GROUP 9

BRAKES

SECTIONS IN GROUP 9

BRAKE SPECIFICATIONS, DESCRIPTION, OPERATION

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NOTES

9-1 BRAKE SPECIFICATIONS

a. Tightening Specifications

Use a reliable torque wrench to tighten the parts listed, to insure proper tightness without straining or distorting parts. These specifications are for *clean and lightly lubricated threads only;* dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

Part	Name	Thread Size	Torque-Ft. Lbs.
Nut	Backing Plate to Steering Knuckle Bolt	7/16-20	45-50
Nut	Backing Plate to Axle Housing Bolt	7/16-20	35-40
Bolt	Wheel Cylinder to Backing Plate	5/16-18	10-15
Nut	Brake Anchor Pin	5/8-18	65-70
Bolt	Brake Drum to Axle Shaft	5/16-18	10-15
Stud	Brake Drum to Axle Shaft (Pilot)	5/16-18	10-15
Nut	Brake Hose Bracket to Frame	5/16-24	10-15
Bolt	Brake Lever to Dash Brace	5/16-18	10-15
Bolt	Pedal Pivot	5/16-24	10-15

b. General Specifications

Items	Series 40-50-60	Series 70
Operating Mechanism, Service Brakes	← Hydraulic →	
Parking Brakes	← Lever and Cables →	
Operation of Service Brakes Independent of Parking Brakes	Yes	Yes
Wheels Braked, Service	← Front and Rear →	
Parking	← Rear Only →	
Approx. % of Total Braking Power on—Front Wheel Brakes	53	53
Rear Wheel Brakes	47	47
Static Pressure in Hydraulic System when Brakes are Released	← 8 to 16 lbs. →	
Number of Brake Shoes at Each Wheel	2	2
Brake Shoe Type	← Self Energizing-Servo →	
Brake Shoe Lining Type	← 1 pc. Molded-Riveted →	
Front Shoe Lining Width x Thickness	2.25" x .187"	2.50" x .25"
Rear Shoe Lining Width x Thickness	← 2.25" x .187" →	
Brake Drum Material	← C.I. Rim Fused to Steel Disk →	
Master Cylinder Piston Dia. (Standard)	17/32"	17/32"
Master Cylinder Piston Dia. (Power)	21/32"	21/32"
Wheel Cylinder Size, Front	1 1/8"	1 1/8"
Rear	1"	1"
Approved Hydraulic Brake Fluid	← G.M. or Delco Super No. 11 →	
Fluid Level, Below Top of Filler Opening	← 1/2" to 1" →	
Shoe Adjusting Screw Setting, from Point where Wheels can just be turned by hand	← Back Off 15-17 Notches →	
Brake Drum Inside Diameter	← 12.017" to 12.023" →	
Brake Drum Rebore, Max. Allowable	← .060" oversize →	
Max. Allowable Runout Inside Drum, New or Rebored	.005"	.005"
Max. Allowable Out-of-Round, Before Rebore	.010"	.010"
Max. Allowable Out-of-Balance of Drum	← 6 in. oz. →	
Max. Allowable Space Between Lining and Shoe Rim after Riveting	.005"	.005"

9-2 DESCRIPTION OF BRAKE MECHANISM

The brake mechanism includes a brake drum and a brake assembly at each wheel, and two separate and independent control systems for applying the brakes—(1) Parking brake control system (2) Service brake control system.

a. Wheel Brake Assemblies

Each brake drum consists of a cast iron rim fused to a pressed steel disk. The cast iron rim provides an ideal braking surface and increased brake lining life. An external web around the circumference prevents distortion and aids in dissipation of heat.

The brake assembly at each wheel uses a primary (front) and a secondary (rear) brake shoe of welded steel construction, with one-piece molded lining attached by tubular rivets. The primary shoe lining is shorter than the secondary shoe lining and is of different composition; therefore the two shoes are not interchangeable. See figure 9-1.

Each brake shoe is held against the backing plate by a hold-down spring, pin, and cup which allow free movement of the shoe. The notched upper end of each shoe is held against the single anchor pin by a heavy coil spring. An adjusting screw and lock spring connects the lower ends of both shoes together and provides adjustment for clearance with the brake drum.

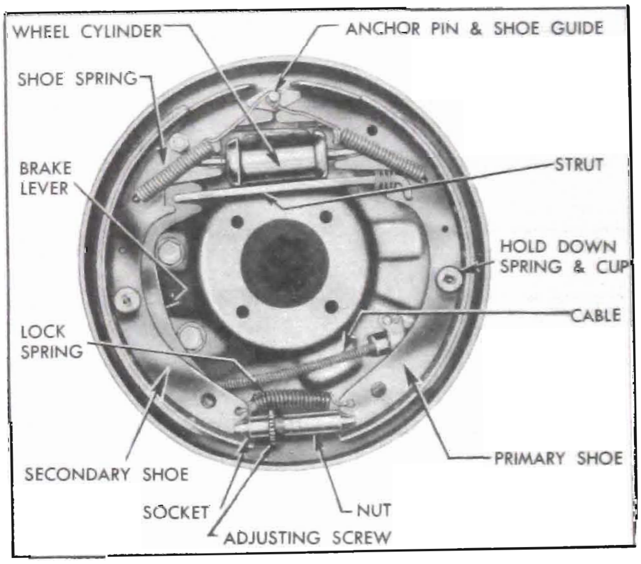

Figure 9-1—Rear Wheel Brake Assembly—Right

A hydraulic wheel cydinder mounted on the backing plate between the upper ends of the brake shoes forces the shoes against the brake drum when the service brakes are applied. On *rear wheels only*, a lever mounted on each secondary shoe and connected to the primary shoe by a strut is used for applying the shoes when used as parking brakes. See figure 9-1.

When the brake shoes contact the rotating drum, in either direction of car travel, they move with the drum until the rearward shoe is stopped by the anchor pin and the forward shoe is stopped by the rearward shoe through the connecting adjusting screw. Frictional force between drum and shoe lining tries to rotate each shoe outward around its anchor point but the drum itself prevents this rotation; consequently the shoes are forced more strongly against the drum than the applying force is pushing them. See figure 9-2. It is also evident that the force applied by the drum to the forward shoe is imparted to the rearward shoe through the connecting adjusting screw.

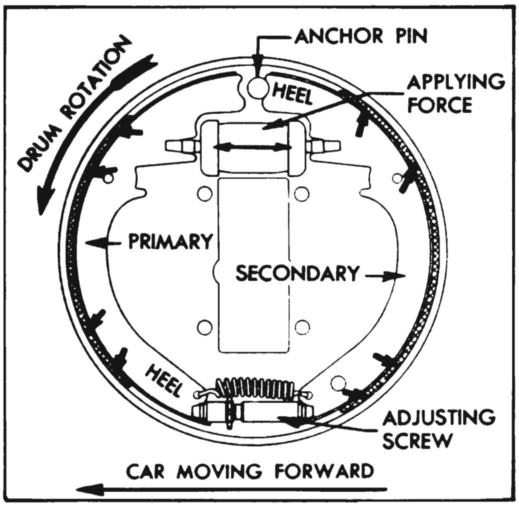

Figure 9-2—Brake Shoe Action

Utilization of the frictional force to increase the pressure of shoes against the drum is called *self-energizing* action. Utilization of force in one shoe to apply the opposite shoe is called *servo* action. *The self-energizing servo action* of Buick brakes provides powerful braking action with relatively light pedal pressure.

b. Parking Brake Control System

The parking brake control system uses a foot operated brake lever, conduit enclosed cables, brake shoe levers and struts to apply the rear wheel brakes only. The brake lever cable connects to a sheave (equalizer) located at center of the rear brake cable, with an adjusting nut to take up cable slack. Each end of the rear brake cable is attached to the free lower end of a brake shoe lever pivoted on each secondary (rear) brake shoe. A strut is mounted between each brake shoe lever and the primary (front) brake shoe. See figure 9-3.

When the brake lever is pushed forward the cables apply an equal pull to each brake shoe lever, and the levers and struts force all rear brake shoes into firm contact with the brake drums. A spring loaded latch automatically locks the brake lever to keep the parking brakes applied. The brake lever is released by pulling the lever release knob. A warning signal, which is standard on *Series 70* and optional on *Series 40-50-60*, will show a red light on instrument panel if the car is operated with the parking brakes applied.

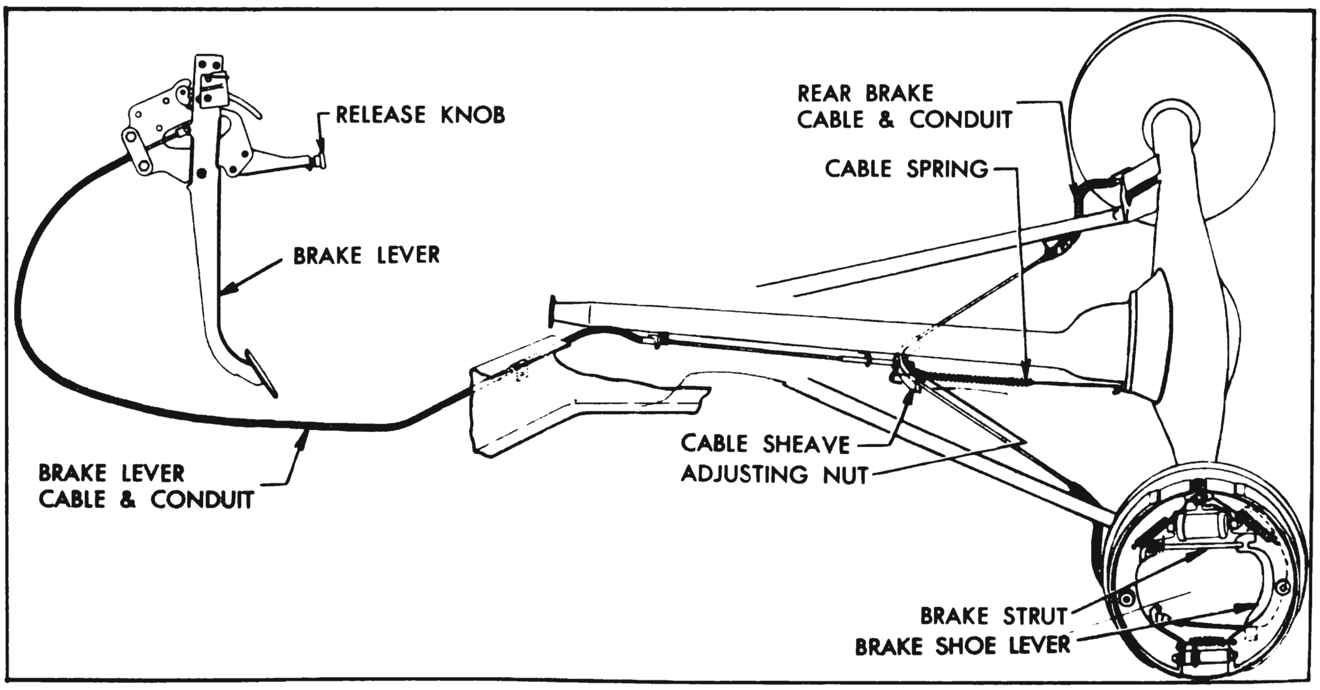

Figure 9-3—Parking Brake Control System

c. Service Brake Control System—Standard Brakes

NOTE: *See paragraph 9-15 for power brakes.*

The regular service brake control system consists of a suspended pedal, a direct acting displacement type master cylinder, a combined check valve and junction, brake pipes and hoses, and four wheel cylinders. See Figure 9-4.

The suspended pedal is hinged at the upper end on a bracket which is welded to the pedal plate. The pedal rotates on a nylon bushing. A nylon socket (located about ⅔ of the way down the pedal) engages the ball end of the master cylinder push rod.

The master cylinder is located on the under side of the pedal plate and is bolted to it from the inner side. The reservoir is filled from under the hood at the left side. The stop light switch is located in a hole drilled into the master cylinder.

The master cylinder contains a vented reservoir for reserve fluid and a cylinder or pressure chamber in which force applied to the brake pedal is transmitted to the fluid which actuates the brake shoes. A breather port and a compensating port permits passage of fluid between the reservoir and pressure chamber under certain operating conditions.

There are no adjustments on the pedal or on the master cylinder push rod. No lubrication is required due to use of nylon bushings.

A single pipe leads from the master cylinder to the check valve and junction assembly located outside the left frame side rail under the left front fender. From the junction a pipe goes forward to a tee between the front brakes; another pipe goes to a tee on the rear axle housing. From these two tees, pipes go to each individual wheel cylinder.

The check valve and junction block assembly, as the name implies, functions both as a distribution point and as a means of maintaining some pressure in the lines and wheel cylinders at all times. The body of the assembly includes a threaded opening at the top where the lower end of the master cylinder pressure line connects. The body also houses the check valve and spring and has a large threaded opening at the bottom to receive the distribution block and check valve seat. The check valve seat is of a rubber composition and is retained to the threaded end of the junction block by a flange. The junction block also functions as a head nut as well as having distribution passages and openings for the brake pipe fittings. See Figure 9-5C. The assembly also includes a large copper gasket used between the junction block and the body of the unit.

Each wheel cylinder contains two pistons and two rubber cups which are held in contact with the pistons by a central coil spring with cup expanders to provide a fluid-tight seal. The wheel cylinder cups are of a special heat resisting rubber. Cups of this material must have an expander to hold the lips of the cup out against the wheel cylinder bore. These cup expanders are crimped on each end of the wheel cylinder

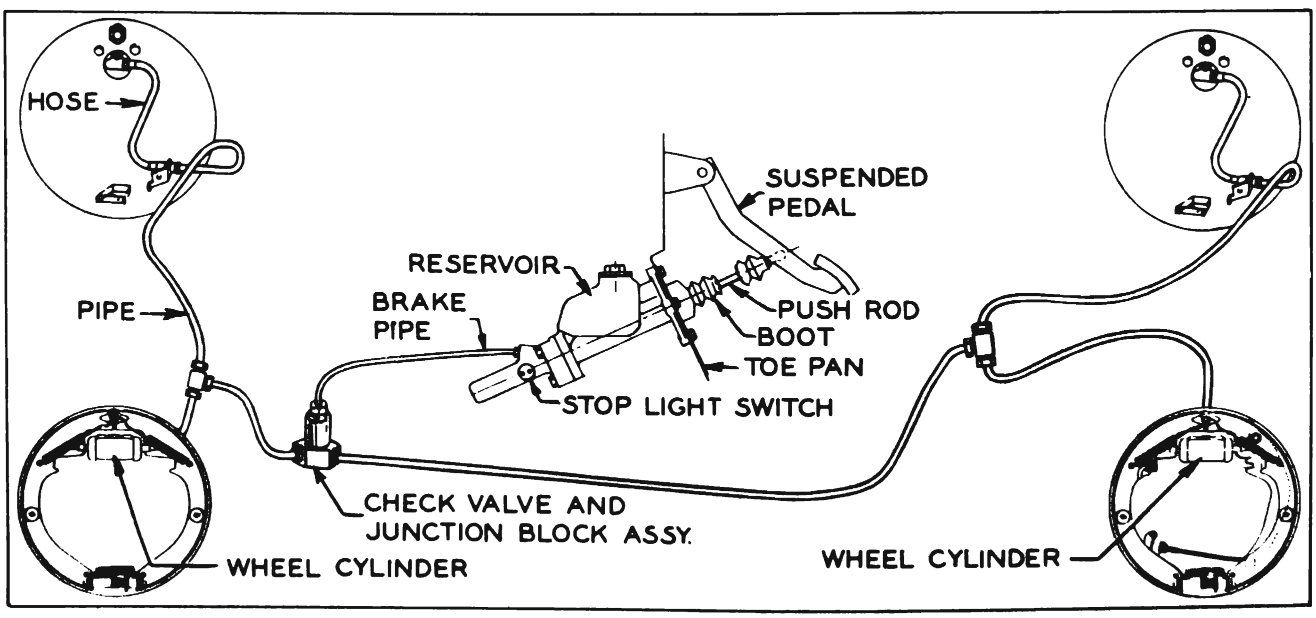

Figure 9-4—Service Brake Control System

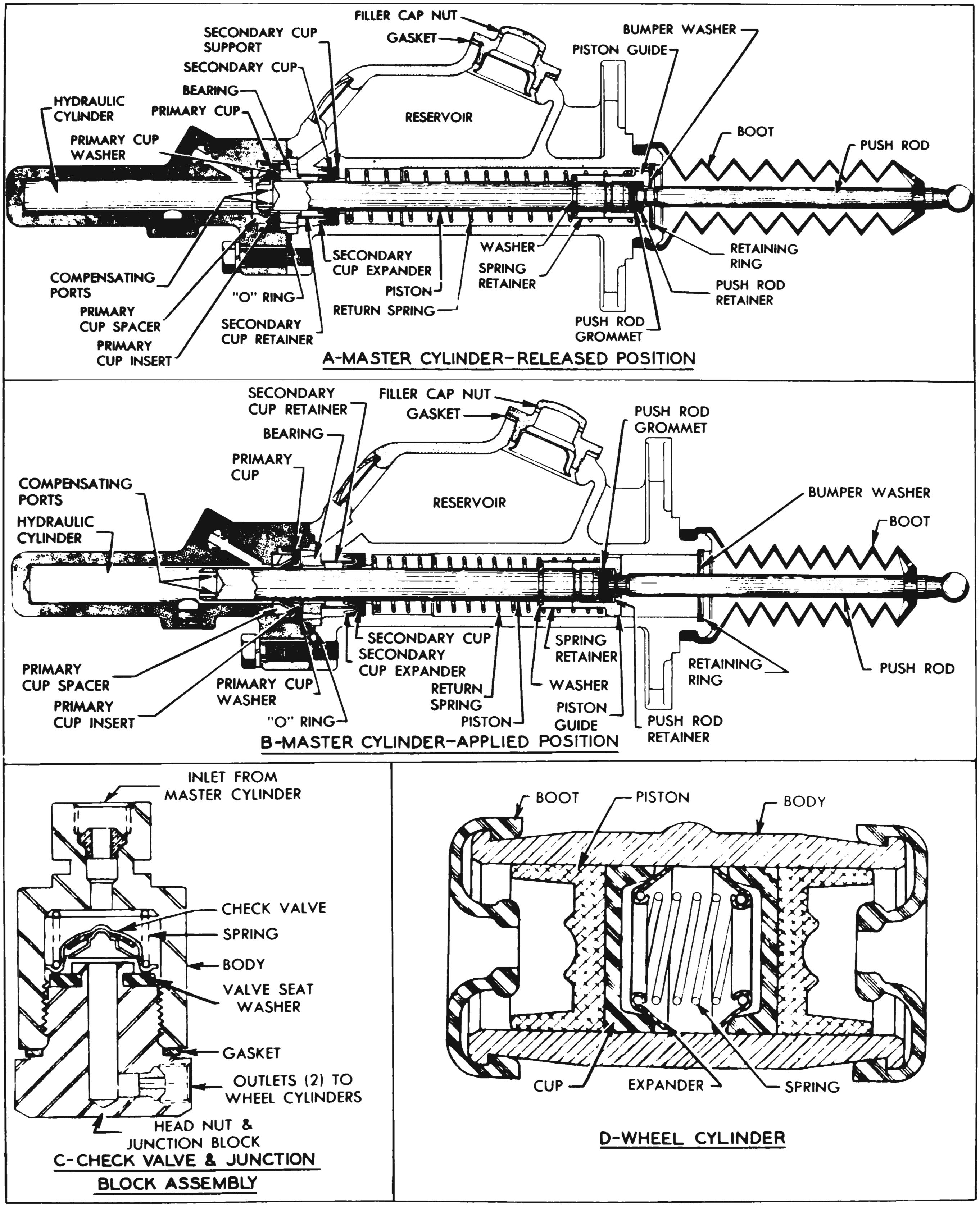

Figure 9-5—Hydraulic Components

spring. The inlet port for brake fluid is located between the pistons so that when fluid pressure is applied both pistons move outward towards the ends of wheel cylinders. The pistons impart movement to the brake shoes by means of connecting links which seat in pistons and bear against webs of shoes. Rubber boots enclose both ends of cylinder to exclude foreign matter. See figure 9-5D. A valve for bleeding the brake pipes and wheel cylinder is located above the inlet port.

9-3 OPERATION OF HYDRAULIC SERVICE BRAKES

NOTE: *See paragraph 9-15 for power brakes.*

When the brakes are in the released position, the master cylinder piston guide is held against the bumper washer by the piston return spring. The piston is held so that the compensating ports in the piston just clear the rear edge of the primary cup. This allows fluid from the reservoir to keep the hydraulic cylinder filled. See Figure 9-5A.

A check valve and junction assembly is located in the line on the outside of the left frame rail. It splits the fluid pressure toward the front and rear wheels and also holds a "static" pressure of 8-16 pounds in all pipes and wheel cylinders. This slight pressure helps to hold the lips of the wheel cylinder cups in firm contact with the cylinder walls to prevent loss of fluid or entrance of air.

When the brake pedal is depressed to apply the brakes, the push rod forces the master cylinder piston past the primary cup and into the hydraulic cylinder. See Figure 9-5B. As this movement starts, the lip of the primary cup covers the compensating ports in the end of the piston to prevent escape of fluid into the reservoir. Continued movement of the piston displaces fluid in the hydraulic cylinder which is then forced out into pipes leading to all wheel cylinders. Fluid forced into the wheel cylinders between the cups causes the pistons and connecting links to move outward and force the brake shoes into contact with the drums.

Movement of all brake shoes into contact with drums is accomplished with very light pedal pressure. Since pressure is equal in all parts of the hydraulic system, effective braking pressure cannot be applied to any one drum until all of the shoes are in contact with their respective drums; therefore the system is self-equalizing. After all shoes are contacting the drums, further force on brake pedal builds up additional pressure in the hydraulic system, thereby increasing the pressure of shoes against drums.

On rapid stops some car weight is transferred from the rear to the front wheels, consequently greater braking power is required at front wheels in order to equalize the braking effect at front and rear wheels. Greater pressure is applied to front brake shoes by using larger wheel cylinders, so that distribution of braking power is approximately 56% at front wheels and 44% at rear wheels.

When the brake pedal is released, the master cylinder piston return spring pushes the pedal back until the piston guide contacts the guide bumper washer in the master cylinder.

At the start of a fast release, the piston moves faster than fluid can follow it in returning from the pipes and wheel cylinders. Therefore, a partial vacuum is momentarily created in the hydraulic cylinder. The greater pressure in the reservoir causes the lip of the primary cup to collapse, allowing fluid to pass into the hydraulic cylinder and keep it filled.

As pressure drops in the master cylinder, the shoe return springs retract all shoes and the connecting links push the wheel cylinder pistons and cups inward, forcing fluid back to the master cylinder. Pressure of returning fluid causes a rubber disc in the check valve to close off all holes. The pressure then forces the check valve off its seat against the tension of the check valve spring, allowing fluid to flow around the check valve and into the hydraulic cylinder. With the master cylinder piston in its released position, the compensating ports in the piston just clear the rear edge of the primary cup. Excess fluid which passed the primary cup on a quick release, or was created by expansion due to increased temperature, now returns to the reservoir. See Figure 9-5A.

When pressure in the wheel cylinders and pipes becomes slightly less than the tension of the check valve spring, the check valve in the junction returns to its seat to hold 8 to 16 pounds of "static" pressure in the pipes and cylinders.