

AIR BAG RESTRAINT SYSTEM

1994 Volvo 960

1994 ACCESSORIES/SAFETY EQUIPMENT
Volvo Air Bags

940 & 960

* PLEASE READ THIS FIRST *

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all WARNINGS and SERVICE PRECAUTIONS.

IDENTIFICATION

All models equipped with Supplemental Restraint System (SRS) can be identified by SRS Labels. SRS labels can be found at following locations: on inside of hood; on driver-side visor and passenger-side of dashboard; on driver-side "B" pillar; and decal on left side of windshield. Models equipped with SRS will also have an SRS warning light mounted in instrument gauge cluster light bar.

DESCRIPTION & OPERATION

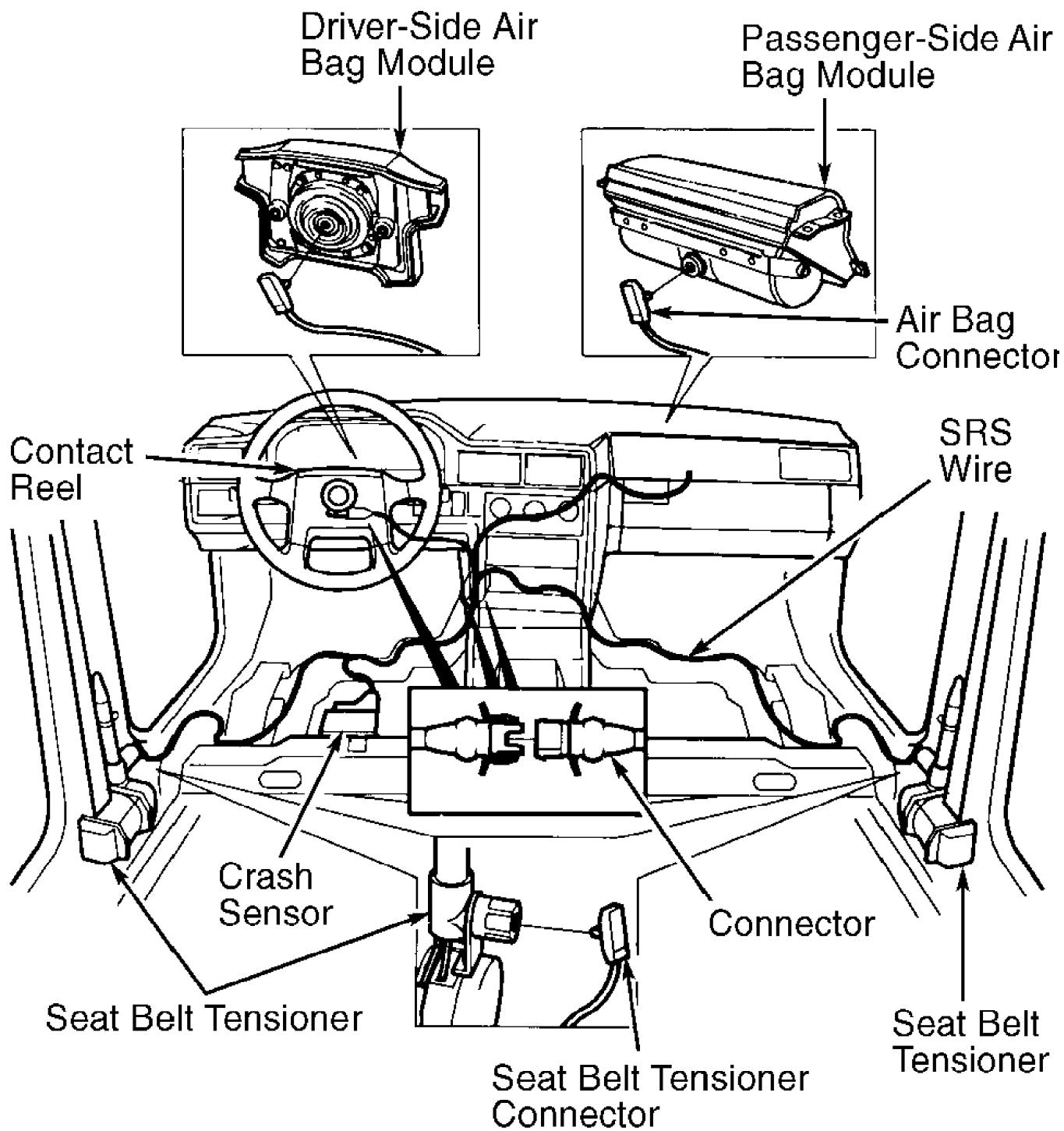
Supplemental Restraint System (SRS) is designed to operate when vehicle strikes a rigid or heavy object with enough force to activate SRS. Activation impact area is directly in front of vehicle and 30 degrees on either side of dead center. SRS is not designed to activate during a side or rear collision, a rollover, or frontal collision at low speed or with soft objects.

Main SRS components include a driver-side air bag/gas generator module, mounted to steering wheel; passenger-side air bag/gas generator module, mounted to instrument panel (960 only); contact reel (clockspring), mounted in steering column, under steering wheel; crash sensor and standby power unit, mounted under driver's seat; SRS warning light, mounted in instrument gauge cluster light bar. See Fig. 1. All models have an On-Board Diagnostic (OBD) system located within engine compartment. All models have pyrotechnical seat belt tensioners for driver and front passenger seats. Seat belt tensioners are mounted inside "B" pillars. For SRS to operate properly, 3-point seat belts must be worn.

If vehicle's deceleration rate, recorded by crash sensor, is sufficiently high, crash sensor delivers voltage signal to ignite gas generators in air bag module and in seat belt tensioners. When air bag module gas generator is ignited, a quantity of non-toxic nitrogen gas is produced, which fills air bag in a few hundredths of a second. Immediately after air bag inflates, gas is released through a ventilation hole on rear of air bag module. Entire sequence of air bag inflation and collapse takes about 0.2 seconds.

Seat belt tensioners are connected to seat belt reel by a cable. When seat belt tensioner is activated by crash sensor, belt is tightened about 4". In a collision, seat belt tensioners tighten seat belts instantly, holding occupant tightly against seat back.

NOTE: Volvo recommends air bag modules and seat belt tensioners be replaced every 10 years to maintain reliability.



93D75534

Fig. 1: Locating SRS Components
 Courtesy of Volvo Cars of North America.

AIR BAG MODULE

Each air bag module consists of an inflatable air bag and inflator unit. Gas generator and ignitor make up the inflator unit, which is mounted to rear of air bag module. A 2-pin electrical

connector with gold-plated terminals is mounted to inflator unit. If 2-pin connector is disconnected for any reason, a safety shorting spring inside 2-pin connector spreads open, touching both terminals. This prevents accidental air bag deployment by static electricity or careless handling.

CONTACT REEL (CLOCKSPRING)

Contact reel is a spirally wound wire coil (not a slip ring) mounted to steering column. This single-wire type contact reel design ensures the most reliable contact possible between air bag module assembly and crash sensor.

CRASH SENSOR

Crash sensor measures and records deceleration/collision force of vehicle to determine if air bag deployment is necessary. Crash sensor also functions as a diagnostic monitor, which continuously monitors SRS operation and records any faults in SRS. Crash sensor incorporates a piezoelectric sensor (to detect deceleration/collision force), microprocessors (to evaluate collision signal and control SRS deployment), a memory (to retain information for fault tracing if power supply fails) and a standby power unit (if battery power supply is lost).

Electrical sensor records combination of "G" force and change in speed (deceleration). Both high "G" force and prolonged deceleration are required to activate SRS. Consequently crash sensor cannot be activated by a hammer blow or other similar influence, which produces a high "G" force for a short time.

To ensure correct operation of crash sensor, crash sensor must be properly secured to floor and securely grounded. Crash sensor is grounded by a short Black wire connected to one of crash sensor's mounting screws. SRS is monitored continuously by microprocessors in the crash sensor, regardless of ignition switch position or engine operation. Crash sensor will illuminate instrument gauge cluster SRS warning light until a fault is corrected and crash sensor memory is cleared.

Crash sensor incorporates a standby power unit if normal power source (battery voltage) is interrupted. Standby power unit stores enough energy to deploy SRS within 100 milliseconds of battery power loss during a collision.

ON-BOARD DIAGNOSTIC UNIT

On-Board Diagnostic (OBD) unit, located within engine compartment, is a 2-part, interconnected unit with an "A" side and a "B" side. OBD unit is used to store fault codes, display fault codes and monitor SRS continuously by self-diagnostics. Fault codes are stored in crash sensor and displayed through OBD unit and/or SRS light on side "A" of OBD unit. See SELF-DIAGNOSTIC SYSTEM under DIAGNOSIS & TESTING.

OBD unit is positioned on left front of engine compartment and is controlled by crash sensor located under driver seat.

ELECTRICAL SYSTEM

SRS deployment harness connectors are Orange, except for passenger-side air bag module connector which is Violet. The SRS connectors between air bag module(s) and crash sensor have gold-plated terminals for maximum conductivity. These colored connectors contain a safety shorting spring in the male half of connector. When connectors are disconnected, safety shorting spring spreads open to touch both

terminals, preventing accidental deployment of air bag by static electricity or careless handling.

SRS WARNING LIGHT

When ignition switch is turned to ON position, SRS warning light will glow. If SRS faults are not detected, SRS warning light will go out after about 10 seconds or immediately after engine is started. If SRS detects a fault, warning light will remain on until fault is corrected and memory is cleared. If warning light fails to glow, bulb is faulty and/or a short exists in wire to bulb.

SEAT BELT TENSIONER

All models are equipped with pyrotechnical seat belt tensioners for driver and front passenger seats. If vehicle's deceleration rate, recorded by crash sensor, is sufficiently high, crash sensor delivers voltage charges to activate gas generators in seat belt tensioners. If seat belt tensioner gas generator is activated by crash sensor, a quantity of non-toxic nitrogen gas is produced. This gas pressure displaces plunger mounted in tensioner tube and tightens seat belt by tensioning cable connected to seat belt reel. In a collision, seat belt tensioners tighten seat belts instantly, holding occupant tightly against seat back.

SYSTEM OPERATION CHECK

Turn ignition switch to ON position (engine not running). If no fault codes are present, SRS warning light will go out after 10 seconds. If SRS is malfunctioning, SRS fault code will be stored in crash sensor memory during the following conditions:

- * SRS warning light does not glow.
- * SRS warning light does not go out after 10 seconds.
- * SRS warning light does not go out after engine is started.
- * SRS warning light comes on while driving.

If SRS warning light indicates a malfunction, enter self-diagnostics and retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM under DIAGNOSIS & TESTING.

Seat Belt Tensioner Inspection

There are 2 methods of determining seat belt tensioner activation. Start by pulling seat belt out and releasing it. If belt normally extends easily to full length, tensioner has not been activated. If either belt sticks, jerks when reeling and unreeling or fails to reel, both belts must be replaced. If seat belt tensioner activation can not be determined, turn ignition switch to OFF position. Remove "B" post inner panel. Insert a steel rod into tensioner tube to establish position of plunger. If plunger position is near bottom of tensioner tube, seat belt tensioner has not deployed. If plunger position is near top of tensioner tube, seat belt tensioner has been activated and both belts must be replaced.

SERVICE PRECAUTIONS

Observe these precautions when working with air bag systems:

- * Always disable SRS before performing any air bag repairs. See DISABLING & ACTIVATING AIR BAG SYSTEM.
- * Always ensure radio is off before disconnecting battery. This

- will prevent damage to radio microprocessor.
- * Always wear safety glasses and gloves when handling a deployed air bag module and/or seat belt tensioners. Air bag module and/or seat belt tensioners may contain sodium hydroxide deposits, which irritate skin.
 - * Use caution when handling sensors. Never strike or jar sensors. All sensors and mounting bracket bolts must be tightened carefully to ensure proper sensor operation. See TORQUE SPECIFICATIONS.
 - * Never apply power to SRS if any SRS crash sensor is not securely mounted to vehicle.
 - * Never make any measurement directly on air bag module(s) or seat belt tensioners. A fault in these components is determined by a process of elimination using Special Test Resistor (998 8695).
 - * To avoid accidental air bag deployment when trouble shooting SRS, DO NOT use self-powered electrical test equipment, such as battery-powered or AC-powered voltmeter, ohmmeter, etc. when air bag module(s) or seat belt tensioners are connected to SRS.
 - * When called for during diagnostics, use a DVOM with ohmmeter ranges of 2000 ohms and 200,000 ohms with a one-percent error tolerance.
 - * Wiring repairs should not be performed on any portion of SRS wiring harness.
 - * Always handle air bag modules with trim cover away from your body. Always place air bag module on workbench with trim cover facing up, away from loose objects.

DISABLING & ACTIVATING AIR BAG SYSTEM

WARNING: DO NOT disconnect crash sensor connector or standby power unit to disable system. This action could cause air bag to deploy.

Disabling System

1) Before proceeding, see SERVICE PRECAUTIONS. Before performing any repairs, turn ignition switch to OFF position. Disconnect and shield negative battery cable.

2) Locate and disconnect Orange air bag module and seat belt tensioner connectors and Violet passenger-side air bag module connector (960). DO NOT disconnect crash sensor connector or standby power unit to disable system. This action could cause air bag to deploy. See Fig. 1.

Activating System

After repairs are performed, ensure all wiring and component connectors are connected. Turn ignition switch to ON position. Connect negative battery cable. Ensure vehicle is not occupied when connecting battery cable. Ensure system is functioning properly. See SYSTEM OPERATION CHECK.

DISPOSAL PROCEDURES

WARNING: An undeployed air bag module or seat belt tensioner should never be disposed of without first being deployed. See SCRAPPED VEHICLE. If deployment is not possible, contact vehicle manufacturer for further instructions.

Several situations may arise requiring some form of disposal action, including:

- * Scrapping a vehicle containing a deployed air bag module(s) or seat belt tensioners.

- * Scrapping a vehicle with undeployed air bag module(s) or seat belt tensioners.
- * Disposal of undeployed, but electrically faulty air bag module(s) or seat belt tensioners.
- * Disposal of a deployed air bag module or seat belt tensioner.

DEPLOYED AIR BAG OR SEAT BELT TENSIONER

Deployed air bag module or seat belt tensioner can be disposed of as any other part. Handle air bag module(s) and/or seat belt tensioners with gloves, and wear safety glasses.

SCRAPPED VEHICLE

WARNING: An undeployed air bag module and/or seat belt tensioner cannot be disposed of without first deploying air bag and/or seat belt tensioner. If this is not possible through procedures outlined below, contact vehicle manufacturer for further instructions. Perform remote deployment outdoors. To avoid personal injury when an air bag is deployed, keep all personnel at least 20 feet away. See SERVICE PRECAUTIONS.

Air Bag Module

1) Move vehicle outdoors to a remote area, away from workshop and other personnel. Disconnect negative battery cable. Open all vehicle windows and doors. Ensure air bag module is secured to steering wheel or instrument panel (if equipped). Remove any loose articles from front seat, and ensure no occupants are inside vehicle.

2) Disconnect driver-side air bag module Orange connector or passenger-side Violet connector. See Fig. 1. Using two 20-foot long wires, splice one end of each wire to air bag side of Orange connector Orange and Orange/White wires. On passenger-side, connect wires to Violet connector Violet and Violet/White wires (960). While at least 20 feet from vehicle, connect both wires to 12-volt power source to trigger air bag inflator. Air bag should deploy.

3) If driver side air bag does not deploy, disconnect 20-foot wires from 12-volt power source. Remove air bag module from steering wheel. See AIR BAG MODULE under REMOVAL & INSTALLATION. Carefully cut off module connector bypassing contact reel. Splice both 20-foot wires to air bag module wires, and tape spliced connections.

4) Reinstall air bag module to steering wheel. While at least 20 feet from vehicle, connect both wires to 12-volt power source to trigger air bag inflator. Air bag should deploy.

Seat Belt Tensioner

1) Move vehicle outdoors to a remote area, away from workshop and other personnel. Disconnect negative battery cable. Open all vehicle windows and doors. Ensure seat belt tensioner is secured to "B" pillar. Remove any loose articles from front seat, and ensure no occupants are inside vehicle. Connect seat belt latch coupling to position shoulder harness across seat back.

2) Locate and disconnect Orange connectors. See Fig. 1. Using 2 wires, each 20 feet long, splice one end of each wire to terminals of male end of Orange connector. While at least 20 feet from vehicle, connect both wire ends to 12-volt power source to trigger seat belt tensioner. Seat belt tensioner should deploy. Repeat procedure for other seat belt tensioner.

3) Ensure seat belt tensioner has deployed. See SEAT BELT TENSIONER INSPECTION under SYSTEM OPERATION CHECK. If seat belt tensioner does not deploy, disconnect 20-foot wires from 12-volt power source. Remove seat belt tensioner trim cover from "B" pillar. See SEAT BELT TENSIONER under REMOVAL & INSTALLATION. See Fig. 6. Carefully remove connector from seat belt tensioner module. Strip back

about 1" of insulation of two wires from seat belt tensioner harness. Splice both 20-foot wire ends to seat belt tensioner wires, and tape spliced connections.

4) While at least 20 feet from vehicle, connect both wires to 12-volt power source to trigger seat belt tensioner.

POST-COLLISION INSPECTION

After vehicle is involved in a collision and SRS did not deploy, perform a system operation check to ensure proper SRS operation. See SYSTEM OPERATION CHECK. Repair as necessary.

Inspect following items and replace if damaged (even if deployment did not occur): knee bolster, instrument panel with air bag module frame, instrument panel frame, instrument panel speakers, steering wheel, sunroof, and windshield.

REMOVAL & INSTALLATION

WARNING: Failure to follow service precautions may result in air bag deployment and personal injury. See SERVICE PRECAUTIONS. After component replacement, always perform a system operation check to ensure proper SRS operation. See SYSTEM OPERATION CHECK.

AIR BAG MODULE

NOTE: Air bag module has a 10-digit identification number that must be used when ordering replacement module.

Removal & Installation (Driver-Side)

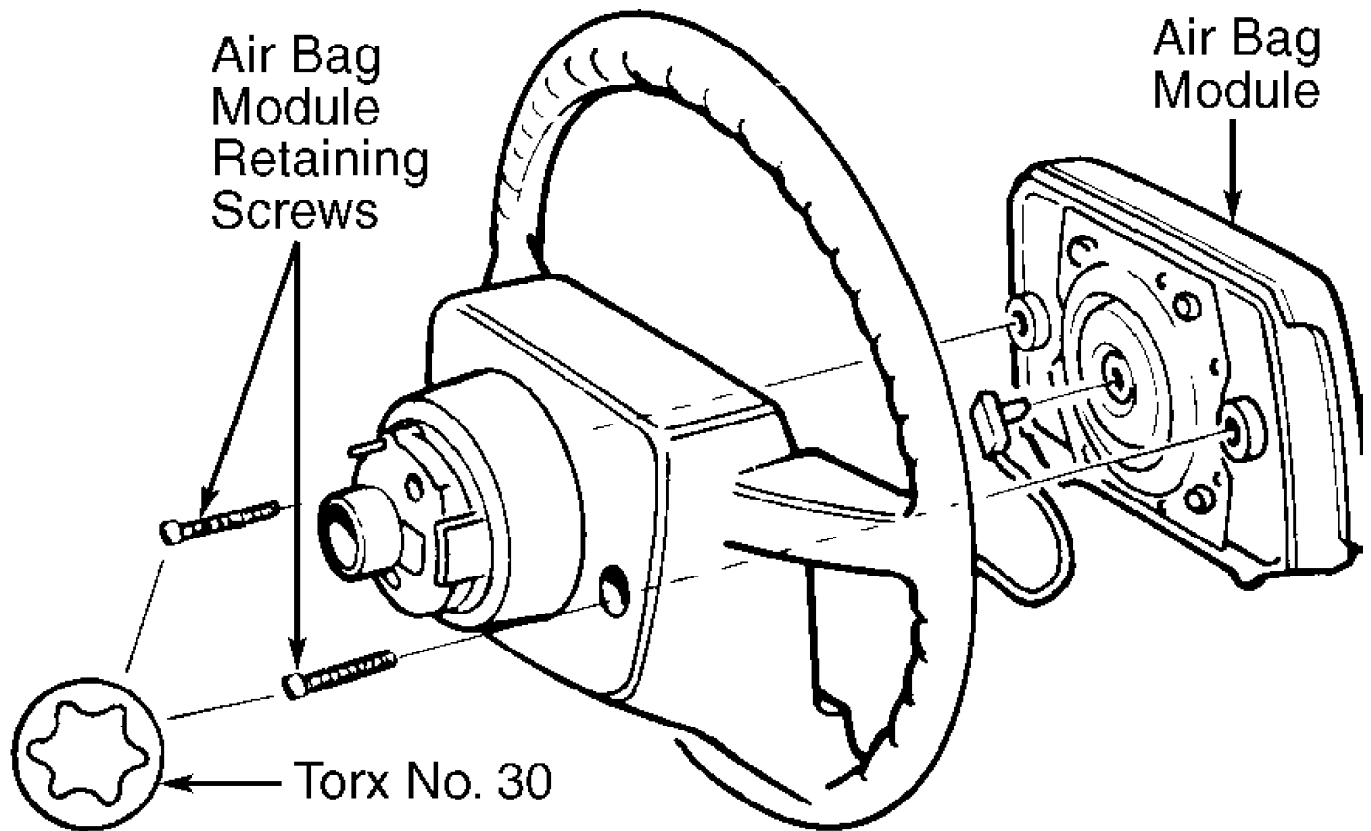
1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Turn ignition switch to disengage steering column lock. Remove steering wheel tilt adjuster (if equipped), steering column lower cover panel and knee bolster assembly.

3) Remove 2 Torx No. 30 screws from rear of steering wheel. See Fig. 2. Pull air bag module away from steering wheel just enough to disconnect wiring connector. Install Special Test Resistor (988 8695) in place of air bag module to prevent generation of fault codes.

4) To install, reverse removal procedure. Tighten air bag module bolts to specification. See TORQUE SPECIFICATIONS TABLE at the end of this article. Turn ignition switch to ON position. Connect negative battery cable. Ensure system is functioning properly. See SYSTEM OPERATION CHECK.

5) If an air bag module fault code exists after replacing air bag module, clear codes, and perform SYSTEM OPERATION CHECK again. If SRS warning light still indicates a malfunction, enter self-diagnostics and retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM under DIAGNOSIS & TESTING.



91112961

Fig. 2: Removing SRS Air Bag Module
 Courtesy of Volvo Cars of North America

Removal & Installation (Passenger-Side)

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Remove driver-side soundproofing panel and center console. Disconnect Violet connector and cut cable tie. Disconnect glove box lid arms. Using a screwdriver between each arm and side of lid, pry out arms. Remove glove box screws and compartment. Remove 4 air bag module screws and disconnect air bag module connector.

3) Remove side defroster outlet screw caps and screws. Pivot 4 vent nozzles downward and pull out. Remove both nozzles and air duct from right side. Remove loudspeaker grilles and loudspeakers. Disconnect loudspeakers connectors. Remove 11 instrument panel retaining screws and disengage cover panel from upper part of frame above center console.

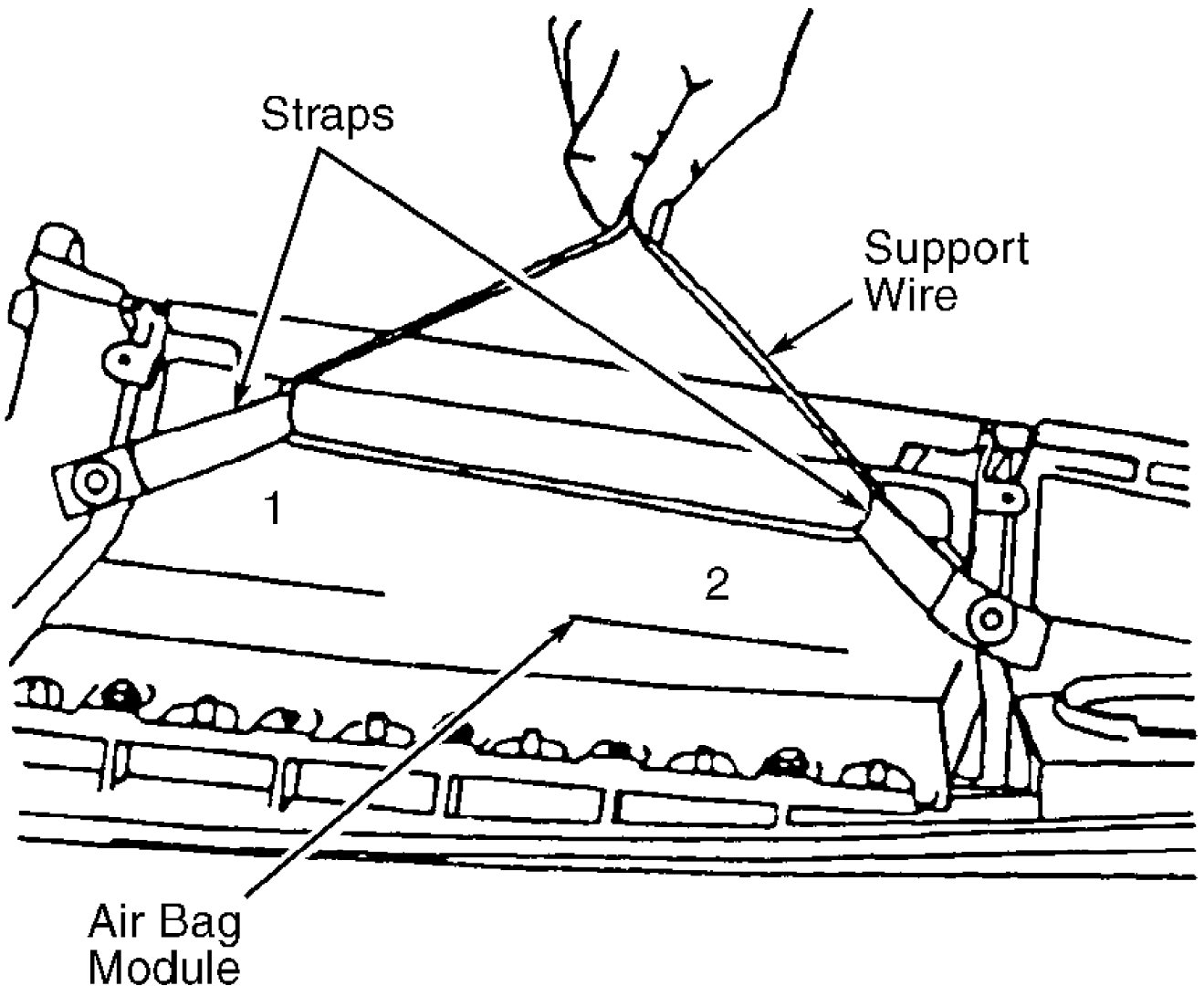
4) Using tamper-resistant Torx bit TX 20, remove 8 air bag module retaining Torx screws. Remove 6 special nuts using locking pliers and remove air bag module.

5) Inspect for excessive foam under felt tape at positions No. "1" and "2". See Fig. 3. If there is excessive foam, remove tape, cut foam so there will not be a bump in instrument panel cover. Reinstall tape over foam. Tightly support air bag module with electrical wire in straps ensuring correct position of straps. See Fig. 3. Incorrect position of straps will not allow instrument panel cover to lay smoothly.

6) Keeping support wire stretched tightly, put air bag module

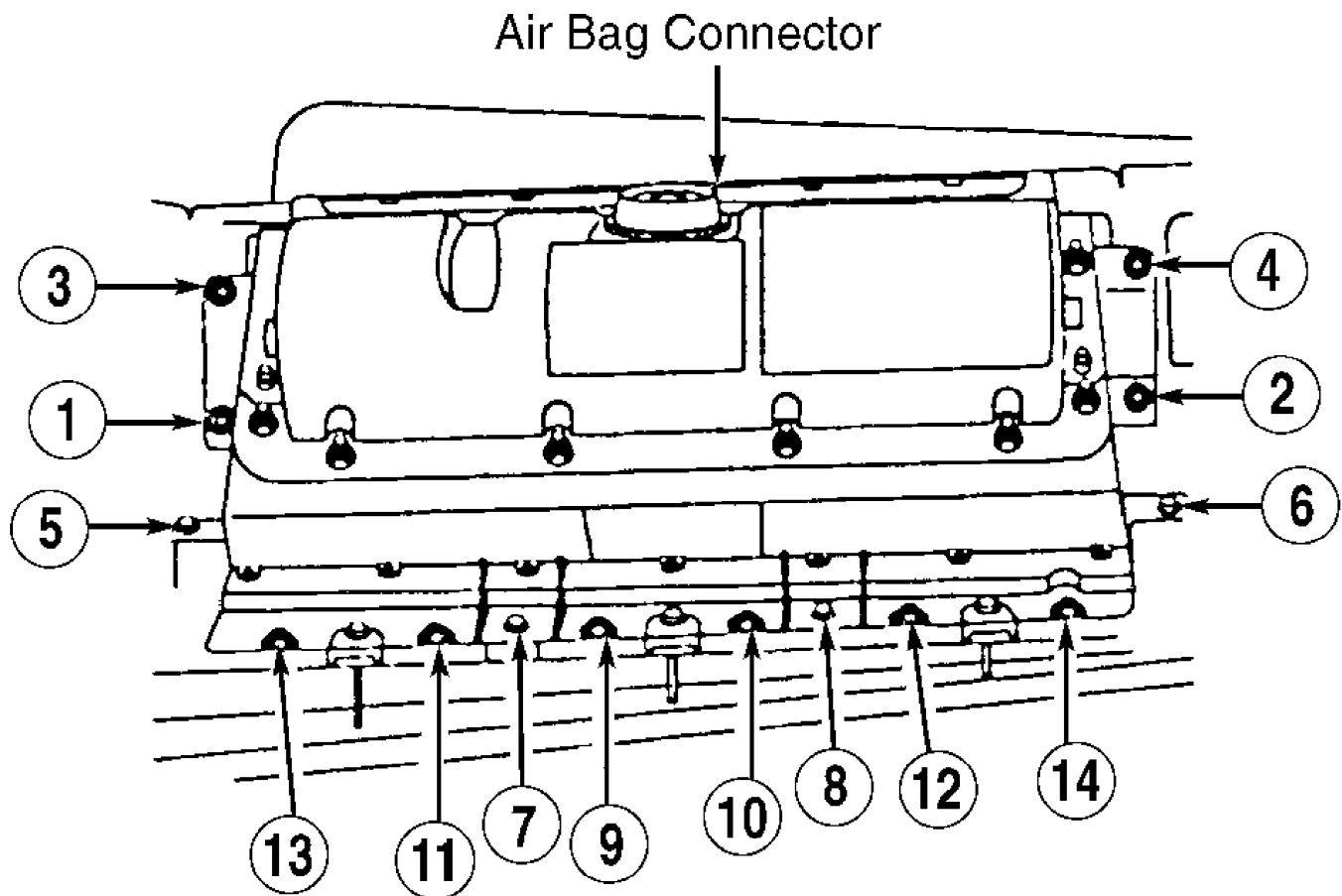
into position. Install Torx screws into positions No. "1" and "2" to secure air bag in place and remove wire. See Fig. 4. Without tightening, install remaining Torx screws and special nuts. Positions No. 1-8 are Torx screws and positions 9-14 are special nuts. Install a support under air bag lid to ensure instrument panel cover and air bag lid are level. Tighten Torx screws and nuts in numbered sequence. See Fig. 4. See TORQUE SPECIFICATIONS TABLE at the end of this article. To complete installation, reverse removal procedures.

7) Turn ignition switch to ON position. Connect negative battery cable. Ensure system is functioning properly. See SYSTEM OPERATION CHECK. If an air bag module fault code exists after replacing air bag module, clear codes, and perform SYSTEM OPERATION CHECK again. If SRS warning light still indicates a malfunction, enter self-diagnostics and retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM under DIAGNOSIS & TESTING.



93E75535

Fig. 3: Installing Passenger-Side Air Bag Module
Courtesy of Volvo Cars of North America.



93F75536

Fig. 4: Passenger-Side Air Bag Module Tightening Sequence
 Courtesy of Volvo Cars of North America.

CRASH SENSOR & STANDBY POWER UNIT

WARNING: DO NOT touch sensor terminal pins, which may carry an electrostatic charge.

NOTE: Crash sensor has an 8-digit identification number that must be used when ordering replacement sensor.

Removal

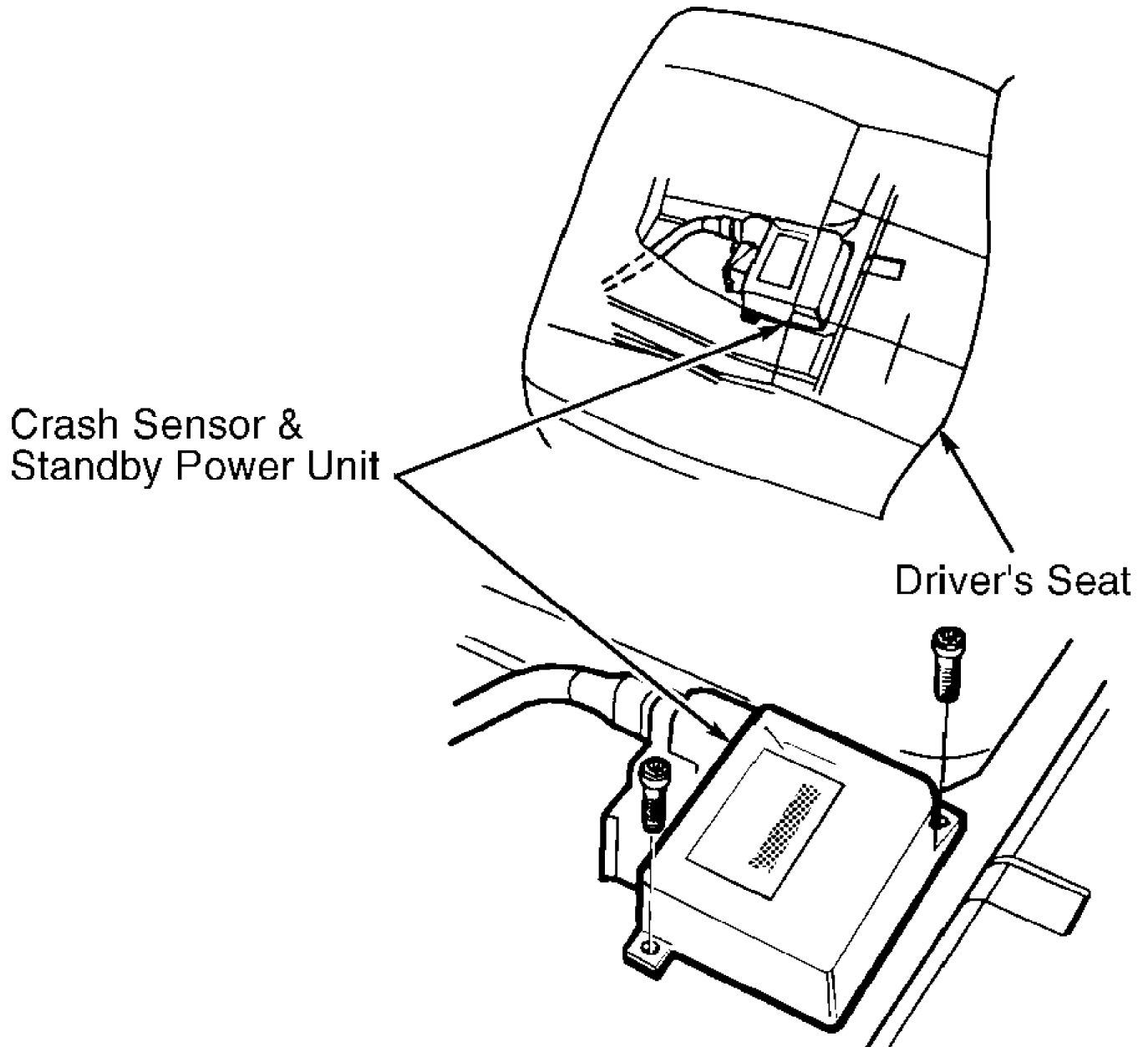
1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Crash sensor is located under driver's seat in same bracket with standby power unit. See Fig. 6. Unbolt driver's seat guide rails from floor. Disconnect seat controls and tilt seat rearward. Lift carpet, remove crash sensor unit and disconnect connector.

Installation

1) To install, reverse removal procedure. Install crash sensor using original bolts. Because ground terminal is secured by one mounting bolt, ensure ground terminal is not damaged when tightening bolts. Tighten all bolts to specification. See TORQUE SPECIFICATIONS TABLE at the end of this article. Ensure all SRS connectors are connected.

2) Turn ignition switch to ON position and connect negative battery cable. Check SRS warning light to ensure system is functioning properly. See SYSTEM OPERATION CHECK. If fault code exists after replacing crash sensor, clear codes, and perform SYSTEM OPERATION CHECK again. If SRS warning light still indicates a malfunction, enter self-diagnostics and retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM under DIAGNOSIS & TESTING.



93G75537

Fig. 5: Locating Crash Sensor & Standby Power Unit
Courtesy of Volvo Cars of North America.

SEAT BELT TENSIONER

NOTE: If air bag deployed, replace both seat belt tensioners

(including belts) since seat belt tensioners are ignited at same time as air bag.

Removal

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Push front seat as far forward as possible. Remove "B" post inner panel. Remove door sill molding and seat side pocket. Remove seat belt tensioner bolts and plunger tube Torx screw from "B" post. Disconnect tensioner connector. See Fig. 6.

Installation

1) To install, reverse removal procedure. Ensure SRS wire is positioned so not to become pinched or cut. Tighten all bolts to specification. See TORQUE SPECIFICATIONS TABLE at the end of this article. Ensure all SRS connectors are connected.

2) Activate SRS system. Check SRS warning light to ensure system is functioning properly. See SYSTEM OPERATION CHECK. If fault code exists after replacing new seat belt reel assembly, clear codes, and perform SYSTEM OPERATION CHECK again. If SRS warning light still indicates a malfunction, enter self-diagnostics and retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM under DIAGNOSIS & TESTING.

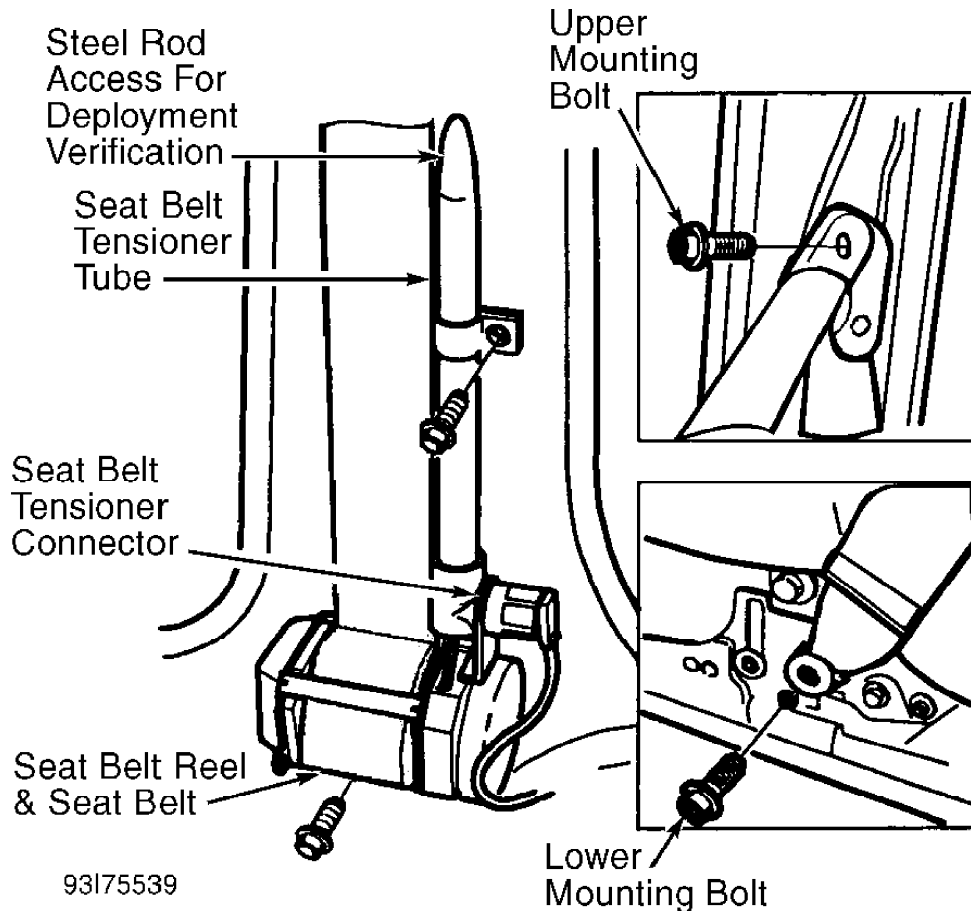


Fig. 6: Removing Passenger-Side Seat Belt Reel & Tensioner
Courtesy of Volvo Cars of North America.

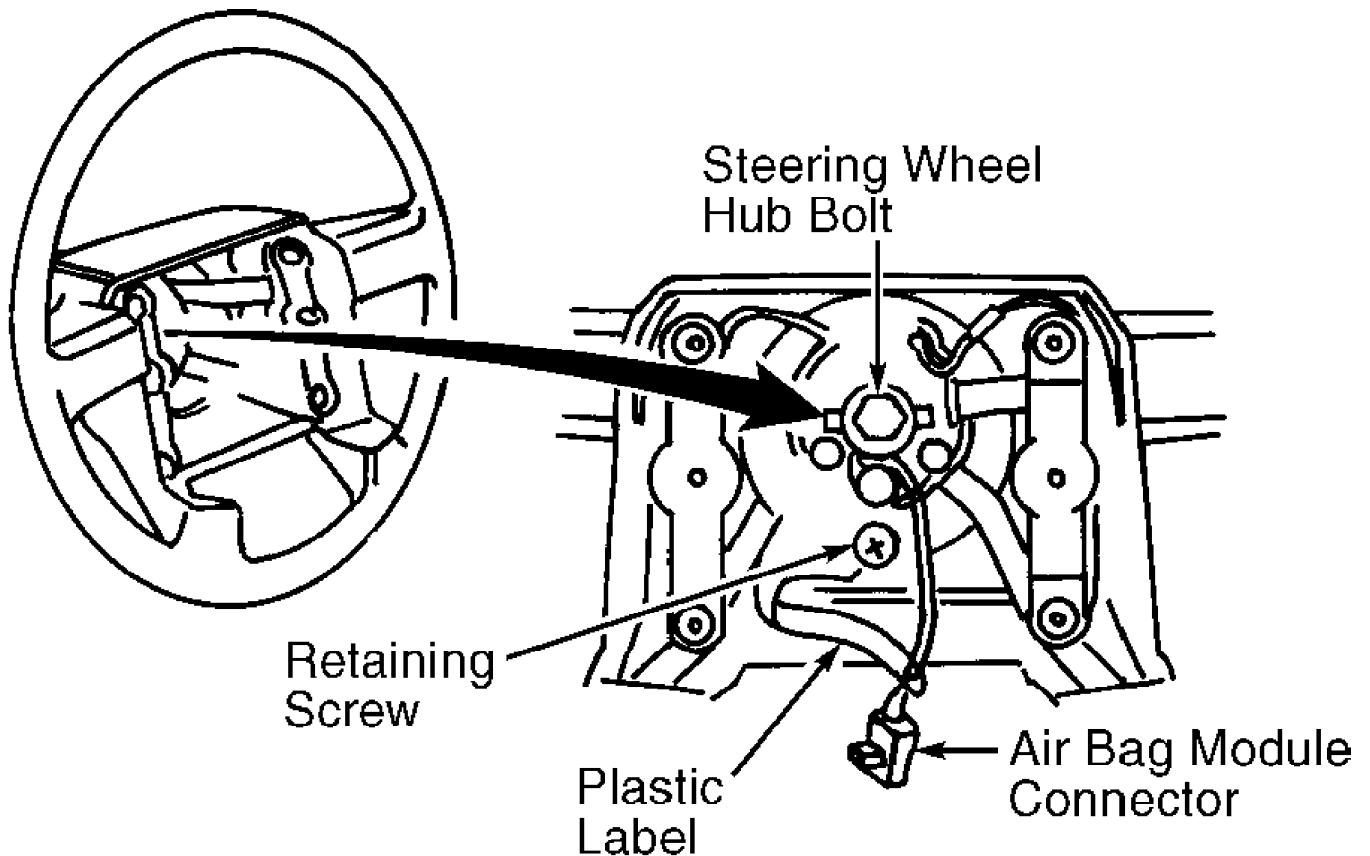
NOTE: If air bag deployed during a collision, contact reel and steering wheel must be replaced.

Removal

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

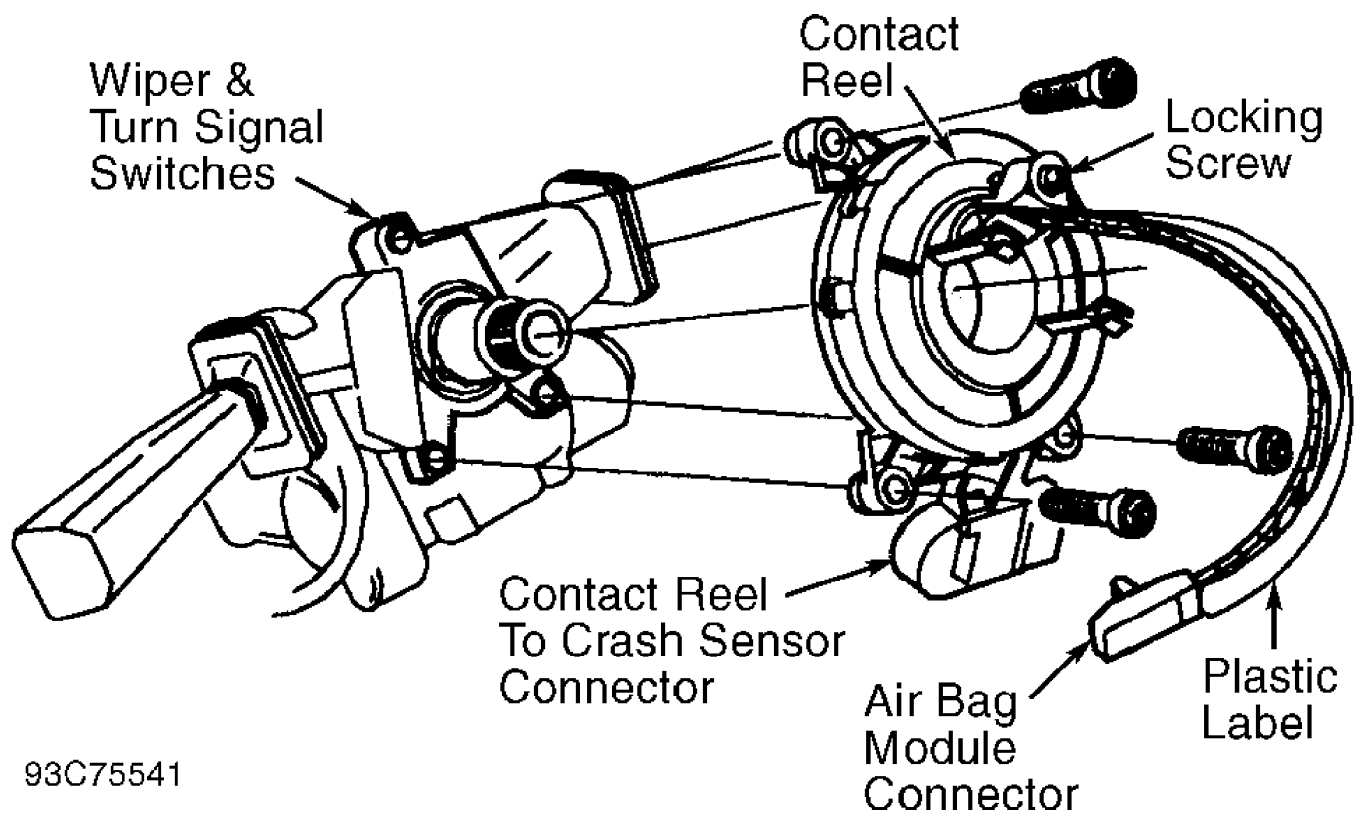
2) Place front wheels in straight-ahead position. Mark steering wheel-to-column location for reinstallation reference. Remove air bag module. See AIR BAG MODULE.

3) Remove steering wheel hub retaining bolt. Remove locking screw at end of plastic warning label from steering wheel, leaving screw attached to plastic warning label. See Fig. 7. Install locking screw into contact reel and tighten. Carefully pull steering wheel from column, allowing wiring and plastic warning label to pass through hole in steering wheel.



93B75540

Fig. 7: Removing Steering Wheel
Courtesy of Volvo Cars of North America.



93C75541

Fig. 8: Removing Contact Reel
 Courtesy of Volvo Cars of North America.

4) Remove steering column upper and lower covers. See Fig. 8. Locate and disconnect contact reel wiring harness connector from behind instrument gauge cluster. See Fig. 1. Disconnect horn connector at rear of contact reel. Remove contact reel retaining screws. Pull contact reel off steering shaft using care to guide wiring up through steering column.

Installation

1) Position new contact reel onto steering shaft. Connect contact reel and horn connectors. Install retaining screws. Install turn signal and wiper switches. Install column covers.

2) Contact reel must be adjusted before completing installation. See CONTACT REEL CENTERING under ADJUSTMENTS to complete installation procedures.

ADJUSTMENTS

CONTACT REEL CENTERING

1) Before performing contact reel centering procedures, ensure contact reel is properly installed and steering wheel is removed. If installing new contact reel, remove shipping lock screw (with plastic label attached) from pin hole. See Fig. 8. Ensure that front wheels are pointed straight ahead.

2) Loosen locking screw to permit contact reel to turn freely. Turn contact reel clockwise to stop, then back counterclockwise about 3 turns until pin hole is at one o'clock position. Lock contact reel in proper position with lock screw that is connected to plastic warning label. See Fig. 8.

3) To install steering wheel, carefully pull contact reel wiring with plastic warning label through hole in steering wheel. Position steering wheel so contact reel pin aligns with proper alignment hole in steering wheel. Install steering wheel hub bolt finger tight to ensure steering wheel does not come off shaft when removing contact reel lock screw.

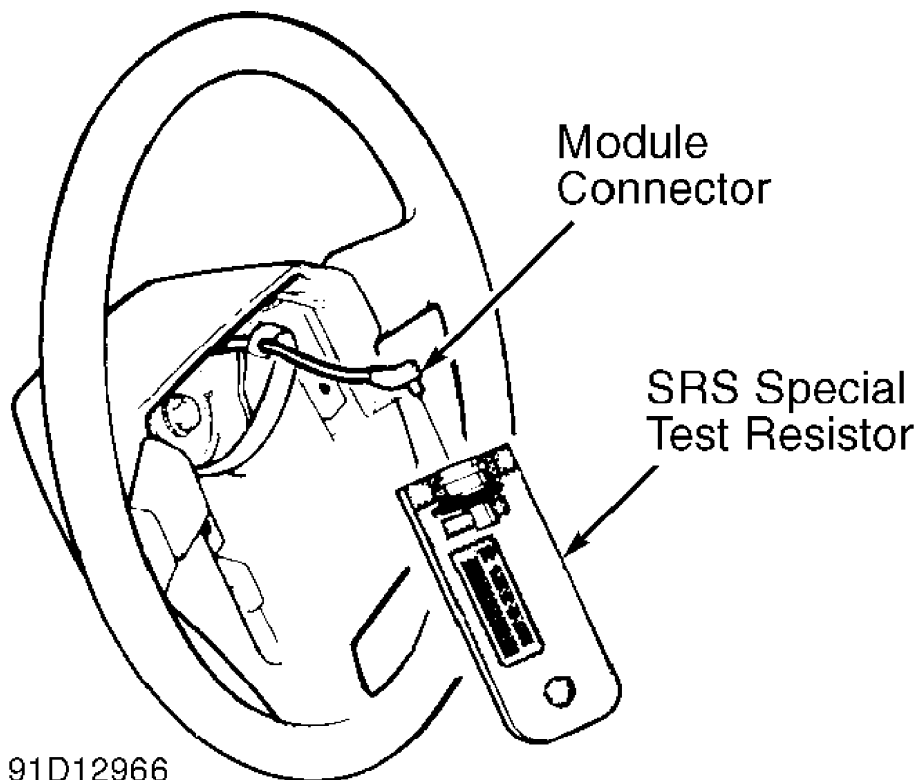
4) Remove lock screw, with plastic label attached, from contact reel pin. Install lock screw, with plastic warning label attached, into retaining screw hole in steering wheel. See Fig. 8. Tighten steering wheel hub retaining bolt to specification. See TORQUE SPECIFICATIONS TABLE at the end of this article.

5) To check contact reel wiring circuit, connect SRS Special Test Resistor (998 8695) to air bag module wiring connector in place of air bag module. See Fig. 9. Activate system.

6) Turn ignition switch to ON position and ensure SRS warning light goes out after 10 seconds. If warning light does not go out, a fault code is set. See SELF-DIAGNOSTIC SYSTEM under DIAGNOSIS & TESTING.

7) If SRS warning light goes out after about 10 seconds, turn ignition switch off. Disconnect negative battery cable. Remove Special Test Resistor (998 8695) from air bag module connector. Position air bag module to steering wheel, and install module wiring connector.

8) Ensure module wiring connector clicks into position. Install air bag module Torx screws to rear of steering wheel, and tighten to specification. See TORQUE SPECIFICATIONS TABLE at the end of this article. Install steering column undercover and steering wheel adjuster (if equipped). Connect negative battery cable. Perform SYSTEM OPERATION CHECK.



91D12966

Fig. 9: Installing SRS Special Test Resistor (998 8695) To Air Bag Module Connector

Courtesy of Volvo Cars of North America

WIRE REPAIR

DO NOT attempt to repair SRS wiring or harness connectors. If SRS wiring or harness connectors are faulty, replace faulty wiring harness.

DIAGNOSIS & TESTING

WARNING: Failure to follow SERVICE PRECAUTIONS may result in air bag deployment and personal injury. See SERVICE PRECAUTIONS.

NOTE: After component replacement, ensure proper system operation. Perform SYSTEM OPERATION CHECK. DO NOT use ohmmeter or other self-powered meter to test resistance of air bag inflator/module or seat belt tensioner. Use Special Test Resistor (998 8695) in place of air bag module(s) or seat belt tensioner when testing resistance of any SRS circuit. Special Test Resistor (998 8695) specified resistance is 1.8-2.5 ohms, which is same as components it replaces. Test resistor can be "deployed" if deployment voltage is applied to it while connected to SRS. Ensure test resistor resistance is as specified after each use. If resistance is not as specified, replace test resistor.

SELF-DIAGNOSTIC SYSTEM

On-Board Diagnostic (OBD) unit performs 2 tests, a start-up test and a cyclical test. During start-up test, microprocessors perform complete system diagnose. A fault will not be recorded until start-up test has been repeated one or 2 more times. Cyclical test is performed 4 times per second. A fault must be detected during 2 successive measurements before a fault will be stored. After fault has been detected for 10 seconds, it will be stored and SRS warning light will be turned on. When a fault(s) is detected, SRS warning light will remain on until fault(s) is corrected and faults are cleared from OBD.

A detected fault can occur internally within air bag module, seat belt tensioner, crash sensor or SRS wiring harnesses. A stored fault or faults will be displayed by a series of flashes from SRS warning light and/or LED light on section "A" of OBD unit located in engine compartment.

Flash codes consist of 3 digits or series of flashes. For example code 2-2-1 would be 2 flashes plus 2 flashes plus one flash. Only first 5 fault codes detected will be stored. These fault codes are stored in a non-volatile memory that will retain stored codes even if battery voltage is lost.

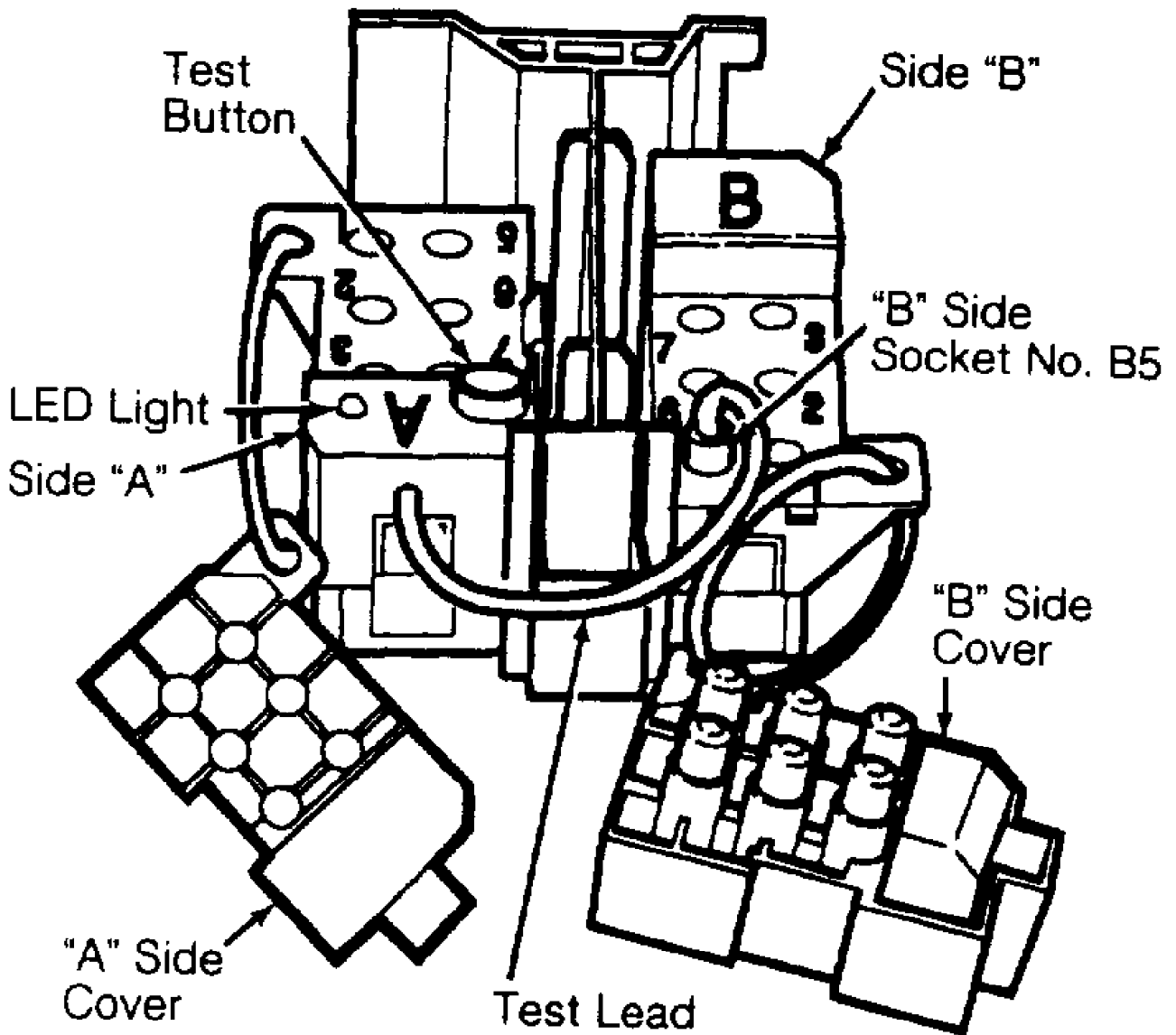
NOTE: If SRS warning light does not come on, go to SRS WARNING LIGHT PROBLEMS.

Retrieving Codes

1) Turn ignition switch to OFF position. Locate On-Board Diagnostic (OBD) unit in engine compartment (left side). See Fig. 1.

2) Connect OBD test lead from side "A" to socket No. B5 in side "B". See Fig. 10. Turn ignition switch to ON position and depress test button on side "A" once. Keep button depressed 0.5-3.0 seconds. LED will display first fault code. Continue depressing test button until all fault codes have been displayed and recorded. There must be at least 1.7 seconds between each flash code displayed.

3) After recording all fault codes, turn ignition off. Turning ignition off will not clear codes. For fault code descriptions, See SRS FAULT CODES table.



93D75542

Fig. 10: Identifying On-Board Diagnostic (OBD) Unit
 Courtesy of Volvo Cars of North America.

NOTE: Fault Code 1-1-2 indicates an interior crash sensor fault.
 Replace crash sensor and do not clear this code.

Clearing Codes

1) All fault codes must be displayed in order at least once before they can be cleared. Display of first code displayed, a second time, indicates all codes in memory have been displayed. Fault codes must be displayed during same ignition-on period before they can be cleared.

2) Connect OBD test lead from side "A" to socket No. B5 in side "B". See Fig. 10. Turn ignition switch to ON position, and depress test button on side "A" once. Keep button depressed for at

least 5 seconds. Release test button and LED will come on. While LED is on, depress test button and hold it for at least 5 seconds. Fault codes are now cleared.

3) Verify that fault codes have been cleared by repeating retrieval steps. See RETRIEVING CODES. If fault codes have been properly cleared, fault code 1-1-1 will display. If another fault code(s) is displayed, record code(s) and repeat code retrieving procedures. Record these codes and repeat clearing procedures. See step 2). If fault codes are still present, correct faults and repeat clearing code procedures. To ensure SRS fault codes are now cleared, perform SYSTEM OPERATION CHECK.

SRS FAULT CODES TABLE

Code	(1) Fault
1-1-1	No Fault Detected
1-1-2	Sensor Module Fault
1-2-7	SRS Lamp, Open-Circuit Or Short-Circuit
2-1-1	Driver's Air Bag, Short-Circuit
2-1-2	Driver's Air Bag, Open-Circuit
2-1-3	Driver's Air Bag, Short-Circuit To Ground
2-1-4	Driver's Air Bag, Short-Circuit To Supply
2-2-1	Passenger Air Bag, Short-Circuit
2-2-2	Passenger Air Bag, Open-Circuit
2-2-3	Passenger Air Bag, Short-Circuit To Ground
2-2-4	Passenger Air Bag, Short-Circuit To Supply
2-3-1	Left Belt Tensioner, Short-Circuit
2-3-2	Left Belt Tensioner, Open-Circuit
2-3-3	Left Belt Tensioner, Short-Circuit To Ground
2-3-4	Left Belt Tensioner, Short-Circuit To Supply
2-4-1	Right Belt Tensioner, Short-Circuit
2-4-2	Right Belt Tensioner, Open-Circuit
2-4-3	Right Belt Tensioner, Short-Circuit To Ground
2-4-4	Right Belt Tensioner, Short-Circuit To Supply

(1) - For corrective action of faults, see FAULT CODE TESTING.

FAULT CODE TESTING

WARNING: DO NOT use ohmmeter or other self-powered meter to test resistance of air bag module(s) or seat belt tensioners. Use Special Test Resistor (998 8695) in place of air bag module(s) or seat belt tensioners when testing continuity or resistance of any SRS circuit.

FAULT CODE 1-1-2

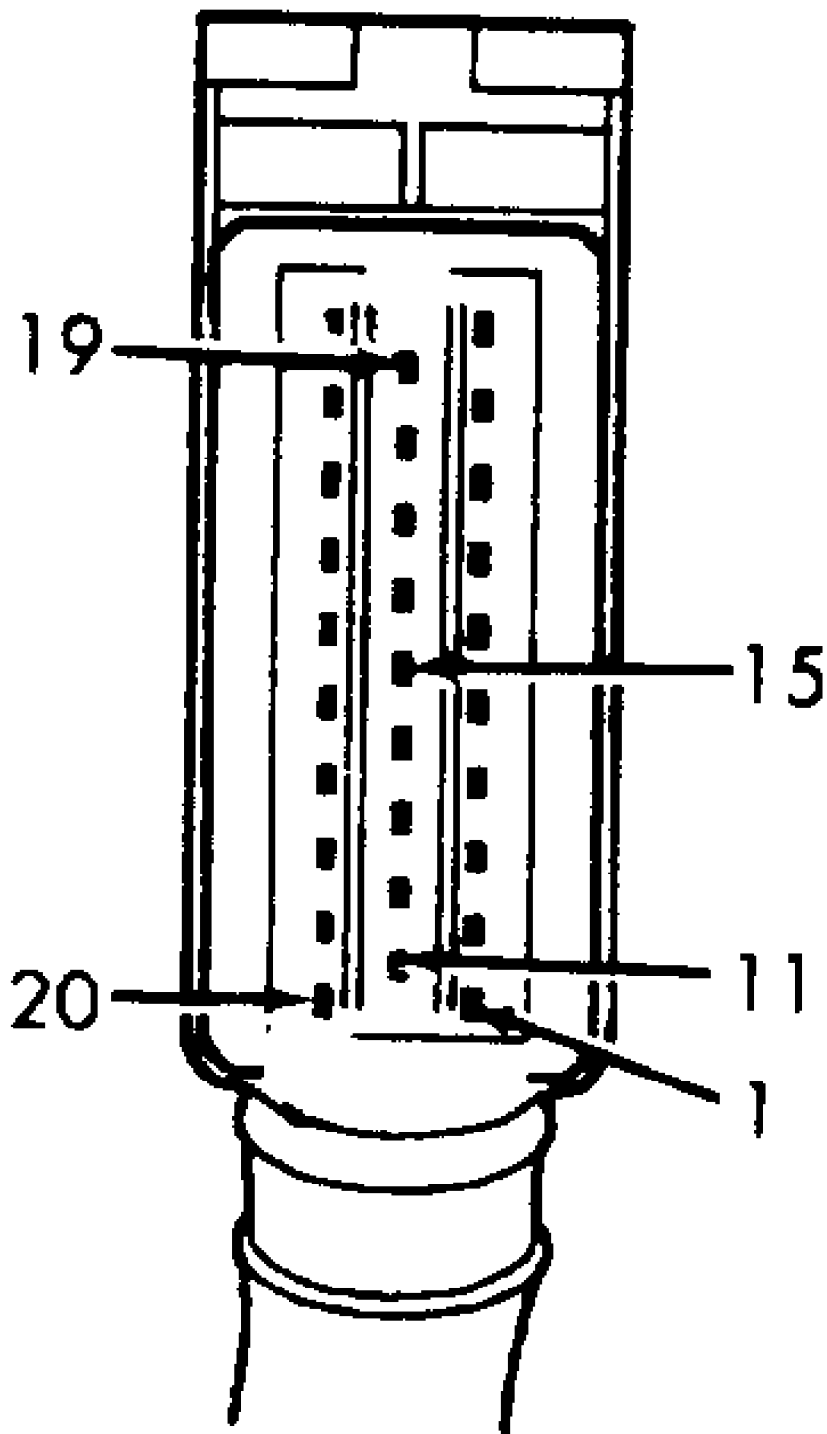
- * Conditions For Fault Code - Self-diagnostics has detected an internal crash sensor module fault.
- * Fault Symptom(s) - None, except for SRS warning light is on.
- * Fault Source(s) - Internal crash sensor fault.
- * Corrective Action - Replace crash sensor and ensure SRS fault codes are now cleared, perform SYSTEM OPERATION CHECK. See CRASH SENSOR & STANDBY POWER UNIT under REMOVAL & INSTALLATION.

FAULT CODE 1-2-7

- * Conditions For Fault Code - SRS warning light is controlled by crash sensor. If SRS warning light or warning light

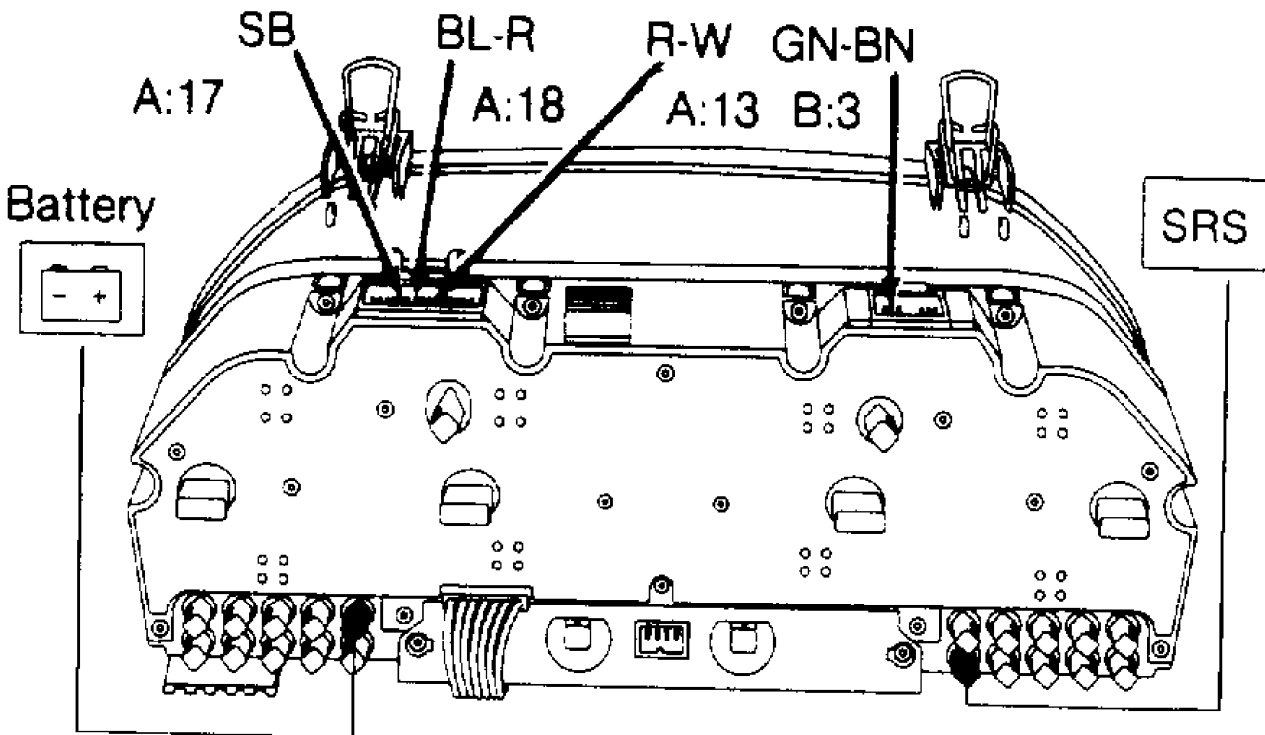
circuit is defective, crash sensor can not detect it.

- * Fault Symptom(s) - SRS warning light is on, indicating a fault code is stored. Warning light does not come on when ignition is turned on.
- * Fault Source(s) - There is a short to battery voltage, short to ground or an open in Green/Brown wire between crash sensor terminal No. 1 and instrument gauge cluster indicator lights terminal B:3. See Fig. 12.
- * Corrective Action :
 - 1) Turn ignition switch to ON position. If SRS warning light comes on with other instrument gauge cluster lights, go to step 2).
 - 2) If SRS warning light does not come on, ensure bulb is okay. If bulb is okay, go to step 4).
 - 2) Turn ignition switch off. Disconnect crash sensor connector under center console. Remove instrument panel cover to gain access to combined instrument gauge cluster connector. Disconnect combined instrument gauge cluster connector. See AIR BAG MODULE under REMOVAL & INSTALLATION. Measure resistance in Green/Brown wire between crash sensor connector terminal No. 1 and instrument gauge cluster connector terminal No. B:3. See Fig. 12. Resistance should be zero ohms. If resistance is infinity, Green/Brown wire has an open.
 - 3) Disconnect battery positive cable. Measure resistance between instrument gauge cluster connector terminal B:3 (Green/Brown wire) and battery positive cable. See Fig. 12. If resistance is infinity, measure resistance between crash sensor terminal No. 1 (Green/Brown wire) and battery positive cable. See Fig. 11. Resistance should be infinity. If either measured resistance is zero ohms, short to battery voltage exists. Repair Green/Brown wire circuit. Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.
 - 4) Turn ignition switch off. Disconnect crash sensor connector under center console. Remove instrument panel cover to gain access to combined instrument gauge cluster connector. Disconnect combined instrument gauge cluster connector. See AIR BAG MODULE under REMOVAL & INSTALLATION. Measure resistance between instrument gauge cluster connector terminal No. B:3 (Green/Brown wire) and ground. See Fig. 12.
 - 5) If resistance is infinity, measure resistance between crash sensor terminal No. 1 (Green/Brown wire) and ground. Resistance should be infinity. If either measured resistance is zero ohms, there is a short to ground. Repair Green/Brown wire circuit.
 - 6) Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes. If fault code does not clear, replace crash sensor. Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.
 - 7) If fault code again does not clear, inspect instrument gauge cluster circuit board and replace if defective. Clear fault codes. Perform SYSTEM OPERATION CHECK to verify repair. Recheck for fault codes.



93E75543

Fig. 11: Identifying Crash Sensor Connector Terminals
Courtesy of Volvo Cars of North America.



93F75544

Fig. 12: Identifying Instrument Gauge Cluster Terminals
 Courtesy of Volvo Cars of North America.

WARNING: DO NOT attempt to measure resistance in any SRS wiring harness or circuit with air bag module(s) and seat belt tensioners connected. Do not attempt to measure resistance directly on air bag modules or seat belt tensioners. Use of an ohmmeter or other current-carrying measuring device may cause deployment of air bags and/or seat belts tensioners.

FAULT CODE 2-1-1, 2-2-1, 2-3-1 Or 2-4-1

- * Conditions For Fault Code - If OBD unit measures a resistance lower than is normal (1.8-2.5 ohms) for air bag igniter(s) and seat belt tensioners, a fault code will be set.
- * Fault Symptom(s) - None, except for SRS warning light is on.
- * Fault Source(s) - There is a short in SRS harness to air bag module(s) and/or seat belt tensioners, connectors or igniter (igniter resistance is too low).
- * Corrective Action:

1) Turn ignition switch to OFF position. Disconnect battery negative cable. Disconnect connector to suspect air bag module or seat belt tensioner. Connect Special Test Resistor (998 8695). See Fig. 9. Clear fault codes. Try to retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM. If fault code does not display within 15 seconds, replace suspect air bag module or belt tensioner. See REMOVAL & INSTALLATION. If fault code does display, go to next step.

2) Disconnect test resistor and measure resistance between suspect module or tensioner connector terminals. If resistance is high (40,000 ohms), circuit is okay. If resistance is zero ohms, there is a short in circuit to module or tensioner. Inspect wiring and connectors between crash sensor and suspect module/tensioner

and replace as necessary. If fault code 2-1-1 is displayed, also inspect contact reel for short. Ensure steering wheel module is disconnected. Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.

FAULT CODE 2-1-2, 2-2-2, 2-3-2, Or 2-4-2

- * Conditions For Fault Code - If OBD unit measures a resistance higher than is normal (1.8-2.5 ohms) for air bag igniter(s) and seat belt tensioners, a fault code will be set.
- * Fault Symptom(s) - None, except for SRS warning light is on.
- * Fault Source(s) - There is an open in SRS harness, connector or air bag module or seat belt tensioner.
- * Corrective Action:

1) Turn ignition off. Disconnect battery negative cable. Disconnect connector to suspect air bag module or seat belt tensioner. Connect Special Test Resistor (998 8695). See Fig. 9. Clear fault codes and try to retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM. If fault code does not display within 15 seconds, replace suspect air bag module or belt tensioner. See REMOVAL & INSTALLATION. If fault code does display, go to next step.

2) Carefully measure resistance between suspect module/tensioner connector and corresponding terminal in crash sensor connector. See WIRING DIAGRAMS. Resistance should be zero ohms. If resistance is infinity, there is an open in wiring harness. Inspect wiring and connectors between crash sensor and suspect module/tensioner and replace as necessary. If fault code 2-1-2 is displayed, also check contact reel for short. Ensure steering wheel module is disconnected. Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.

FAULT CODE 2-1-3, 2-2-3, 2-3-3, Or 2-4-3

- * Conditions For Fault Code - Fault code will be stored if a short to ground is detected.
- * Fault Symptom(s) - None, except for SRS warning light is on.
- * Fault Source(s) - Short to ground exists in wiring harness, connectors, module or tensioners.
- * Corrective Action:

1) Turn ignition to OFF position. Disconnect suspect module/tensioner. Connect Special Test Resistor (998 8695). See Fig. 9. Clear fault codes and try to retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM. If fault code does not display within 15 seconds, replace suspect air bag module or belt tensioner. See REMOVAL & INSTALLATION. If fault code does display, go to next step.

2) Carefully measure resistance between suspect module/tensioner connector and ground. If resistance is infinity, wiring is not shorted to ground. If resistance is zero ohms, harness is shorted to ground. Inspect wiring and connectors between crash sensor and suspect module/tensioner. If fault code 2-1-3 is displayed, also check contact reel for short. Ensure steering wheel module is disconnected. Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.

FAULT CODE 2-1-4, 2-2-4, 2-3-4 Or 2-4-4

- * Conditions For Fault Code - Fault code will be stored if a short to supply is detected.
 - * Fault Symptoms - None except SRS warning light is on.
 - * Fault Sources - Short to supply exists in wiring harness, connectors, module or tensioners.
 - * Corrective Action:
- 1) Turn ignition off. Disconnect battery negative cable.

Disconnect connector to suspect module/tensioner. Connect Special Test Resistor (998 8695). See Fig. 9. Clear fault codes. Try to retrieve fault codes. See SELF-DIAGNOSTIC SYSTEM. If fault code does not display within 15 seconds, replace suspect air bag module or belt tensioner. See REMOVAL & INSTALLATION. If fault code displays, go to next step.

2) Disconnect battery positive cable. Connect ohmmeter between suspect module/tensioner connector terminals (one at a time) and battery positive cable. When connecting battery, turn ignition switch to ON position. As ignition is turned on, measure resistance. If resistance is infinity, no short is present. If resistance is zero ohms, there is a short to supply.

3) Inspect wiring and connectors between crash sensor and suspect module/tensioner. If fault code 2-1-4 is displayed, also check contact reel for short. Ensure steering wheel module is disconnected. Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.

SRS WARNING LIGHT PROBLEMS

NOTE: Some faults do not set codes. These faults must be located by measurement, interpreting secondary fault codes and eliminating other faults.

SRS WARNING LIGHT WILL NOT COME ON

* Conditions For Fault(s):

1) Normally SRS warning light should come on when ignition is turned on. SRS warning light should go out after 10 seconds or when engine starts. Incorporated into the instrument gauge cluster circuit board is an indicating circuit that switches SRS warning light on and off. Voltage supplied to indicating circuit is controlled by crash sensor. When self-diagnostics are completed, crash sensor lowers supply voltage from 8.5 volts to 1.5 volts, causing SRS light to go out.

2) At this time voltage measured at alternator terminal "D+" will be zero volts with ignition off or in position "I", .8-2 volts with ignition in position II, and greater than 8 volts when engine is running.

* Fault Symptom(s) - SRS light does not come on when ignition is on, but flashes when fault codes are displayed. Fault codes can be read on OBD LED. SRS warning light does not come on.

* Fault Source(s) - Alternator (Red wire) terminal "D+" is shorted to supply. Defective SRS light. Incorrect voltage in instrument gauge cluster. Circuit between crash sensor and instrument gauge cluster shorted to ground (this will set fault code 1-2-7; see FAULT CODE TESTING). Crash sensor SRS light output defective (this will set fault codes 1-1-2 or 1-2-7; see FAULT CODE TESTING)

* Corrective Action:

1) Check circuit between alternator (Red wire) terminal "D+" and crash sensor connector terminal No. 19 for a short to battery voltage. Measure voltage between crash sensor connector terminal No. 19 and ground. See Fig. 11. If voltage is less than 2 volts, short does not exist. If voltage is greater than 8 volts, SRS light circuit is shorted to battery voltage. Repair as necessary, clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.

2) If fault code 1-1-2 is displayed, replace crash sensor, see FAULT CODE TESTING. Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes. If fault code 1-2-7 is displayed, see FAULT CODE TESTING. If fault code 1-1-1 is

displayed, remove instrument panel cover, raise instrument gauge cluster and replace SRS warning light bulb. If SRS warning light bulb still not come on, replace printed circuit board in instrument gauge cluster. Clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.

SRS WARNING LIGHT COMES ON, BUT FAULT CODE(S) DO NOT DISPLAY

- * Conditions For Fault Code - None.
- * Fault Symptom(s) - SRS warning light comes on, but only fault code 1-1-1 is displayed.
- * Fault Source(s) - Open or short to ground in circuit between alternator terminal "D+" and crash sensor terminal No. 19. High/low supply voltage. Instrument gauge cluster fault. Open in circuit between crash sensor and instrument gauge cluster.
- * Corrective Action:
 - 1) Disconnect crash sensor connector. Start engine. Check circuit from alternator terminal "D+" to terminal No. 19 at crash sensor for an open or short. See Fig. 11. Ensure voltage is greater than 8 volts. If voltage is less than 8 volts, repair short or open in circuit. If voltage is greater than 8 volts, go to next step.
 - 2) Start engine and measure voltage at terminal No. 15 of crash sensor connector. See Fig. 11. If voltage is greater than 9 volts, go to next step. If voltage is less than 9 volts, replace SRS warning light circuit in instrument gauge cluster. If voltage does not increase to greater than 9 volts after circuit replacement, replace crash sensor.
 - 3) After repairs and/or component replacement, clear fault codes and perform SYSTEM OPERATION CHECK to verify repair and recheck for fault codes.

ON-BOARD DIAGNOSTIC UNIT PROBLEMS

LED DOES NOT COME ON

- * Conditions For Fault Code - None.
- * Fault Symptom(s) - LED on diagnostic unit does not come on.
- * Fault Source(s) - Defective LED. No power supply to diagnostic unit. Diagnostic unit not grounded.
- * Corrective Action:
 - 1) Connect test lead from diagnostic unit side "A" to side "B" socket No. 5. See Fig. 10. Turn ignition switch to ON position. When test button on side "A" is depressed, LED should come on. If LED does not come on, go to next step and check power supply.
 - 2) Turn ignition switch to ON position. Disconnect connector from underside of diagnostic unit side "A". Measure voltage between socket No. 4 and ground. If battery voltage is present, go to next step and check ground connection. If battery voltage is not present, check fuse No. 33 and associated wiring for an open.
 - 3) Turn ignition switch to OFF position. With diagnostic unit side "A" connector disconnected, measure resistance between socket No. 8 and ground. If resistance is zero ohms, replace diagnostic unit and repeat test. If resistance is greater than zero ohms, inspect ground terminal and circuit for an open.

LED COMES ON, BUT NO CODES ARE DISPLAYED

- * Conditions For Fault Code - Fault code 1-1-1 does not display indicating that no fault has been detected.
- * Fault Symptom(s) - None.
- * Fault Source(s) - Open or short between diagnostic unit test lead and crash sensor connector terminal No. 29. See Fig. 11. Crash sensor internal fault.

* Corrective Action:

Turn ignition switch to ON position. Disconnect diagnostic unit test lead from side "B" socket No. 5. See Fig. 10. Measure voltage between socket No. 5 and ground. If voltage is approximately 10 volts, replace diagnostic unit. If voltage is not approximately 10 volts, inspect circuit between crash sensor connector No. 29 and diagnostic unit side "B" socket No. 5 for an open or short to ground.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

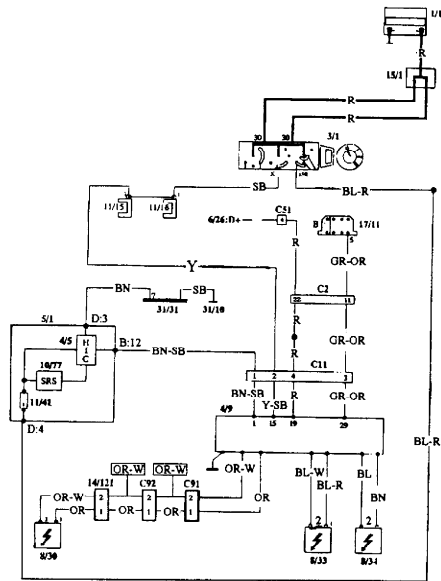
Application	Ft. Lbs. (N.m)
Seat Rail-To-Floor Bolts	35 (48)
Seat Belt Tensioner Mounting Bolts	35 (48)
Seat Rails-To-Floor Bolts	35 (48)
Steering Wheel Bolt	24 (33)
	INCH Lbs. (N.m)
Driver-Side Air Bag Module	89 (10)
Crash Sensor Bracket Bolts	96 (11)
Knee Bolster Bolts	62 (7)
Passenger-Side Air Bag Module	
Hexagon Nuts	53 (6)
Torx Screws	27 (3)

POST-COLLISION AIR BAG SAFETY INSPECTION

POST-COLLISION AIR BAG SAFETY INSPECTION TABLE

Replace After Deployment	<ul style="list-style-type: none"> * Air Bag Module(s) * Contact Reel * Initiation Wiring To Passenger Module * Seat Belt Units * Sensor Module (1) * Steering Wheel * SIPS (Sensor Module, Ignition Circuit & Bag Module)
Inspect & If Damaged, Replace Component (Even If Air Bag Did Not Deploy)	<ul style="list-style-type: none"> * Dashboard & Frame * Dashboard Speakers * Knee Bolsters & Brackets * Panels Under Dashboard * Windshield & Moulding
Comments	<ul style="list-style-type: none"> * DO NOT attempt SRS wiring repairs. * Visually inspect SIPS & seats in event of minor collisions without deployment. <p>(1) - Replace if fault code cannot be erased or if there is damage in the area of the Sensor Module.</p>

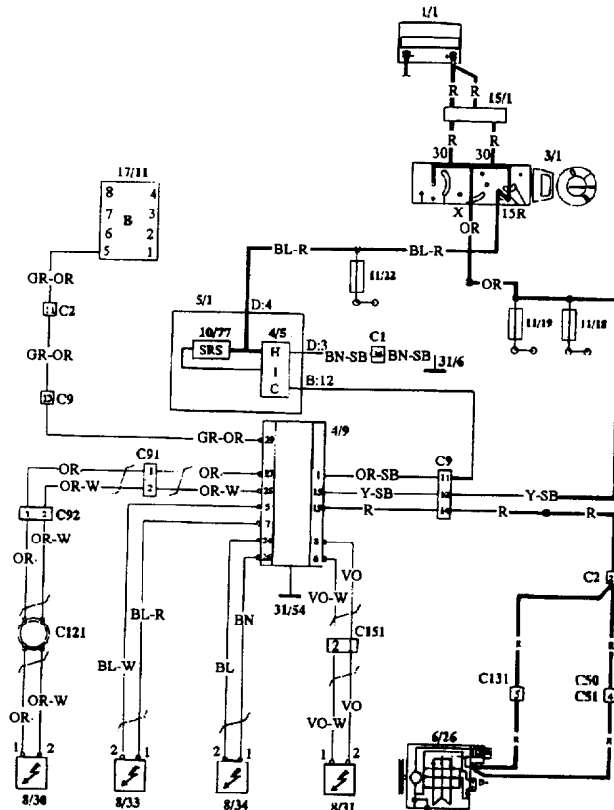
WIRING DIAGRAMS



- 1/1 - Battery
- 3/1 - Ignition Switch
- 4/5 - SRS Safety Circuit
- 4/9 - SRS Crash Sensor
- 5/1 - Instrument Gauge Cluster
- 6/26 - Alternator
- 8/30 - Driver's Air Bag Module
- 8/33 - Driver's Seat Belt Tensioner
- 8/34 - Passenger's Seat Belt Tensioner
- 10/77 - SRS Warning Light
- 11/1-26 - Fuses
- 11/41 - Instrument Gauge Cluster Fuse
- 14/121 - SRS Contact Reel
- 15/1 - Positive Terminal Board
- 17/11 - Diagnostic Unit "B"
- 31/10 - Ground Terminal, Right A-Post
- 31/31 - Ground Busbar; Electrical Distribution Unit
- C2 - 53-Pin Connector; Instrument Gauge Cluster-To-Left Wheel Housing Harness
- C11 - 4-Pin Connector At Electrical Distribution Unit
- C51 - 8-Pin Connector; Left Wheel Housing Harness-To-Engine Harness
- C91 - 2-Pin Connector At Electrical Distribution Unit
- C92 - 2-Pin Connector Under Steering Wheel

93H75546

Fig. 13: Air Bag System Wiring Diagram (940)
 Courtesy of Volvo Cars of North America.



- 1/1 - Battery
- 3/1 - Ignition Switch
- 4/5 - SRS Safety Circuit
- 4/9 - SRS Crash Sensor
- 5/1B - 12-Pin Terminal In Instrument Gauge Cluster
- 5/1D - 4-Pin Terminal In Instrument Gauge Cluster
- 6/26 - Alternator
- 8/30 - Driver's Air Bag Module
- 8/31 - Passenger's Air Bag Module
- 8/33 - Driver's Seat Belt Tensioner
- 8/34 - Passenger's Seat Belt Tensioner
- 10/77 - SRS Warning Light
- 11/18, 11/19, 11/22 - Fuses
- 15/1 - Positive Terminal Board
- 17/11 - Diagnostic Unit "B"
- 31/6 - Ground Terminal, Left A-Post
- 31/54 - SRS Crash Sensor Ground Terminal
- C1 - 53-Pin Connector; Instrument Gauge Cluster-To-Bottom Rail Harness
- C2 - 53-Pin Connector; Instrument Gauge Cluster-To-Left Wheel Housing Harness
- C9 - 24-Pin Connector; Instrument Gauge Cluster-To-Tunnel Harness
- C50 - 8-Pin Connector; Left Wheel Housing Harness-To-Engine Harness
- C51 - 8-Pin Connector; Left Wheel Housing Harness-To-Engine Harness
- C91 - 2-Pin Connector; Sensor Harness-To-Driver's Side Air Bag Module
- C92 - 2-Pin Connector Under Steering Wheel
- C121 - SRS Contact Reel
- C131 - 53-Pin Connector; Left Wheel Housing Harness-To-Engine Harness
- C151 - 2-Pin Connector; Passenger's Side Sensor Harness-To-Air Bag Module

93I75547

Fig. 14: Air Bag System Wiring Diagram (960)
 Courtesy of Volvo Cars of North America.