

## BMW 4 CYLINDER

2002

## DESCRIPTION

Brake system is hydraulically operated using a tandem master cylinder and a power brake unit. Front disc brakes consist of rotors attached to wheel hubs, and four piston fixed calipers attached to steering knuckles. Rear brakes are leading-trailing shoe/drum type, using a dual piston wheel cylinder. Parking brake is cable operated, activating secondary shoes of rear brake assemblies.

## ADJUSTMENT

## FRONT DISC BRAKE PADS

Front disc brakes are self-adjusting, therefore, no adjustment in service is required.

## REAR DRUM BRAKES

Raise and support rear of vehicle and release parking brake. Using an offset wrench (BMW 6038), tighten left eccentric nut counterclockwise and then right eccentric nut clockwise until wheel is locked. **NOTE** — Rotate tire while making adjustments. Loosen each adjuster until wheel is just free to rotate.

## PARKING BRAKE

With rear brakes properly adjusted, pull back rubber boot on parking brake lever and loosen lock nuts. Pull brake lever up to fifth ratchet stop and check for braking action at rear wheels. If adjustment is required, tighten adjusting nuts until rear wheels are locked. Tighten lock nuts and ensure wheels turn freely with parking brake lever released.

## HYDRAULIC SYSTEM BLEEDING

**NOTE** — Manufacturer recommends replacement of brake fluid in entire system once a year to avoid moisture build-up. Attach a pressure bleeder to master cylinder reservoir.

**NOTE** — DO NOT exceed 29 psi. Raise vehicle and remove front wheels. Attach a bleeder hose to bleeder screw and immerse opposite end of hose into a container of brake fluid. Open bleeder screw, allow all air to escape, then close bleeder screw. Continue operation until all air has been bled from system. **NOTE** — On front disc brakes, bleed lower inboard screw before bleeding lower outboard screw.

## REMOVAL &amp; INSTALLATION

## FRONT DISC BRAKE PADS

**Removal** — Raise and support front of vehicle and remove wheels. Drive retaining pins out toward center of vehicle and remove cross spring. Using a suitable pulling tool, remove brake pads. If pads bind, attach a slide hammer to puller and remove. If pads are to be reinstalled, mark for reassembly reference. **NOTE** — Pads are not interchangeable.

**Installation** — **NOTE** — Replacement of disc pads should be done in complete sets only. Using a cylinder brush, clean guide surface and support surface in caliper. **NOTE** — DO NOT use oil based solvents. Siphon sufficient fluid from master

cylinder reservoir to prevent overflowing, then press pistons to bottom of bores. Install disc pads, cross spring, and retaining pins. Pump brake pedal several times to position pads against rotor.

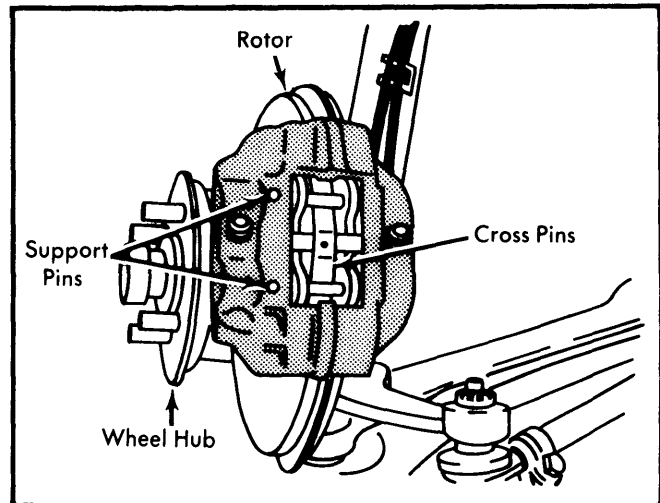


Fig. 1 Installed View of BMW 2002 Disc Brake and Caliper

## FRONT DISC BRAKE CALIPER

**Removal** — Raise and support front of vehicle and remove wheels. Disconnect hydraulic lines and plug openings. Remove bolts securing caliper to steering knuckle and remove caliper.

**Installation** — Reverse removal procedure and note the following: Left and right calipers are not interchangeable. When installed, bleeder screws must face upward. Tighten all bolts and fittings evenly and bleed hydraulic system.

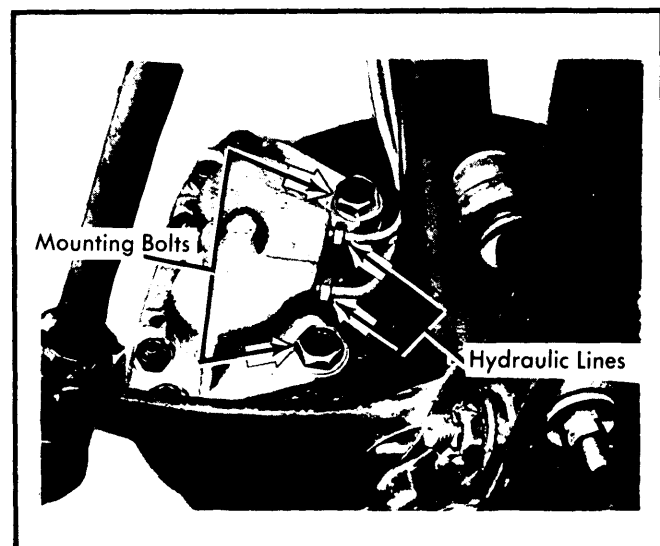


Fig. 2 Attaching Points of Brake Caliper and Hydraulic Lines

## FRONT DISC BRAKE ROTOR

**Removal** — Remove caliper. **NOTE** — Do not allow caliper to hang from hydraulic line after removal; support out of way. Remove hub grease cap, cotter pin and nut, then remove hub and rotor assembly from axle. Remove Allen bolts and separate brake rotor from wheel hub.

## BMW 4 CYLINDER (Cont.)

**Installation** — Install rotor onto wheel hub and tighten bolts securely. Install hub and rotor assembly onto axle, install outer wheel bearing, washer and nut. Adjust wheel bearings and install cotter pin and grease cap. See *Wheel Bearing Adjustment* in *WHEEL ALIGNMENT* Section. Install caliper and bleed hydraulic system if necessary.

### REAR BRAKE DRUM

**Removal** — Remove tire and wheel assembly and loosen eccentric adjusting nuts. Pull drum straight out from axle to remove.

**Installation** — Install brake drum to axle, install tire and wheel assembly, and adjust brake shoes and parking brake (if required).

### REAR BRAKE SHOES

**Removal** — With brake drum removed, remove shoe spring at bottom of brake assembly and pull shoes out from wheel cylinder. Disconnect parking brake cable from lever, remove return spring and strut, and remove brake shoes.

**Installation** — Reverse removal procedure and note the following: Make sure long end of upper return spring is installed between parking brake lever and brake shoe. Ensure brake shoe spring at bottom of assembly is installed behind support plate.

### REAR BRAKE WHEEL CYLINDER

**Removal** — With brake drum removed, disconnect hydraulic line, and remove bleeder screw and wheel cylinder attaching bolts. Using an offset wrench (BMW 6038), turn brake shoe eccentric adjusting nuts until shoes are spread out from wheel cylinder as far as possible. Remove wheel cylinder by maneuvering out of backing plate.

**Installation** — Reverse removal procedure, adjust brake shoes, and bleed hydraulic system.

### MASTER CYLINDER

**Removal** — Siphon fluid as necessary from master cylinder reservoir. If necessary, remove air cleaner assembly. Disconnect hydraulic lines from cylinder, cap all openings, and mark lines for reassembly reference. Remove attaching bolts and separate master cylinder from power unit.

**Installation** — Reverse removal procedure and note the following: Make sure rubber "O" ring is installed on master cylinder between cylinder and power unit. Check clearance between master cylinder piston and power unit push rod. Clearance should be .002" (.051 mm), and is adjusted by removing or installing shims behind head of power unit push rod.

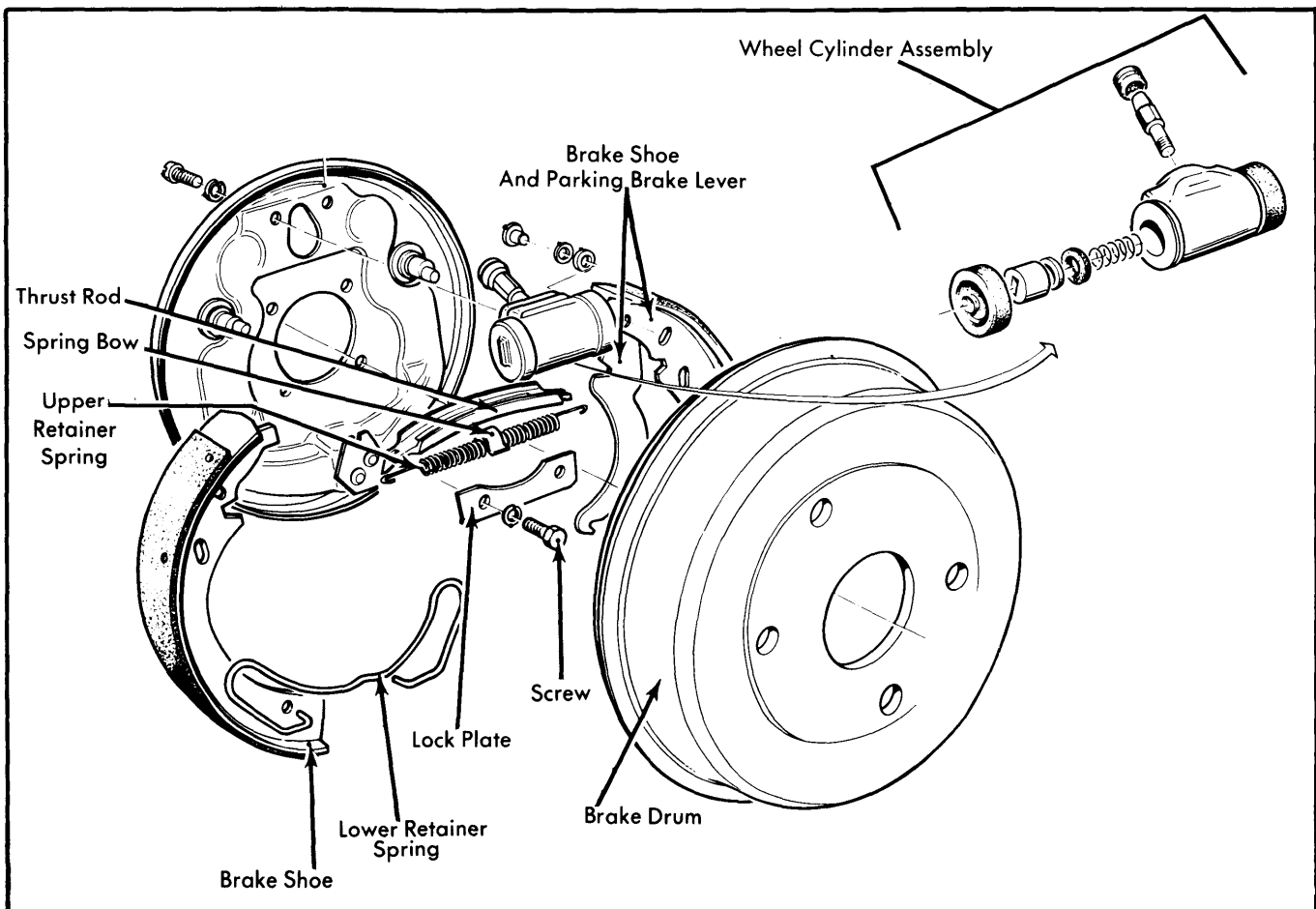


Fig. 3 Exploded View of Rear Drum Brake Assembly

# Brakes

## BMW 4 CYLINDER (Cont.)

### POWER BRAKE UNIT

**Removal** — With master cylinder removed, disconnect power unit push rod from pedal assembly by removing clevis pin. Disconnect vacuum line from check valve, remove nuts attaching power unit to support, and remove power brake unit.

**Installation** — Reverse removal procedure, taking care to install rubber "O" ring on master cylinder between cylinder and power unit.

**Check Valve Replacement** — Vacuum check valve is located in vacuum line at intake manifold. To remove, loosen hose clamps, separate vacuum hoses from valve, and remove valve. To install, position check valve so that arrows or black portions of valve face intake manifold, install vacuum hoses, and install and tighten clamps.

**Filter Replacement** — With power brake unit removed from vehicle, remove rubber dust boot, retainer, silencer, and filter. To install, reverse removal procedure making sure slots in filter and silencer are offset 180° in relation to one another.

## OVERHAUL

### FRONT DISC BRAKE CALIPER

**Disassembly** — 1) With caliper fitted to a vise, remove snap rings and pull out rubber protective caps. Take special care not to damage pistons.

2) Using suitable piston clamp (BMW 34 1 050), lock one piston into cylinder bore. Insert a small block of hard wood between other piston and flat surface of clamp. Apply light air pressure to inlet port and expel piston from cylinder bore.

3) Using sealing plate across bore of vacant cavity, force out second piston. Third and fourth pistons are removed in a like manner. Using a plastic instrument, dig seal from groove on cylinder bore.

**NOTE** — Manufacturer does not recommend separating caliper halves unless a leak is detected.

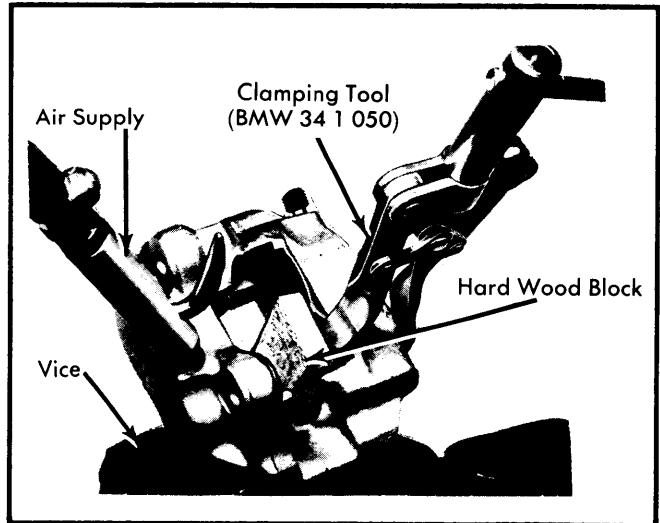


Fig. 4 Forcing Piston From Position in Brake Caliper

**Cleaning & Inspection** — Clean all parts in alcohol and dry with compressed air. Check cylinder bores, pistons, and flange surfaces for rust, corrosion, or other damage. Replace parts as necessary; do not attempt to machine caliper bores or pistons.

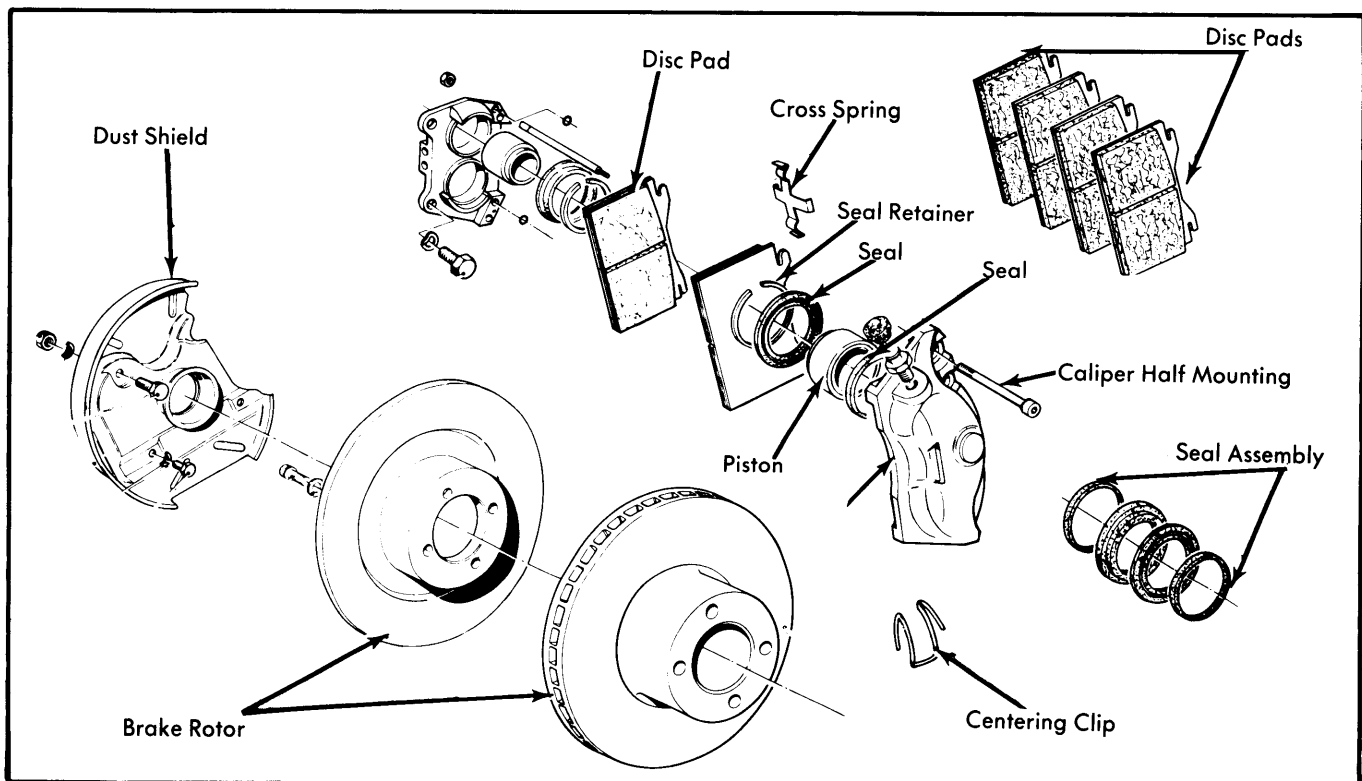


Fig. 5 Disassembled View of BMW Disc Brake

## BMW 4 CYLINDER (Cont.)

**Reassembly** – Reassemble caliper with new sealing rings and expansion bolts if halves were separated. Tighten caliper expansion bolts alternately and evenly from inside out. Coat pistons and sealing rings with ATE brake cylinder paste (or equivalent) and install into caliper bores. Install protective caps.

### REAR WHEEL CYLINDER

**Disassembly** – Remove dust caps, then withdraw piston and seal assemblies and spring. Remove bleeder screw. Remove rubber seals from pistons.

**Cleaning & Inspection** – Clean all parts in alcohol. Check all parts for wear or damage; replace parts as necessary. Make sure that grooves on cylinder body are not corroded.

**Reassembly** – Coat all parts with ATE brake cylinder paste (or equivalent) and reverse disassembly procedure.  
**NOTE** – Manufacturer recommends replacing piston seals whenever cylinder has been disassembled.

### MASTER CYLINDER

**Disassembly** – Push in on primary piston and remove piston stop screw on top of master cylinder. Remove retaining ring from end of cylinder and withdraw primary piston assembly. Use compressed air to remove secondary piston assembly from cylinder bore, then remove piston return spring. Disassemble piston assemblies, noting number and position of parts used.

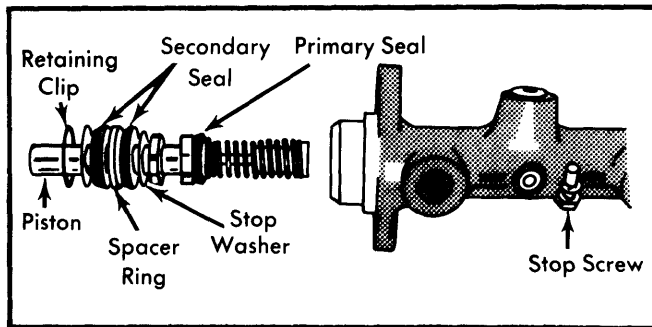


Fig. 6 Master Cylinder Primary (Rear) Piston Assembly

**Cleaning & Inspection** – Clean all parts in alcohol and check for wear or damage. **NOTE** – Cylinders with surface defects in bores must be replaced; do not overhaul.

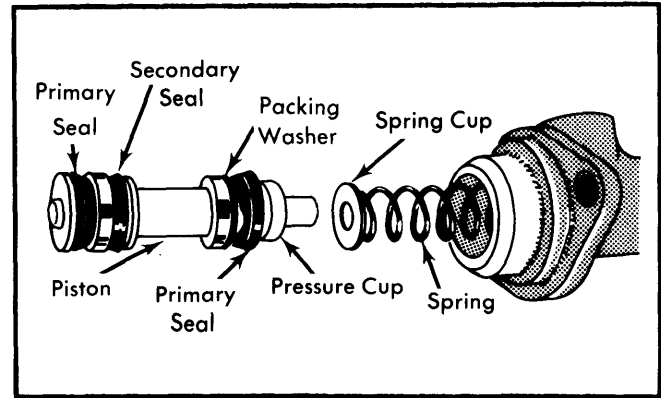


Fig. 7 Master Cylinder Secondary (Front) Piston Assembly

**Reassembly** – Reassemble piston assemblies using a thin coating of ATE brake cylinder paste (or equivalent). Install piston assemblies into cylinder bore using a suitable guide

**Reassembly** – To reassemble, reverse disassembly procedure and note the following: Coat all components with ATE brake paste. Ensure piston is fitted using sleeve tool (BMW 34 3 010). New piston seals are marked with paint rings; paint marks face away from each other. When installing stop screw, place pressure on piston. Always replace copper sealing ring under stop screw.

TIGHTENING SPECIFICATIONS	
Application	Ft. Lbs. (mkg)
Caliper-to-Steering Knuckle .....	58-69 (8-9.5)
Rotor-to-Wheel Hub .....	43-48 (6-6.7)
Caliper Halves (Expansion Bolts).....	17-20 (2.3-2.7)
Master Cylinder-to-Power Unit .....	9-11 (1.2-1.5)
Brake Hose-to-Caliper .....	9-12 (1.3-1.6)

BRAKE SYSTEM SPECIFICATIONS				
Application	Drum Diam. In. (mm)	Wheel Cylinder Diameter		Master Cylinder Diameter In. (mm)
		Front In. (mm)	Rear In. (mm)	
2002	9.055 (230)	①	.625 (15.8)	.813 (20.6)

① – Front disc brake equipped.

# Brakes

## BMW 4 CYLINDER (Cont.)

DISC BRAKE ROTOR SPECIFICATIONS						
Application	Disc Diameter In. (mm)	Lateral Runout In. (mm)	Parallelism In. (mm)	Original Thickness In. (mm)	Minimum Refinish Thickness In. (mm)	Discard Thickness In. (mm)
2002	9.488 <sup>①</sup> (240)	.008 <sup>②</sup> (.2)	.0008 (.02)	.....	.....	.3543 (9)

① - ±.008" (.2 mm).

② - Installed on vehicle.

BRAKE DRUM SPECIFICATIONS				
Application	Drum Diameter In. (mm)	Original Diameter In. (mm)	Maximum Refinish Diameter In. (mm)	Discard Diameter In. (mm)
2002	9.055 (230)	9.055 (230)	9.095 (231)	①

① - More than Maximum Refinish Diameter.