

2000 BMW X5

2000-04 BRAKES Anti-Lock/Traction Control - X5

2000-06 BRAKES

Anti-Lock/Traction Control - X5

IDENTIFICATION

2001 CHASSIS & ENGINE IDENTIFICATION

Model (Chassis Code)	Engine Size (Code)
2000-2003	
X5 (E53)	4.4L (M62)
2001-2004	
X5 (E53)	3.0L (M54)
2002-2003	
X5 (E53)	4.6L (M62)
2004	
X5 (E53)	4.4L (N62)

DESCRIPTION

NOTE: For additional information, see appropriate DISC article.

CAUTION: See ANTI-LOCK BRAKE SAFETY PRECAUTIONS article in GENERAL INFORMATION.

Anti-Lock Brake System/Automatic Stability Control plus Traction (ABS/ASC+T) system consists of a hydraulic unit, slip control module, 4 wheel speed sensors, ASC switch, relays and wiring harness. System may also have brakelight switch, pedal travel sensor, auxiliary throttle position motor, auxiliary throttle position sensor and/or ASC diode. ASC+T portion of system interfaces with engine control module (DME). If vehicle has automatic transmission, ASC+T/DSC portion of system interfaces with automatic transmission control module to modify shift points.

To maintain maneuverability and stability of vehicle during hard braking, ABS prevents wheel lock-up. ABS activates at speeds greater than about 6 MPH and deactivates when speed drops below about 3 MPH. ASC+T optimizes vehicle stability and traction when accelerating or starting from a standstill. During control phase, engine torque is reduced by decreasing engine air intake and retarding ignition timing, and braking is applied to rear wheels. If more control is needed, ignition and fuel injection are gradually phased out. Brakes are only applied if vehicle is traveling at speed of less than 60 MPH. For speeds up to 24 MPH, braking of individual rear wheels has same effect as limited slip differential which increases traction. When moving from a standstill when both driven wheels have same level of traction, or in all circumstances at speeds more than 24 MPH, the brake applications have effect of increasing stability.

Dynamic Stability Control (DSC) is an enhancement to ASC+T system. DSC optimizes stability during cornering and avoidance maneuvers. DSC is integrated into ASC+T control module. DSC monitors steering angle, lateral acceleration, brake pressure and movement of vehicle around its vertical axis. If differences in

wheel speeds occur, system avoids wheel spin by reducing engine torque. If necessary, system responds with application of brakes to rear wheels. If system detects instability in vehicle, braking action can also be directed to front wheels by DSC to stabilize vehicle.

ABS indicator light and ASC+T indicator lights on the instrument panel come on when ignition is turned on, then go out after about 2 seconds or when engine is started (bulb check). If a problem is detected in ABS system, ABS indicator light will come on and ABS/ASC+T systems will be disabled. Vehicle will then convert to conventional braking. ASC indicator light will flash during traction regulation. If a problem is detected, or ASC+T system is switched off, ASC+T indicator light will come on steadily. ASC+T system can be manually switched off which is advisable when snow chains are used or vehicle is being rocked.

OPERATION

SLIP CONTROL MODULE

Anti-Lock Brake System/Automatic Stability Control plus Traction (ABS/ASC+T) control module computes the acceleration, deceleration and slip factors as generated from rotating wheels via the wheel pulse (speed) sensors. If Dynamic Stability Control (DSC) is part of system, ABS/ASC+T/DSC control module also computes steering angle, lateral acceleration, brake pressure and movement of vehicle around its vertical axis. Control module program can determine correct response behavior of the system based on these computations. Control module response is sent by electronic signals to the electromagnetically operated valves in the ABS/ASC+T hydraulic unit.

The control module contains electronic monitoring circuits. These monitoring circuits ensure proper operation of the ABS. If the control module detects a defect in the wiring harness or any electrical part of the equipment, the monitoring circuit will switch off appropriate system control. If problem also affects ABS, both systems will be switched off and braking will return to normal use of standard brake system. Appropriate indicator lights will come on.

HYDRAULIC UNIT

NOTE: **Hydraulic units are model specific and are not interchangeable.**

Hydraulic unit has 4 channels allowing braking control at individual wheels. To control the braking system pressure, the brake hydraulic unit has a 3-way valve which permits 3 separate brake pressure conditions. Pressure build-up, pressure retention and pressure drop are the 3 pressure phases that adapt to the vehicle braking requirements.

As soon as wheel lock-up is indicated, brake fluid pressure is reduced. If the wheel still tends to lock, pressure will be further reduced until wheel acceleration or the slip limit is detected. The pressure is then raised and the control phases repeated. These pressure changes occur in milliseconds.

The return delivery pump returns brake fluid from the wheel brake cylinder, while dropping the pressure to the appropriate brake circuit. The pump is a 2-piston design so circuits of a dual brake circuit system remain separated.

WHEEL PULSE (SPEED) SENSORS

Wheel pulse (speed) sensors are installed at each wheel. Each wheel pulse sensor generates a signal proportional to the speed of a rotating toothed wheel. Wheel pulse sensors relay the signal to the ABS/ASC+T control module, which computes the actual wheel speed. The toothed wheels, which run past the permanently magnetized edge of the speed sensor, are attached to the hub.

BLEEDING/FLUSHING BRAKE SYSTEM

See BLEEDING in appropriate DISC article.

SERVICING

Use brake fluid called for in owner's manual. Brake fluid should be replaced every 2 years. See **BLEEDING/FLUSHING BRAKE SYSTEM** . Over time, brake fluid will retain moisture from air and could cause brake fluid boiling point to drop from 464°F (240°C) to 320°F (160°C).

DIAGNOSIS & TESTING

NOTE: **Diagnosis and test procedures are available on BMW Diagnosis and Information System (DIS) Tester. Diagnosis and testing information is not available for use with generic test equipment.**

REMOVAL & INSTALLATION

CAUTION: Before disconnecting battery, there is danger of mixing up battery leads. If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads. Disconnecting the battery will clear the fault memories of the control units. It is important to first read fault memories and have any faults printed. The radio can only be put back into service after disconnection by keying the radio code back in. For this reason, obtain the radio code card from the customer before starting work. Note down programmed stations and store these stations back in memory once the battery has been reconnected. Stored settings of the on-board computer and clock will also be lost. On cars with infrared sender locking systems, all the available keys must be re-coded. On some models, power windows and slide/tilt sunroof must be reinitialized.

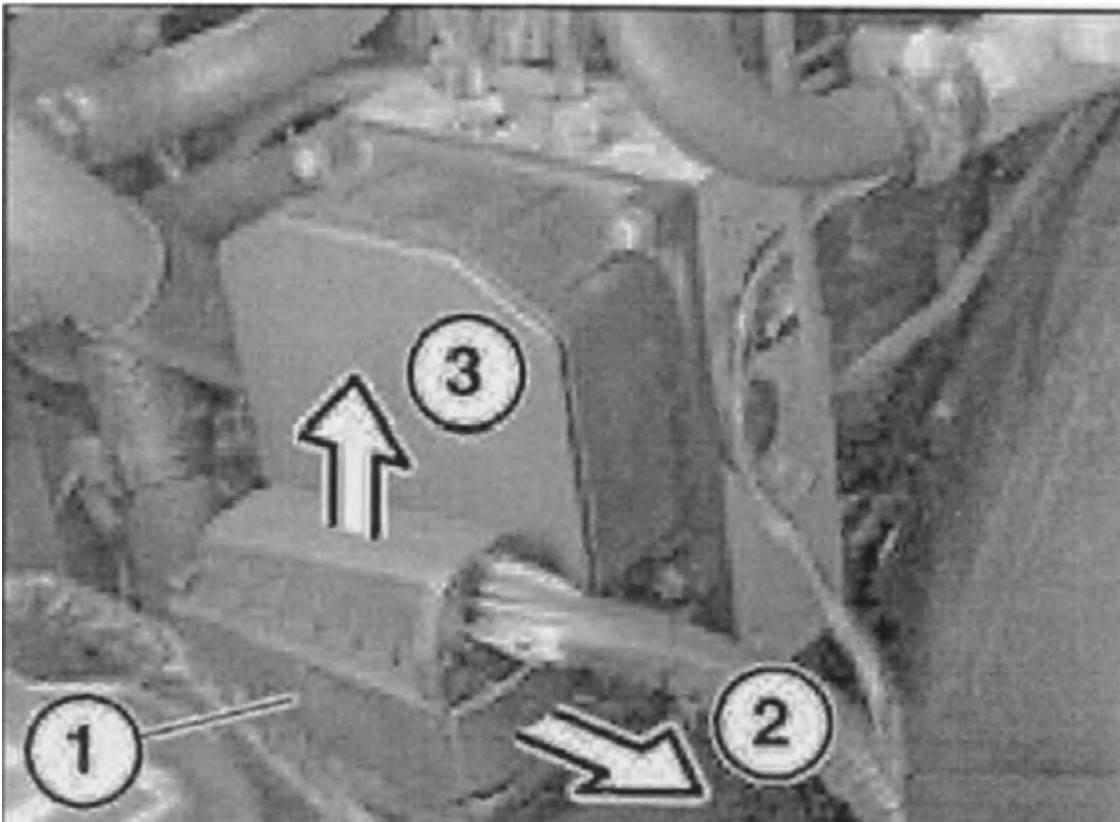
DSC CONTROL MODULE

Removal & Installation

1. Before removing DSC control module, read out fault memory and, if necessary, print out trouble code.
2. If necessary, detach auxiliary water pump with holder from body. Disconnect electric connection and press auxiliary water pump to one side.
3. Unfasten plug connection lock (1) in direction (2). Detach plug connection (1) in direction (3) vertically

towards top. See **Fig. 1** .

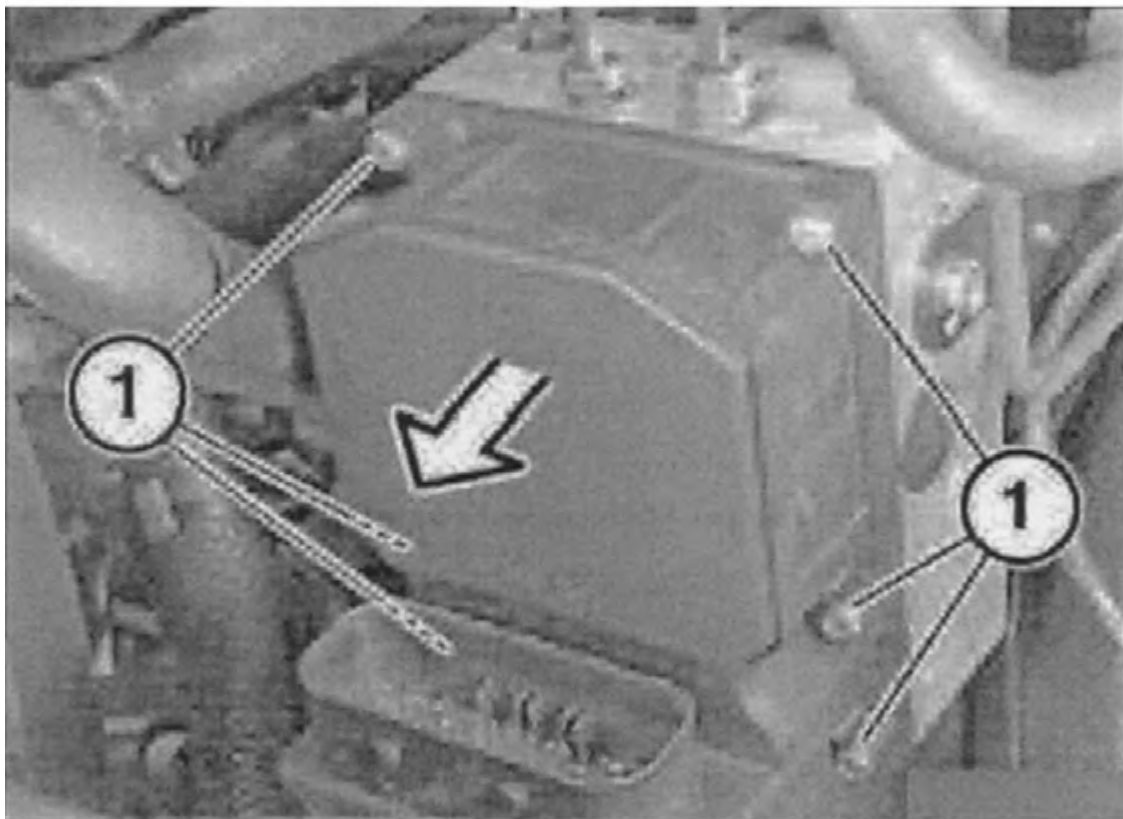
4. Release screws (1) and detach control module (2) from hydraulic unit. See **Fig. 2** .
5. Before installation, check sealing surface (1) between control module and hydraulic unit for damage. Clean sealing surface. Do not use tools with sharp edges or aggressive cleaning agents. Check contact lugs (2) for corrosion or damage. Replace hydraulic unit if sealing surface or contact lugs are damaged. See **Fig. 3** .
6. Carefully push control module (1) onto hydraulic unit (2). Ensure solenoid coils are not tilted. See **Fig. 4** .
7. Housing edge of control module (1) must slide over extension on hydraulic unit (2). See **Fig. 5** .
8. Install (do not tighten down) NEW screws (1 and 2) uniformly until control module rests evenly on hydraulic unit. Install new screws (3-6), do not tighten down. Tighten down screws (1-6) in specified sequence. See **Fig. 6** .
9. Tighten screws to specification. See **TORQUE SPECIFICATIONS** .
10. Position plug connection vertically on control module so as to avoid damaging pins. Slide connector lock into place.
11. Recode new control units and adjust steering angle sensor with the DIS (Diagnosis and Information System) under the menu item "Service functions".
12. Carry out end-of-belt test with DIS (Diagnosis and Information System).



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Fig. 1: Removing Plug Connection

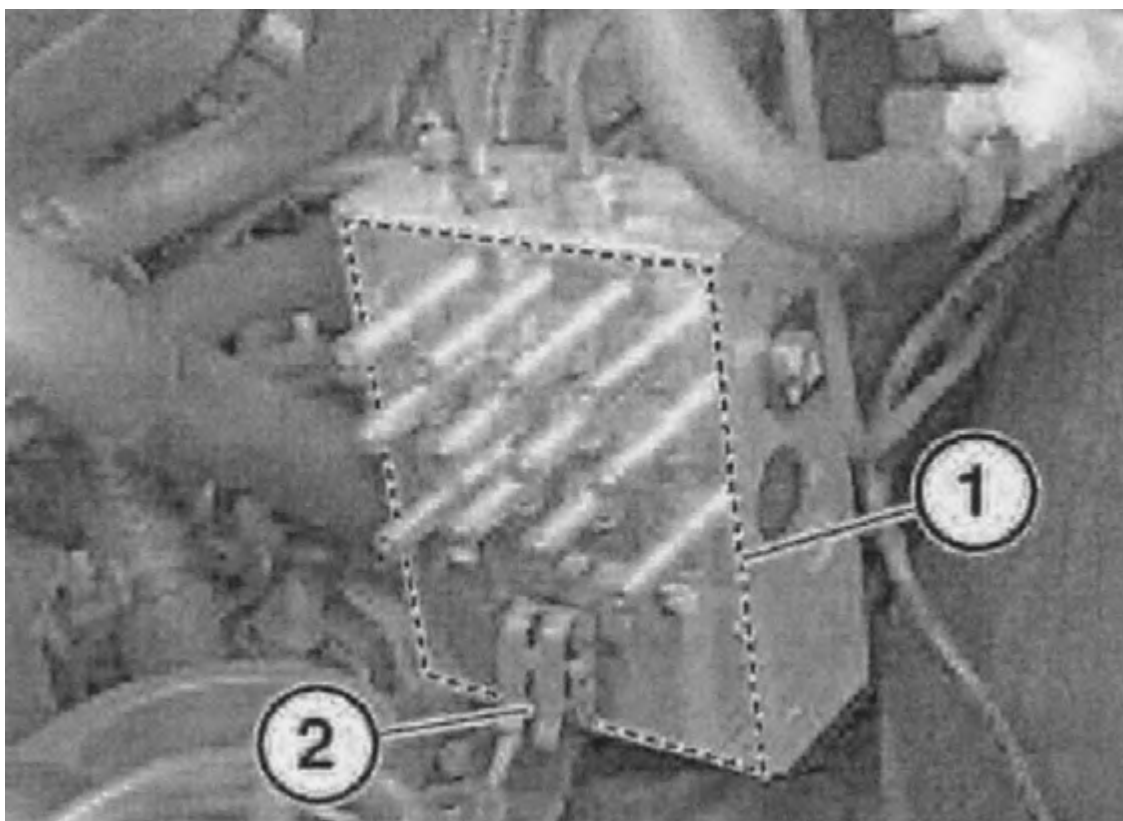
Courtesy of BMW OF NORTH AMERICA, INC.



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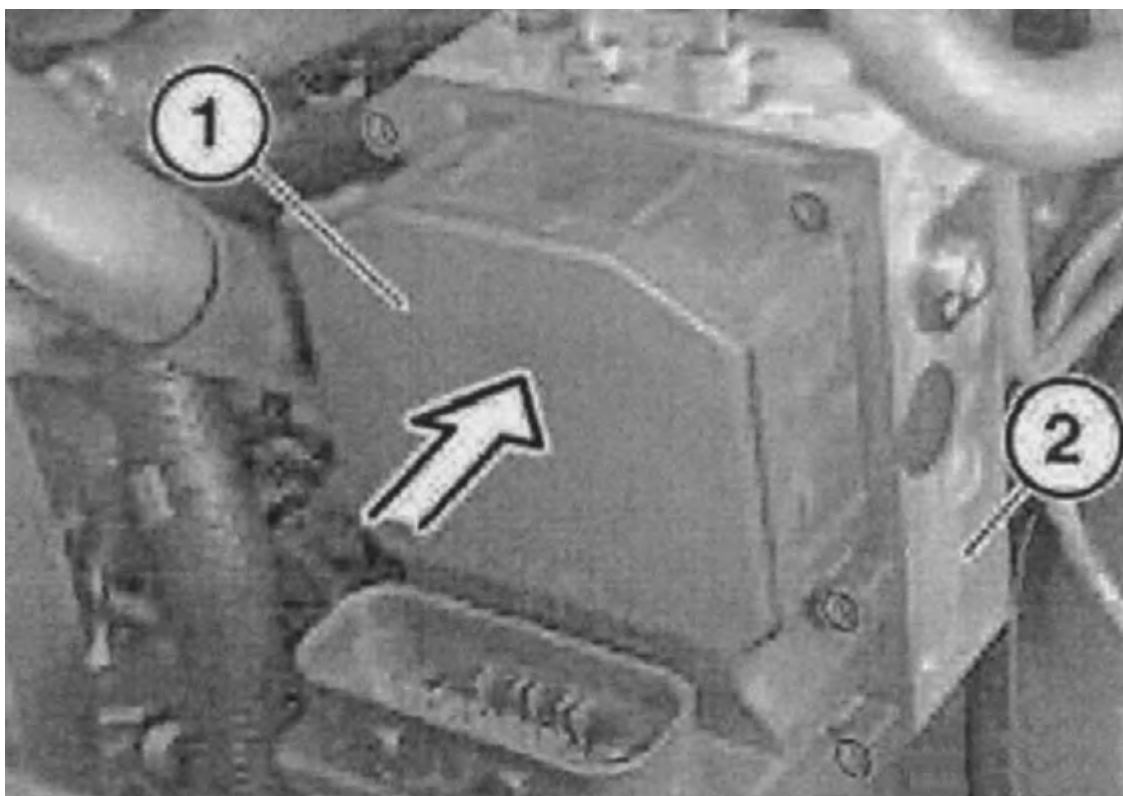
Fig. 2: Removing Control Unit From Hydraulic Unit

Courtesy of BMW OF NORTH AMERICA, INC.



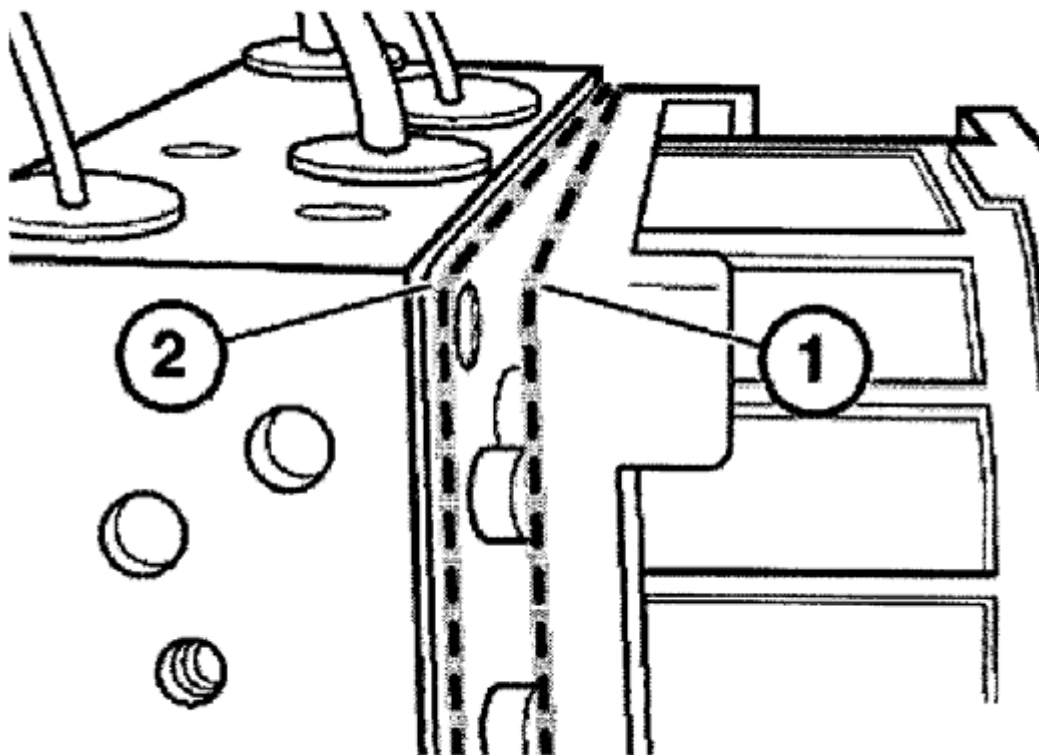
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Fig. 3: Locating Sealing Surface Components
Courtesy of BMW OF NORTH AMERICA, INC.



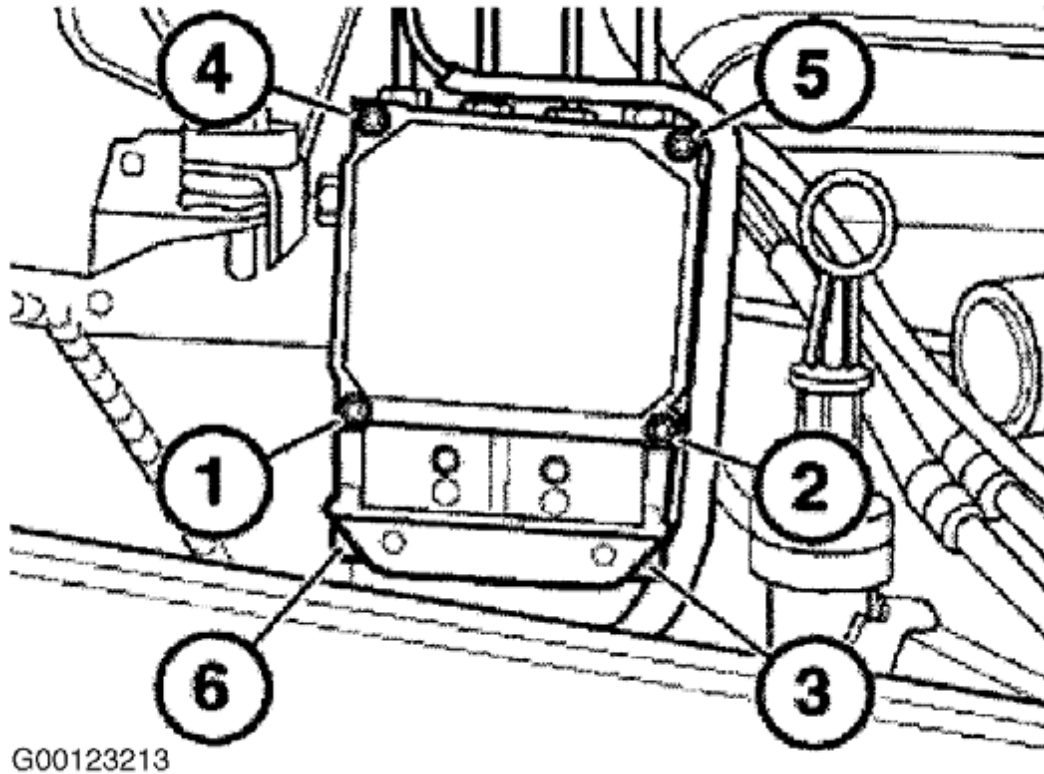
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Fig. 4: Pushing Control Module Onto Hydraulic Unit
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 5: Locating Edge Of Control Module
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 6: Identifying Order Of Control Module Screws
Courtesy of BMW OF NORTH AMERICA, INC.

DSC HYDRAULIC UNIT

Removal & Installation

1. Before removing hydraulic unit, read out control unit fault memory and, if necessary, print out diagnostic trouble code.
2. Load and block brake pedal with pedal support.
3. If necessary, detach auxiliary water pump with holder from body. Disconnect electric connection and press auxiliary water pump to one side.
4. Detach plug connection to control unit.

CAUTION: Do not bend brake lines.

5. Mark location of all brakelines at DSC hydraulic unit and disconnect.
6. Unlock plug connection on pressure sensor and detach. Release screw and remove hydraulic unit. See

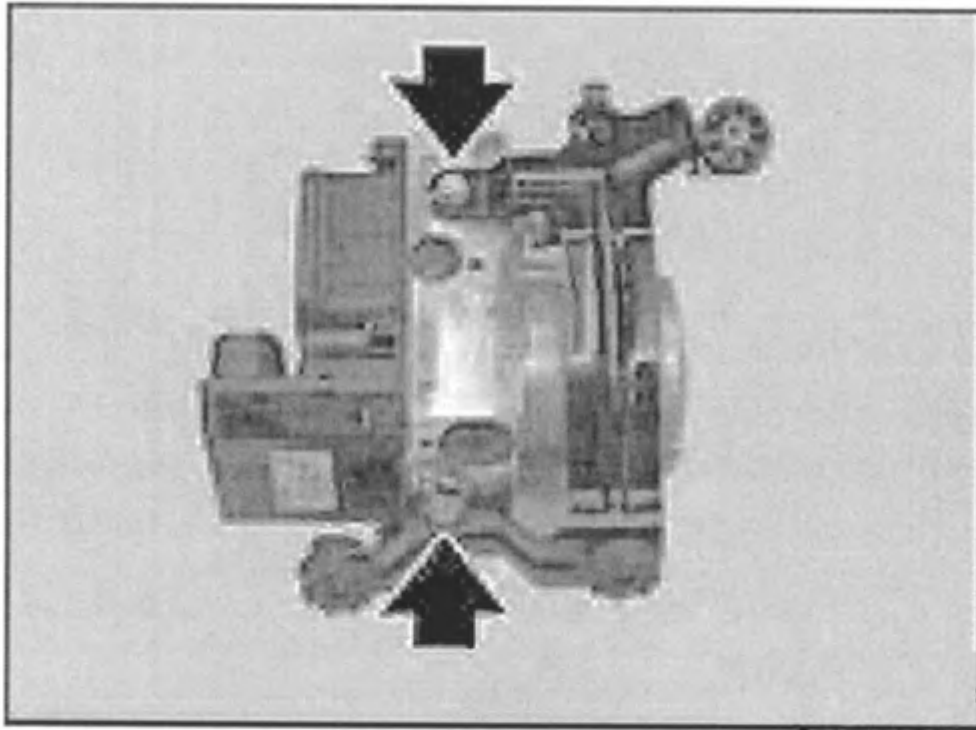
Fig. 7 .

7. Release screws and convert bracket. See **Fig. 8** .
8. To install, reverse removal procedure.
9. Tighten screws and brake lines to specification. See **TORQUE SPECIFICATIONS** .
10. After completing work, bleed brake system. See BLEEDING in appropriate DISC article.
11. Using Diagnosis Information System (DIS), carry out function check of hydraulic unit, coding for a new control unit, adjustment of steering angle sensor and end-of-tape test for new control unit.



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Fig. 7: Locating Plug Connection & Screw
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 8: Converting Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

DSC3 PRECHARGING PUMP

Removal & Installation

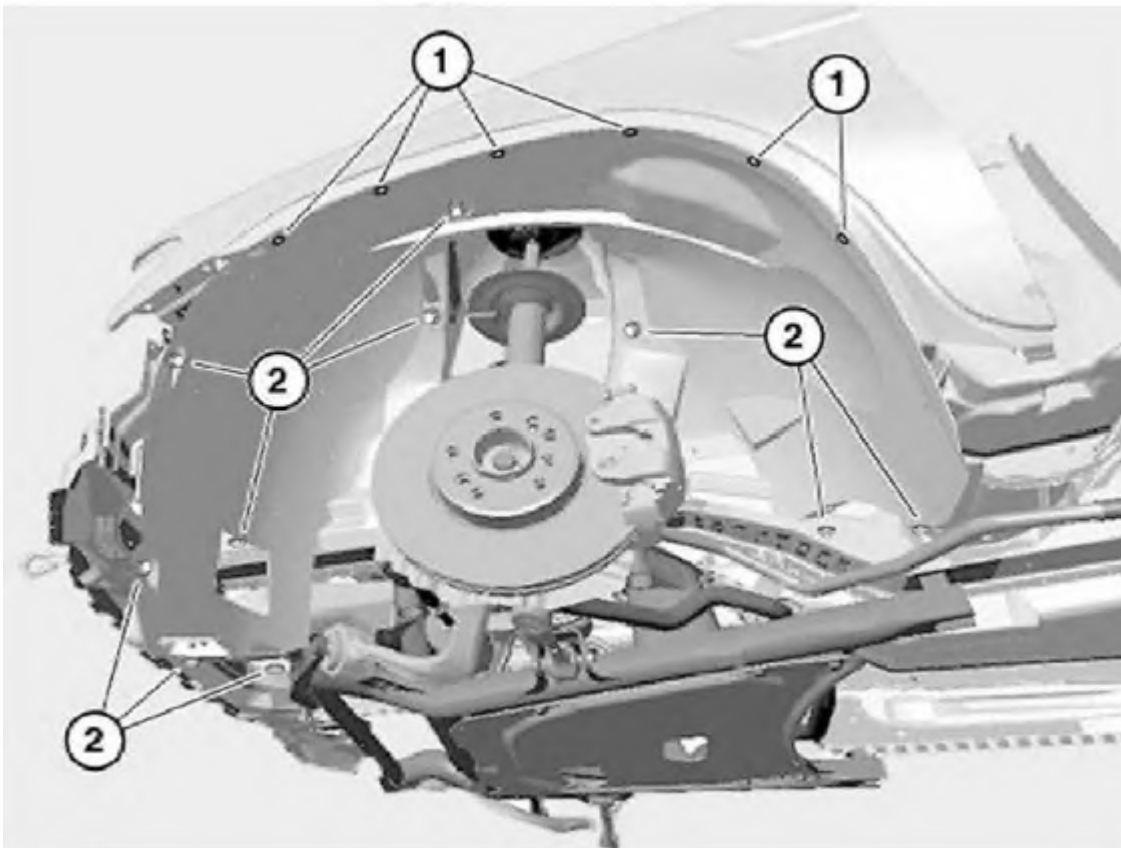
1. Draw off brake fluid using a syringe dedicated to brake fluid.
2. Remove left front wheel.
3. Remove expansion rivets (1) and release screws (2). Remove wheel arch. See **Fig. 9** .
4. Release screw. See **Fig. 10** .

CAUTION: Brake fluid may emerge. Do not mix up brake lines.

5. Unlock plug connection and disconnect. Disconnect brake lines. See **Fig. 11** .
6. Remove precharging pump from rubber mounts.
7. Release screws. Convert protective cap (1) and holder (2). See **Fig. 12** .
8. To install, reverse removal procedure. Tighten screws and brake lines to specification. See **TORQUE**

SPECIFICATIONS .

9. After completing work, connect brake fluid changer.
10. Activate precharging pump with BMW Diagnosis and Information System (DIS) Tester.
11. Bleed front axle circuit. See BLEEDING in appropriate DISC article.
12. Tighten wheel lug bolts to specification. See **TORQUE SPECIFICATIONS .**



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Fig. 9: Removing Wheel Arch**Courtesy of BMW OF NORTH AMERICA, INC.**



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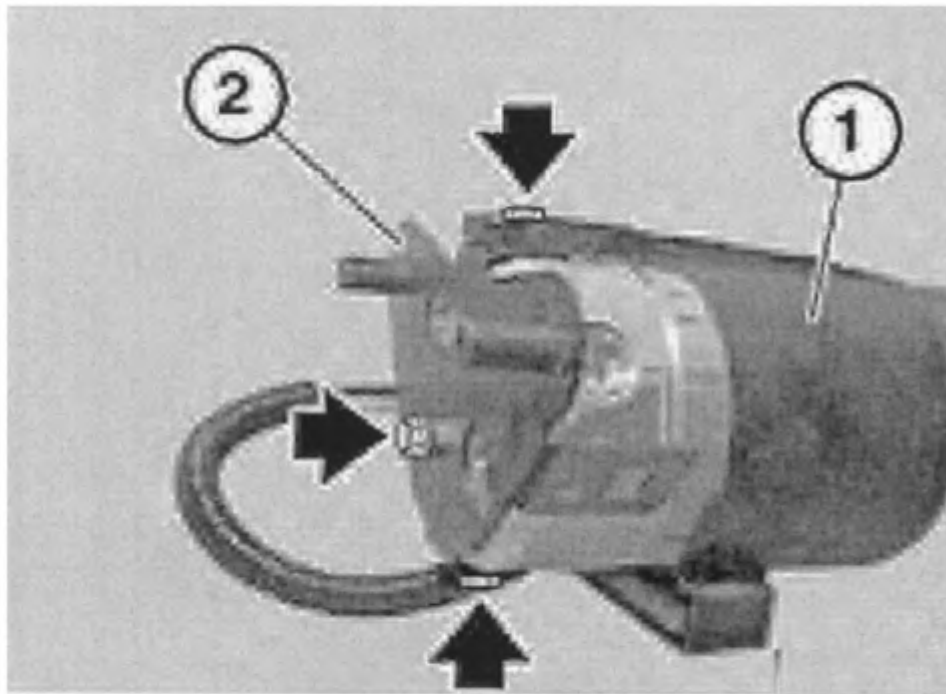
Fig. 10: Locating Screw

Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 11: Locating Brake Lines & Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.



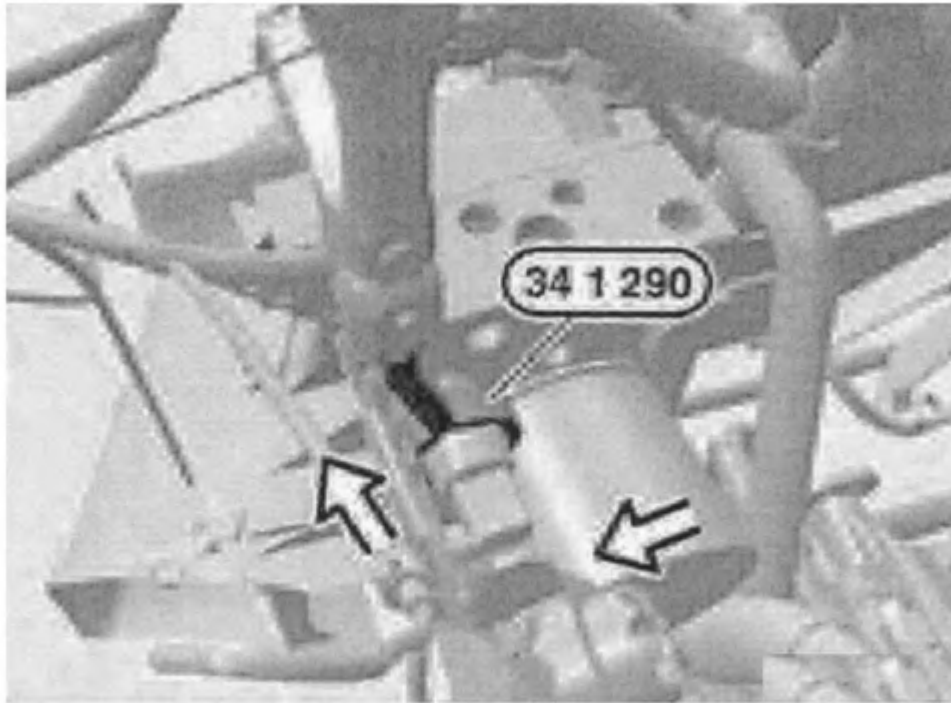
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Fig. 12: Locating Precharging Pump Components
Courtesy of BMW OF NORTH AMERICA, INC.

PRESSURE SENSOR FOR DSC

Removal & Installation

1. Switch off ignition.
2. Protect brake system against unauthorized actuation.
3. Unlock plug connection and detach. Release screw. See **Fig. 7** .
4. Press holder away in direction of arrow. Detach pressure sensor with special tool (34 1 290). See **Fig. 13** .
5. Check sealing surfaces and thread of pressure sensor and of hydraulic unit for damage.
6. Screw in a new pressure sensor immediately after unscrewing the old one. Tighten to specification with special tool (34 1 290). See **TORQUE SPECIFICATIONS** .
7. Balance of installation is reverse of removal. Tighten screw to specification. See **TORQUE SPECIFICATIONS** .
8. After completing work, bleed front axle circuit. See BLEEDING in appropriate DISC article.
9. Check pressure sensor under pressure for leaks.
10. Pressure sensor check by DSC system: turn on ignition and firmly depress brake pedal. Warning lamps must not come on.



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Fig. 13: Removing Pressure Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

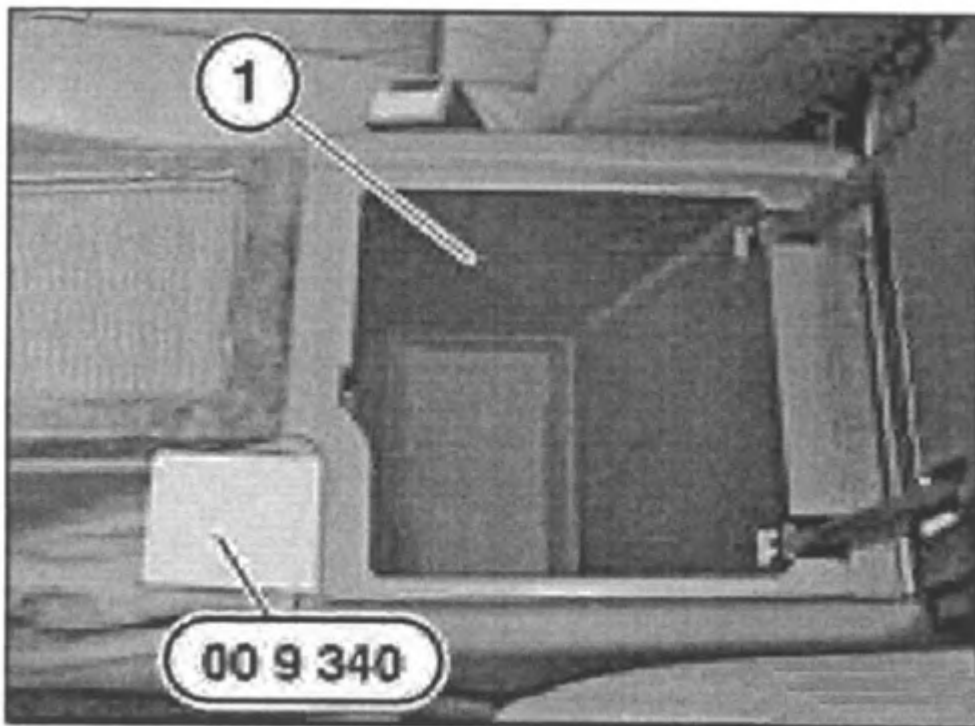
ROTATION-RATE SENSOR DSC III (DSC SENSOR)**Removal**

NOTE: **Rotation rate sensor also contains function of transversal acceleration sensor.**

1. Lever out storage box (1) with special tool (00 9 340) and remove. See **Fig. 14** .
2. Loosen air duct screws (1). See **Fig. 15** .
3. Pull out fresh-air grill (1) in direction of arrow. See **Fig. 16** .
4. Disconnect plug connections (1). If necessary, disconnect plug connections on switch for seat heating. Remove fresh-air grill (2). Unclip cigarette lighter (3). See **Fig. 17** .
5. Remove air duct (2). See **Fig. 15** .
6. Release screws (1). See **Fig. 18** .

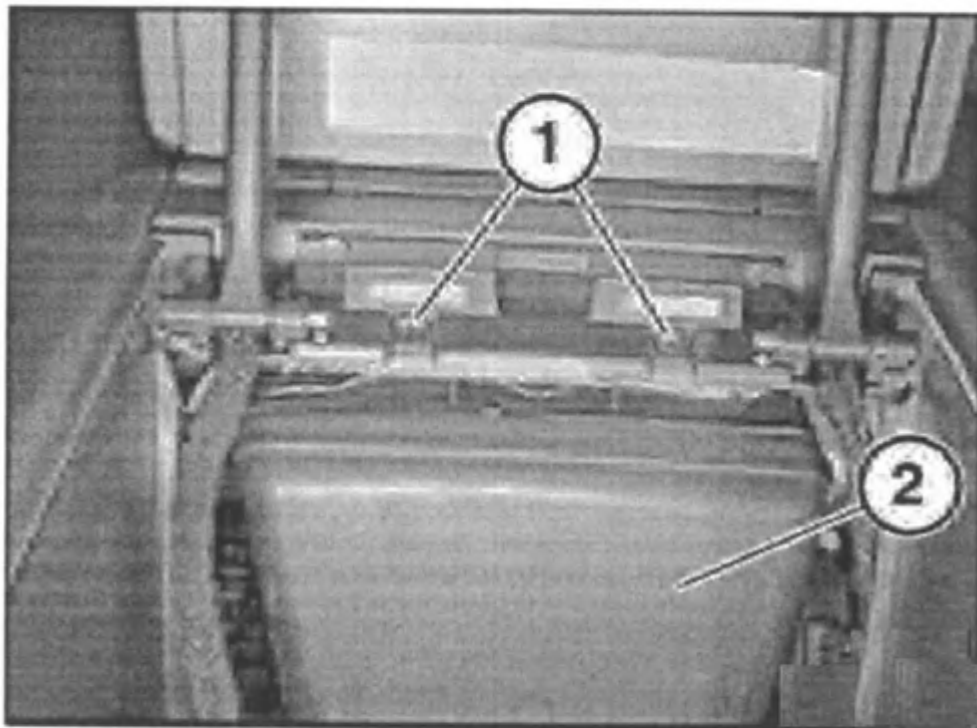
CAUTION: Last clip on front carpet (4) must be unclipped (risk of damage).

7. Unclip clips (1) on left/right with carpet (3) outwards from center console (2). Pull out carpet (3) towards rear. See **Fig. 19** .
8. Unfasten screws (1 and 2) left/right for release of cup holder (3). See **Fig. 20** .
9. Release left/right screws (2). Pull left/right side sections (1) apart and pull out center console (rear) with cup holder (3). See **Fig. 21** .
10. Release screws (1 and 2). See **Fig. 22** .
11. Unlock plug connection and detach. See **Fig. 23** .



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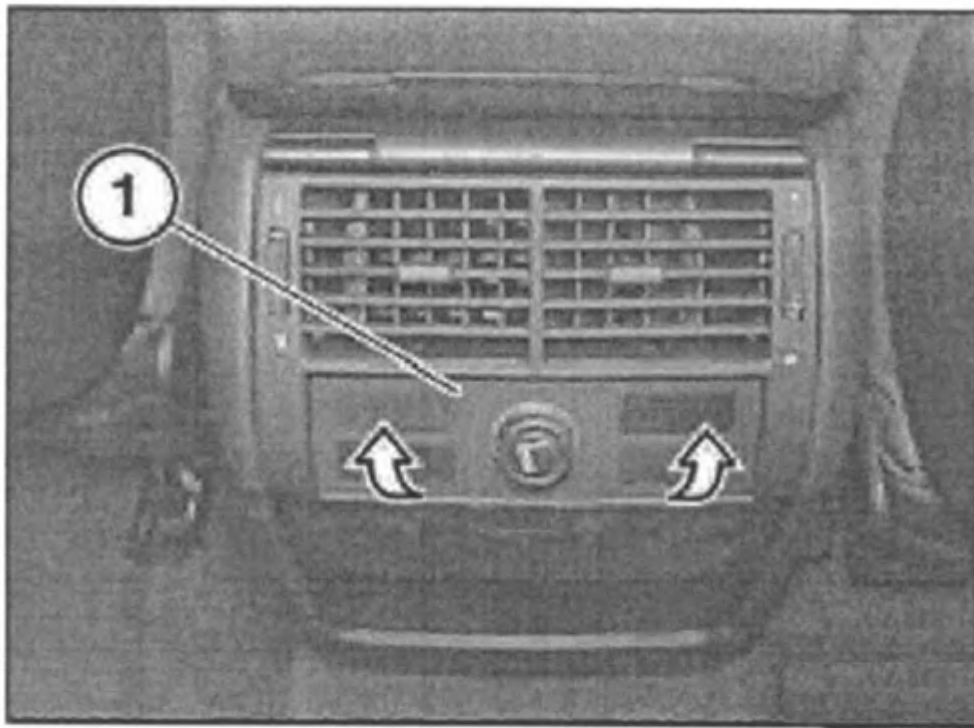
Fig. 14: Levering Out Storage Box
Courtesy of BMW OF NORTH AMERICA, INC.



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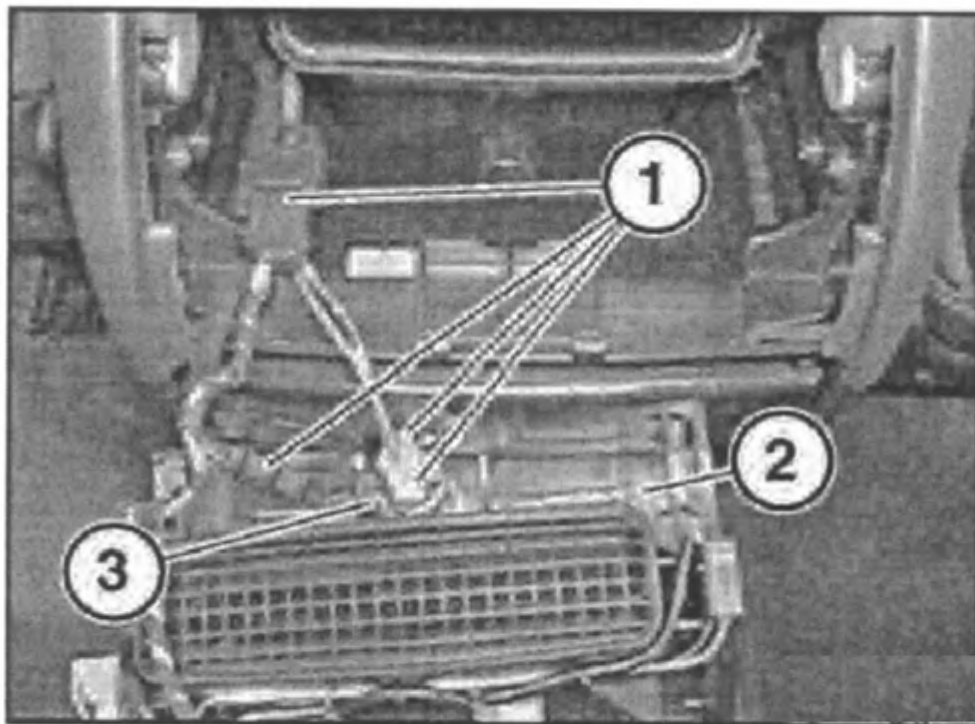
Fig. 15: Locating Air Duct Screws

Courtesy of BMW OF NORTH AMERICA, INC.



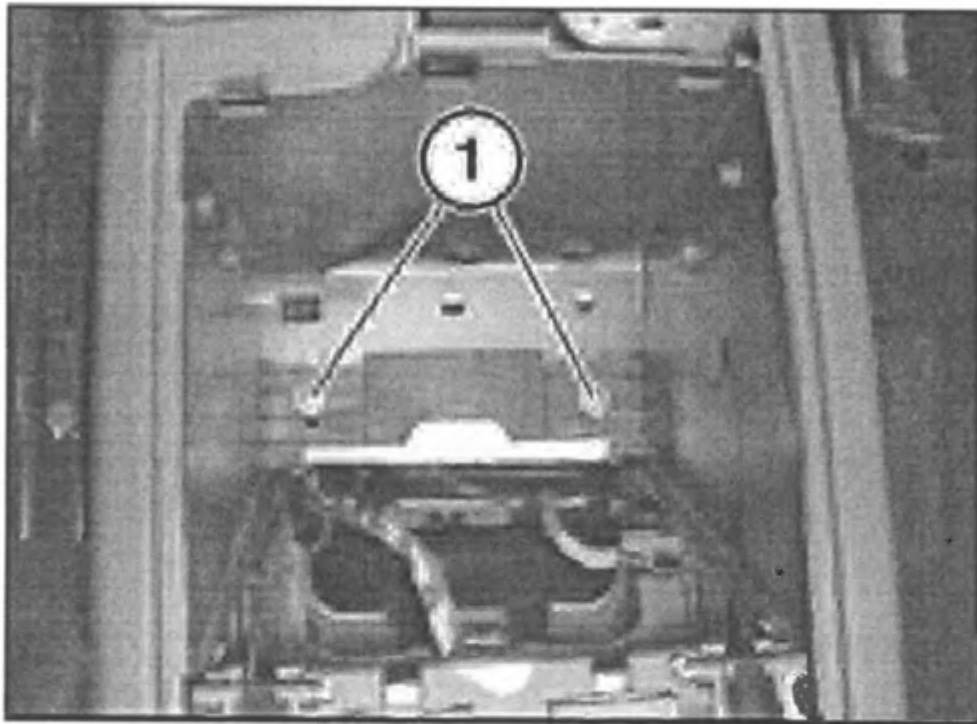
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Fig. 16: Pulling Out Fresh-Air Grill
Courtesy of BMW OF NORTH AMERICA, INC.



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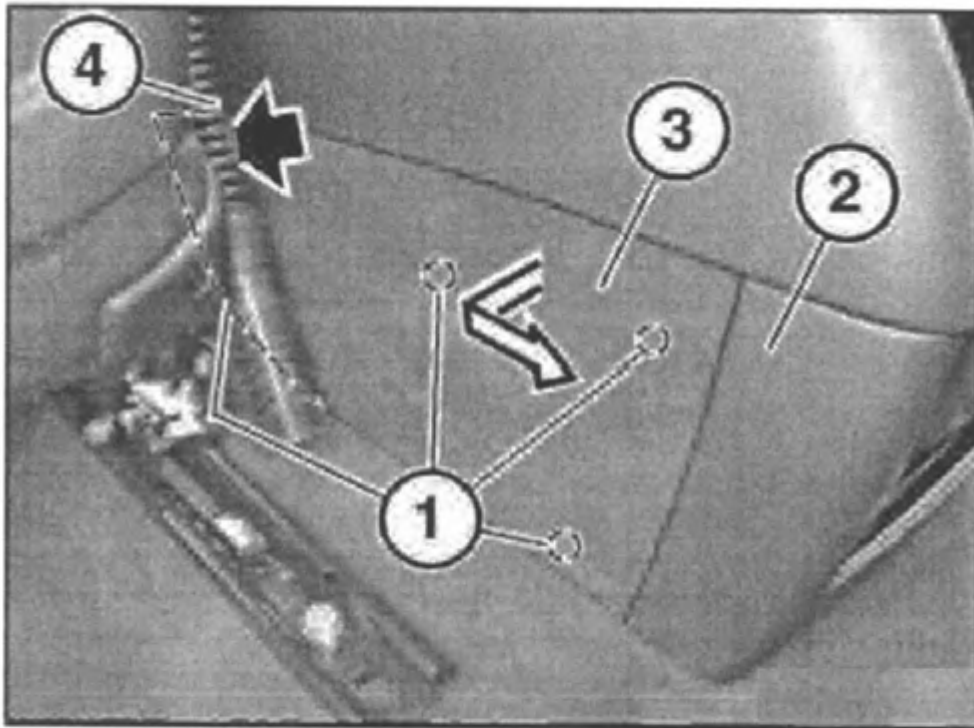
Fig. 17: Disconnecting Fresh-Air Grill
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 18: Locating Screws

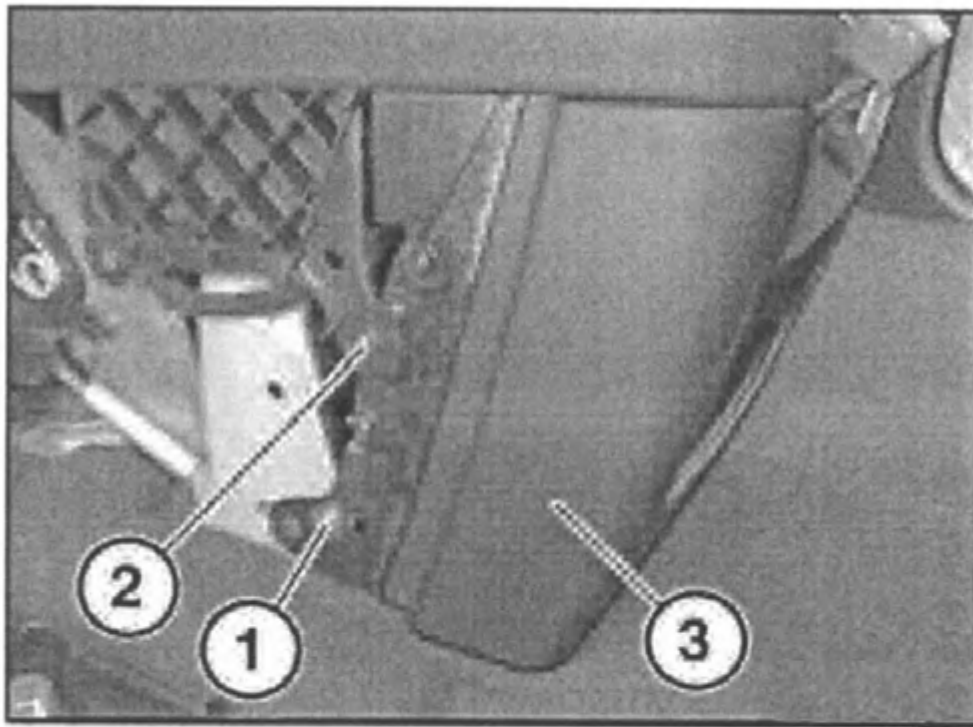
Courtesy of BMW OF NORTH AMERICA, INC.



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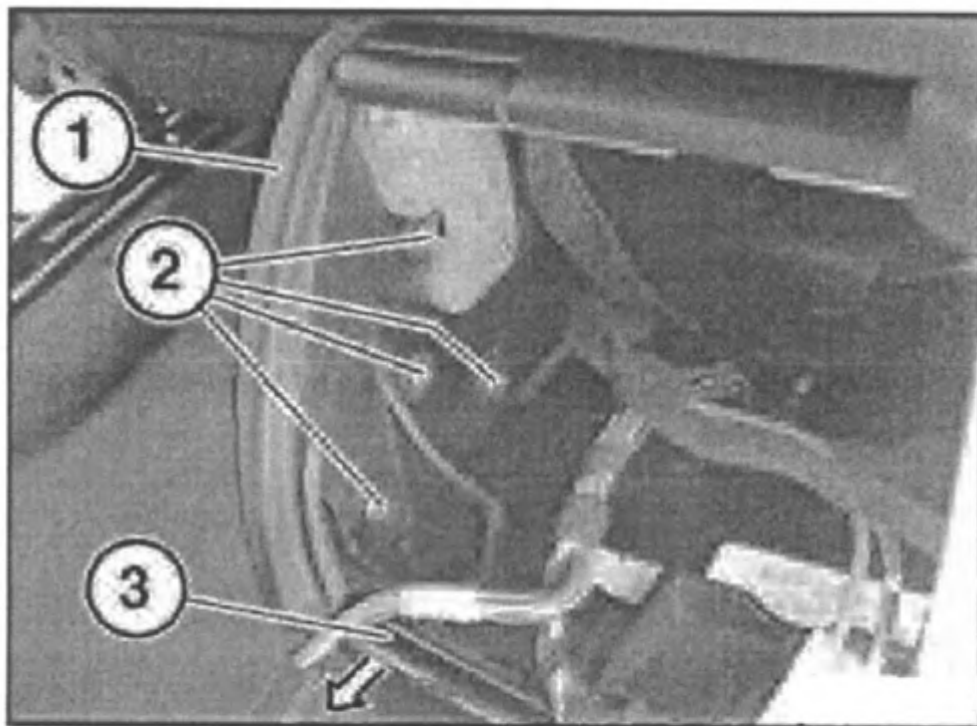
Fig. 19: Pulling Out Carpet

Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 20: Removing Screws For Cup Holder
Courtesy of BMW OF NORTH AMERICA, INC.

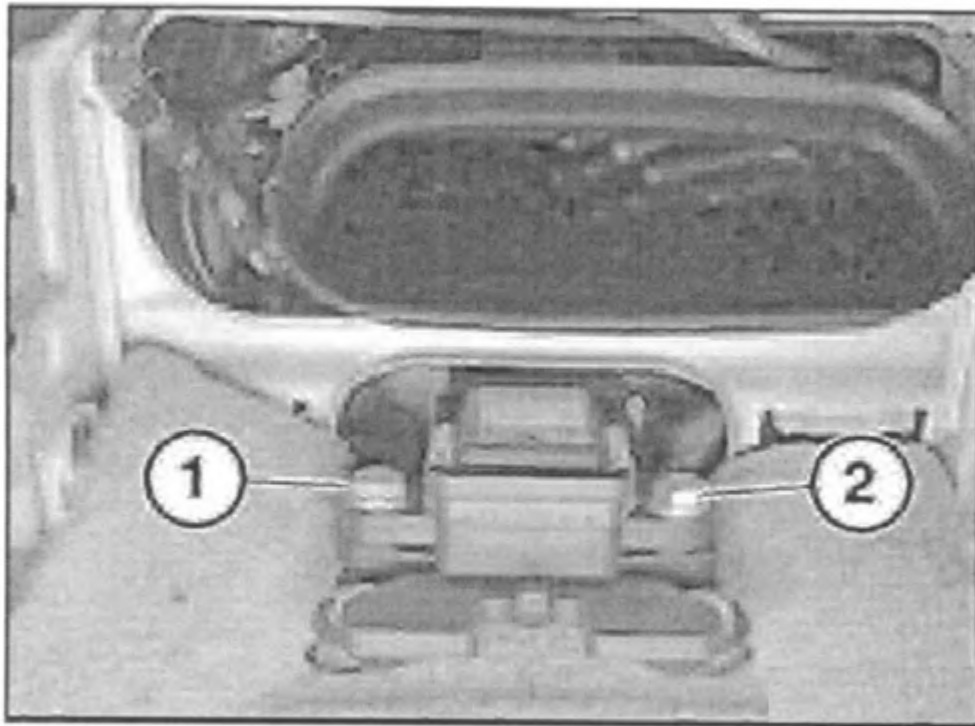


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Fig. 21: Pulling Out Center Console (Rear)
Courtesy of BMW OF NORTH AMERICA, INC.

2000 BMW X5

2000-04 BRAKES Anti-Lock/Traction Control - X5



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Fig. 22: Locating Rotation-Rate Sensor Screws
Courtesy of BMW OF NORTH AMERICA, INC.

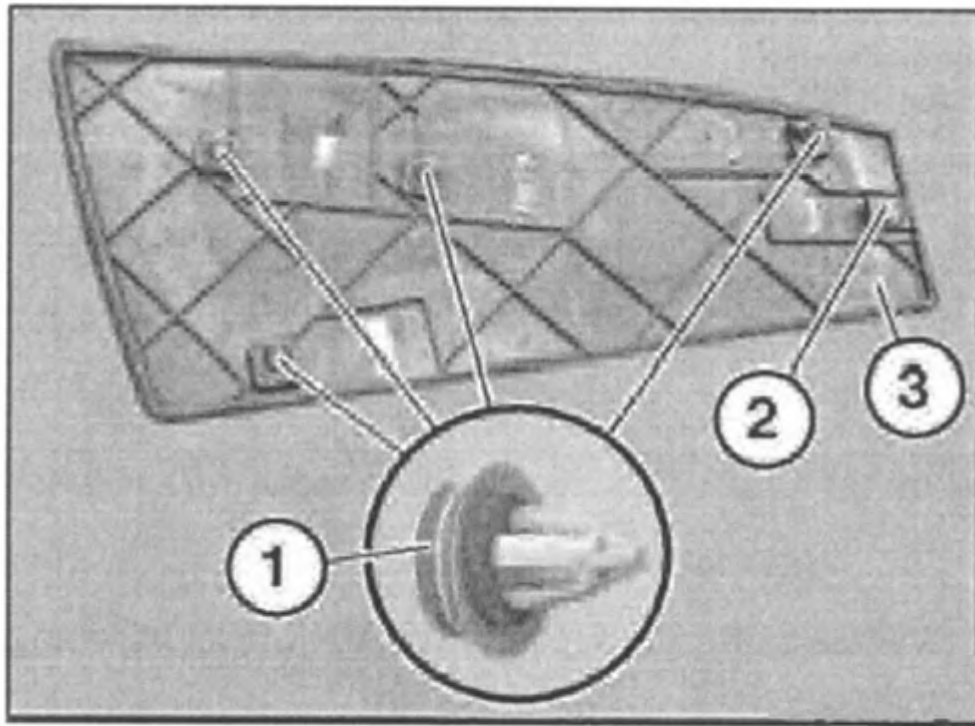


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Fig. 23: Removing Rotation-Rate Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

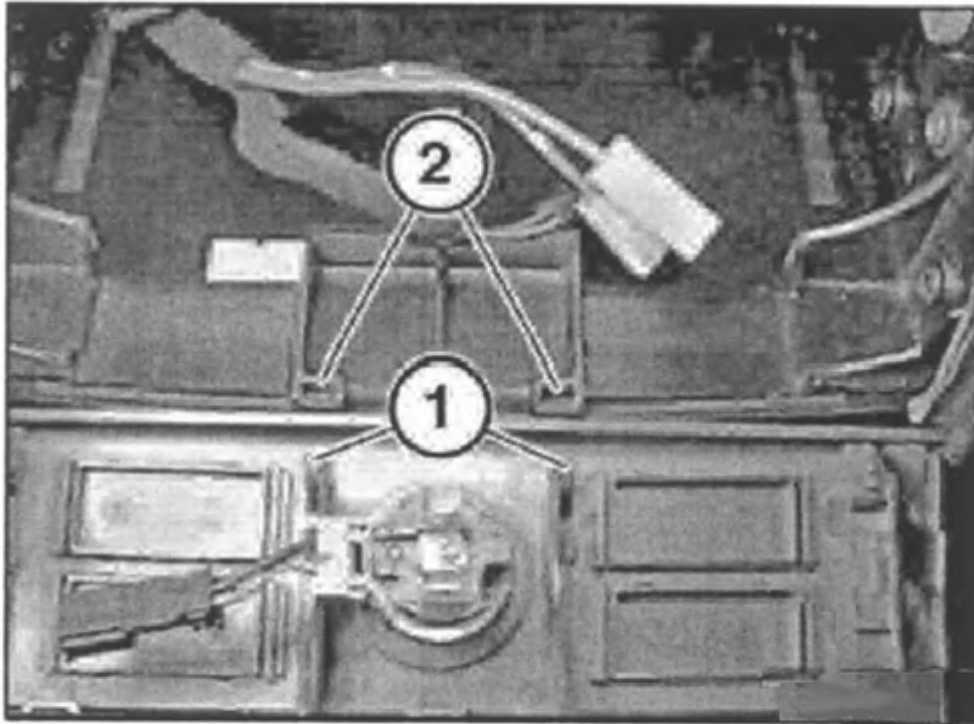
1. Installation is reverse of removal. Ensure proper locking of plug connectors and tighten screws to specification. See **TORQUE SPECIFICATIONS** .
2. Replace center console (rear) with cup holder and tighten screws.
3. If necessary, replace faulty clips (1) with sealing washer and retainer (2) on carpet (3). See **Fig. 24** .
4. Install screws (1). See **Fig. 18** .
5. Prior to tightening down all screws (1), fit air duct (2) correctly. See **Fig. 15** .
6. If detached, connect plug connections on switch for seat heating.
7. Snap journals (1) into place in openings (2). See **Fig. 25** .
8. Install fresh-air grill.
9. Ensure that air duct (2) is correctly seated. See **Fig. 15** .
10. Press in storage box.
11. Carry out adjustment of rotation rate sensor and transversal acceleration sensor with DIS (Diagnosis and Information System) under menu item "Service functions".



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Fig. 24: Replacing Carpet Clips

Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 25: Locating Journals

Courtesy of BMW OF NORTH AMERICA, INC.

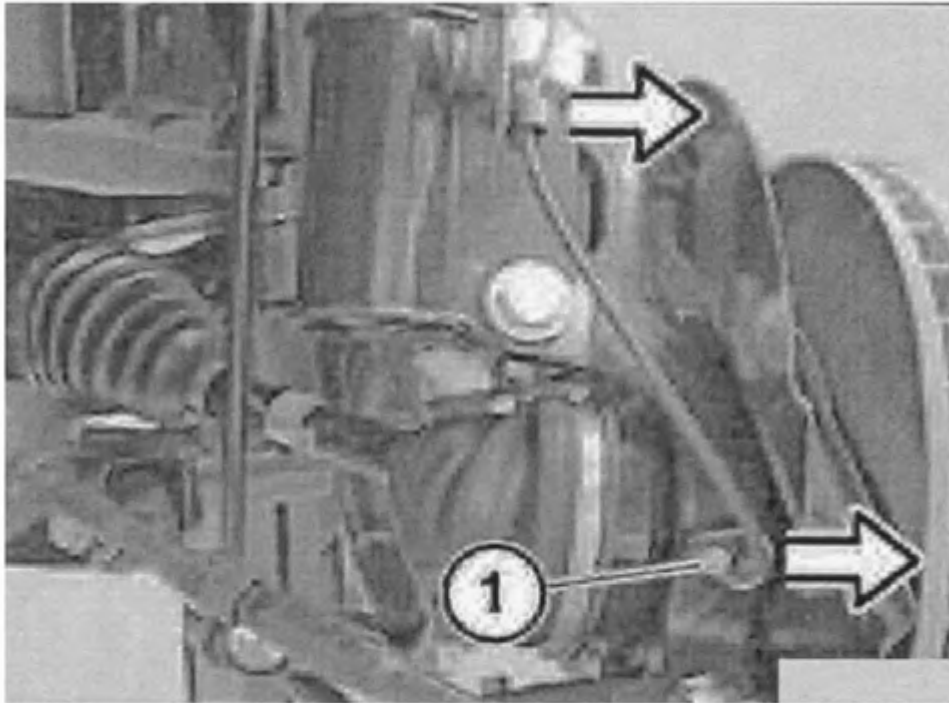
WHEEL PULSE (SPEED) SENSOR - FRONT**Removal & Installation**

1. Open wheel pulse sensor (ABS pulse generator) housing. Remove plug connection from fixture and disconnect. See **Fig. 26** .
2. Pull cable with rubber grommet out of bracket on spring strut.
3. Remove hexagon-socket-head cap screw (1), pull cable out of mounting on spring strut. Pull wheel pulse sensor from bore. See **Fig. 27** .
4. Clean and lubricate hole for wheel speed sensor with Staburags NBU 12/K or equivalent.
5. To install, reverse removal procedure. Tighten screws to specification. See **TORQUE SPECIFICATIONS** .
6. Ensure proper locking of electrical connector and proper seating of rubber grommets.



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Fig. 26: Opening Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.



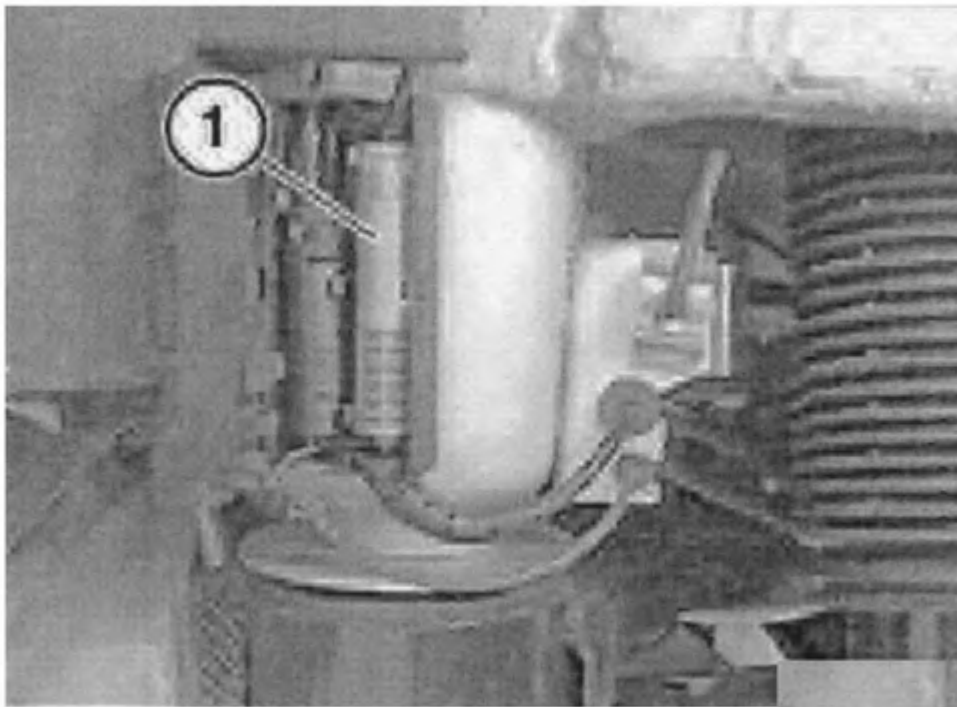
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Fig. 27: Locating Hexagon Socket Head Cap Screw
Courtesy of BMW OF NORTH AMERICA, INC.

WHEEL PULSE (SPEED) SENSOR - REAR

Removal & Installation

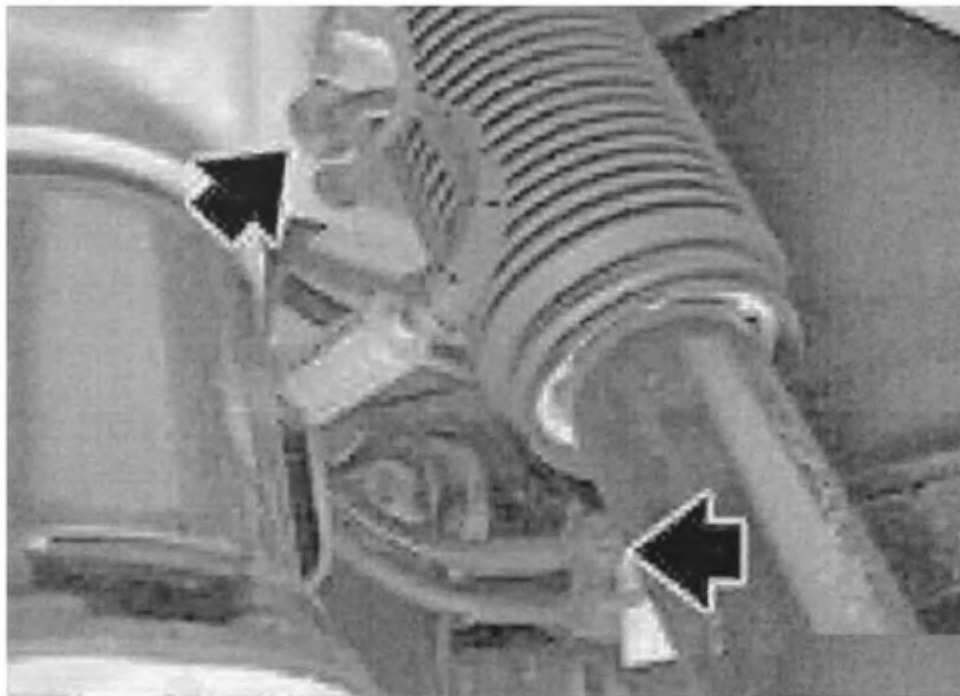
1. Remove wheel.
2. Pull plug connection (1) out of mounting and disconnect. See **Fig. 28** .
3. Pull cable with rubber grommets out of brackets and open cable ties. See **Fig. 29** .
4. Remove hexagon-socket-cap screw (1) and remove wheel pulse sensor (2) from bore. See **Fig. 30** .
5. Clean and lubricate hole for wheel pulse sensor with Staburags NBU 12/K or equivalent.
6. To install, reverse removal procedure. Tighten screw to specification. See **TORQUE SPECIFICATIONS** .
7. Ensure proper locking of the plug connection and proper seating of the cable in the fixtures and brackets.
8. When installing wheel, tighten wheel lugs to specification. See **TORQUE SPECIFICATIONS** .



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Fig. 28: Removing Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

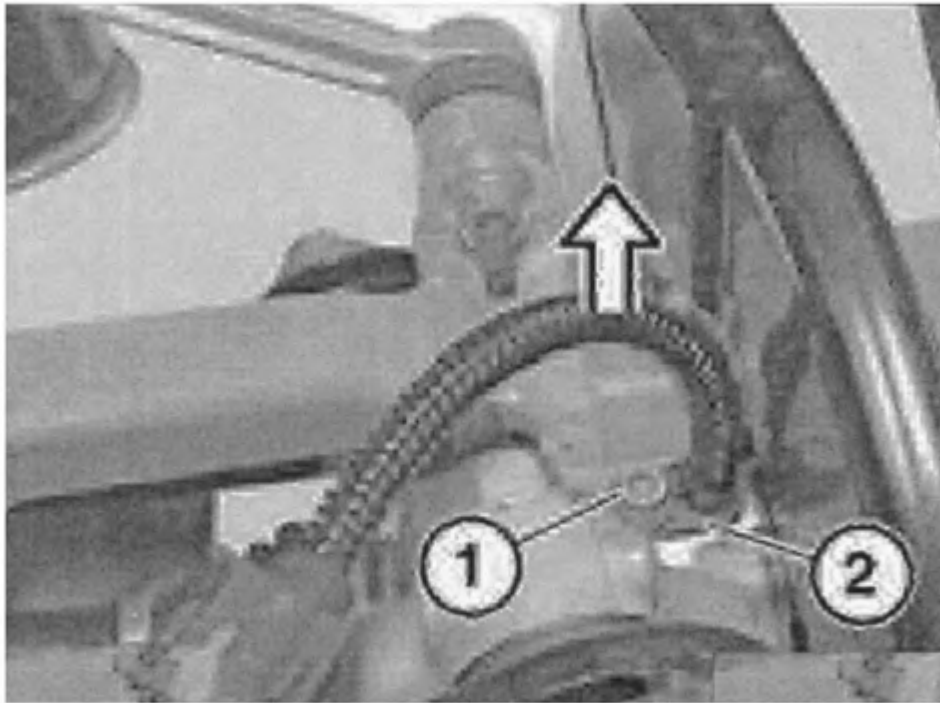


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Fig. 29: Locating Grommets & Ties
Courtesy of BMW OF NORTH AMERICA, INC.

2000 BMW X5

2000-04 BRAKES Anti-Lock/Traction Control - X5



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Fig. 30: Removing Pulse Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

TORQUE SPECIFICATIONS

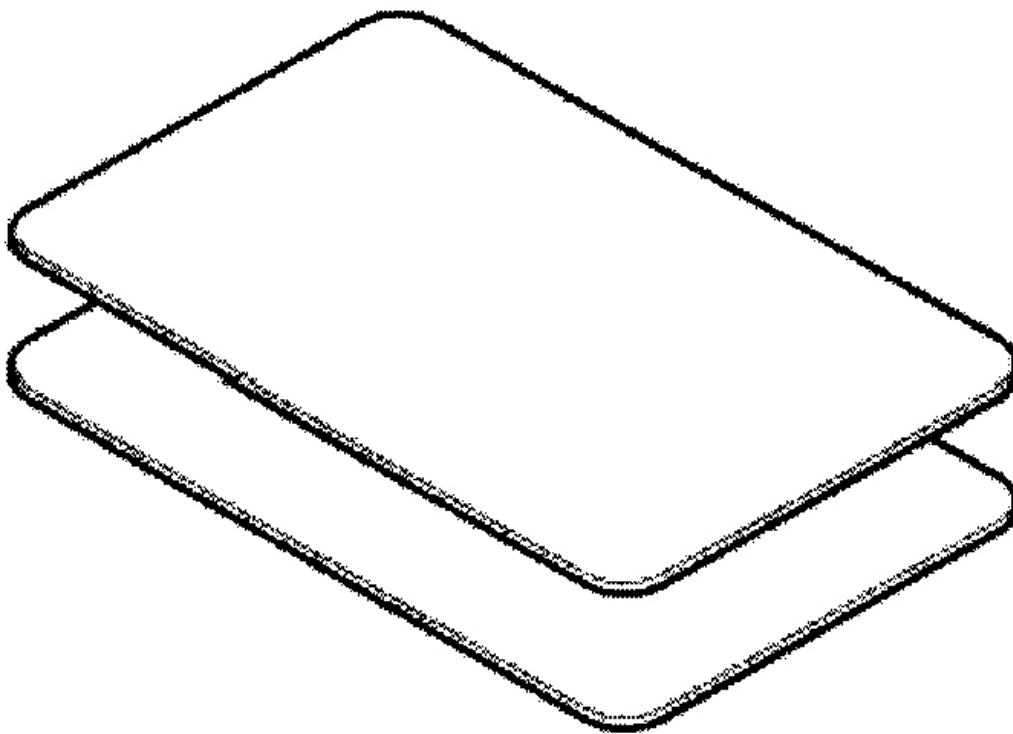
TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Brake Line Couplings	13-14 (17-19)
Pressure Sensor To Hydraulic Unit	14 (19)
Wheel Lug Bolts	96-111 (130-150)
INCH Lbs. (N.m)	
Bracket To Hydraulic Unit	71 (8)
Bracket, Hydraulic Unit To Body	71 (8)
Control Module On Hydraulic Unit	26 (2.9)
Rotation-Rate Sensor To Body	71 (8)
Screws To Precharging Pump & Holder	71 (8)
Wheel Pulse Sensor To Swivel Bearing/Wheel Carrier	71 (8)

WIRING DIAGRAMS

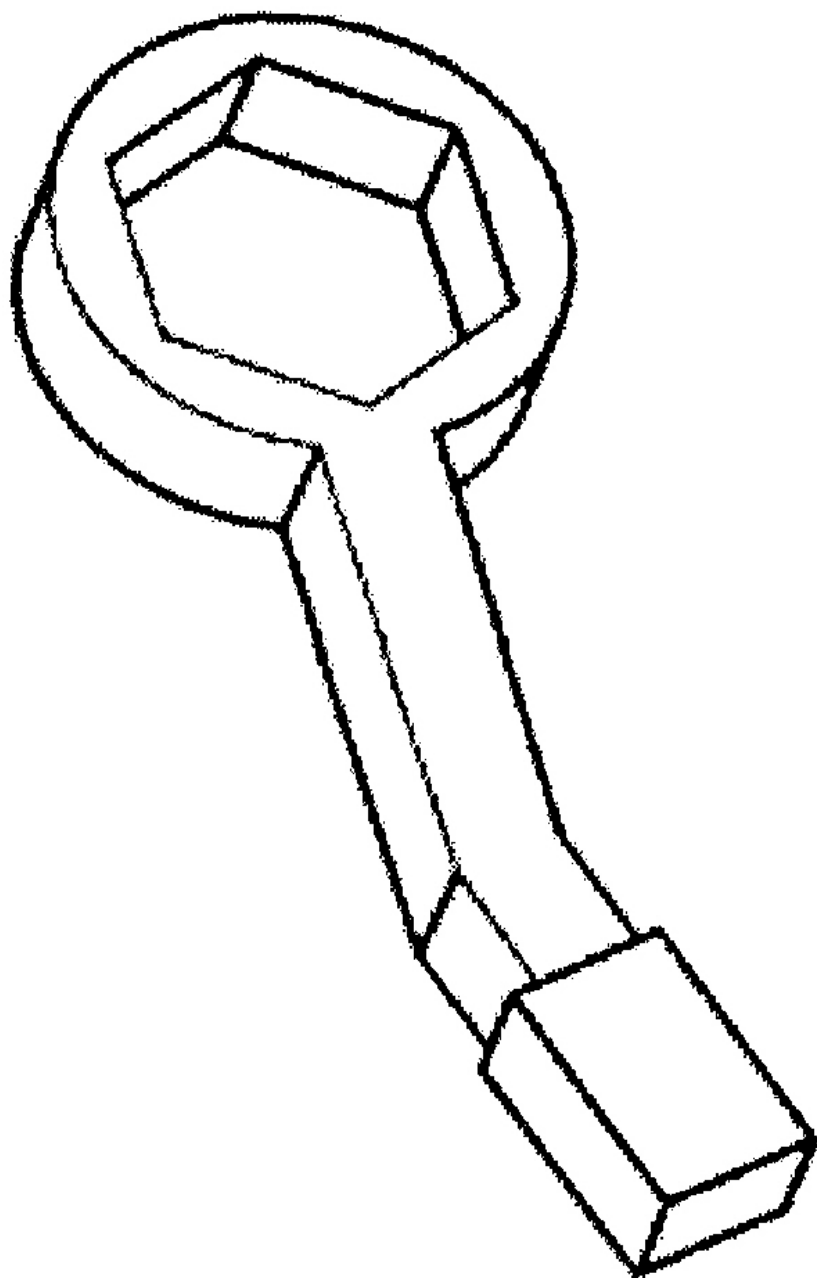
For wiring diagrams, see appropriate SYSTEM WIRING DIAGRAMS article.

SPECIAL TOOLS



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Fig. 31: Identifying Disassembly Aid (00 9 340)
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 32: Identifying Plug-On Ring Wrench (34 1 290)
Courtesy of BMW OF NORTH AMERICA, INC.