

# BRAKES

All series are equipped with self-energizing hydraulic brakes.

Equalization is dependent on anchor pin adjustment, condition of drum, lining and lining contact, also tire tread wear, and camber limits.

## MASTER CYLINDER

The master cylinder is located on the inside of left front frame side rail. Special bolts hold cylinder to frame. Frame is slotted so that bolts are installed in frame from the master cylinder side and are held in position and prevented from turning by slotted arrangement in frame.

### CAUTION

1. Never remove filler cap until it is perfectly clean. No dirt must *ever* get into the fluid reservoir.
2. Never add any fluid to system except Delco "Super 9" Brake fluid, otherwise *serious* service trouble may result.
3. Never wash cylinders or parts in gasoline, kerosene or any oil. Always use a good grade of clean alcohol or Delco Brake Declene for cleaning parts. Be sure to dip all parts in clean Delco Brake Fluid before reassembling.
4. Do not fill reservoir beyond the *lower* end of the filler plug. See Brake Chart or Fig. 5-1 for recommended fluid level.
5. Never reclaim used fluid.

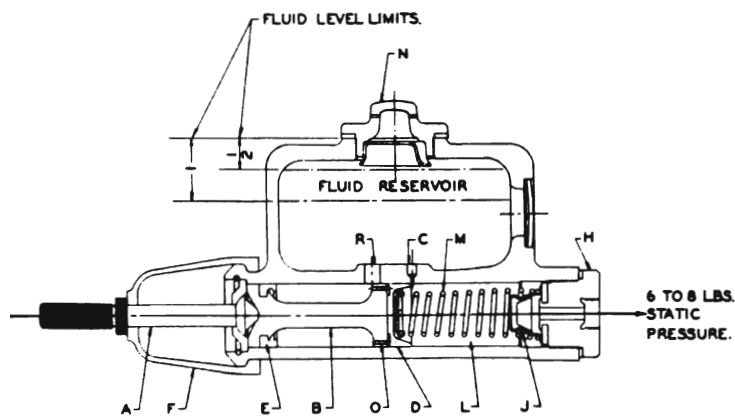


Fig. 5-1. Master Brake Cylinder

## Master Cylinder Operation While Applying Brakes

(See Fig. 5-1)

Piston push rod (A) forces piston (B) and rubber cup (D) toward plug (H). As soon as rubber cup (D) covers port (C) pressure is built up in cylinder (L). This forces fluid to pass through check valve holes in valve (J) and results in the pressure in each wheel cylinder being the same as the pressure in cylinder (L). The cylinder pressure is proportional to the pressure exerted on brake pedal.

## While Releasing Brake

When brake pedal is released slowly, rubber cup (D) follows piston (B) in release direction. Cylinder (L) fills with fluid returning from the wheel cylinders. For fluid to return from wheel cylinders into cylinder (L) it is necessary for fluid to push check valve (J) away from rubber seat. Spring (M) always maintains enough tension on check valve to provide a 6 to 8 pound pressure in brake lines and wheel cylinders after the brakes are fully released.

When brake pedal is released quickly the brake pedal return spring returns piston (B) and rubber cup (D) to released position before cylinder (L) is filled by fluid flow from the wheel cylinders. During this fast release action, additional fluid flows through holes (O) in piston (B) and past edges of rubber cup (D) thereby supplying cylinder (L) with sufficient fluid to be full even though wheel cylinders have not fully returned. As the wheel cylinders return to released position, fluid continues to flow into cylinder (L) and escape into reservoir through the compensating port (C). Piston (B) is always surrounded by fluid from reservoir because port (R) connects the two.

If port (C) becomes plugged or is covered partially by cup (D), there will be no escape for additional fluid accumulated in cylinder (L) at time of fast release action. This will result in dragging brakes and continuous operation of the "stop" light.

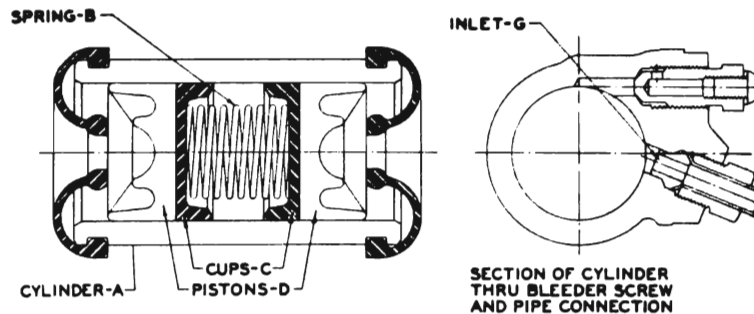


Fig. 5-2. Brake Cylinder—Sectional

Port (C) can be covered by rubber cup (D) when in released position, only as result of incorrect master cylinder assembly, use of wrong parts, or because brake pedal does not have floor board clearance.

#### With Released Brakes

When brake pedal is fully released, spring (M) holds check valve (J) against seat with sufficient pressure to maintain 6 to 8 lbs. pressure in brake lines and wheel cylinders.

Leakage past seat will result in low pedal on first brake application. Pedal will be low only after time has been allowed for leakage to occur.

Cylinder (L) is connected with reservoir through compensating port (C). Piston (B) is surrounded by fluid from reservoir because of connecting port (R).

During the bleeding operation, fluid flows from the master cylinder to the point being bled. The flow of fluid is resisted only by check valve (J). Since no pressure is built up in brake lines, there is no return of fluid to the master cylinder when the brake pedal is moved slowly toward release position. Therefore, during bleeding, the fluid from reservoir flows through port (R) to piston (B), through holes (O) and past edges of rubber cup (D), and from cylinder (L) through check valve (J) into brake lines.

#### WHEEL CYLINDER

The wheel cylinders are of the double piston type and are attached to brake backing plates.

The front wheel cylinders are larger than the rears and cannot be interchanged. See Fig. 5-2.

The design of the backing plate provides limit stop for the wheel cylinder pistons when brake drums are removed. To replace pistons or piston cup it will be necessary to remove wheel cylinder from backing plate.

Should removal and disassembly of master or wheel cylinders be necessary, clean parts with Delco Brake Declene. When reassembling, dip internal parts in brake fluid.

Never insert a test wire through compensating port as this may result in leaving a burr which will cut a groove in the cup.

Extreme care should also be exercised to see that only Delco "Super 9" Brake Fluid is used in the brake system. Shock absorber oil, or other fluids containing even a trace of mineral oil, will cause "swelling" and other serious damage to rubber parts of the brake system.

#### Cleaning Hydraulic Brake Parts

When cleaning rubber brake parts and other brake system internal parts, or if it is necessary to flush brake system with a cleaner, Delco Brake "Declene" is recommended as a satisfactory flushing or cleaning fluid if used in accordance with instructions furnished with the product.

Delco "Super 9" Brake Fluid is the only substitute recommended for cleaning brake parts.

#### BLEEDING OF LINES AND WHEEL CYLINDERS

"Bleeding of the system" is the removing of air in the tubing and cylinders. Air in system is usually caused by depressing the brake pedal

with low fluid level in master cylinder or by disconnecting any part of the hydraulic system.

If the main pipe line from the master cylinders is disconnected, then it will be necessary to bleed all four wheel cylinders. If a line is disconnected at any wheel cylinder, then that wheel cylinder *only* need be bled.

#### CAUTION

**Do not attempt to bleed the system while brake drums are removed.**

Fill the reservoir on master cylinder with Delco Hydraulic Brake Fluid Super 9. (See "Brake Fluid.") Hydraulic brake master cylinder filler, J-713, and adapter for master brake cylinder filler, J-713-2, should be used for this operation.

Remove bleeder screw from wheel cylinder and with J-627 wrench in place attach drain tube J-628, allowing tube to hang in a clean glass jar. See Figs. 5-2 and 5-3. Unscrew the bleeder valve three-quarters of a turn, depress brake pedal full stroke, allow to return slowly. Continue operating pedal in this manner until liquid which is being deposited in glass jar is free from air bubbles. Bleeding operation re-

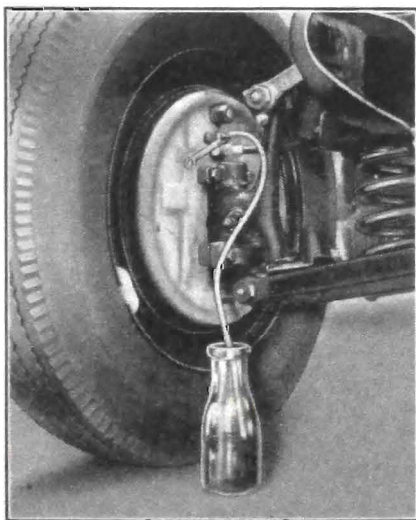


Fig. 5-3. Brake Bleeding

quires approximately one-half pint of fluid for each wheel.

#### CAUTION

**It is very important that fluid level in reservoir be maintained at not less than half full during bleeding operation.**

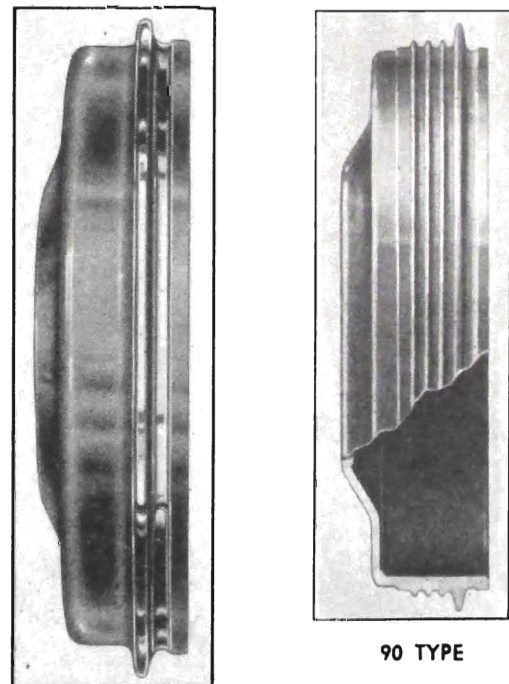
#### Checks for Brake System Leaks

1. Jack up all four wheels in a safe manner.
2. Use ordinary pedal jack to apply brake pedal pressure sufficient to make it barely possible to turn car wheels by hand.
3. If leak occurs the brakes will gradually release. The leak may then be located by increasing the pedal pressure and examining all points.

#### BRAKE DRUMS

Series 40-50-60-70 cars are equipped with Buick cast drums.

Series 90 cars are equipped with solid cast-iron drums. See Fig. 5-4.



40-50-60-70 TYPE

Fig. 5-4. Brake Drum

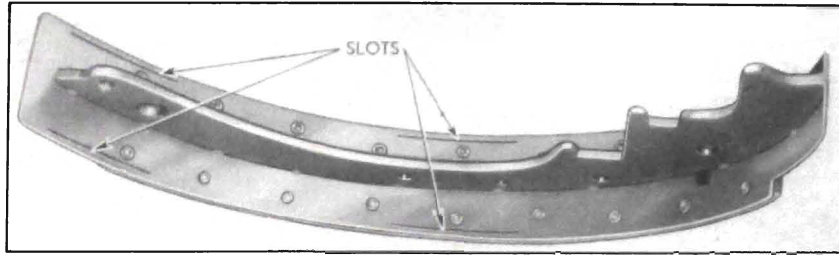


Fig. 5-5. Slotted Brake Shoe

### BRAKE SHOES

#### All Series

Brake shoes which are slotted on side toward the backing plate are used to prevent squeaks. See Fig. 5-5.

#### Brake Adjustment for Wear

Do not adjust when brakes are warm. Brake drums should be at approximately room temperature. Readjust brakes when pedal travels within 2 inches of toe board with brakes applied; or for high speed driving, when pedal travels within 3 inches of toe board. See Fig. 5-8.

1. Jack up all four wheels in a safe manner. Remove adjusting hole covers from brake backing plates. (Where brake adjustment tool is inserted.) See Fig. 5-7.



Fig. 5-6. Anchor Pin Nut Wrench

2. Loosen rear parking brake cables at equalizer.
3. Check pedal for clearance at toe board.
4. Inspect to see that anchor pin nuts are tight, using 16" wrench, J-854. See Fig. 5-6.

If anchor pin nut is found loose, reset as per instructions under "Major Adjustment."

5. Expand brake shoes by turning adjusting screw, using tool H.M. 13985, moving tool toward center of wheel until brake drum can just be turned by hand. See Fig. 5-7.



Fig. 5-7. Brake Adjustment Tool

6. Adjust parking brake cables as per instructions under "Parking Brake."
7. Back off adjusting screw approximately 17 notches. Brake drum must then turn freely. If there is a heavy drag between shoes and drum reset anchor pin as outlined in "Major Brake Adjustment" until drum turns freely.

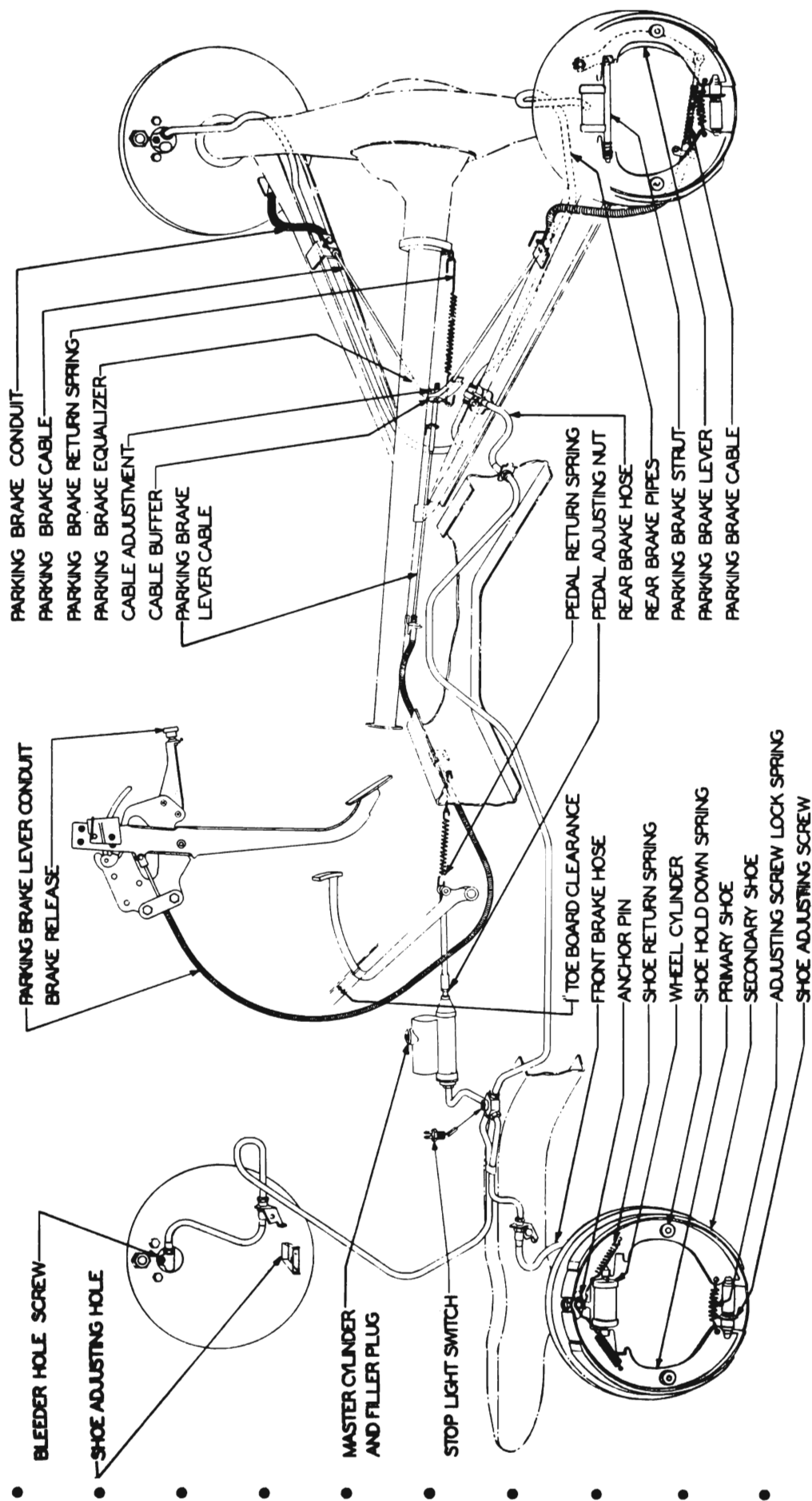


Fig. 5-8. Brake Adjustment Chart

8. Lubricate brake pedal and connection to master cylinder.
9. Reinstall adjusting hole covers in backing plates.
10. Check master cylinder fluid level to limits given. See Fig. 5-1.
11. Road test car.

### MAJOR BRAKE ADJUSTMENT

For brake lining inspection and lubrication of brake parts, or replacement of shoes, or when "Adjustment for Wear" has failed to give satisfactory brake, proceed as follows:

1. Jack up car in safe manner and remove wheels. Check brake pedal for clearance at toe boards. See Fig. 5-8 or 5-13.
2. Remove hub and drum assemblies. Remove adjusting hole covers in backing plates.
3. Inspect brake lining for wear and imbedded steel or foreign particles on surface of lining, loose rivets, oil-soaked lining and oil leaks. If lining is worn to rivet heads or oil-soaked, install new shoes or relined old shoes.

If rear wheel bearing oil seals show leaks, it is advisable to replace outer seal at this time. When installing new oil seals, put a small amount of lubricant on the seals where they contact the axle shafts. This will prevent tearing and burning of the seals during the breaking-in period.

If steel is imbedded in lining, thoroughly clean the lining, removing any foreign particles from surface of lining and rivet counterbores. Loose rivets in lining must be tightened or replaced.

Inspect brake drums for scoring. If grooved from foreign particles in lining, sand drums smooth. If scored or badly grooved, drums may be rebored. See "Reboring Drums."

4. Loosen parking brake cable by backing off nut on equalizer. See Fig. 5-8.
5. If shoes are to be replaced, remove brake

shoe hold-down cups and springs, also disconnect the brake shoe return springs and shoe connecting springs.

6. Thoroughly clean shoes, brake backing plates and all contacting points. Apply a thin coat of Bendix Brake Lubricant or Delco Brake Lubricant to all metal contacting points. Contact points may be lubricated without removing shoes by prying shoes away from backing plate sufficient to allow lubrication.
7. Clean and lubricate rear cables of parking brake, removing any excess lubricant at ends of conduit. See "Parking Brake Lubrication."

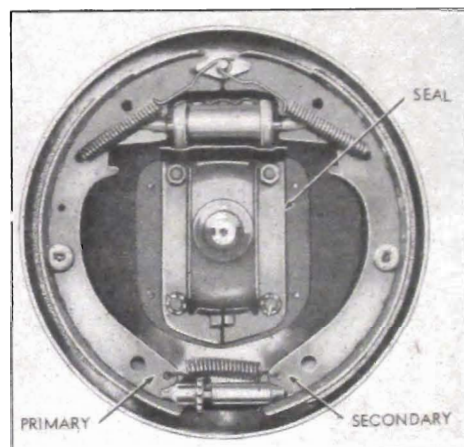


Fig. 5-9. Front Brake Assembly

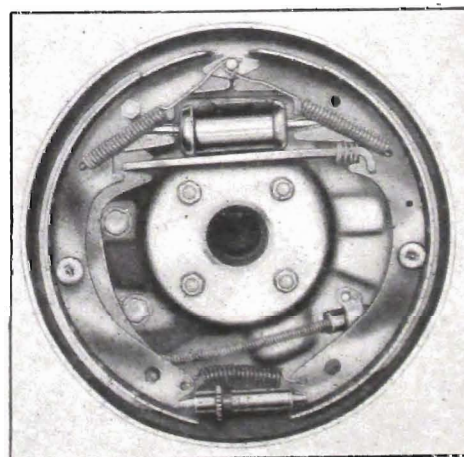


Fig. 5-10. Rear Brake Assembly

8. Inspect bolts for tightness that hold the brake backing plates to steering knuckle and rear axle housing.

9. Reassemble brakes, springs, etc.

NOTE: Secondary shoes, or those with the longer linings, are assembled to the rear on both front and rear brakes.

10. Reinstall hub and drum assemblies.

When newly lined shoes are installed, it may be necessary to back off on adjusting screw to allow clearance for drum installation.

11. Turn drum so that feeler hole is at center of lining section of secondary shoe.

Insert screwdriver between lining of secondary shoe and drum. Pry shoe assembly away from drum sufficient to seat primary shoe solidly against opposite side of drum. See Fig. 5-11.

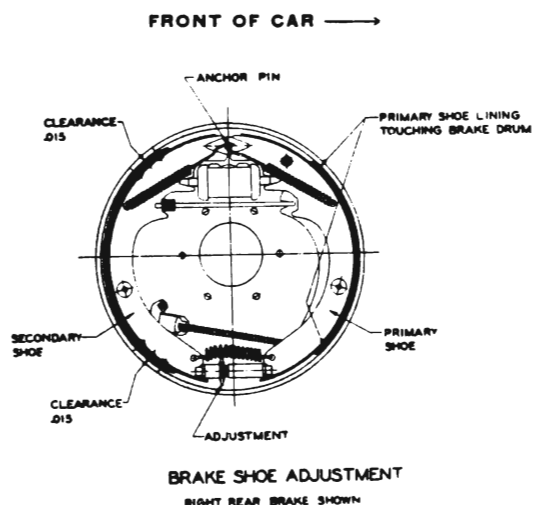


Fig. 5-11. Brake Shoe Adjustment

12. Turn shoe adjusting screw and loosen and move anchor pin if necessary, to obtain .015" clearance between drum and each end of secondary shoe, see Fig. 5-12. Solid contact of primary shoe against drum must be maintained during this adjustment.

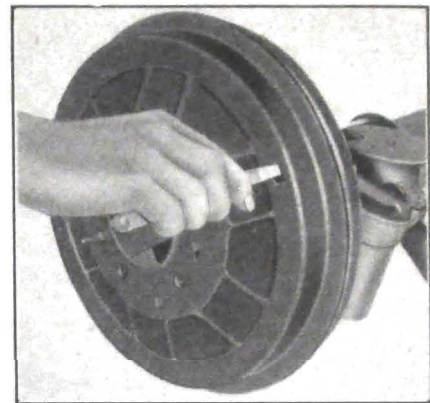


Fig. 5-12. Brake Drum Feeler Gauge

13. Check anchor pin nut for being securely tightened.
14. Adjust parking brake at equalizer as outlined under "Parking Brake."
15. Check master cylinder fluid level to limits given. If any hydraulic connections have been disturbed or if reservoir on master cylinder was pumped dry, bleed brake lines as outlined under "Bleeding of Lines and Wheel Cylinders."
16. Reassemble inspection hole covers in brake drums and adjusting hole covers in brake backing plates and install wheels.
17. Lower car and test on road. Check parking brake, observing if rear wheel brakes are equal. If not equal, loosen adjustment on tight brake, rather than tighten on loose brake. If it is necessary to loosen adjustment over two notches to balance parking brakes, recheck the location of equalizer.

### BRAKE PEDAL ADJUSTMENT

The only brake pedal adjustment necessary is to have full pedal throw and clearance at the toe-board. If improperly set, correct as follows: (See Fig. 5-13)

1. Loosen check nut on master cylinder push rod.

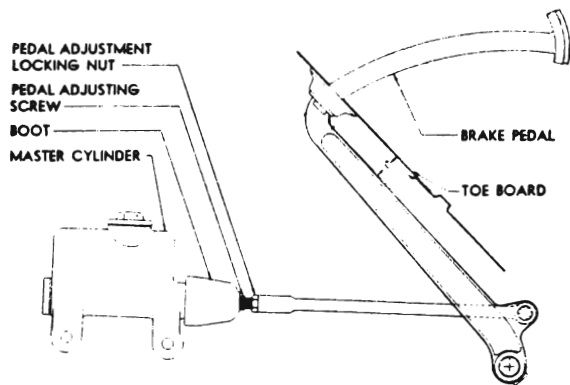


Fig. 5-13. Brake Pedal Clearance

2. Adjust master cylinder rod to give clearance under toe-board, by turning push rod with pliers.
3. Tighten lock nut, holding rod from turning. Before adjusting for clearance under toe-board, be certain that pedal returns to its stop in the end of the master cylinder freely, does not bind on pedal shaft, and that pedal return spring has not lost its tension.

**CAUTION**

Lack of clearance at this point will cause heavy brake drag because it will prevent proper master cylinder operation.

**PARKING BRAKE**

The parking brake consists of a mechanical arrangement which operates the brake shoes in the rear wheels. This system does not interfere in any way with the hydraulic system. See Fig. 5-18.

- A latching arrangement is provided to lock or
- release the pedal. The knob which operates the
- latch is located at lower flange of instrument
- panel on the left side.

**Parking Brake Lubrication**

1. Disconnect parking brake at equalizer.
2. Remove the two screws holding conduits to rear backing plate.
3. Remove screw and clip which holds conduit to rear strut rod on Series 40-50-60-70.

4. Slide conduit away from backing plate and install Bendix Cable Lubricant sparingly on inner cable.
5. Slide conduit within 2" of normal position and clean inner cable at backing plate end of all surplus lubricant. Otherwise, surplus lubricant will be forced into backing plate where it will get on linings.
6. Reinstall screws at backing plate and clip at rear strut rod on Series 40-50-60-70.
7. Conduit from brake lever to torque tube rarely needs lubrication. This conduit may be lubricated by disconnecting inner cable at brake lever and removing exposed portion from grommets under torque tube. Coat the exposed section under torque tube heavily with graphite lubricant. Pull out inner cable at brake lever end as far as possible. This allows section under torque tube to deposit lubricant in rear end of conduit.

The exposed section of inner cable at brake lever end may now be lubricated.

Reinstall and connect up and adjust parking brake.

**Parking Brake Adjustment**

Before making parking brake adjustment, shoes must be adjusted as outlined under "Major Brake Adjustment."

1. Jack up rear wheels.
2. Release brake lever.
3. Expand shoes in both rear drums by turning adjusting screw, until rear wheels can just be turned by hand. Tighten adjusting nut at end of hand brake cable until cables are taut.
4. Back off adjusting screws in each wheel 15 notches.
5. Test rear brakes for holding. Apply enough pedal pressure so that rear wheels can just be turned by hand. If the rear wheels are not balanced evenly, back off the tight wheel not over 2 notches. If it is necessary



to loosen adjustment over 2 notches center up equalizer attached to rear cables.

### Brake Fluid—Delco Super 9

Hydraulic brake fluid known as Delco Super 9 is used in all series brake systems. This fluid should be used exclusively in past series hydraulic brakes as well as current models.

Fill to limits shown in Fig. 5-1.

The qualifications and advantages of Super 9 Fluid are as follows:

1. It is an all-weather fluid which will operate satisfactorily within a temperature range of 300° F. above zero to 50° F. below zero.
2. It has no detrimental effect on rubber or metal.
3. It will not gum the cylinders or pistons even under extreme heat, providing quality rubber is used in the hydraulic system.
4. It can be added to previously recommended brake fluid and will mix satisfactorily.
5. Because of temperature range, it is an all-year fluid which need not be changed seasonally.

### BRAKE LINING

Shoes or linings may be obtained as follows:

1. **New brake shoe assemblies** ground to correct radius as used in production and ready for installation are available for all series as well as all past models equipped with hydraulic brakes.

Using these complete shoes is the most satisfactory method to follow in servicing brakes.

Popular sizes of shoes stocked are slotted on sides same as 1941 and 1942 production brake shoes. This slotting serves to eliminate backing plate squeaks.

Slotting of earlier model shoes is not practical in service. The advantage of eliminating backing plate noise can only be obtained by using complete shoe assemblies when servicing brakes.

Complete shoe assemblies are available from G.M.P.D. Warehouses or Buick Motor Division in Flint, Mich.

2. **Brake shoe sets of .030" oversize** are available for use with brake drums which have been rebored. Oversize linings are not available except when purchased already installed on shoes.

Drums should not be rebored more than .030" per side, or .060" in diameter. If drums are refinished less than .060" in diameter, linings can be ground down to proper size.

3. **Production brake lining only**, shaped, drilled and packaged with rivets in sets of two primary and two secondary linings from the G.M.P.D. Warehouses or Buick Motor Division in Flint. These linings have been ground to correct production thickness, which eliminates weave patterns and gives a smooth surface for rapid break-in.

### Unequal Wear

More wear is usually encountered on the secondary shoe linings than on the primary shoe. This is because the secondary shoe accomplishes most of the braking action.

If primary shoes are not badly worn at time secondary shoes are relined, it is satisfactory to reline or replace the secondary shoes only.

### REBORING BRAKE DRUMS

Brake drums which are scored or rough may be rebored or ground oversized a maximum of .060" on the diameter. This is the equivalent of a .030" cut.

To obtain the maximum life, braking surface of the drum must be smooth. Taper should be held within .005" across the finished surface and concentricity within .007" (indicator run-out).

## SPECIFICATIONS—BRAKES

ITEMS	SERIES 40-A	SERIES 40-B	SERIES 50	SERIES 60	SERIES 70	SERIES 90
<b>BRAKES</b>						
Number of Complete Brakes.....	4	4	4	4	4	4
Type .....	← Internal Expanding →		← Internal Expanding →		← Internal Expanding →	
Foot Brake Mechanism.....	← Hydraulic →		← Hydraulic →		← Hydraulic →	
Master Cylinder Size.....	1"	1"	1"	1"	1"	1"
Front Brake Cylinder Size.....	1½"	1½"	1½"	1½"	1½"	1½"
Rear Brake Cylinder Size.....	1"	1"	1"	1"	1"	1"
Brake Drum Material.....	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron
Brake Drum Diameter.....	12"	12"	12"	12"	12"	14"
Brake Lining Make—Primary.....	← Ferodo BZ-10-2C Woven →					
Brake Lining Make—Secondary.....	← Manhattan Raybestos 2320K Molded →					
Brake Lining—Width and Thickness	1¾" x ¾"	1¾" x ¾"	1¾" x ¾"	2¼" x ¾"	2¼" x ¾"	2" x ¾"
Primary Lining—Number per wheel	1	1	1	1	1	1
Length Per Wheel.....	9½"	9½"	9½"	10"	10"	12½"
Secondary Lining—No. Per Wheel	1	1	1	1	1	1
Length Per Wheel.....	12¾"	12¾"	12¾"	12½"	12½"	14¾"
Total Lining Length Per Wheel....	22½"	22½"	22½"	22½"	22½"	26¾"
Total Lining Length Per Car.....	90¾"	90¾"	90¾"	91¾"	91¾"	107¼"
Total Brake Area (sq. in.).....	158.7	158.7	158.7	206.4	206.4	214.6
Percentage Braking Power on Rear	47	47	47	47	47	47
Parking Brake Lever Operates.....	← Rear Service Shoes →		← Rear Service Shoes →		← Rear Service Shoes →	
Operation Independent of Service Brake .....	Yes	Yes	Yes	Yes	Yes	Yes
Parking Brake Lever Actuated Thru	Cables	Cables	Cables	Cables	Cables	Cables
Location of Parking Brake Lever....	← Under instrument panel on left side →					