

ACCESSORIES/SAFETY EQUIPMENT**BMW - Air Bag Restraint Systems****DESCRIPTION & OPERATION**

WARNING: Accidental air bag deployment is possible. Personal injury may result. Read and follow all **WARNINGS** and **AIR BAG SAFETY PRECAUTIONS** before working on air bag system or related components.

The Supplemental Restraint System (SRS), also known as air bag system, is designed to provide increased accident protection for driver and passengers by deploying front air bags and seat belt pretensioners in a front-end collision and side air bags and side impact head protection system when side impact is detected.

Main components of the air bag system include air bag control module (mounted on tunnel under center console), driver-side air bag module, passenger-side air bag module, side air bag modules, side impact head protection modules, side air bag crash sensors, seat belt pretensioners, AIR BAG warning light and contact ring (clockspring).

Air bag control unit is capable of system self-diagnosis. Air bag system components are monitored electrically. Any interferences in operation can be detected. These interferences (faults) are then stored in air bag control module memory. Diagnosis can only be performed when DIS-MoDiC tester is connected to vehicle's Data Link Connector (DLC).

AIR BAG CONTROL UNIT

The air bag control unit is located under center console. Air bag control unit contains an internal safety sensor. If air bag control unit safety sensor senses an impact, it applies voltage to the air bags. The air bag control unit also features a self-diagnostic system that monitors the air bag system for faults. If a fault is detected, a code sets in air bag control unit memory.

CONTACT RING

Contact ring (mounted on bottom of steering wheel) is a continuous loop of wire ribbon that forms an electrical circuit between the steering wheel and steering column. This wire ribbon winds and unwinds to ensure electrical contact when the steering wheel is turned.

DRIVER-SIDE AIR BAG MODULE

Driver-side air bag module consists of an inflatable air bag, gas generator and ignitor. The gas generator and ignitor make up the inflator unit, which is mounted permanently to back of air bag module.

Air bag module consists of an inflatable air bag, 2 gas generators and 2 igniters. Air bag fully inflates in about 35 milliseconds. Gas is then released through a filtered vent on the side of the air bag, causing it to deflate.

PASSENGER-SIDE AIR BAG MODULE

2001 BMW X5 30i

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Passenger-side air bag module is installed inside instrument panel, above glove box. It is accessible by removing the cover or panel on top of passenger-side air bag module.

Air bag module consists of large inflatable air bag, 2 gas generators, and 2 igniters. Air bag fully inflates in about 35 milliseconds. Gas is then released through a filtered vent on the windshield side of the air bag, causing it to deflate.

SEAT BELT PRETENSIONERS (EMERGENCY TENSIONING RETRACTOR)

Seat belt retractor or Emergency Tensioning Retractor (ETR) is located in seat belt buckle. When front air bags deploy, air bag control unit also deploys seat belt retractor which increases seat belt tension and holds front seat occupant(s) tightly against seat backrest, increasing seat belt effectiveness.

SEAT OCCUPANCY MODULE (SBE)

Output signals from the passenger-side seat occupancy sensor pad are converted from a varying analog signal to a digital pulse signal by the SBE. This signal is then sent to the air bag control unit to assist it in making deployment decisions. SBE module is located under passenger seat.

SEAT OCCUPANCY SENSOR PAD

Front passenger seat cushion is equipped with a foil contact sensor. If front passenger seat is occupied, seat occupancy detector will send a varying analog signal to the SBE. This signal varies in direct proportion to the weight or movement of seat occupant.

SIDE AIR BAG MODULES

Side air bag modules are installed behind door trim panel on both front and both rear doors. They are accessible by removing door trim panel of appropriate door.

Side air bag module consists of an inflatable air bag, gas generator, and igniter. Air bag fully inflates in about 35 milliseconds. Gas is then released through a filtered vent on the back side of the air bag, causing it to deflate.

SIDE IMPACT HEAD PROTECTION SYSTEM (HPS)

HPS consists of air bag modules which are installed along both A-pillars, over front doors and extend slightly beyond B-pillar. Air bag modules are also installed in C-pillars and extend over rear doors. They provide additional protection for the front and rear passenger in the event of a severe side impact.

HPS module consists of an inflatable tube-shaped air bag, gas generator, and igniter. Air bag fully inflates in about 35 milliseconds. Gas is then released through a filtered vent causing it to deflate.

COMPONENT LOCATIONS

RESTRAINT SYSTEM COMPONENT LOCATIONS

Component	Location

2001 BMW X5 30i

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Contact ring	On top of steering column, below steering wheel
Data link connector	Under left side of instrument panel
Driver-side air bag module	Front face of steering wheel
Passenger-side air bag module	Right side of instrument panel, above glove box
Side air bag modules	Behind door trim panels
Side impact head protection	Under headliner, over doors
Air bag control unit	Under center console

SERVICING

Check AIR BAG warning light operation and diagnostic system for trouble codes at regular service intervals.

SYSTEM OPERATION CHECK

Turn ignition switch to ON position. If AIR BAG warning light should illuminate for 6-10 seconds then turn off. If AIR BAG warning light illuminates for 6-10 seconds and turns off, air bag system is functioning properly. If AIR BAG warning light illuminates for 6-10 seconds and turns off, then illuminated again or remains illuminated, a fault in air bag system has been detected. If AIR BAG warning light illuminates while operating the vehicle, fault in air bag system has been detected. If AIR BAG warning light fails to illuminate, this indicates bulb or wiring is faulty.

AIR BAG SAFETY PRECAUTIONS

Observe these precautions when working on air bag system:

- When working on air bag system or components, disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM**.
- Always ensure radio is off before disconnecting battery. This will prevent damage to radio microprocessor.
- Before straightening damaged metal or arc-welding, disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM**.
- Always wear safety glasses, gloves and long-sleeve shirt when handling deployed air bag modules. Air bag module may contain sodium hydroxide deposits, which could irritates skin.
- Handle sensors carefully. Never strike or jar sensors. All sensors and mounting bracket bolts must be tightened to specification to ensure proper sensor operation.
- Never use any air bag system component that has been dropped from 2 feet or higher.
- DO NOT use self-powered electrical test equipment, such as battery- powered or AC-powered voltmeter, ohmmeter, test light etc.
- Always handle air bag module with trim cover facing away from your body. Always place air bag module on work bench with trim cover facing up.
- Never expose air bag system components to temperatures greater than 167° (75°C).
- Never expose any air bag system components to cleaning agents such as solvents, gasoline, lye etc.

DISABLING & ACTIVATING AIR BAG SYSTEM

WARNING: Accidental air bag deployment is possible. Personal injury may result. Avoid using memory savers when working on air bag system.

DISABLING SYSTEM

Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . If equipped with MK3 navigation system, turn ignition off and wait one minute for system to complete power-down procedure. On all models, retrieve and record any fault codes. Obtain radio anti-theft code. Record programmed radio stations. Ensure ignition is off. Disconnect and shield the negative battery cable. Wait at least 5 seconds before servicing vehicle.

ACTIVATING SYSTEM

Ensure ignition is off. Connect negative battery cable. Perform system operation check. See **SYSTEM OPERATION CHECK** . Reprogram radio and set clock. On some vehicles, infrared locking system keys must be recoded, power windows and slide-tilt sunroof must be reinitialized.

DISPOSAL PROCEDURES

WARNING: Air bag module and seat belt pretensioners must be deployed before disposal. Disposing of undeployed components may violate federal, state and-or local laws. This also applies to vehicles that are to be scrapped.

DEPLOYED AIR BAG MODULES & SEAT BELT PRETENSIONERS

Deployed air bag modules and seat belt pretensioners are not classified as hazardous material; dispose of them like any other part.

ON-VEHICLE DEPLOYMENT (SCRAPPED VEHICLES ONLY)

WARNING: If components will not deploy using the following procedures, contact vehicle manufacturer for disposal instructions.

All Air Bags & Seat Belt Pretensioners

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Move vehicle outdoors to a remote area, away from workshop and people. Disconnect and shield negative battery cable. Close doors and open windows, sunroof and trunk. Ensure all air bag modules are securely installed. Remove loose objects from around air bag modules.
2. Disconnect air bag control unit harness connector. Air bag control unit is located underneath center console between front seats. Attach Firing Device (62 1 270) and Cable (62 1 210) to 30-pin connector or Cable (62 1 310) to 50-pin connector. Connect firing device to 12-volt battery placed 33 feet (10 m) to rear of vehicle.

3. Press firing device switch to deploy air bags and pretensioners. If Cable (62 1 310, 50-pin connector) is used, only air bags and pretensioner on one side of vehicle will deploy. To deploy remaining air bags and pretensioner, connect cable to free connector and repeat this step.

UNDEPLOYED AIR BAG-FAULTY UNIT

If diagnostic testing and deploying procedures indicate air bag module and-or ETR is faulty, DO NOT dispose of in usual manner. Contact vehicle manufacturer for proper disposal instructions.

OFF-VEHICLE DEPLOYMENT

Contact manufacturer for specific instructions.

POST-COLLISION INSPECTION

When a vehicle has been involved in a collision, certain components of the passive restraint system must be inspected or replaced. See **AIR BAG/SRS COMPONENT INSPECTION & REPLACEMENT TABLES** article in the GENERAL INFORMATION section.

REMOVAL & INSTALLATION

WARNING: Accidental air bag deployment is possible. Personal injury may result. Read and follow all **WARNINGS** and **AIR BAG SAFETY PRECAUTIONS** before working on air bag system or related components.

AIR BAG CONTROL UNIT

Removal & Installation

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . The air bag control unit is located between the front seats under center console.
2. Remove screws on center console, lift hand brake and remove center console. Remove rear fan under center console. Remove control unit cover screws and remove cover. Disconnect control unit electrical connector, remove control unit mounting screws and remove control unit.
3. To install, reverse removal procedure. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . If installing a new air bag control unit, it must be re-encoded.

DRIVER-SIDE AIR BAG MODULE

Removal & Installation

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Insert screwdriver through opening on rear side of steering wheel. See **Fig. 1** .

2. Press down on spring loaded clip and pull out air bag. See **Fig. 2** . Repeat process on opposite side. Pull out air bag and disconnect electrical connectors. Open locks on plugs and disconnect plug connections. Remove air bag. Put air bag module in a secure area with trim pad facing upward.
3. To install, reverse removal procedure. Insert air bag module hooks into locks and press air bag module into steering wheel. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

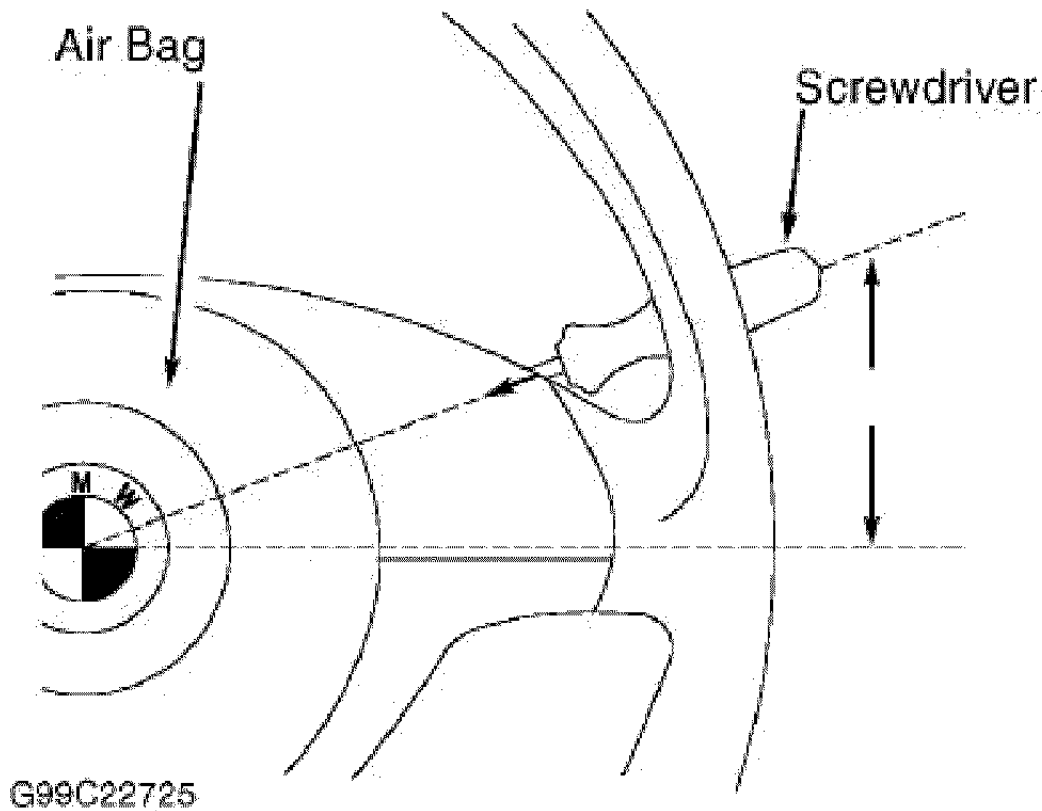


Fig. 1: Releasing Driver-side Air Bag Module

Courtesy of BMW OF NORTH AMERICA, INC. ID=

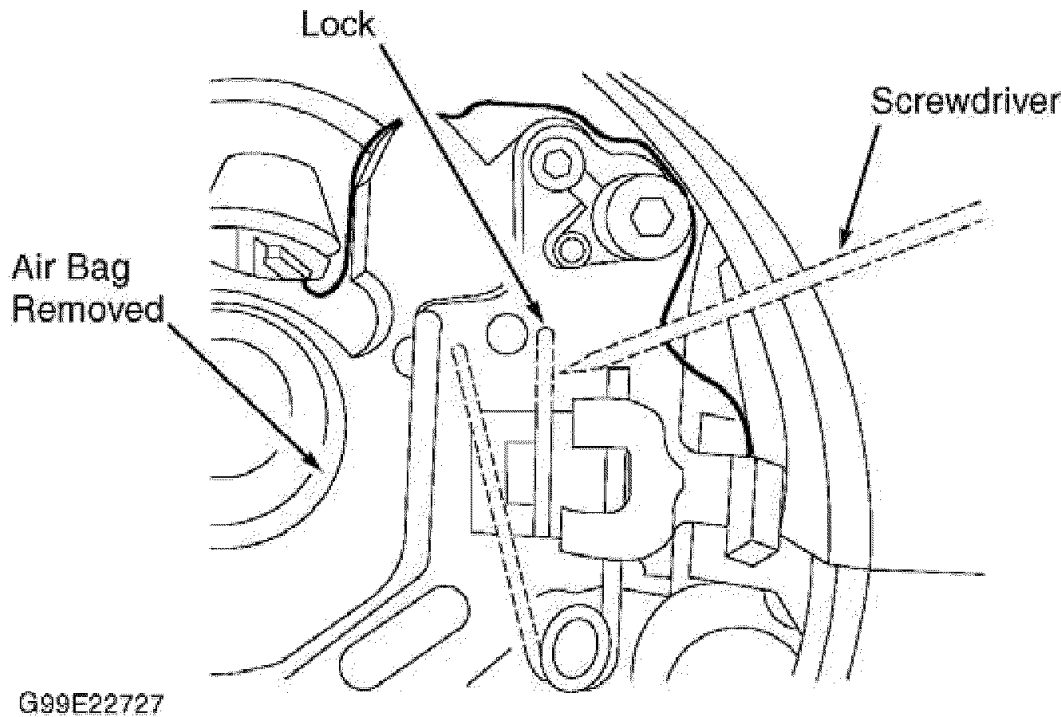


Fig. 2: Releasing Driver-side Air Bag Module Retaining Clips (Air Bag Module Removed For Clarity)
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FRONT SEATS

Removal & Installation

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Move front seat fully forward and upward. Remove lower seat belt anchor bolt, located on outboard seat frame.
2. Remove 2 rear seat track mounting bolts. Move seat fully rearward. Remove 2 front seat track mounting bolts. Unlock and disconnect under seat harness connector. Protect door sill with protective cover and lift out front seat.
3. To install, reverse removal procedure. Tighten seat track mounting and lower seat belt anchor bolts to specification. See **TORQUE SPECIFICATIONS** . Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

HEADLINER

Removal & Installation

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See

DISABLING & ACTIVATING AIR BAG SYSTEM . Lower windows. Remove edge guards from all door openings. Remove front and rear grab handles. Remove A-pillar trim on both sides. Remove B-pillar trim on both sides and suspend on shoulder belt. Remove C-pillar trim on both sides. Remove D-pillar trim on both sides.

2. If equipped with sunroof, open and raise sunroof panel to highest setting. Remove bellows starting from center and working toward front and rear. Remove sunroof panel screws. Raise rear of sunroof panel until setting lever can be levered out of retaining pin on sunroof panel. Release retaining screw until assembly opening is free. Raise setting lever and unhook from slide.
3. Remove left and right sun visors with holders. Remove interior lights. Remove front headliner bracket and remove screws underneath bracket. Remove all door rubbers holding headliner. Push back on headliner to release sliding clips. Remove headliner through rear of vehicle.
4. To install, reverse removal procedure. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

PASSENGER-SIDE AIR BAG MODULE

NOTE: **If passenger-side air bag module has been deployed, passenger-side air bag cover must also be replaced.**

Removal & Installation

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Insert Plastic Wedge (00 9 323) on both sides of passenger-side air bag cover, release catches, lift cover up and place on instrument panel. See **Fig. 3** . Disconnect Orange passenger-side air bag module harness connector. Remove air bag module retaining nuts and remove air bag module from instrument panel. Remove air bag cover and cover bracket.
3. To install, reverse removal procedure. Be careful not to pinch wiring harness. Tighten passenger-side air bag module retaining nuts to specification. See **TORQUE SPECIFICATIONS** . Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

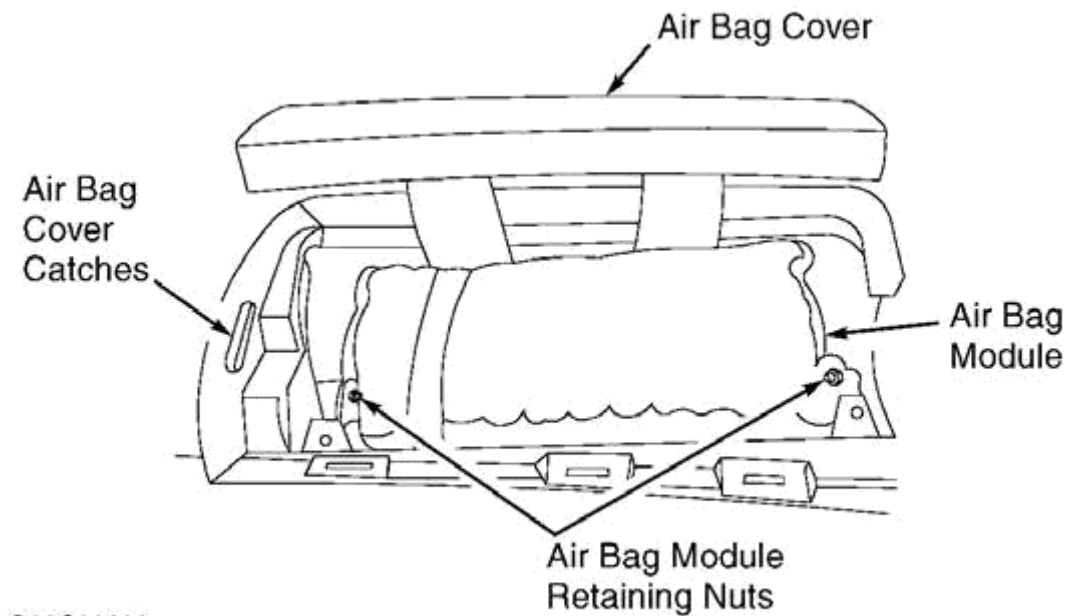


Fig. 3: Removing Passenger Air Bag Module

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SEAT BELT PRETENSIONERS (EMERGENCY TENSIONING RETRACTOR)

Removal & Installation

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Remove front seat. See **FRONT SEATS** .
2. Disconnect seat belt pretensioner connector from under seat harness connector. Disconnect seat belt buckle switch connector. Remove seat belt pretensioner mounting bolt. Remove seat belt pretensioner.
3. To install, reverse removal procedure. Tighten seat belt pretensioner mounting bolt to specification. See **TORQUE SPECIFICATIONS** . Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

SIDE AIR BAG MODULE

Removal & Installation

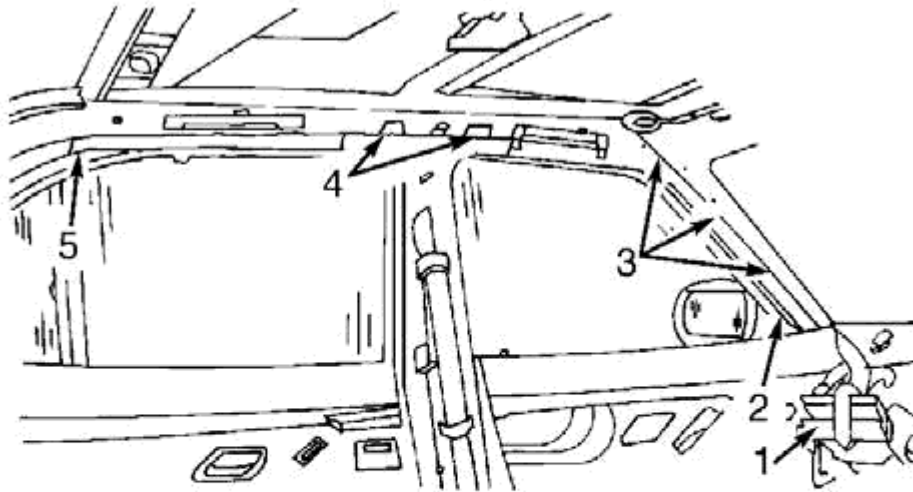
1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Using Trim Tool (00 9 321), remove decorative strip from appropriate door trim panel. Using trim fool, pry out footwell light from bottom of door. Pry out power window switch assembly from door panel. Remove door trim panel retaining screws.

3. Using Trim Tool (00 9 317), release door trim panel retaining clips. Remove and discard side air bag module mounting screws. Disconnect side air bag module harness connector and remove module from vehicle.
4. To install, reverse removal procedure. Use NEW micro-encapsulated side air bag module mounting screws. Tighten to mounting screws specification. See **TORQUE SPECIFICATIONS** . Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

SIDE IMPACT HEAD PROTECTION SYSTEM (HPS)

Removal & Installation (Front)

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Remove headliner. See **HEADLINER** . Remove steering wheel. See **STEERING WHEEL** .
2. Remove steering column adjustment switch. Remove instrument cluster retaining screws and remove instrument cluster. Remove glove box. Remove passenger-side air bag module. See **PASSENGER-SIDE AIR BAG MODULE** . Remove center console.
3. Remove hood release lever. Remove left and right kick panels. Remove decorative trim on instrument panel. Remove left and right instrument panel under covers. Remove screws on front left and right sides of instrument panel. Lift instrument panel trim up and rearward. Disconnect electrical connectors. Remove instrument panel trim.
4. Disconnect HPS gas generator electrical connector. Remove gas generator nuts and remove gas generator, located on side of instrument panel frame. See **Fig. 4** . Remove gas generator tube retaining bracket screw and bracket. Remove front A-pillar retaining screw securing HPS tether to A-pillar. Remove rear retaining screw securing HPS tether to C-pillar. Release A-pillar retaining clips with air bag module. Release roof frame retaining clips. Remove HPS air bag assembly.
5. To install, reverse removal procedure. Tighten air bag and gas generator nuts to specification. See **TORQUE SPECIFICATIONS** . Ensure air bag does not contact any sharp edges either on body or on clips. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .



- 1. Gas Generator
- 2. A-Pillar Mounting Bolt
- 3. A-Pillar Retaining Clips

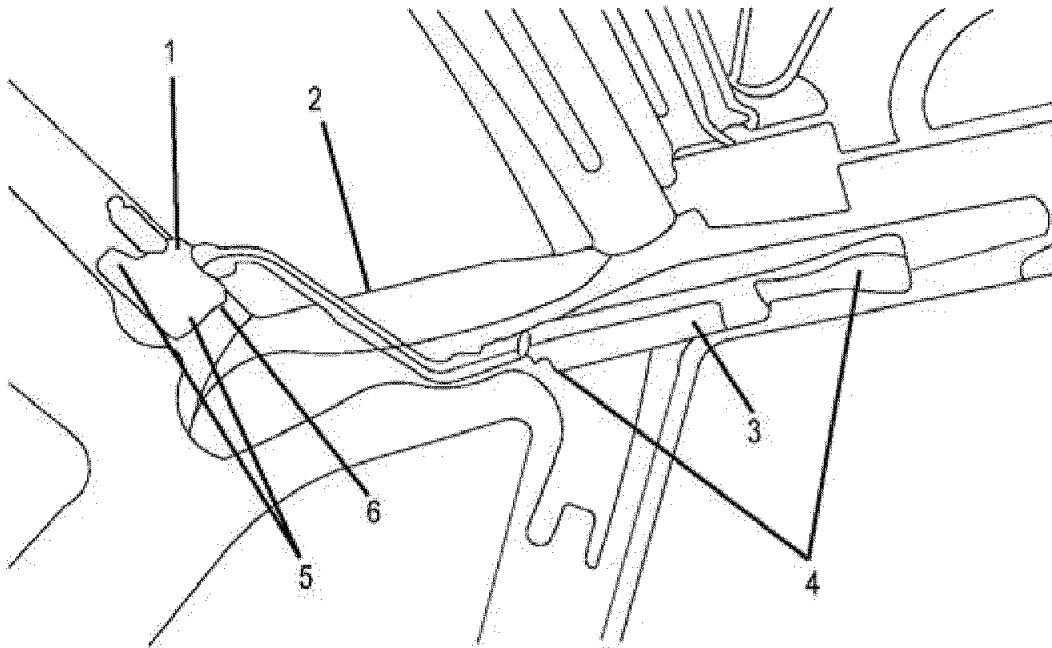
- 4. Roof Frame Retaining Clips
- 5. C-Pillar Mounting Bolt

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Fig. 4: Identifying Front Head Air Bag Components
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Removal & Installation (Rear)

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Remove headliner. See **HEADLINER** .
2. Disconnect rear head air bag gas generator electrical connector. See **Fig. 5** . Loosen but, DO NOT remove, gas generator mounting screws. Remove rear head air bag module mounting screws. Remove, gas generator mounting screws. Slide gas generator upward and remove complete rear head air bag module assembly toward front.
3. To install, reverse removal procedure. Ensure air bag does not contact any sharp edges either on body or on clips. Tighten air bag and gas generator bolts to specification. See **TORQUE SPECIFICATIONS** . Ensure air bag does not contact any sharp edges either on body or on clips. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .



1. Gas Generator
2. Gas Tube
3. Rear Head Air Bag Module
4. Rear Head Air Bag Module Mounting Screws
5. Gas Generator Mounting Screws
6. Electrical Connector

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Fig. 5: Identifying Rear Head Air Bag Components
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STEERING WHEEL

Removal & Installation

1. Before proceeding, see **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Remove driver-side air bag module. See **DRIVER-SIDE AIR BAG MODULE** . Ensure front wheels are in straight-ahead position. Remove steering wheel retaining bolt or nut. Mark steering wheel hub in relation to steering shaft for installation reference. Remove steering wheel.
3. To install, reverse removal procedure. Be sure steering wheel retaining pins snap into recesses. Tighten steering wheel retaining bolt or nut to specification. See **TORQUE SPECIFICATIONS** . Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

DIAGNOSTICS

For information on air bag system diagnostic trouble codes, see **1988-2002 AIR BAG TROUBLE CODES** article. All air bag system diagnosis must be carried out using proprietary BMW DIS-MoDiC tester.

WIRE REPAIR

Individual pairs of firing circuit wires may be repaired using BMW air bag cable kits. Only one crimping connector can be installed into a single wire. Wires cannot be lengthened as a result of the repair. Damaged wire or connectors in door wiring harness must be repaired by replacing the entire door wiring harness.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs (N.m)
Lower seat belt anchor bolt	35 (48)
Passenger-side air bag module retaining nuts	16 (22)
Seat belt pretensioner mounting bolt	33 (45)
Seat track mounting bolts	33 (45)
Steering wheel retaining	
bolt	46 (63)
nut	59 (80)
	INCH Lbs. (N.m)
Driver-side air bag module Torx screw	70 (8)
Front head impact gas generator nuts	35 (4)
Head impact air bag	
A-pillar mounting bolt	97 (11)
C-pillar mounting bolt	97 (11)
Mounting bracket bolts	35 (4)
Rear head impact gas generator screws	35 (4)
Rear head impact module mounting screws	27 (3)
Side air bag module mounting screws	75 (8.5)

WIRING DIAGRAMS

Wiring diagrams were not available at time of publication.