

Brakes



BRAKE SYSTEM

1963-64 Corvettes are equipped with four-wheel drum brakes. These are hydraulically operated, self-adjusting, and feature double-piston wheel cylinders. Three brake options were available with the drum system. Power brakes featured a Moraine vacuum assist master cylinder and were the first power brakes ever offered on the Corvette. The second option was the standard drums (honed to a 20 micro-inch finish and equipped with special heat resistant springs) and metallic linings for more fade resistance. The third option was intended for heavy-duty or competition usage. These cerametallic linings were larger and the drums were finned and scooped.

In 1965, the four-wheel disc brake system was introduced. This system includes a fixed caliper, rotating vented disc, and four-piston pad actuation. A heavy-duty, optional disc brake system is available for special purposes (1965-75). A different front caliper, brake pad, and brake line pressure regulator are used. Heavy-duty brake calipers are easily recognized by the two, pad retaining pins instead of the standard brake's single pin.

1984 models use a Girling brake system with aluminum single-piston calipers.

CAUTION: *When servicing wheel brake parts, do not create dust by grinding or sanding brake linings or by cleaning wheel brake parts with a dry brush or with compressed air. (A water dampened cloth should be used.) Many wheel brake parts contain asbestos fibers which can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm.*

Adjustment

DRUM BRAKES

Rotate the star wheel adjuster until a slight drag is felt between the shoes and drum, then back off 1/4 turns on the adjuster. Backing the car and firmly braking will allow the self-adjustment feature to complete the adjustment.

DISC BRAKES

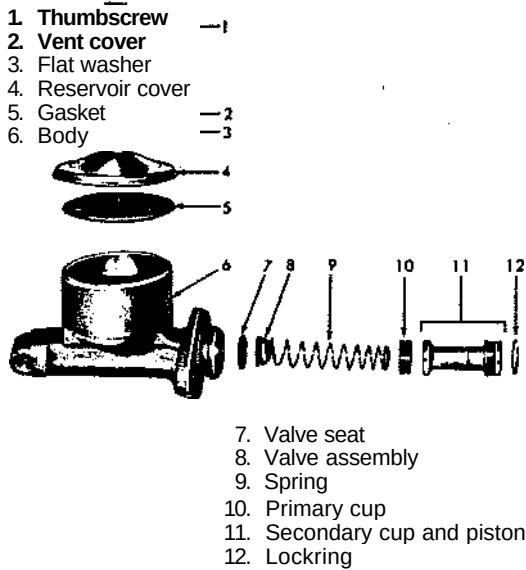
These brakes are inherently self-adjusting and no adjustment is ever necessary or possible.

HYDRAULIC SYSTEM

Master Cylinder—Drum Brakes

REMOVAL AND INSTALLATION

1. Disconnect the hydraulic lines from the cylinder. Plug the lines to keep dirt out of the lines and master cylinder.
2. Remove the clevis pin and clip from the brake pedal arm.
3. Remove the main cylinder-to-firewall nuts and lockwashers, and remove the master cylinder.
4. Install the master cylinder on the firewall studs. Install the lockwashers, and tighten the nuts.
5. Insert the clevis pin through the clevis and the brake pedal and secure with a cotter pin.
6. Install the hydraulic lines to the master cylinder.
7. Refill the cylinder with brake fluid and bleed the lines.
8. Adjust the brake pedal as necessary.



Exploded view of 1963-64 master cylinder

OVERHAUL

NOTE: Overhaul of the main cylinder portion of power brake master cylinders is the same as that for manual master cylinders.

1. Secure the master cylinder in a vise and remove the push rod assembly and the protective boot. This exposes the lock ring which, when removed, allows extraction of the piston stop, secondary cup, and piston.

2. Remove the cylinder end plug and push out the primary cup, spring, valve assembly, and seat.

3. Wash the component parts with clean alcohol only, and be sure that all traces of gasoline or kerosene are removed. Gasoline will cause premature deterioration of the cylinder's rubber parts.

4. Carefully inspect the washed metal parts and the cylinder bore. A corroded cylinder must be replaced. Discoloration or stains should be removed with crocus cloth. When doing so, wrap the cloth around a finger and rotate the cylinder around the supported cloth. Do not polish the bore lengthwise as this can cause a fluid leak.

5. Check the piston-to-cylinder clearance with a feeler gauge. Clearance should be between 0.001 in. and 0.005 in.

6. To reassemble, moisten the cylinder bore with clean brake fluid and replace the valve seat, valve assembly, and spring.

NOTE: Be sure that the valve and seat are properly installed before proceeding. An incorrectly assembled check valve will dis-

tort and fail to provide a check valve seal, which will result in a reduction of brake pedal travel and a corresponding loss of actual braking.

7. Moisten the primary cup with clean brake fluid and install it, flat side out, and seated over the spring. The primary cup is distinguished by a brass support ring at its base.

8. Dip the secondary cup in clean brake fluid and slip it over the end of the piston.

9. Insert the completed assembly, with the bleeder brake end of the piston installed first. Secure the parts with the piston stop and the snap-ring, and install the end plug.

10. Attach the rubber boot and push rod, and replace the cylinder on the firewall.

11. Attach the brake pedal clevis and adjust the push rod-to-piston clearance. Correct adjustment calls for a barely perceptible free pedal before piston/push rod contact.

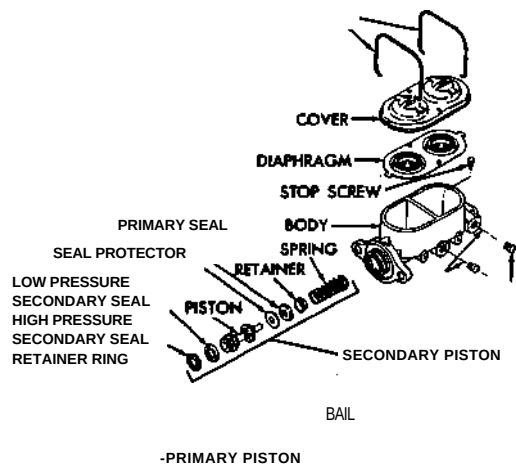
Master Cylinder—Disc Brakes

1967-82

The early disc brake master cylinder is serviced in the same manner as the drum brake master cylinder. The later master cylinder is the dual reservoir type. This offers a separate brake circuit for the front and rear wheel pairs and prevents total loss of braking should one circuit fail.

This master cylinder is actually two complete master cylinders contained in a single housing, with the front reservoir controlling the front brake pairs and the rear reservoir, the rear brake line just below the master cylinder.

Be absolutely certain that replacement parts are identified as identical to those being



Exploded view of 1967-82 master cylinder

replaced when overhauling the dual master cylinder. The displacement capability of the master cylinder is dependent upon the length of the secondary piston.

Overhaul

1. Remove the unit from the vehicle using the same general procedure as described for conventional master cylinders.

2. Remove the mounting gasket and boot, and the main cover; purge the unit of its fluid.

3. Secure the cylinder in a vise and remove the push rod retainer and the secondary piston stop bolt found inside the forward reservoir.

4. Compress the retaining ring and extract it along with the primary piston assembly.

5. Blow compressed air into the piston stop screw hole to force the secondary piston, spring, and its retainer from the bore of the cylinder. An alternate method uses a piece of wire, hooked on one end, to snag and extract the secondary piston.

6. Check the brass tube-fitting inserts and if they are damaged, remove them. Leave undamaged inserts in place.

7. If replacement is necessary, thread a 6-32 x 1/2 in. self-tapping screw into the insert. Hook the head of the screw with a claw hammer and pry the insert free.

8. An alternate way to remove the inserts is to first drill the outlet holes to 13/64 in. and thread them with a 1/4 in.-20 tap. Position a thick washer over the hole to serve as a spacer then thread a 1/2 in.-20 x 1/2 in. hex head bolt into the insert and tighten the bolt until the insert is freed.

9. Use denatured alcohol and compressed air to clean the component parts. Slight rust may be removed with fine crocus cloth.

10. Replace the brass tube inserts at this time by positioning them in their holes and threading a brake line tube nut into the outlet hole. Turn down the nut until the insert is seated.

11. Check the piston assemblies for correct identification and when satisfied, position the replacement secondary seals in the twin grooves of the secondary piston.

12. The outside seal is correctly placed when its lips face the piston's flat end. The lips of the inner seal face the piston compensating holes.

13. Slip the primary seal and its protector over the secondary seals. The flat side of the

seal should face the piston's compensating hole flange.

14. Replace the primary piston assembly with the assembled component found in the overhaul kit.

15. Moisten the cylinder bore and the secondary piston's inner and outer seals with new brake fluid. Assemble the secondary piston spring to its retainer and position them over the end of the piston with the retainer inside the lips of the primary seal.

16. Insert the combined spring and piston assembly into the cylinder and use a small wooden dowel or pencil to seat the spring against the end of the bore.

17. Moisten the primary piston seals with new brake fluid and push it, push rod receptacle end out, into the cylinder.

18. Keep the piston pushed in and snap the retaining ring into place.

19. Relax the pressure on the pistons and allow them to seek their static positions.

20. Replace the secondary piston stop screw and torque it to 25-40 in. lbs.

21. Replace the reservoir diaphragm and cover.

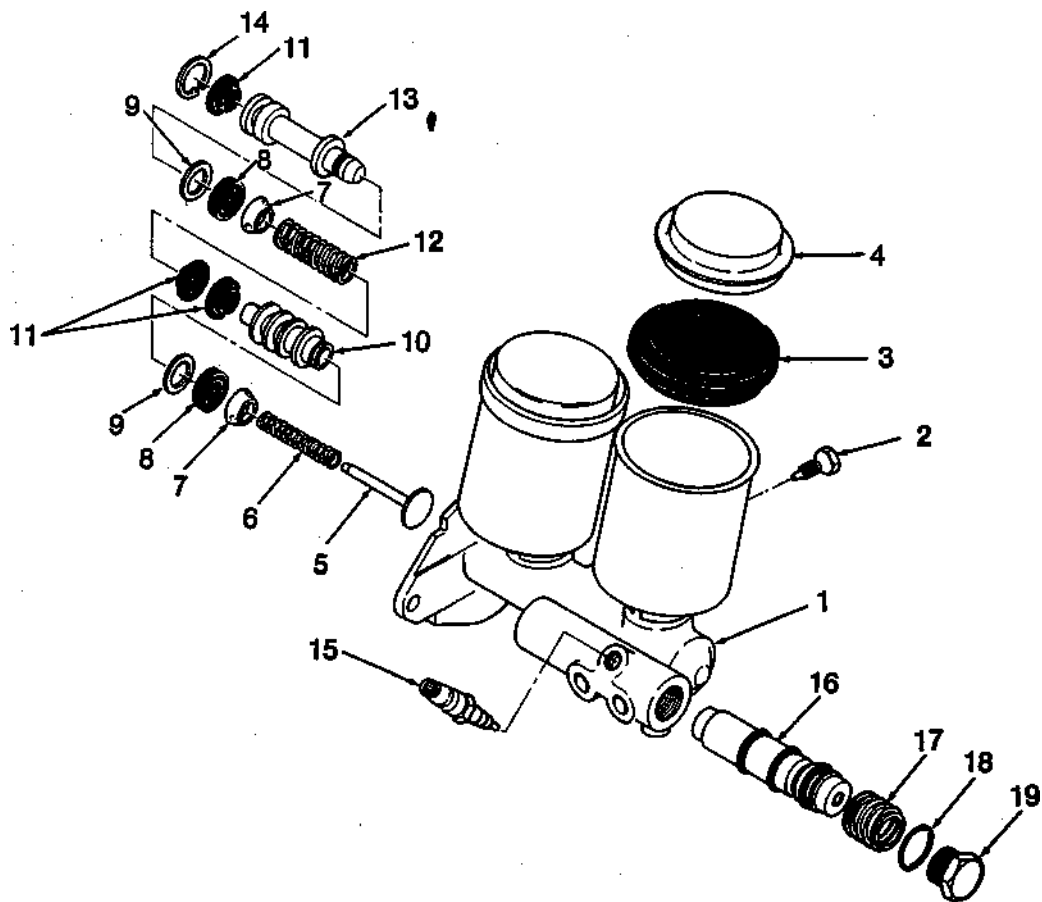
7984 AND LATER

This master cylinder assembly is an aluminum and plastic composite with an integral proportioning valve/warning switch, individual reservoirs and a conventional front-to-rear split. Two outlets are provided for the front brakes, fed from the front reservoir and secondary piston; with one outlet for the rear brakes, fed by the rear reservoir and primary piston. The master cylinder is removed by disconnecting the brake lines and removing the mounting nuts attaching the assembly to the power booster. Cap all brake lines during service procedures to prevent contamination of the hydraulic system with dirt, grease or water.

NOTE: Use only D.O.T. 3 or Delco Supreme #11 brake fluid in this brake system. Do not use silicone brake fluid such as Delco Supreme #24. Any type of silicone brake fluid may cause seal damage. Do not use lubricated compressed air to blow off brake parts, as damage to rubber components could occur.

Overhaul

1. Remove master cylinder reservoir caps, separate the cap and diaphragm, then discard the diaphragms. Inspect the caps for cracks



- | | |
|----------------------------------|------------------------|
| 1. Body and reservoir assemblies | 11. Secondary seal |
| 2. Stop bolt | 12. Primary spring |
| 3. Diaphragm | 13. Primary piston |
| 4. Cap | 14. Retaining ring |
| 5. Spring locator | 15. Warning switch |
| 6. Secondary spring | 16. Combination piston |
| 7. Seal retainer | 17. Spring |
| 8. Primary seal | 18. O-ring |
| 9. Seal washer | 19. Plug |
| 10. Secondary piston | |

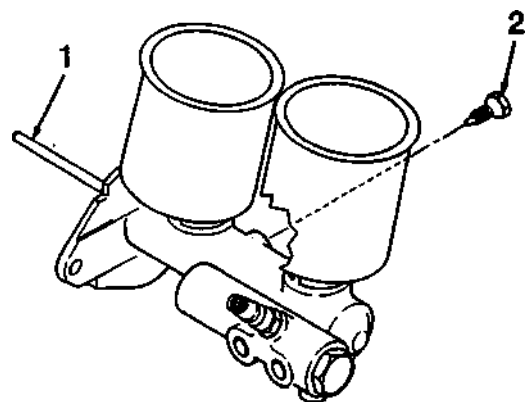
Exploded view of brake master cylinder—1984 and later

or damage and replace, if necessary. Drain and discard any remaining brake fluid.

2. Secure the master cylinder in a suitable holding fixture, like a piece of steel plate with holes drilled to accommodate the mounting bolts and piston bore clamped in a vise. Clamping the aluminum master cylinder in a vise is not recommended and may cause cracks or damage. -

3. Fully depress the master cylinder pistons with a suitable brass rod or wooden dowel and remove the stop bolt. Remove the retaining snap ring with suitable pliers.

NOTE: *Never remove the stop bolt unless both pistons are fully bottomed in the bore.*



Bottom the piston in the bore with a brass or wood rod (1) before removing or installing stop bolt (2)

4. Remove the brass rod or dowel and primary piston.

5. Lightly tap the open end of the master cylinder body on a block of wood to dislodge the secondary piston.

6. Remove the primary piston spring.

7. Remove the seal retainer with a small screwdriver and discard the retainer.

8. Remove and discard the primary seal and washer. Remove and discard the secondary seal.

9. Remove the spring locator and spring from the secondary piston.

10. Remove and discard the seal retainer with a small screwdriver.

11. Remove and discard the primary seal, washer and secondary seal.

12. Remove the switch, being careful to retain the plastic body, spring and probe as an assembly.

13. Remove the end plug, then discard the O-ring. O-rings should be replaced whenever the master cylinder is overhauled.

14. Gently tap the master cylinder body on a block of wood to dislodge the combination piston with ground spring attached. The combination piston should be discarded and replaced as a complete assembly.

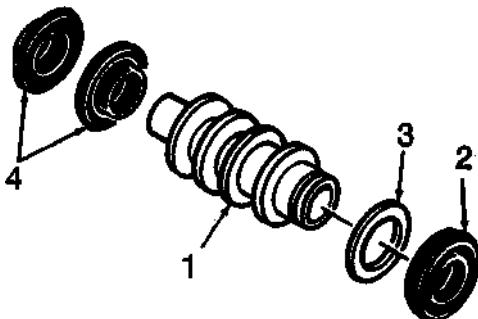
15. Wash all parts to be reused in clean, denatured alcohol. Use only dry, filtered compressed air to blow out passages in the master cylinder body.

NOTE: Do not wash the replacement combination piston in any cleaning solution. New parts are coated with special grease.

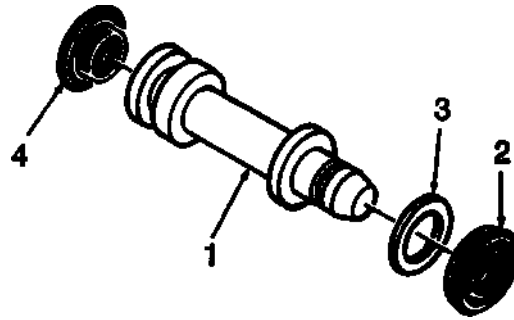
16. Lubricate the secondary piston and seals with clean brake fluid and assemble the seals to the piston.

17. Lubricate and install the primary seal washer and seal.

18. Install the seal retainer while making sure it seats properly in the groove in the secondary piston.



Secondary piston (1) showing location of primary seal (2), washer (3) and secondary seal (4)



Primary piston (1) showing location of primary seal (2), washer (3) and secondary seal (4)

19. Install the secondary spring and spring locator in the secondary piston.

20. Lubricate the master cylinder bore with clean brake fluid and install the secondary piston spring assembly.

21. Lubricate the primary piston and piston seals with clean brake fluid and install the secondary seals.

22. Install the primary seal washer and seal. Install the seal retainer, making sure it is properly seated in the primary piston groove.

23. Install the primary piston spring, then install the primary piston spring assembly into the master cylinder bore.

24. Using a brass rod or wooden dowel, push on the primary piston until the primary and secondary pistons bottom in the bore. Once the pistons bottom, install the stop bolt and torque to 7-9 ft. lbs. (9-12 N-m).

CAUTION: Do not install the stop bolt unless the pistons are fully bottomed in the master cylinder bore.

25. Install a new snap ring retainer in the master cylinder bore, making sure it is seated properly into the groove. Remove the brass rod or dowel.

26. Install the fine wire spring over the capped end of the new combination piston.

27. Lubricate both the bore and the combination piston with clean brake fluid and insert the piston open end first. Make sure the piston is fully bottomed in the bore.

28. Lubricate a new O-ring with clean brake fluid and install it over the threaded end of the plug. Install the end plug and torque to 75-90 ft. lbs. (100-120 N-m).

29. Install new diaphragms on the reservoir caps and fill with the recommended brake fluid. Torque mounting bolts to 15 ft. lbs. (21 N-m). Bleed the brake system and check for leaks after installation.

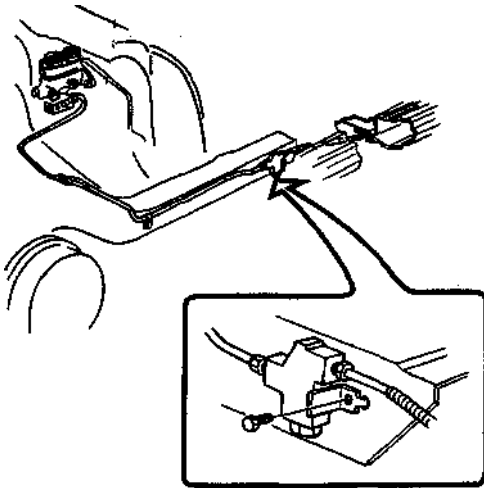
CAUTION: The use of silicone brake fluid such as Delco Supreme #24 can damage

the seals and rubber components in the brake system. Use brake fluid that meets or exceeds DOT 3 specifications, such as Delco Supreme #11 or equivalent.

Pressure Regulating Valve (Rear Metering)

7965-68 WITH H.D. BRAKES

The pressure regulating valve is mounted in the rear brake line just below the main cylinder. The valve controls the hydraulic pressure to the front or rear brakes, as applicable, resulting in the correct pressure balance between the front and rear hydraulic systems. The valve guards against premature lock-up of the front or rear wheels when the brakes are applied.



Pressure regulating valve—Typical

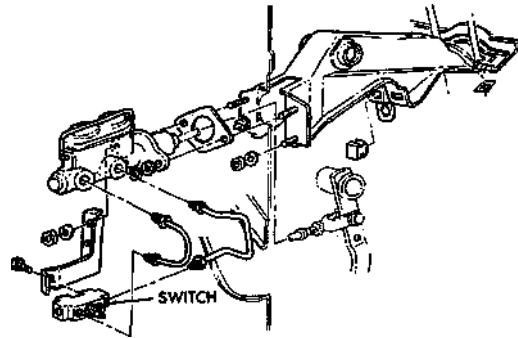
REMOVAL AND INSTALLATION

1. Place some dry rags under the valve to absorb any fluid spilled during removal.
2. Disconnect the hydraulic brake lines and protect the openings from dirt.
3. Remove the mounting screw and remove the valve.
4. To install position the valve and install the mounting screw.
5. Connect the hydraulic lines and bleed the brake system.

Brake Pressure Indicator and Distribution Switch

1967-77

This switch is connected to the hydraulic lines from the master cylinder and is a pressure differential type, designed to light the



Brake pressure indicator and distribution switch—typical

brake warning lamp on the instrument panel if either the front or rear hydraulic system fails. The brake warning light will come on only when the brakes are applied. It will not remain on when the brakes are released. This switch is a non-adjustable and non-serviceable component and must be replaced if found defective.

REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the electrical lead from the switch assembly.
3. Place dry rags below the switch to absorb any spilled fluid.
4. Clean any dirt from the switch and hydraulic lines and disconnect the hydraulic lines at the switch. Cover the open line ends to protect the system from dirt.
5. Remove the mounting screw and remove the switch.
6. To install reverse the above and bleed the brake system.

TESTING AND CENTERING THE SWITCH

Whenever work on the brake system is done, it is possible that the brake warning light will come on and refuse to go off when the work is finished. In this event, the switch must be centered.

1. Raise and support the vehicle.
2. Attach a bleeder hose to the rear brake bleed screw and immerse the other end of the hose in a jar of clean brake fluid.
3. Be sure that the master cylinder is full.
4. Turn the ignition key ON. Open the bleed screw while an assistant applies heavy pressure on the brake pedal. The warning lamp should light. Close the bleed screw before the helper releases the pedal.

To reset the switch, apply heavy pressure

to the pedal. This will apply hydraulic pressure to the switch which will recenter it.

5. Repeat Step 4 for the front bleed screw.

6. Turn the ignition OFF and lower the vehicle.

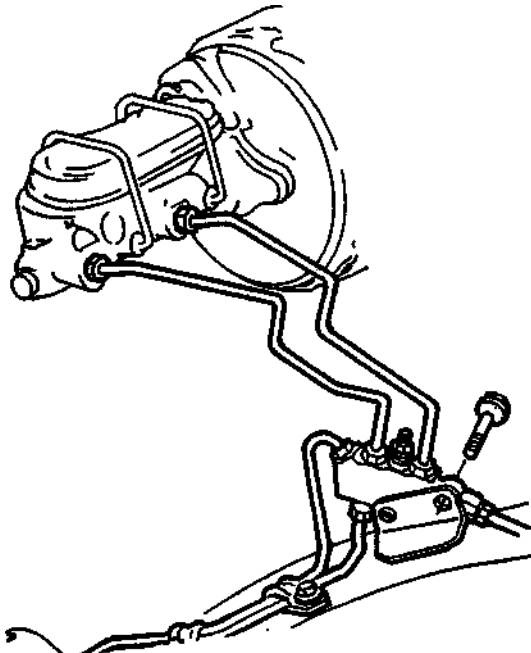
NOTE: If the warning lamp does not light during Step 4, the switch is defective and must be replaced.

Combination Valve

1978-82

The combination valve is mounted on the frame and is connected to the hydraulic lines from the master cylinder. The proportioning section of the combination valve proportions outlet pressure to the rear brakes after a predetermined rear input pressure has been reached. This is done to prevent rear wheel lock-up. The valve is designed to have a bypass feature which assures full system pressure to the rear brakes if the front brake system fails and full system pressure to the front brakes if the rear brake system fails.

The warning switch is designed to constantly compare front and rear brake pressure from the master cylinder and turn on the light on the dash in case of front or rear system failure. The warning light switch portion of the combination valve is not serviceable. If the switch is found defective the combination valve must be replaced.



Combination valve mounted below master cylinder

REMOVAL AND INSTALLATION

1. Disconnect the hydraulic lines at the combination valve. Plug the lines to prevent loss of fluid and to protect the system from dirt.

2. Disconnect the valve switch wire terminal and remove the combination valve.

3. To install reverse the above and bleed the brake system.

TESTING

1. Raise the vehicle on a hoist.

2. Attach a bleeder hose to a rear brake bleed screw and immerse the other end of the hose in a container partially filled with clean brake fluid. Make sure the master cylinder reservoirs are filled.

3. Turn the ignition switch to "On" and open the bleeder screw while a helper applies moderate pressure to the brake pedal. The warning lamp should light. Before the helper releases the brake pedal close the bleeder screw. Press down on the brake pedal and the light should go out.

4. Attach the bleeder hose to the front brake bleeder and repeat Step 3. Turn the ignition switch off.

5. If the warning lamp does not light during Steps 3 and 4 but does light when a jumper is connected to ground, the warning light switch portion of the combination valve is defective and the combination valve must be replaced.

Brake Bleeding

The hydraulic brake system must be bled any time one of the lines is disconnected or air enters the system. This may be done manually or by the pressure method. Correct bleeding sequence is: left rear wheel cylinder, right rear, right front, left front.

The manufacturer recommends that the entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in the hydraulic system. Flushing is also recommended if there is any doubt as to the grade of fluid in the system. If fluid has been used which contains the slightest trace of mineral oil, all rubber parts that have been subjected to the contaminated fluid should be replaced. When bleeding the rear brake system, the front of the car should be raised higher than the rear. This will position the bleeder valve near the 12 o'clock position and prevent air from being trapped in the caliper.

Pressure Bleeding

1. Clean the top of the master cylinder, remove the cover, and attach the pressure bleeding adapter.

2. Check the pressure bleeder reservoir for correct pressure and fluid level, then open the release valve.

3. Fasten a bleeder hose to the wheel cylinder bleeder nipple and submerge the free end of the hose in a transparent receptacle. The receptacle should contain enough brake fluid to cover the open end of the hose.

4. Open the wheel cylinder bleeder nipple and allow the fluid to flow until all bubbles disappear and an uncontaminated flow exists.

5. Close the nipple, remove the bleeder hose and repeat the procedure on the other wheel cylinders according to the bleeding sequence.

Manual Bleeding

An alternative to the pressure method of bleeding requires two people to perform: one to depress the brake pedal and the other to open the bleeder nipples.

1. Observe the cleaning operation of the pressure method, then remove the cover and fill the reservoir.

2. Attach a bleeder hose and clear container as before.

3. Have the assistant depress the brake pedal to the floor, and then pause until fluid flow ceases and the bleeder nipple is closed.

4. Allow the pedal to return and repeat the procedure until a steady, bubble-free flow is seen.

5. Secure the nipple and move to the other wheels in the correct sequence.

6. Periodically check the master cylinder for an adequate supply of fluid. If the reservoir runs dry, air will enter the system and bleeding will have to be done again.

DRUM BRAKES (FRONT OR REAR)**Brake Drums****REMOVAL AND INSTALLATION**

1. Jack the car so wheels are off the ground.
2. Remove the wheel or wheels where brake drums are to be removed.
3. Pull the brake drum off—it may be nec-

essary to gently tap the rear edges of the drum to start it off the studs.

4. If extreme resistance to removal is encountered, it will be necessary to retract the adjusting screw. Knock out the access hole in the brake drum and turn the adjuster to retract the linings.

5. Install brake drums after adjusting the linings.

6. Install the drums in the same position on the hub or axle shaft as removed.

INSPECTION

When a drum is removed, it should be inspected for cracks, scores, or other imperfections. These must be corrected before the drum is replaced.

CAUTION: *If the drum is found to be cracked, replace it. Do not attempt to service a cracked drum.*

Minor drum score marks can be removed with fine emery cloth. Heavy score marks must be removed by "turning the drum." This is removing the metal from the entire inner surface of the drum in order to level the surface. Automotive machine shops and some large parts stores are equipped to perform this operation.

If the drum is not scored, it should be polished with fine emery cloth before replacement. If the drum is resurfaced, it should not be enlarged past 0.060 in. of the original diameter.

It is advisable, while the drums are off, to check them for out-of-round. An inside micrometer is necessary for an exact measurement, therefore unless this tool is available, the drums should be taken to a machine shop to be checked. Any drum which is more than 0.006 in. out-of-round will result in an inaccurate brake adjustment and other problems, and should be refinished or replaced. **NOTE:**

If the micrometer is available, make all measurements at right angles to each other and at the open and closed edges of the drum machined surface. Check the drum with a micrometer in the following manner:

1. Position the drum on a level surface.
2. Insert the micrometer with its adapter bars if necessary.
3. Obtain a reading on the micrometer at the point of maximum contact. Record this.
4. Rotate the micrometer 45° and take a similar reading. The two readings must not vary more than 0.006 in.

Brake Shoes

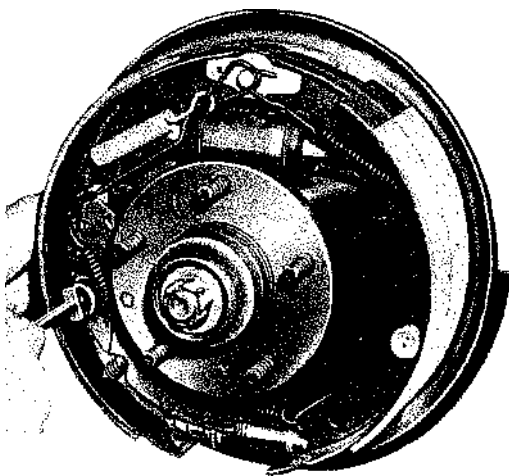
INSPECTION

Remove the drum and inspect the lining thickness on both brake shoes. A front brake lining should be replaced if it is less than $\frac{1}{8}$ in. thick at the lowest point on the brake shoe. The limit for rear brake linings is $\frac{1}{16}$ in.

NOTE: Brake shoes should always be replaced in axle sets.

REMOVAL AND INSTALLATION

1. Support the car on jackstands, slacken the parking brake cable and remove the rear wheels, rear brake drums, and front drums and hub assemblies.
2. Free the brake shoe return springs, actuator pull-back spring, hold-down pins and springs, and actuator assembly.
3. On rear wheels, disconnect the adjusting mechanism and spring, and remove the primary shoe.
4. Disconnect the parking brake lever from the secondary shoe and remove the shoe. Front wheel shoes may be removed simultaneously.
5. Clean and inspect all parts. Scored or out-of-round drums should be reconditioned or replaced.
6. Check wheel bearings, oil seals, wheel cylinders, and rear axle seals; repacking or replacing as needed.
7. Inspect the replacement shoes for nicks or burrs, lubricate the backing plate contact points, brake cable and levers, and adjusting screws, then reassemble.
8. Be sure that the left and right-hand adjusting screws are not mixed. The star wheel



Freeing hold-down pins and springs

should be nearest the secondary shoe when properly installed.

9. Reverse the procedure for reassembly. When completed, make an initial adjustment as described under adjustments.

Metallic brakes

Maintenance procedures for the metallic lining-only option are the same as those for standard brakes. Do not substitute these linings in standard drums, unless they have been honed to a 20 micro-inch finish and equipped with the special heat resistant springs.

The oversize metallic lining and finned drum option requires attention to the following maintenance deviations: The adjusting screw uses a solid film lubricant, and should not be cleaned with solvent or lubricated. The final brake adjustment also differs for this option in that the self-adjustment feature actuates when firm pedal application is made when the car is moving forward. Maintenance procedures require these linings to be broken in. Make an initial adjustment then use moderate pedal pressure to make six to eight stops from approximately 30 mph. Follow this with six to eight stops from approximately 60 mph; making each stop at a one-mile interval.

Wheel Cylinder

REMOVAL AND INSTALLATION

1. Jack and support the axle.
2. Remove the wheel and drum.
3. Disconnect the wheel cylinder pipe or hose from the fitting at the flange plate.
4. Disconnect the brake shoe retracting spring from the brake shoes.
5. On rear wheels remove the two cap screws which hold the rear wheel cylinder to the flange plate and remove the wheel cylinder.
6. On front wheels remove the anchor pin which holds the front wheel cylinder to the flange plate and remove the wheel cylinder.

OVERHAUL

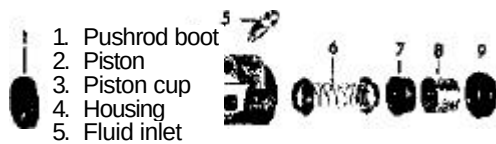
Wheel cylinder overhaul procedures are similar to those for the master cylinder. Overhaul kits containing the necessary replacements are readily available. When rebuilding and installing the wheel cylinders, avoid introducing contaminants into the system. Piston-to-cylinder clearance should be 0.003 in. to 0.006 in. and is checked in the same

manner as for the master cylinder. Cleaning and honing procedures are the same.

To reassemble, moisten the pistons and cups with clean brake fluid and position the spring in the center of the cylinder. Install the rubber cups—flat side Out—followed by the pistons—flat side in. Complete the assembly with the push rods and protective boots. The front wheel cylinder housings are secured to the backing plate by a threaded anchor pin. Torque the pin to 65 ft. lbs.

Wheel Bearings

Wheel bearing removal and installation and adjustment procedures are covered in Chapter 8.



pring
7. Piston cup
8. Piston
9. Pushrod boot

Exploded view of wheel cylinder

Parking Brake

ADJUSTMENT

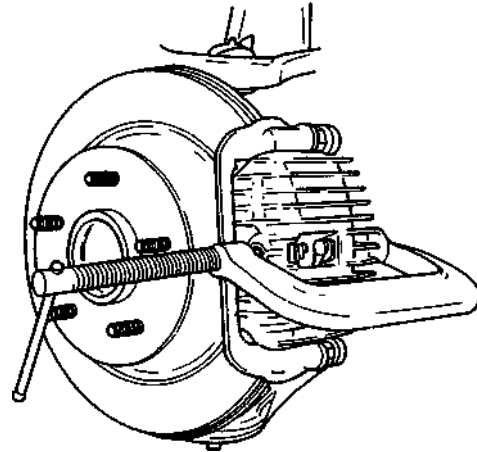
The rear brakes do double duty as both wheel brakes and parking brakes. Such an arrangement makes proper adjustment of the parking brakes dependent upon proper adjustment of the wheel brakes. With the wheel brakes correctly adjusted, remove the idler return spring and loosen the locknut on the convex side of the rear brake cable equalizer. Next, tighten the adjustment nut against the concave side of the equalizer until a 16 lb strand tension is achieved in the forward brake cable. Tighten the locknut and attach the idler return spring.

DISC BRAKES FRONT OR REAR

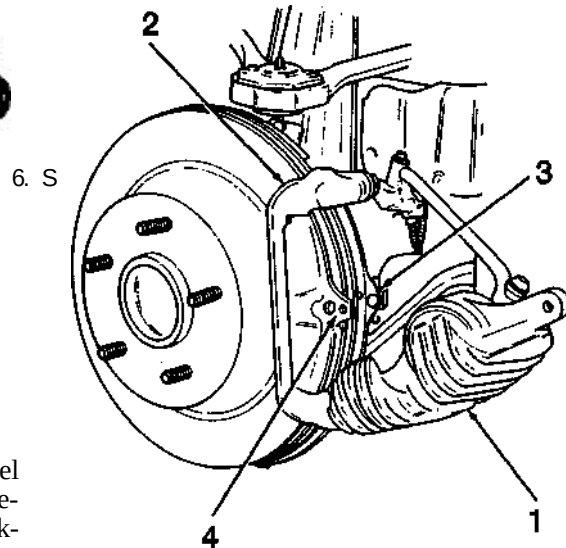
Brake Pads

INSPECTION

Brake pads should be replaced when the lining is worn to the approximate thickness of the metal part of the shoe.



Using C-clamp to retract the caliper piston for pad removal



Pivot the caliper (1) on the mounting bracket (2) to expose the inboard (3) and outboard (4) brake pads

REPLACEMENT

1. Drain 1/2 of the brake fluid from the master cylinder.

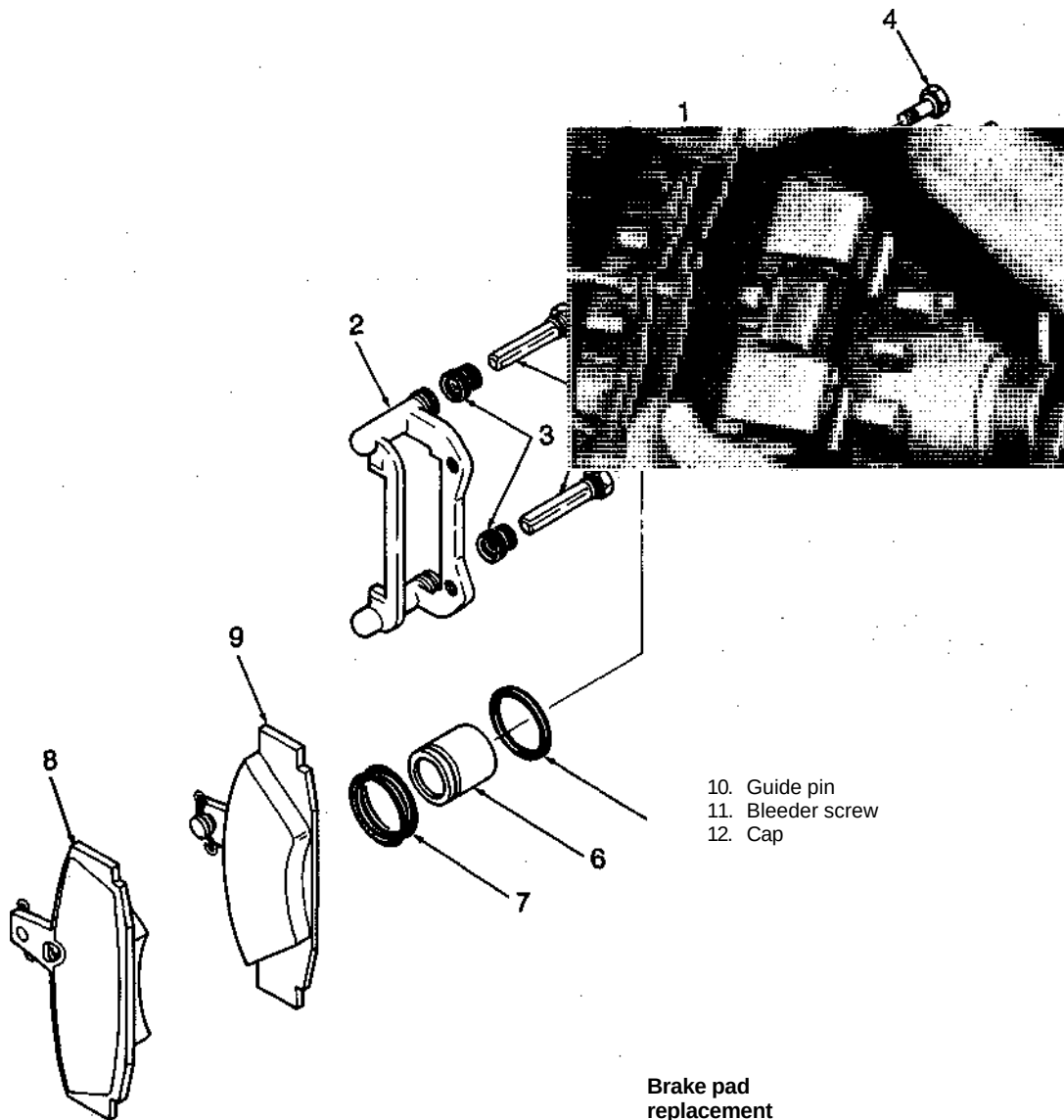
NOTE: The insertion of the thicker replacement brakes will push the caliper pistons back into their bores and the resulting hydraulic action will cause a full master cylinder to overflow.

2. Raise and support the car and remove the wheels. On 1984 and later models, use a C-clamp to bottom the caliper piston in its bore.

3. Extract and discard the cotter pin found on the inside end of the brake pad retaining pin(s) (two retaining pins on heavy duty

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Exploded view of Girlock caliper assembly on 1984 and later models



brakes). On 1984 and later models, remove and discard the upper self-locking bolt, then rotate the caliper back to expose the pads. The lining wear sensor is on the outboard pad.

4. Withdraw the retaining pin(s) and remove the pads.

5. Force the caliper pistons into their bores and insert the replacement pads.

6. Replace the retaining pins and secure them with new $\frac{3}{4}$ in. x $\frac{1}{2}$ in. plated cotter pins. On 1984 and later models, install new self-locking bolt and torque to 22-25 ft. lbs. (30-34 N-m). Bleed the system, if necessary.

Calipers

REMOVAL AND OVERHAUL

1. With the vehicle securely raised and its wheels removed, disconnect the front caliper's brake hose at its support bracket and die rear unit's line from the inside caliper.
2. Tape the open end of each line to prevent dirt from entering.
3. Pull the cotter pins, retaining pins, and brake pads, and unbolt the caliper from its mounting bracket.
4. Remove the two large bolts and split the caliper case.
5. Remove the fluid transfer hole's O-rings.
6. The pistons are retained by ring-like boots. To remove them, fully depress the pistons and, with a screwdriver, lever the boots from their seats. Remove the pistons, springs, and seals, using air pressure if necessary.
7. Clean all parts with non-mineral based solvent and compressed air, and replace the rubber parts with those in the brake service kit.
8. Inspect the piston bores for damage or corrosion. Polish corroded bores with crocus

cloth and, if this is not enough, replace the caliper. Replace all self-locking bolts.

9. Maintain the proper tolerances by referring to the following chart.

Caliper Piston-to-Bore Clearance

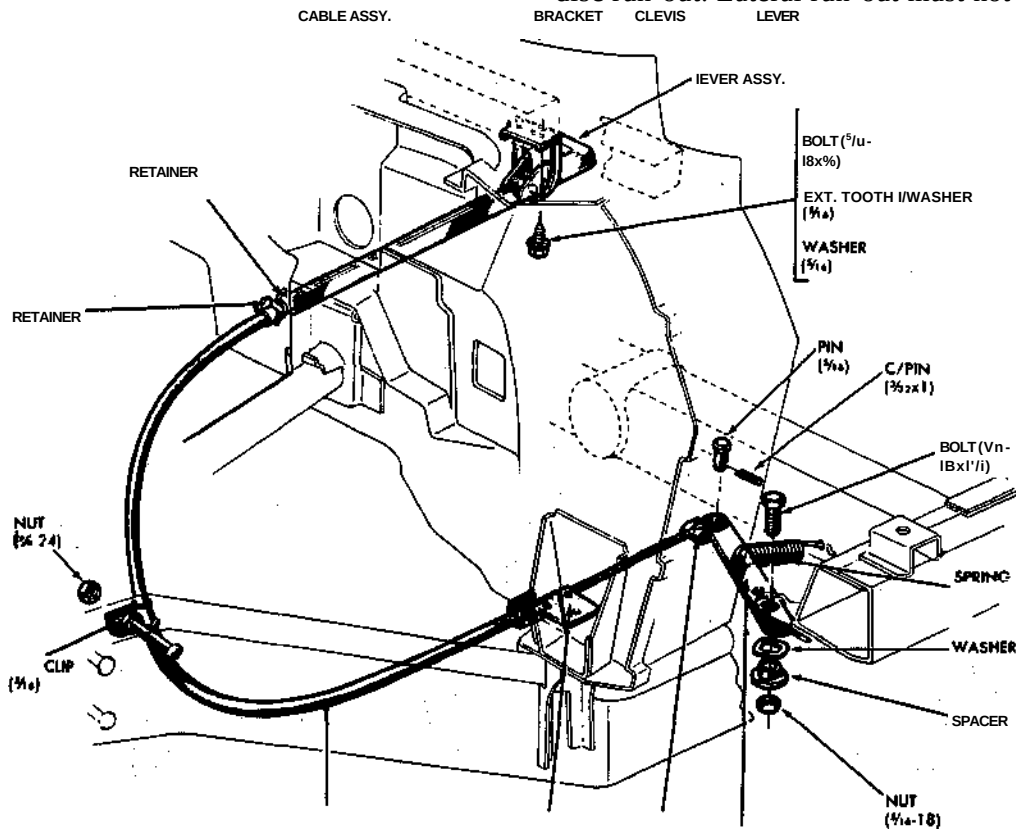
1— $\frac{3}{8}$ in. bore	1— $\frac{1}{2}$ in. bore	0.0035-0.009
		0.0045-0.010

10. Reverse the disassembly procedure to reassemble. Lubricate parts with brake fluid. NOTE: Remember, when positioning the piston seal on the piston, that it goes in the groove nearest the pistons flat end with the lap facing the largest end. If placement is correct, the seal lips will be in the groove and not extend over the groove's step. Bleed the brake system after installation.

Disc

REMOVAL AND MAINTENANCE

Braking performance is greatly affected by the disc run-out. Lateral run-out must not ex-



1963-64 parking brake assembly

ceed 0.005 in. total. Discs should not be re-finished to a thickness of less than 1.215 in. (⁴⁷/64 in. on 1982 and later)

Should it become necessary to replace the disc, the rivets that attach the disc to its hub

must be drilled out. The replacement disc does not have to be riveted to the hub as the lug nuts adequately secure both.

Wheel Bearings

Wheel bearing removal and installation and adjustment procedures are covered in Chapter 8.

PARKING BRAKE

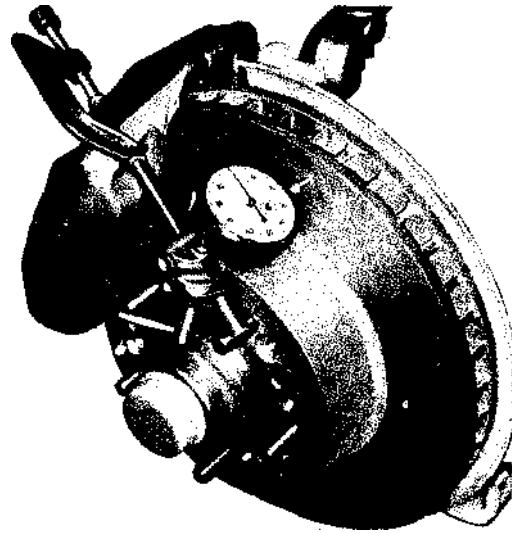
ADJUSTMENT

The parking brake is a conventional drum brake located in the rear wheel disc. Adjustments are similar to those for a regular drum brake.

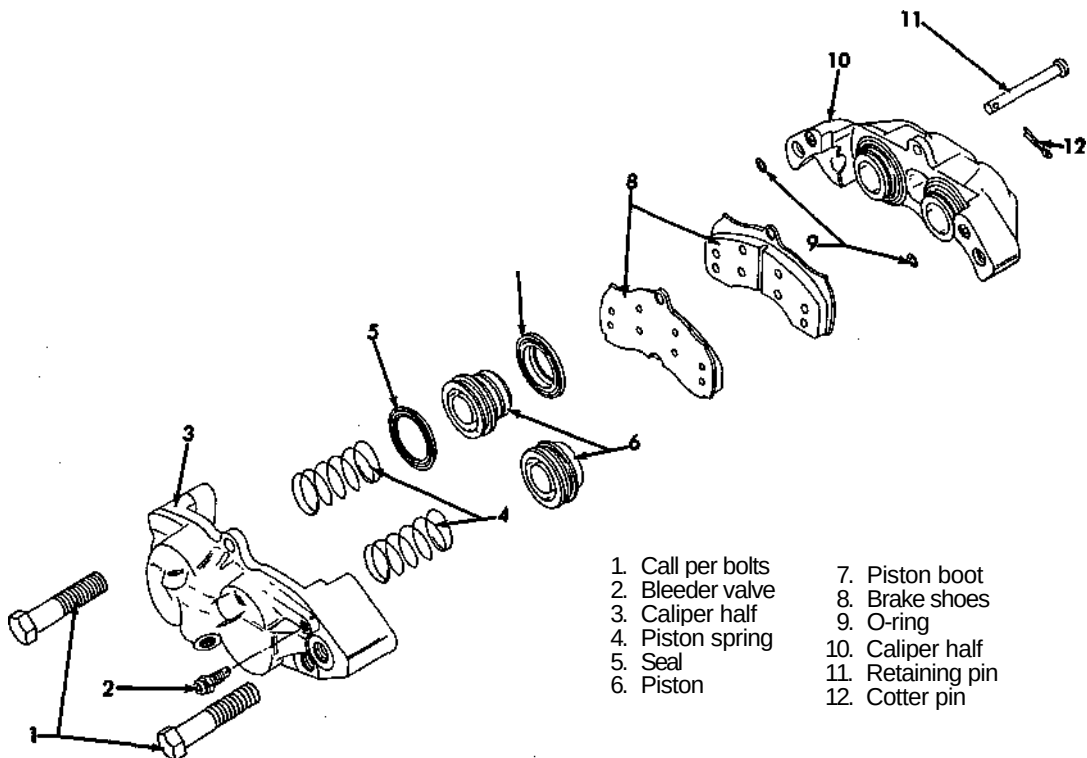
1. Block the front wheels. Jack the rear wheels off the ground and remove the wheels. Release the handbrake.

2. Rotate the disc until the adjusting screw can be seen through the hole in the disc.

3. Loosen the parking brake cables at the equalizer until they go slack. Insert a screw driver and adjust with an up-and-down motion.

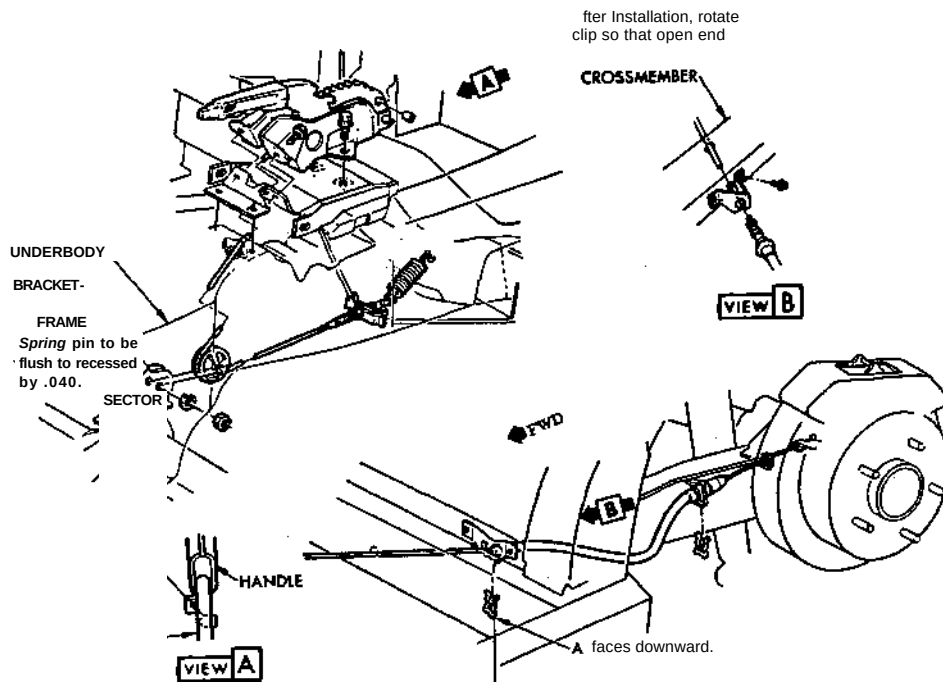


Checking disc run-out



- | | |
|-------------------|-------------------|
| 1. Calliper bolts | 7. Piston boot |
| 2. Bleeder valve | 8. Brake shoes |
| 3. Caliper half | 9. O-ring |
| 4. Piston spring | 10. Caliper half |
| 5. Seal | 11. Retaining pin |
| 6. Piston | 12. Cotter pin |

Exploded view of calliper



Disc brake parking brake cable assembly



Parking brake adjustment on disc brake model

4. Tighten the adjuster until the disc can not move, then back off six to eight notches.
5. Apply the parking brake to the fourth notch. Tighten the cables at the equalizer to give a light drag with the wheel mounted.
6. Release the parking brake and check for no drag condition.

MAKE SHOE REMOVAL AND REPLACEMENT

1. Jack the car up and remove the wheel and tire.
2. Remove the brake caliper as previ-

ously outlined. Do not disconnect the brake line, but remove the line clip from the control arm and hang the caliper above the disc with wire.

3. Drill the disc retaining rivets out and remove the disc from the axle hub.

4. Insert a screwdriver into the adjusting hole and turn the screw several times to expand the shoes.

5. Push the brake shoes forward until the front shoe hold-down spring can be seen through the adjusting hole.

6. Insert a pair of needle-nosed pliers through the hole and grasp the hold-down pin. Depress the spring with a screwdriver inserted from the side and turn the pin 90° to free the spring and retainer. Remove the spring and retainer.

7. Repeat this operation on the rear brake shoe.

8. Retract the shoes by turning the adjuster screw. Pull the shoes from the adjuster and remove the adjuster and spring.

9. Separate the shoes at the anchor pin and lift the shoes up and out of the housing, while allowing the straight part of the return spring to go between the outer tip of the anchor pin and the axle flange plate.

10. Lightly lubricate the backing plate shoe

276 BRAKES

contact surfaces, anchor pin, and adjusting screw threads.

11. Install the return spring on the replacement shoes and position the shoes on the anchor pin.

12. Install the adjuster spring and adjuster. Turn the adjuster screw to expand the shoes.

13. Turn the axle shaft flange so that the adjustment hole aligns with the front hold-down spring pin.

14. Push the shoe forward and over the hold-down pin.

15. Install the spring and retainer over the hold-down pin and using needle-nosed pliers again, and a screwdriver as in Step 6, depress the spring and twist the pin 90°.

16. Repeat the above step on the rear shoe. Another pair of needle-nosed pliers will have

to be utilized to hold the pin in position, as head of this pin is not accessible.

17. Turn the adjuster screw to retract the shoes.

18. Install the brake disc onto the studs, making sure that the adjustment holes in the disc and flange align.

19. Install the caliper as previously outlined.

20. Adjust the parking brake as previously described.

21. Install the tire and wheel and lower the car.

22. After installation of new parking brake linings, the shoes should be burnished. At a speed of 50 mph, apply the parking brakes until a slight drag is felt. Keep the brakes on for approximately 50-60 seconds.