

SECTION 5

BRAKES

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GENERAL DESCRIPTION

The Duo-Servo 4-wheel, hydraulic brake system used on the Corvette is basically the same design as that utilized on the Chevrolet Passenger Car. Service procedures and component differences pertaining to Corvette only are enumerated in this section.

Brake linings are bonded to the shoes and have a total effective area of 157 square inches. The composite-type, cast iron alloy brake drums have a contact

area of 11 inches in diameter by 2 inches front (1.75 inches rear) in width.

The single-stroke, ratchet-type parking brake actuating/release lever, located to the left of the steering column, is connected to the rear wheel brake assemblies through a three-piece cable and idler lever assembly (fig. 1).

MAINTENANCE AND ADJUSTMENTS

PARKING BRAKE

The rear brake assemblies serve a dual purpose in that they are utilized both as a hydraulically operated service brake and also as a mechanically operated

parking brake. In view of this dual purpose, the service brake must be properly adjusted as a base for parking brake adjustment; conversely, the parking brake must be properly adjusted for the service brake to function as intended.

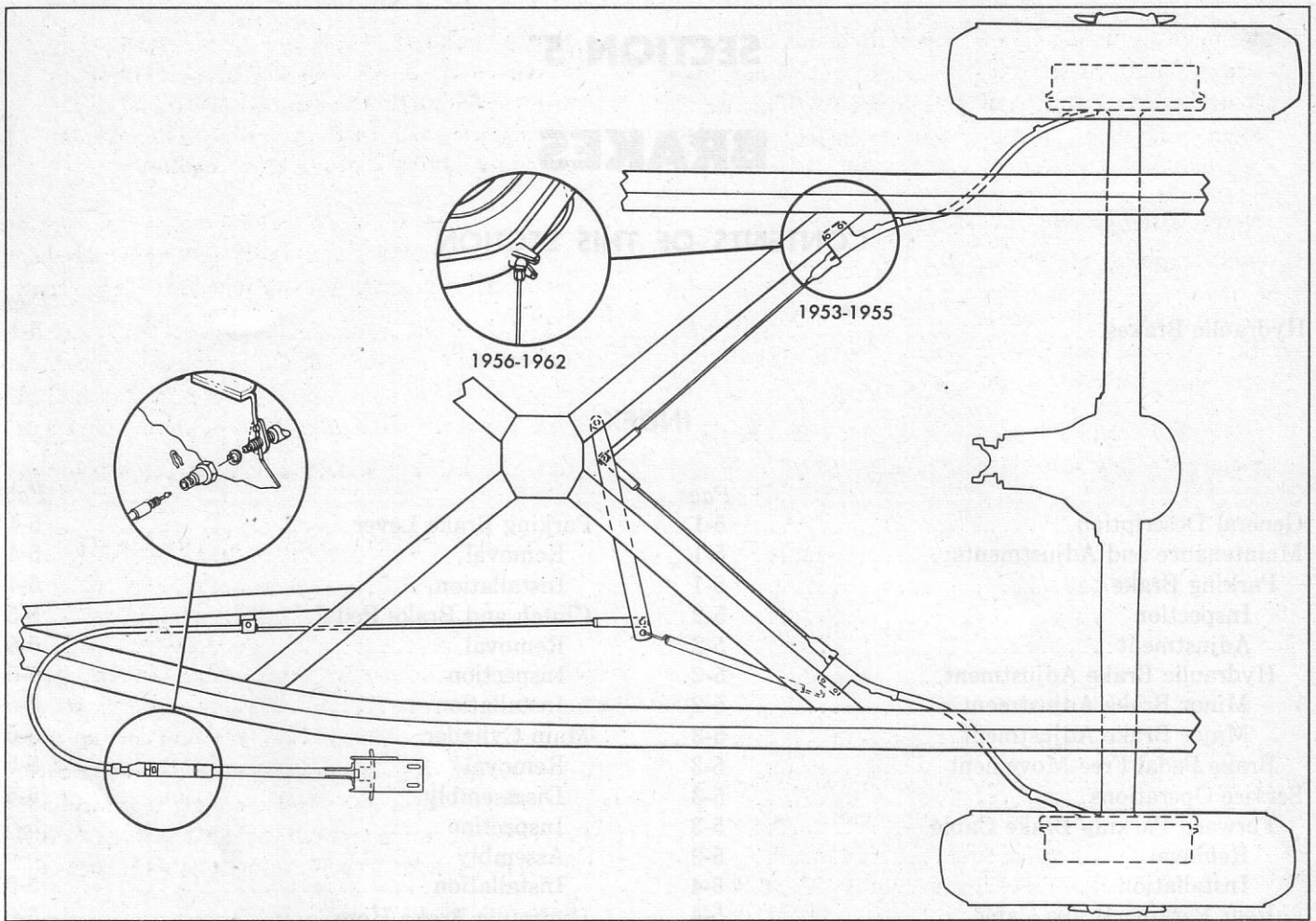


Fig. 1—Parking Brake System

Inspection

If complete release of the parking brake is not obtained, unless the lever is forcibly returned to its released position, or if application effort is high, check parking brake lever assembly for free operation. If operation is sticky or a bind is experienced, correct as follows:

1. Clean and lubricate brake cables and idler lever pivot points.
2. Inspect brake lever and idler lever for straightness and alignment (replace if necessary).
3. Clean and lubricate parking brake lever assembly.
4. Check condition and installation of return spring.
5. Check routing of cables for kinks and binding.
6. Check rear brakes for improper adjustment or malfunction.

Adjustment

1. Pull parking brake lever up one notch from fully released position.
2. Raise vehicle so that both rear wheels are off the floor.
3. Loosen the forward check nut at the forward cable stud, and tighten the rear check nut until a

light uniform drag is felt when rear wheels are rotated. Adjust rear cables individually until drag is equalized at both rear wheels.

4. Tighten check nuts securely.
5. Fully release parking brake lever and rotate rear wheels; no drag should be present.

HYDRAULIC BRAKE ADJUSTMENT

Minor Brake Adjustment

A minor brake adjustment should be performed when braking conditions indicate that normal lining wear is evident. When braking action is unequal, severe or otherwise unsatisfactory, see "Major Brake Adjustment."

1. Raise vehicle to desired working height.
2. Loosen the rear check nut at the forward cable stud sufficiently to remove all tension from the parking brake system.

NOTE: If parking brake cables have been adjusted too short, the rear brake shoes will be forced away from the anchor pins in brake release position, making correct shoe adjustment impossible.

3. Remove adjusting screw access hole cover from brake flange plate. Expand shoes by turning adjusting screw with Tool J-9485 until a light uniform drag is felt on the brake drum when wheel is rotated.

NOTE: Moving the outer end of the tool upward expands the shoes.

4. Turn brake screw back (to retract brake shoes) 12 notches. This will provide adequate running clearance between shoes and drum.
5. Repeat operations 3 and 4 at each wheel and replace adjusting screw access hole covers.
6. After hydraulic brakes have been adjusted, adjust the parking brakes as outlined under "Parking Brake Adjustment."
7. Lower vehicle to floor and test operation of brakes.

Major Brake Adjustment

The major brake adjustment should be performed when braking action is unequal, severe or otherwise unsatisfactory. A major brake adjustment must also be performed after new brake shoes have been installed or when the vehicle has accumulated sufficient mileage to warrant a thorough inspection of the brake assemblies and drums.

1. Raise vehicle to desired working height.
2. Loosen rear check nut at forward parking brake cable sufficiently to remove all tension from the parking brake system.
3. Loosen anchor pin nut just enough so that pin can shift in slotted hole in flange plate.

NOTE: If nut is loosened too much, the anchor pin will tilt due to pull of brake shoe pull-back springs.

4. Remove adjusting screw access hole cover, and turn brake adjusting screw to expand shoes until a light uniform drag is felt on drum when wheel is rotated.
5. Tap anchor pin and brake flange plate to allow shoes to center in drum. If drag on drum decreases, tighten adjusting screw as before and again tap anchor pin and flange plate. Repeat this operation until light uniform drag is constant. Tighten anchor pin nut to 60-80 ft. lbs. torque.

NOTE: Vehicles equipped with heavy-duty brakes and special steering (Regular Production Option 687) utilize an eccentric anchor pin for centering the brake shoe assemblies. Center shoes by turning anchor pin as required.

6. Turn adjusting screw back (to retract brake shoes) 12 notches, and check wheel for freedom from drag. If drag is experienced, repeat Operation 5.
7. Repeat Operations 4, 5, and 6 at each wheel. Replace adjusting screw access hole covers and adjust parking brake as outlined in this section.
8. Lower vehicle to floor and test operation of brakes.

BRAKE PEDAL FREE MOVEMENT

The brake pedal free movement and pedal height are both controlled by a nonadjustable pedal stop located in the main cylinder (fig. 2). Proper pedal height and free movement are maintained by the brake pedal return spring. To determine correct pedal free movement, depress and measure the distance the pedal travels before push rod contacts main cylinder piston. Free movement should be not less than $\frac{1}{4}$ inch. If less than $\frac{1}{4}$ inch free movement is experienced:

1. Check tension of return spring.
2. Inspect pedal and pedal suspension for binding and misalignment.
3. Check main cylinder for proper attachment and installation of pedal stop.

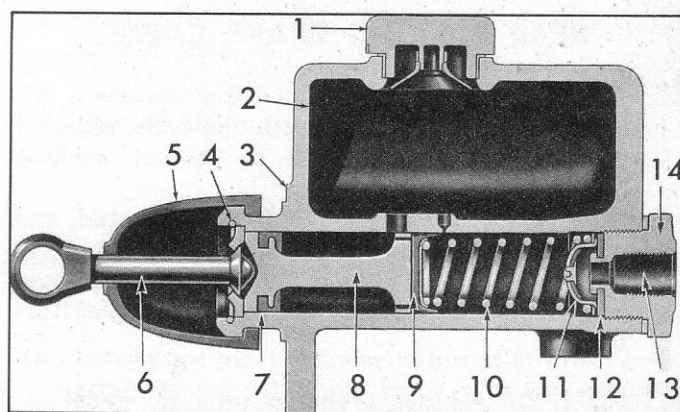


Fig. 2—Main Cylinder Sectional View

- | | |
|-------------------------------------|--------------------------|
| 1. Filler Cap | 8. Piston |
| 2. Fluid Reservoir | 9. Primary Cup |
| 3. Main Cylinder Body | 10. Piston Return Spring |
| 4. Lock Ring | 11. Check Valve |
| 5. Rubber Boot | 12. Valve Seat |
| 6. Push Rod and Pedal Stop Assembly | 13. Fluid Outlet |
| 7. Secondary Cup | 14. End Plug |

SERVICE OPERATIONS

FORWARD PARKING BRAKE CABLE

Removal

(Refer to Figure 1.)

1. Place parking brake handle in the fully released position.
2. Remove return spring at idler lever.
3. Remove rear check nut from forward cable stud, and withdraw cable from clevis.
4. Remove cable conduit from frame mounted retaining bracket.
5. Raise vehicle hood, and working at engine side of dash wall, remove the spring-type retainer from end of conduit retaining nut.
6. Remove conduit retaining nut from parking brake lever, disengage cable ball from slot in lever, and remove cable assembly from vehicle.

Installation

1. Insert cable ball through nut and lockwasher, and position ball in slotted hole at end of parking brake lever. Thread nut onto end of lever and torque to 40-60 ft. lbs.
2. Position cable conduit end into nut and secure by installing spring-type retainer in slotted portion of nut.
3. Install cable conduit in frame mounted bracket. Install retaining bolt and torque to 86-107 in. lbs.
4. Position forward check nut on cable stud, pass cable stud through clevis at idler lever, and install rear check nut.
5. Connect return spring at idler lever, and adjust parking brake as outlined in this section.

REAR PARKING BRAKE CABLE

Removal

1. Place parking brake lever in the fully released position, and raise vehicle to desired working height.
2. Remove forward check nut from cable stud, and withdraw cable stud from clevis.
3. Remove "U" shaped snap retainers from grooves in rear cable conduit, and remove cable from bracket.

NOTE: On vehicles produced prior to model year 1956, the rear cable mounting brackets and cable are serviced as an assembly. Therefore, it will be necessary to remove the bracket from the "X" member.

4. Back off rear service brakes sufficiently to allow for drum removal.
5. Remove rear wheel and drum assembly.

6. Remove secondary brake shoe pull-back spring and shoe hold-down spring.
7. Remove cable end from parking brake actuating lever.
8. Compress expanded conduit locking fingers at flange plate entry hole and withdraw cable.

Installation

1. Pass end of cable and conduit tip through flange plate entry hole, making sure that conduit locking fingers all expand fully.
2. Compress retaining spring and install cable end in parking brake actuating lever.
3. Install secondary shoe hold-down pin and spring.
4. Install secondary shoe pull-back spring.
5. Install brake drum and wheel and tire assembly.
6. Route cable conduit to retaining bracket and install "U" shaped retaining clip in conduit grooves.

NOTE: On 1953 through 1955 models position cable retaining bracket to "X" member and secure with bolts and nuts.

7. Place rear check nut on cable stud, position cable stud in clevis, and install forward check nut.
8. Adjust rear service brakes and parking brake as outlined in this section.
9. Lower vehicle and test operation of brakes.

PARKING BRAKE LEVER

Removal

1. Disconnect parking brake idler lever return spring and loosen front cable check nut sufficiently to allow removal of cable at actuating lever.
2. Raise vehicle hood, and working at engine side of dash wall, remove the spring-type retainer from end of conduit retaining nut.
3. Remove conduit retaining nut, disengage cable ball from lever, and position cable to one side.
4. Remove nut, lockwasher, and plain washer from flange retaining bolt.
5. Working from the driver's compartment, remove the retaining bolts from lever support, and remove lever from vehicle.

Installation

1. Position flange end of lever through dash wall cutout and secure support end to support.
2. Position flange retaining bolt through dash and secure from the engine side with plain washer, lockwasher and nut.

3. Position ball end of cable through conduit retaining nut and lockwasher, position ball in slotted hole at end of parking brake lever, and thread nut onto end of lever—torque nut to 40-60 ft. lbs.
4. Position cable conduit end into retaining nut and secure by installing spring-type retainer in slotted portion of nut.
5. Connect idler lever return spring, and adjust parking brake as outlined in this section.

CLUTCH AND BRAKE PEDAL

Removal

1. Raise vehicle hood, and using a wood block or other suitable device between toe pan and cross shaft lever, block the clutch cross shaft so that clutch pedal arm does not make contact with the pedal stop.
2. Disconnect clutch push rod at clutch pedal (remove clip and washer from pedal bracket) (fig. 3).

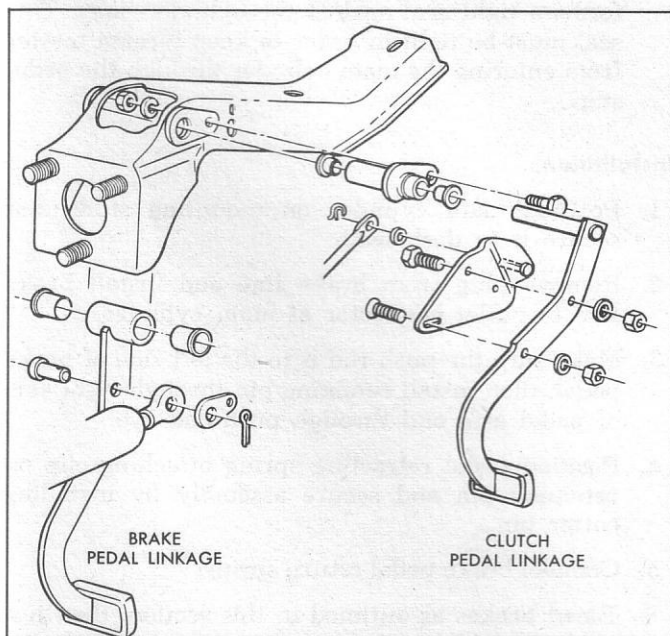


Fig. 3—Clutch and Brake Pedal Installation

3. Remove cotter pin and washer from right side of clutch pivot shaft, and withdraw pedal assembly from pedal support bracket.
4. Disconnect brake pedal return spring.
5. Remove main cylinder push rod retaining pin from the pedal arm.
6. Remove pedal sleeve attaching bolt from the pedal support bracket.
7. Slide pedal sleeve to the left and remove from pedal support bracket. Brake pedal assembly will be free for removal when sleeve clears the pedal support bracket.

Inspection

1. Clean all metal parts with a good nontoxic cleaning solvent.
2. Wipe nylon bushings clean with a clean cloth.

CAUTION: Nylon bushings should not be treated with a cleansing agent of any nature.

3. Inspect all nylon bushings for wear and damage.
4. Inspect all mating surfaces of bushings for wear and damage—replace parts as required.

Installation

1. Apply lubricant to inside diameter of brake pedal bore and install nylon bushings in bore.
2. Lubricate inside diameter of sleeve assembly and install nylon bushing in left side of bore.
3. Position brake pedal assembly to pedal support bracket, and install sleeve assembly through pedal support so that it also retains the brake pedal.
4. Install pedal sleeve attaching bolt—bolt may be installed in either direction—and tighten nut securely.
5. Position main cylinder push rod to left side of pedal, install retaining pin, position retracting spring attaching clip on pin and secure by installing cotter pin.
6. Install brake pedal retracting spring.
7. Position nylon bushing in right side of sleeve assembly bore.
8. Install clutch pedal pivot through sleeve assembly bore, and secure by installing washer and cotter pin.
9. Connect clutch push rod to clutch pedal—install washer and clip.
10. Remove clutch cross shaft blocking device, and test operation of clutch and brakes.

MAIN CYLINDER

Removal

1. Remove brake pedal retracting spring.
2. Disconnect main cylinder push rod at brake pedal arm—remove cotter pin from push rod retaining pin, remove pedal retracting spring attaching clip and withdraw retaining pin from pedal arm.
3. Remove brake line from outlet end of main cylinder. Install suitable plug in line and at main cylinder to prevent brake fluid from escaping.
4. Remove the three retaining nuts, and remove main cylinder from vehicle.

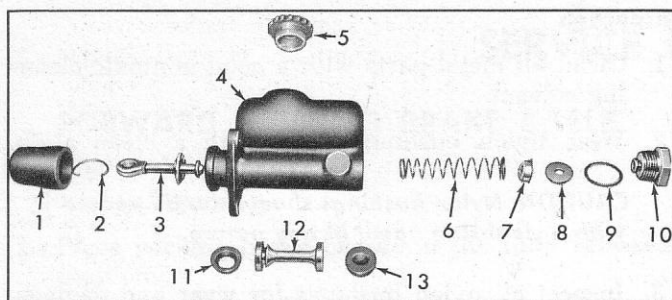


Fig. 4—Main Cylinder—Exploded View

- | | |
|-------------------------|--------------------|
| 1. Rubber Boot | 8. Valve Seat |
| 2. Lock Ring | 9. End Plug Gasket |
| 3. Push Rod Assembly | 10. End Plug |
| 4. Body | 11. Secondary Cup |
| 5. Filler Plug | 12. Piston |
| 6. Piston Return Spring | 13. Primary Cup |
| 7. Valve Assembly | |

Disassembly

1. Remove boot from main cylinder (fig. 4).
2. Place main cylinder in a vise so that the lock ring can be removed from the groove in cylinder bore.
3. Remove lock ring, push rod assembly, piston assembly, primary cup, and spring and valve assembly from main cylinder bore.
4. Remove filler cap.
5. Remove the end plug from outlet end of main cylinder.
6. Remove valve seat (rubber washer) from the end plug.

Inspection

1. Wash all parts in clean alcohol. Make sure that compensating and bypass ports in main cylinder body and bypass holes in piston are clean and open.

NOTE: Before washing parts, hands must be clean. Do not wash hands in gasoline or oil before cleaning parts. Use soap and water to clean hands.

2. Inspect cylinder bore for corrosion, pits, and foreign matter.
3. Inspect primary and secondary cups, check valve and valve seat for damage and swelling. Swelling of rubber parts is due to the use of improper brake fluid or washing parts in gasoline or kerosene.

NOTE: The primary cup has a brass support ring vulcanized in its base to prevent it from imbedding in the piston bypass holes during braking action.

4. Check piston fit in cylinder bore. The clearance

between piston and wall of cylinder should be 0.001-0.005 inch.

Assembly

1. Dip check valve seat in clean brake fluid and position it over the button on end plug.
2. Position a new gasket over the end plug and install the end plug in the main cylinder.
3. Position check valve and spring assembly in cylinder bore.
4. Place the primary cup in the bore with the cupped side against the spring.
5. Assemble secondary cup to the piston and install assembly in the bore so that the bypass hole end of the piston will be against the primary cup.
6. Install the pedal stop and push rod assembly and lock in place by installing the lock ring in retaining groove.
7. Install the rubber boot, making sure the boot forms a tight seal against the cylinder body. This seal must be tight in order to keep foreign matter from entering the main cylinder through the pedal stop.

Installation

1. Position main cylinder on mounting studs and secure it to dash wall.
2. Remove plug from brake line and install brake line to outlet connector at main cylinder.
3. Make sure the push rod is to the left side of brake pedal, then install retaining pin through right side of pedal arm and through push rod eye.
4. Position pedal retracting spring attaching clip on retaining pin and secure assembly by installing cotter pin.
5. Connect brake pedal return spring.
6. Bleed brakes as outlined in this section, then test operation of brake system.

HYDRAULIC BRAKE HOSE

Replacement

When replacing hydraulic brake hose, follow procedure outlined in 1961 Passenger Car Shop Manual, and add the following precautionary inspection.

Inspect hose installation by removing weight completely from wheel and turn wheels from lock to lock, while observing hose position. Be sure that hose does not touch other parts at any time during suspension or wheel travel. If contact does occur, remove hose retainer and rotate female hose end in support bracket one or two points in appropriate direction, replace retainer, and reinspect.

CAUTION: Under no circumstances should brake hose be tightened at the wheel cylinder with the female hose end in the support bracket. Always remove hose from support bracket, tighten hose at wheel cylinder, then install hose in support bracket.

METALLIC BRAKE SHOE LININGS

As brake shoes with this type lining require specially finished brake drums (honed to a 20 micro-inch finish), metallic linings are not recommended for service replacement on vehicles with standard drums that have not been honed to specified finish.

All service operations remain the same as the standard brakes, except for the adjustment and seating of the linings to the drums after replacement. New linings may be used with the old drums as is, provided surface smoothness of drum is as specified.

NOTE: Parts used to fabricate brake assemblies with metallic linings are of special heat resistant material; therefore, it is extremely important that parts designed for this usage be used, if replacement is required.

After the brakes have been adjusted to 12 notches loose, the following recommended "lining seating" procedure should be accomplished.

1. Make six to eight stops from 30 mph with moderate pedal pressure to aid in seating and to modulate any tendency to dive.
2. Make six to eight complete stops from maximum legal highway speed at approximately one mile intervals to fully seat the linings.
3. Readjust brakes if required.