

Brake Systems

1965-73 DELCO-MORAINE FOUR PISTON DISC

Buick Special Skylark & G.S. (1967-68) ①
 Buick Sportwagon (1968) ①
 Camaro (1969) ①
 Corvette (1965-73) ②
 Chevrolet, All (1967-68) ②
 Oldsmobile, Exc. Toronado (1967-68) ①
 Pontiac, All (1967) ①
 Firebird & Tempest (1968) ①

① - "Delco-Moraine Automatic Adjuster" used rear wheels; "Kelsey-Hayes (General Motors) Disc" optional on Toronado.

② - Corvette has disc brakes on all four wheels. Other models use "Delco-Moraine Automatic Adjuster" on rear wheels.

DESCRIPTION

SERVICE BRAKES (FRONT WHEELS)

Disc brake unit consists of a rotating disc and a fixed caliper unit. Disc is mounted on front wheel hub. Caliper straddles the disc and is bolted to a support which is attached to steering knuckle. Caliper contains four pistons, two acting on each shoe, with one shoe on each side of disc. Hydraulic line connects to inboard half of caliper. Outboard half of caliper receives fluid from internal transfer passage in caliper. Some models use a metering valve in the line to the front brakes. It is usually mounted near the master cylinder. The metering valve delays application of the front brakes until the rear wheel brake shoes have had time to expand against the return springs, resulting in a more even braking action between front and rear. Corvette models may also be equipped with heavy duty disc brakes which include optional front calipers, shoes, linings and rear pressure regulator valve.

SERVICE BRAKES (REAR WHEELS)

Some models use a proportioning valve in the line to the rear wheels. This valve limits the pressure to the rear brakes so that the rear wheels will not lock up in a hard stop. Corvette rear wheels have disc brakes which are

similar to front wheel units. Unless noted, servicing procedures for Corvette rear brakes are the same as for front brakes. *NOTE* - On Corvette heavy duty disc brakes, two retaining cotter pins are used at each end of caliper to secure shoes and linings.

PARKING BRAKE (CORVETTE)

Conventional type shoe brake mounted on a backing plate attached to rear wheel spindle support. Cable operated. Shoes expand against a small drum which is behind the disc.

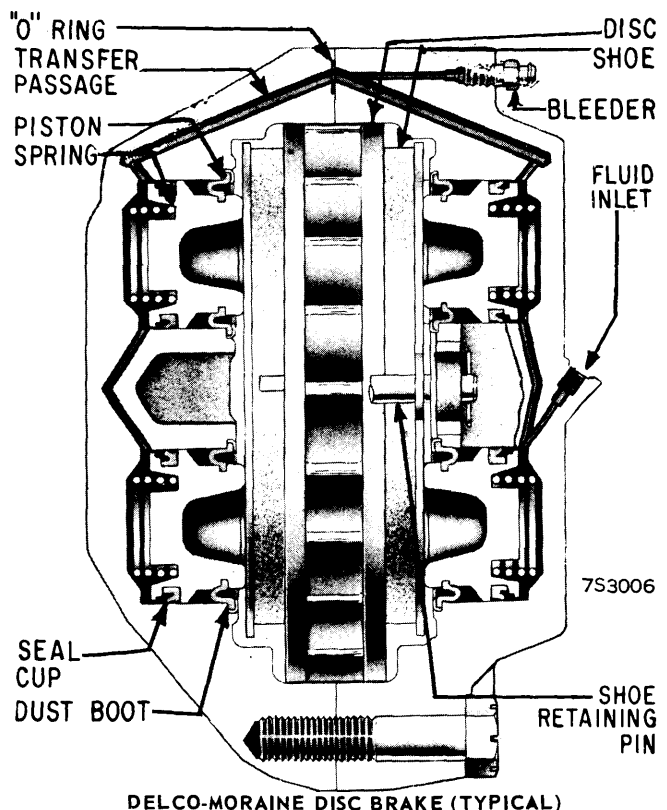
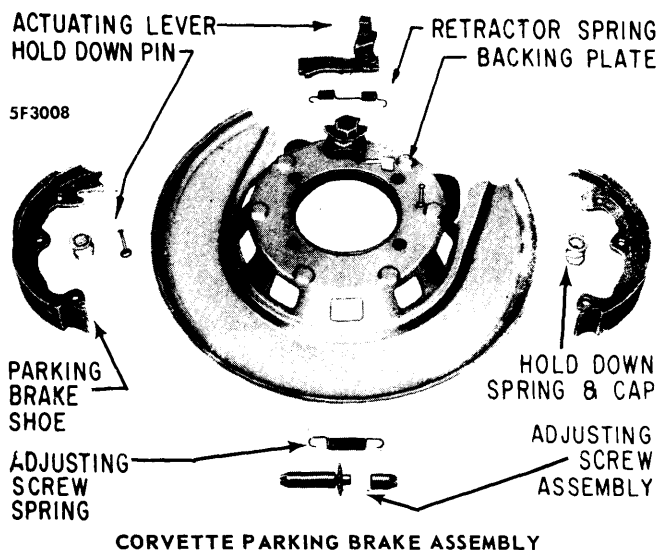
ADJUSTMENT

SERVICE BRAKES

Disc brakes are self-adjusting. Caliper piston seals are designed to retract pistons just enough to allow brake lining to lightly brush disc without any drag.

PARKING BRAKE (CORVETTE)

Shoe Adjustment - Raise vehicle on hoist and remove rear wheels. Loosen brake cables at equalizer until parking brake levers move freely to "Off" position, with slack in cables. Turn disc until adjusting screw can be seen through hole in disc. Insert adjusting tool and tighten screw until disc will not move, then back off ten notches (1965-67), or six to eight notches (1968-73). Install rear wheels.



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Cable Adjustment (1965-72) — Apply parking brake handle (inside vehicle) two notches from fully released position, then tighten parking brake cables at equalizer until a slight drag is felt when rear wheels are turned. Release parking brake and ensure wheels rotate freely without drag.

Cable Adjustment (1973) — With vehicle still on hoist, loosen equalizer rear check nut and forward check nut. Place brake handle in applied position (13 notches). Tighten check nuts until an 80-lb. pull is obtained when lever is moved into 14th notch. Torque check nuts to 70 INCH lbs.

SERVICING

BLEEDING SYSTEM

See *Hydraulic Brake Bleeding in this Section.*

NOTE — Rear wheels have two bleeder screws, and rear wheel must be removed for access. When pressure bleeding equipment is used, set pressure at 10-20 lbs.

SHOE & LINING REPLACEMENT

NOTE — Shoes with bonded linings should be replaced when lining is worn to approximately 1/16" thickness. Shoes with riveted lining should be replaced when lining is worn to within approximately 1/32" of rivets.

Removal — Siphon two-thirds of brake fluid from master cylinder. **NOTE** — Do not empty master cylinder completely or disconnect hydraulic lines, or air will be drawn into system. Raise vehicle and remove wheels. Remove and discard cotter pin from inboard end of shoe retaining pin and slide retaining pin out. Remove shoes by pulling up. **NOTE** — If shoes are to be reused, mark for reassembly in original location.

Installation — Use two screwdrivers, as levers, to push pistons back as new shoes are inserted. When both shoes are replaced, insert retaining pin, and install new cotter pin. Repeat procedure at each wheel where shoes are to be replaced. Refill master cylinder, with new fluid, to proper level. If necessary, bleed system. **CAUTION** — Do not move vehicle until firm pedal is obtained.

ROTOR SERVICING

Lateral Runout — Adjust wheel bearings until all endplay is eliminated. Attach dial gauge, such that pointer is approximately one inch from rotor edge. Set gauge to zero and turn rotor through one complete revolution, noting gauge. See *Rotor Specifications for maximum allowable runout.* Readjust wheel bearings.

Parallelism — Check thickness of rotor at four or more points around circumference. Make all measurements at same distance from edge of rotor. If thickness varies more than specified, refinish or replace rotor, as necessary.

Rotor Specifications ①

Flatness, Exc. 1972-73 Corvette001"
1972-73 Corvette002"
Parallelism, All0005"
Runout, 1967-69, All Exc. Corvette ②004"
1965-69 Corvette Front004"
1965-69 Corvette Rear003"
1970 Corvette002"
1971-73 Corvette005"
Minimum Thickness, 1" Disc965"
1 1/4" Disc	1.215"
Surface, Micro-Inches, 1965-70, All	30-50
1971-73 Corvette	20-60

① — Light scoring, less than .015" in depth, will not be detrimental to brake operation. Turning or refinishing discs to remove light scoring is not necessary.

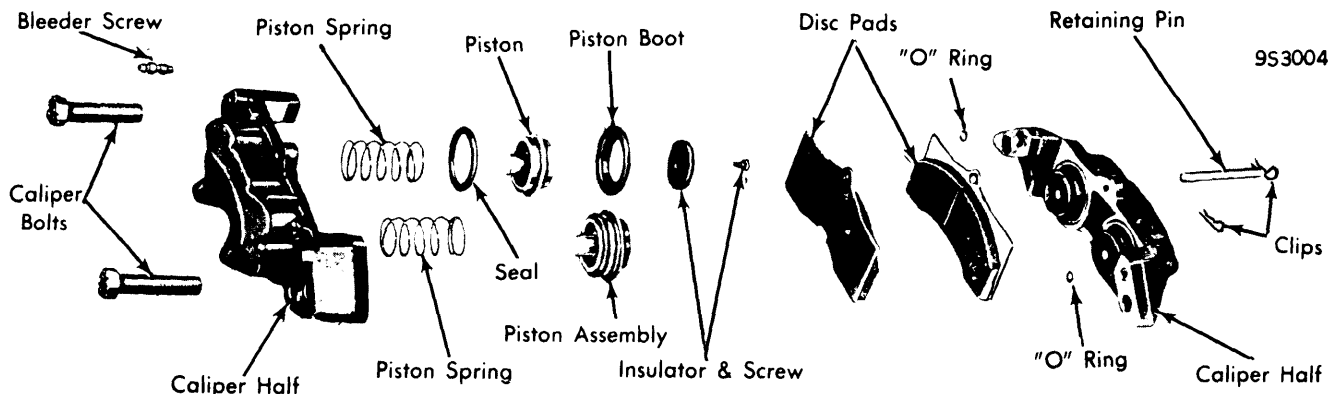
② — If Chevrolet front disc is turned, runout must not exceed .002". Turning disc is not recommended on Chevrolet front wheels.

REMOVAL & INSTALLATION

BRAKE CALIPER

Removal — Raise and support vehicle. Remove wheels. Clean dirt from around brake hose and line connections. On front caliper, disconnect brake hose at support bracket. On rear caliper, disconnect brake tubing from inboard caliper. Plug open hose or line to prevent foreign material from entering system. Remove two hex bolts and lift caliper assembly from mounting bracket.

Installation — Use two screwdrivers to depress pistons while caliper is slipped over disc. Secure caliper assembly with two mounting bolts. Place new copper gasket on front brake hose, and install hose to caliper. Clean rear brake tubing seat, and fasten tube securely to caliper. Ensure front brake hose is not twisted, insert hex of hose fitting into support bracket hole, and secure it with "U" shaped retainer. Turn wheel from side to side and observe that hose does not contact other parts. Readjust hose as necessary. Bleed system. Install wheels and lower vehicle. **CAUTION** — Do not move vehicle until firm pedal is obtained.



CALIPER ASSEMBLY

Brake Systems

1965-73 DELCO-MORAINÉ FOUR PISTON DISC (Cont.)

BRAKE HUB & ROTOR

Removal (Front Rotor) — Raise and support vehicle. Remove wheels. Remove caliper assembly, as previously described. **NOTE** — *It may not be necessary to disconnect hoses.* Set caliper aside or suspend it such that weight is taken from hose. Insert wood block between brake pads as caliper is being removed (to prevent full extension of caliper pistons). Remove hub grease cap, spindle nut, and washer; then, remove hub and rotor assembly. **NOTE** — *Do not separate front hub and rotor, as they are serviced as assembly only.*

Installation — Reverse removal procedure, bleed system, and install wheels.

Removal (Rear Rotor) — Repeat procedure as for front rotor, through caliper removal. **NOTE** — *It may be necessary to disconnect and plug brake tubing.* Drill out rivet heads, and separate disc and hub.

► **ROTOR RIVETING NOTE** — Do not attempt to re-rivet assembly. Installation of lug nuts and studs will hold new disc. When checking runout, after rivets have been removed, it will be necessary to install lug nuts.

Installation — **NOTE** — *Ensure emergency brake adjusting holes of spindle and disc are in alignment.* Reverse removal procedure, bleed system, and install wheels. **CAUTION** — *Do not move vehicle until firm pedal is obtained.*

OVERHAUL

BRAKE CALIPER

Disassembly — Remove brake shoes by pulling cotter pin from end of retaining pin; then, withdraw retaining pin and pull shoes out. Separate caliper halves by removing two large bolts. Extract two small "O" rings from cavities around fluid transfer holes. Push piston to bottom of caliper, insert screwdriver under inner edge of steel ring in boot, and pry boot out of seat. **CAUTION** — *Use care not to puncture seal during piston removal.* Remove pistons, springs, boots, and seals from respective caliper halves.

Cleaning & Inspection — Clean all metal parts in brake fluid. **NOTE** — *Do not use any mineral base solvents.* Blow out all fluid passages in grooves, with compressed air. Discard all rubber parts and replace with new parts from service kit.

Inspect piston bores for scoring or pits. If bore cannot be cleaned with fine crocus cloth, caliper half must be replaced. Check fit of piston in bore, using feeler gauge. Clearance for 2 1/16" or 1 7/8" bore should be .0045-.010" and for 1 3/8" bore, clearance should be .0035-.009". If bore is not damaged and either clearance is exceeded, install new piston.

Assembly — Assemble seal in piston groove closest to flat end of piston. Lip on seal must face toward large end of piston. Seal lips must be in piston groove, not extending over step in end of groove. Place spring in bore. Lubricate seal with clean brake fluid. Install piston assembly in bore, using suitable compressor tool (J-22629 or J-22639). Place boot in piston groove closest to concave end of piston. Position suitable boot seal installer tool (J-22628 or J-22639) over piston and seat steel boot-retaining ring evenly in counterbore, below machined surface of caliper. Install "O" rings in fluid transfer holes. Lubricate, attach, and torque caliper halves together.

COMBINATION VALVE

Valve is non-serviceable and must be replaced, if defective.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Caliper Mounting Bracket-to-Knuckle, 5/8-18	120
1/2-20.....	75
Caliper-to-Mounting Bracket.....	70
Caliper Assembly.....ⓐ	130
Bleeder Screw.....	65 INCH Lbs.
Tube Fitting, Exc. 1973 Corvette.....	100 INCH Lbs.
1973 Corvette.....	115 INCH Lbs.
Disc-to-Hub.....	70
Wheel Lug Nuts	
Chevrolet, All Models.....	75
Buick Special, Skylark, G.S. 400.....	65
Oldsmobile F-85.....	65
88, 98.....	80
Pontiac, except Tempest.....	75
Tempest.....	65

ⓐ - Dip bolt in brake fluid.