SECTION 6E

STEERING WHEEL AND COLUMN

CAUTION: Disconnect the negative battery cable before removing or installing any electrical unit or when a tool or equipment could easily come in contact with exposed electrical terminals. Disconnecting this cable will help prevent personal injury and damage to the vehicle. The ignition must also be in LOCK unless otherwise noted.

TABLE OF CONTENTS

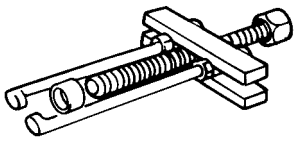
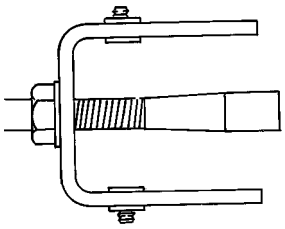
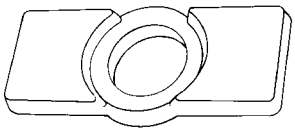
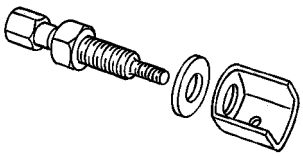
SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb•Ft	Lb•In
Ignition Switch Housing Shear Bolts	11	-	97
Ignition Switch Retaining Screw	2	-	18
Steering Column Jacket Assembly Front Bracket Bolts	22	16	-
Steering Column Jacket Assembly Rear Bracket Nuts	22	16	-
Steering Shaft Universal Joint Pinch Bolt	25	18	-
Steering Wheel Horn Cap Screws	4.5	-	40
Steering Wheel Nut	23	17	-
Steering Wheel Rotation Sensor Retaining Screw	2	-	18
Support Housing Screws	16	12	-
Turn Signal Switch Housing Screws	3	-	27
Upper and Lower Steering Column Cover Panel Screws	3	-	27

SPECIAL TOOLS

SPECIAL TOOLS TABLE

 A110B008	**KM-210-A Steering Wheel Puller**
 A105E053	**J-23653-A Lock Plate Compressor**
 A105E052	**J-36667 Lock Plate Adapter (tilt)**
 A105E063	**J-21854-01 Pivot Pin Remover**

DIAGNOSIS

STEERING COLUMN DIAGNOSIS

Lock System

Lock System Will Not Unlock

Checks	Action
Check the lock cylinder for damage.	Replace the lock cylinder.
Check the ignition switch for lack of free movement.	Lubricate the ignition switch.
Check the steering column housing for binding or damage.	Remove the steering shaft and clear the steering column housing. Replace the steering column housing as needed.

Lock System Will Not Lock

Checks	Action
Check the lock cylinder for damage.	Replace the lock cylinder.
Check the ignition switch for a lack of free movement.	Lubricate the ignition switch.
Check the steering column housing for binding or damage.	Remove the steering shaft and clear the steering column housing. Replace the steering column housing as needed.

High Lock Effort

Checks	Action
Check the lock cylinder for damage.	Replace the lock cylinder.
Check the ignition switch for lack of free movement.	Lubricate the ignition switch.
Check for extreme misalignment of the housing to the cover.	Realign the cover on the housing. Replace the cover as needed.
Check for a bent ignition switch mounting bracket.	Replace the ignition switch mounting bracket.

Key Cannot Be Removed in the LOCK Position

Checks	Action
Check to see that the ignition switch is set correctly.	Reset the ignition switch.
Check the lock cylinder for damage.	Replace the lock cylinder.

Column

Noise in the Column

Checks	Action
Check the steering gear to column joints for improper installation.	Tighten the steering shaft universal joint pinch bolts. Replace the steering shaft joints as needed.
Check the steering shaft bearing for wear or damage.	Replace the steering shaft bearing.
Check the spherical joint for lack of lubrication.	Lubricate the spherical joint.
Check the steering shaft for lack of lubrication.	Lubricate the steering shaft bearing.
Check the shaft lock snap ring for improper seating.	Adjust the shaft lock snap ring. Replace the shaft lock snap ring as needed.

High Steering Shaft Effort

Checks	Action
Check the steering shaft bearing for wear or damage.	Replace the steering shaft bearing.
Check for an improperly installed or deformed dust seal.	Replace the dust seal.
Check for a damaged upper or lower bearing.	Replace the upper or the lower bearing.
Check the steering shaft universal joints for a lack of free movement.	Lubricate the steering shaft universal joints. Replace the steering shaft universal joints as needed.

Lash in the Steering Column

Checks	Action
Check the steering column bracket mounting bolts for improper installation.	Tighten the steering column bracket mounting bolts.
Check for broken weld nuts on the steering column jacket.	Replace the steering column jacket.
Check for loose steering column housing to steering column jacket support screws.	Tighten the support screws.

Loose Steering Wheel

Checks	Action
Check for excessive clearance between the holes in the steering wheel support or the housing and the pivot pin diameters.	Replace the pivot pins with pivot pins of the correct size.
Check to see if the upper bearing is seated correctly in the housing.	Correctly seat the upper bearing. Replace the upper bearing as needed.
Check for loose steering column housing support screws.	Tighten the steering column housing support screws.

Noise When Tilting the Column

Checks	Action
Check for worn upper tilt bumpers.	Replace the upper tilt bumpers.
Check for tilt spring binding.	Adjust the tilt spring. Replace the tilt spring as needed.

Turn Signal/Dimmer Switch

Turn Signal Will Not Stay in the Turn Position

Checks	Action
Check the turn signal switch for an improper installation.	Remove and inspect the turn signal switch. Reinstall the switch.
Check the cancelling mechanism for broken or missing components.	Replace the cancelling mechanism.
Check the turn signal switch housing for foreign material.	Remove any foreign material.

Turn Signal Will Not Cancel

Checks	Action
Check the cancelling mechanism for broken or missing components.	Replace the cancelling mechanism.

Turn Signal/Dimmer Switch Difficult to Operate

Checks	Action
Check the turn signal/dimmer switch and turn signal/dimmer switch lever for improper installation.	Remove and inspect the turn signal/dimmer switch and signal/dimmer switch lever. Reinstall the signal/dimmer switch and signal/dimmer switch lever.
Check the signal/dimmer switch housing for foreign material.	Remove any foreign material.

Turn Signal Will Not Indicate Lane Change

Checks	Action
Check for a broken lane change pressure pad or a broken spring hanger.	Replace the lane change pressure pad or the spring hanger.
Check for improper functioning of the lane change spring.	Replace the lane change spring.
Check the turn signal switch for improper installation.	Replace the turn signal switch.

No Turn Signal Lights

Checks	Action
Check for an inoperative turn signal flasher.	Replace the turn signal flasher.
Check for a faulty turn signal switch.	Replace the turn signal switch.
Check the chassis to column connector for an improper connection.	Reconnect the chassis to column connector.

Turn Indicator Lights On, but Not Flashing

Checks	Action
Check for an inoperative turn signal flasher.	Replace the turn signal flasher.
Check for a faulty turn signal switch.	Replace the turn signal switch.
Check the chassis to column connector for an improper connection.	Reconnect the chassis to column connector.

Front or Rear Turn Signal Lights Not Flashing

Checks	Action
Check for a faulty turn signal switch.	Replace the turn signal switch.
Check the chassis to column connector for an improper connection.	Reconnect the chassis to column connector.

Turn Signal Lights Flash Very Slowly

Checks	Action
Check the chassis to column connector for an improper connection.	Reconnect the chassis to column connector.

Ignition Switch

Electrical System Will Not Function

Checks	Action
Check the ignition switch for damage.	Replace the ignition switch.
Check the ignition switch for improper installation.	Remove and inspect the ignition switch. Reinstall the ignition switch.
Check the ignition switch electrical connector for improper installation.	Reconnect the ignition switch electrical connector. Replace the ignition switch electrical connector.

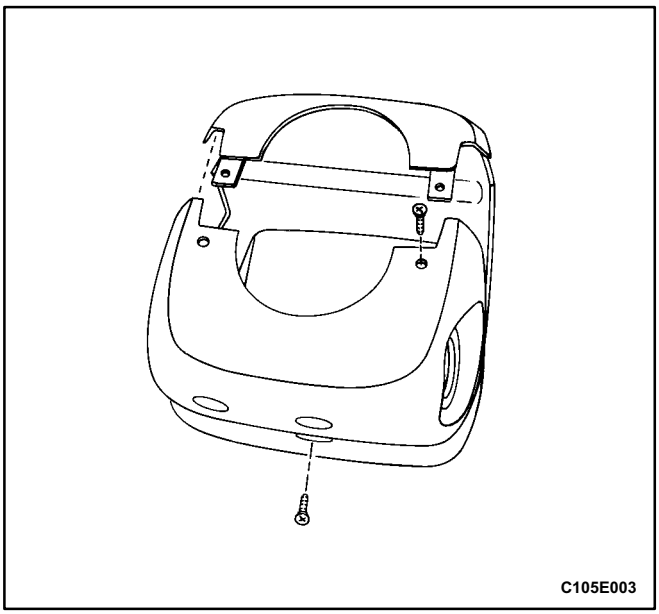
Ignition Switch Will Not Turn

Checks	Action
Check the ignition switch for damage.	Replace the ignition switch.
Check the ignition switch for improper installation.	Remove and inspect the ignition switch. Reinstall the ignition switch.

Wiper/Cruise Control/Switch and Lever

Switch Inoperative: No LOW, HIGH, INTERMITTENT or WASH

Checks	Action
Check the wiper switch for damage.	Replace the wiper/cruise control switch.
Check the wiper switch for improper installation.	Remove and inspect the wiper/cruise control switch. Reinstall the wiper/cruise control switch.
Check the cruise control switch for damage.	Replace the wiper/cruise control switch.


C105E003

MAINTENANCE AND REPAIR

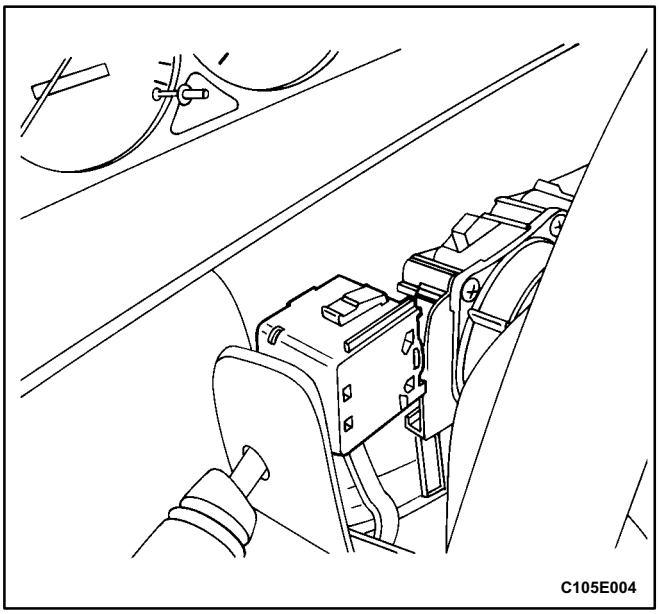
ON-VEHICLE SERVICE

HEADLAMP/TURN SIGNAL SWITCH AND LEVER

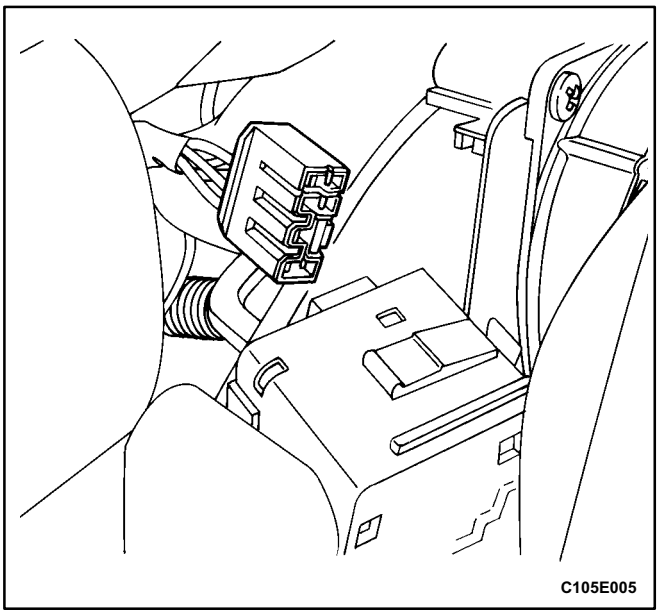
(Left-Hand Drive Shown, Right-Hand Dirve Similar)

Removal Procedure

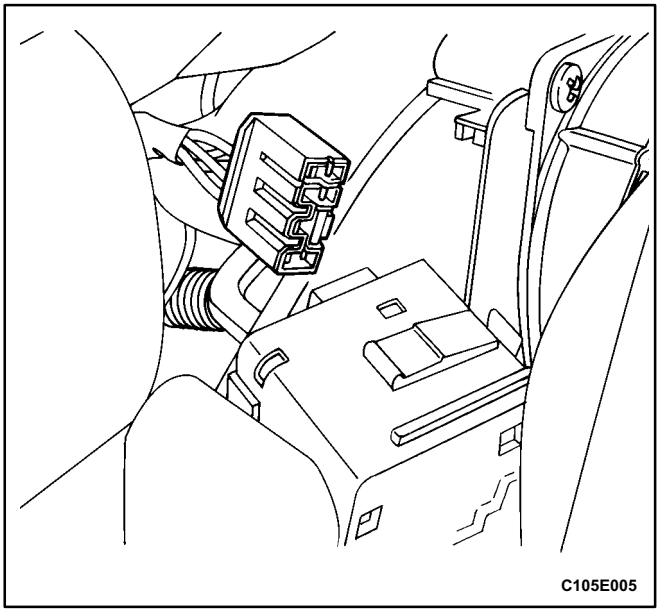
1. Disconnect the negative battery cable.
2. Remove the upper and the lower steering column cover panel screws.
3. Remove the upper and the lower steering column cover panels.


C105E004

4. Remove the turn signal switch by pushing in on the tabs on the top and the bottom of the switch housing.

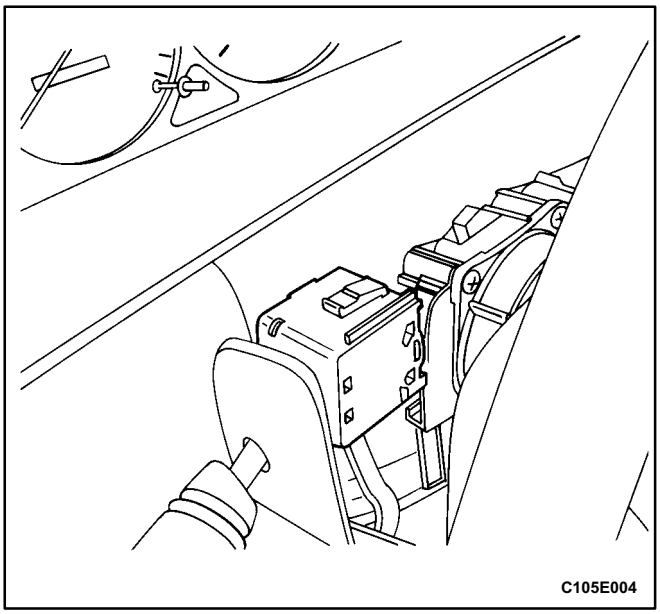

C105E005

5. Disconnect the electrical connections from the turn signal switch.

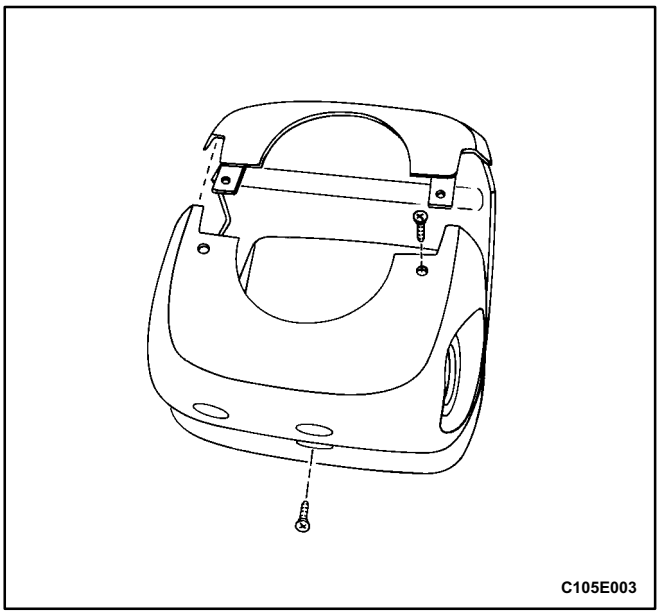

C105E005

Installation Procedure

1. Connect the electrical connections to the turn signal switch.


C105E004

2. Install the turn signal switch by snapping it into the switch housing.

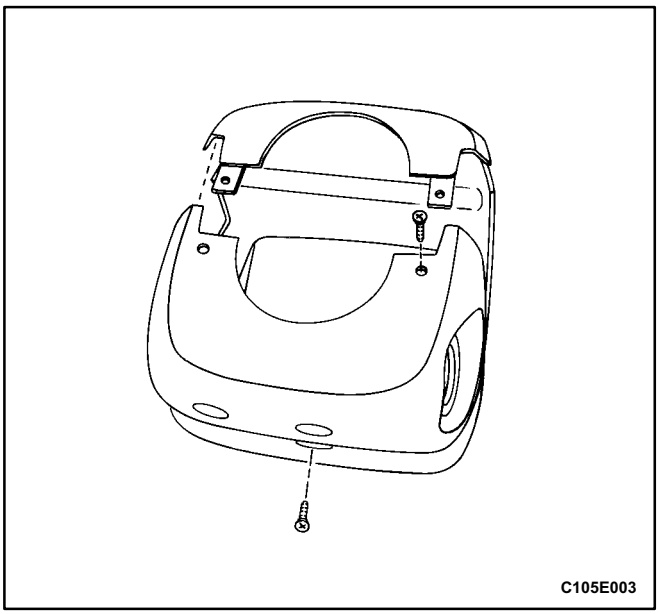

C105E003

3. Install the upper and the lower steering column cover panels. Install the upper and the lower steering column cover panel screws.

Tighten

Tighten the upper and the lower steering column cover panel screws to 3 N•m (27 lb•in).

4. Connect the negative battery cable.

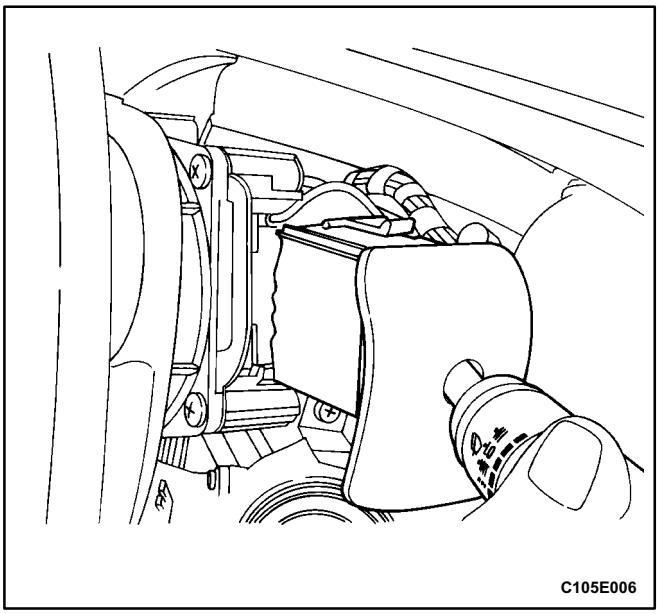

C105E003

WIPER/CRUISE CONTROL/SWITCH AND LEVER

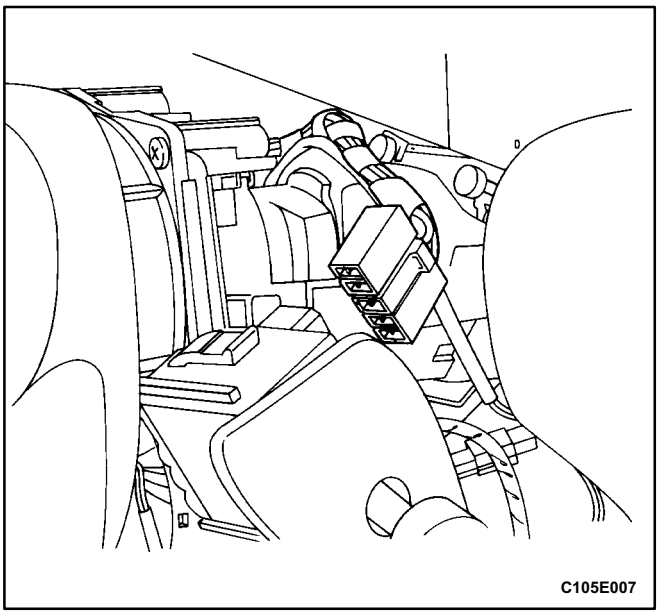
(Left-Hand Drive Shown, Right-Hand Drive Similar)

Removal Procedure

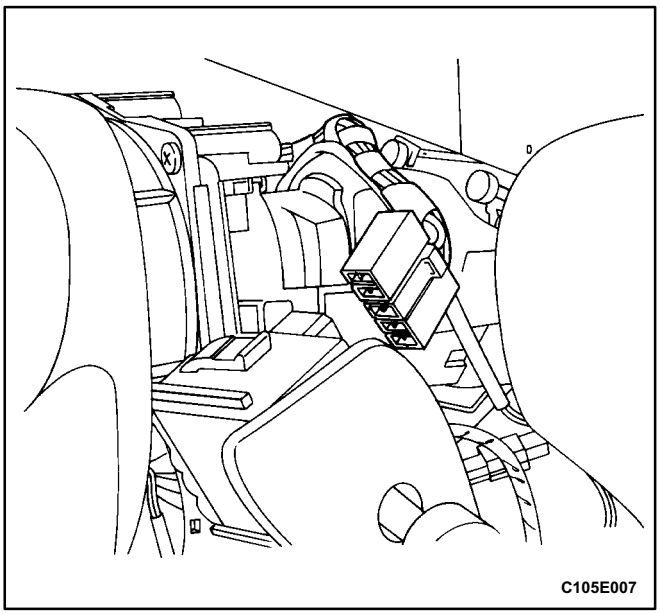
1. Disconnect the negative battery cable.
2. Remove the upper and the lower steering column cover panel screws.
3. Remove the upper and the lower steering column cover panels.


C105E006

4. Remove the wiper switch by pushing in on the tabs on the top and the bottom of the switch housing.

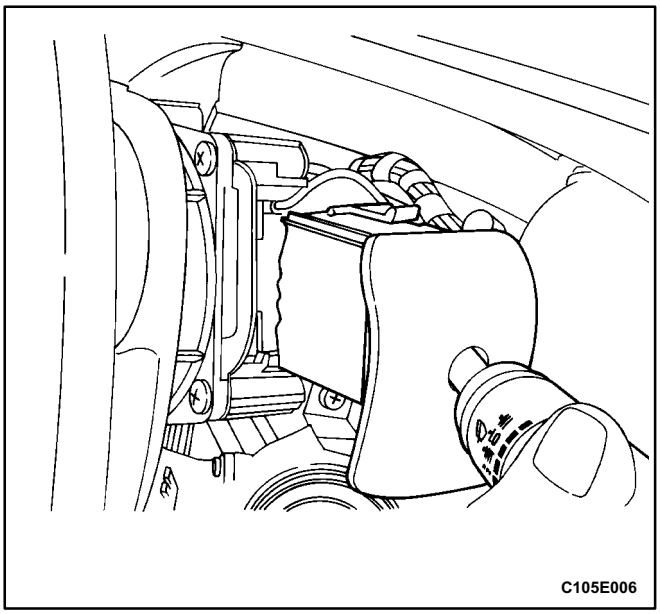

C105E007

5. Disconnect the electrical connector from the wiper switch. Disconnect the cruise control connector, if so equipped.

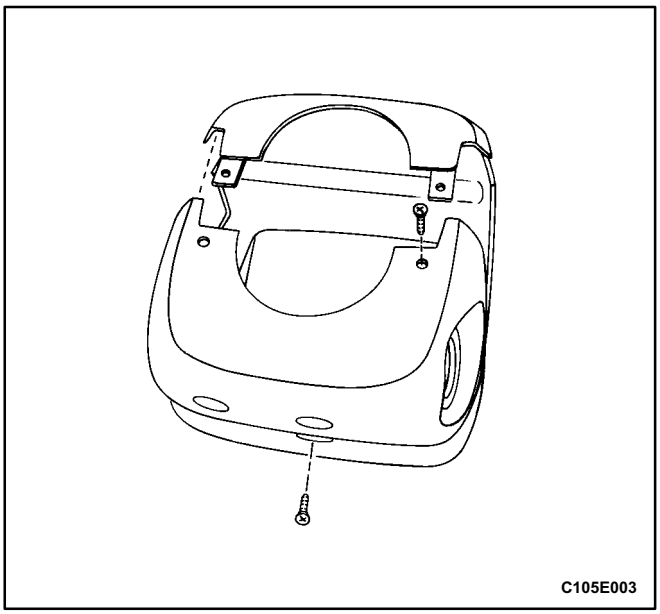

C105E007

Installation Procedure

1. Connect the electrical connector to the wiper switch. Connect the cruise control connector, if so equipped.


C105E006

2. Install the wiper switch by snapping it into the switch housing.

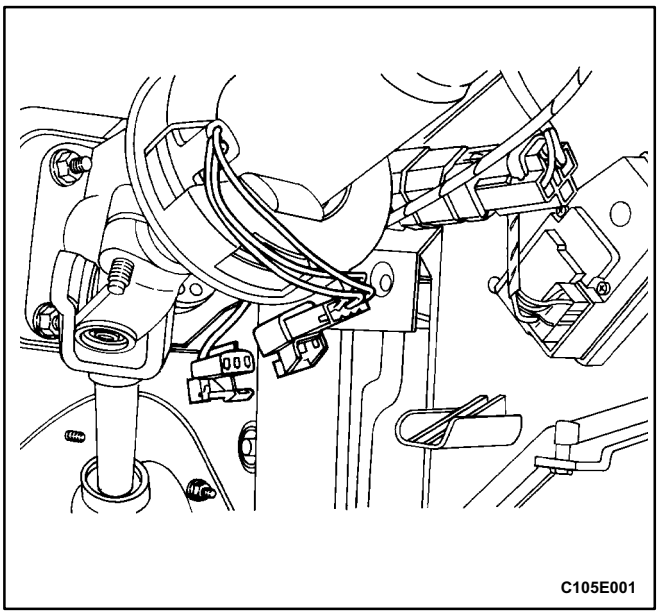

C105E003

3. Install the upper and the lower steering column cover panels. Install the upper and the lower steering column cover panel screws.

Tighten

Tighten the upper and the lower steering column cover panel screws to 3 N•m (27 lb•in).

4. Connect the negative battery cable.

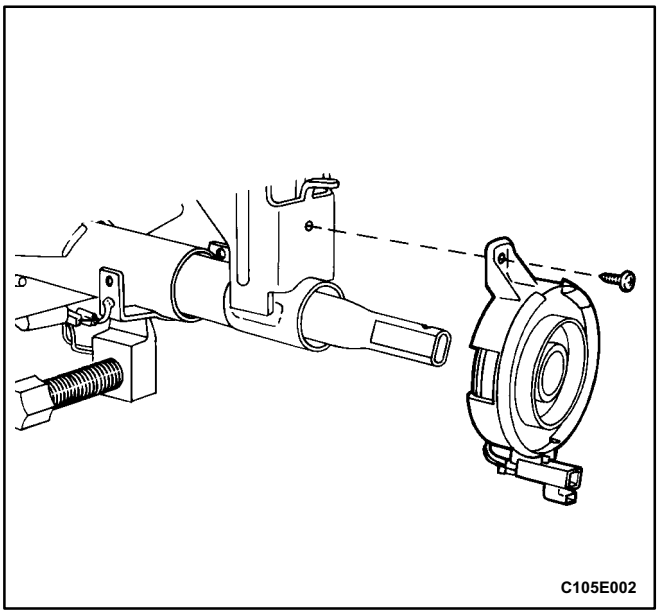

C105E001

STEERING WHEEL ROTATION SENSOR

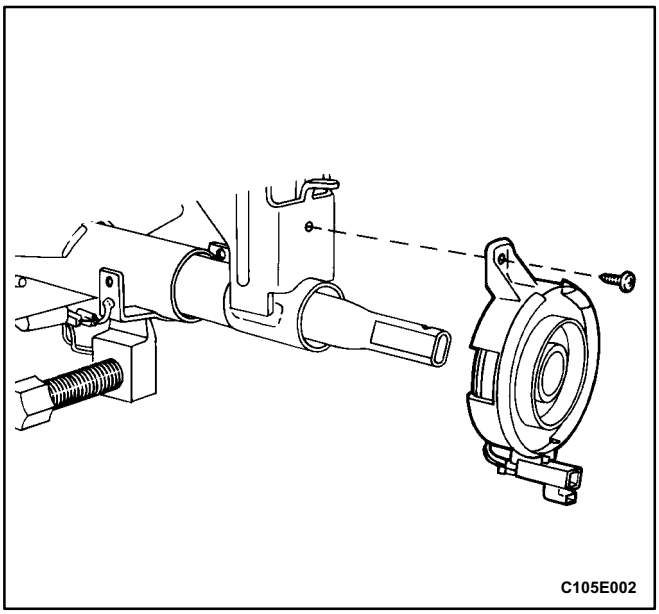
(Left-Hand Drive Shown, Right-Hand Drive Similar)

Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the upper and the lower instrument trim panels. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Disconnect the steering wheel rotation sensor electrical connector.


C105E002

4. Remove the intermediate shaft from the steering column to allow removal of the steering wheel rotation sensor. Refer to „Steering Column" in this section.
5. Remove the retaining screw from the steering wheel rotation sensor.
6. Remove the steering wheel rotation sensor.

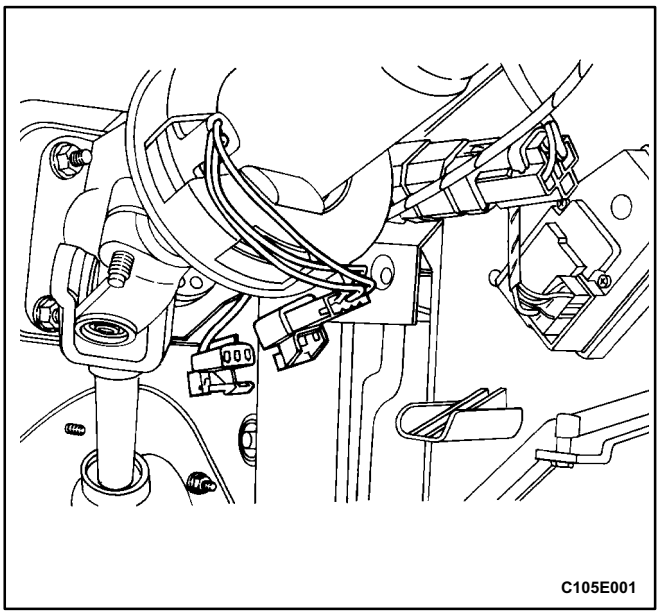

C105E002

Installation Procedure

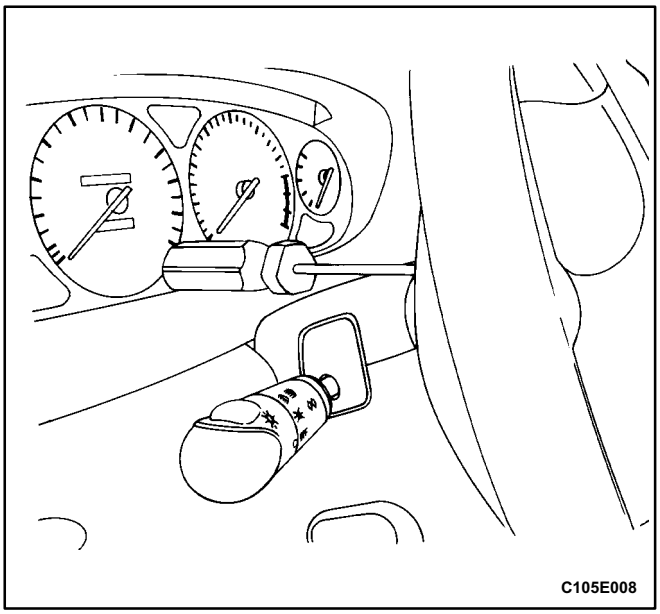
1. Install the steering wheel rotation sensor with the retaining screw.

Tighten

Tighten the steering wheel rotation sensor retaining screw to 2 N•m (18 lb•in).


C105E001

2. Install the intermediate shaft onto the steering column. Refer to „Steering Column" in this section.
3. Connect the steering wheel rotation sensor electrical connector.
4. Install the upper and the lower instrument trim panels. Refer to *Section 9E, Instrumentation/Driver Information*.
5. Connect the negative battery cable.


C105E008

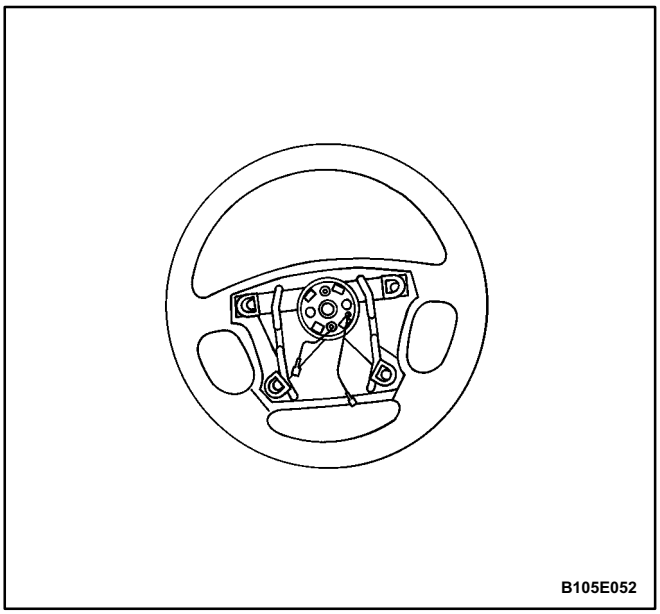
STEERING WHEEL WITHOUT SIR

Tools Required

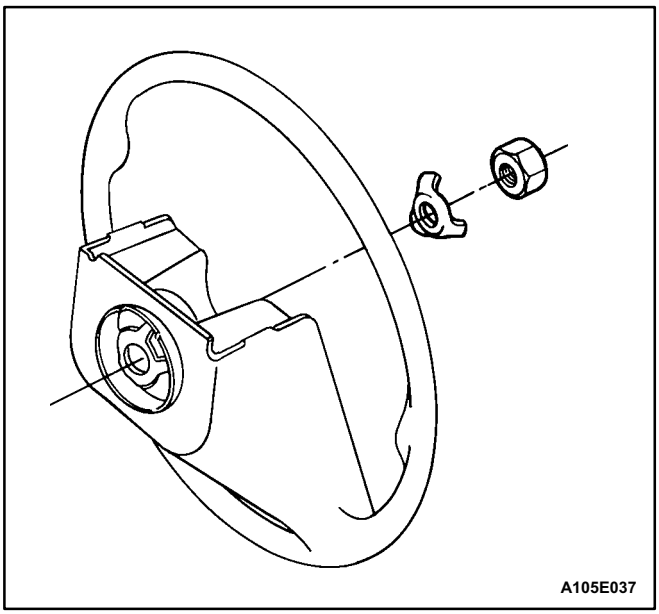
KM-210-A Steering Wheel Puller

Removal Procedure

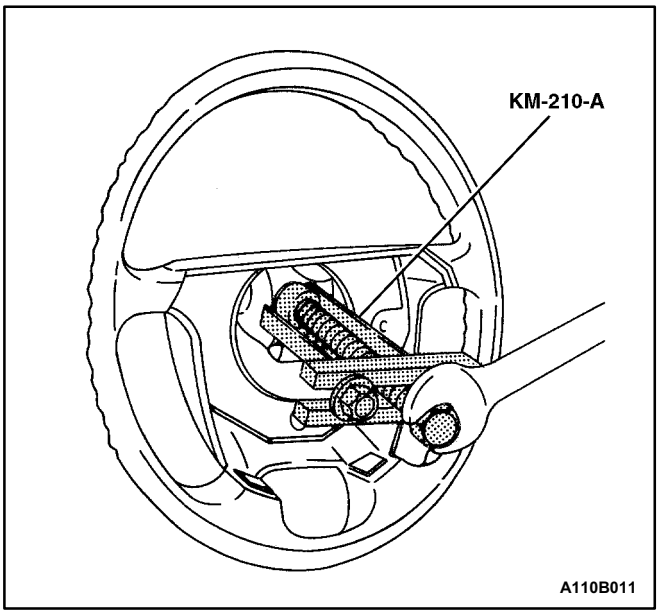
1. Disconnect the negative battery cable.
2. Rotate the steering wheel to allow access to the steering wheel horn cap screw. Remove the horn cap screw.
3. Rotate the steering wheel to allow access to the other steering wheel horn cap screw. Remove the horn cap screw.


B105E052

4. Remove the steering wheel horn cap and disconnect the horn leads.

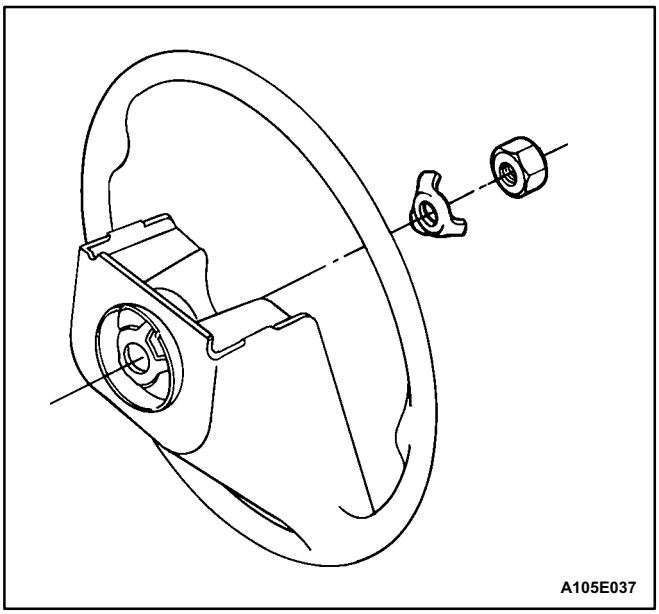


5. Remove the steering wheel nut and the retaining clip.



Important: In order to install the steering wheel correctly, match mark the steering column shaft to the steering wheel.

6. Remove the steering wheel using the steering wheel puller KM-210-A.
7. Unclip the contact ring from the steering wheel, if necessary.

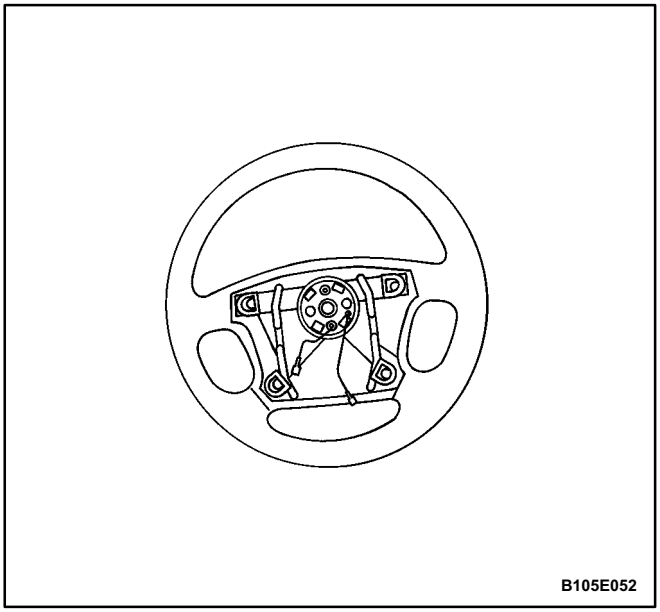


Installation Procedure

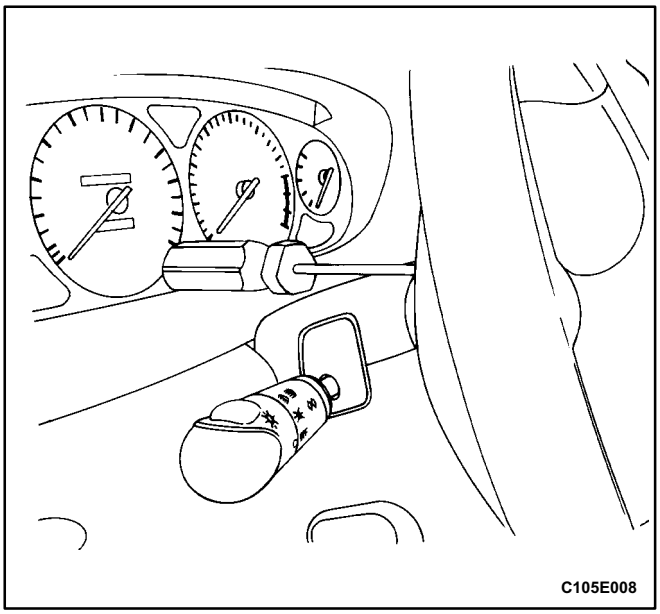
1. Clip the contact ring on the steering wheel, if necessary.
2. Align the match marks on the steering wheel and the steering column shaft.
3. Install the retaining clip and a new steering wheel nut.

Tighten

Tighten the steering wheel nut to 23 N•m (17 lb•ft).


B105E052

4. Bend the tabs to secure the retaining clip.
5. Connect the horn leads and install the steering wheel horn cap.

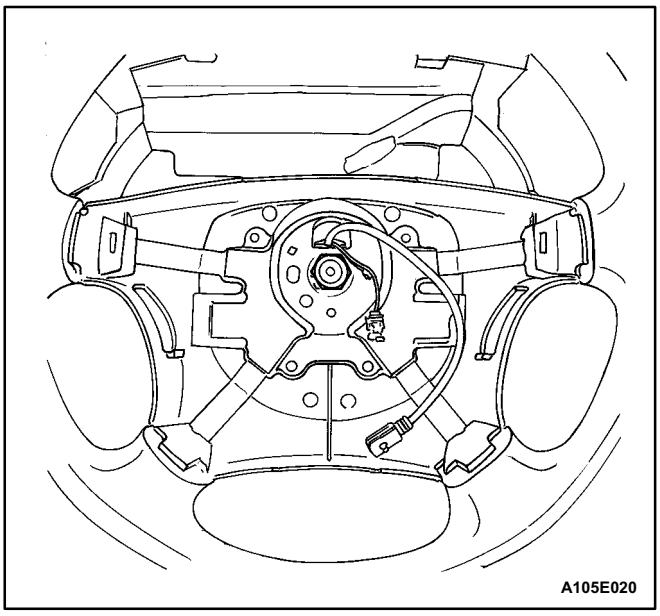

C105E008

6. Rotate the steering wheel to allow access to the steering wheel horn cap screw. Install the horn cap screw.
7. Rotate the steering wheel to allow access to the other steering wheel horn cap screw. Install the horn cap screw.

Tighten

Tighten both steering wheel horn cap screws to 4.5 N•m (40 lb•in).

8. Connect the negative battery cable.


A105E020

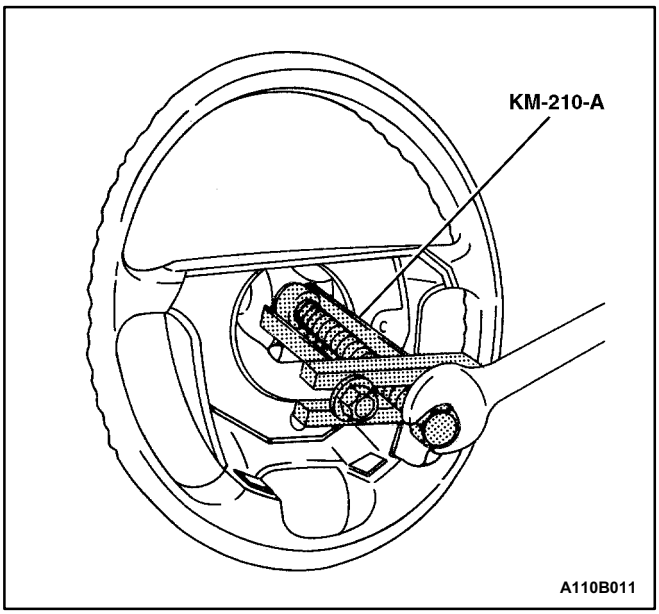
STEERING WHEEL WITH SIR

Tools Required

KM-210-A Steering Wheel Puller

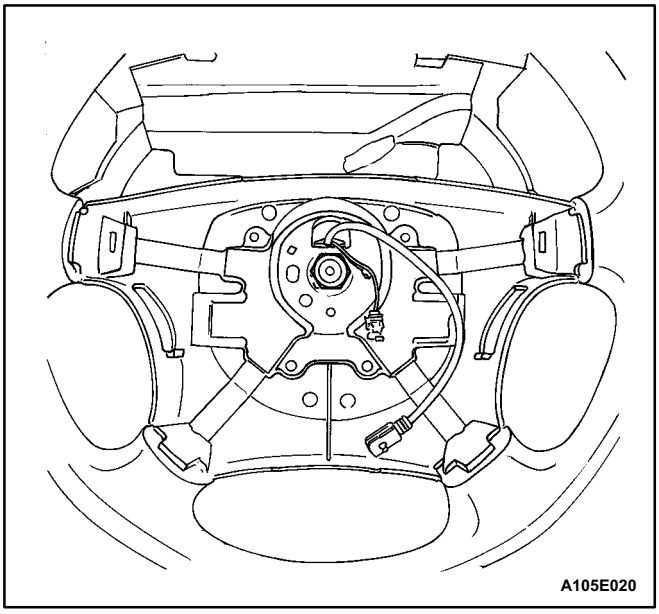
Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the SIR module. Refer to *Section 8B, Supplemental Inflatable Restraints*.
3. Remove the steering wheel nut and the retaining clip.



Important: In order to install the steering wheel correctly, match mark the steering column shaft to the steering wheel.

4. Remove the steering wheel using the steering wheel puller KM-210-A.
5. Unclip the contact ring from the steering wheel, if necessary.



Installation Procedure

1. Clip the contact ring on the steering wheel, if necessary.

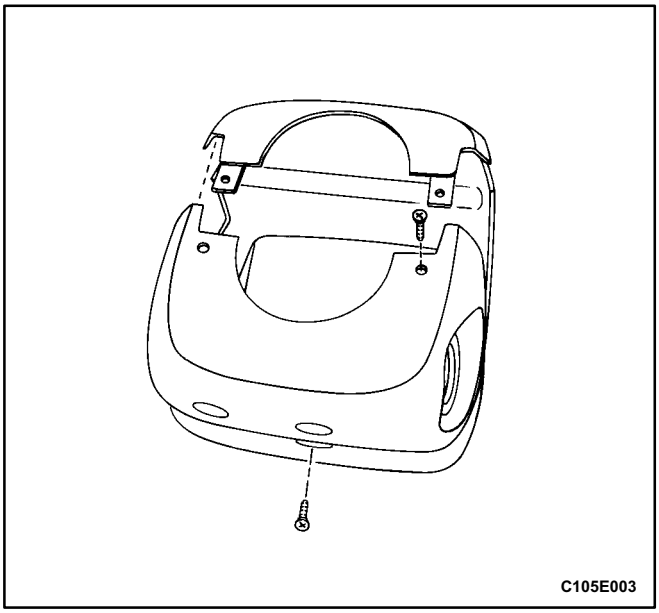
Important: In order to correctly install the steering wheel, matchmark the steering column shaft to the steering wheel.

2. Align the match marks on the steering wheel and the steering column shaft. Turn the signal canceling cam on the wheel to the left.
3. Install the retaining clip and the steering wheel nut.

Tighten

Tighten the steering wheel nut to 23 N•m (17 lb•ft).

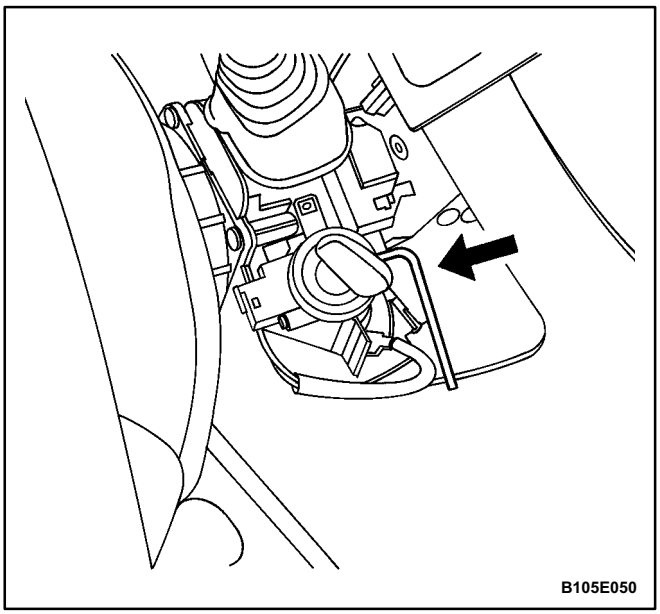
4. Bend the tabs to secure the retaining clip.
5. Install the SIR Module. Refer to *Section 8B, Supplemental Inflatable Restraints*.
6. Connect the negative battery cable.



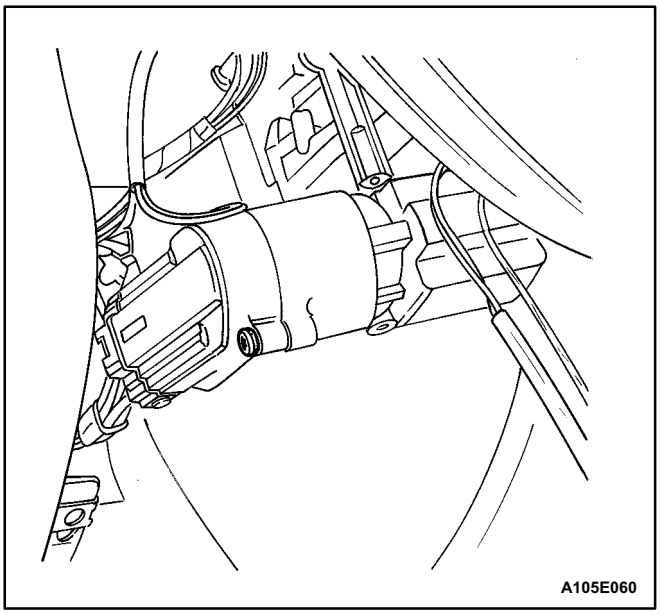
IGNITION LOCK CYLINDER AND SWITCH

Removal Procedure

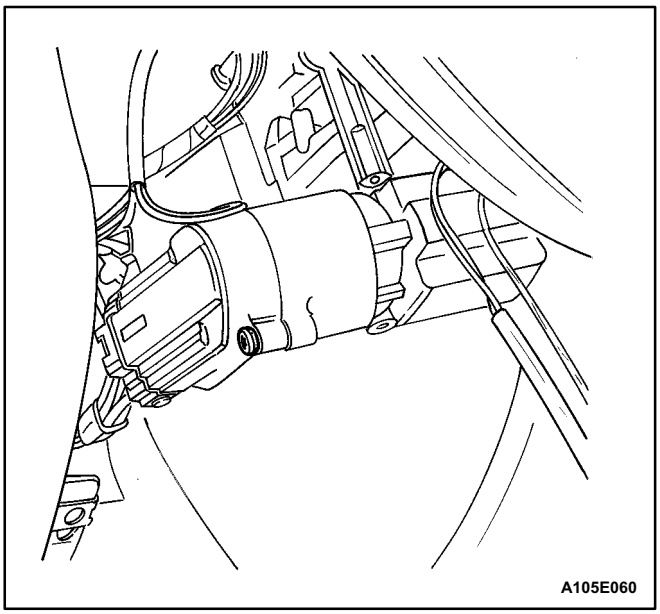
1. Disconnect the negative battery cable.
2. Remove the upper and the lower steering column cover panel by removing the screws.
3. Disconnect the electrical connector for the immobilizer detection coil.



4. With the key in the ignition turned to the position designated ACC, remove the lock cylinder by pressing down the detent spring and pulling the lock cylinder out of the switch cylinder housing.



5. Remove the ignition switch retaining screw.
6. Disconnect the wiring and remove the ignition switch.

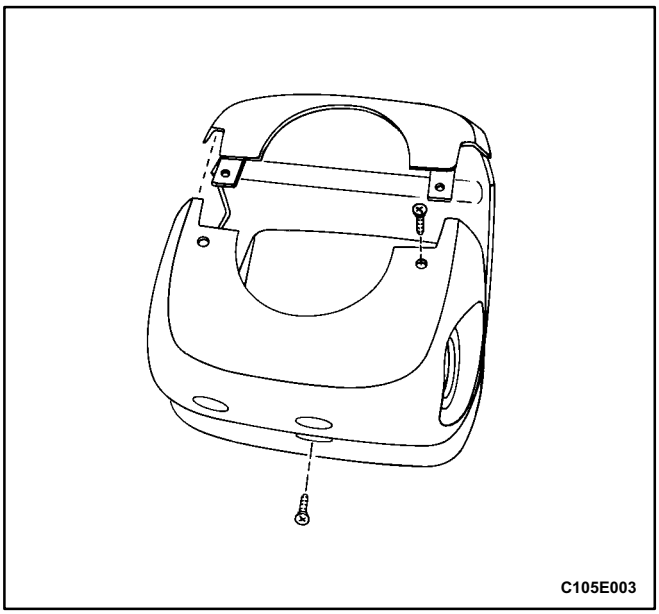


Installation Procedure

1. Install the ignition switch with the ignition switch retaining screw.

   ### Tighten

   Tighten the ignition switch retaining screw to 2 N•m (18 lb•in).
2. Connect the wiring to the ignition switch.



3. Install the lock cylinder.
4. Connect the electrical connector for the immobilizer detection unit.
5. Install the upper and the lower steering column cover panel with the screws.

Tighten

Tighten the upper and the lower steering column cover panel screws to 3 N•m (27 lb•in).

6. Connect the negative battery cable.

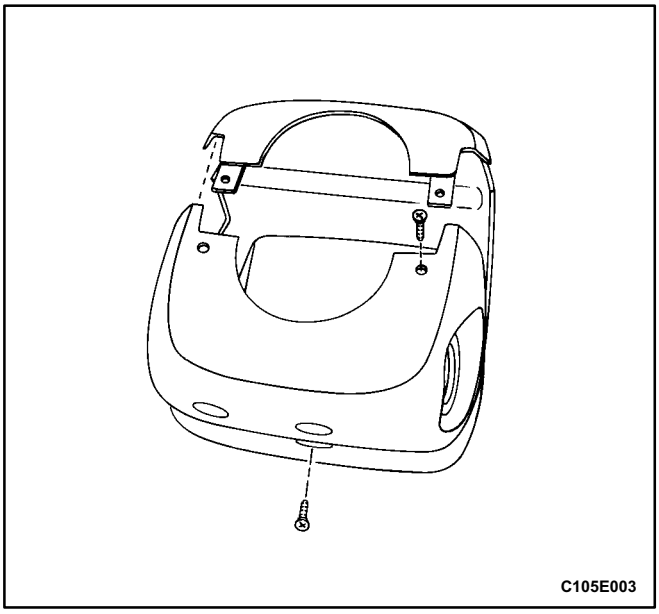
STEERING COLUMN

(Left-Hand Drive Shown, Right-Hand Drive Similar)

Important: Remove the steering column only if the following conditions exist:

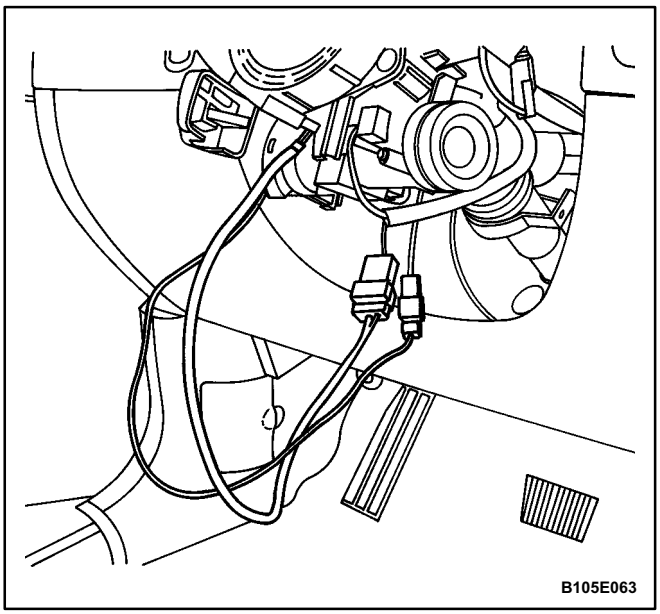
- The steering column requires replacement.
- The steering and the ignition lock housing require replacement.
- Another operation requires the removal of the steering column.

Notice: The steering column is extremely susceptible to damage after it has been removed from the vehicle. Dropping the column assembly on its end or hammering the end of the steering shaft can collapse the steering shaft or loosen the plastic injections which maintain column rigidity. Leaning on the column can cause it to bend or deform. Any of the above damage can impair the column's collapsible design. If it is necessary to remove the steering wheel, use only the specified steering wheel puller.

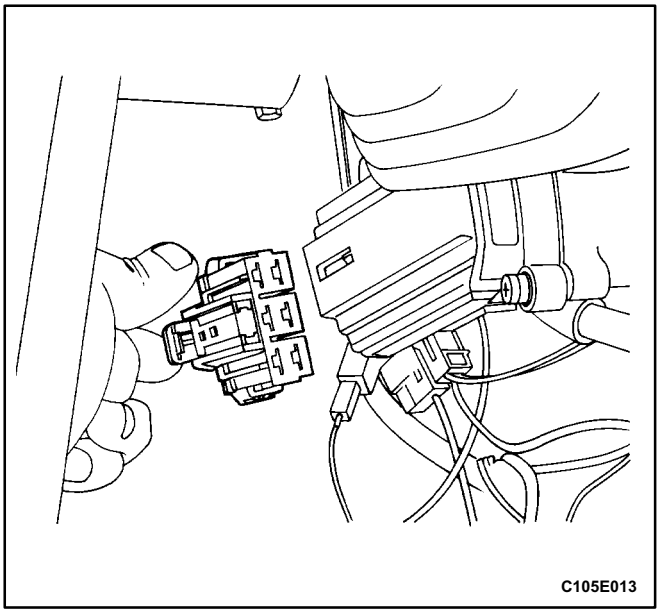


Removal Procedure

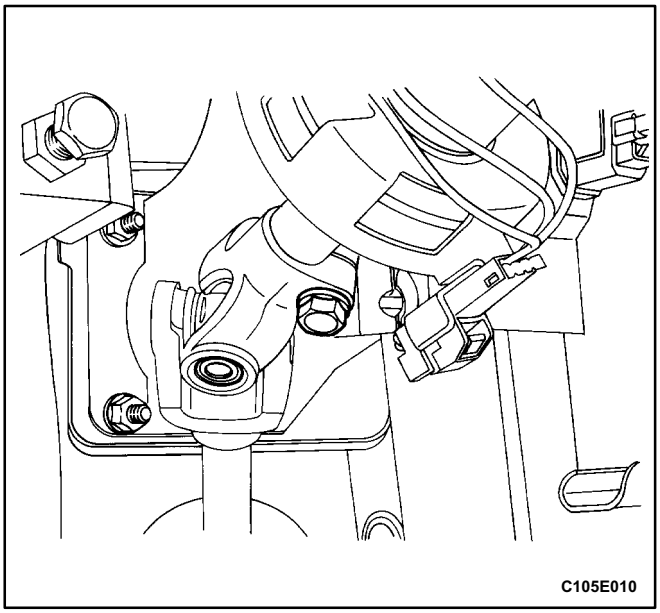
1. Disconnect the negative battery cable and let the vehicle sit for 1 minute to deactivate the airbag.
2. Remove the the lower instrument trim panels. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Remove the switch levers. Refer to „Turn Signal Switch and Lever" and „Wiper Switch and Lever" in this section.
4. Remove the upper and the lower steering column cover panel by removing the screws.
5. Remove the immobilizer module. Refer to *Section 9T, Remote Keyless Entry and Antitheft System.*



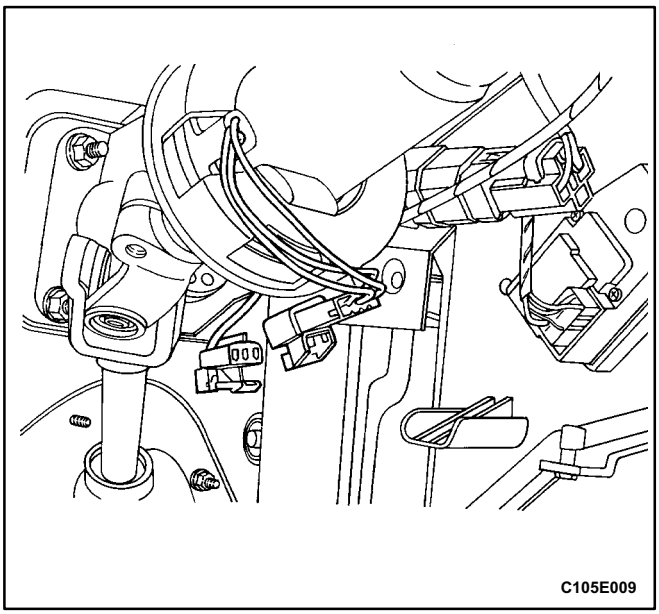
6. Disconnect the airbag electrical connections.



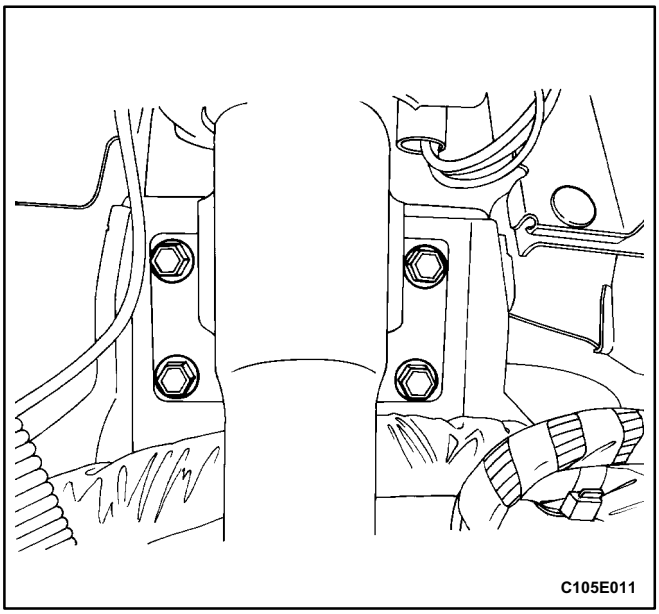
7. Disconnect the ignition switch electrical connection.



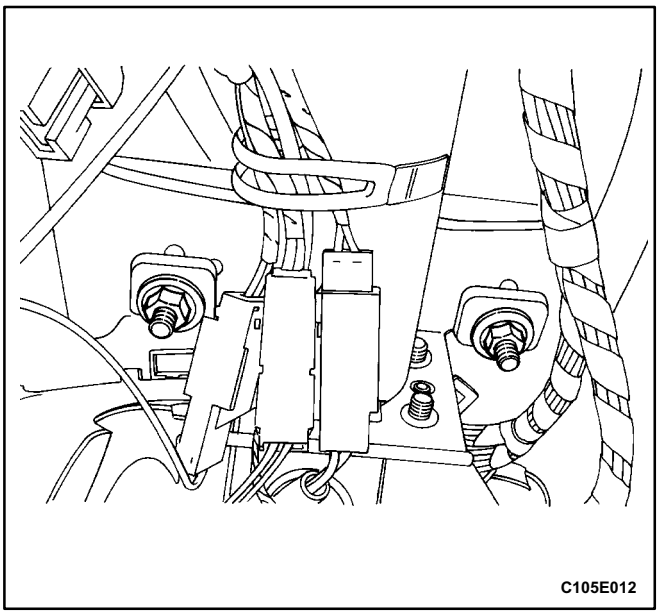
8. Adjust the steering to the straightāhead position.
9. Remove the pinch bolt from the intermediate shaft universal joint.


C105E009

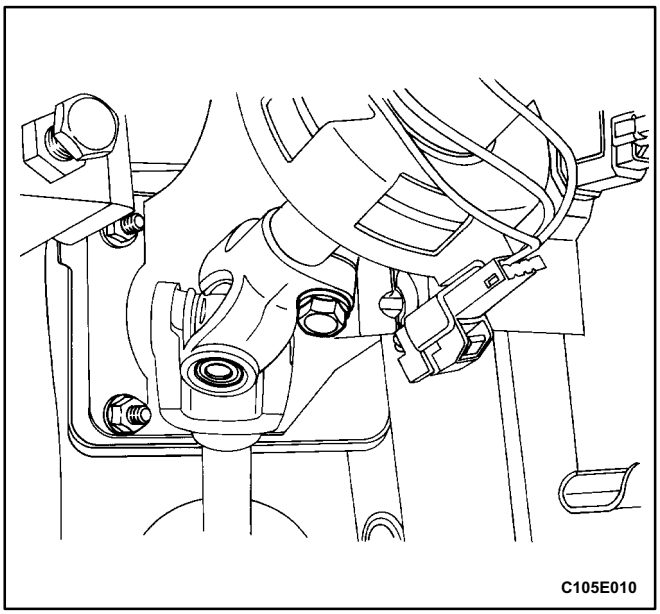
10. Disconnect the speed sensitive steering electrical connector.


C105E011

11. Remove the bolts holding the front bracket of the steering column jacket assembly.


C105E012

12. Remove the nuts holding the rear bracket of the steering column jacket assembly.
13. Guide the steering column assembly out of steering shaft flange and carefully lay down the assembly.


C105E010

Installation Procedure

Important: For proper installation of the steering column, be sure the steering wheel spokes are centered diagonally and pointed downward and the front wheels are positioned in the straight ahead position.

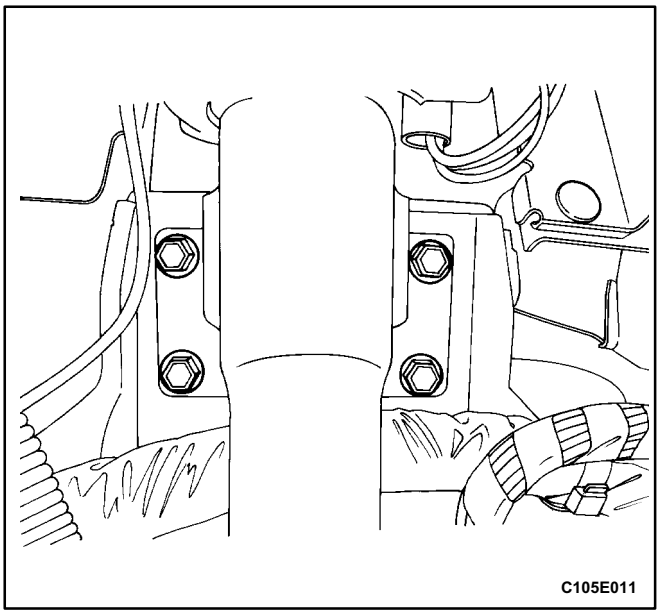
1. Carefully guide the steering shaft into the intermediate shaft universal joint.

Important: Provide support for the steering column assembly until the mounting nuts are fastened. Do not let the steering column assembly hang unsupported.

2. Install the pinch bolt into the non threaded hole of the flange.

Tighten

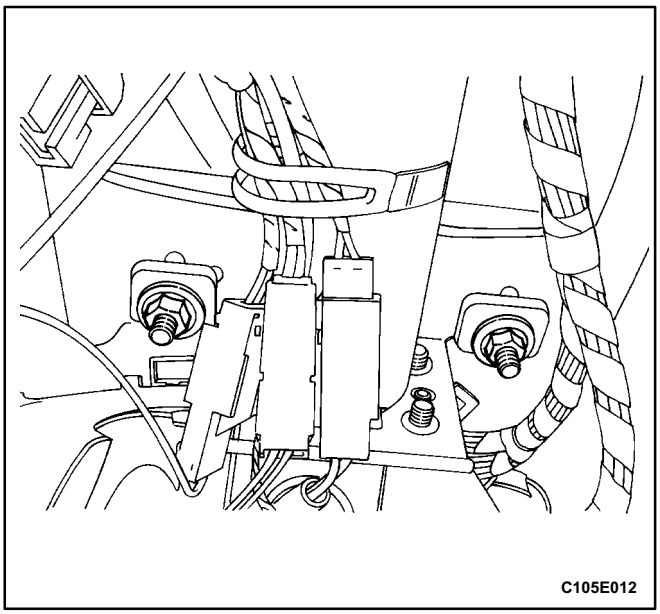
Tighten the steering shaft universal joint pinch bolt to 25 N•m (18 lb•ft).


C105E011

3. Install the bolts for the front bracket of the steering column jacket assembly.

Tighten

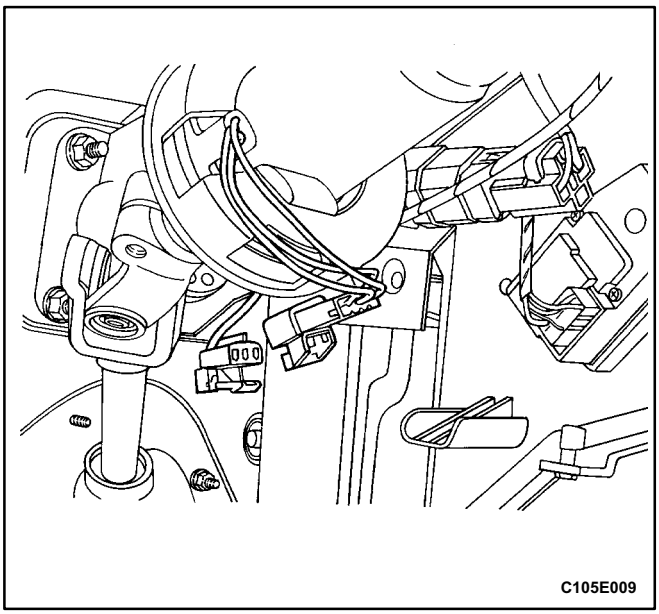
Tighten the steering column jacket assembly front bracket bolts to 22 N•m (16 lb•ft).


C105E012

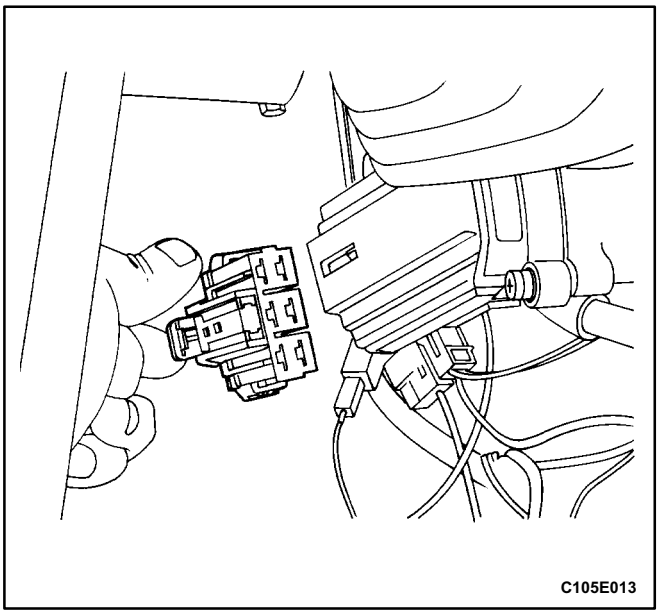
4. Install the nuts for the rear bracket of the steering column jacket assembly.

Tighten

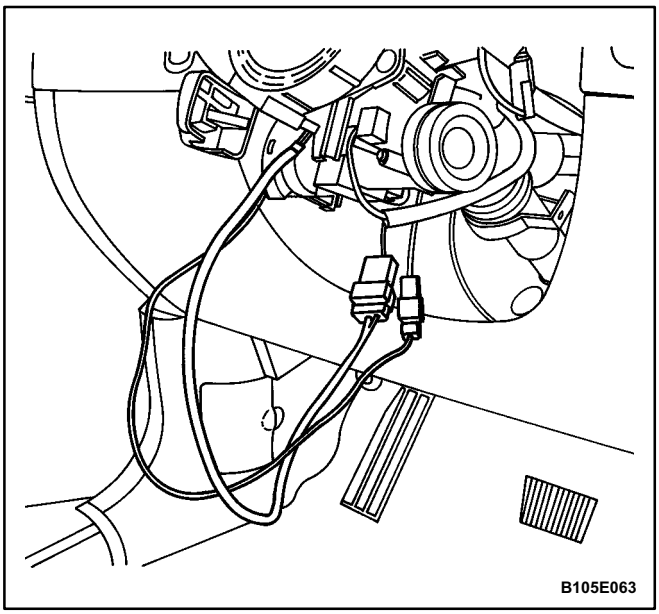
Tighten the steering column jacket assembly rear bracket nuts to 22 N•m (16 lb•ft).


C105E009

5. Connect the speed sensitive steering electrical connector.


C105E013

6. Connect the ignition switch electrical connection.

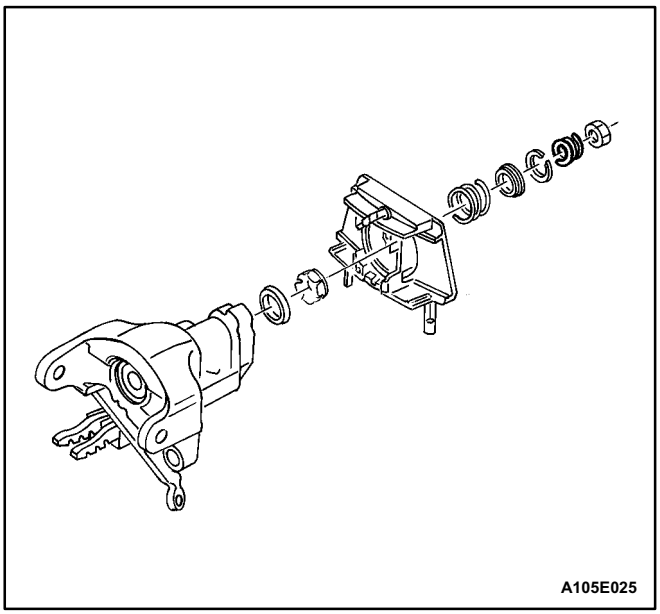

B105E063

7. Connect the airbag electrical connections.
8. Install the switch levers. Refer to „Turn Signal Switch and Lever" and „Wiper Switch and Lever" in this section.
9. Install the immobilizer module. Refer to *Section 9T, Remote Keyless Entry and Anti-theft System.*
10. Install the lower instrument trim panels. Refer to *Section 9E, Instrumentation/Driver Information*.
11. Install the upper and the lower steering column cover panel with the screws.

Tighten

Tighten the upper and the lower steering column panel screws to 3 N•m (27 lb•in).

12. Inspect the steering wheel in a straightâhead position. Refer to Section *6C, Power Steering Gear.*
13. Connect the negative battery cable.


A105E025

UNIT REPAIR

TILT STEERING COLUMN

Tools Required

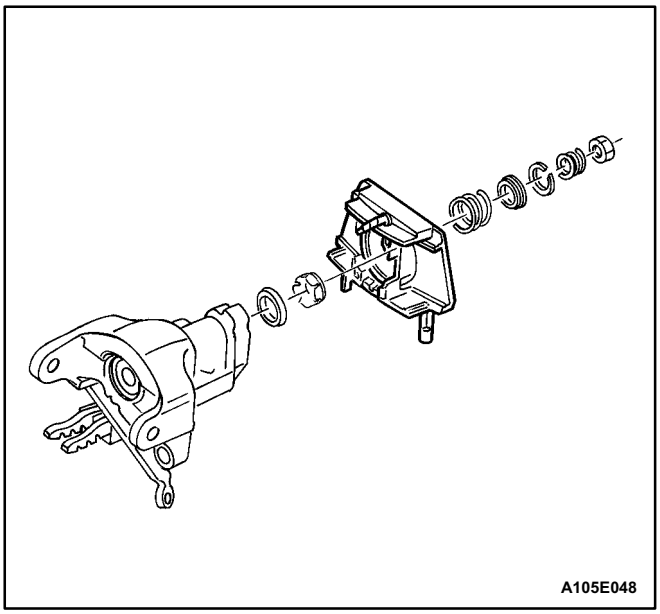
J-36667 Lock Plate Adapter (Tilt)

J-23653-A Lock Plate Compressor

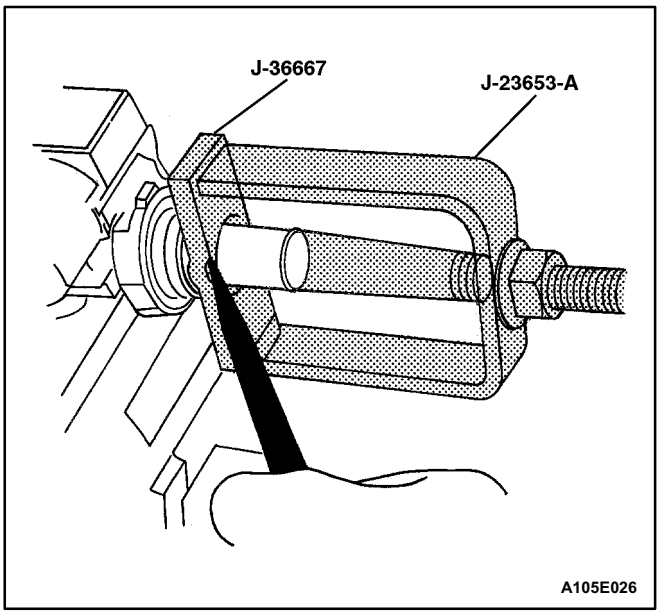
J-21854-01 Pivot Pin Remover

Disassembly Procedure

1. Remove the steering column from the vehicle. Refer to „Steering Column" in this section.
2. Remove the steering wheel from the steering column. Refer to „Steering Wheel without SIR" or „Steering Wheel with SIR" in this section.
3. Pull the canceling cam spring from the upper end of the shaft assembly, if it has not been previously removed.

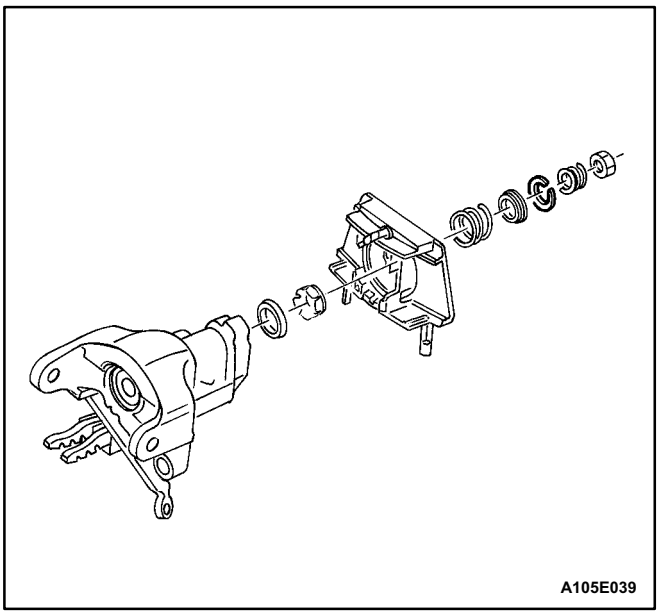

A105E048

4. Remove the turn signal switch housing screws. Remove the turn signal switch housing from the steering column housing.

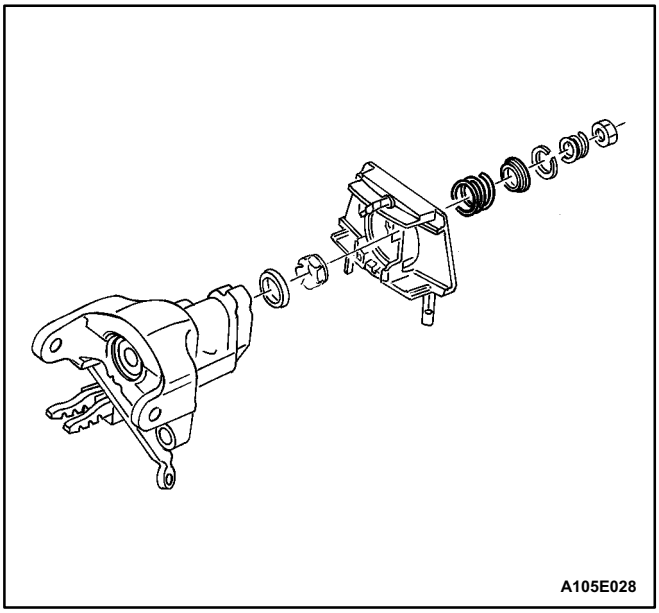


A105E026

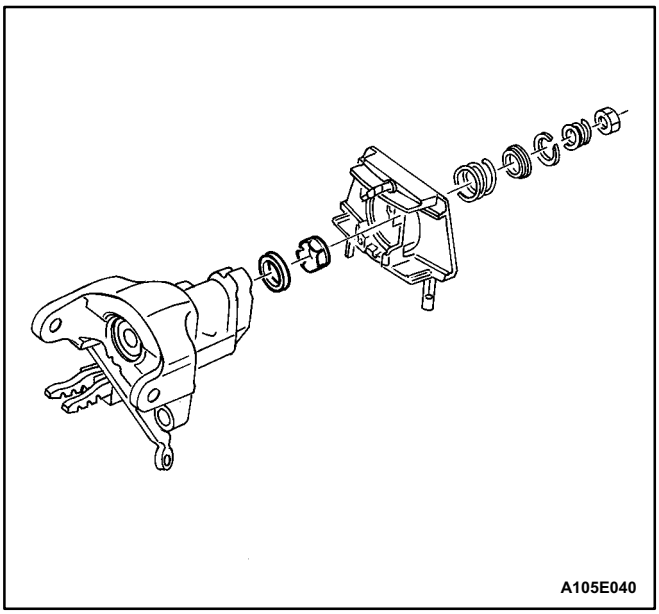
5. Compress the spring retainer and upper bearing spring with the tilt lock plate adapter J-36667 and the lock plate compressor J-23653-A.



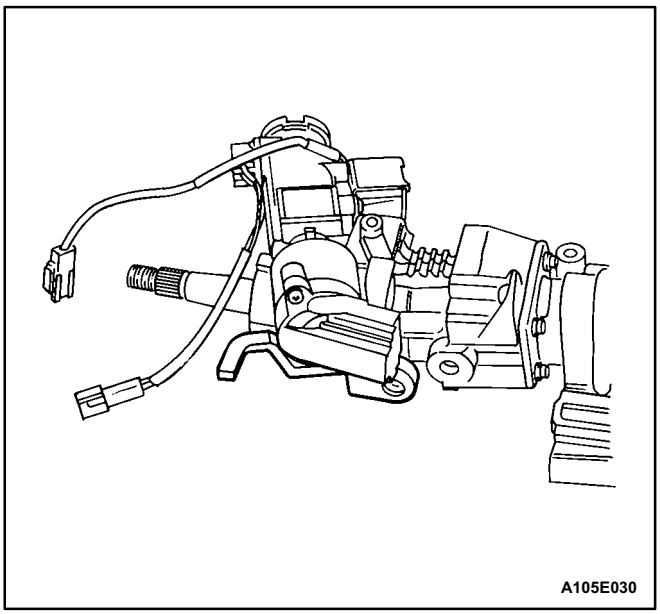
6. Remove the retaining ring.



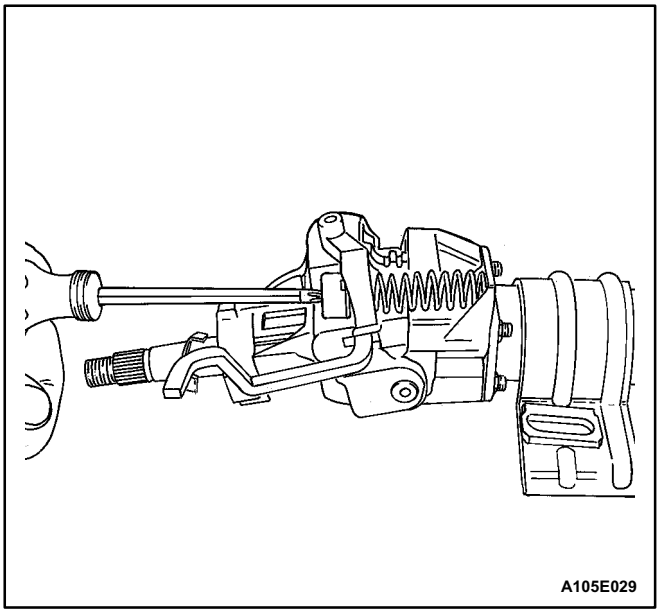
7. Remove the spring retainer and the upper bearing spring.



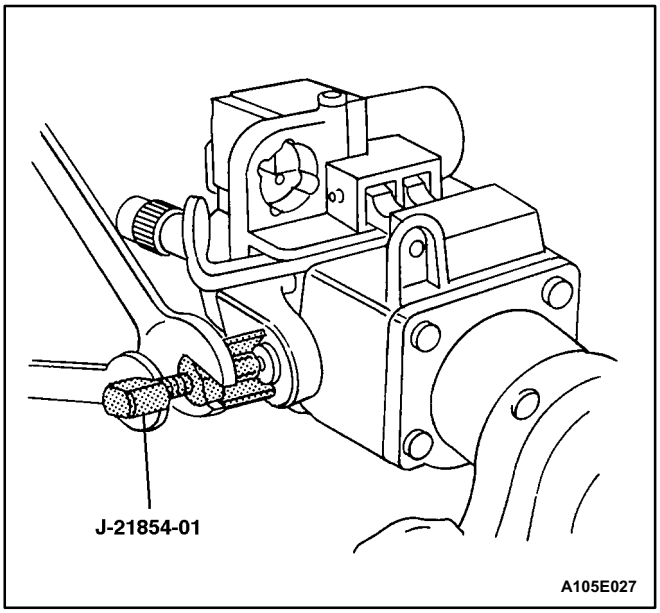
8. Remove the inner race seat and the inner race.


A105E030

9. Pull the tilt level on the column housing assembly and tilt the column all the way up.

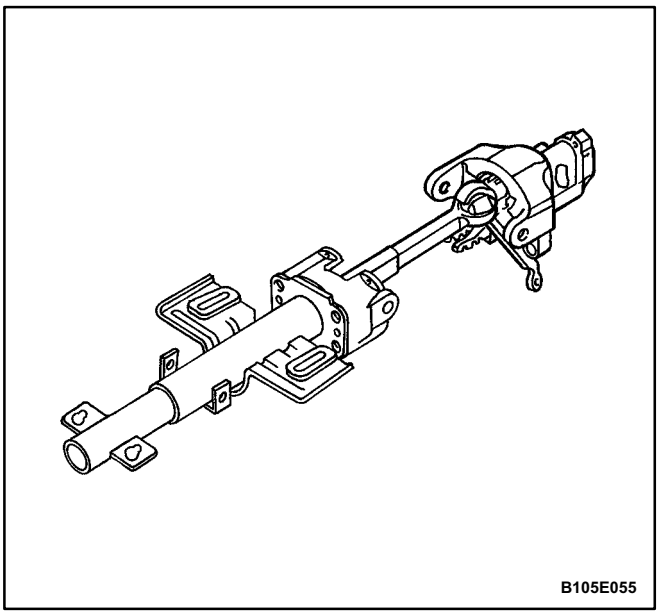

A105E029

10. Insert a Phillips screwdriver into the square opening at the bottom of the spring retainer. Push and turn left to release the spring retainer and the wheel tilt spring.
11. Remove the spring retainer and the wheel tilt spring.

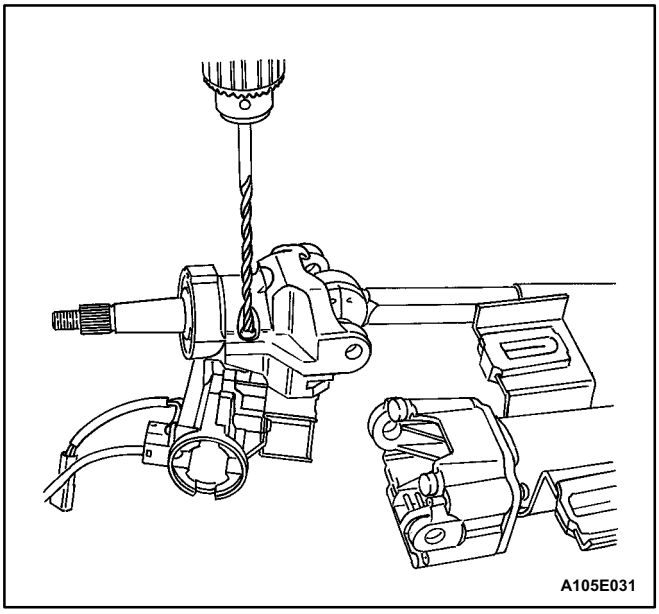


A105E027

12. Remove the two pivot pins using the pivot pin remover J-21854-01.

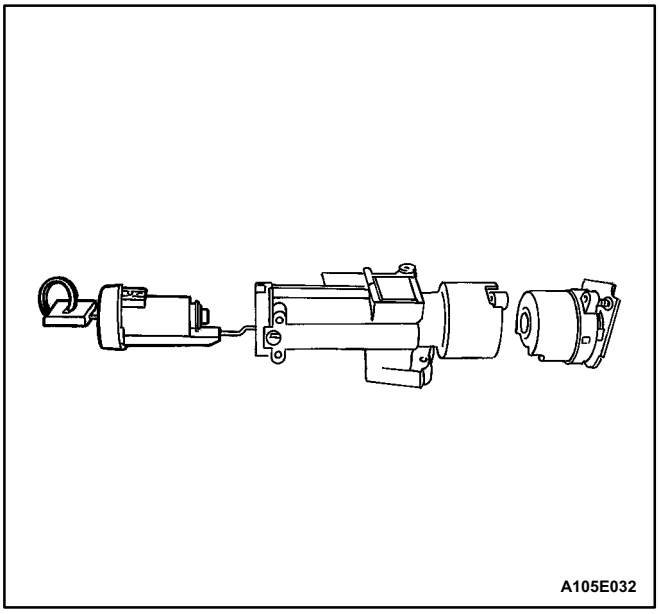

B105E055

13. Place the lock cylinder in the ACC position.
14. Pull the tilt lever to release the column housing. Remove the column housing and the steering shaft from the housing support.

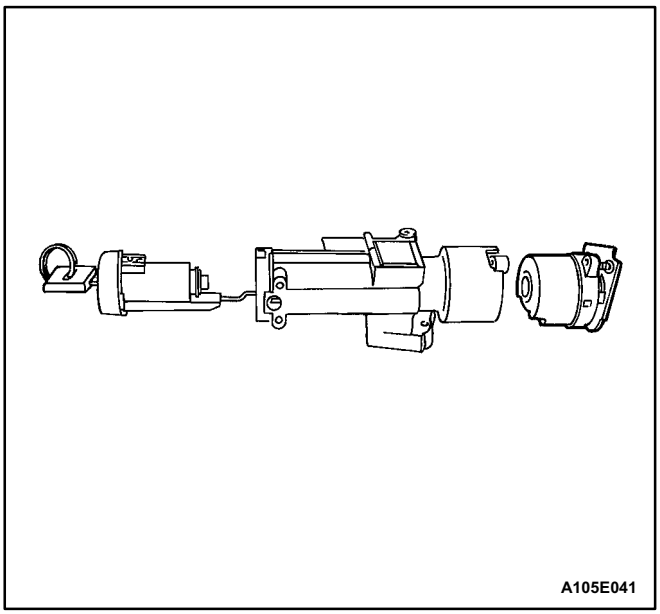

A105E031

15. Remove the shear bolts, the shear bolt washers, and the ignition switch housing from the steering column housing as follows:
    15.1. Use a metal punch to start the drill head.
    15.2. Drill off the head of the shear bolts down to the steel shear bolt washers with a 6.5 mm (1/4 inch) drill bit.
    15.3. Separate the washers and the ignition switch housing from the column housing.
    15.4. Remove the threaded end of the shear bolts from the ignition switch housing with locking pliers.

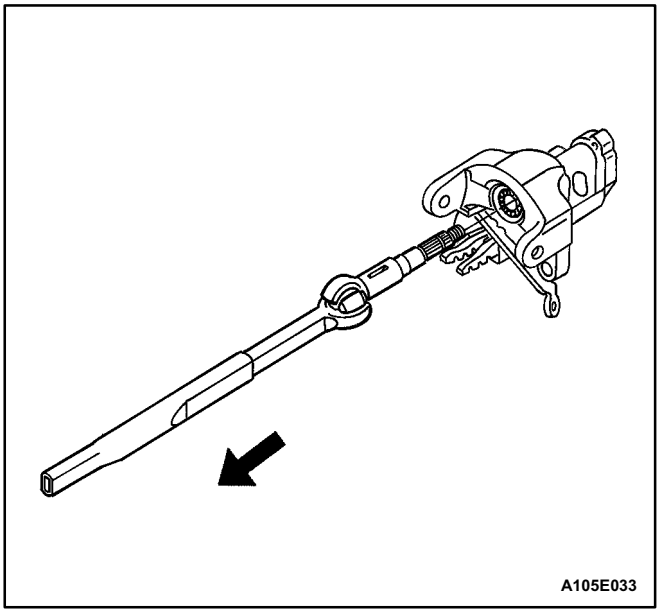
Important: After drilling and removing the threaded end of the shear bolts, all the metal shavings must be cleaned from all the parts.


A105E032

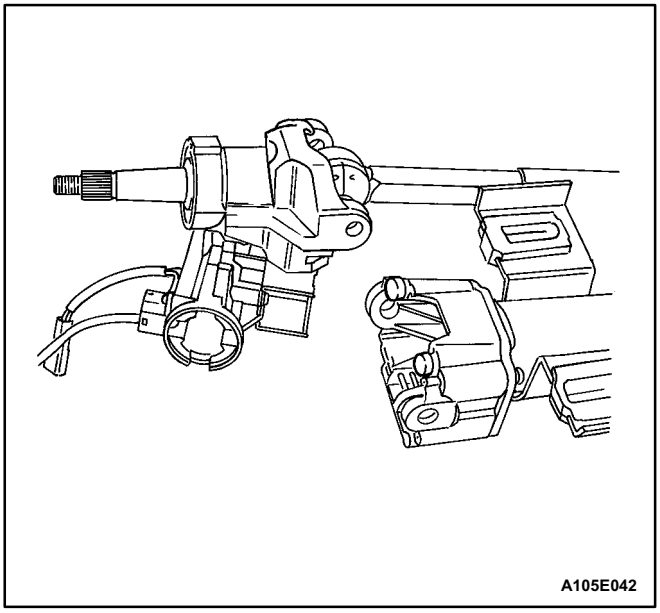
16. Remove the lock cylinder from the ignition switch housing by pushing the lock cylinder release tab.


A105E041

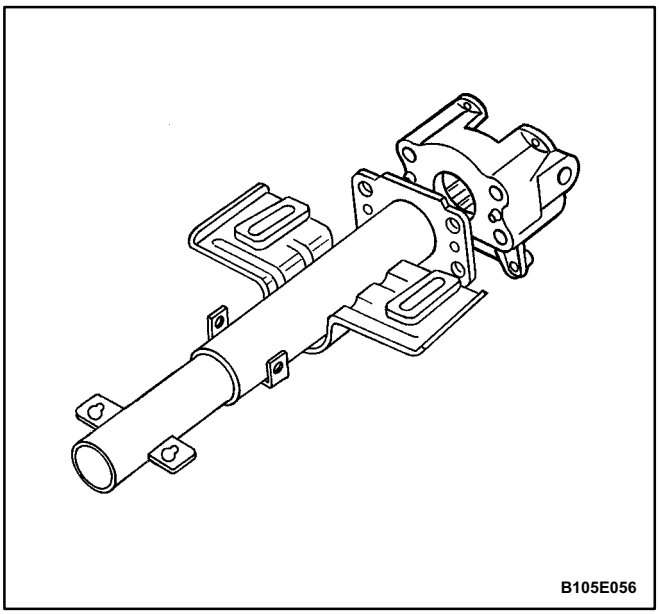
17. Remove the ignition switch retaining screw and remove the ignition switch assembly.


A105E033

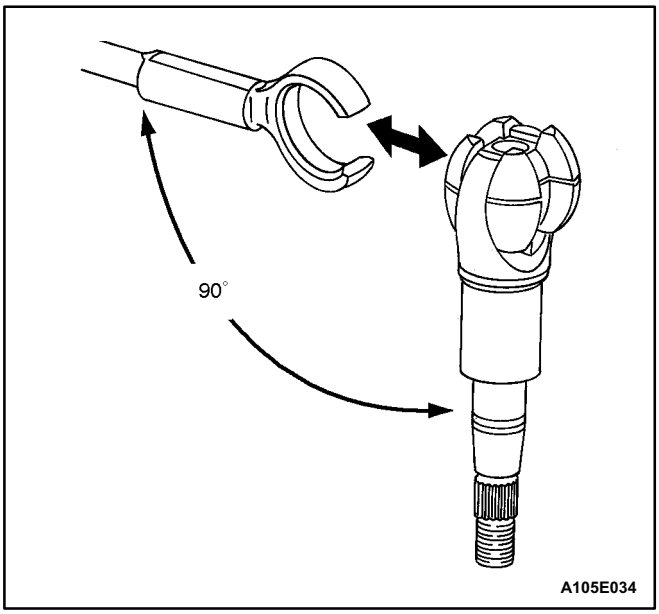
18. Remove the steering shaft assembly from the housing support.


A105E042

19. Remove the tilt bumpers with a pair of pliers.


B105E056

20. Remove the support screws and remove the support housing from the jacket assembly.

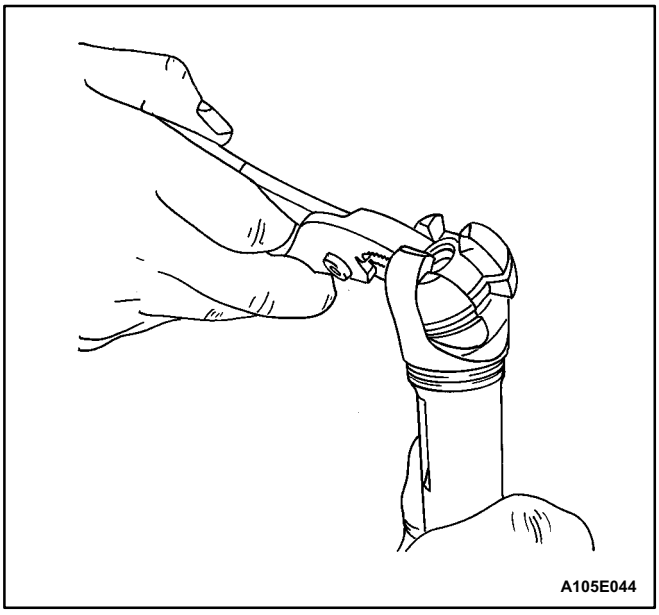


A105E034

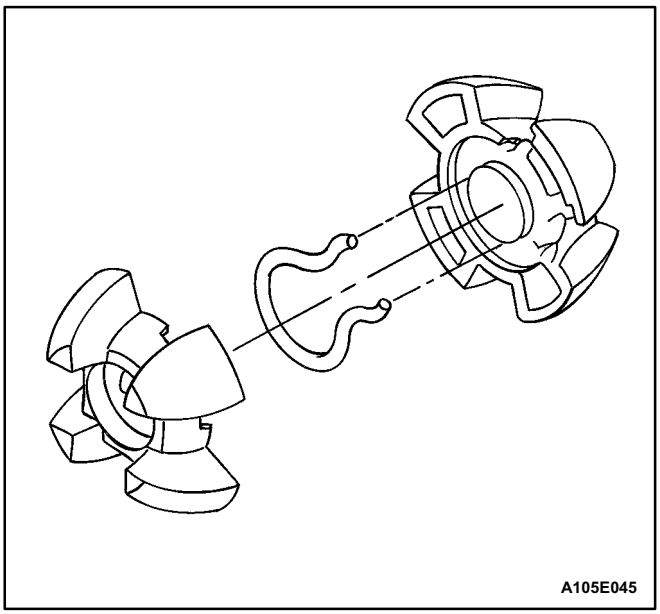
Disassembly Procedure for the Steering Shaft Assembly

Important: Prior to separating the upper shaft from the lower shaft, note the relationship of the upper shaft, with the lock bolt slot at the 12 o'clock position, to the lower shaft pinch bolt groove at the 7 o'clock position. Refer to this orientation for proper assembly.

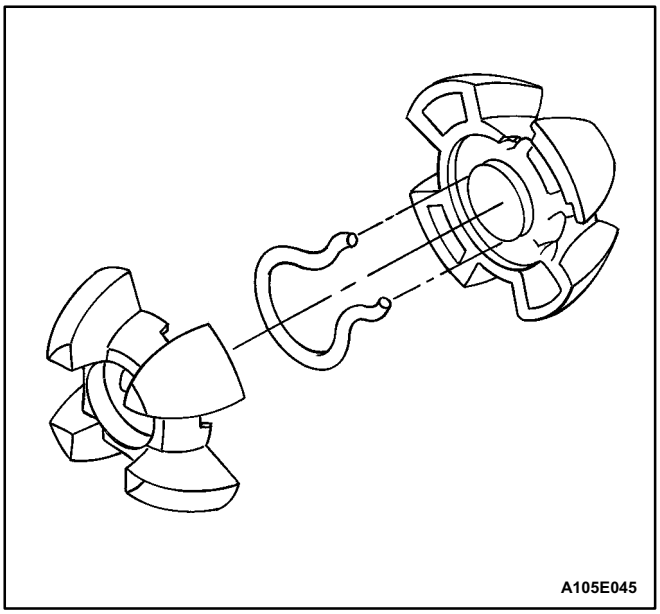
1. Position the upper shaft 90 degrees to the lower shaft and separate the two parts.


A105E044

2. Rotate the centering sphere 90 degrees and remove it from the upper shaft.

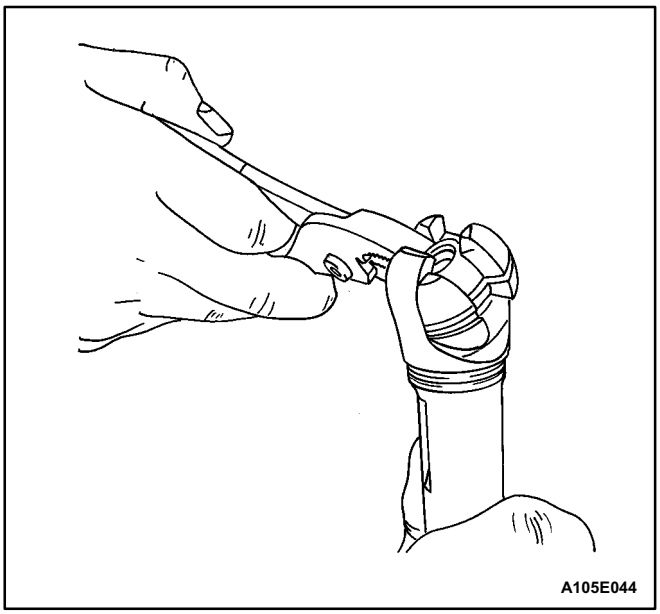


3. Separate the sphere halves and remove the joint preload spring.

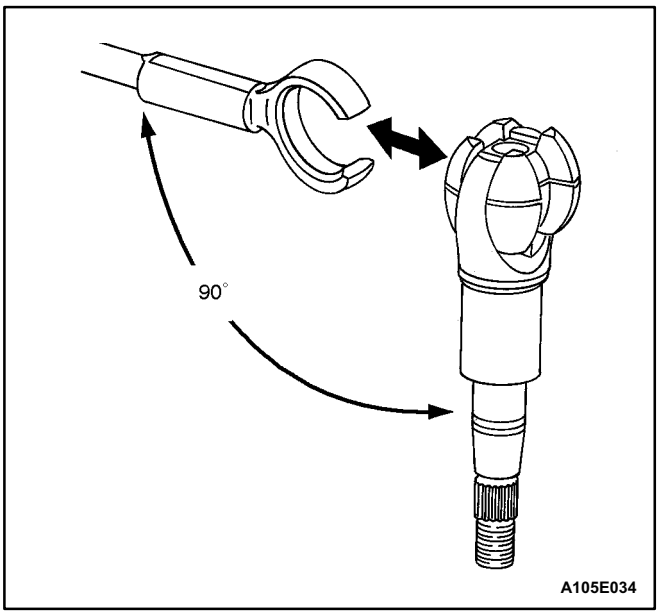


Assembly Procedure for the Steering Shaft Assembly

1. Lubricate the centering sphere halves and the joint preload spring with lithium grease.
2. Place the joint preload spring between the sphere halves with the ends of the spring in the notches.



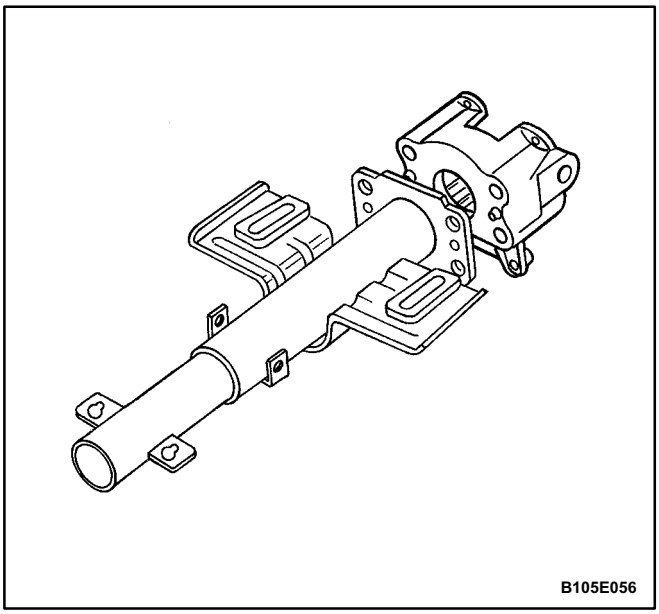
3. Lubricate the sphere end of the upper shaft with lithium grease.
4. Place the sphere into the upper shaft and rotate the sphere 90 degrees.



5. Lubricate the sphere end of the lower shaft with lithium grease.

Important: To insure proper operation, the upper shaft and the lower shaft must be aligned correctly when they are connected.

6. Place the lock bolt slot on the upper shaft at the 12 o'clock position.
7. Place the pinch bolt groove near the end of the lower shaft at the 7 o'clock position.
8. Connect the upper shaft to the lower shaft.



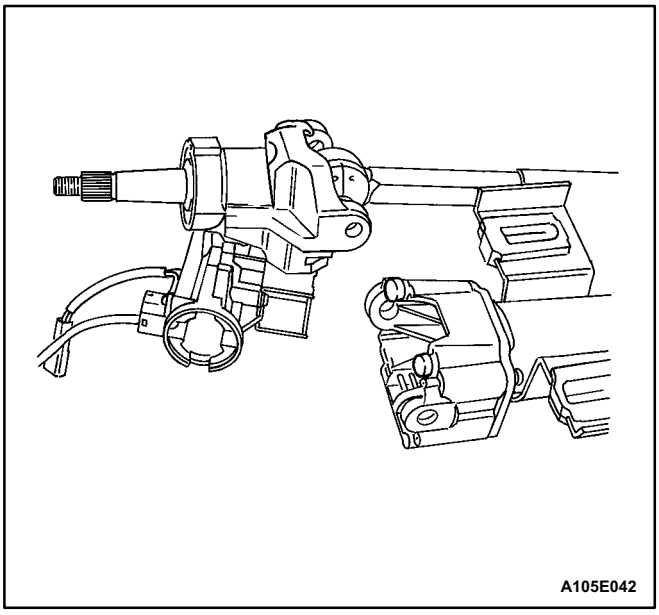
Assembly Procedure

Important: All fasteners in the following steps must be seated firmly before being tightened to specifications.

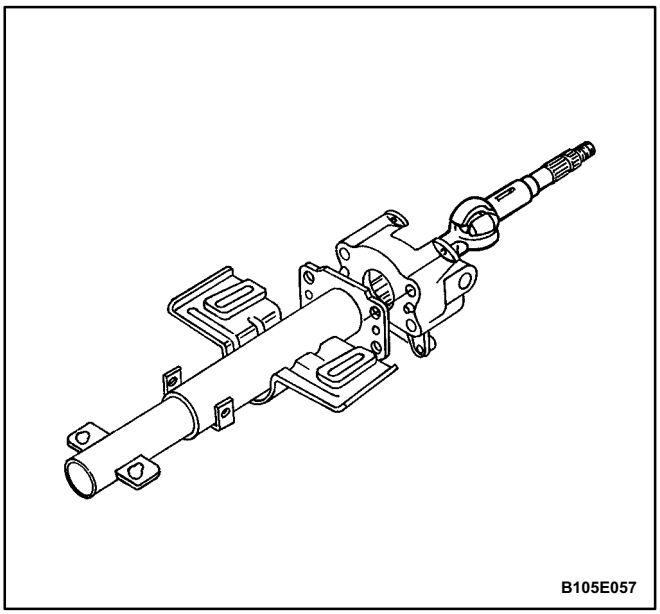
1. Connect the support housing to the jacket assembly with the support screws.

Tighten

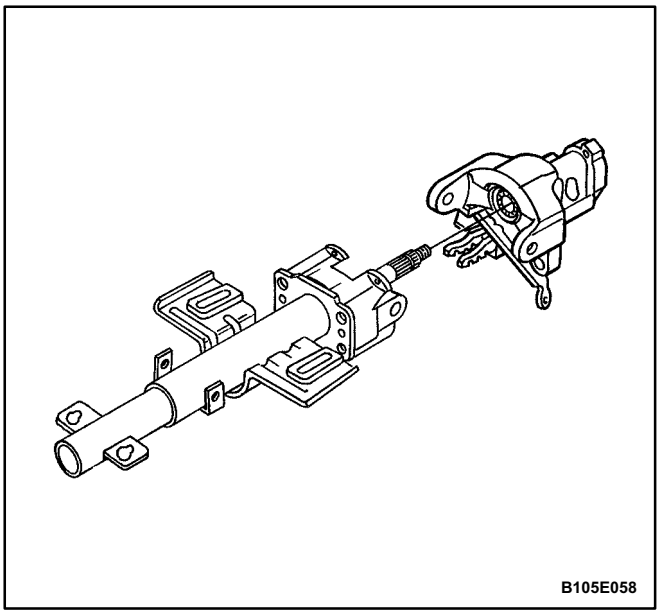
Tighten the support housing screws to 16 N•m (12 lb•ft).



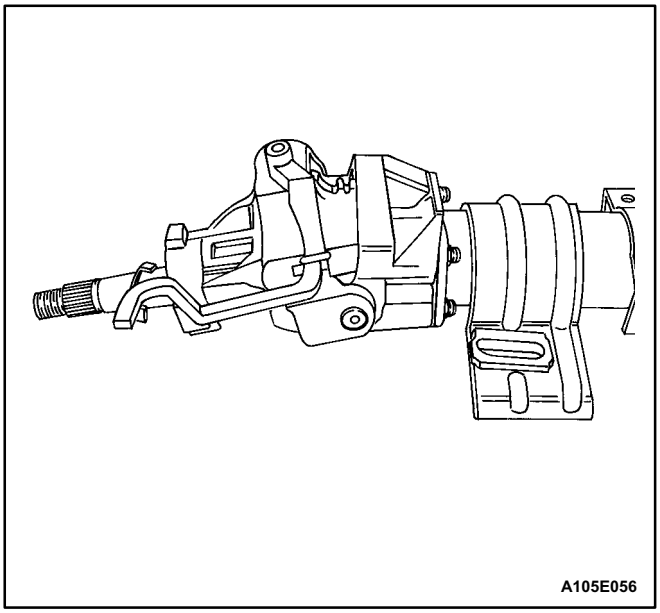
2. Connect the tilt bumpers to the support housing and snap them in place.


B105E057

3. Slide the steering shaft assembly into the support housing.

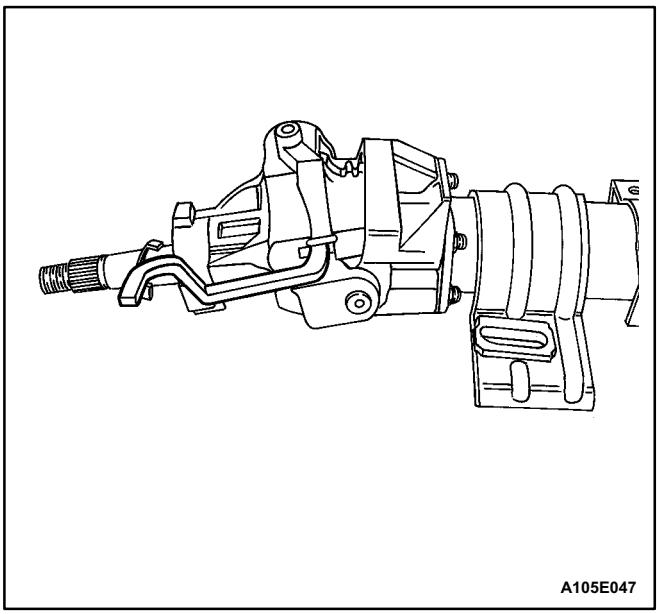

B105E058

4. Lubricate both bearings in the column housing with lithium grease. Slide the column housing onto the shaft assembly and the housing support.

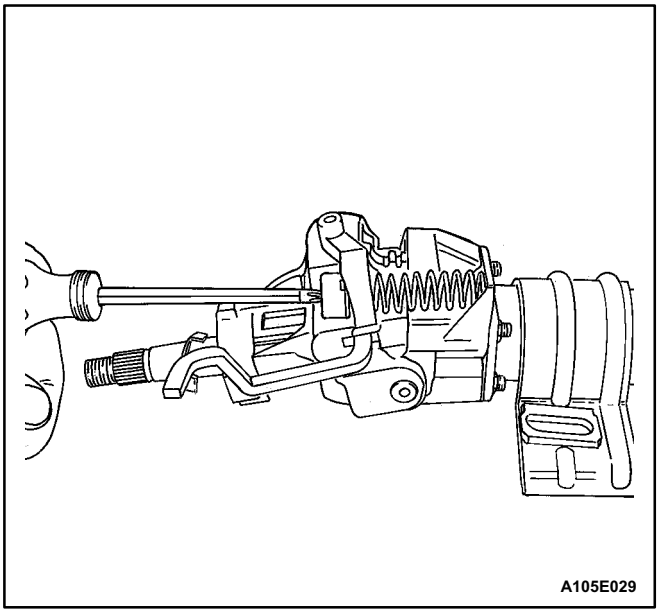

A105E056

5. Lubricate the pivot pins with lithium grease and slide the pins into the housing until the pins are bottomed. Tap the pivot pins in place.

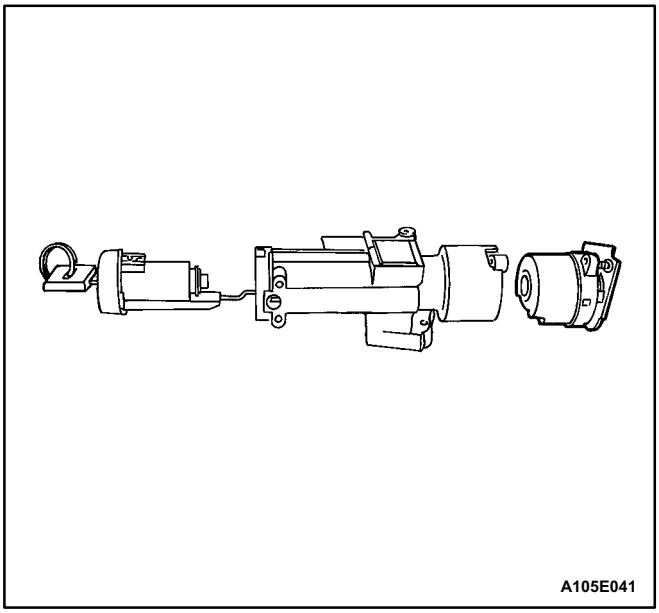
Important: The pivot pins must be staked to the column housing after installation. Stake each pin at three equally spaced locations.


A105E047

6. Pull the tilt lever on the column housing and tilt the column all the way up.


A105E029

7. Lubricate the tilt spring with lithium grease.
8. Install the tilt spring and the spring retainer. Be sure the spring engages the locating tab on the support housing. Insert a Phillips screwdriver into the square opening in the spring retainer, push down, and turn right to lock it in place.

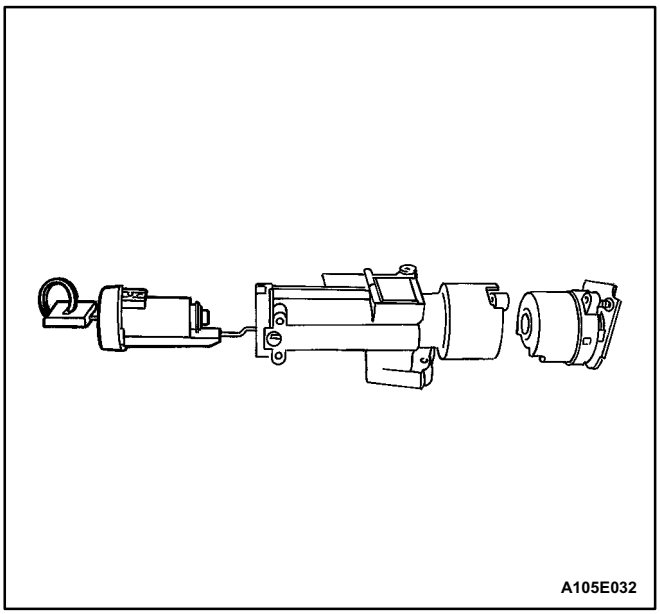

A105E041

9. Install the ignition switch with the ignition switch retaining screw.

Tighten

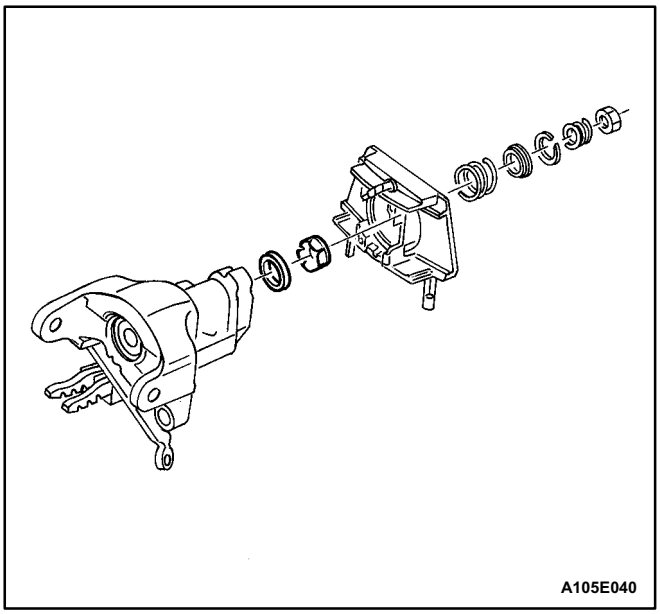
Tighten the ignition switch retaining screw to 2 N•m (18 lb•in).

10. Connect the wiring. Refer to „Ignition Lock Cylinder and Switch" in this section.


A105E032

Important: To ensure that the tab on the lock cylinder shaft and the slotted opening on the ignition switch are in alignment, the lock cylinder must be in the ACC position prior to installation.

11. Install the lock cylinder into the ignition switch housing.

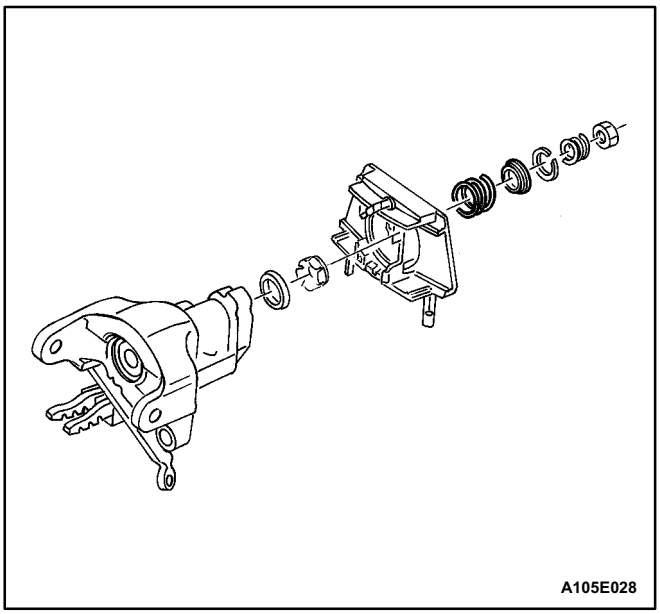

A105E040

12. Attach the ignition switch housing to the column housing with the shear bolt washers and the shear bolts.

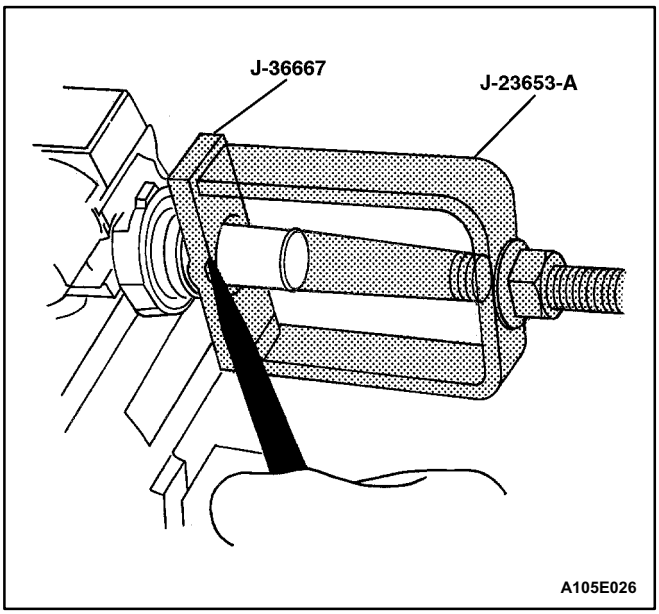
Tighten

Tighten the ignition switch housing shear bolts until the bolt heads separate from the body, approximately 11 N•m (97 lb•in).

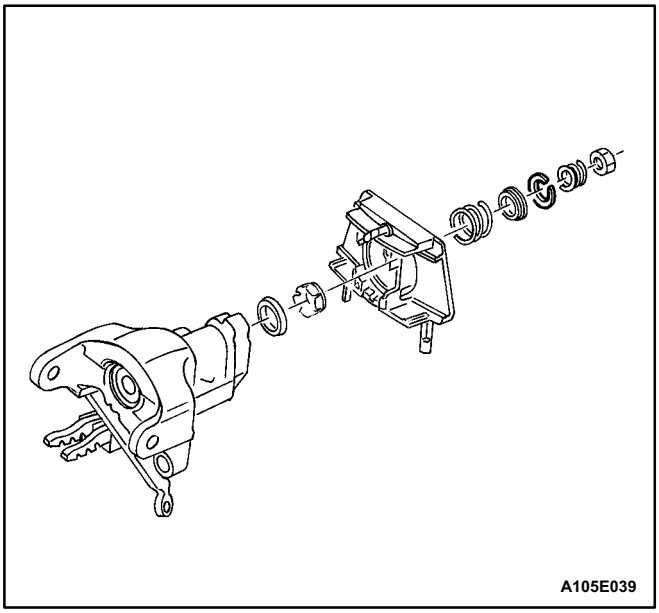
13. Place the lock cylinder in the LOCK position and remove the key.
14. Rotate the steering shaft assembly until the lock bolt engages and locks the steering shaft in position.
15. Install the inner race and the inner race seat.


A105E028

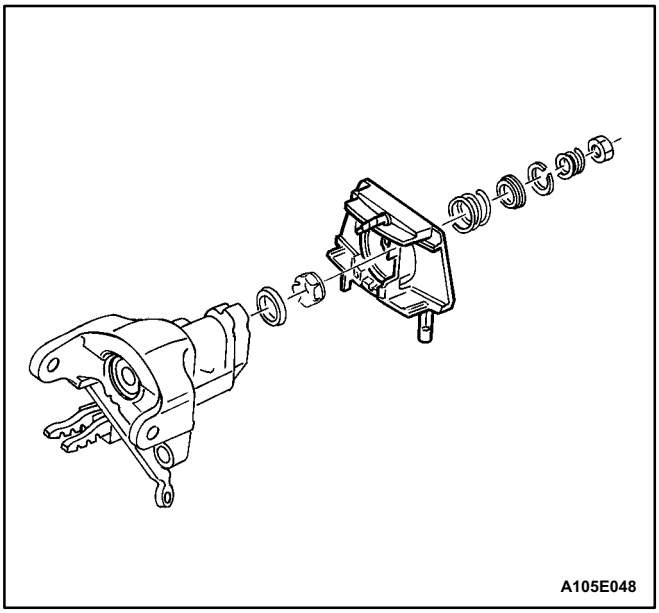
16. Install the upper bearing spring and the spring retainer.



17. Compress the upper bearing spring and the spring retainer with the tilt lock plate adapter J-36667 and the lock plate compressor J-23653-A.



18. Place the retaining ring into the groove on the upper shaft.



19. Connect the turn signal switch housing to the steering column housing with the turn signal switch housing screws.

Tighten

Tighten the turn signal switch housing screws to 3 N•m (27 lb•in).

20. Install the steering column into the vehicle. Refer to „Steering Column" in this section.
21. Install the cancelling cam spring and the steering wheel onto the steering column. Refer to „Steering Wheel without SIR" or „Steering Wheel with SIR" in this section.

GENERAL DESCRIPTION AND SYSTEM OPERATION

STEERING WHEEL AND COLUMN

Caution: To ensure the energy absorbing action of the steering column, it is important to use only the specified screws, bolts, and nuts, tightened to the specified torque.

In addition to the steering function, the steering column provides safety and security.

The energy absorbing column is designed to compress in a front end collision to lessen the chance of driver injury.

The ignition switch and the lock are mounted on the column, allowing the ignition and steering operations to be locked to inhibit theft of the car.

The column levers trigger the turn signals, the headlight beams, and the windshield washer and wipers.

A tilt steering column uses a spherical joint to allow the steering wheel to tilt up and down. This enables the driver to adjust the steering wheel to a comfortable position.

Notice: Apply a thin coat of lithium grease to all friction points when reassembling.

The column may be disassembled and reassembled easily.

IGNITION SWITCH KEYHOLE LAMP

For description and lamp replacement information, refer to *Section 9B, Lighting Systems.*

IGNITION KEY REMINDER

The ignition key reminder alerts the driver that the key is still in the ignition when the driver attempts to exit the vehicle.

An internal switch in the ignition lock cylinder supplies battery voltage to the reminder chime module when all of the following conditions are true:

- The key is in the ignition switch.
- The ignition is OFF.
- The driver's door is open.

For information on removal and installation of the reminder chime module, refer to *Section 9E, Instrumentation/Driver Information*.

HVAC (HEATING, VENTILATION, AND AIR CONDITIONING)

CONTENTS

SECTION 7A

HEATING AND VENTILATION SYSTEM

CAUTION: Disconnect the negative battery cable before removing or installing any electrical unit or when a tool or equipment could easily come in contact with exposed electrical terminals. Disconnecting this cable will help prevent personal injury and damage to the vehicle. The ignition must also be in LOCK unless otherwise noted.

TABLE OF CONTENTS

SPECIFICATIONS

HEATER TEMPERATURE SPECIFICATIONS

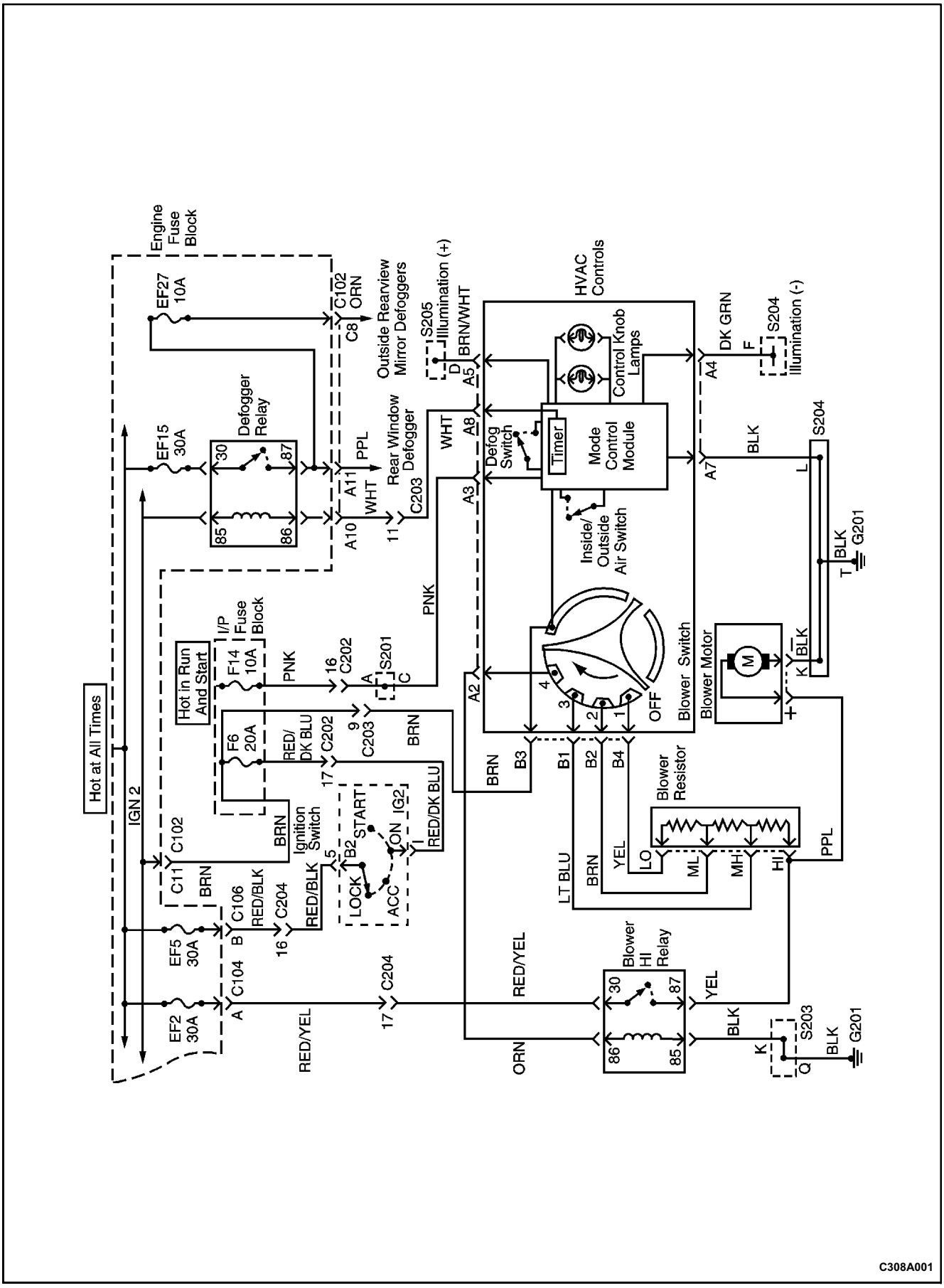
Ambient Air Temperature	Heater Outlet Air Temperature
– 18°C (0°F)	54°C (129°F)
– 4°C (25°F)	59°C (138°F)
10°C (50°F)	64°C (147°F)
24°C (75°F)	68°C (154°F)

FASTENER TIGHTENING SPECIFICATIONS

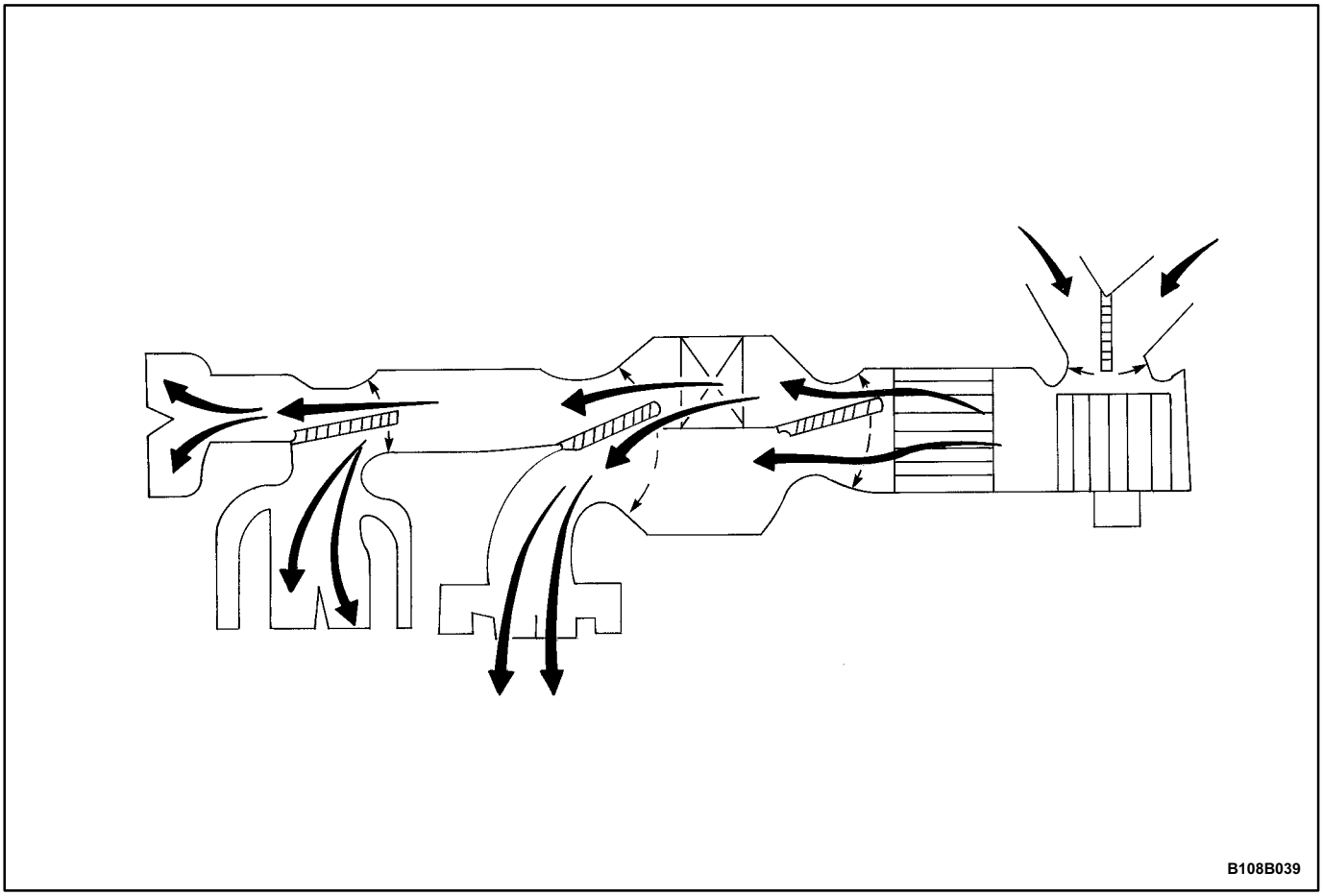
Application	N•m	Lb•Ft	Lb•In
Blower Motor to Heater/Air Distributor Case Screws	6	-	53
Blower Motor Resistor Screws	6	-	53
Controller Retaining Screws	4	-	35
Heater/Air Distributor Case Assembly Screws	8	-	71
Heater Core Cover Screws	3	-	26.5
Heater Core Retaining Bracket Screw	3	-	26.5
Vacuum Tank Mounting Nuts	4	-	35

SCHEMATIC AND ROUTING DIAGRAMS

NONA/C DIAGRAM



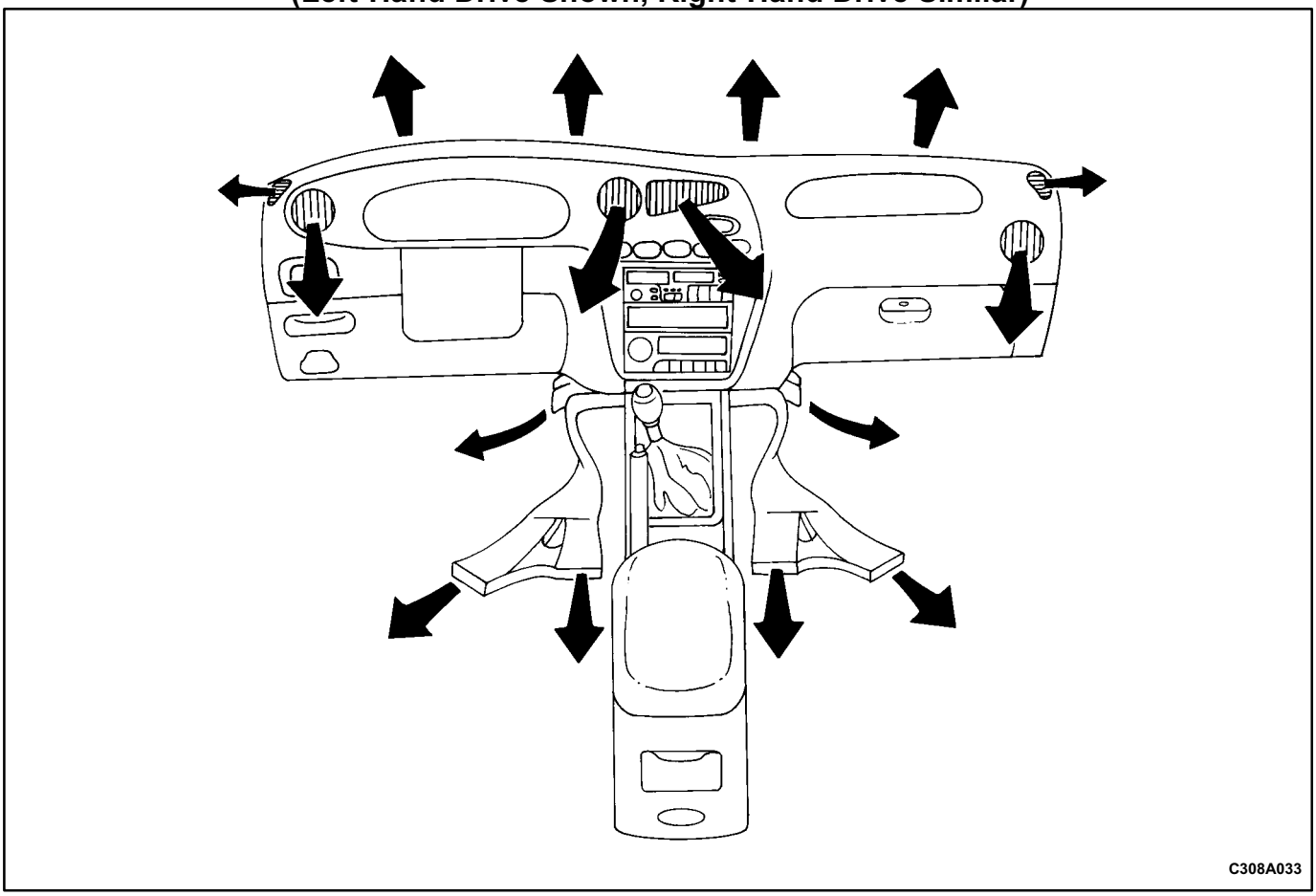
AIRFLOW - TYPICAL



B108B039

AIRFLOW WITH REAR HEATING DUCT

(Left-Hand Drive Shown, Right-Hand Drive Similar)



DIAGNOSIS

HEATER SYSTEM

INSUFFICIENT HEATING OR DEFROSTING

Caution: The cooling system is pressurized when hot. Injury can result from removing the surge tank cap before the engine is sufficiently cool.

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?	-	Go to *Step 2*	System OK
2	Check the coolant level. Is the coolant level correct?	-	Go to *Step 4*	Go to *Step 3*
3	Add coolant as needed. Is the repair complete?	-	System OK	Go to *Step 4*
4	Check the drive belts for tension or damage. Are the drive belts OK?	-	Go to *Step 6*	Go to *Step 5*
5	Correct any problem with the drive belts. Is the repair complete?	-	System OK	Go to *Step 6*
6	Check the coolant hoses for leaks or kinks. Are the coolant hoses OK?	-	Go to *Step 8*	Go to *Step 7*
7	Repair any problem with the coolant hoses. Is the repair complete?	-	System OK	Go to *Step 8*
8	Check the surge tank cap. Refer to *Section 2D, Engine Cooling.* Is the surge tank cap OK?	-	Go to *Step 10*	Go to *Step 9*
9	Repair or replace the surge tank cap as needed. Is the repair complete?	-	System OK	Go to *Step 10*
10	1. Turn the A/C switch OFF on vehicles equipped with air conditioning (A/C). 2. Set the blower motor switch on maximum speed. 3. Set the heater control to full hot. 4. Turn the ignition ON. 5. Check for airflow from the vent outlet. Is there heavy airflow from the vent outlet?	-	Go to *Step 11*	Go to *Step 26*
11	Check for a change in the airflow at various blower speeds. Does the blower speed increase as the switch is turned from minimum to maximum?	-	Go to *Step 12*	Go to „Blower Electrical (Manual and Non A/C)"
12	1. Turn the A/C switch OFF. 2. Set the temperature lever to full hot. 3. Set the blower motor switch on maximum speed. 4. With the engine sufficiently cool, remove the surge tank cap. 5. Start the vehicle and idle the engine. 6. Watch for the flow of the coolant. Is the coolant flow visible?	-	Go to *Step 14*	Go to *Step 13*

Insufficient Heating or Defrosting (Cont'd)

Step	Action	Value(s)	Yes	No
13	1. Check the system for the following problems: ● Restriction in the cooling system. ● Failed water pump impeller. ● Faulty thermostat. 2. Make repairs to the cooling system, as needed. Are the repairs complete?	-	System OK	Go to *Step 14*
14	1. Install the surge tank cap. 2. With the ignition ON, allow the engine to warm up for about 20 minutes. Drive the vehicle at 48 km/h (30 mph). 3. Use a thermometer to measure the ambient air temperature and the discharge air temperature at the heater outlet. Does the heater output meet the minimum values given?	Refer to „Heater Temperature Specifications”	Go to *Step 15*	Go to *Step 16*
15	1. Check the vehicle for cold air leaks at the following locations: ● Dash. ● Heater cases. ● Vents. 2. Check under the seat for obstructions. 3. Repair any leaks or obstructions. Are the repairs complete?	-	System OK	-
16	1. Turn the ignition OFF. 2. Turn the temperature control knob to full cold, then rapidly to full hot. 3. Listen for the sound of the temperature door slam just before reaching the end of the travel range of the control knob. Does the door slam?	-	Go to *Step 18*	Go to *Step 17*
17	1. Check the following aspects of the temperature door: ● Travel. ● Cables. ● Linkage. 2. Verify the accuracy of the temperature controls at full hot. 3. Verify the accuracy of the temperature controls at full cold. Is the repair complete?	-	System OK	-
18	1. Set the temperature control knob to full hot. 2. Start the vehicle. 3. Check the temperature of the heater inlet hose and the heater outlet hose by feel. The air temperature around the hoses should be at least 29°C (84°F). Is the heater inlet hose hot and the heater outlet hose warm?	-	Go to *Step 19*	Go to *Step 22*
19	Check the thermostat. Refer to *Section 2D, Engine Cooling.* Is the thermostat installed and seated properly?	-	Go to *Step 20*	Go to *Step 21*

Insufficient Heating or Defrosting (Cont'd)

Step	Action	Value(s)	Yes	No
20	Replace the thermostat. Refer to *Section 2D, Engine Cooling.* Is the repair complete?	-	System OK	-
21	Reinstall the thermostat. Is the repair complete?	-	System OK	-
22	Inspect the heater hoses for proper installation. Are the heater hoses reversed?	-	Go to *Step 23*	Go to *Step 24*
23	Reinstall the heater hoses properly. Is the repair complete?	-	System OK	-
24	1. Back flush the heater core. 2. Drain the cooling system. 3. Replace the coolant. 4. Warm the engine to an average operating temperature. 5. Feel the heater inlet hose and the heater outlet hose. Is the heater inlet hose hot and the heater outlet hose warm?	-	System OK	Go to *Step 25*
25	Replace the heater core. Is the repair complete?	-	System OK	-
26	Recheck the system using the „Control Settings/Correct Results" tests. Refer to „Improper Air Delivery or No Mode Shift" in this section. Is the repair complete?	-	System OK	Go to *Step 27*
27	Check for airflow from the defroster or the vent outlets. Is there high airflow from the defroster or the vent outlets?	-	Go to *Step 28*	Go to *Step 29*
28	1. Check the heater door at the floor and the vent door to get the proper airflow and to verify proper operation. 2. Repair as required. Is the repair complete?	-	System OK	-
29	Switch the mode knob to defrost. Is the defroster airflow OK?	-	Go to *Step 30*	Go to *Step 31*
30	1. Remove the heater outlet and check for obstructions. 2. Remove any obstructions in the heater outlet. Is the repair complete?	-	System OK	-
31	Check for an airflow change at various blower speeds. Does the blower speed increase as the control is turned from minimum to maximum?	-	Go to *Step 32*	Go to „Blower Electrical (Manual and Non A/C)"
32	Check for obstructions in the system at the blower inlet and at the air filter, if the vehicle is equipped with one. Are there any obstructions?	-	Go to *Step 33*	Go to *Step 34*
33	Remove the obstructions in the system at the blower inlet or replace a clogged filter. Is the repair complete?	-	System OK	-

Insufficient Heating or Defrosting (Cont'd)

Step	Action	Value(s)	Yes	No
34	1. Set the blower on maximum speed. 2. Rotate the temperature control from full hot to full cold. 3. Listen for an airflow change. Does the airflow change?	-	Go to *Step 35*	Go to *Step 36*
35	1. Check the following aspects of the temperature door: ● Travel. ● Cables. ● Linkage. ● Control. 2. Verify the accuracy of the temperature control at full hot. Is the repair complete?	-	Go to *Step 1*	-
36	1. Check the system for any obstruction between the blower and the system outlets. 2. Remove any obstruction. Is the repair complete?	-	Go to *Step 1*	-

BLOWER ELECTRICAL (MANUAL AND NON A/C)

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?	-	Go to *Step 2*	System OK
2	Turn the blower ON. Does the blower run at any speed?	-	Go to *Step 14*	Go to *Step 3*
3	1. Disconnect the power connector from the blower motor under the dashboard on the passenger side of the vehicle. 2. Turn the ignition ON. 3. Turn the blower ON. 4. Test for voltage on the connector. The terminal connected to the PPL wire is positive and the terminal connected to the BLK wire is negative. Is this voltage present?	11-14 V	Go to *Step 4*	Go to *Step 5*
4	Replace the blower motor. Is the repair complete?	-	System OK	-
5	Check fuse EF5 in the engine fuse block. Is the fuse blown?	-	Go to *Step 6*	Go to *Step 7*
6	1. Turn the ignition ON. 2. Use a short detector to locate a possible short in the following locations: ● Fuse panel to blower speed switch. ● Blower speed switch to heater resistor block. ● Heater resistor block to blower motor. ● Blower speed switch to blower HI relay. 3. Repair any short. 4. Replace any blown fuse. Is the repair complete?	-	System OK	-

Blower Electrical (Manual and Non A/C) (Cont'd)

Step	Action	Value(s)	Yes	No
7	1. Turn the ignition ON. 2. Set the blower switch on 4. 3. Check the blower motor ground. Is the ground OK?	-	Go to *Step 9*	Go to *Step 8*
8	Repair the blower motor ground. Is the repair complete?	-	System OK	-
9	Check the motor connector with a 12 volt test light. Does the test light come on?	-	Go to *Step 10*	Go to *Step 11*
10	Repair the open in the feed wire from the resistor block to the blower motor. Is the repair complete?	-	System OK	-
11	Use the 12 volt test light to check the power feed terminal on the blower speed switch. Does the light come on?	-	Go to *Step 12*	Go to *Step 13*
12	Replace the blower speed switch. Is the repair complete?	-	System OK	-
13	Repair the open in the power wire from the blower speed switch to the fuse panel. Is the repair complete?	-	System OK	-
14	Turn the blower on speed 4. Does the blower fail to operate at speed 4?	-	Go to *Step 15*	Go to *Step 21*
15	Check fuse EF2 in the engine fuse block. Is this fuse blown?	-	Go to *Step 16*	Go to *Step 17*
16	1. Turn the ignition ON. 2. Set the blower motor switch on 4. 3. Use a short detector to locate a possible short in the following locations: ● Engine fuse panel to blower HI relay. ● Blower HI relay to blower motor. 4. Repair any short. 5. Replace the EF2 fuse. Is the repair complete?	-	System OK	-
17	1. Turn the ignition switch ON. 2. Set the blower switch on 4. 3. Check for 12 volts on the blower HI relay coil terminal from the blower speed switch terminal A2. Is this voltage present?	-	Go to *Step 18*	Go to *Step 19*
18	Replace the blower speed switch. Is the repair complete?	-	System OK	-
19	1. Turn the ignition OFF. 2. Check for opens in the following locations: ● EF2 fuse to blower HI relay. ● Blower speed switch to blower HI relay. ● Blower HI relay to ground. ● Blower HI relay to blower motor. 3. Repair any opens. Is the repair complete?	-	System OK	Go to *Step 20*

Blower Electrical (Manual and Non A/C) (Cont'd)

Step	Action	Value(s)	Yes	No
20	Replace the blower HI relay. Is the repair complete?	-	System OK	-
21	1. Disconnect the resistor block connector. 2. Connect one lead of a self powered test light to any single lead on the resistor block. Use the other lead to probe each of the other two terminals. Does the test light illuminate on all terminals?	-	Go to *Step 23*	Go to *Step 22*
22	Replace the resistor block. Is the repair complete?	-	System OK	-
23	1. Turn the ignition to LOCK. 2. Disconnect the connector from the resistor block. 3. Connect a jumper lead from the positive terminal on the battery to any wire terminal in the connector. 4. Use a 12-volt test light to check for voltage from the corresponding wire on the blower speed switch. 5. Repeat the same test on the other wires. Does the lamp light on all three wires?	-	Go to *Step 25*	Go to *Step 24*
24	Replace the blower speed switch. Is the repair complete?	-	System OK	-
25	Repair the open in the affected wire. Is the repair complete?	-	System OK	-

IMPROPER AIR DELIVERY OR NO MODE SHIFT (MANUAL AND NON A/C)

This procedure provides a test of all functions of the heater/defroster unit.

1. Warm up the vehicle.
2. Keep the engine running.
3. Perform the tests outlined in the table below and look for the results indicated.

CONTROL SETTINGS			CORRECT RESULTS				
MODE KNOB	TEMP. CONTROL	BLOWER MOTOR SWITCH	BLOWER SPEED	POWER VENT OUTLET	FLOOR OUTLET	DEFROST OUTLET	SIDE WINDOW OUTLET
Vent	Cold	Off	Off	No Airflow	No Airflow	No Airflow	No Airflow
Vent	Cold	4	High	Ambient Airflow	No Airflow	No Airflow	No Airflow
Floor	Cold to Hot	4	High	No Airflow	Cold to Hot Airflow	Minimum Cold to Hot Airflow	Minimum Cold to Hot Airflow
Defroster	Cold to Hot	4	High	No Airflow	Minimum Cold to Hot Airflow	Cold to Hot Airflow	Minimum Cold to Hot Airflow

If any of these settings does not produce the correct results, perform the following diagnostic procedure.

Improper Air Delivery or No Mode Shift (Manual and Non A/C) (Cont'd)

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?	-	Go to *Step 2*	System OK
2	1. Examine the affected door in the unit for proper attachment to the vacuum actuator. 2. Check the actuator connection to the door. 3. Check that the vacuum hose is properly connected. Is everything connected properly?	-	Go to *Step 4*	Go to *Step 3*
3	Repair as necessary. Is the repair complete?	-	System OK	-
4	1. Disconnect the actuator at the door. 2. Check the range of the door travel and the effort required to move it. Does the door move freely through its entire range of travel so that it can close at both ends of the range?	-	Go to *Step 5*	Go to *Step 3*
5	Check the travel of the actuator by turning the control knob with the engine running. Is the actuator travel OK?	-	Go to *Step 6*	Go to *Step 7*
6	1. Reinstall the actuator. 2. Recheck the system using the „Control Settings/Correct Results" tests in this procedure. Does the system perform properly?	-	System OK	Go to *Step 9*
7	1. Check the vacuum hose at the control. 2. Check for a broken control. Is there a problem with the vacuum hose or the control?	-	Go to *Step 8*	Go to *Step 9*
8	Repair the vacuum hose or the control as necessary. Is the repair complete?	-	System OK	Go to *Step 9*
9	Recheck the system using the „Control Settings/Correct Results" tests in this procedure. Is the repair complete?	-	System OK	Go to *Step 10*
10	Check for airflow from the defroster or the vent outlets. Is there high airflow from the defroster or the vent outlets?	-	Go to *Step 11*	Go to *Step 12*
11	Adjust the heater door at the floor and the vent door to get the proper airflow. Is the repair complete?	-	System OK	-
12	Switch the mode knob to defrost. Is the defroster airflow OK?	-	Go to *Step 13*	Go to *Step 14*
13	1. Remove the heater outlet. 2. Check the heater outlet for obstructions. 3. Remove any obstructions in the heater outlet. Is the repair complete?	-	System OK	-
14	Check the blower speeds for change in the airflow. Does the blower speed increase as the control is turned from 1 to 4?	-	Go to *Step 15*	Go to „Blower Electrical (Manual and Non A/C)"

Improper Air Delivery or No Mode Shift (Manual and Non A/C) (Cont'd)

Step	Action	Value(s)	Yes	No
15	1. Check for obstructions in the system at the blower inlet and check the air filter if the vehicle is so equipped. 2. Remove any obstructions at the blower inlet and replace the filter if it is clogged. Is the repair complete?	-	System OK	Go to *Step 16*
16	1. Set the blower on 4. 2. Rotate the temperature control from full hot to full cold. 3. Listen for an airflow change. Does the airflow change?	-	Go to *Step 17*	Go to *Step 18*
17	1. Check the temperature door, the cable, the linkage, and the control. 2. Adjust the temperature control to full hot. Is the repair complete?	-	System OK	-
18	1. Check the system for any obstruction between the blower and the system outlets. 2. Remove any obstruction between the blower and the system outlets. Is the repair complete?	-	System OK	-

TOO MUCH HEAT

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?	-	Go to *Step 2*	System OK
2	Is there too much heat when the mode switch is in the floor position?	-	Go to *Step 3*	Go to *Step 9*
3	Is there objectionable defroster bleed?	-	Go to *Step 4*	Go to *Step 5*
4	1. Check the door travel, the cable, the vacuum actuators, and the linkage for the heater and the defroster. 2. Adjust or repair, as required. Is the repair complete?	-	System OK	-
5	1. In vehicles equipped with A/C, set the A/C switch OFF. 2. In all vehicles, set the blower speed to maximum. 3. Set the temperature to full hot. 4. Turn the ignition switch ON. 5. Start the engine. 6. Check for airflow from the floor outlets. 7. Check the floor outlet attachment. Is the airflow high?	-	Go to *Step 6*	Go to *Step 8*
6	Check for a change in the airflow at different blower speeds. Does the airflow change as the setting for the blowerspeed switch is changed?	-	Go to *Step 7*	Go to „Blower Electrical (Manual and Non A/C)"

Too Much Heat (Cont'd)

Step	Action	Value(s)	Yes	No
7	1. Check the temperature door travel, the cable, and the linkage. 2. Adjust to full cold. 3. Check for full hot. Is the repair complete?	-	System OK	-
8	Adjust or repair the floor/defroster and/or the vent/floor mode. Is the repair complete?	-	System OK	-
9	In the vent position, is the problem objectionable bleed?	-	Go to *Step 10*	Go to *Step 15*
10	1. Check the system case for leaks. 2. Check the floor outlet attachment. Are there problems?	-	Go to *Step 11*	Go to *Step 12*
11	Repair the system case or the floor outlet attachment as required. Is the repair complete?	-	System OK	Go to *Step 12*
12	1. Turn the ignition switch OFF. 2. Turn the temperature control knob to full hot, then rapidly to full cold. Do you hear the door slam just before you reach the end of the control travel?	-	Go to *Step 13*	Go to *Step 14*
13	Adjust the vent door to vent more. Is the repair complete?	-	System OK	-
14	1. Check the temperature door travel, the cable, and the linkage. 2. Verify that the temperature door goes to full cold. 3. Check the temperature door for full hot. Is the temperature door travel correct?	-	System OK	-
15	1. Set the fresh air/recirculating air control to fresh air (indicator lamp off). 2. Set the temperature control to full cold. 3. Start the vehicle and allow the engine to warm up. 4. Measure the air temperature at the blower inlet, or cowl, and at the vent air outlet inside the vehicle. Is the outlet air more than 5°C (41°F) warmer than the inlet air?	-	Go to *Step 16*	System OK
16	1. Check for hot air leaks from the engine compartment to the blower inlet. 2. Repair as needed. Is the repair complete?	-	System OK	-

CONTROLS

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?	-	Go to *Step 2*	System OK
2	Move controls other than the temperature adjustment. Is an excessive effort required to move the controls?	-	Go to *Step 15*	Go to *Step 3*
3	Move the temperature control. Is an excessive effort required to move the control?	-	Go to *Step 6*	Go to *Step 4*
4	Move the blower control to maximum. Does the temperature door move too easily?	-	Go to *Step 5*	System OK
5	Remove the cable from the controller. Does the control knob turn freely, without the click stops?	-	Go to *Step 15*	-
6	Check the cables for improper routing, kinks, wiring interference, or other instrument panel interference. Is there a problem?	-	Go to *Step 7*	Go to *Step 8*
7	Repair as needed. Is the repair complete?	-	System OK	-
8	1. Remove the cable from the temperature door. 2. Cycle the door manually. 3. Check for door binding. Is there any door binding?	-	Go to *Step 9*	Go to *Step 12*
9	Check the door seal for proper installation. Is the door seal OK?	-	Go to *Step 10*	Go to *Step 11*
10	1. Check a binding door for shaft alignment, a bent shaft, a bent door, or a warped case. 2. Repair, as needed. Is the repair complete?	-	System OK	-
11	Repair the door seal, as needed. Is the repair complete?	-	System OK	-
12	Check for control binding. Does the control bind?	-	Go to *Step 14*	Go to *Step 13*
13	1. Reinstall the cable to the door. 2. Check the clearance for the cable to dash components. 3. Repair any interference. Is the repair complete?	-	System OK	-
14	1. Remove the cable from the control. 2. Check the control for binding. Does the control bind?	-	Go to *Step 15*	Go to *Step 16*
15	Replace the control. Is the repair complete?	-	System OK	-
16	Replace the cable. Is the repair complete?	-	System OK	-

BLOWER NOISE

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?	-	Go to *Step 2*	System OK
2	1. Sit inside the vehicle. 2. Close the doors and the windows. 3. Turn the ignition ON. 4. Start the engine. 5. Set the temperature to full cold. 6. Cycle through the blower speeds, the modes, and the temperature settings in order to find the noise. Is the blower noise constant at high blower speeds or certain modes, but absent at lower speeds or in other modes?	-	Go to *Step 11*	Go to *Step 3*
3	Check for vibrations from the blower motor and fan assembly at each blower speed by feeling the blower motor housing. Do you find excessive vibration?	-	Go to *Step 6*	Go to *Step 4*
4	1. Remove the blower motor and fan assembly. Refer to ”Blower Motor” in this section. 2. Check for foreign material at the opening of the blower inlet. Do you find any foreign material at the blower inlet?	-	Go to *Step 5*	Go to *Step 6*
5	Remove all foreign material. Is the repair complete?	-	System OK	Go to *Step* 6
6	1. Examine the blower fan for wear spots, cracked blades, a cracked hub, a loose fan retaining nut, or bad alignment. 2. Examine the blower case for wear spots. Do you find any problem?	-	Go to *Step 7*	Go to *Step 9*
7	Repair as required. Is the repair complete?	-	System OK	Go to *Step 8*
8	Replace the motor and fan assembly. Is the repair complete?	-	System OK	Go to *Step 9*
9	If the noise is a click/tick or whine, replace the mo□ tor. Is the repair complete?	-	System OK	Go to *Step 10*
10	Reinstall the original motor. Is the problem still present?	-	Go to *Step 11*	System OK
11	1. Set the blower speed on maximum. 2. Check full hot to full cold temperature positions in the defrost, floor, and vent modes. Is the noise present in the defrost mode only?	-	Go to *Step 12*	Go to *Step 13*
12	1. Check the ducts for obstructions or foreign materials. 2. Remove any obstructions or foreign materials. 3. Check the floor/defroster door seals. 4. Repair or replace the door seals, as needed. Is the repair complete?	-	System OK	-
13	Is the noise present in the floor mode only?	-	Go to *Step 12*	Go to *Step 14*

Blower Noise (Cont'd)

Step	Action	Value(s)	Yes	No
14	Is the noise present in the vent mode only?	-	Go to *Step 15*	Go to *Step 16*
15	1. Check the ducts for obstructions or foreign materials. 2. Remove any obstructions or foreign materials. 3. Check the vent door seals. 4. Repair or replace as needed. Is the repair complete?	-	System OK	-
16	Is the noise present in all modes, but not all tem□ perature positions?	-	Go to *Step 17*	Go to *Step 18*
17	1. Check the temperature door seals. 2. Repair or replace, as needed. Is the repair complete?	-	System OK	-
18	1. Check the system for obstructions or foreign materials between the fan and the temperature door. 2. Repair or replace, as needed. Is the repair complete?	-	System OK	Go to *Step 2*

MAINTENANCE AND REPAIR

ON-VEHICLE SERVICE

TEMPERATURE CABLE ADJUSTMENT

Because the cable and the cable housings have fixed lengths, it is impossible to make a temperature cable adjustment.

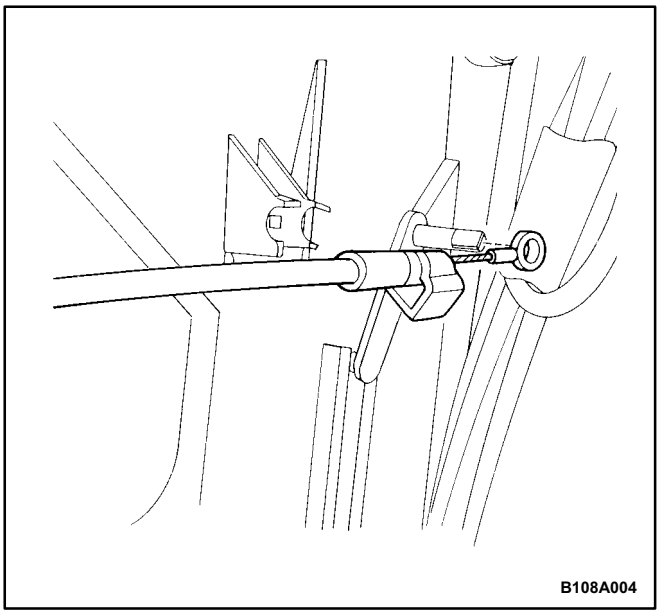
The heater/air distributor case linkage also cannot be adjusted.

If a malfunction is suspected, verify the proper operation of the controller and the mechanical doors for the heater/air distributor case assembly.

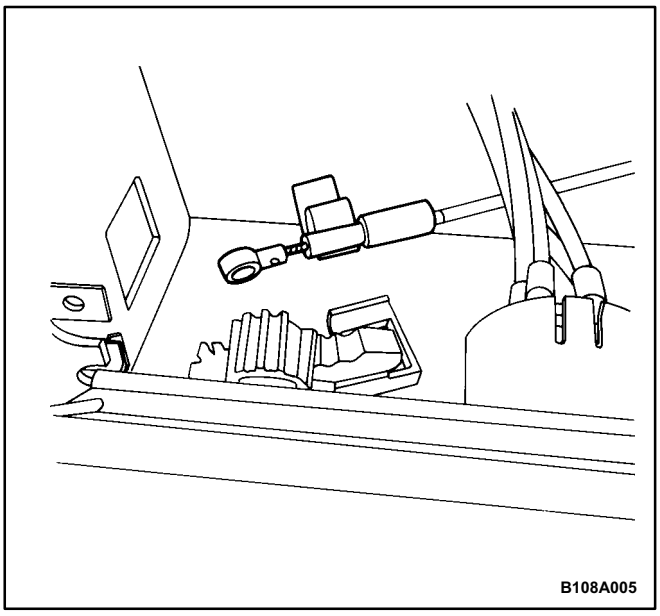
TEMPERATURE CONTROL CABLE

(Left-Hand Drive Shown, Right-Hand Drive Similar)

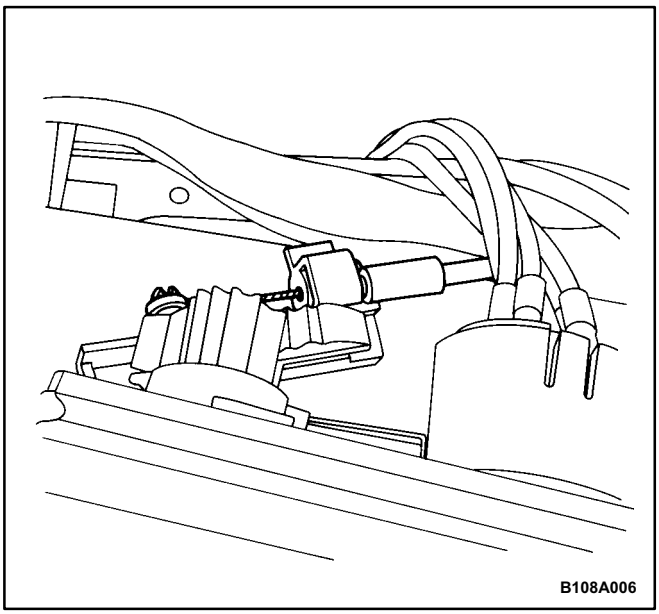
Removal Procedure


B108A004

1. Disconnect the negative battery cable.
2. Remove the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Slide the cable eyelet off the post on the temperature door lever.
4. Disconnect the cable retainer from the blower housing.

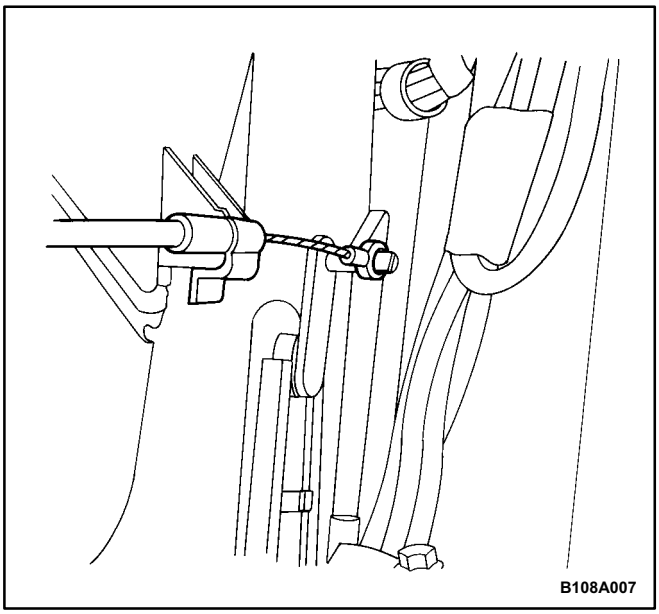

B108A005

5. Remove the audio system trim plate. Refer to *Section 9F, Audio Systems*.
6. Remove the four controller retaining screws.
7. Pull out the controller to provide clearance for removal of the temperature control cable.
8. Disconnect the temperature control cable eyelet from the post on the controller.
9. Snap the cable housing connector out of the slide position on the controller.



Installation Procedure

1. Install the temperature control cable eyelet to the post on the controller.
2. Snap the cable housing connector to the slide position on the controller.

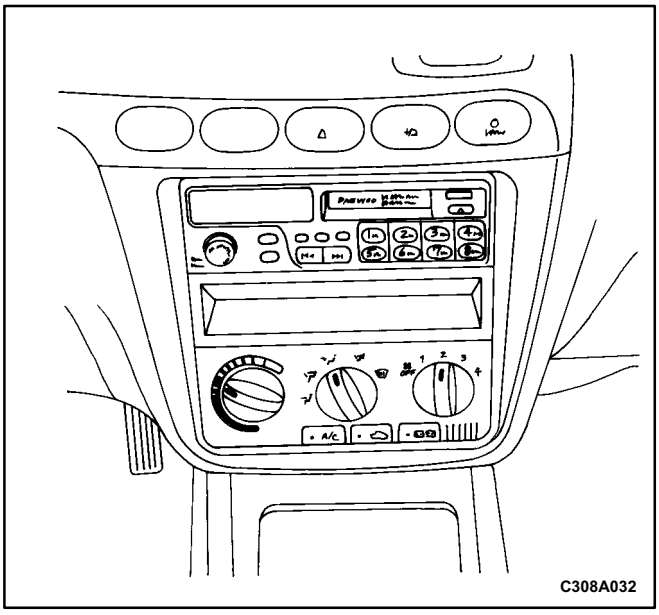


3. Gently insert the controller into position on the center console.
4. Install the four controller retaining screws.

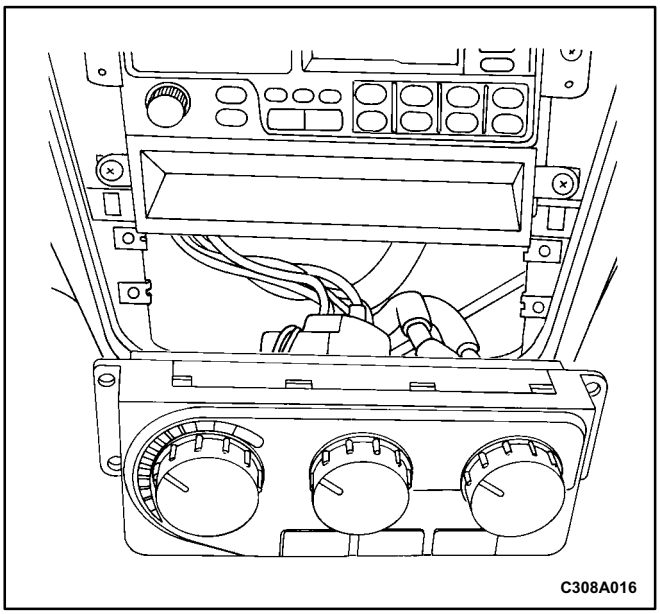
Tighten

Tighten the controller retaining screws to 4 N•m (35 lb•in).

5. Install the temperature control cable eyelet to the post on the temperature door lever.
6. Snap the cable retainer to the blower housing.



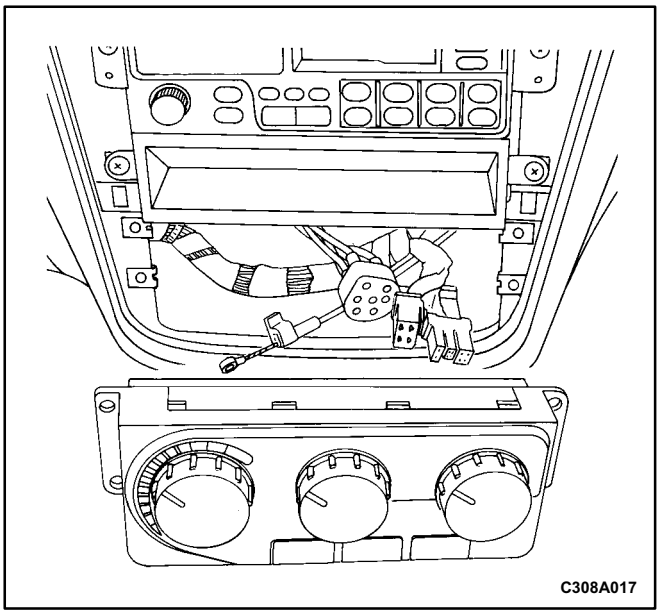
7. Move the temperature control to verify the smooth operation and function of the door and the cable.
8. Install the audio system trim plate. Refer to *Section 9F, Audio Systems*.
9. Connect the negative battery cable.
10. Operate the heating and cooling systems to verify proper function.
11. Install the glove box. Refer to *Section 9E, Instrumentation/Driver Information.*


C308A016

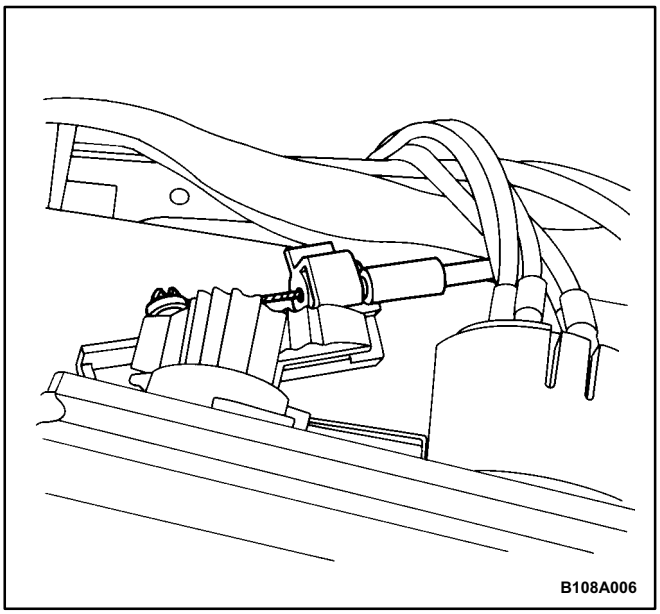
CONTROL ASSEMBLY

Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the audio system trim plate. Refer to S*ection 9F, Audio Systems.*
3. Remove the four controller retaining screws.
4. Pull out the controller to provide clearance for removal of the temperature control cable.

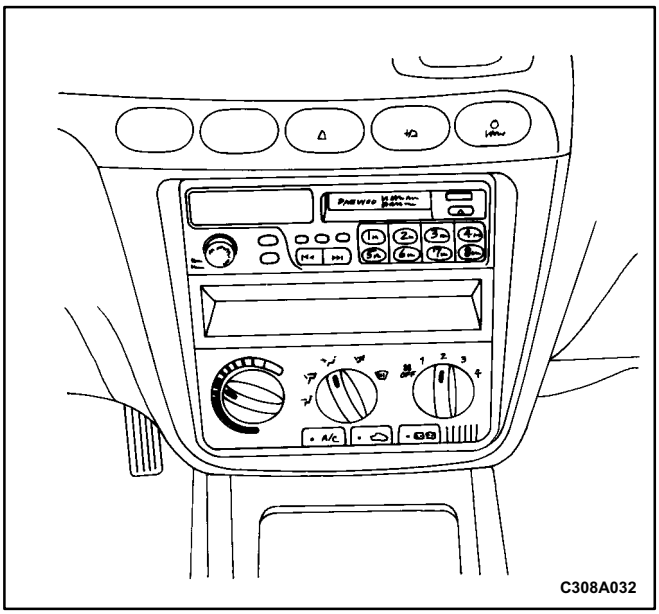

C308A017

5. Disconnect the temperature control cable by gently prying the cable eyelet from the post on the controller. Unsnap the cable housing from the mechanical slide. Note the location of the cable and the housing for ease of installation.
6. Disconnect the electrical connectors.
7. Remove the vacuum hose connection block from the mode control switch.


B108A006

Installation Procedure

1. Connect the vacuum hose connection block to the mode control switch.
2. Press the cable end eyelet onto the post on the controller.
3. Attach the mechanical cable housing to its original control position.
4. Connect the electrical connectors to the sockets on the back of the controller.

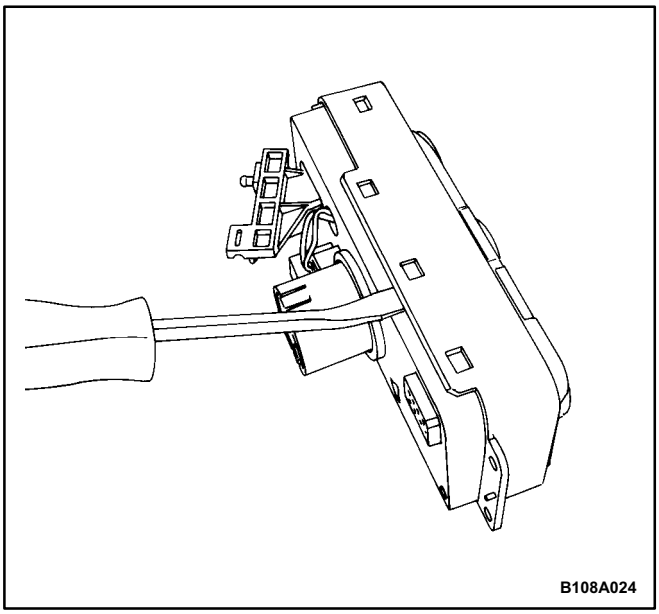

C308A032

5. Gently insert the controller into position on the center console.
6. Install the retaining screws.

Tighten

Tighten the controller retaining screws to 4 N•m (35 lb•in).

7. Connect the negative battery cable.
8. Confirm the proper operation of the controller by moving it through all of the controller's possible functioning positions.
9. Install the audio system trim plate. Refer to *Section 9F, Audio Systems.*

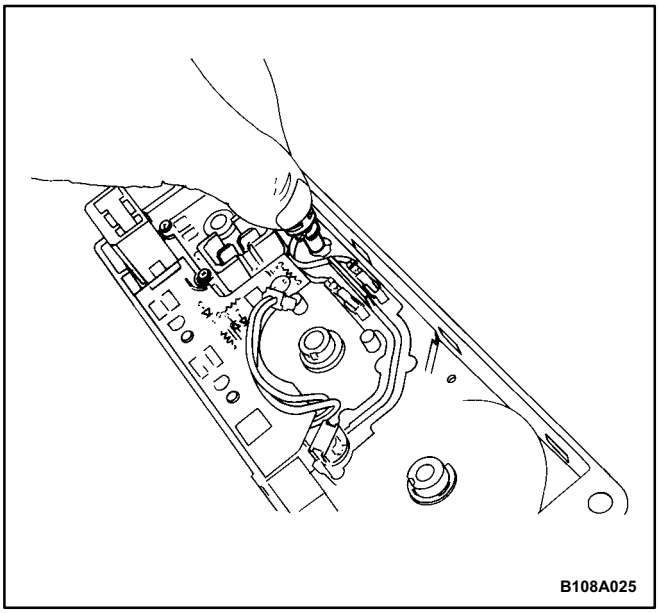

B108A024

CONTROL ASSEMBLY KNOB LIGHTING

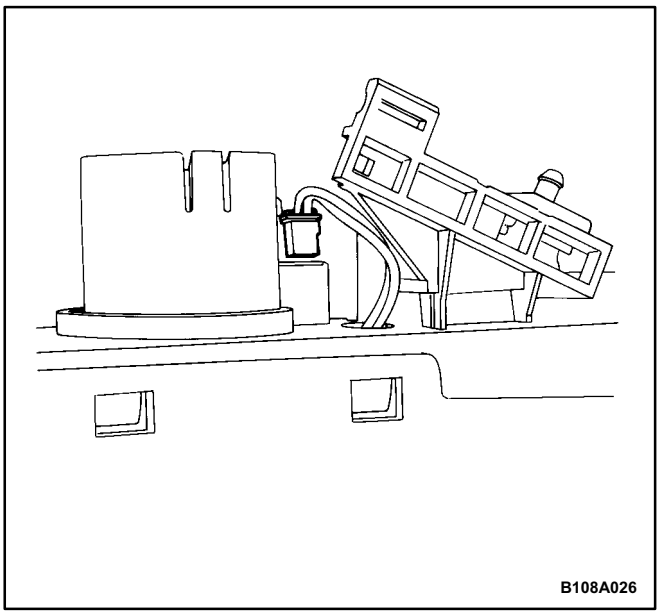
(Left-Hand Drive Shown, Right-Hand Drive Similar)

Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the heating and ventilation system control assembly. Refer to „Control Assembly” in this section.
3. Disconnect the small connector to the vacuum control switch on the rear of the assembly case.
4. Separate the control assembly case halves.

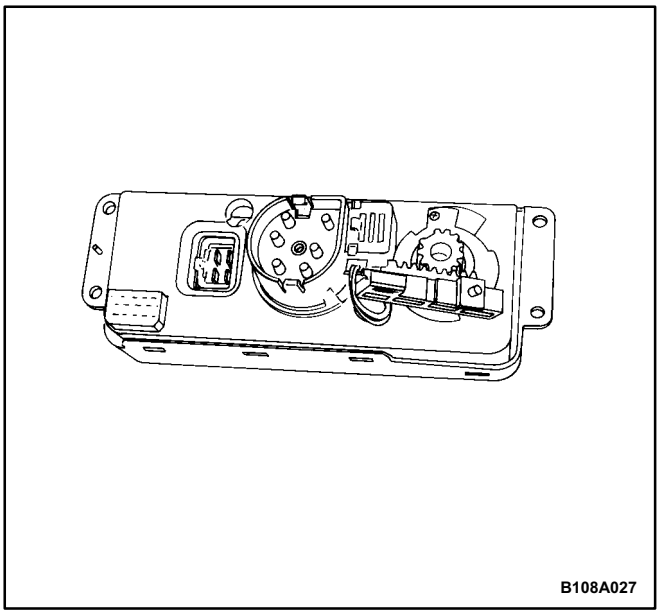

B108A025

5. Turn the bulb holder to the left and pull out the bulb.

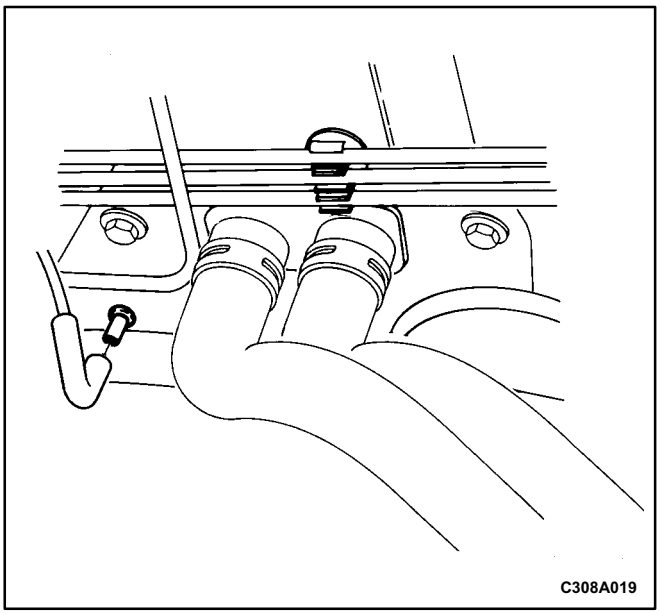

B108A026

Installation Procedure

1. Install the bulb into the holder and turn the bulb to the right.
2. Install the control assembly case halves.
   - Pass the connector for the vacuum switch through the hole in the rear assembly case part.
   - Be sure to align the flats on mating control shafts of the two case halves.
3. Install the connector into the vacuum control switch.


B108A027

4. Install the control assembly. Refer to „Control Assembly" in this section.
5. Connect the negative battery cable.
6. Check the knob light for proper operation.

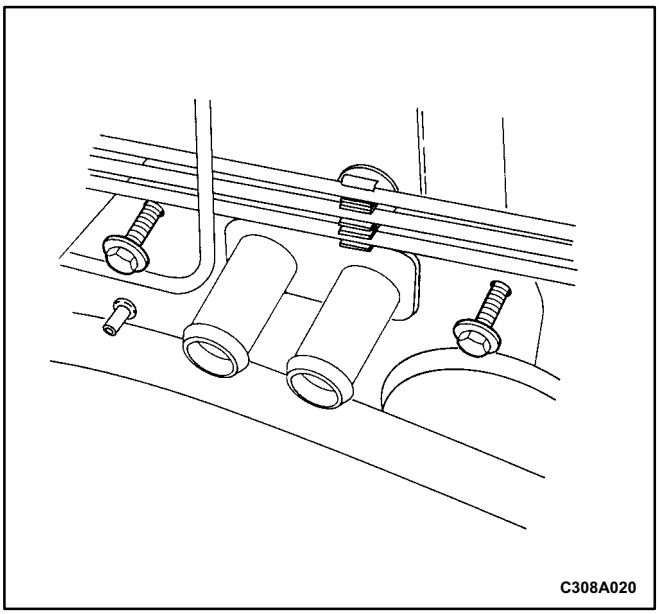

C308A019

HEATER/AIR DISTRIBUTOR CASE ASSEMBLY

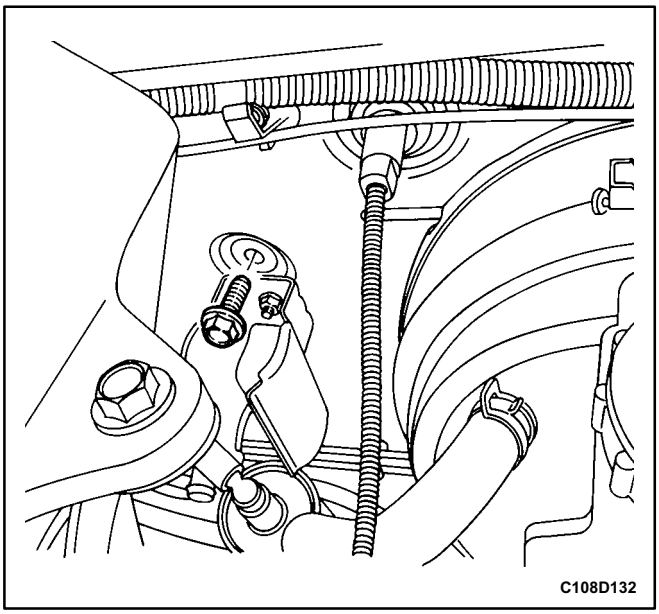
(Left-Hand Drive Shown, Right-Hand Drive Similar)

Removal Procedure

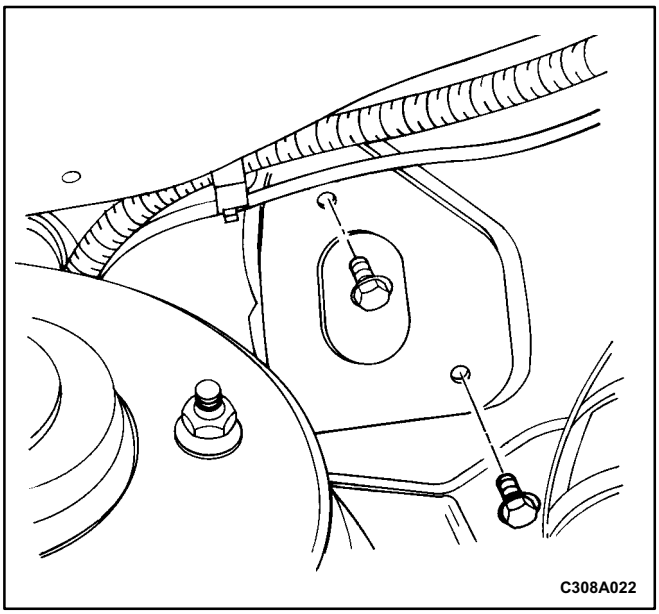
1. Disconnect the negative battery cable.
2. Remove the instrument panel carrier assembly. Refer to *Section 9E, Instrumentation/Driver Information.*
3. Drain the cooling system. Refer to *Section 1D, Engine Cooling*.
4. Twist the vacuum hose connection and remove it from beside the heater hoses.


C308A020

5. Compress the heater hose clamps at the fire wall and slide the clamps toward the engine.
6. Remove the two heater hoses from the core pipes at the fire wall.
7. Remove the screws that secure the heater/air distributor case assembly to the fire wall on either side of the heater hoses.


C108D132

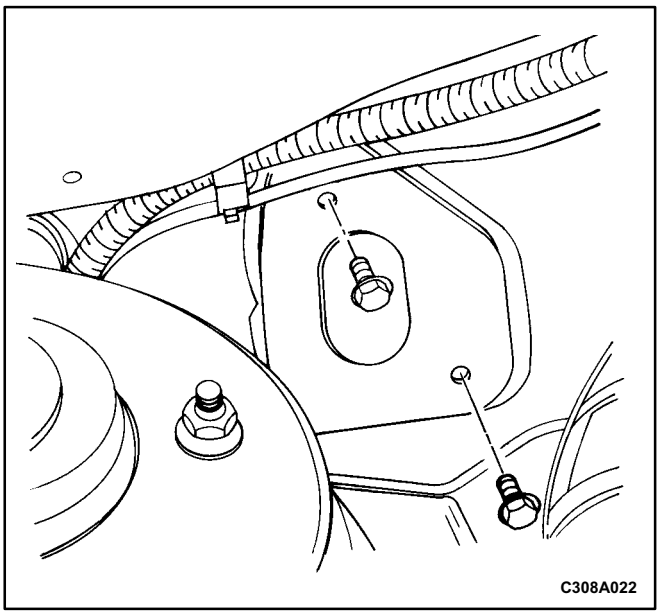
8. Remove the heater/air distributor case screw from above the fuel filter on the engine compartment side of the fire wall.


C308A022

9. Have an assistant support the heater/air distributor case from inside the vehicle.
10. Remove the heater/air distributor case screws from the connecting block mount on the engine compartment side of the fire wall. The heater/air distributor case assembly will start to drop.

Notice: To avoid damaging the heater core pipes, move the heater/air distributor case assembly straight away from the vehicle until the pipes are free from their openings in the fire wall.

11. Remove the heater/air distributor case assembly.



Installation Procedure

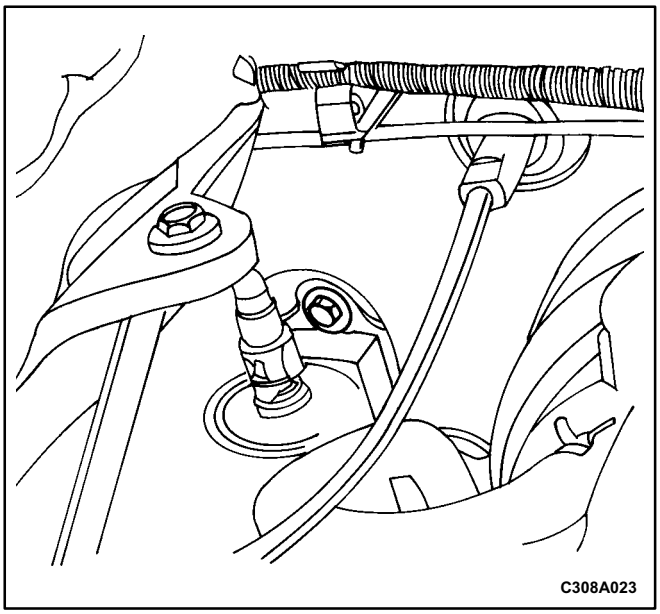
1. Position the heater/air distributor case assembly in the vehicle.

Notice: To avoid damaging the vehicle, make sure the heater core pipes do not contact the fire wall opening.

2. Slowly raise the heater/air distributor case assembly into position against the fire wall and hold it there while the screws are installed and tightened from the engine side of the fire wall.
3. Install the heater/air distributor case assembly screws at the connecting block mount on the engine compartment side of the fire wall.

Tighten

Tighten the heater/air distributor case assembly screws to 8 N•m (71 lb•in).

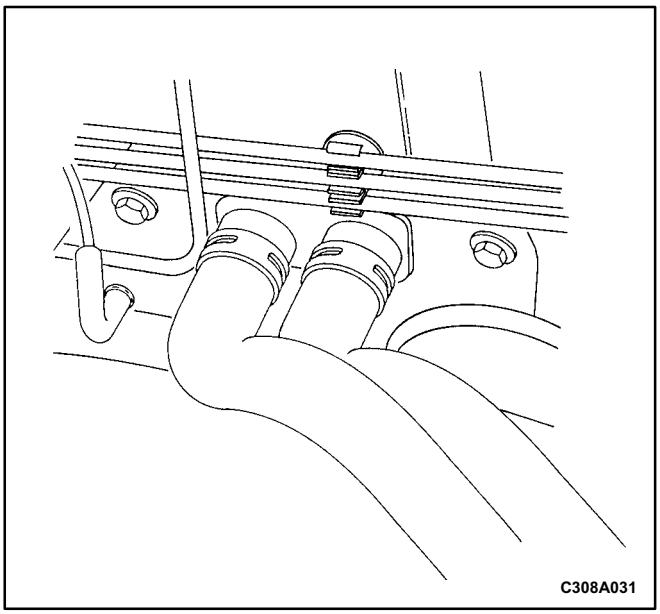


4. Align and install the heater/air distributor case assembly screw above the fuel filter.

Tighten

Tighten the heater/air distributor case assembly screw to 8 N•m (71 lb•in).

5. Replace the fuel filter into its mounting clamp.

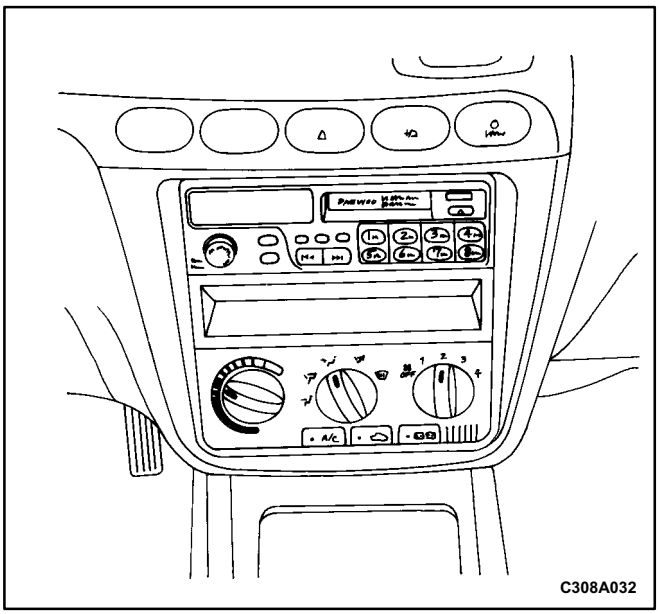


6. Install the heater/air distributor case assembly screws on either side of the heater core pipes.

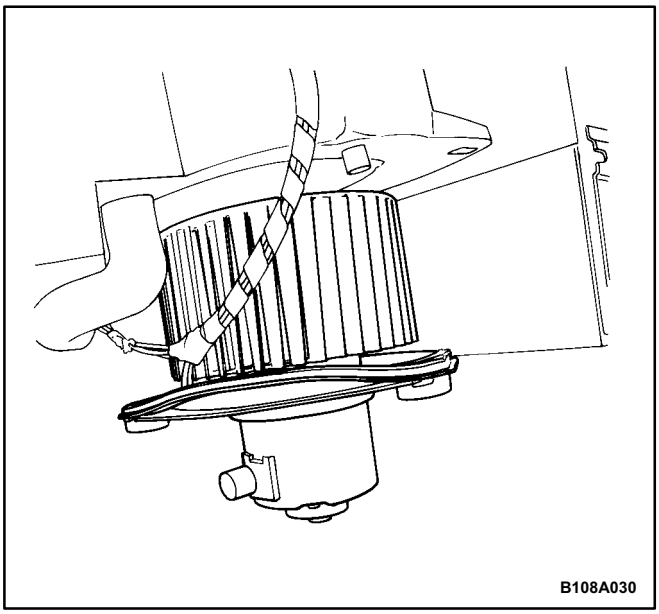
Tighten

Tighten the heater/air distributor case assembly screws to 8 N•m (71 lb•in).

7. Install the two heater hoses.
8. Slide the heater hose clamps into position.
9. Install the vacuum hose.


C308A032

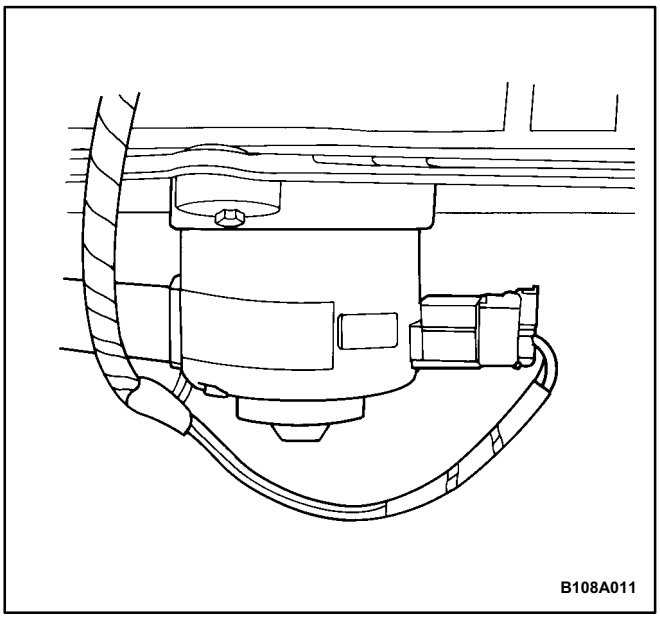
10. Install the instrument panel carrier assembly. Refer to *Section 9E, Instrumentation/Driver Information.*
11. Fill the cooling system. Refer to *Section 1D, Engine Cooling*.
12. Connect the negative battery cable.
13. Operate the controls to verify that the heating and ventilation systems function properly.


B108A030

BLOWER MOTOR

Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Remove the footwell upper cover. Refer to *Section 9E, Instrumentation/Driver Information*.
4. Disconnect the blower motor electrical connector.
5. Remove the blower motor cooling hose.
6. Remove the screws that secure the motor to the heater/air distributor case.
7. Remove the motor, the seal, and the shock mount pads from the heater/air distributor case by gently pulling the motor straight down and out.

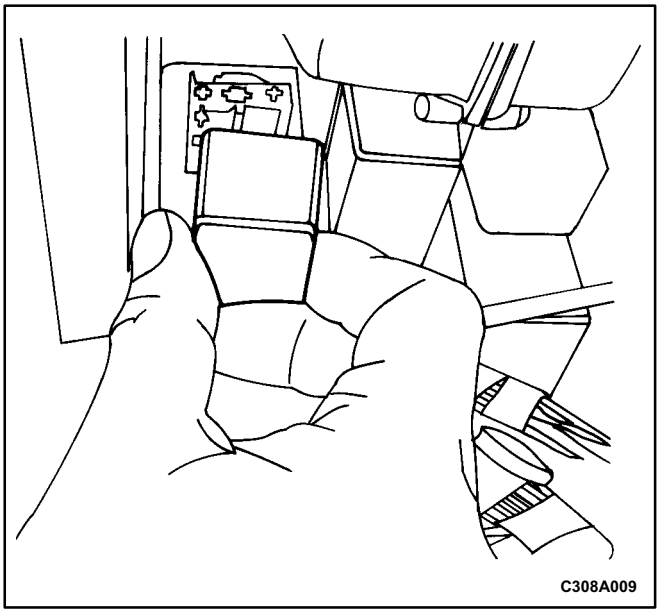


Installation Procedure

1. Install the blower motor and the seal with the shock mount pads in the heater/air distributor case. Hold the blower motor in position.
2. Install the screws to secure the blower motor to the heater/air distributor case.

   Tighten

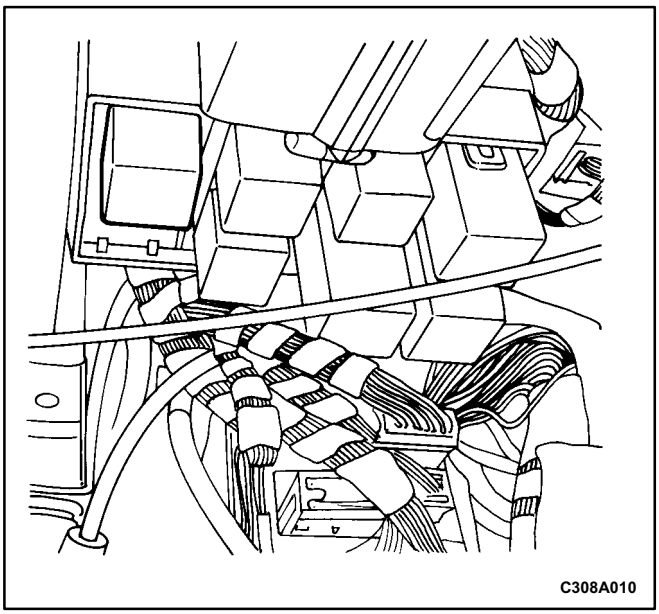
   Tighten the blower motor to heater/air distributor case screws to 6 N•m (53 lb•in).
3. Install the blower motor cooling hose.
4. Connect the blower motor electrical connector.
5. Connect the negative battery cable.
6. Confirm that the blower motor operates properly.
7. Replace the footwell upper cover. Refer to *Section 9E, Instrumentation/Driver Information*.
8. Replace the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.



HIGHBLOWER RELAY

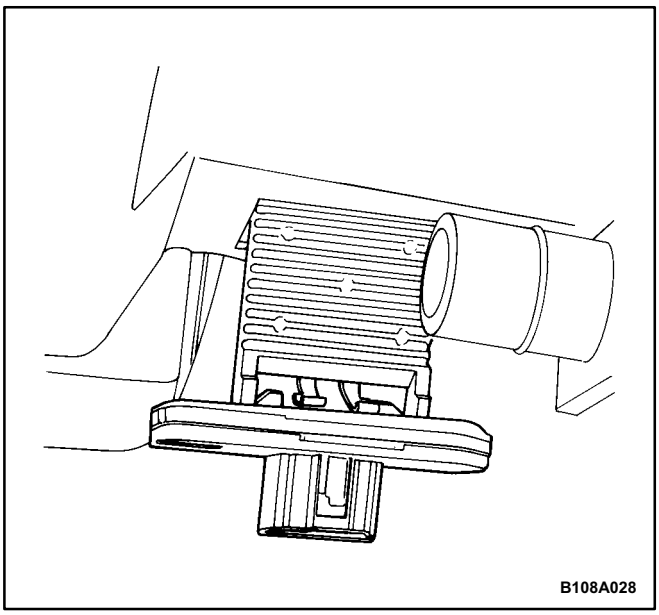
Removal Procedure

1. Disconnect the negative battery cable.
2. Locate the relay box under the instrument panel on the driver's side.
3. Pull out the high blower relay at the front of the relay box.


C308A010

Installation Procedure

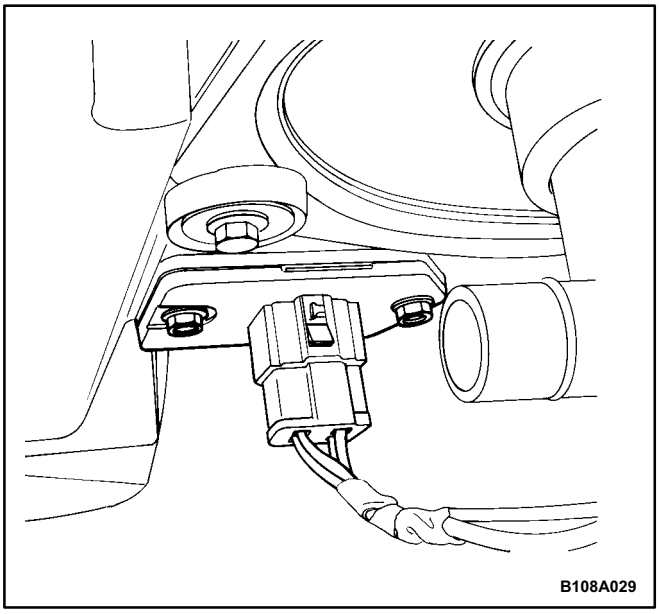
1. Align the high blower relay contacts with the relay terminal slots.
2. Push the relay firmly into base. The relay must be seated and flush with the base edge.
3. Connect the negative battery cable.


B108A028

BLOWER RESISTOR

Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Remove the footwell upper cover. Refer to *Section 9E, Instrumentation/Driver Information*.
4. Disconnect the electrical connector at the resistor.
5. Remove the mount screws from the resistor.
6. Remove the resistor from the heater/air distributor case by gently pulling the resistor downward.

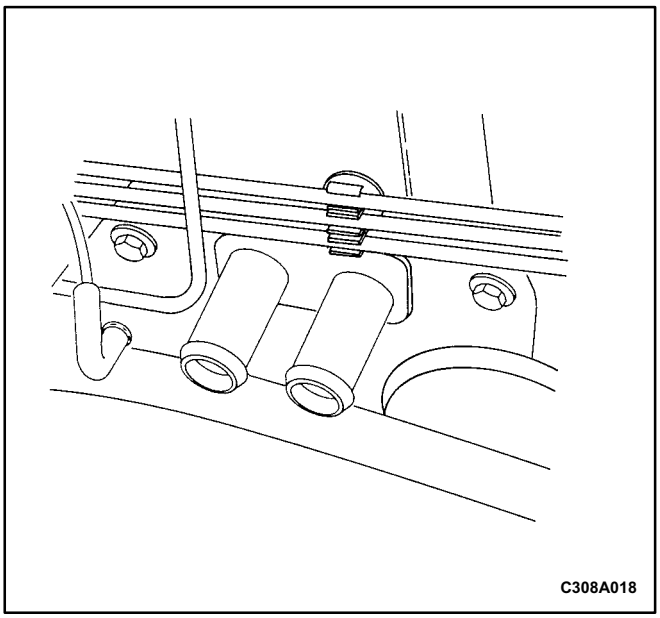

B108A029

Installation Procedure

1. Install the new resistor into the heater/air distributor case with the screws.

   Tighten

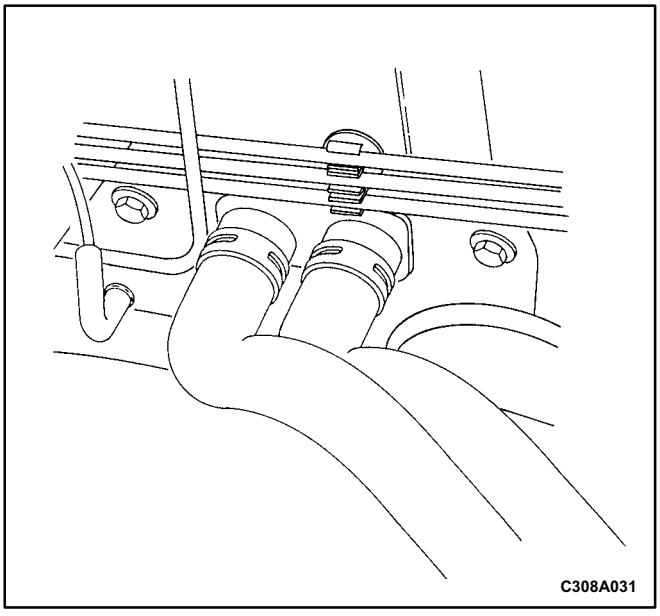
   Tighten the blower motor resistor screws to 6 N•m (53 lb•in).
2. Connect the electrical connector at the resistor.
3. Connect the negative battery cable.
4. Confirm the proper performance of the blower.
5. Replace the footwell upper cover. Refer to *Section 9E, Instrumentation/Driver Information*.
6. Replace the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.


C308A018

HEATER HOSES

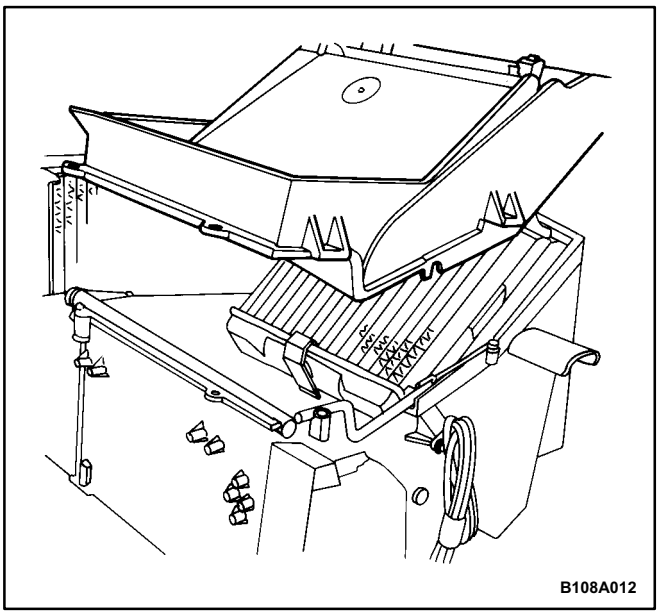
Removal Procedure

1. Partially drain the cooling system.
2. Raise and suitably support the vehicle.
3. Compress and slide rearward the two heater hose spring clamps at the fire wall.
4. Gently twist the hose from the left to the right and back again to loosen the bond between the hose and the tube.
5. Remove the end of the hose from the tube.
6. Repeat Steps 3 and 4 with the other hose.
7. Compress the heater hose spring clamp on the inlet coolant line and slide the clamp rearward.
8. Remove the heater hose from the vehicle.
9. Compress the heater hose spring clamp at the connection below the intake manifold and slide the clamp rearward.
10. Remove the heater hose from the vehicle.


C308A031

Installation Procedure

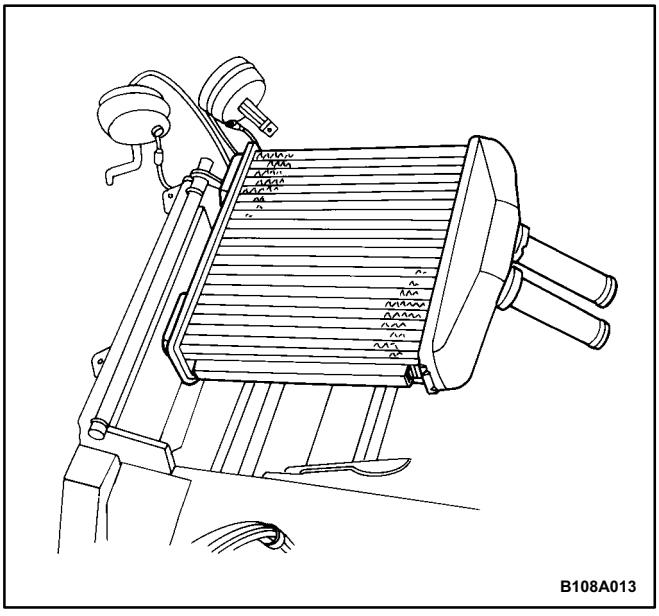
1. Install the left heater hose to the coolant inlet line fitting. Slide the end of the heater hose over the coolant fitting until the hose is seated.
2. Install the right heater hose to the fitting below the intake manifold. Slide the end of the heater hose over the fitting until it is seated.
3. Install and seat the other end of each heater hose.
4. Compress and slide the spring clamps into position on the heater hoses and release the tension.
5. Fill the cooling system.
6. Check the hoses for leaks.
7. Lower the vehicle.


B108A012

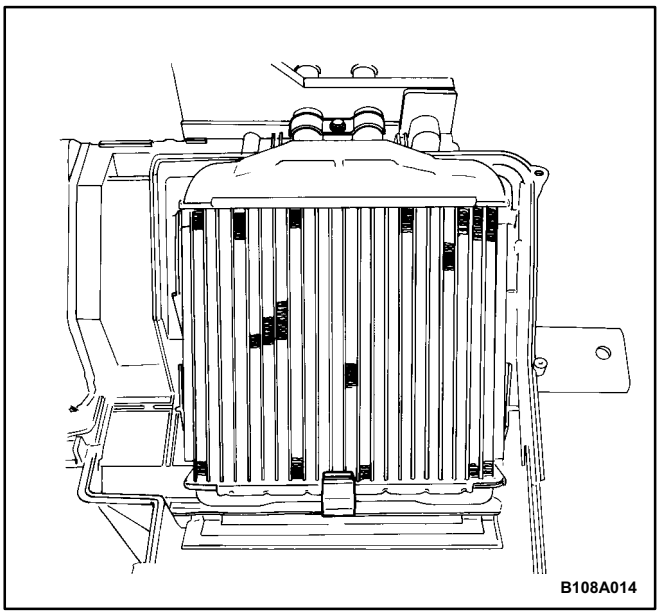
HEATER CORE

Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the instrument panel from the vehicle. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Remove the heater/air distributor case from the vehicle. Refer to „Heater/Air Distributor Case Assembly" in this section.
4. Disconnect the vacuum actuators from the vent/floor door and the defroster door.
5. Remove the vacuum actuators from the heater/air distributor case.
6. Remove the screws that secure the heater core cover to the heater/air distributor case assembly.
7. Slowly separate the lower heater core cover from the rest of the assembly.


B108A013

8. Remove the screw and the bracket clamp that secure the heater core lines to the case.
9. Remove the spring clamp that secures the heater core body to the case.
10. Remove the heater core from the case.


B108A014

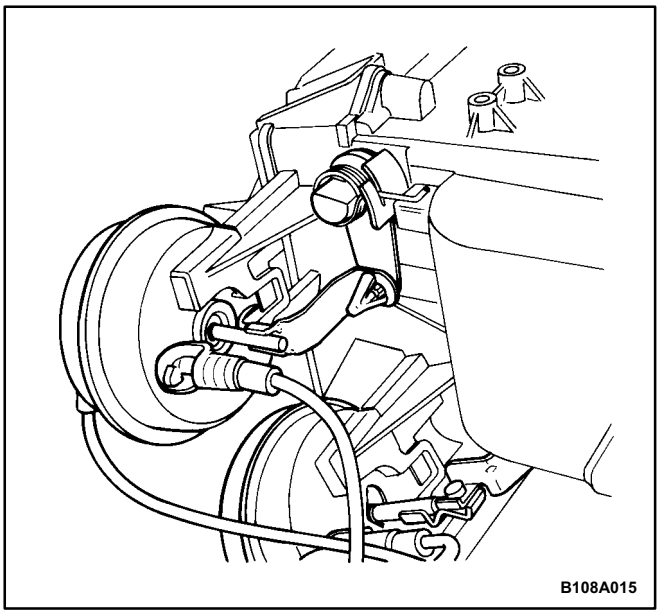
Installation Procedure

1. Install the heater core into the case.
2. Secure the heater core lines to the case with the retaining bracket clamp and the screw.

Tighten

Tighten the heater core retaining bracket screw to 3 N•m (27 lb•in).

3. Install the heater core body with the retaining spring clamp.

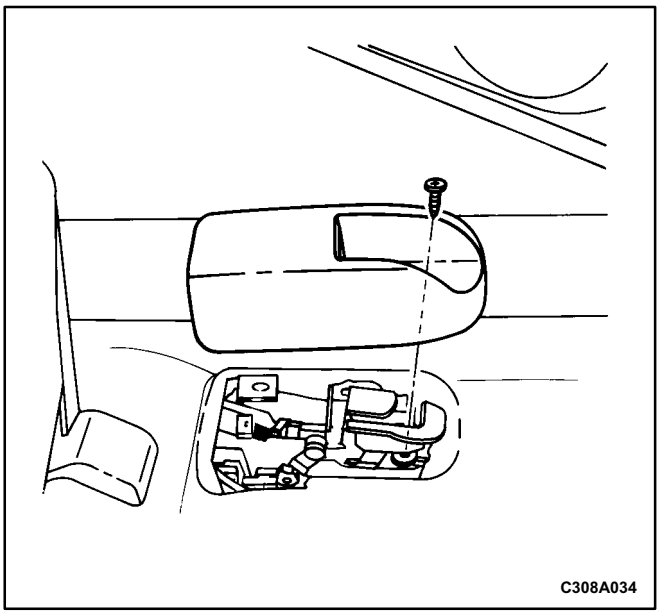

B108A015

4. Install the heater core cover.
5. Install and tighten the screws that secure the heater core cover to the heater/air distributor case assembly.

Tighten

Tighten the heater core cover screws to 3 N•m (27 lb•in).

6. Install the actuators for the vent/floor and the defroster doors.
7. Install the heater/air distributor case. Refer to „Heater/Air Distributor Case Assembly" in this section.
8. Install the instrument panel. Refer to *Section 9E, Instrumentation/Driver Information*.
9. Fill the cooling system.
10. Connect the negative battery cable.

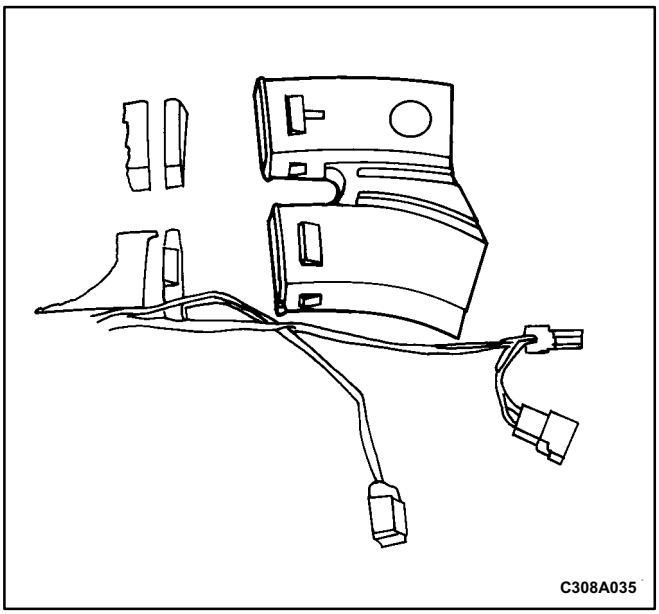

C308A034

REAR HEATING DUCT

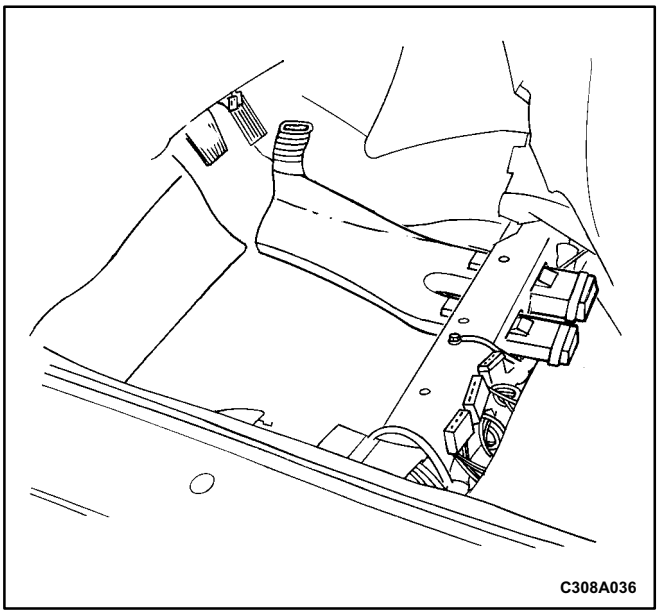
(Left-Hand Drive Shown, Right-Hand Drive Similar)

Removal Procedure

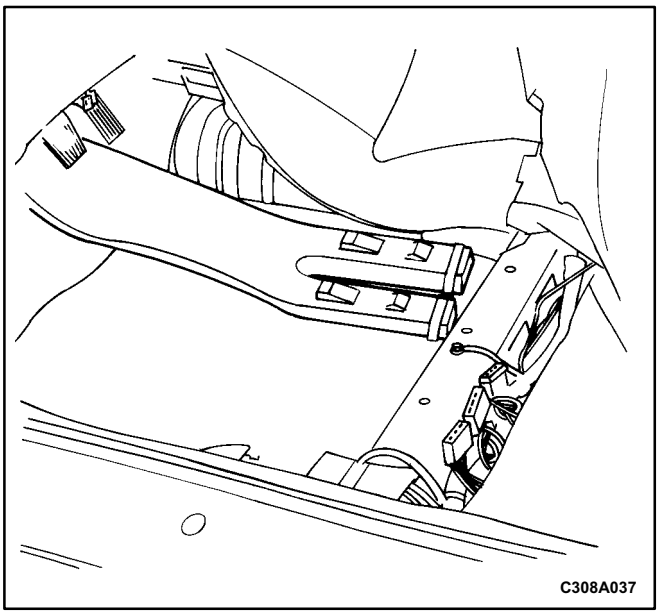
1. Remove the front seat. Refer to *Section 9H, Seats.*
2. If you are working on the driver side of the vehicle, remove the trim that covers the remote release handles for the fuel door and the rear deck lid, then remove the release handles.
3. Remove the front rocker trim plate. Refer to *Section 9G, Front Interior Trim.*



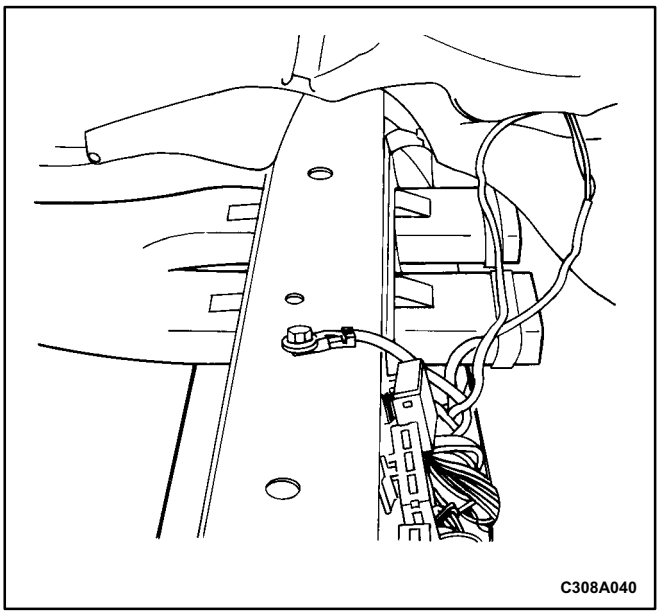
4. Remove the kick panel. Refer to *Section 9G, Interior Trim.*
5. Remove the rear heating duct outlet extension.



6. Roll the carpet away from the door and the fire wall, toward the center of the vehicle.
7. Roll the carpet pad toward the center of the vehicle. Uncover the entire heating duct, including the coupling to the air distributor case.

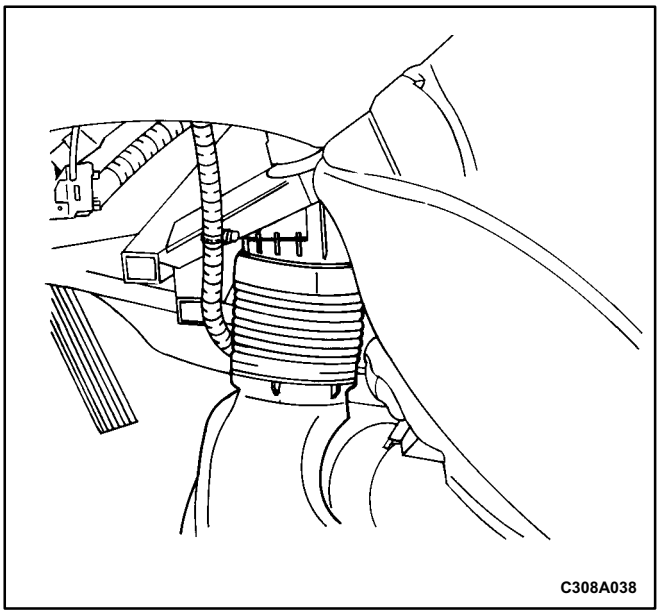


8. Compress and disengage the coupling from the air distributor case.
9. Move the front end of the rear heating duct away from the center of the vehicle.
10. Slide the rear heating duct forward to remove the duct outlets from the openings in the crossmember.
11. Remove the rear heating duct from the vehicle.

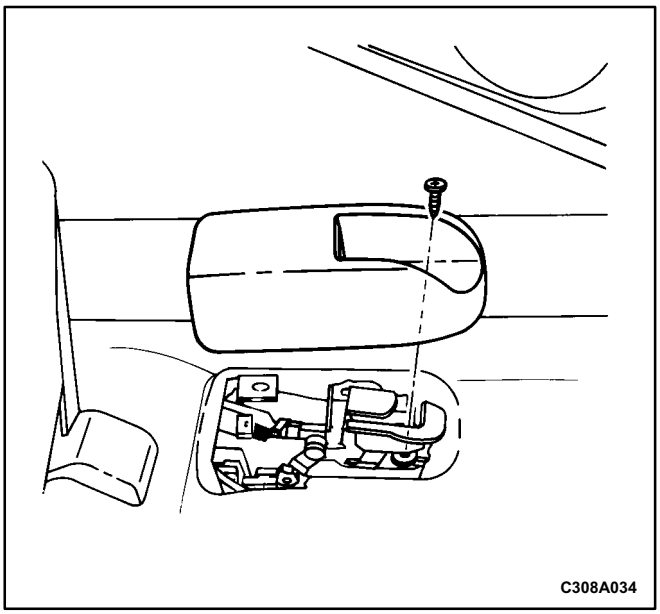

C308A040

Installation Procedure

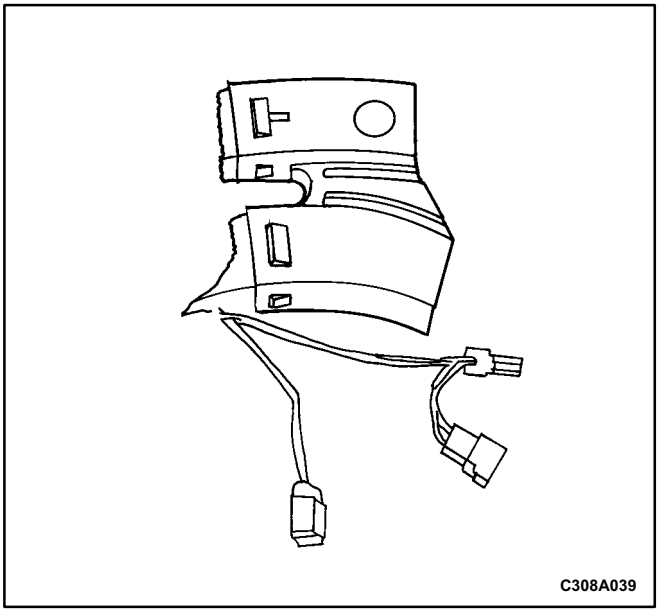
1. Insert the rear heating duct outlets into the holes in the crossmember. Push the duct outlets through the holes until they latch into place.


C308A038

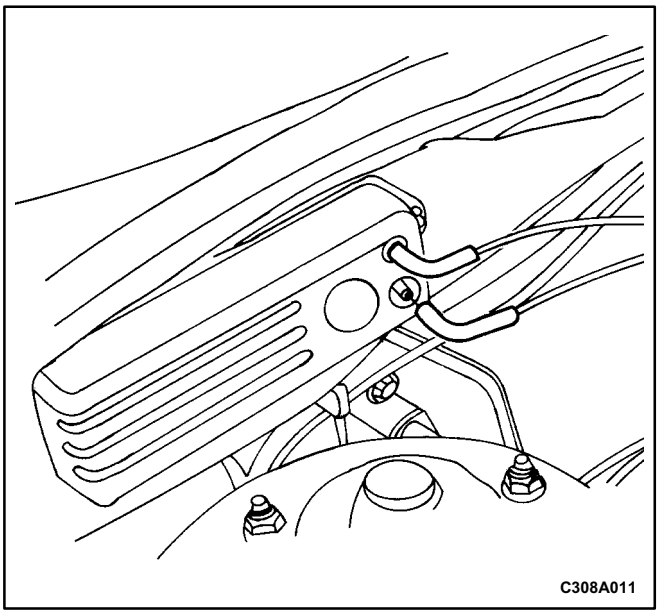
2. Place the air distributor case coupling onto the rear heating duct inlet.
3. Compress the coupling and maneuver the front end of the duct under the outlet of the air distributor case until you can engage the other end of the coupling onto that outlet. The duct should be against the vehicle central tunnel. The coupling should completely surround the air distributor case outlet and the rear heating duct inlet.


C308A034

4. Replace the carpet pad over the floor.
5. Replace the carpet over the floor.
6. Pass any electrical connectors through the opening and maneuver the opening over the rear heating duct outlets so they are exposed.
7. Smooth the carpeting and tuck the edges into place at the door opening in the kick panel area.
8. If you are working on the driver side of the vehicle, smooth the carpeting and tuck the edges into place in the area around the remote release handles for the rear deck lid and the fuel door. Then replace the cover over the remote release handles.


C308A039

9. Replace the kick panel. Refer to *Section 9G, Interior Trim.*
10. Replace the rocker trim plate. Refer to Section 9G, Interior Trim.
11. Replace the rear heating duct outlet extension.
12. Replace the front seat. Refer to *Section 9H, Seats.*

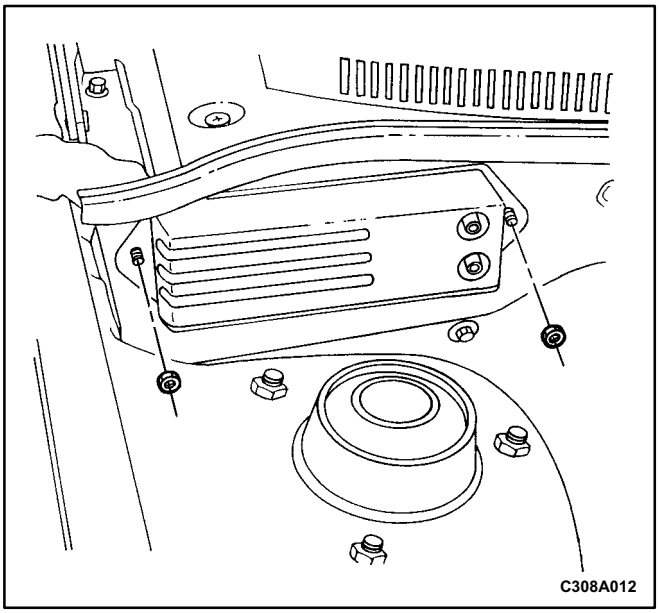

C308A011

HVAC CONTROL VACUUM TANK

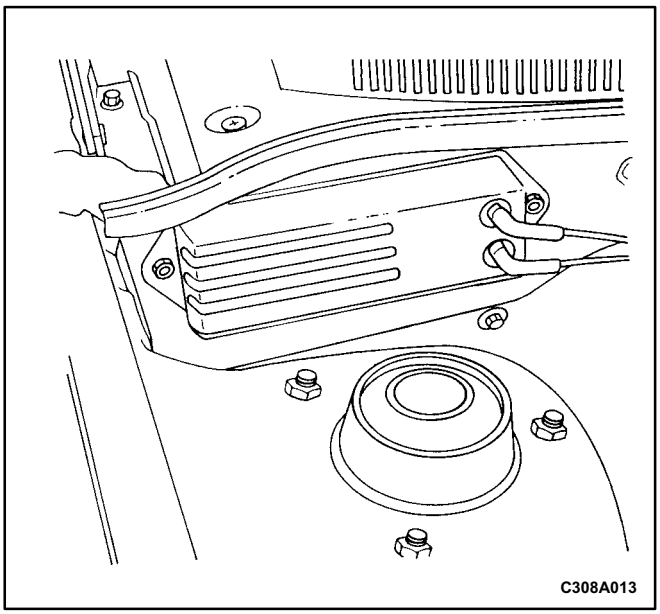
(Left-Hand Drive Shown, Right-Hand Drive Similar)

Removal

1. Disconnect the vacuum hoses that connect to the intake manifold and to the mode control switch.


C308A012

2. Remove the nuts that secure the vacuum tank to the fire wall.
3. Remove the vacuum tank from the fire wall.



Installation

1. Place the vacuum tank against the fire wall over the mounting studs.
2. Secure the tank with the mounting nuts.

Tighten

Tighten the vacuum tank mounting nuts to 4 N•m (35 lb•in).

3. Install the vacuum hoses.

Important: The line to the intake manifold goes onto the bottom port, marked **S**. There is a check valve to maintain the vacuum for heater control during temporary losses of vacuum in the intake manifold. If the connections are reversed, the controls will not function properly.

GENERAL DESCRIPTION AND SYSTEM OPERATION

HEATING AND VENTILATION SYSTEMS

The base heater system is designed to provide heating, ventilation, windshield defrosting, and side window defogging on the models equipped with side window defoggers.

The heater and fan assembly blower regulates the airflow from the air inlet for further processing and distribution.

The heater core transfers the heat from the engine coolant to the inlet air.

The temperature door regulates the amount of the air that passes through the heater core. The temperature door also controls the temperature of the air by controlling the mix of the heated air with the ambient air.

The mode door regulates the flow and the distribution of the processed air to the heater ducts and to the defroster ducts.

The console mounted heating and ventilation control panel contains three rotary control knobs and two push control knobs which operate as follows:

Rotary Temperature Control Knob

- Actuates by cable.
- Raises the temperature of the air entering the vehicle by rotation toward the right, or the red portion of the knob.

Rotary Mode Control Knob

- Actuates by vacuum.
- Regulates the air distribution between the windshield, the instrument panel, and the floor vents.

Rotary Blower Control Knob

- Turns ON to operate the blower motor at four speeds.
- Turns OFF to stop the blower.
- Operates completely independently from both the mode control knob and the temperature control knob.
- Changes the fan speed in any mode and at any temperature setting.

Rear Window Defogger Push Knob

- Controls the rear window defogger.
- Turns ON the rear window defogger when the push knob is depressed and the indicator lamp is illuminated.

Fresh Air Control Push Knob

- Operates by vacuum.
- Switches between recirculating the passenger compartment air and bringing outside air into the passenger compartment.
- Is normally in the fresh air mode.
- Illuminates the indicator lamp when in the recirculating mode.