

BRAKE SYSTEM

Article Text

1989 Volkswagen Golf

For Volkswagen Technical Site

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Monday, August 23, 1999 11:40PM

ARTICLE BEGINNING

1989-90 BRAKE SYSTEMS

Disc & Drum

Cabriolet, Fox, Golf, GTI, Jetta, Jetta GLI, Vanagon

DESCRIPTION

All models are equipped with front disc brakes. Rear brakes are either disc or drum brakes. Parking brake is cable-actuated, which applies rear brakes. All models use pressure regulator between front and rear brake circuits to avoid rear wheel lock-up during hard braking. A vacuum power assist servo is used to ease brake pedal application. A vacuum check valve, located in vacuum supply hose, prevents vacuum leak off when engine is off.

BRAKE PRESSURE REGULATOR ADJUSTMENT (VANAGON)

NOTE: Adjustable pressure regulators are mounted on body and operated by spring connected to rear axle. Nonadjustable pressure regulators, which are proportioning valves, have no spring connection to axle.

1) Raise vehicle and support securely. Attach Pressure Gauges (US 1016) to left front brake caliper and right rear wheel cylinder. Bleed pressure gauge and hoses through valve on gauges.

2) Pump brakes several times. Remove pressure regulator from studs, leaving brake lines connected. Press on brake pedal until reading on both gauges is 725 psi (50 bar).

3) Maintain pressure on pedal while tilting regulator forward. Stop tilting regulator at point where straight line between 2 mounting studs on body forms 30 degree angle with straight line between 2 mounting holes on regulator. Be careful not to kink brake lines when tilting regulator.

4) Increase pressure on brake pedal until reading on front gauge is 1450 psi (100 bar). Reading on rear pressure gauge must be 798-943 psi (55-65 bar). If reading is not within specified range, replace pressure regulator. Disconnect gauges and bleed brakes.

BRAKE PRESSURE REGULATOR ADJUSTMENT (EXCEPT VANAGON)

1) On Fox wagon, measure between hub center and lower edge of fender lips (both sides) with 165 lbs. in driver's seat, full fuel tank and tires on ground. On all others, measure from top of wheel rim to lower edge of fender lip. Attach spring tensioners on each side to hold axle in measured position.

2) On Fox wagon, ensure measured distance is 11.8" (300 mm). On all models, raise vehicle and support securely. Check measurement and adjust tensioners (if necessary). Connect Pressure Gauge (US 1016) to left front caliper and right rear caliper or wheel cylinder in

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place of bleeder valves. Bleed hoses and gauges through bleeder valve on gauges. Lower vehicle to ground

3) Bounce vehicle several times and allow it to settle normally. Pump pedal several times. Depress brake pedal until front gauge shows pressure given for first reading in BRAKE PRESSURES chart. Record rear gauge reading. Increase pedal pressure until front gauge shows pressure given for second reading in BRAKE PRESSURES chart. Record rear gauge reading.

4) If pressure readings are not as specified on nonadjustable regulator, replace regulator. On adjustable regulators, if pressure reading at rear gauge is too high, loosen clamp bolt and reduce spring tension.

5) Increase spring tension if pressure reading at rear gauge is too low. Regulator must be replaced if pressures cannot be corrected by spring adjustment. Bleed hydraulic system after disconnecting gauges.

NOTE: DO NOT adjust spring tension while pressure is applied on brake pedal.

BRAKE PRESSURES TABLE

AA

Application	Front Gauge psi (bar)	Rear Gauge psi (bar)
Cabriolet		
1st Reading	797 (55)	565-623 (39-43)
2nd Reading	1450 (100)	739-826 (51-57)
Fox		
Coupe & Sedan		
1st Reading	725 (50)	537-609 (37-42)
2nd Reading	1450 (100)	725-958 (50-66)
Wagon		
1st Reading	725 (50)	392-479 (27-33)
2nd Reading	1450 (100)	754-841 (52-58)
GLI/GTI		
1st Reading	725 (50)	450-479 (31-33)
2nd Reading	1450 (100)	754-783 (52-54)
Golf		
1st Reading	725 (50)	507-565 (35-39)
2nd Reading	1450 (100)	812-870 (56-60)
Jetta (8-Valve Engine)		
1st Reading	725 (50)	551-609 (38-42)
2nd Reading	1450 (100)	855-914 (59-63)
Jetta (16-Valve Engine)		
1st Reading	725 (50)	435-522 (30-36)
2nd Reading	1450 (100)	739-826 (51-57)

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Vanagon

1st Reading	725 (50)
2nd Reading	1450 (100)	798-943 (55-60)

AA

MASTER CYLINDER PUSH ROD ADJUSTMENT

NOTE: Push rod should only need adjustment when servo is replaced.

VANAGON

Loosen lock nut on push rod. Move clevis until distance from mounting face of power booster to center of clevis eye is 4.38" (111 mm). This adjustment must be made before installing pedal cluster and booster.

ALL OTHERS

Push rod is nonadjustable.

STOPLIGHT SWITCH ADJUSTMENT

NOTE: Stoplight switches mounted on master cylinder are nonadjustable.

Adjustable stoplight switch is located above brake pedal. Loosen lock nut. Turn switch until distance between brake pedal arm and first thread on switch body is .20-.24" (5-6 mm). Tighten lock nut. See Fig. 1.

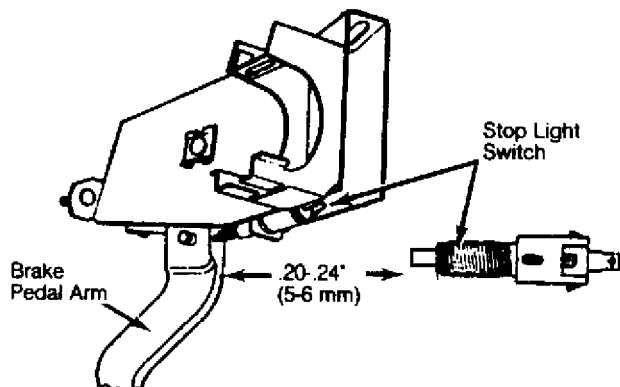


Fig. 1: Stoplight Switch Adjustment
Courtesy of Volkswagen United States, Inc.

PARKING BRAKE ADJUSTMENT (FOX & VANAGON)

NOTE: Check rear brake adjustment before adjusting parking brake.

FOX & VANAGON

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1) Raise vehicle and support securely. Release parking brake. Tighten self-locking adjusting nut until there is no play at brake components. Pull on cable housings to check for play. Apply and release parking brake several times.

2) Check adjustment by pulling parking brake handle up 2-4 notches. Rear wheels should be too tight to turn by hand. Release parking brake. Rear wheels should rotate freely.

PARKING BRAKE ADJUSTMENT (MODELS W/REAR DISC)

Raise vehicle and support securely. Release parking brake lever. Apply brake pedal once. Loosen lock nuts. Tighten each adjusting nut until lever on respective caliper lifts off stop. Measure gap between stop and lever. See Fig. 2. Do not move lever off stop more than .039" (1.0 mm). Tighten lock nuts. Ensure wheels are locked on 3 notches.

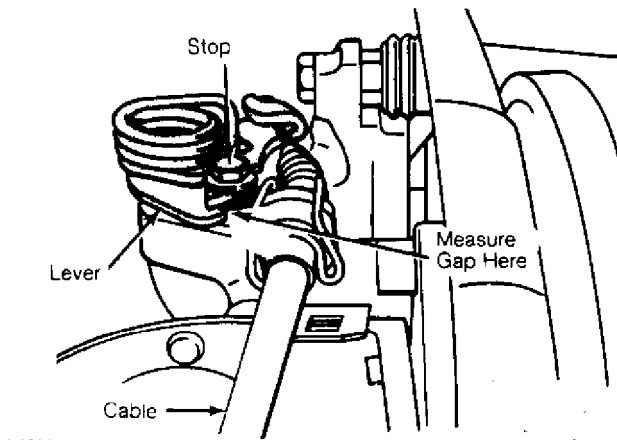


Fig. 2: Rear Disc Parking Brake Adjustment
Courtesy of Volkswagen United States, Inc.

PARKING BRAKE ADJUSTMENT (ALL OTHERS)

Raise vehicle and support securely. Apply brake pedal once firmly. Pull parking brake handle up 2 notches. Loosen locking nuts, at parking brake lever. Tighten adjusting nuts until respective rear wheel is locked. Release parking brake. Ensure rear wheels rotate freely. Tighten lock nuts.

WHEEL BEARINGS ADJUSTMENT

NOTE: FWD front wheel bearings and rear wheel bearings on Vanagon, also called hub or axle bearings, are sealed units with one piece outer race. Bearings are nonadjustable.

REAR WHEEL BEARINGS (FWD MODELS)

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Tighten adjusting nut snugly while turning drum or rotor. Back off and retighten nut until thrust washer can just be moved with screwdriver. Install locking cap and new cotter key. Install dust cap.

FRONT WHEEL BEARINGS (VANAGON)

Tighten adjusting nut snugly while turning rotor. Back off and retighten nut slowly until thrust washer can just be moved with screwdriver under finger pressure. After adjustment, peen flange of NEW hub nut into spindle axle shaft recess.

FRONT PADS R & L

REMOVAL

Raise vehicle and support securely. Remove front wheels. Remove mounting bolts. Push caliper housing upward and swing out from bottom. Siphon small amount of brake fluid from reservoir. Remove pads and retaining springs from carrier. Replace pads that exceed wear limit. Wear limit of pads is .28" (7.0 mm), including backing plate. See Figs. 4 and 5.

INSTALLATION

1) Seat piston fully into cylinder bore by hand. Attach retaining springs to pad carrier. Install inner pad first and then install outer pad in carrier.

2) Install caliper housing into pad carrier. DO NOT force caliper any further than necessary to start Allen head mounting bolts. Excessive force could distort springs, which would cause noises during braking.

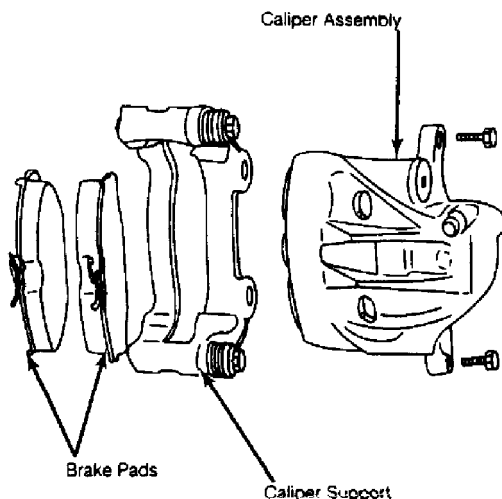


Fig. 3: Exploded View of Typical Front Caliper Assembly
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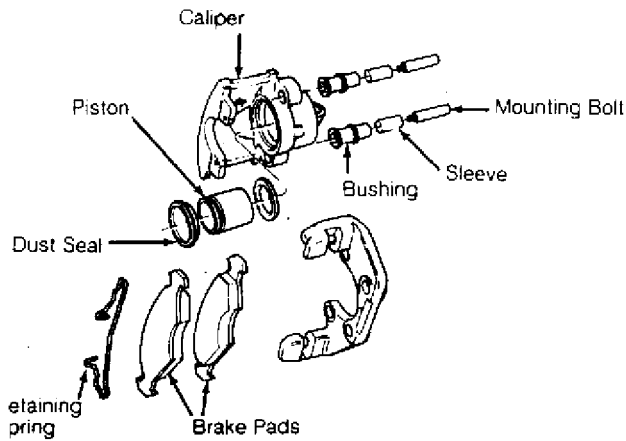


Fig. 4: Exploded View of Front Disc Brake Assembly (Fox)
Courtesy of Volkswagen United States, Inc.

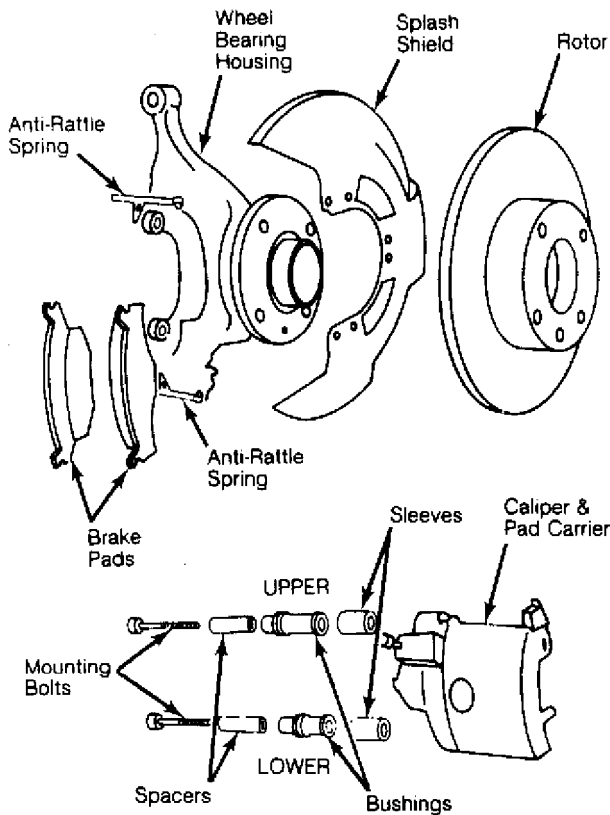


Fig. 5: Exploded View of Front Disc Brake Assembly (All Others)
Courtesy of Volkswagen United States, Inc.

FRONT & REAR CALIPER R & I

REMOVAL

Raise vehicle and support securely. Remove wheels. Disconnect brake line from caliper and plug openings. Bend back locking tabs (if

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equipped) on mounting bolts. Remove caliper mounting bolts. Remove caliper assembly from wheel bearing housing.

INSTALLATION

To install, reverse removal procedure. Use new lock plates and mounting bolts. Bleed hydraulic brake system.

FRONT & REAR ROTOR R & I

REMOVAL (VANAGON)

Raise vehicle and support securely. Remove wheels. Remove caliper, leaving hose connected. Suspend caliper from frame with wire. Remove grease cap. Loosen peen nut. Remove thrust washer and outer wheel bearing. Pull hub and rotor from spindle.

REMOVAL (FWD MODELS)

Raise and support vehicle. Remove wheels. Remove caliper and suspend from frame with wire. Remove countersunk screw that holds rotor to hub. Pull rotor off hub.

INSTALLATION (ALL MODELS)

To install, reverse removal procedure. Adjust wheel bearings (if necessary).

REAR BRAKE PADS R & I

REMOVAL

Raise vehicle and support securely. Remove rear wheels. Disconnect parking brake cable from caliper. Using 2 wrenches, hold guide pin with open end wrench while removing upper self-locking mounting bolt. Swing caliper down on lower mounting bolt. Remove brake pads from carrier. Wear limit is .276" (7.0 mm), including backing plate.

INSTALLATION

1) Place brake pads in carrier. Using Allen wrench, push piston into caliper while turning it clockwise. Depth of piston in bore of caliper determines clearance of outer pad to rotor.

2) Swing caliper into position and measure clearance between outer pad and rotor. When clearance is .039" (1.0 mm), brake adjustment is correct. Install NEW self-locking upper mounting bolt. Reconnect parking brake cable and check parking brake adjustment. With engine off, depress brake pedal approximately 40 times to reset automatic adjuster.

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CAUTION: DO NOT depressing brake pedal, with engine running, to reset automatic adjuster or damage to automatic adjuster will occur.

REAR DRUM R & I

CAUTION: ALWAYS loosen or tighten castellated axle nuts with wheels on ground.

REMOVAL (VANAGON)

Remove dust cap and cotter pin. Loosen castellated nut. Raise and support vehicle securely. Remove wheels. Release parking brake at equalizer, and back off adjuster. Remove drum retaining screws. Attach a puller and remove drum. Ensure drum can rotate freely during removal.

INSTALLATION

To install, reverse removal procedure. Drum retaining screws must be tight. Tighten castellated axle nut to 253 ft. lbs. (350 N.m). Adjust parking brake and depress brake pedal several times to set self-adjusting mechanism.

REMOVAL (FWD MODELS)

Raise and support vehicle. Remove wheels. Using screwdriver inserted through wheel bolt hole, push adjusting wedge up against stop. Remove grease cap, cotter pin, nut lock and nut. Remove thrust washer and outer bearing. Remove drum with inner bearing and grease seal.

INSTALLATION

To install, reverse removal procedure. Adjust wheel bearings (if necessary). Apply brake pedal firmly several times to set self-adjusting mechanism.

BRAKE SHOES R & I (VANAGON)

REMOVAL (VANAGON)

1) After removing drum, remove retainer clips, hold-down springs and anchor pins. Disconnect parking brake cable from lever on brake shoe. Disconnect lower return and adjuster springs. Pull brake shoes out of lower support. See Fig. 6.

2) Disconnect both upper return springs. Remove both brake shoes from backing plate together with adjuster lever. Ensure both pistons remain in wheel cylinder. Separate brake shoes from adjuster lever. Remove parking brake lever from rear brake shoe.

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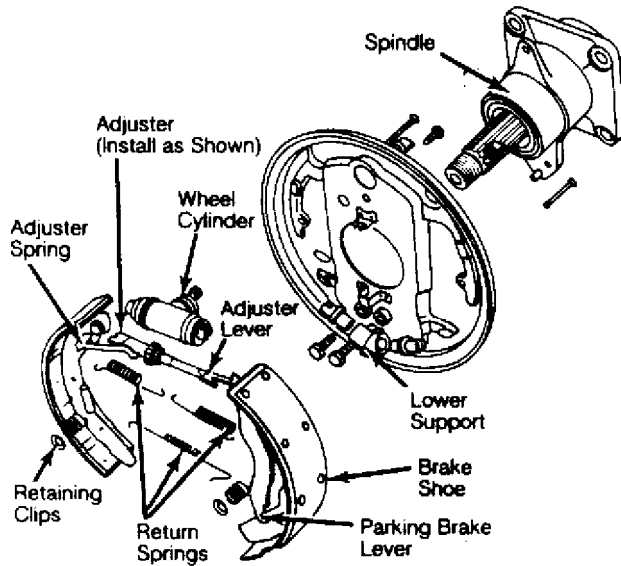


Fig. 6: Exploded View of Rear Brake Assembly (Vanagon)
Courtesy of Volkswagen United States, Inc.

INSTALLATION

1) To install, reverse removal procedure. Adjust brake shoes so that distance from lining surface on leading shoe to lining surface on trailing shoe is 9.87" (250.7 mm).

2) Adjust parking brake at equalizer. There should be no free play between parking brake lever on brake shoe and adjusting rod. Install brake drum. Depress brake pedal several times to set self-adjusting mechanism.

BRAKE SHOES R & I (FWD MODELS)

REMOVAL (FWD MODELS)

1) After removing drum, remove retainer clips, hold-down springs and anchor pins. Remove lower return spring. Disconnect parking brake cable from lever. See Fig. 7.

2) Disconnect adjusting wedge spring and upper return spring. Remove brake shoes together with push rod and tensioning spring. Place push rod and shoes in vise. Remove tension spring. Separate shoes from push rod.

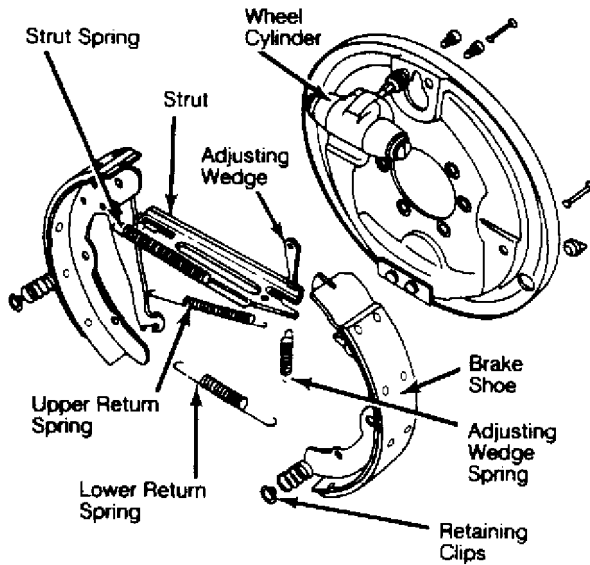


Fig. 7: Exploded View of Rear Brake Assembly (All Others)
 Courtesy of Volkswagen United States, Inc.

INSTALLATION

To install, reverse removal procedure. Ensure that lug on adjusting wedge faces backing plate. Adjust wheel bearings (if necessary). Apply brake firmly to set self-adjusting mechanism.

MASTER CYLINDER R & I (VANAGON)

REMOVAL (VANAGON)

1) Remove instrument panel. Drain master cylinder reservoir. Disconnect brake lines and wiring at master cylinder. Disconnect vacuum lines at power assist servo. Remove pedal and bracket assembly.

2) Disconnect brake push rod from brake pedal. Remove power assist servo and master cylinder assembly together from pedal bracket. Remove master cylinder from power assist servo.

INSTALLATION

To install, reverse removal procedure. Install new "O" ring between master cylinder and power assist servo. Adjust brake push rod length. See MASTER CYLINDER PUSH ROD ADJUSTMENT in this article. Bleed hydraulic system.

MASTER CYLINDER R & I (EXCEPT VANAGON)

REMOVAL (ALL OTHERS)

1) Drain master cylinder reservoir. Remove cover plate (if equipped). Disconnect brake lines and wiring at master cylinder.

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2) On models without power assist servo, disconnect brake push rod at brake pedal. On models equipped with power assist servo, remove master cylinder from servo. Be careful to keep any spacers used on attaching bolts for proper installation.

INSTALLATION

To install, reverse removal procedure. Always use new "O" ring between master cylinder and power assist servo. Bleed hydraulic system.

VACUUM POWER ASSIST SERVO R & I

REMOVAL (VANAGON)

Remove instrument panel. Remove servo and master cylinder as an assembly. Separate master cylinder from servo.

INSTALLATION

To install, reverse removal procedure. Before attaching brake push rod to brake pedal, check and adjust push rod length. See MASTER CYLINDER PUSH ROD ADJUSTMENT section of this article. Complete installation and bleed hydraulic system.

REMOVAL (ALL OTHERS)

Remove master cylinder from power assist servo. Disconnect brake push rod from brake pedal. Disconnect vacuum hose from servo. Remove servo from vehicle.

INSTALLATION

To install, reverse removal procedure. Always replace damping ring, washer, filter and "O" ring. Slots in damping washer and filter must be offset 180 degrees.

FRONT CALIPER OVERHAUL

DISASSEMBLY

Place caliper in soft-jawed vise. Insert wooden block in caliper. Blow compressed air into brake hose opening to force piston out of bore. Remove dust seal. Remove piston seal without damaging bore.

REASSEMBLY

Install piston seal in bore. Slide dust seal onto piston. Lubricate piston and cylinder bore with brake paste. Insert piston into bore. Place inner lip of dust seal into groove of caliper bore.

Press piston in as far as it will go with Piston Compressor (US 1023/4). When piston is fully seated, fit outer lip of dust seal into groove on piston.

REAR CALIPER OVERHAUL

DISASSEMBLY

Clamp caliper housing in soft-jawed vise. Use Allen wrench to remove piston from bore, turning it counterclockwise. Pry piston seal out of caliper housing bore, using care to avoid scratching surface of bore.

CLEANING & INSPECTION

Clean all parts in brake fluid. Black staining from piston seal wear may show on caliper bore walls and piston. This staining is normal.

REASSEMBLY

1) Lightly coat piston and seals with brake paste. Install piston seal in groove of caliper bore. Fit outer lip of dust cap onto piston. Inner lip of dust cap must be fitted into groove in caliper housing bore. See Fig. 8.

2) Press piston down into bore while turning in clockwise direction. Get piston as far as possible into bore. Slip outer lip of dust cap into groove on piston. Check and adjust pad clearance and parking brake after installation and bleeding is completed.

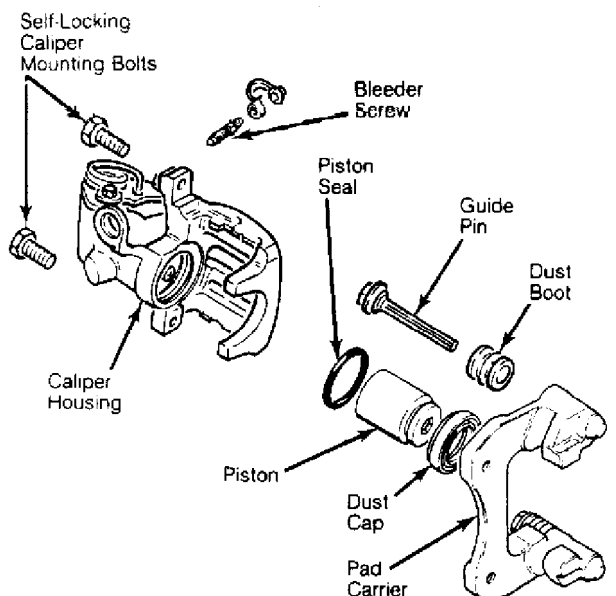


Fig. 8: Exploded View Of Rear Caliper
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MASTER CYLINDER OVERHAUL

NOTE: Master cylinder used on Golf, Golf GT, GTI, Jetta and Jetta GLI models are not to be rebuilt. Complete unit must be replaced if found to be defective.

DISASSEMBLY

1) Power assisted master cylinders differ in external design and primary piston configuration from unassisted versions. Disassembly procedure is identical for all versions. Remove dust boot (if equipped). Remove pressure valves and stoplight switches (if equipped). See Fig. 9.

2) Move primary piston assembly slightly into bore in order to remove piston stop screw. Hold down piston assemblies against spring tension to remove circlip and washer from end of cylinder. Cover end of cylinder with rag to catch any internal parts or brake fluid that might pop out after circlip is removed.

3) Tap open end of cylinder to remove secondary piston assembly. Note location of primary and secondary return springs and piston cups for reassembly procedure. Also note difference in size and shape between components from primary and secondary circuits. Remove all external hardware from cylinder.

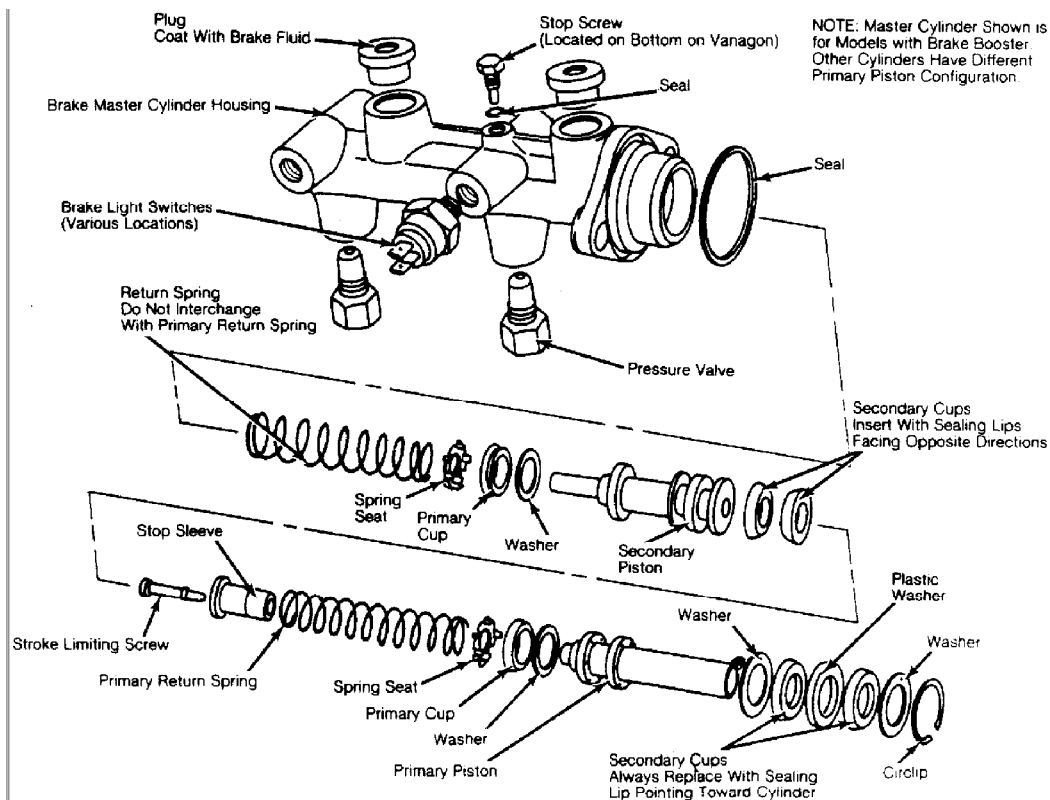


Fig. 9: Exploded View Of Power Assist Master Cylinder
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CLEANING & INSPECTION

Clean all parts with brake fluid or denatured alcohol. Check cylinder bore and pistons for wear. Replace complete assembly if hard parts are damaged. Replace all soft parts during overhaul. ALWAYS use all parts included in repair kit.

REASSEMBLY

To assemble, reverse disassembly procedure. Coat primary piston shaft with lubricant supplied in repair kit. Coat pistons and cups with brake paste. DO NOT interchange return springs or piston cups between primary and secondary circuits. Secondary piston may have to be moved slightly to install stop ADJ screw.

**POWER ASSIST SERVO, PRESSURE REGULATING VALVE
& PROPORTIONING VALVE**

Power assist servo units are supplied by both ATE and FAG. Servo units are interchangeable. Servo units supplied by either manufacturer may be installed with master cylinders supplied by the other. Vehicle manufacturer states that these servos, if defective, must be replaced as complete assemblies. DO NOT disassemble power assist servo as parts are not available.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

AAA

Application	Ft. Lbs. (N.m)
Caliper Mounting Bolts (1)	
Cabriolet	26 (35)
Fox	30 (41)
Vanagon	26 (35)
All Others	
Front	18 (25)
Rear	26 (35)
Pad Carrier Mounting Bolt	
Cabriolet	52 (70)
Vanagon	200 (272)
All Others	48 (65)
Rear Axle Nut	
Vanagon	253 (350)
Rear Backing Plate-to-Flange Bolt	
Vanagon	47 (64)
All Others	44 (60)
Rear Brake Shoe Support Bolt	
Vanagon	48 (65)
Wheel Lug Nut	
Vanagon	132 (180)

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All Others 81 (110)

INCH Lbs. (N.m)

Wheel Cylinder Bolt

Vanagon 144 (16)
 All Others 84 (9.5)

(1) - Always replace all self-locking bolts.

AA

DISC ROTOR SPECIFICATIONS

DISC BRAKE ROTOR SPECIFICATIONS

AA

Application	Fraction (Decimal)
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Cabriolet (Vented)

Front

Lateral Runout002 (.05)
Original Thickness787 (20)
Min. Refinish Thickness708 (18)

Fox (Solid)

Front

Disc Diameter	9.40 (239)
Lateral Runout .....	.002 (.05)
Original Thickness .....	.472 (12)
Min. Refinish Thickness .....	.393 (10)

Golf, GTI, Jetta & Jetta GLI

Front - Solid

Original Thickness .....	.472 (12)
Min. Refinish Thickness .....	.413 (10.5)

Golf, GTI, Jetta & Jetta GLI

Front - Vented

Disc Diameter	10.079 (256)
Lateral Runout .....	.002 (.05)
Original Thickness .....	.787 (20)
Min. Refinish Thickness .....	.709 (18)

Rear

Solid

Lateral Runout .....	.002 (.05)
Original Thickness .....	.394 (10)
Min. Refinish Thickness315 (8.0)

in. (mm)

Vanagon (Solid)

Front

Disc Diameter	10.158 (258)
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Original Thickness591 (15)
Min. Refinish Thickness512 (13)
AA

DRUM SPECIFICATIONS

DRUM BRAKE SPECIFICATIONS
AA
Application Fraction (Decimal)

Cabriolet, Golf, GTI, Jetta & Jetta GLI
Rear
Drum Diameter 7.087 (180)
Max. Drum Refinish 7.106 (180.5)

Rear
Drum Diameter 9.921 (252)
Max. Drum Refinish (1) 9.860 (253)

(1) - Use oversize linings after turning drum .020"
(.50mm) or more.
AA

END OF ARTICLE