

340 Brakes

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GENERAL

All BMW E32 models are equipped with power-assisted four-wheel disc brakes with integral anti-lock brakes (ABS). A brake booster power-assists a dual-circuit master cylinder. Some models use a hydraulic brake boost while others models use a vacuum boost system. Boost system varies depending on model and model year, as identified later in the text.

Single-piston calipers act on vented front rotors and solid or vented rear rotors. A brake pad wear sensor for each axle indicates when pads need replacement. The dual-drum parking brake is integrated with the rear brake rotors.

NOTE—

On 1990 and later cars, ASC or ASC+T is integrated with the ABS. To identify cars with traction control, check for an ASC switch mounted in the center console.

WARNING—

- Brake friction materials such as brake linings or pads contain abrasive fibers which can lead to illnesses. Do not create dust by grinding, sanding, or cleaning the pads with compressed air. Avoid breathing any brake friction fibers or dust.
- Brake fluid is poisonous, highly corrosive and dangerous to the environment. Wear safety glasses and rubber gloves when working with brake fluid. Do not siphon brake fluid with your mouth. Immediately clean away any fluid spilled on painted surfaces and wash with water. Dispose of brake fluid properly.
- Do not reuse self-locking nuts, bolts or fasteners. They are designed to be used only once and may fail if reused. Always replace them with new self-locking nuts.

TROUBLESHOOTING

Brake performance is mainly affected by three things: the level and condition of the brake fluid, the brake system's ability to create and maintain hydraulic pressure, and the condition of the friction components.

Air in the brake fluid will make the brake pedal feel spongy during braking or will increase the brake pedal force required to stop. Fluid contaminated by moisture or dirt can corrode the system. Inspect the brake fluid inside the reservoir. If it is dirty or murky, or is over a year old, the fluid should be replaced.

Visually check the hydraulic system starting at the master cylinder. Check all brake fluid lines and couplings for leaks, kinks, chafing and corrosion.

On a car with vacuum brake booster, check the brake booster by pumping the brake pedal approximately 10 times with the engine off. Then hold the pedal down and start the engine. The pedal should fall slightly. If not, check for any visible faults before suspecting a faulty brake booster. Check for strong vacuum at the vacuum hose fitting at the booster, and check the non-return valve for one-way flow.

Worn or contaminated brake pads will cause poor braking performance. Oil-contaminated or glazed pads cannot produce as much friction, and stopping distances will increase. Inspect the rotors for glazing, discoloration, scoring or oil contamination.

Steering wheel vibration while braking at speed is often caused by warped rotors, but can also be caused by faulty thrust arm bushings. See **310 Front Suspension** for more information on thrust arm bushings.

Table a lists symptoms of brake problems, their probable causes and suggested corrective actions.

Table a. Brake System Troubleshooting

Symptom	Probable cause	Corrective action
Brake squeak or squeal	1. Incorrectly installed brake pads or parking brake shoes 2. Brake pad carriers dirty or corroded 3. Brake pad anti-rattle springs faulty or missing 4. Brake pads heat-glazed or oil-soaked 5. Wheel bearings worn (noise most pronounced when turning)	1. Check component installation. 2. Remove brake pads and clean calipers. 3. Install/replace anti-rattle springs. 4. Replace brake pads. Clean rotors. Replace leaking calipers as required. 5. Replace worn bearings. See 310 Front Suspension or 330 Rear Suspension.
Pedal goes to floor when braking	1. Brake fluid level low due to system leaks 2. Master cylinder faulty	1. Check fluid level and inspect hydraulic system for signs of leakage. Fill and bleed system. 2. Replace master cylinder.
Low pedal even after system bleeding	1. Master cylinder faulty	1. Replace master cylinder.
Pedal feels spongy or brakes work only after pedal is pumped	1. Air in brake fluid 2. Master cylinder faulty (internal return spring weak) 3. Leaking line or hose unions	1. Bleed system. 2. Replace master cylinder. 3. Repair or replace lines and hoses. Bleed system.
Excessive braking effort	1. Brake pads wet 2. Brake pads heat-glazed or oil-soaked 3. Vacuum booster or vacuum hose connections to booster faulty (where applicable) 4. Hydraulic booster system out of fluid or malfunctioning (where applicable)	1. Use light pedal pressure to dry pads while driving. 2. Replace brake pads. Clean rotors. Replace leaking calipers. 3. Inspect vacuum lines. Test vacuum booster and replace as required. Test vacuum non-return valve for one-way air flow. 4. Test hydraulic booster pump and components.
Brakes pulsate, chatter, or grab	1. Warped brake rotors 2. Brake pads worn 3. Brake pads heat-glazed or oil-soaked	1. Resurface or replace rotors. 2. Recondition brakes. 3. Replace brake pads. Clean rotors. Replace leaking calipers.
Uneven braking, car pulls to one side, rear brakes lock	1. Incorrect tire pressures or worn tires 2. Brake pads on one side of car heat-glazed or oil-soaked 3. Caliper or brake pads binding 4. Worn suspension components	1. Inspect tire condition. Check and correct tire pressures. 2. Replace brake pads. Clean rotors. Replace leaking calipers. 3. Clean and recondition brakes. 4. Inspect for worn or damaged suspension components. See 310 Front Suspension or 330 Rear Suspension.
Brakes drag, bind, or overheat	1. Brake caliper or brake pads binding 2. Master cylinder faulty	1. Clean or replace caliper. 2. Replace master cylinder.

NOTE—

Tires and wheels are important parts of the braking system. Check tires for wear and proper inflation. Check wheels for flat spots and trueness.

BLEEDING BRAKES

When preparing to bleed the brakes, be sure to read the following warnings and cautions.

WARNING—

When working underneath the car, make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

CAUTION—

- Brake fluid is highly corrosive and dangerous to the environment. Dispose of it properly.
- When adding or replacing brake fluid always add new brake fluid from an unopened container.
- It is important to bleed the entire brake system whenever any part of the brake hydraulic system has been opened.

NOTE—

*Bleeding the ASC+T hydraulic pump, which is part of the ASC+T system is covered later under **Bleeding hydraulic system (ASC+T)**.*

Brake bleeding is usually done for one of two reasons; either to replace old brake fluid as part of routine maintenance or to expel trapped air in the system that resulted from opening the brake hydraulic system during repairs.

Brake system bleeding can be done with a pressure bleeder, a vacuum bleeder, or manually. Pressure bleeding is recommended as the most efficient method.

When bleeding the brakes, start at the wheel farthest from the master cylinder and progress in the following order:

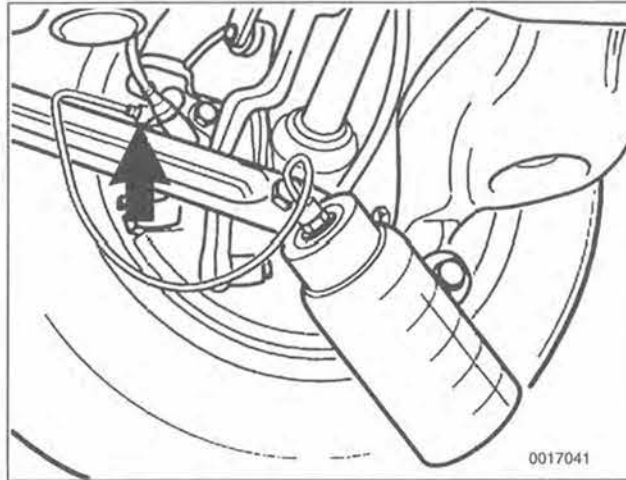
- Right rear brake
- Left rear brake
- Right front brake
- Left front brake.

CAUTION—

On cars with Automatic Stability Control with Traction (ASC+T), special procedures are required to properly bleed the front and rear brakes.

Pressure bleeding brakes (except cars with ASC+T)

- Using clean syringe, remove old brake fluid from reservoir. Clean out reservoir with a lint-free cloth.
- Top off brake fluid and connect pressure bleeder to reservoir.
- ◀ Connect bleeder hose and waste bottle to right rear bleeder screw (arrow).
- Pressurize system to approximately 1 bar (14.5 psi).



CAUTION—

Do not exceed a pressure of 2 bar (29 psi) when pressure bleeding the brake system. Excessive pressure will damage the brake fluid reservoir.

- Have helper hold brake pedal down.



- ◀ Open bleeder screw (arrow). Have helper slowly pump brakes *at least 12 times* with bleeder screw open, holding pedal down on last pump. Close bleeder screw and release brake pedal.
- Refill brake fluid reservoir and proceed to next wheel in order given above.

Tightening Torques

- Bleeder screw (7 mm) 5 Nm (44 in-lb)
- Bleeder screw (9 mm) 12-16 Nm (9-12 ft-lb)

Vacuum bleeding brakes (except cars with ASC+T)

- Using clean syringe, remove old brake fluid from reservoir. Clean out reservoir with a lint-free cloth.
- Top off brake fluid and replace reservoir cap.
- Connect vacuum pump to right rear brake bleeder screw. Route discharge hose into waste bottle.

CAUTION—

Vacuum bleeding requires an air-tight seal between the pump and the bleeder screw. Any leakage will result in faulty bleeding.

- Open bleeder screw and withdraw brake fluid until it is clean and without air bubbles.

NOTE—

Fill the brake fluid reservoir level frequently to prevent it from emptying during brake bleeding.

- Close bleeder screw. Refill brake fluid reservoir and proceed to next wheel in order given above.

Tightening Torques

- Bleeder screw (7 mm) 5 Nm (44 in-lb)
- Bleeder screw (9 mm) 12-16 Nm (9-12 ft-lb)

Manually bleeding brakes (except cars with ASC+T)

- Using clean syringe, remove old brake fluid from reservoir. Clean out reservoir with a lint-free cloth. Top off brake fluid and replace reservoir cap.

- Connect bleeder hose and waste bottle to right rear bleeder screw (arrow).

- Have helper pump brakes several times. Then hold pedal down firmly on last pump.

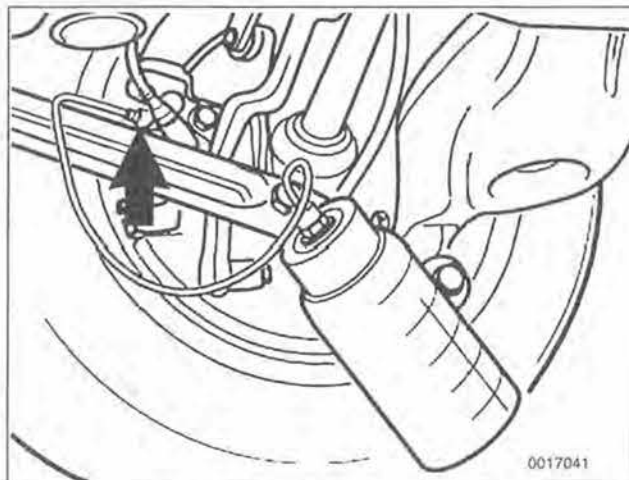
- Open right rear caliper bleeder screw and allow fluid to expel. Close bleeder screw.

- Repeat previous two steps at least 12 times, or until discharged brake fluid is clean and without air bubbles.

NOTE—

Fill the brake fluid reservoir level frequently to prevent it from emptying during brake bleeding.

- Refill brake fluid reservoir and proceed to next wheel in order given above and repeat procedure.



Tightening Torques

- Bleeder screw (7 mm) 5 Nm (44 in-lb)
- Bleeder screw (9 mm) 12-16 Nm (9-12 ft-lb)

Bleeding brakes (cars with ASC+T)

Whenever repairs or replacement of components such as brake master cylinder or ASC+T hydraulic unit are performed a revised bleeding procedure must be followed. If repairs are downstream of the ASC+T hydraulic unit (i.e., caliper replacement) normal pressure bleeding procedures for ABS equipped cars must be followed.

Bleeding brakes in ASC+T equipped cars requires a pressure bleeder and is a multi-step procedure. Bleeding the front brakes differs significantly from bleeding the rear brakes. Be sure to read the complete procedure before starting work on the car.

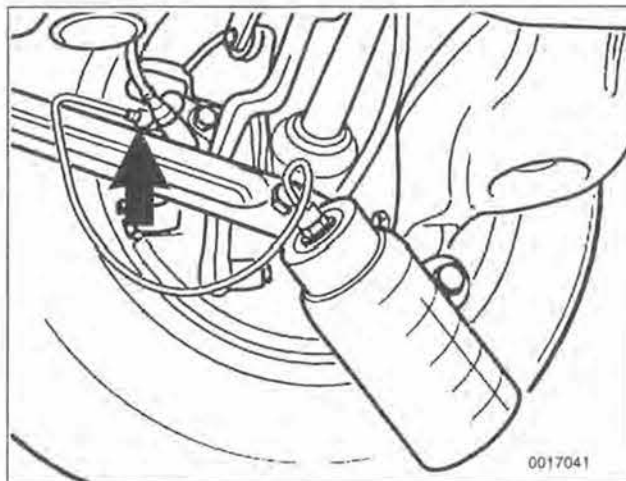
NOTE—

Bleed ASC+T hydraulic system first, as described later in this repair group.

- Using clean syringe, remove old brake fluid from reservoir. Clean out reservoir with a lint-free cloth and top off brake fluid.
- Connect pressure bleeder to reservoir.

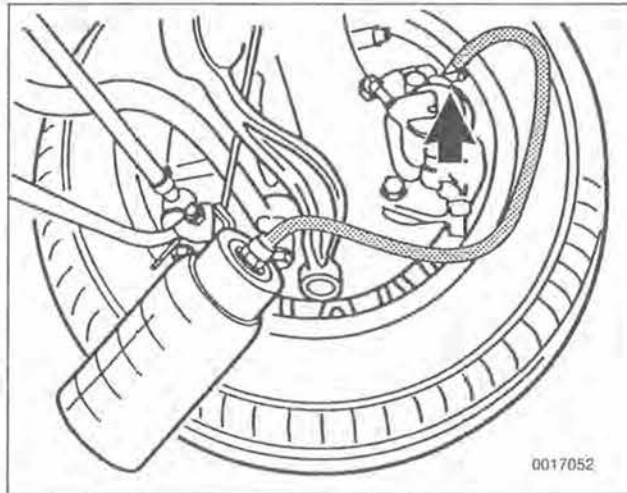
CAUTION—

Do not exceed 2 bar (30 psi) of pressure in brake bleeder.



Rear brakes

- Connect bleeder hose and brake fluid waste bottle to right rear bleeder screw (**arrow**).
- Open bleeder and flush brake fluid for 2-4 minutes, (approximately 100cc).
- Connect bleeder hose and brake fluid waste bottle to left rear bleeder screw.
- Open bleeder and flush brake fluid for 2-4 minutes, (approximately 100cc).
- Connect bleeder hose and brake fluid waste bottle to right rear bleeder screw.
- Open bleeder and pump brake pedal 20 times or until fluid is clean and free of air bubbles.
- Connect bleeder hose and brake fluid waste bottle to left rear bleeder screw.
- Open bleeder and pump brake pedal 20 times or until fluid is clean and free of air bubbles.



- Raise rear of car and place jack stand under each rear trailing arm. Lower car with trailing arms resting on jack stands until drive axles are in horizontal position.

NOTE—

This will prevent damage to the C/V joints during bleeding.

- Connect bleeder hose and brake fluid waste bottle to right rear bleeder screw.
 - Open bleeder screw.
 - Start engine and select low gear. Run engine slowly up to 3,500 rpm and hold engine speed.
 - Operate ASC switch (on center console) about every 2 seconds for a period of one minute.
 - Close bleeder.
 - Move shift lever to neutral and stop engine.
- Repeat on left rear brake caliper.

NOTE—

Bleeding operation will use approximately 1.5 liters of brake fluid.

Front brakes

- Connect pressure bleeder to brake fluid reservoir.
- Connect bleeder hose and waste bottle to right front bleeder screw (**arrow**).
 - Pump brake pedal 12 time or until fluid is clean and free of air bubbles.
 - Hold brake pedal down while tightening bleeder valve.
- Repeat on left front caliper.
- Top-off fluid in both hydraulic and brake reservoirs and replace caps.

Tightening Torques

- Bleeder screw (7 mm) 5 Nm (44 in-lb)
- Bleeder screw (9 mm) 12-16 Nm (9-12 ft-lb)

BRAKE PADS, CALIPERS AND ROTORS

Brake pads can be replaced without disconnecting the brake fluid hose from the caliper or having to bleed the brakes. The rotors can be replaced without disassembling the wheel hub and bearing. Always machine or replace rotors in pairs. Replace pads in sets (one set = one axle.)

WARNING—

Brake friction materials such as brake linings or pads contain abrasive fibers which can lead to illnesses. Do not create dust by grinding, sanding, or cleaning the pads with compressed air. Avoid breathing any brake friction fibers or dust.

Brake pads, replacing

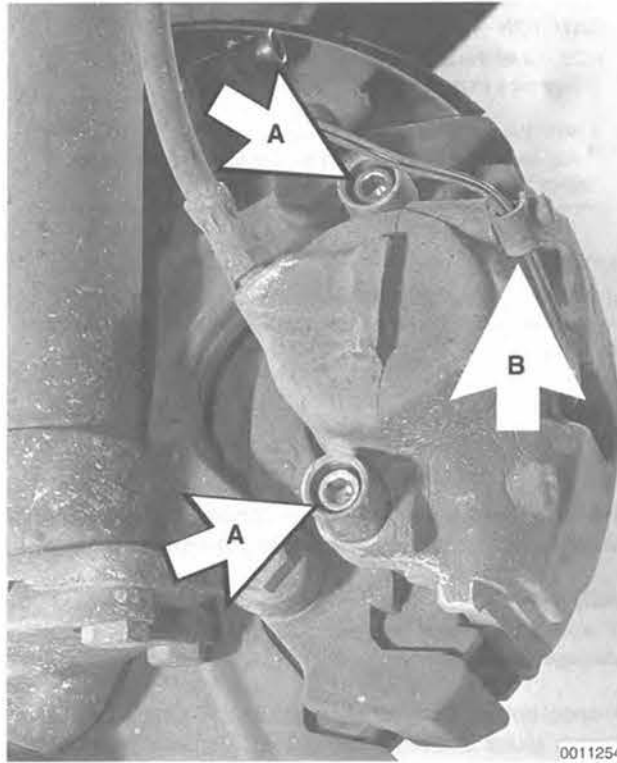
This procedure is applicable to both front and rear brake pads.

- Raise car and remove wheels.

WARNING—

Make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

- Remove plastic caps from guide bolt bushings and then remove guide bolts (A). Disconnect brake pad sensor wire from holder (B).



- Unhook brake pad anti-rattle clip from caliper using screwdriver (arrow).



340-10 BRAKES



0011264

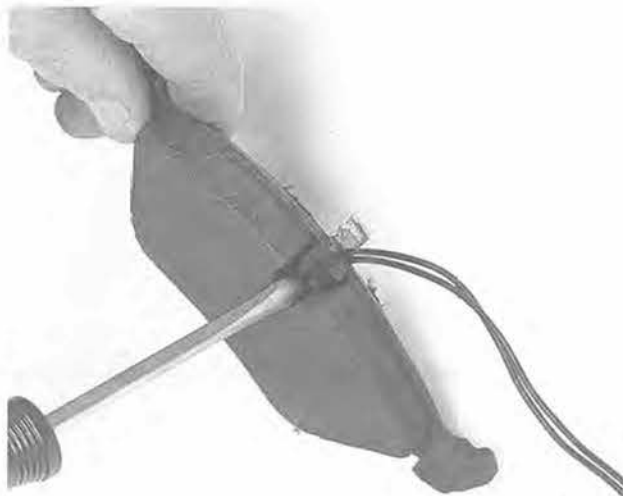
➤ Pull caliper straight off rotor.

CAUTION—

- Do not let the brake caliper hang from the brake hose. Support it from the chassis with strong wire.
- With the pads removed, residual hydraulic pressure may cause the caliper piston to slide out. Use a wooden block to hold the piston in place.

NOTE—

If there is a ridge on the rotor edge, the caliper piston will have to be pushed into the caliper slightly before the caliper can be removed.



0011256

➤ Remove brake pads from caliper. Where applicable pry pad wear sensor from pad using a thin screwdriver.

NOTE—

If reusing the sensor, use care when removing as it is easily damaged during removal.

- Inspect brake caliper for signs of leakage. Check that caliper piston slides smoothly into caliper. Replace caliper if any faults are found.
- Clean guide bolts thoroughly and carefully inspect them for damage. Faulty guide bolts could cause brake failure.
- Insert brake pad wear sensor into cutout in new pad where applicable.

NOTE—

If the brake lining indicator light came on prior to brake pad replacement, the wear sensor should be replaced.



0011257

➤ Slowly press piston back into caliper. Use a rag to protect caliper piston and seals.

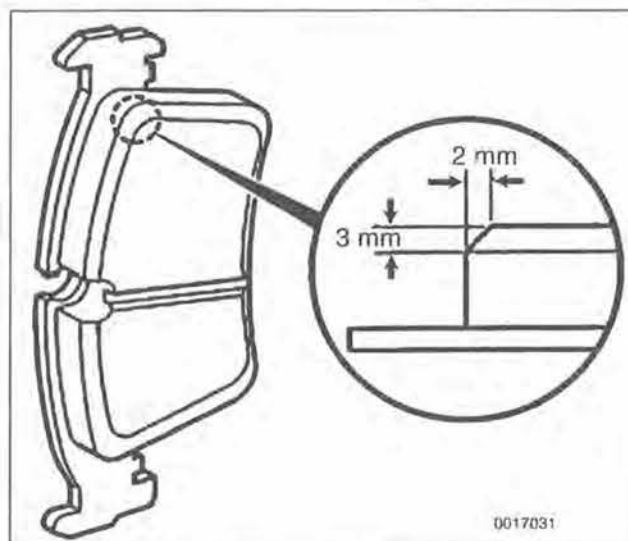
NOTE—

- To protect hydraulic components from old contaminated brake fluid, open caliper bleeder screw when pressing piston back into caliper. This will also reduce the effort required to push the piston in. Catch expelled fluid in appropriate container.
- Open the bleeder screw only when applying force to the piston. Do not allow air to be drawn in through the bleeder screw.
- Pressing the caliper piston in with bleeder screw closed may cause the brake fluid reservoir to overflow. To prevent this, use a clean syringe to first remove some fluid from the reservoir.

- Lightly coat contact points of new pads with Plastilube® or equivalent.
 - Place outer brake pad onto caliper.
 - Place inner brake pad with its locating spring onto brake caliper piston.
 - Route pad wear sensor wiring through caliper opening and bleeder dust cap.
- Installation is reverse of removal.
 - Do not lubricate guide bolts.
 - Once brake assembly is installed depress brake pedal several times to seat pads.

Tightening Torques

- Caliper guide bolt to pad carrier 30 Nm (22 ft-lb)
- Road wheel to hub 100 ± 10 Nm (74 ± 7 ft-lb)



- ◀ In case of persistent squealing or grinding noises from the brakes, make sure that pads and rotors are free of dirt, rust or scoring. Free up all moving parts. Chamfer all edges of brake pads.

Brake caliper, removing and installing

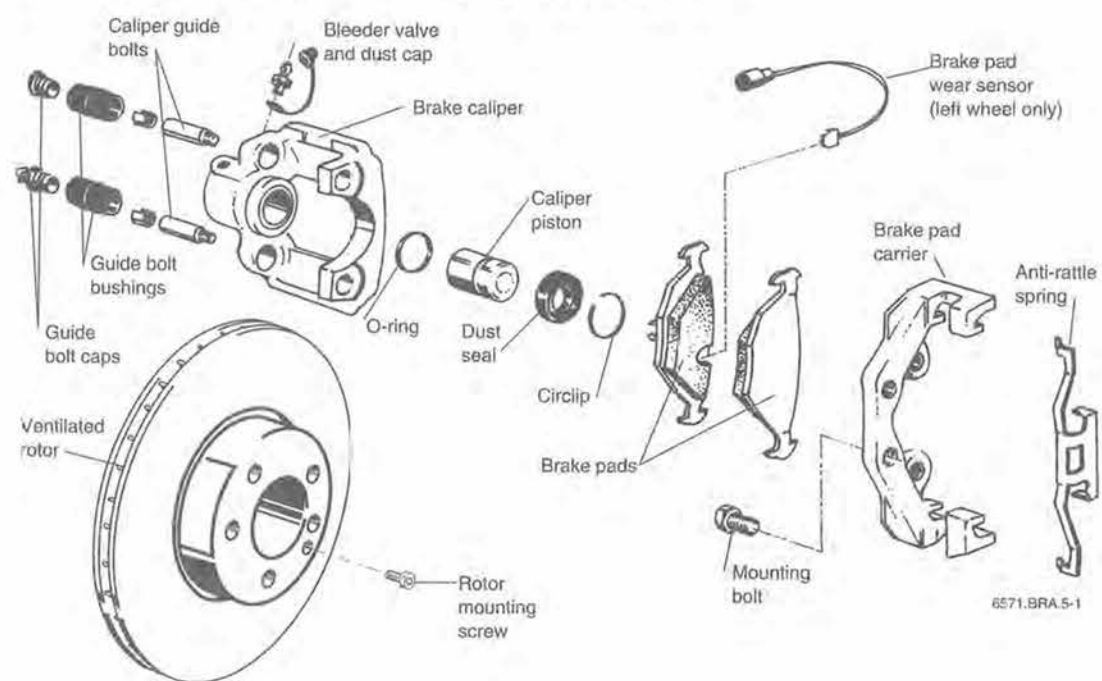
This procedure is applicable to both front and rear calipers. Front and rear brake assemblies are shown in the illustrations.

- Raise car and remove wheel.

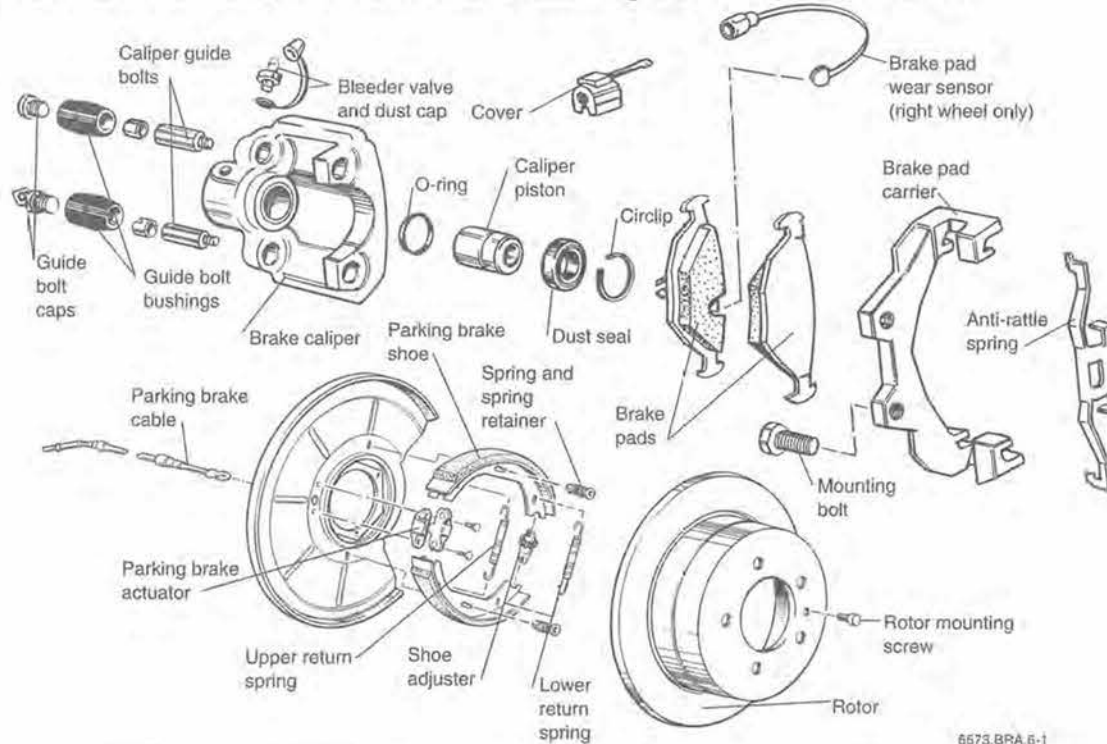
WARNING—

Make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

Front brake caliper and rotor assembly



Rear brake caliper, rotor and parking brake assemblies





➤ Remove brake pad carrier mounting bolts (**arrows**) from strut assembly (front caliper) or from trailing arm (rear caliper).

- Loosen brake hose fitting at caliper and spin caliper assembly off hose.
- Inspect brake caliper for any signs of leakage. Check that caliper piston slides smoothly into caliper. Replace caliper if any faults are found.
- Installation is reverse of removal. Bleed entire brake system before driving car. See **Bleeding Brakes**.

Tightening Torques

- Brake fluid hose to caliper. 17-19 Nm (13-15 ft-lb)
- Caliper guide bolt to pad carrier 30 Nm (22 ft-lb)
- Front brake caliper to strut assembly . 110 Nm (81 ft-lb)
- Rear brake caliper to trailing arm 67 Nm (50 ft-lb)
- Road wheel to hub 100 ± 10 Nm (74 ± 7 ft-lb)

Brake rotor, removing and installing

Always replace rotors in pairs.

- Without disconnecting brake line at caliper, remove brake caliper as described earlier.
- Remove brake rotor mounting screw (**arrow**) from face of rotor.
- Inspect rotor for excessive grooving, cracks and warping. Check rotor thickness. See **Table b**.

NOTE —

The minimum allowable thickness should be stamped on the rotor hub. Measure the rotor braking surface with a micrometer at eight to ten different points and use the smallest measurement recorded.

Table b. Rotor Reconditioning Specifications

	Front	Rear
Wear limit (min. thickness)		
735i/iL	26.4 mm (1.039 in.)	10.4 mm (0.409 in.)
740i/iL, 750iL	26.4 mm (1.039 in.)	18.4 mm (0.724 in.)
Axial runout (max.)		
Rotor removed	0.09 mm (0.004 in.)	0.04 mm (0.002 in.)
Rotor installed	0.20 mm (0.008 in.)	0.20 mm (0.008 in.)



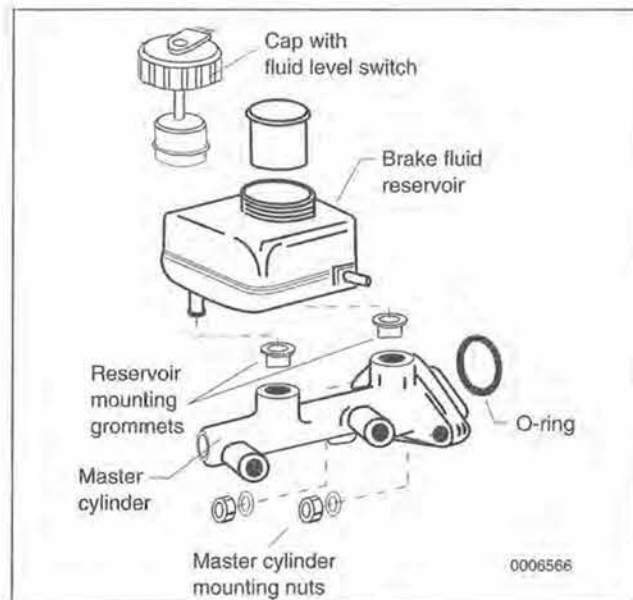
- Installation is reverse of removal.
- Clean rotor with brake cleaner before installing.
- Clean wheel hub with wire brush before installing rotor.
- If brake fluid hose was removed or loosened, entire brake system must be bled as described under **Bleeding Brakes**.
- Once brake assembly is installed depress brake pedal several times to seat caliper and pads.

NOTE—

- Brake rotor and wheel hub must be free of grease.
- When installing new rear brake rotors, the parking brake should be adjusted. See **Parking Brake**.

Tightening Torques

- Brake rotor to wheel hub 16 Nm (12 ft-lb)
- Caliper guide bolt to pad carrier 30 Nm (22 ft-lb)
- Front brake caliper to strut assembly . . 110 Nm (81 ft-lb)
- Rear brake caliper to trailing arm 67 Nm (50 ft-lb)
- Road wheel to hub 100 ± 10 Nm (74 ± 7 ft-lb)



MASTER CYLINDER

- ◀ On cars with M30 and M70 engines: The brake master cylinder is mounted to the front of the brake booster on the driver side bulkhead.
- On cars with M60 engine: The brake master cylinder is mounted in the front left of the engine compartment, behind the headlight.

NOTE—

Two types of brake power assist systems are used. Early 735i/iL models (built up to 3/1988) and all 750iL models use a hydraulic boost system. 735i/iL built from 3/1988 and all 740i/iL cars use a vacuum boost system.

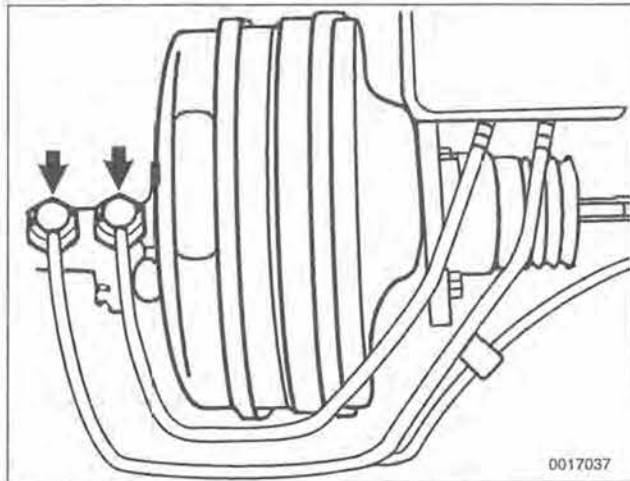
Master cylinder, removing and installing

- Using clean syringe, empty brake fluid reservoir.

CAUTION—

Brake fluid is highly corrosive and dangerous to the environment. Dispose of it properly.

- Disconnect brake fluid level sender connector from fluid reservoir cap.



- Carefully remove reservoir from master cylinder by pulling straight up.
- ◀ On 740j/iL: Remove brake fluid supply hoses (**arrows**) from top of master cylinder.
- On cars with manual transmission: Remove clutch master cylinder supply hose from side of fluid reservoir.
- Disconnect brake fluid lines from master cylinder. Plug openings and brake lines.
- Unscrew mounting hardware and remove master cylinder from brake booster.

NOTE—

It may be necessary to move aside the engine main power connector, the diagnostic connector or the hydraulic oil reservoir for better access to the master cylinder fittings.

- Make sure all nuts, fluid couplings, thread bores and mating surfaces are clean.
- If the fluid reservoir was removed, install it carefully using new sealing grommets.
- Mount master cylinder to the brake booster using new O-ring and new self-locking nuts.

CAUTION—

- On cars with hydraulic brake booster, always replace master cylinder mounting bolts.
- Use care not to over-torque the master cylinder mounting nuts. This could damage the brake booster and prevent proper vacuum build-up.

Tightening Torques

- Brake master cylinder to brake booster

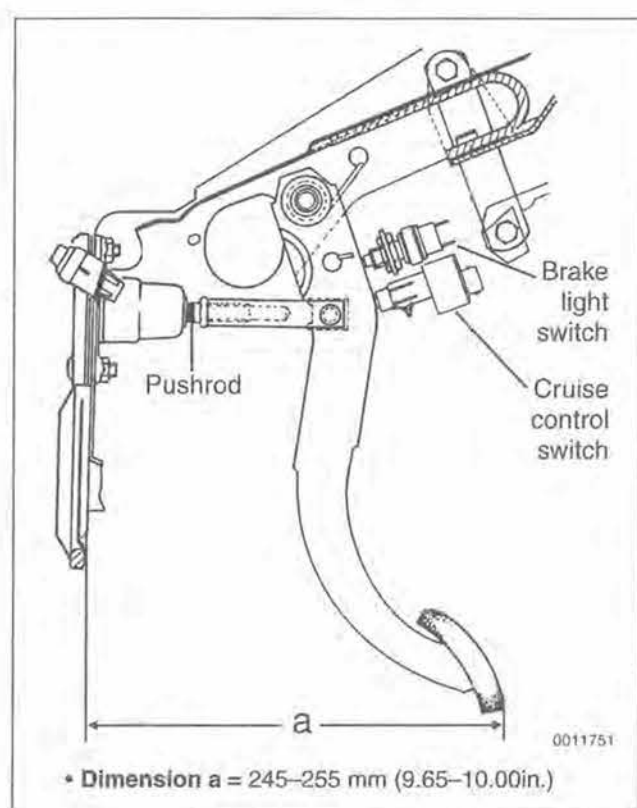
Hydraulic booster	28 Nm (20 ft-lb)
Vacuum booster	21 Nm (16 ft-lb)

- Connect all brake fluid lines and bleed entire brake system as described under **Bleeding Brakes**.

Tightening Torque

- Brake fluid line to master cylinder

M10 coupling	19 Nm (15 ft-lb)
M12 coupling	17 Nm (13 ft-lb)



Brake pedal height, adjusting (except cars with M60 engine)

Brake pedal height and brake light switch adjustment should be checked any time the master cylinder or the brake booster are removed or replaced.

➤ To adjust pedal height, gain access to the top of the pedal cluster by removing the pedal cluster trim panel, as described in **513 Interior Trim**. Once the trim panel is removed, loosen the lock-nut on the pushrod clevis and slowly turn the pushrod until the correct dimension is obtained. Adjust pedal height to dimension **a**.

For brake light switch adjustment, remove the electrical connectors from the switch, loosen the locknut, and thread the switch in and out until the switch plunger is about $\frac{3}{4}$ depressed with the pedal in the rest position. Be sure to retighten the locknut on the pushrod clevis and locknut on the brake light switch.

BRAKE BOOSTER

Two different brake booster systems have been installed in E32 cars. See **Table c**.

Table c. Brake Booster Systems

735i/iL	740i/iL	750iL
Hydraulic brake boost system (to 3/88)	Vacuum brake boost system	Hydraulic brake boost system
Vacuum brake boost system (from 3/88)		

Intake manifold vacuum acts on a large diaphragm in the vacuum booster to help reduce pedal effort. The booster used in 740i/iL cars is a compact dual diaphragm unit which produces increased boost.

In cars with the hydraulic brake booster system, power steering fluid pressure is used to provide boost pressure for the brakes.

Vacuum brake booster, removing and installing (735i/iL)

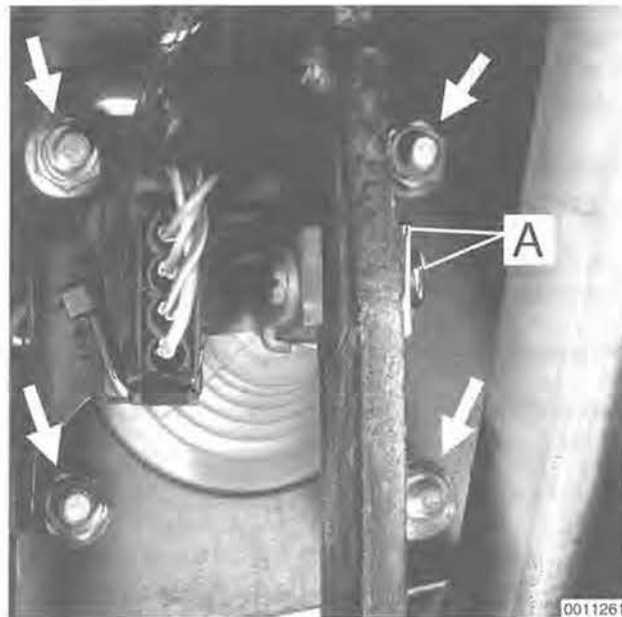
On 735i/iL cars with vacuum brake booster, the booster is mounted to the rear bulkhead on the driver side of the engine compartment, directly behind the brake master cylinder.

- Using clean syringe, empty brake fluid reservoir.

CAUTION—

Brake fluid is highly corrosive and dangerous to the environment. Dispose of it properly.

- Remove brake fluid level sender connector from reservoir cap. On cars with manual transmission, remove clutch master cylinder supply hose from side of reservoir.
- Disconnect brake fluid lines from master cylinder.
- Disconnect vacuum hose to brake booster.
- Working inside car, remove dashboard panel(s) from beneath steering column to access pedal assembly. See **513 Interior Trim**.
- Remove clip and clevis pin (A) from brake booster pushrod and disconnect it from brake pedal lever.
 - Remove brake booster mounting nuts (arrows).
- Working in engine compartment, remove brake booster together with master cylinder.
- If vacuum booster or master cylinder O-ring is being replaced, disconnect booster from master cylinder.
- During installation make sure all nuts, fluid couplings, thread bores and mating surfaces are clean.
- Mount master cylinder to vacuum booster using new O-ring and new self-locking nuts.



CAUTION—

- On cars with hydraulic brake booster, always replace master cylinder mounting bolts.
- Use care not to over-torque the master cylinder mounting nuts. This could damage the brake booster and prevent proper vacuum build-up.

Tightening Torque

- Brake master cylinder to vacuum brake booster 21 Nm (16 ft-lb)
- Mount brake booster/master cylinder assembly to bulkhead using new self-locking nuts.

Tightening Torque

- Brake booster to bulkhead 22 Nm (16 ft-lb)

- Connect brake pedal lever to booster pushrod. Make sure clevis pin retaining clip is correctly installed.
- Connect all brake fluid lines and bleed entire brake system as described in **Bleeding Brakes**.
- Connect large vacuum line to vacuum booster.

Tightening Torques

- Brake fluid line to master cylinder 17-19 Nm (13-15 ft-lb)

NOTE—

When replacing the brake booster non-return valve or the vacuum hose, install the valve so that the molded arrow on the valve is pointing towards the intake manifold. Use new hose clamps.

- Adjust brake pedal height as described earlier.
- Start engine and check that SRS light functions correctly and that brake lights work properly. Re-check brake pedal height.

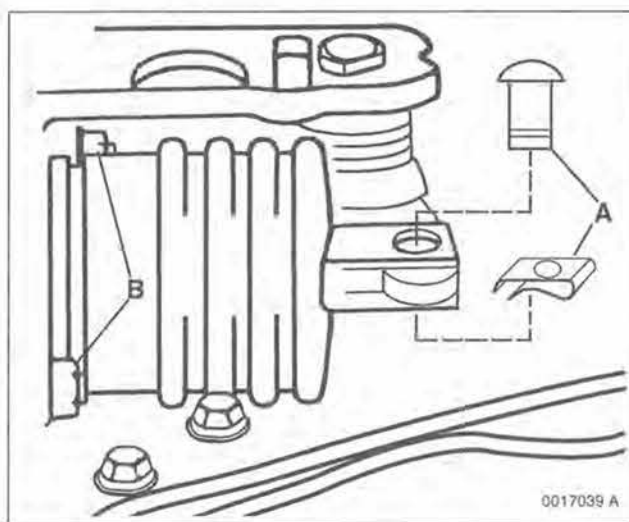
Vacuum brake booster, removing and installing (740i/iL)

On 740i/iL cars, the vacuum brake booster is directly behind the brake master cylinder in back of the left headlight.

- Remove brake master cylinder as described earlier.
- Using clean syringe detach brake fluid reservoir and lay aside.
- Disconnect vacuum hose from booster.
- Pull retaining clip and clevis pin (A) off booster push rod.
 - Remove booster mounting nuts (B) and lift out booster.
- Installation is reverse of removal.
 - Connect all brake fluid lines and bleed entire brake system as described in **Bleeding Brakes**.
 - Connect vacuum line to vacuum booster.

Tightening Torques

- Brake booster to bracket. 22 Nm (16 ft-lb)
- Brake booster to master cylinder 21 Nm (20 ft-lb)
- Brake fluid line to master cylinder 17-19 Nm (13-15 ft-lb)



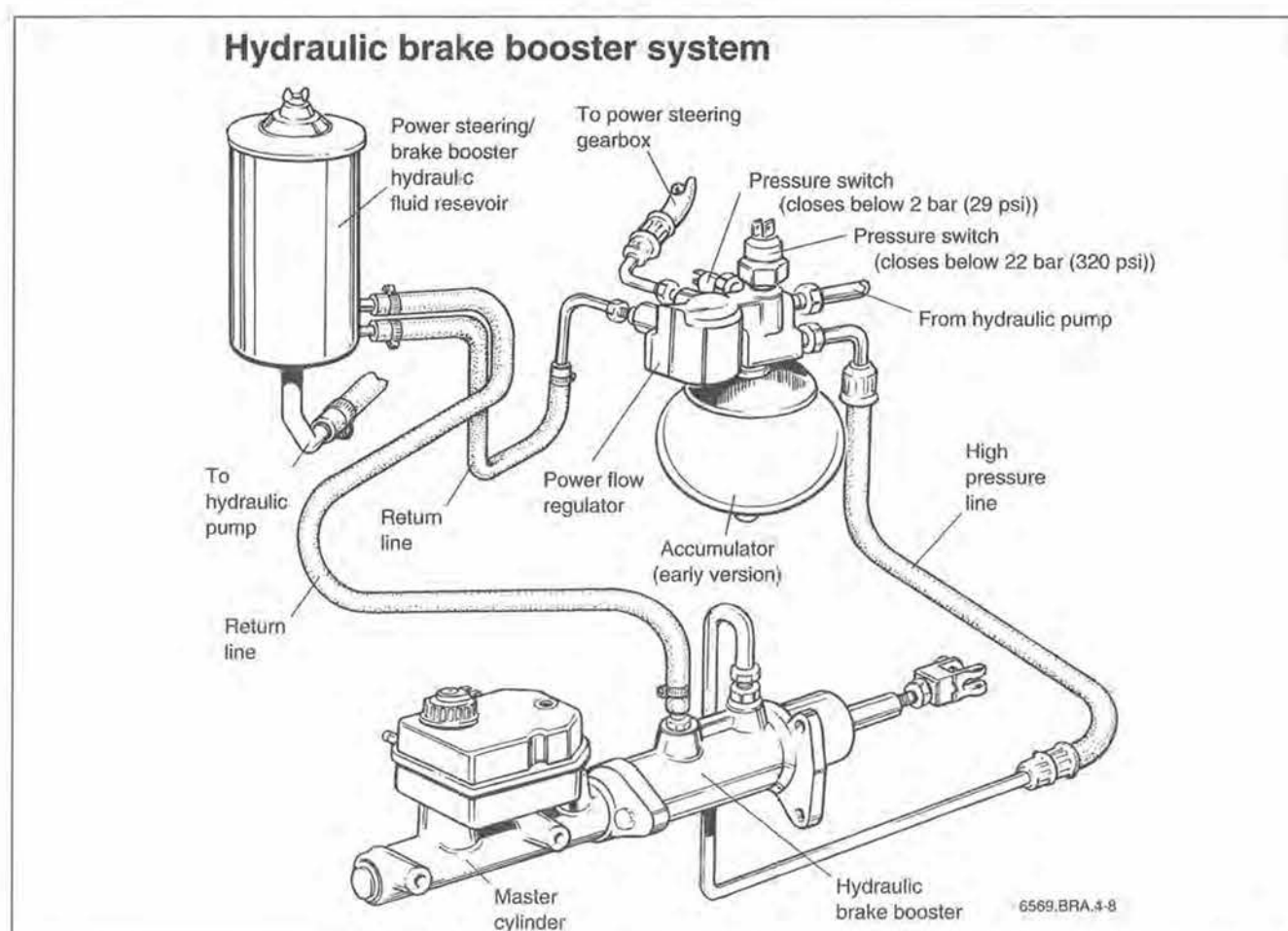
BRAKE BOOSTER

Hydraulic brake booster system

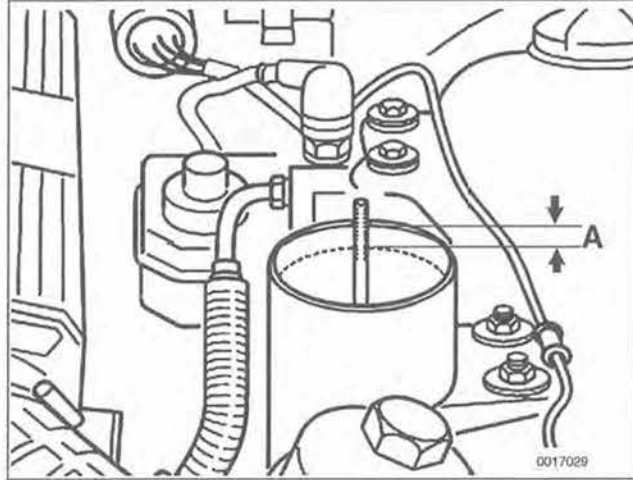
When the engine is running, the power steering pump supplies hydraulic fluid under pressure to the power flow regulator and accumulator. The regulator and accumulator assembly stores and regulates the pressure to the brake booster. When the brake pedal is depressed, the pressure in the brake booster helps actuate the master cylinder to reduce pedal effort.

NOTE—

The hydraulic booster system is sometimes referred to as the H31 system.



The pedal pushrod is connected to the brake booster, which is connected directly to the master cylinder, so failure of the booster does not normally result in total brake failure. The hydraulic brake booster is not repairable, and if faulty must be replaced. Special high-pressure measuring equipment is needed to test the system.



Before testing system, check fluid level in power steering/brake booster reservoir.

- With engine off, remove cover from reservoir.
- Depress brake pedal until fluid level stops rising (approximately 20 times).
- Add fluid if level (A) is lower than 25 mm (1 inch) from top rim of reservoir.

NOTE —

- The hydraulic system on early E32 cars (up to September 1991) uses Pentosin® CHF 7.1 hydraulic fluid.
- Beginning with cars produced in September 1991, Pentosin® CHF 11 S is used in the hydraulic system.

CAUTION —

Check the hydraulic reservoir for a label identifying the type of fluid used. Do not mix the various kinds of fluid.

Hydraulic brake booster system, testing

Testing the hydraulic brake booster system is done in three stages:

- Pressure test
- Fluid leak test
- Hydraulic accumulator test

- Discharge hydraulic accumulator pressure by operating brake pedal at least 20 times with engine stopped.

Pressure test

- Thoroughly clean area around hydraulic pressure switch on side of power flow regulator and remove pressure switch (A).

WARNING —

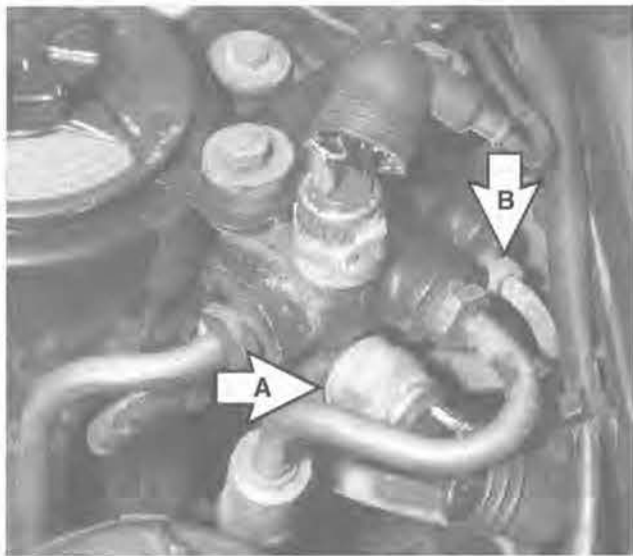
Extreme cleanliness is essential when working on the hydraulic brake booster system. Even a small piece of dirt could damage the brake booster system or the power steering system.

- Connect pressure gauge in place of pressure switch.

NOTE —

The gauge should have a range of 0 to 60 bar (0 to 1000 psi).

- Start engine and check for leaks. With engine running, pressure should be at upper switching specification listed in Table d.



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**Table d. Hydraulic Brake Booster
Test Specifications**

Upper switching pressure	52 to 57 bar (754 to 827 psi)
Lower switching pressure	36 to 41 bar (522 to 595 psi)
Maximum allowable pressure drop after 5 minutes	5 bar (73 psi)

- Apply brake pedal until pressure drops to lower switching specification. Check that pressure quickly returns to upper switching specification.

NOTE —

If any faults are found up to this point, the power flow regulator is faulty and should be replaced.

- Turn engine off. After five minutes, pressure drop should be no greater than specification listed in **Table d**.

NOTE —

If the pressure drop exceeds the limits, proceed with fluid leak test below. If the pressure drop is within limits, proceed with hydraulic accumulator test below.

Tightening Torque

- Pressure switch to power flow regulator 18 Nm (13 ft-lb)

Fluid leak test

NOTE —

Perform this test if the system did not hold the specified pressure during the pressure test given earlier.

- Remove reservoir return line (B) from power flow regulator to check for leaking fluid.

NOTE —

If fluid comes out of the power flow regulator, the regulator is faulty and should be replaced. If no fluid comes out, the brake booster is leaking internally and should be replaced.

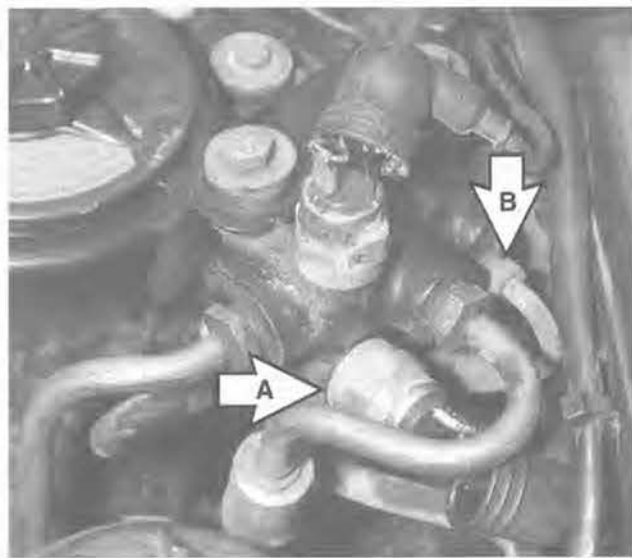
- Install return line.

Tightening Torque

- Return line to power flow regulator 16 Nm (12 ft-lb)

Hydraulic accumulator test

- Discharge hydraulic accumulator by pumping brake pedal at least 20 times. Start engine. If pressure does not immediately rise to specifications listed in **Table e**, hydraulic accumulator is faulty and should be replaced.



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**Table e. Hydraulic Accumulator
Pressure Specifications**

50°F (10°C)	141 to 363 psi (9.75 to 25.0 bar)
68°F (20°C)	145 to 377 psi (10.0 to 26.0 bar)
86°F (30°C)	149 to 402 psi (10.25 to 27.75 bar)

- Remove test equipment and install and tighten return line and pressure switch.

Tightening torque

- Pressure switch to power flow regulator 18 Nm (13 ft-lb)

Hydraulic brake booster, replacing

- Discharge hydraulic accumulator by operating brake pedal at least 20 times with the engine stopped.
- Remove master cylinder as described earlier.
- Clean supply and return line fittings on brake booster. Remove hydraulic lines from booster.

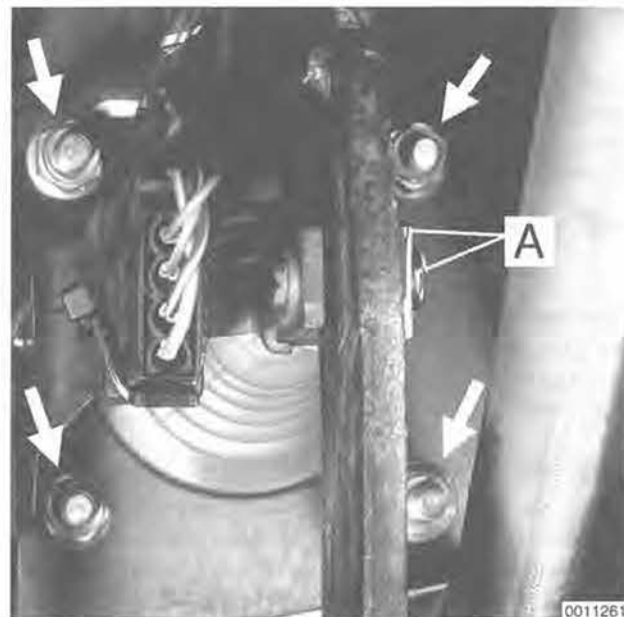
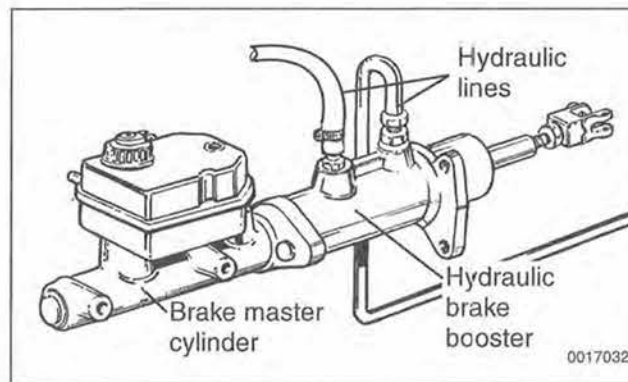
WARNING—

Extreme cleanliness is essential when working on the hydraulic brake booster system. Even a small piece of dirt could damage the brake booster system or the power steering system.

- Working inside car, remove lower left trim panels above brake pedal. See **513 Interior Trim**.
- Remove clip and clevis pin (A) from brake booster pushrod and disconnect it from brake pedal lever. Remove four mounting nuts. Working from engine compartment side, pull brake booster from pedal base.
- Installation of brake booster is reverse of removal.
 - Tighten all fittings to specified torque.
 - Adjust brake pedal travel and brake light switch as described under **Brake pedal height, adjusting**.

Tightening torque

- Brake booster to bulkhead 22 Nm (16 ft-lb)
- Hydraulic lines to brake booster 31 Nm (23 ft-lb)
- Master cylinder to hydraulic brake booster 28 Nm (20 ft-lb)

**BRAKE BOOSTER**

CAUTION—

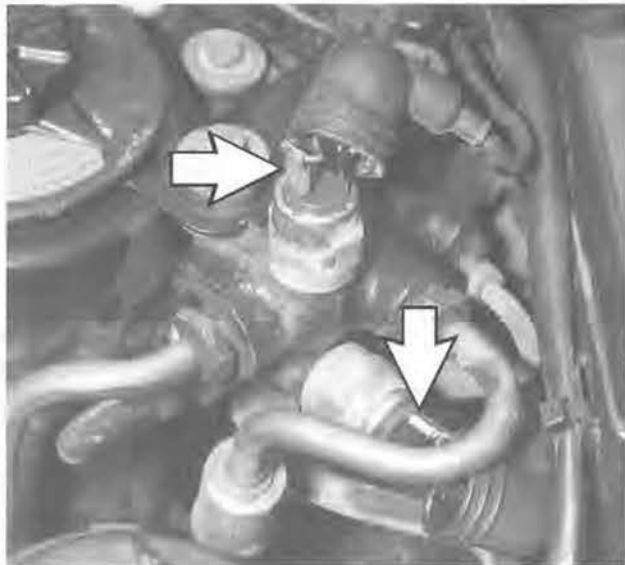
- On cars with hydraulic brake booster, always replace master cylinder mounting bolts.
- Use care not to over-torque the master cylinder mounting nuts. This could damage the brake booster and prevent proper vacuum build-up.
- Hydraulic fittings should be installed using a crowfoot flare-nut wrench and an accurate torque wrench. Failure to tighten the fittings to the specified torque with the correct wrench could result in damage to the component or the fitting. Damaged fittings or components will result in leaks, which will affect system operation.

Power flow regulator, replacing

- Discharge hydraulic brake accumulator by operating brake pedal at least 20 times with engine stopped.
- Thoroughly clean power flow regulator and its fittings.

WARNING—

Extreme cleanliness is essential when working on the hydraulic brake booster system. Even a small piece of dirt could damage the brake booster system or the power steering system.



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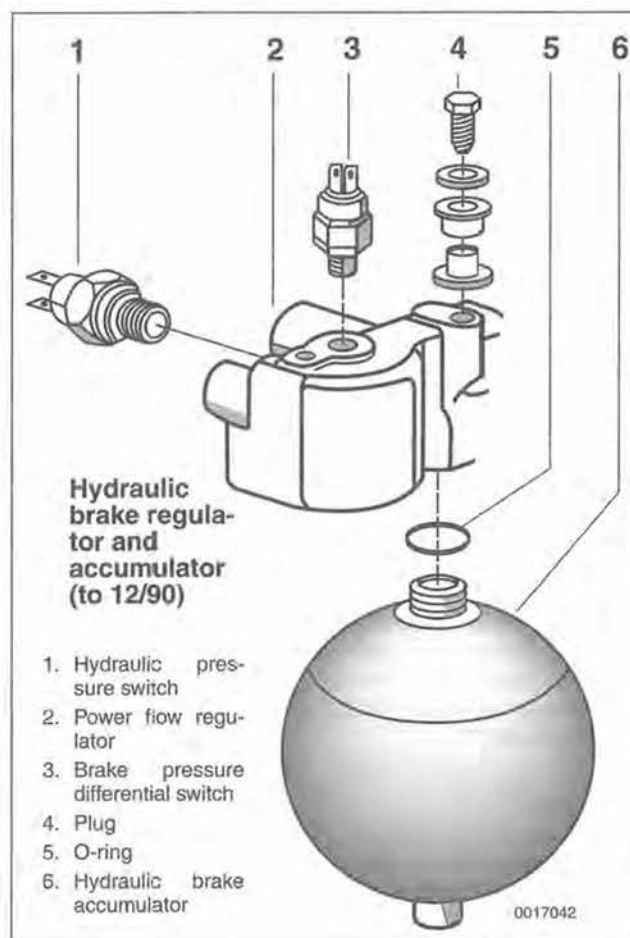
- Remove and label electrical wires from two pressure switches on regulator (arrows).
- Remove hydraulic lines from power flow regulator.
- Remove regulator by removing two mounting bolts.
- Installation of power flow regulator is reverse of removal.
 - If power flow regulator is being replaced, install old switches to new regulator.
 - On early cars (to 12/90): Remove accumulator from regulator by clamping regulator in a soft-jaw vise and threading accumulator off. Reinstall in new regulator.
 - Tighten all fittings to specified torque.
 - Adjust brake pedal height as described earlier.
 - When installation is complete, bleed power steering system as described in **320 Steering and Wheel Alignment**.

WARNING—

Hydraulic fittings should be installed using a crowfoot flare-nut wrench and an accurate torque wrench. Failure to tighten the fittings to the specified torque with the correct wrench could result in damage to the component or the fitting. Damaged fittings or components will result in leaks, which will affect system operation.

NOTE—

If the accumulator is difficult to remove from the regulator, use a strap wrench or a large oil filter wrench on the accumulator while the regulator is in the vise.



Tightening Torques

- Accumulator to power flow regulator 50 Nm (36 ft-lb)
- Line from power flow regulator to steering gearbox 50 Nm (36 ft-lb)
- Line from power flow regulator to power steering pump 40 Nm (30 ft-lb)
- Line from power flow regulator to brake booster 31 Nm (23 ft-lb)
- Pressure switches to power flow regulator 18 Nm (13 ft-lb)
- Return pipe from power flow regulator to fluid reservoir 16 Nm (12 ft-lb)

Hydraulic brake accumulator, removing and installing

The hydraulic accumulator, or "bomb," in early models (up to 12/90) is installed to the underside of the power flow regulator. In later models (from 12/90) it is installed behind the front left foglight.

Early version (up to 12/90)

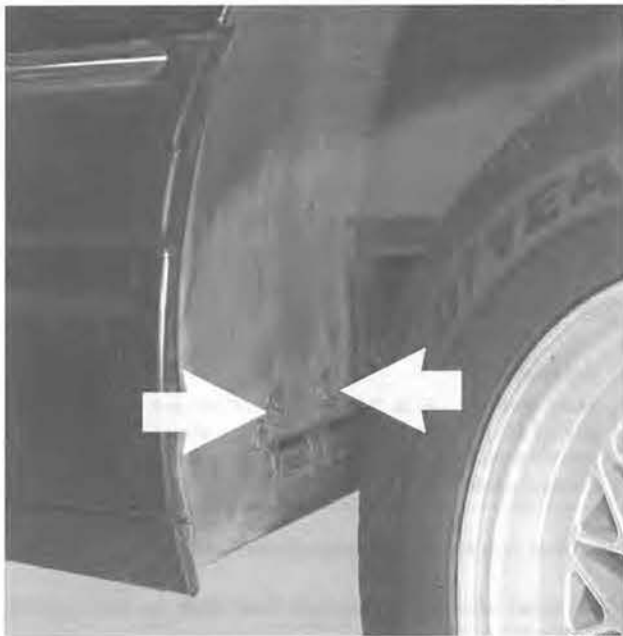
- Remove power flow regulator as described earlier.
- Remove accumulator from regulator by clamping regulator in a soft-jaw vise and threading accumulator off.
- Reinstall in new regulator.
- Reinstall regulator as described earlier.
- Run engine and operate brake pedal.
- Check hydraulic fluid level.

Tightening Torques

- Accumulator to power flow regulator 50 Nm (36 ft-lb)
- Line from power flow regulator to steering gearbox 50 Nm (36 ft-lb)
- Line from power flow regulator to power steering pump 40 Nm (30 ft-lb)
- Line from power flow regulator to brake booster 25 to 35 Nm (18 to 25 ft-lb)
- Return pipe from power flow regulator to fluid reservoir 16 Nm (12 ft-lb)

Late version (from 12/90)

- Discharge hydraulic brake accumulator by operating brake pedal at least 20 times with engine stopped.

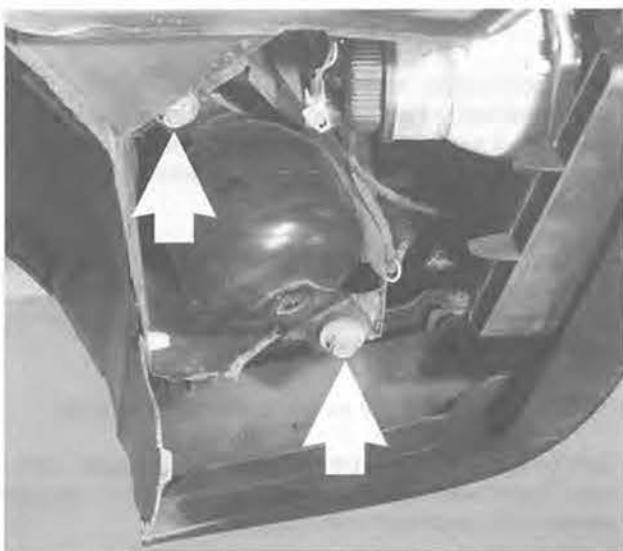


— Raise car on lift.

WARNING—

Make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

➤ Remove two bolts (**arrows**) in left front wheel housing holding alternator fresh air intake duct in place and remove duct.



➤ Remove accumulator mounting nuts (**arrows**) from brackets.

— Disconnect hydraulic lines from accumulator.

NOTE—

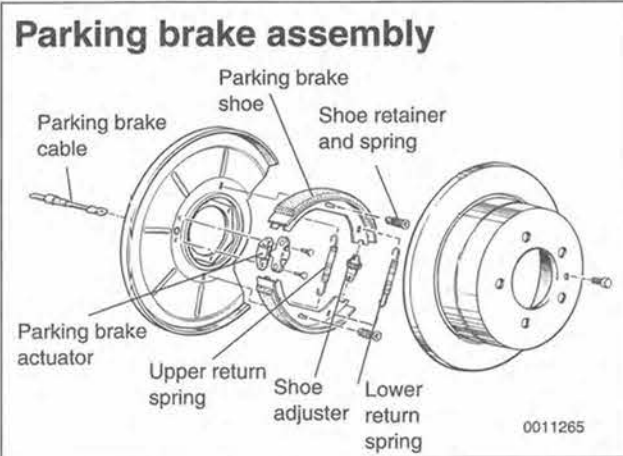
Have shop towel ready to catch any fluid that escapes.

— Installation is reverse of removal.

- Run engine and operate brake pedal.
- Check hydraulic fluid level.

Tightening Torques

- Accumulator to bracket (M8) 22 Nm (16 ft-lb)
- Line to hydraulic power booster 40 Nm (30 ft-lb)
- Return pipe from power flow regulator to fluid reservoir 16 Nm (12 ft-lb)



PARKING BRAKE

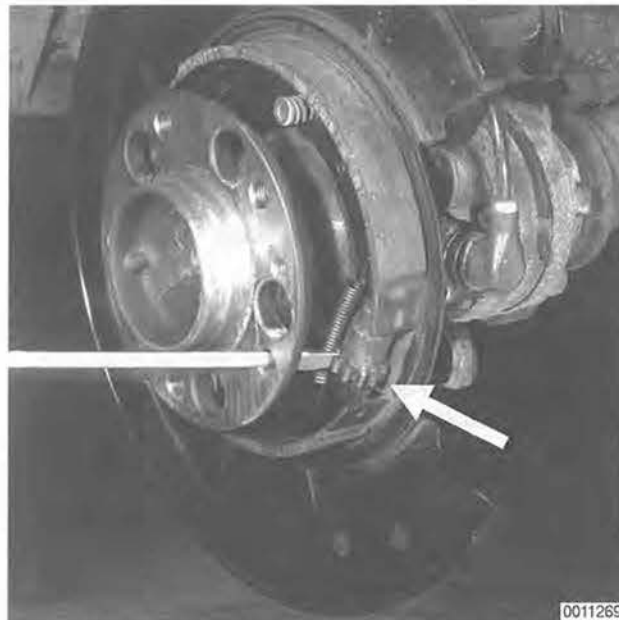
➤ The parking brake is a dual drum system integrated into the rear wheel brake rotors.

Parking brake shoe replacement is not normally required, but periodic adjustment of the shoes may be necessary from time to time to compensate for wear. The parking brake should also be adjusted any time the cable, the rear brake rotor or the parking brake shoes are replaced.

PARKING BRAKE



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Parking brake, adjusting

The parking brake can be adjusted with the wheels installed, although the rear of the car will need to be lifted slightly to spin the rear wheels.

- Lift parking brake lever boot out of console. While holding cables stationary, loosen parking brake cable nuts (**arrows**) until they are completely slack.

- Raise rear of car.

WARNING—

Make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

- Remove one lug bolt from each rear wheel.
- Turn road wheel until lug bolt hole lines up with parking brake adjuster.

- Using screwdriver, turn adjuster (**arrow**) to expand brake shoes until road wheel can no longer turn, then back adjuster off about eight (8) notches. (Rear wheel and brake rotor shown removed in photo.) Repeat procedure on other rear wheel.

- Working inside car, set parking brake several times to seat cable. Then pull parking brake lever up four notches. Tighten cable adjusting nuts until it is just possible to turn rear wheels with slight resistance.

- Release lever and make sure rear wheels turn freely.

- Turn on ignition. With parking brake lever released, instrument panel warning light should be off. Check that light comes on as soon as lever is pulled up.

- Install parking brake lever boot. Install road wheel lug bolts.

Tightening Torque

- Road wheel to hub 100 ± 10 Nm (74 ± 7 ft-lb)

Parking brake shoes, removing and installing

- Raise rear of car.

WARNING—

Make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

- Without disconnecting brake fluid hose, remove rear brake calipers from trailing arms. Remove rear brake rotors. See **Brake Pads, Calipers and Rotors**.

CAUTION—

Do not let the brake caliper assembly hang from the brake hose. Support it from the chassis with strong wire.

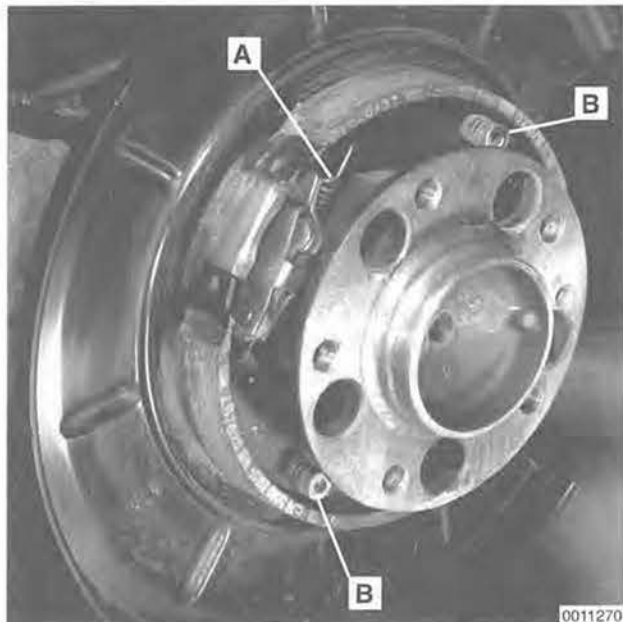
- Unhook upper return spring (A) from brake shoes. Remove shoe retainers (B) by pushing them and rotating 90°.

- Spread shoes apart at top and remove them from below.

NOTE—

When removing the brake shoes the shoe expander pivot pin may fall out.

- Inspect shoe expander to make sure it functions properly. Apply thin coat of grease to sliding parts and pins.
- Installation is reverse of removal. Be sure to adjust parking brake cables as described earlier.



Parking brake cable, replacing

- Remove rear brake caliper and rotor. See **Brake Pads, Calipers, and Rotors**.
- Remove parking brake shoes as described above.
- Remove parking brake cable from cable holder on trailing arm.
- Working inside car, lift parking brake lever boot out of console. Remove cable adjusting nut (arrow).
- Slide cable out of housing from below car and install new cable.
- Installation is reverse of removal. Adjust parking brake as described above.



ANTILOCK BRAKE SYSTEM (ABS)/ TRACTION CONTROL (ASC/ASC+T)

Automatic stability control (ASC) uses ABS wheel sensor input to the DME to improve vehicle stability by controlling power to the rear wheels.

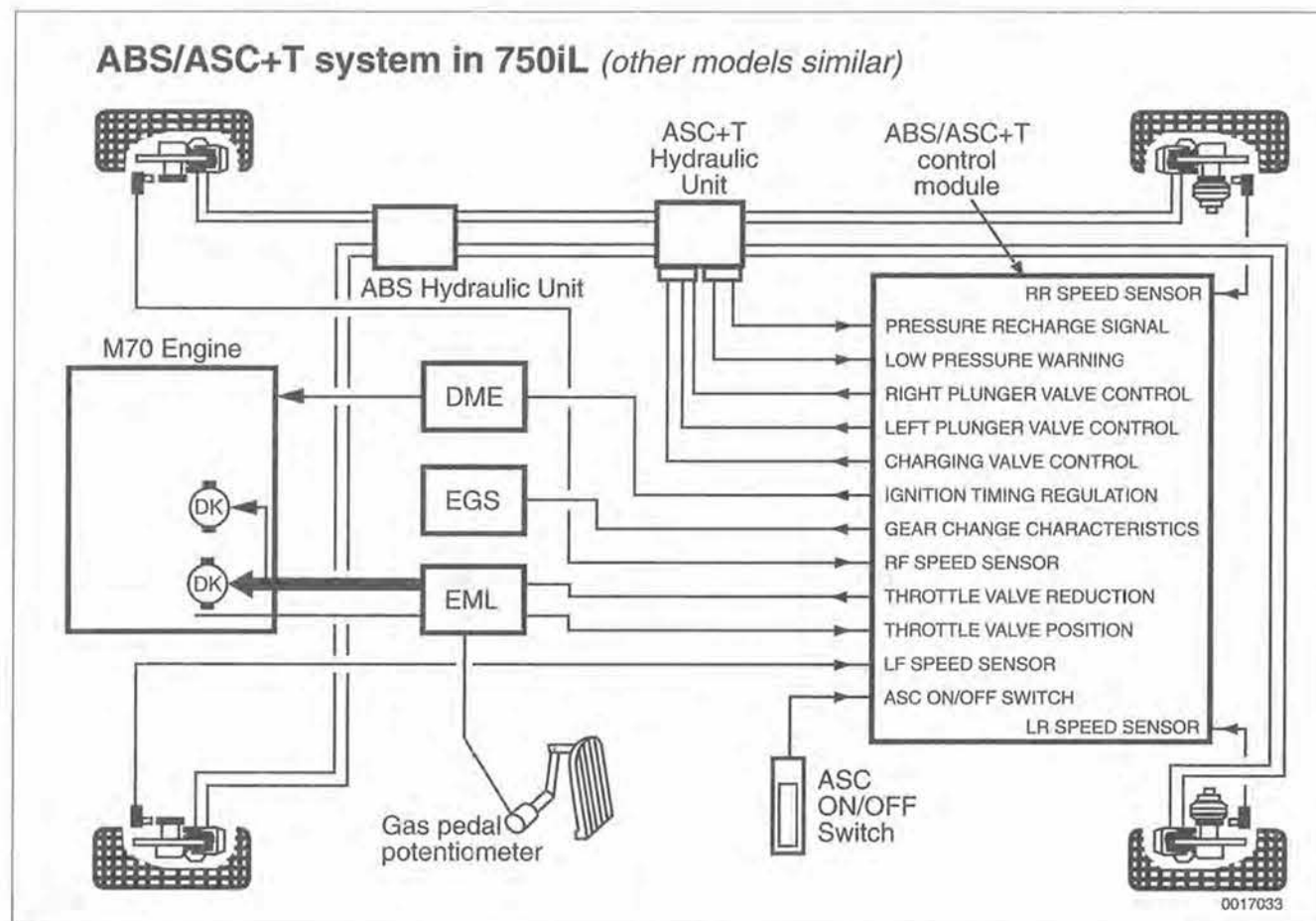
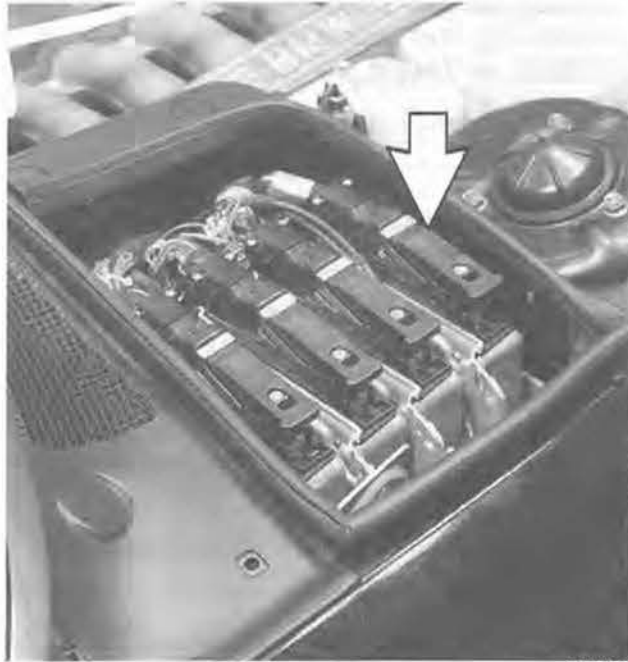


Table f. ABS and Traction Control Application in E32 Cars

Model	ABS	ASC	ASC+T
735i/iL	Yes	Yes (from 1991)	No
740i/iL	Yes	No	Yes
750iL	Yes	Yes (1990)	Yes (from 1991)

Automatic stability control with traction control (ASC+T) uses individual wheel brakes as well as engine management to control wheel lock up or spin.

The traction control system is integrated with the ABS system. The two systems share the same control module and receive wheel speed information from the wheel speed sensors. However, the two systems operate independently from each other. Each is capable of functioning in the event of fail-



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ure by the other, unless shared electrical components such as power supply also fail.

The ABS/traction control module works in conjunction with the DME/EML (735i/iL or 750iL) or DME/ADS (740i/iL) and EGS (transmission control) modules.

The ABS/traction control system is designed to be maintenance free. There are no adjustments that can be made to the system. Repair and troubleshooting of the major ABS/traction control system components require special test equipment and knowledge and should be done by an authorized BMW dealer.

- ◀ The ABS/traction control electronic control module (**arrow**) is located in the electronics box (E-box) in the right rear of the engine compartment. (E-box on 750iL shown, other models are similar.)

ABS system inspection

ABS self-tests each time the car is started. Once the test is complete, the ABS dashboard light turns off. If the ABS dashboard light remains lit or comes on at any time during driving, a system fault has occurred and the ABS system is electronically disabled. The conventional braking system remains fully functioning.

A visual inspection of the ABS system may help to locate system faults. If no visual faults can be found and the ABS light remains on, have the system diagnosed by an authorized BMW dealer.

Carefully inspect the entire ABS wiring harness, particularly the pulse sensor harnesses and connectors near each wheel. Look for chafing or damage due to incorrectly routed wires.

Remove the pulse sensors and clean the sensor tips. Inspect the toothed ABS pulse wheels for missing teeth or other damage. Check the pulse wheels for dirt, brake pad dust accumulation, or heavy rust deposits that could alter the clearance between the sensor tip and the wheel.

NOTE—

If a front pulse wheel is damaged, the entire wheel hub with integral wheel bearing must be replaced. In the rear the pulse wheel is integral with the drive axle flange. See 310 Front Suspension or 330 Rear Suspension.

ABS hydraulic control unit, removing and installing (735i/iL or 740i/iL)

- Disconnect negative (–) battery cable. See **020 Maintenance**.

CAUTION—

Prior to disconnecting the battery, read the battery disconnection cautions given at the front of this manual on page vii.

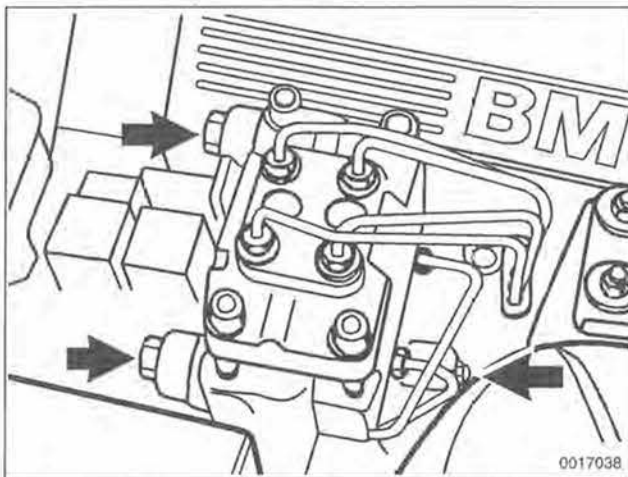
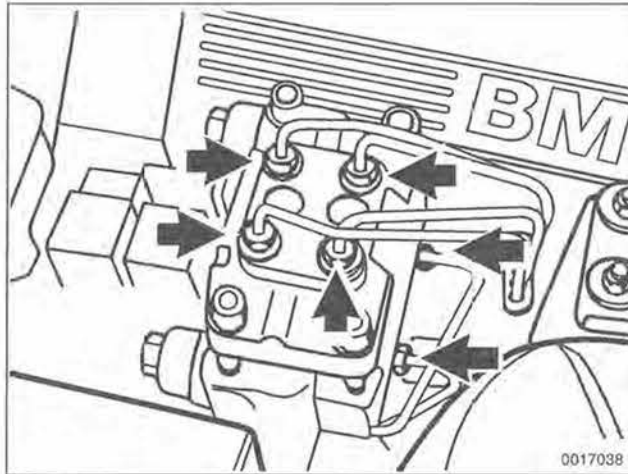
- Using a clean syringe drain brake fluid from reservoir.
- Remove plastic cover on ABS hydraulic control unit. Disconnect electrical harness connector and ground cable.

- Loosen but do not remove ABS control unit hydraulic lines (arrows).

- Remove hydraulic lines and insert plugs in openings.

CAUTION—

- Be very sure top of ABS unit is clean and free of any dirt before removing hydraulic lines.
- Mark all hydraulic lines before removing them. Lines must go back in the same locations as they were removed from.



- Loosen ABS unit mounting bolts (arrows) and slide unit up and out of its mounts.

- Installation is reverse of removal. Bleed complete brake system.

Tightening Torques

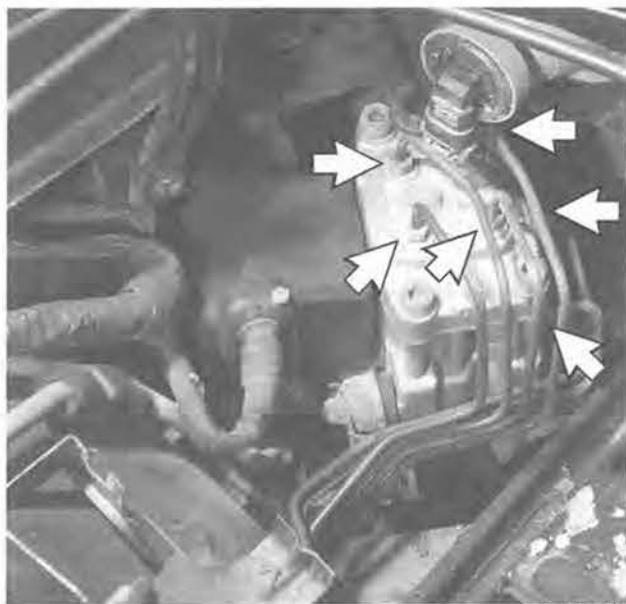
- Brake lines to ABS unit 17-19 Nm (13-15 ft-lb)

ABS hydraulic control unit, removing and installing (750iL)

- Disconnect negative (–) battery cable. See **020 Maintenance**.

CAUTION—

Prior to disconnecting the battery, read the battery disconnection cautions given at the front of this manual on page viii.



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- Remove upper and lower left side air filter housing.
- ◀ Loosen but do not remove ABS control unit hydraulic lines (arrows).

NOTE —

- Have shop towel ready to catch any fluid that escapes.
- Left headlight may need to be removed for better access to brake lines.

- Remove plastic cover on ABS hydraulic control unit. Disconnect electrical harness connector and ground cable.
- Remove hydraulic lines and insert plugs in openings.

CAUTION —

- Be very sure top of ABS unit is clean and free of any dirt before removing hydraulic lines.
- Mark all hydraulic lines before removing them. Lines must go back in the same locations as they were removed from.

- Loosen ABS unit mounting bolts and slide unit up and out of its mounts.
- Installation is reverse of removal. Bleed complete brake system.

Tightening Torques

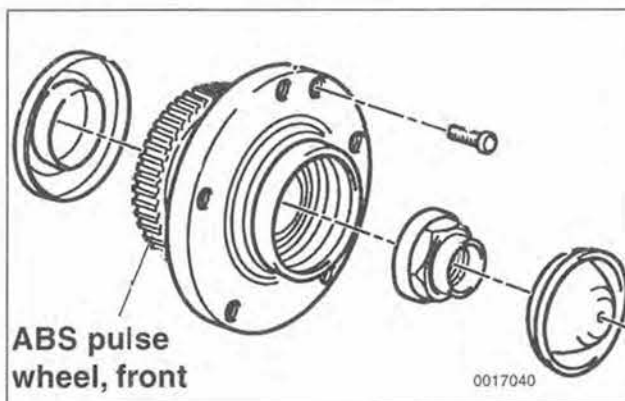
- Brake lines to ABS unit
- M10 coupling 19 Nm (15 ft-lb)
- M12 coupling 17 Nm (13 ft-lb)

ABS pulse wheel

Dirt or rust accumulation on the toothed pulse wheels, which can send false signals to the ABS/traction control module, must be cleaned off. If any teeth are damaged or broken, the wheel must be replaced.

The rear wheel pulse wheel is part of the outer drive axle flange. See **330 Rear Suspension** for drive axle and flange removal.

- ◀ The front wheel pulse wheel is integral with the wheel hub and wheel bearing. See **310 Front Suspension** for front wheel hub removal.



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ABS pulse sensor, replacing

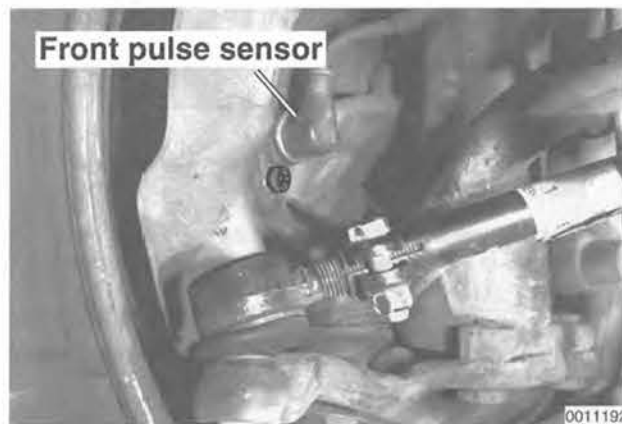
- Raise car and locate pulse sensor.

WARNING—

Make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

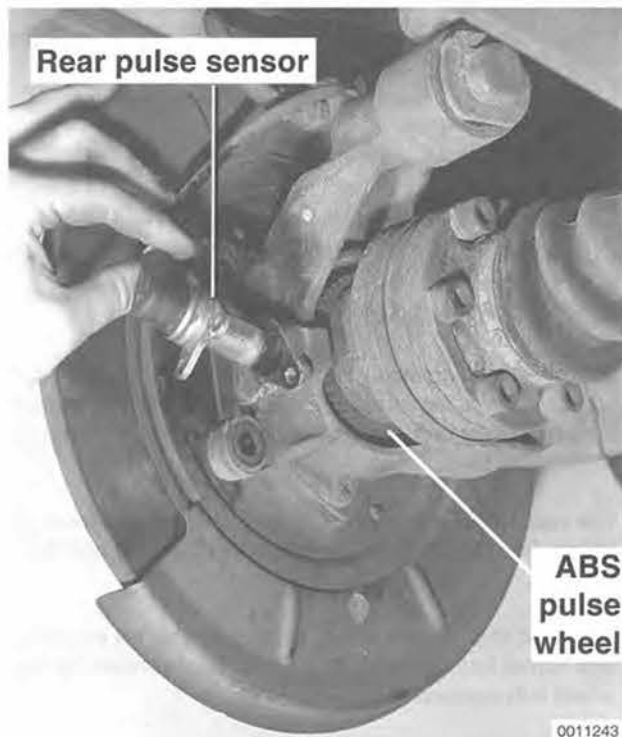
Front sensor

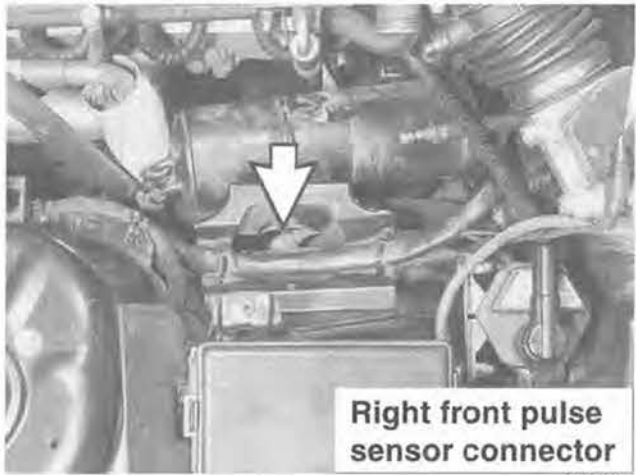
- Unscrew pulse sensor mounting bolt.
 - Remove sensor from its housing.
 - Remove harness from any retaining mounts.



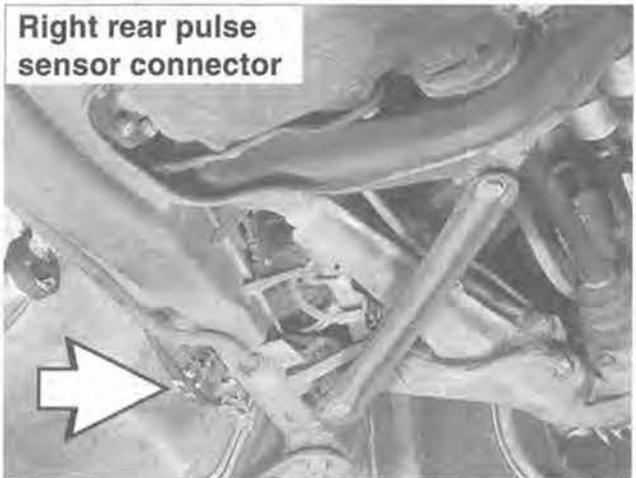
Rear sensor

- Remove rear wheel and brake caliper as described earlier.
 - Unscrew pulse sensor mounting bolt.
 - Remove sensor from housing.





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Working in engine compartment (front wheel sensors) or under rear of car (rear wheel sensors), disconnect pulse sensor connector and remove sensor from car.

NOTE —

- To gain access to the left front sensor connector, detach and move aside oil filter housing or hydraulic fluid reservoir, as needed.
 - To gain access to the right front sensor connector, detach and move aside the windshield washer reservoir and the fuel tank purge canister, as needed.
 - To gain access to the left rear sensor connector, lift the left rear seat cushion as described in 520 Seats.
- Apply thin coat of Molykote® Longterm 2 or equivalent grease to pulse sensor and housing. Installation is reverse of removal.

Table g. ABS Pulse Sensor to Pulse Wheel Gap

Wheel	Gap
Front	0.18 - 0.71 mm (0.007 - 0.028 in)
Rear	0.15 - 0.88 mm (0.006 - 0.035 in)

ASC+T System

NOTE —

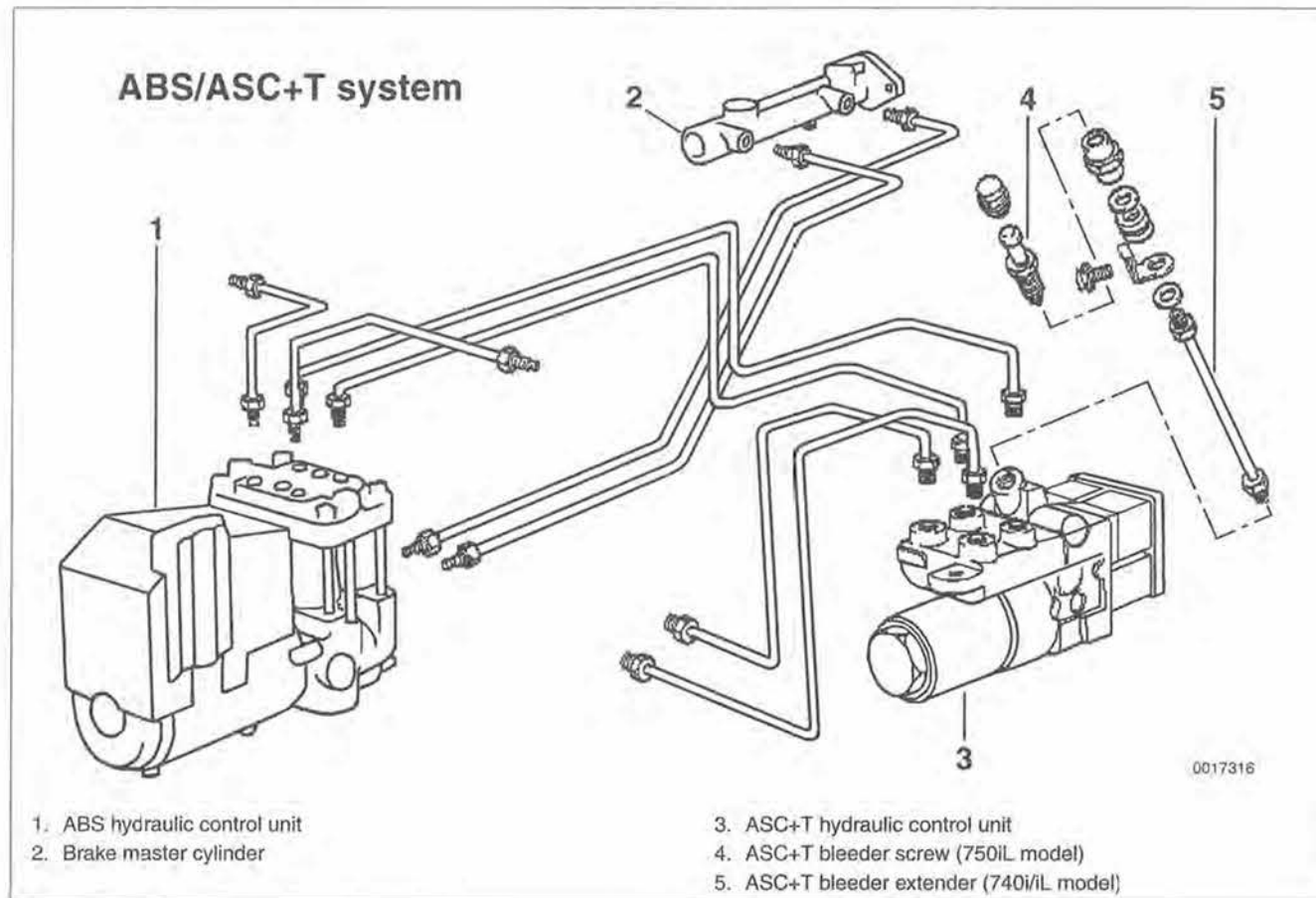
To determine whether an E32 car is equipped with ASC+T, look for the ASC+T hydraulic control unit. It is installed next to the left front strut tower in the engine compartment. Most 1991 and later 740i/iL and 750iL cars are equipped with ASC+T.

The ABS wheel speed sensors supply the traction control system with wheel speed input. The ASC system uses this input to control throttle and timing, thereby reducing the potential for spin at the rear wheels.

The ASC+T system adds the potential for braking control at the rear wheels, depending on the degree of wheel slip and road speed. In addition, by braking the spinning wheel and directing torque to the wheel with better traction, the need for a limited slip differential is eliminated.

NOTE —

For optimum propulsion in deep snow, or if the car needs to be rocked by rapidly changing between forward and reverse, the traction control system can be switched off using the ASC switch on the center console.



CAUTION—

- ASC+T may be unnecessarily activated if tires are unequal in size, traction or inflation.
- Switch the system off if fitting snow-chains.

The driver is informed of the status of the ASC+T system by an indicator lamp on the instrument cluster.

Whenever the ignition system is switched on, the ASC+T system is in operation. The indicator lamp goes off when the engine is started. If a wheel speed sensor indicates wheel slip due to excessive acceleration for the given road conditions, the ASC lamp flashes to alert the driver. At the same time, the system acts through the DME and the ABS systems to reduce power to the wheel(s). If the ASC+T system fails or is switched off, the ASC lamp stays on.

In addition, the EGS (automatic transmission) control module modifies gear shift points in response to signals from the ASC+T control module.

Bleeding hydraulic system (ASC+T)

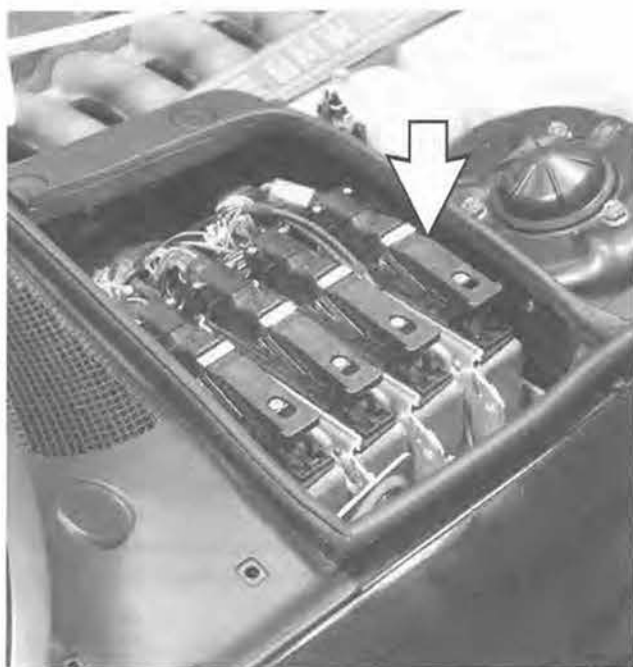
NOTE—

- Before bleeding the hydraulic system, be sure the brake system is filled with brake fluid.
- The hydraulic system on early E32 cars uses Pentosin® CHF 7.1 hydraulic fluid.
- Beginning with cars produced in September 1991, Pentosin® CHF 11 S is used in the hydraulic system.

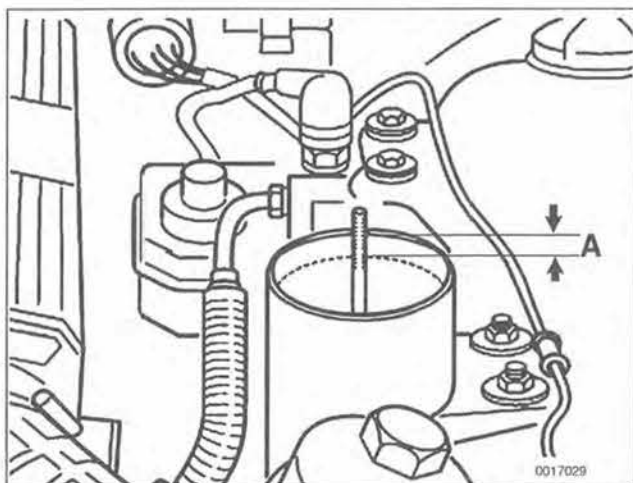
CAUTION—

Check the hydraulic reservoir for a label identifying the type of fluid used. Do not mix the various kinds of fluid.

- With ignition switch in off position remove cover from E-Box located in the right rear of engine compartment.
- Disconnect harness connector from ABS/ASC+T control unit (arrow).



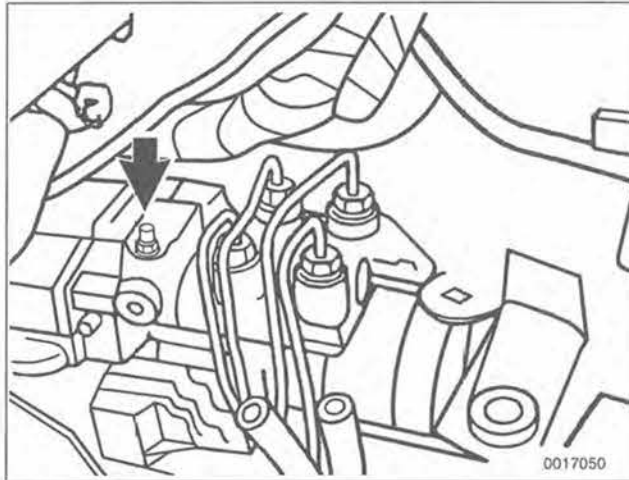
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- Fill hydraulic oil reservoir to **A** = 25 mm (1 inch) from top.
- Reconnect control unit harness connector.
- Start engine and run for at least 30 seconds.

340-36 BRAKES

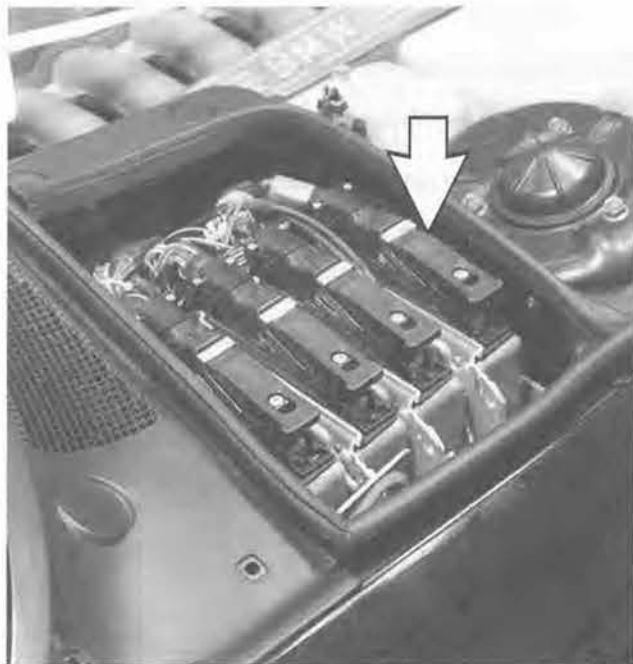


- Install bleeder hose on ASC+T hydraulic control unit bleeder valve (**arrow**) and place other end of hose in waste bottle.
- Open bleeder valve and flush system until oil is free of air bubbles.
- Close bleeder valve.
- Shut engine off.
- Check and if necessary top up hydraulic fluid level.

Reinitializing ABS/ASC+T control module

The ABS/ASC+T system must be reinitialized if any of the following components has been disconnected or replaced.

- ABS/ASC+T hydraulic control unit
- Throttle-valve assembly
- Throttle potentiometer



- Disconnect ABS/ASC+T control module harness connector (**arrow**) located in E-box at right rear corner of engine compartment.
- Run engine for one minute, then shut off.
- Reattach ABS/ASC+T control module.

ASC+T hydraulic control unit, replacing (740i/iL)

- Disconnect negative (–) battery cable. See **020 Maintenance**.

CAUTION—

Prior to disconnecting the battery, read the battery disconnection cautions given at the front of this manual on page viii.

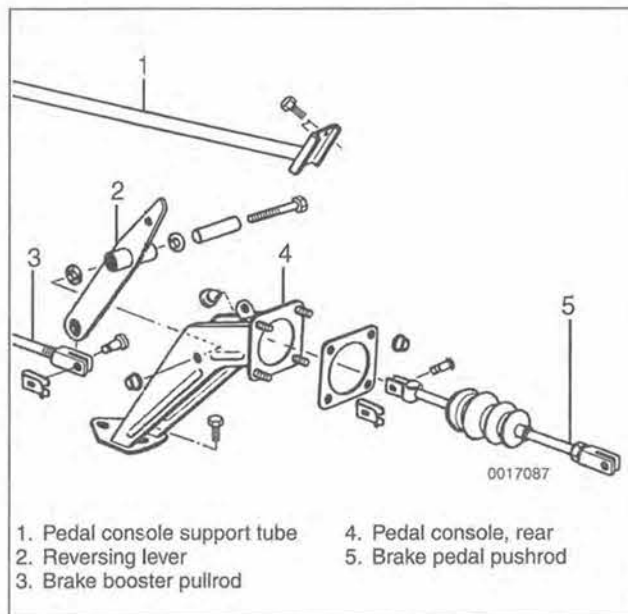
- Using a clean syringe drain hydraulic fluid reservoir. Remove reservoir.
- Remove oil filter housing supply line support bracket.
- Remove dashboard panel(s) from beneath steering column to access pedal assembly. See **513 Interior Trim**.

- ◀ Working inside car, remove rear pedal console mounting nuts (arrows).



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- ◀ Working in engine compartment close to rear bulkhead, remove rear pedal console assembly.

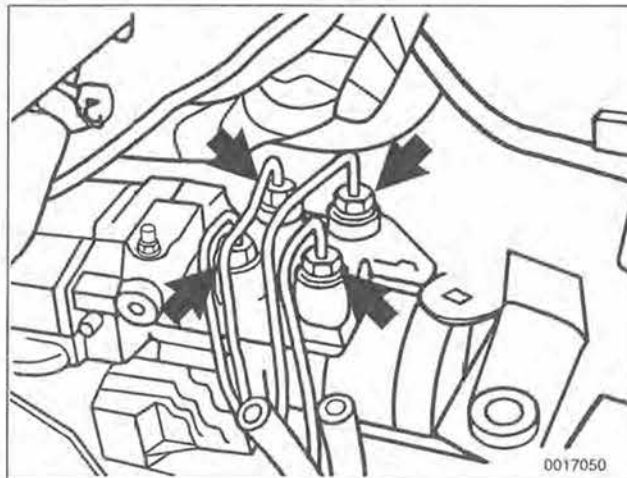


- Loosen ASC+T hydraulic unit bleeder valve to release hydraulic pressure.

NOTE—

Have shop towel ready to catch escaping oil.

- Disconnect four brake lines (**arrows**) at top of hydraulic unit. Also remove brake lines to ABS hydraulic control unit, as necessary.

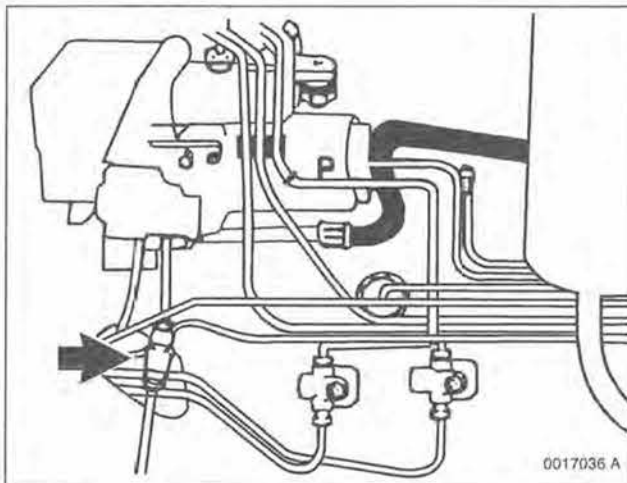


- Raise front of car and remove left front wheel.

WARNING—

Make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

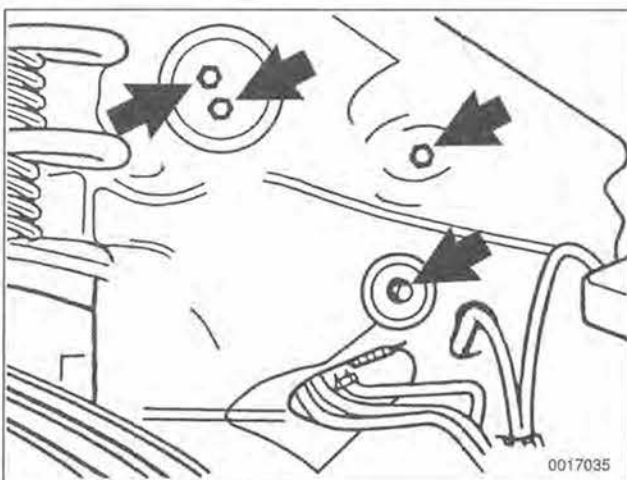
- Remove engine splash pan if necessary. Disconnect hydraulic fluid line from adapter fitting (**arrow**) from below.

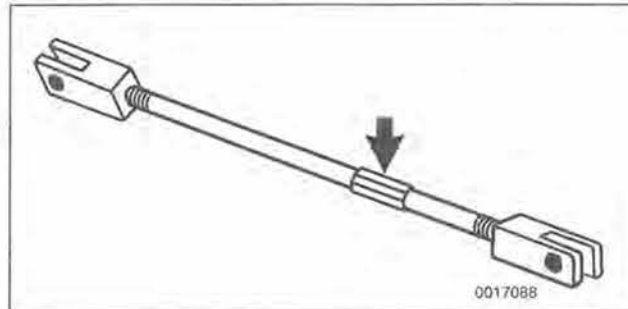


- Remove left front wheel housing splash shield.

- Remove four hydraulic unit mounting bolts (**arrows**) in back of splash shield.

- Lift ASC+T hydraulic unit out through opening made by removing pedal console assembly.





➤ When reinstalling brake pullrod, make sure flattened section of rod (**arrow**) is installed toward engine compartment rear bulkhead.

- Remainder of installation is reverse of removal.
- Bleed brake system as described under **Bleeding brakes (cars with ASC+T)**.
- Reinitialize ASC+T system as described earlier.

Tightening Torques

- Brake lines to hydraulic unit . . . 17-19 Nm (13-15 ft-lb)
- Rear pedal console to bulkhead 22 Nm (16 ft-lb)

ASC+T hydraulic control unit, replacing (750iL)

- Disconnect negative (–) battery cable. See **020 Maintenance**.

CAUTION—

Prior to disconnecting the battery, read the battery disconnection cautions given at the front of this manual on page viii.

- Remove brake booster and master cylinder as described earlier.
- Loosen hydraulic unit bleeder valve to release hydraulic pressure.

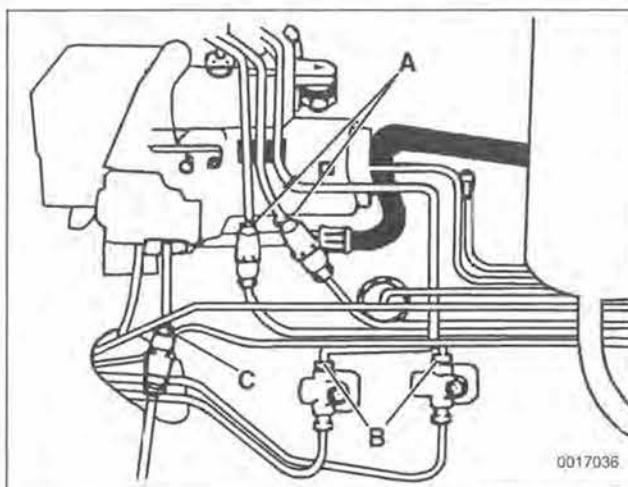
NOTE—

Have shop towel ready to catch escaping oil.

- Raise front of car and remove left front wheel.

WARNING—

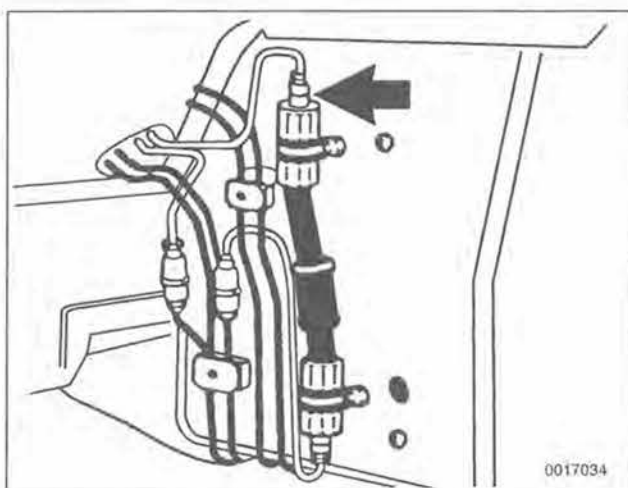
Make sure the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.



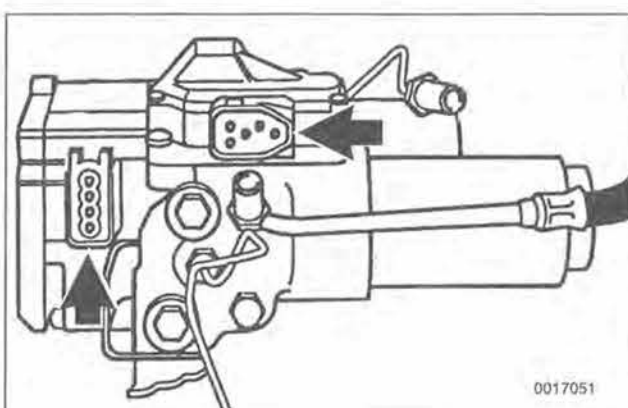
- Remove engine splash pan if necessary.

- Disconnect brake lines at junctions **A** and **B** from below.
- Disconnect hydraulic fluid line at adapter fitting **C** from below.

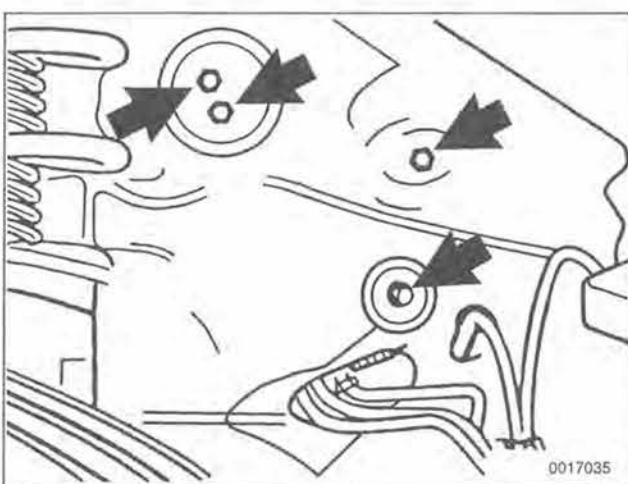
340-40 BRAKES



- Loosen and remove self levelling (LAD) control pressure fitting from adapter (arrow).



- Disconnect electrical harness connectors (arrows) from hydraulic unit.



- Remove left front wheel housing splash shield.
- Remove four hydraulic unit mounting bolts (arrows) in back of left wheel housing splash shield.
- Remove hydraulic unit by pulling it up through opening made by removing brake booster.
- Installation is reverse of removal.
 - Bleed brake system as described under **Bleeding brakes (cars with ASC+T)**.
 - Bleed hydraulic boost system as described earlier.
 - Reinitialize ASC+T system as described earlier.

Tightening Torques

- Brake lines to hydraulic unit . . . 17-19 Nm (13-15 ft-lb)
- Brake booster to bulkhead 22 Nm (16 ft-lb)
- Brake master cylinder to hydraulic booster 28 Nm (20 ft-lb)

