**ARTICLE BEGINNING**

2000-01 BRAKES
Disc - Camaro

Firebird

## DESCRIPTION & OPERATION

Brake system is a dual hydraulic pedal-actuated system with a master cylinder, vacuum brake booster, front disc brakes and rear disc brakes. Hydraulic brake line routing is split front and rear for safety reasons.

Master cylinder has dual pressure chambers with a primary piston to supply hydraulic pressure to front brakes and a secondary piston to pressurize rear brakes. There is one outlet for both front brakes and one outlet for both rear brakes. Some models have a fluid level sensor built into master cylinder reservoir.

Front disc brakes are continually self-adjusting. Caliper piston seals are designed to retract pistons enough to allow brake lining to lightly brush rotor. Sliding caliper design compensates for lining wear. Replace brake pads in axle sets when lining thickness is .030" (.76 mm) or less.

Rear disc brakes are a single piston caliper assembly with parking brake incorporated. When parking brake is applied, rear disc brake piston is mechanically pushed out of caliper housing. Within piston is a self-adjusting mechanism to keep parking brake in proper adjustment. Replace brake pads in axle sets when lining thickness is .030" (.76 mm) or less.

## BLEEDING BRAKE SYSTEM

CAUTION: Because of brake fluid expansion due to heat absorbed from brakes and engine, DO NOT overfill master cylinder reservoir. DO NOT reuse brake fluid. Use only NEW, clean DOT 3 brake fluid. DO NOT use DOT 5 silicone brake fluid. Check brake fluid level frequently during bleeding procedure.

BRAKELINE BLEEDING SEQUENCE

| Application | Sequence |
|---|---|
| Camaro & Firebird | RR, LR, RF, LF |

### MANUAL BLEEDING

Master Cylinder

1) Fill brake fluid reservoir. Keep reservoir at least half full during procedure. Disconnect forward brake pipe connection at

 

master cylinder. Allow brake fluid to fill master cylinder piston bore until fluid flows from forward pipe connection. Reconnect forward brake pipe to master cylinder.

2) Slowly depress brake pedal and hold. Loosen forward brake pipe connection at master cylinder to purge air from bore. Tighten connection and slowly release brake pedal. Wait 15 seconds, and repeat until all air is removed from bore. When clear fluid flows from forward connection, repeat steps at rear brake pipe connection at master cylinder.

Brake Caliper

NOTE: Bleed individual calipers only after all air is removed from master cylinder. See MASTER CYLINDER.

1) Place box end wrench over caliper bleed screw. Attach a clear tube over bleed screw. Submerge other end of tube in a clear container partially filled with brake fluid. Depress brake pedal slowly one time and hold. Loosen brake caliper bleed screw to purge air from cylinder. Tighten brake caliper bleed screw and slowly release brake pedal.

2) Repeat sequence until all air is removed. If it is necessary to bleed all brake calipers follow brakeline bleeding procedure. See BRAKELINE BLEEDING SEQUENCE. Test drive vehicle. Ensure vehicle exceeds 3 MPH (5 KM/H) for ABS modulator actuation. If brake pedal is spongy or soft, rebleed system until pedal is firm.

### PRESSURE BLEEDING

1) Remove master cylinder reservoir cap. Attach Bleeder Adapter (J-35589) to reservoir. Pressurize system to 20-25 psi (1.4-1.72 kg/cmý). Connect bleeder hose onto bleeder adapter.

2) Raise and support vehicle. If it is necessary to bleed all calipers follow brakeline bleeding sequence. See BRAKELINE BLEEDING SEQUENCE. Place box end wrench over caliper bleed screw. Submerge other end of tube in a clear container partially filled with brake fluid. Open caliper bleed screw three quarters of a turn and allow brake fluid to flow until no air bubbles are seen. Apply brake pedal intermittently during bleeding. Close caliper bleed screw.

3) Repeat sequence until all air is removed. If it is necessary to bleed all brake calipers follow brakeline bleeding procedure. See BRAKELINE BLEEDING SEQUENCE. Test drive vehicle. Ensure vehicle exceeds 3 MPH (5 KM/H) for ABS modulator actuation. If brake pedal is spongy or soft, rebleed system until pedal is firm.

## ADJUSTMENTS

### BRAKE PEDAL HEIGHT & FREE PLAY

Brake pedal height and free play are not adjustable. See BRAKE PEDAL TRAVEL SPECIFICATIONS table.

### BRAKE PEDAL TRAVEL

 

NOTE: Brake pedal travel is not adjustable. Most low brake pedal problems are caused by air in hydraulic system and improper rear brake adjustment. Other less frequent causes of excessive pedal travel are incorrect power booster push rod length, worn linings, misadjusted parking brake, contaminated brake fluid, uneven brake pad wear, damaged pads, loose brake components, low brake fluid level, or a leak in hydraulic system. Most high brake pedal problems are usually caused by low engine vacuum, a vacuum leak, or a malfunctioning power booster. Bleed hydraulic system before performing procedure and ensure rear brake adjustment is correct. Following procedure determines if brake pedal travel is as specified.

1) Install Brake Pedal Effort Gauge (J-28662) onto brake pedal. Hook end of tape measure over top of brake pedal. Measure and record distance to rim of steering wheel.

2) Block wheels. Run engine at idle. Shift transmission into Neutral. Apply 100 lbs. (45 kg) of force to brake pedal. Measure and record distance to rim of steering wheel again. Difference between measured values is brake pedal travel. See BRAKE PEDAL TRAVEL SPECIFICATIONS table.

3) If brake pedal travel is not within specification, ensure brake power booster piston rod length is correct and rear brakes are adjusted. See POWER BRAKE BOOSTER PISTON ROD. Recheck brake pedal travel. If brake pedal travel still exceeds specification, repair brake system.

BRAKE PEDAL TRAVEL SPECIFICATIONS

| Application | In. (mm) |
|---|---|
| Camaro & Firebird | 2.00-3.50 (51.0-89.0) |

## PARKING BRAKE

Preliminary Information

1) Adjustment is normally required only if caliper has been disassembled or pads have been replaced. Ensure brake pads are NEW or parallel to within .006" (.15 mm) thickness. Adjustment will not be accurate if pads are heavily tapered.

2) Turning adjusting screw clockwise increases free play. See Fig. 1. Turning adjusting screw counterclockwise decreases free play. Adjustment will not correct a condition such as levers not returning to their stops.

Adjustment

1) Disconnect cable end from parking brake lever on caliper. See Fig. 1. Remove lever return spring. Have an assistant apply and hold light pressure on brake pedal (enough to stop rotor from turning by hand). This takes up clearances and ensures components are aligned.

2) Apply light hand pressure to parking brake lever. Check free play between lever and caliper stop. If free play is not .024-.

 

028" (.61-.71 mm), go to next step. If free play is .024-.028" (.61-.71 mm), parking brake cable is adjusted. Install lever return spring. Reconnect parking brake cable.

3) Remove adjusting screw. Clean threads. Coat threads with adhesive. Install adjusting screw. Turn screw until free play between lever and caliper stop is .024-.028" (.61-.71 mm). Have assistant release brake pedal, then apply brake pedal firmly 3 times. Recheck free play. Adjust again if necessary. Install lever return spring. Reconnect parking brake cable.

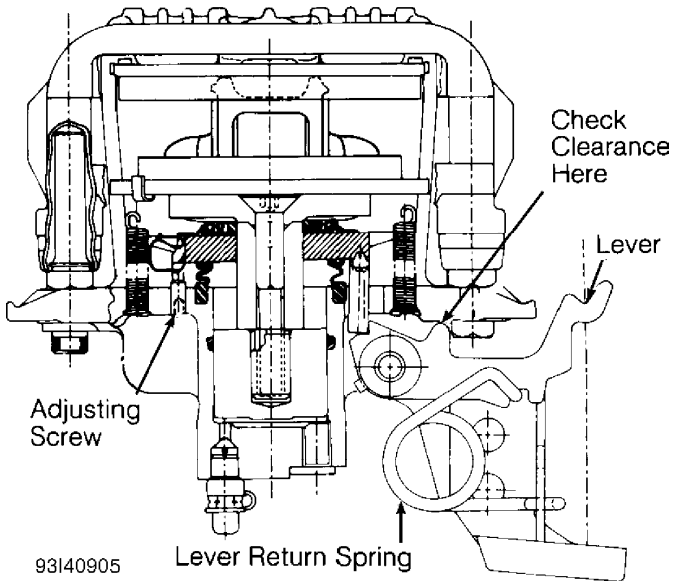


Fig. 1: Cross-Sectional View Of Rear Caliper Assembly
Courtesy of General Motors Corp.

## POWER BRAKE BOOSTER PISTON ROD

NOTE: Use the following procedure to measure how far booster piston rod protrudes from booster when vacuum is applied to booster. Piston rod is not adjustable. If piston rod protrusion is out of limits, replace power brake booster. Power brake booster is now serviced as a complete assembly and is no longer rebuildable.

Booster does not have to be installed to perform procedure. Apply 20-25 in. Hg vacuum or maximum available engine vacuum to booster. Position Piston Rod Gauge (J-37839) over piston rod. See Fig. 2. One side of gauge measures minimum rod length. Other side measures maximum rod length. If piston rod length does not fall between maximum and minimum dimensions, replace piston rod with service-adjustable piston rod to obtain correct dimension.

 

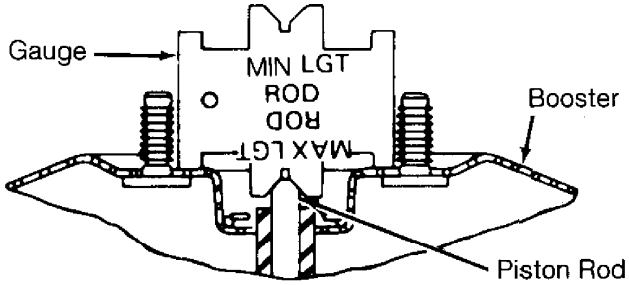


Fig. 2: Gauging Power Brake Booster Piston Rod
Courtesy of General Motors Corp.

BRAKELIGHT SWITCH

Hold brake pedal in applied position. Press switch fully forward until switch body is seated. Pull brake pedal fully rearward against pedal stop with 50 lbs. (22.5 kg) of pressure. DO NOT exceed specified pressure or power brake booster may be damaged. Switch is adjusted when clicking sounds are no longer heard. Ensure brakelights do not stay on with brake pedal at rest (released).

## TESTING

BRAKE WARNING INDICATOR INOPERATIVE

NOTE: See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

## REMOVAL & INSTALLATION

FRONT BRAKE CALIPER

Removal

1) Remove and discard 2/3 of brake fluid from master cylinder reservoir to prevent overflow when servicing. Raise and support vehicle. Mark wheel in relation to hub. Remove wheel. Install and finger-tighten 2 lug nuts with flat side toward rotor to hold rotor when caliper is removed.

2) On all vehicles, if not completely removing caliper (such as for overhaul), go to next step. If completely removing caliper, remove bolt securing brake hose to caliper. Disconnect brake hose from caliper. Plug opening in brake hose and caliper to prevent fluid loss and contamination.

3) Position "C" clamp with stationary end of clamp on caliper housing and threaded end on outboard pad. Tighten "C" clamp until piston is pushed into bore far enough to slide caliper off of rotor. Remove "C" clamp.

4) Remove caliper guide pin bolts. See Fig. 3. Remove caliper. If brake hose is still connected to caliper, hang caliper by wire so brake hose will not be damaged. Remove pads from caliper.

Installation

 

1) Lubricate guide pin bolts. See Fig. 3. Install caliper. Install caliper guide pin bolts. Guide pin bolts should slide into bushings with hand pressure.

2) If bolts do not slide through bushings using hand pressure, remove bolts and bushings. Inspect caliper bores for corrosion. If corrosion is found, remove corrosion using 1" (25.4 mm) diameter wheel cylinder honing brush. Clean bores with clean, denatured alcohol. Install and lubricate bushings. Install caliper bolts.

3) Tighten caliper bolts to specification. See TORQUE SPECIFICATIONS. If brake hose was not disconnected, go to next step. If brake hose was disconnected, connect brake hose to caliper. Tighten fitting bolt to specification. Bleed brake hydraulic system, and go to next step. See BLEEDING BRAKE SYSTEM.

4) Apply brakes several times to seat pads. Install wheel, aligning marks made during removal. Tighten wheel lug nuts to specification. Fill brake fluid reservoir. Road-test vehicle.

## FRONT BRAKE PADS

### Removal

Remove caliper. See FRONT BRAKE CALIPER. Remove inner and outer pad from caliper using a screwdriver if necessary. See Fig. 3.

### Installation

1) Clean outside surface of caliper piston boot with denatured alcohol. See Fig. 3. Slowly compress piston into bore with a "C" clamp, being careful not to cock piston to one side or damage piston boot. Using small piece of plastic or wood, lift inner edge of boot next to piston and press out any trapped air. Reposition boot so it lays flat with convolutions in proper position.

2) Install inner pad, snapping retainer into place in piston. Ensure pad lays flat against piston. Ensure boot is not touching pad. Install outer pad with wear sensor facing downward. Ensure pad lays flat against caliper. To install remaining components, reverse removal procedure.

## FRONT BRAKE ROTOR

### Removal & Installation

Raise and support vehicle. Remove tire and wheel. Remove and support caliper. See FRONT BRAKE CALIPER. Remove rotor. To install, reverse removal procedure. Tighten nuts and bolts to specification. See TORQUE SPECIFICATIONS.

## REAR BRAKE CALIPER

### Removal

1) Raise and support vehicle. Disconnect front parking brake cable from rear cables at equalizer. Mark wheel in relation to hub. Remove wheel. Install and finger-tighten 2 lug nuts with flat side toward rotor to hold rotor when caliper is removed.

2) If not completely removing caliper (such as for overhaul), go to next step. If completely removing caliper, remove bolt securing

 

brake hose to caliper. Discard old gaskets. Disconnect brake hose from caliper. Plug opening in brake hose and caliper to prevent fluid loss and contamination.

3) Remove and discard upper and lower caliper guide pin bolts. Remove caliper and wire aside.

Installation

1) Replace guide pins or boots if corroded or damaged. Install caliper housing over rotor. Install NEW upper and lower guide pin bolts. Tighten to specification. See TORQUE SPECIFICATIONS.

2) If brake hose was not disconnected, go to next step. If brake hose was disconnected, connect NEW gaskets and brake hose onto caliper. Tighten fitting bolt to specification. Bleed brake hydraulic system and go to next step. See BLEEDING BRAKE SYSTEM.

3) Apply brakes several times to seat pads. Remove 2 wheel lug nuts from rotor and install wheel, aligning marks made during removal. Tighten wheel lug nuts to specification. Fill brake fluid reservoir. Road-test vehicle.

## REAR BRAKE PADS

Removal

1) Remove 2/3 of brake fluid from master cylinder reservoir. Raise and support vehicle. Mark wheel in relation to wheel studs. Remove wheel. Install 2 wheel lug nuts finger-tight to retain rotor. Position "C" clamp with one end on brake hose fitting bolt and other end on outer pad.

2) Tighten "C" clamp until piston is bottomed in caliper. Remove and discard upper guide pin bolt securing caliper onto caliper mounting bracket. Rotate caliper downward on lower guide pin. Remove pads and pad shim. Discard pad shim.

Installation

1) Clean residue from pad guide surfaces on caliper mounting bracket and caliper housing. Replace guide pins or boots if corroded or damaged. Install NEW pad shim and pads. Install inner pad with wear sensor on leading edge of inner pad (assuming forward wheel rotation).

2) Rotate caliper housing into position. Ensure springs on outer pad do not stick through inspection hole in caliper housing. Install NEW upper guide pin bolt. Tighten to specification. See TORQUE SPECIFICATIONS. Start engine. Pump brake pedal slowly and firmly to seat pads.

3) Check parking brake levers to ensure they are against stops on caliper. If levers are not against stops, repair or adjust parking brake linkage as necessary. Remove 2 wheel lug nuts from rotor and install wheels, aligning marks made during removal. Fill master cylinder reservoir. Road test vehicle.

## REAR BRAKE ROTOR

Removal & Installation

1) Raise and support vehicle. Mark wheel in relation to wheel studs. Remove wheel. Remove 2 caliper mounting bracket bolts. Discard bolts. Remove caliper mounting bracket with caliper attached and wire

 

aside. See REAR BRAKE CALIPER. Mark rotor in relation to hub for installation reference.

2) Remove rotor. To install, reverse removal procedure. Install NEW mounting bracket bolts. Tighten nuts and bolts to specification. See TORQUE SPECIFICATIONS.

## MASTER CYLINDER

### Removal

Remove brake fluid and discard from master cylinder reservoir. Disconnect brakelines from master cylinder. Plug openings. Disconnect hose from reservoir (if equipped). Plug opening. Remove nuts securing master cylinder to power brake booster. Remove master cylinder.

### Installation

Bench bleed master cylinder. To complete installation, reverse removal procedure. Tighten master cylinder nuts and brakeline fittings to specification. See TORQUE SPECIFICATIONS. Bleed brake system. See BLEEDING BRAKE SYSTEM.

## POWER BRAKE BOOSTER

NOTE: Power brake booster can be removed without completely removing master cylinder, but if both components are to be removed, remove master cylinder first.

### Removal

1) Remove hood rear seal. Remove left side air inlet screen. Remove brake booster hose and clamp from check valve. Remove master cylinder from brake booster. Remove left side instrument panel insulator.

2) Remove brake pedal nuts from brake booster. On vehicles equipped with M/T, loosen clutch master cylinder nuts. On all models, disconnect brake booster pushrod from brake pedal lever pin. Remove pushrod retainer and washer, from inside vehicle. Remove power brake booster.

### Installation

To install, reverse removal procedure. Tighten fasteners to specification. See TORQUE SPECIFICATIONS.

## REAR AXLE BEARINGS & OIL SEAL

### Removal

Raise and support vehicle. Remove wheel. Remove rear axle shaft. See. Place pry bar behind seal case. Use pry bar to remove rear axle seal from rear axle housing. Insert Axle Bearing Remover (J-2281301) into bore. Position axle bearing remover so that tangs on tool engage bearing outer race. Use slide hammer to remove bearing.

### Installation

Lubricate NEW axle shaft bearing with gear lubricant. Using bearing installer, install axle shaft bearing so bearing installer

 

bottoms against shoulder in housing. Lubricate NEW oil seal lip with gear lubricant. Using oil seal installer, install oil seal into housing bore until even with axle tube. To install remaining components, reverse removal procedure. Tighten bolts to specification. See TORQUE SPECIFICATIONS. Fill rear axle with gear lubricant.

**OVERHAUL**

NOTE: To aid in overhaul procedures, use exploded views. See Figs. 3 and 4.

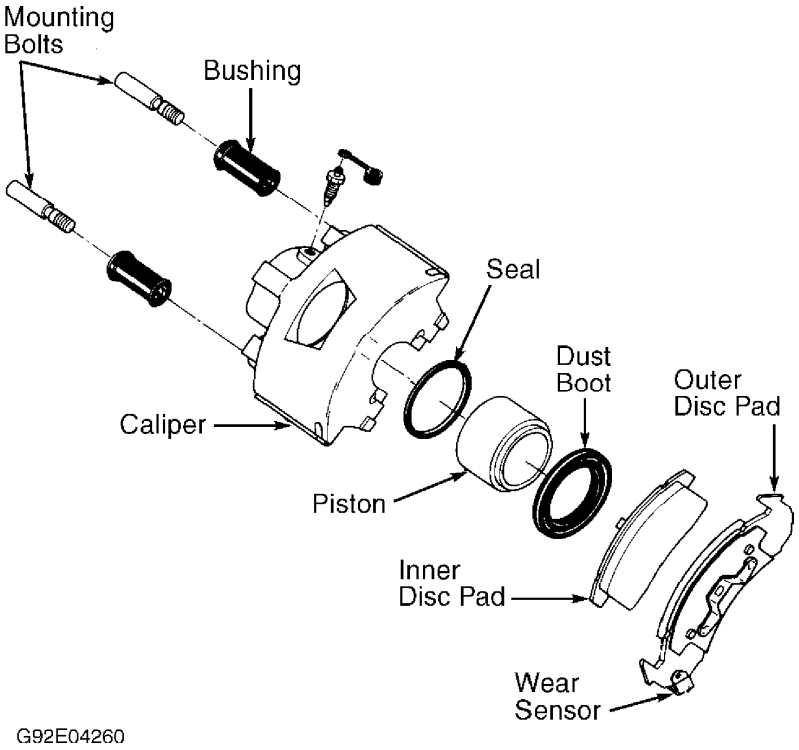


Fig. 3: Exploded View Of Front Brake Caliper
Courtesy of General Motors Corp.

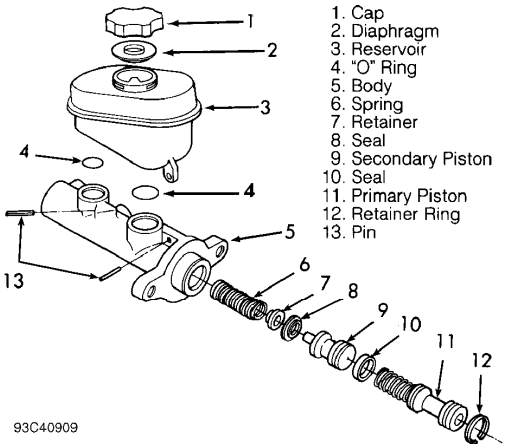


Fig. 4: Exploded View Of Master Cylinder
Courtesy of General Motors Corp.

 

## DISC BRAKE SPECIFICATIONS

DISC BRAKE SPECIFICATIONS

| Application | In. (mm) |
|---|---|
| Disc Diameter | |
| Front | 10.945 (278.00) |
| Rear | 11.535 (292.99) |
| Lateral Runout | |
| Front | .005 (.13) |
| Rear (On Vehicle) | .006 (.15) |
| Rear Axle Flange | .002 (.05) |
| Parallelism | .0005 (.013) |
| Original Thickness | |
| Front | 1.260 (32.00) |
| Rear | 1.020 (25.90) |
| Minimum Refinish Thickness | |
| Front | 1.223 (31.08) |
| Rear | .980 (24.89) |
| Discard Thickness (1) | |
| Front | 1.209 (30.71) |
| Rear | .965 (24.51) |

(1) - Use specification stamped on rotor.

## HYDRAULIC COMPONENT SPECIFICATIONS

HYDRAULIC COMPONENT SPECIFICATIONS

| Application | In. (mm) |
|---|---|
| Master Cylinder Bore | 1.000 (25.40) |
| Front Caliper Bore | 2.500 (63.50) |
| Rear Caliper Bore | 1.595 (40.51) |

## TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

| Application | Ft. Lbs. (N.m) |
|---|---|
| Brakeline/Brake Hose Fitting | |
| At ABS Modulator | 11 (15) |
| At Caliper | 32 (43) |
| At Master Cylinder | 24 (33) |
| Caliper Bolt/Pin | |
| Front | 23 (31) |
| Rear | 23 (31) |
| Caliper Mounting Plate Bolt (Rear) | 74 (100) |

 

| | |
|---|---|
| Pinion Shaft Lock Bolt (1) | 27 (37) |
| Power Brake Booster-To-Firewall Nut | 20 (27) |
| Rear Axle Fill Plug | 26 (35) |
| Rear Axle Housing Cover Bolt | 22 (30) |
| Wheel Lug Nut | 100 (136) |

INCH Lbs. (N.m)

| | |
|---|---|
| Bleeder Screw | 106 (12) |

(1) - Apply Loctite (12345382) to bolt threads.

**END OF ARTICLE**

 