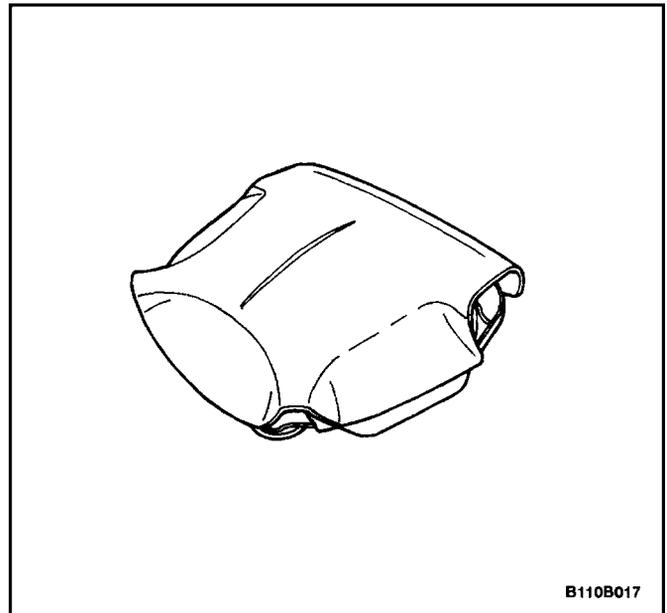
AIRBAG MODULES

Driver Airbag Module

CAUTION : *Tampering with the driver airbag module creates the risk of an injury from an unexpected deployment. Therefore, the driver airbag module should never be disassembled.*

The driver airbag module is under the center pad of the steering wheel.

The driver airbag module contains an ignition charge and a gas generator to inflate the folded airbag.



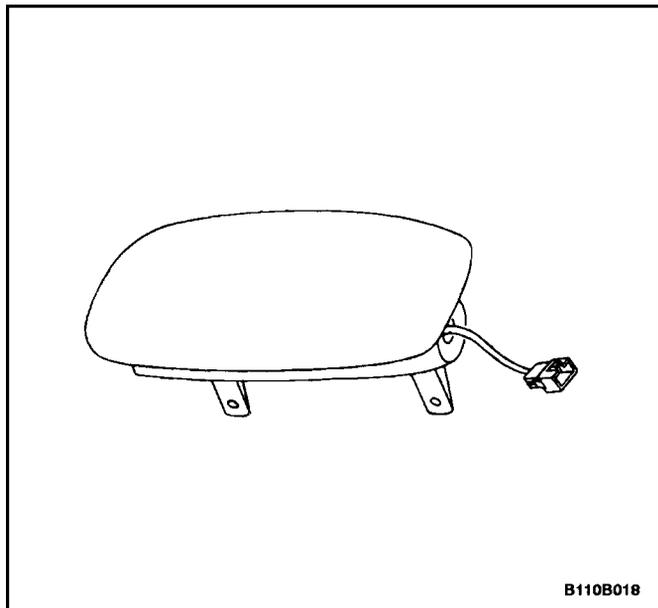
Passenger Airbag Module

CAUTION : *Tampering with the passenger airbag module creates the risk of an injury from an unexpected deployment. Therefore, the passenger airbag module should never be disassembled.*

The passenger airbag module is on the passenger side of the instrument panel.

The passenger airbag module contains an ignitor charge and a gas generator to inflate the folded airbag.

The passenger airbag also includes wiring and a connector. The airbag side of the yellow connector contains a shorting bar which short circuits the passenger high circuit to the passenger low circuit when the connector is disconnected. The shorting bar prevents current from traveling through the passenger airbag module during servicing. The shorting bar is disengaged when the connector is connected. If the wiring or connector on the passenger airbag is damaged, the passenger airbag must be replaced.



SENSING AND DIAGNOSTIC MODULE (SDM)

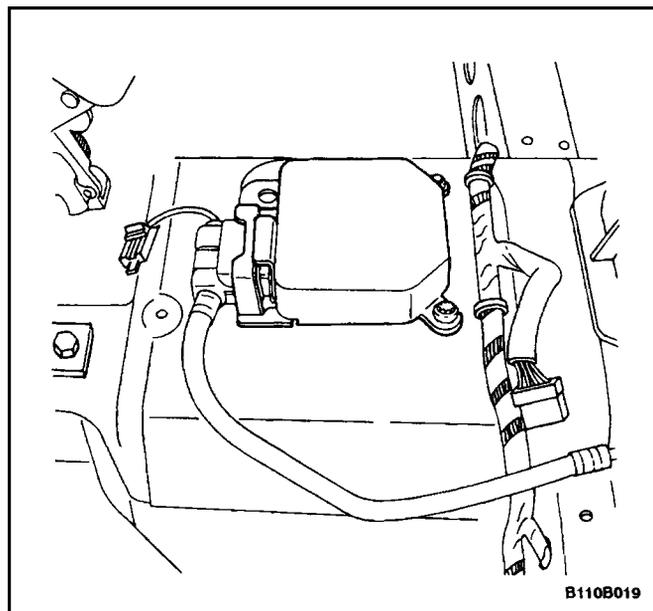
CAUTION : *During service procedures, be careful when handling the sensing and diagnostic module (SDM). Never shake or jar the SDM. Never apply power to the supplemental inflatable restraints (SIR) system when the SDM is not rigidly attached to the vehicle. All SDM mounting bolts must be fully tightened. The arrow on the SDM must point toward the front of the vehicle. Failure to follow these precautions could cause deployment and result in personal injury.*

The SDM is located on the floor beneath the floor console assembly. The SDM performs the following functions:

- Monitors the SIR system electrical components and sets a diagnostic trouble code (DTC) when a malfunction is detected.
- Records any faults that are discovered.
- Displays SIR DTCs and system status information when connected to a scan tool.
- Illuminates the AIRBAG indicator to alert the driver to any faults.
- Provides a reserve power source to deploy the airbags if an accident has disabled the normal power source.
- Monitors vehicle velocity changes to detect frontal impacts which are severe enough to warrant deployment.

- Causes current to flow through the airbag modules to cause deployment if the SDM detects a frontal impact of sufficient force.

The SDM contains no user-serviceable parts.



AIRBAG WARNING LAMP

The instrument cluster contains an AIRBAG warning indicator. To verify the operation of the AIRBAG indicator and the sensing and diagnostic module (SDM), the SDM performs a turn-on test when the ignition is turned ON. The SDM flashes the AIRBAG indicator seven times by supplying an intermittent ground to the indicator lamp circuit.

After flashing seven times, the AIRBAG indicator will turn off if the SDM detects no malfunctions.

The AIRBAG indicator stays on if the SDM has detected malfunctions in the internal or external circuits which could potentially affect the operation of the supplemental inflatable restraint (SIR) system. Some malfunctions could result in nondeployment when necessary or deployment under conditions which would not normally result in deployment.

When the SDM is not properly attached to its connector, the SDM connector supplies a ground to the AIRBAG indicator by connecting the wire from the warning lamp to the SDM ground wire, and the AIRBAG indicator turns on.

CLOCK SPRING

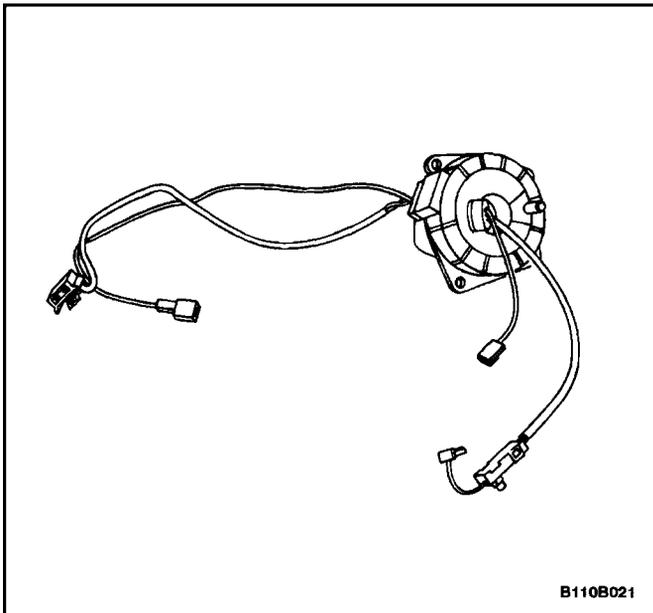
CAUTION : *Disassembling the clock spring can cause injury or cause the clock spring to malfunction.*

CAUTION : *Over-rotating the clock spring without the steering wheel in position could damage the clock spring and result in an inoperative driver airbag leading to possible injury in the case of a collision.*

There is a coil assembly in the steering which is referred to as a clock spring because of its internal resemblance to the type of spring used in a mechanical clock. The clock spring has no timekeeping function and should never be disassembled. The clock spring contains current-carrying coils. Two of the current-carrying coils maintain continuous contact within the driver deployment loop while the steering wheel is rotated. The clock spring also contains a coil that maintains continuous contact for the horn circuit.

Turning the steering wheel in one direction tightens the coil, and turning the steering wheel in the opposite direction loosens the coil. Do not turn rotate the clock spring when the steering wheel is not attached.

The clock spring also includes the wiring and the connectors for the horn circuit and the driver airbag circuit. A yellow two-way connector on the lower steering column is attached to the clock spring wiring. The airbag side of the yellow connector contains a shorting bar which connects the driver high circuit to the driver low circuit when the connector is disconnected. The shorting bar prevents current from traveling through the driver airbag module during servicing. The shorting bar is disengaged when the clock spring connector is connected.



WIRING HARNESS CONNECTORS

If the sensing and diagnostic module (SDM) electrical connector is not attached properly, a built-in shorting bar will connect the wire from the AIRBAG warning lamp with the SDM ground wire. This turns on the AIRBAG lamp.

To prevent deployment during servicing, additional shorting bars are located in the following locations:

- The clock spring electrical connector at the lower steering column.
- The passenger airbag electrical connector.
- The driver airbag module.

The shorting bars are only a backup safety device. Always disable the Supplemental Inflatable Restraints (SIR) system before beginning any service procedure.

