GROUP 9
BRAKES

SECTIONS IN GROUP 9

SECTION 9-A
BRAKE SPECIFICATIONS, DESCRIPTION, OPERATION

CONTENTS OF SECTION 9-A

9–1 BRAKE SPECIFICATIONS

a. Tightening Specification

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	Brake Cylinder and Pedal Mounting Bracket to Dash	3/8 -16	20-28
Nut	Rear Brake Assembly to Axle Housing	3/8 -24	50-70
Bolt & Nut	Front Brake Assembly and Steering Arm to Knuckle	7/16-20	60-82
Bolt	Front Brake Anchor Pin	1/2 -20	80-105
Screw	Attaching Wheel Cylinder to Backing Plate		10-12

b. General Specifications

Items	
Operating Mechanism, Service Brakes	Hydraulic
Parking Brakes	Lever and Cables
Operation of Service Brakes Independent of Parking Brakes	Yes
Wheels Braked, Service	Front and Rear
Parking	Rear Only
Approx. % of Total Braking Power on - Front Wheel Brakes	57
Rear Wheel Brakes	43
Brake Pedal Height Adjustment	Yes
Static Pressure in Hydraulic System when Brakes are Released	8 to 16 lbs.
Number of Brake Shoes at Each Wheel	2
Brake Type	Self Energizing-Servo
Brake Shoe Lining Type	1 pc., Molded-Riveted

b. General Specifications (Cont'd)

Items	
Front Shoe Lining Width x Minimum Thickness	2.50" x .196"
Rear Shoe Lining Width x Minimum Thickness	2.00" x .196"
Master Cylinder Piston Dia.	1"
Wheel Cylinder Size, Front	1 1/16"
Rear	.15/16"
Approved Hydraulic Brake Fluid	GM or Delco Super No. 11 or Equivalent
Fluid Level, Below Lip of Filler Opening	1/8"
Shoe Adjusting Screw Setting, from Point where Wheels can just be turned by hand	Back Off 30 Notches
Brake Drum Inside Diameter, New	9.495" to 9.505"
Brake Drum Rebore, Max. Allowable Inside Diameter	9.565"
Max. Allowable Taper, Before Rebore	.003"
Max. Allowable Out-of-Round, Before Rebore	.006"
Max. Allowable Out-of-Balance of Drum	2 in. oz.
Max. Allowable Space Between Lining and Shoe Rim after Riveting	.005"

9-2 DESCRIPTION OF BRAKE MECHANISM

The vehicle brake mechanism includes four brake drums, four wheel brake assemblies (each assemble with its own self-adjuster), and two separate and independent control systems including the service brake system and the parking brake system.

a. Wheel Brake Assemblies

Enclosing each wheel brake assembly is a brake drum which consists of a cast iron rim fused to a pressed steel disk. At all four wheels the rims are finned for external heat dissipation. The cast iron rim provides an ideal braking surface which increases brake lining life. See Figure 9-1.

Figure 9-1—Brake Drum

The brake assembly at each wheel uses a primary (front) and secondary (rear) brake shoe of welded steel construction. One-piece molded linings are attached to the brake shoes by 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 9-2.

Each brake shoe is held against the backing plate by a hold-down spring, pin, and cup which allows 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 spring connects the lower ends of both shoes together and provides adjustment for clearance with the brake drum. There is no anchor pin adjustment as the pins are fixed in the backing plates.

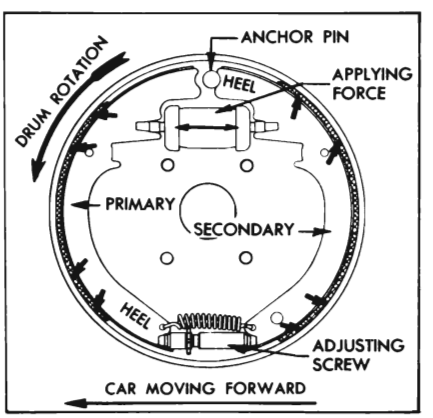

Figure 9-2—Brake Shoe Action

A hydraulic wheel cylinder 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 9-11.

During service brake application, in either direction of car travel, the brake shoes contact the rotating drum at each wheel and move with the drum until one shoe is stopped by the anchor pin and the other shoe is stopped through the connecting adjusting screw. Frictional force betweem 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 one shoe is imparted to the other shoe through the connecting adjusting screw.

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, which applies only the rear wheel brakes, uses a foot-operated lever, conduit enclosed cables, and brake shoe levers and struts. By means of an equalizer, the front parking brake cable is connected to the forward portion of a center cable. See Figure 9-3. This center cable is routed rearward from the equalizer through retaining guides which attach to right and left side frame rails. The center cable attaches at either end to a rear cable assembly. Each rear cable connects to the free lower end of a brake shoe lever. These levers (one in each brake shoe assembly) pivot on the secondary shoes. Struts are mounted between the brake shoe levers and the primary shoes. See Figure 9-12.

When the foot-operated lever is depressed, the cables apply an equal pull to each brake shoe lever. The levers and struts force all rear brake shoes into firm contact with brake drums. A rachet mechanism on the pedal-lever assembly automatically locks the control system in applied position. The brakes are released by pulling on the release knob.

c. Service Brake Control System

The regular foot-powered service brake control system is a pedal operated hydraulic system which applies the brakes at all four wheels with equalized pressure.

The hydraulic system consists of one master cylinder connected by pipes and flexible hoses to a wheel cylinder mounted between the brake shoes at each wheel. The master cylinder, pipes, hoses, and four wheel cylinders are filled with a special fluid. A 1/4" O.D. brake pipe connects the master cylinder assembly to a distributor located on the left frame rail. From the distributor, the right front brake pipe is routed forward a short distance to the front frame cross member and along the cross member to the right front hose bracket. The left front brake pipe extends across the top of the frame rail to the left front hose bracket. The center pipe extends rearward from the distributor, and follows the left frame rail to the rear frame cross member where it extends inboard and connects at the front o the cross member to the rear brake hose bracket. A flexible hose connects the center brake pipe to a rear tee block located at the center of the axle assembly. Two pipes lead from the tee block, one to the rear left wheel cylinder, and the other to the rear right wheel cylinder. See Figure 9-4.

The brake pedal is suspended from a pivot shaft on the pedal support. The master cylinder push rod clevis attaches directly to the shank of the pedal. The overall mechanical advantage in the brake linkage is approximately 6 to 1. See Figure 9-5.

The pivot shaft in the brake pedal has nylon bearings which are lubricated during installation, but do not require periodic lubrication. Whenever the linkage is disassembled, however, all friction surfaces should be lightly coated with Lubriplate. Because there is no pedal stop, the pedal is stopped in the "off" position by contact of the push rod with the stop plate in the master cylinder. A clevis threaded onto the end of the push rod makes it possible to adjust brake pedal height.

A plunger type stop light switch, which operates mechanically, is mounted on a bracket just rearward of the brake pedal. When the brakes are fully released, the brake pedal bears against the plunger and depresses it in "off" position. As the pedal arm moves forward during brake application, the spring-loaded plunger moves to the "on" position. See Figure 9-5.

The master cylinder contains a integrally cast fluid reservoir and a cylinderical pressure chamber in which force applied to the brake pedal is transmitted to the fluid that actuates the brake shoes. A breather port and a compensating port permit passage of fluid between the reservoir and the pressure chamber during certain operating conditions. The reservoir itself is sealed against entrance of outside atmosphere and possible contamination by a diaphragm located under the vented reservoir cover. During brake application and release, the fluid level within the reservoir changes; the diaphragm permits increase and decrease of fluid volume without the necessity of venting. A coil spring holds a check valve against the seat and also holds a rubber primary cup against the inner end of the piston. This cup and a rubber secondary cup on the outer end of the piston prevent excape of fluid past the piston. The piston is retained in the cylinder by a stop plate and lock ring. The push rod which actuates the piston extends through the stop plate, and a rubber boot is installed over this end of the cylinder to exclude foreign matter.

Each wheel cylinder contains two pistons and two rubber cups which

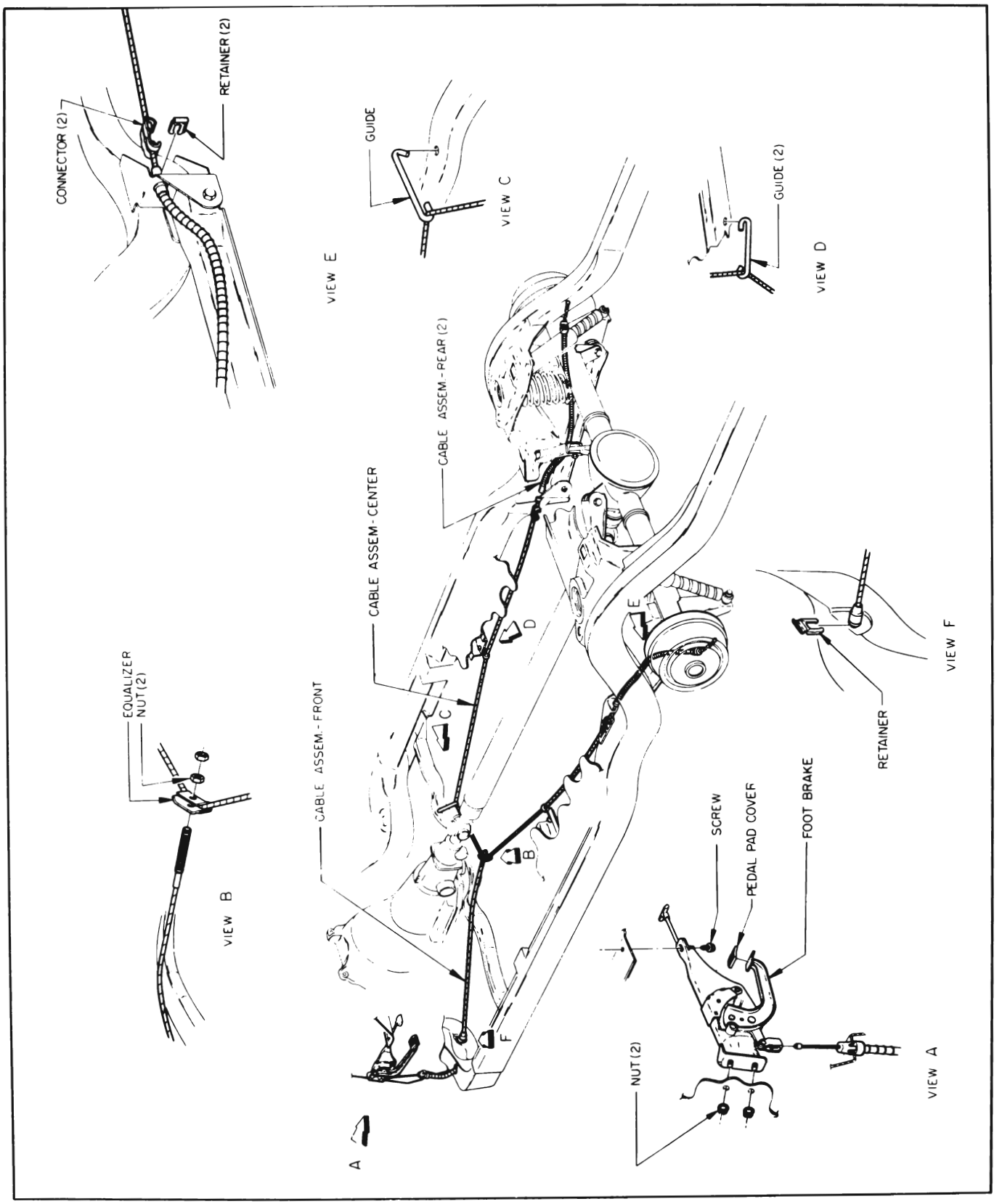

Figure 9-3—Parking Brake Control System

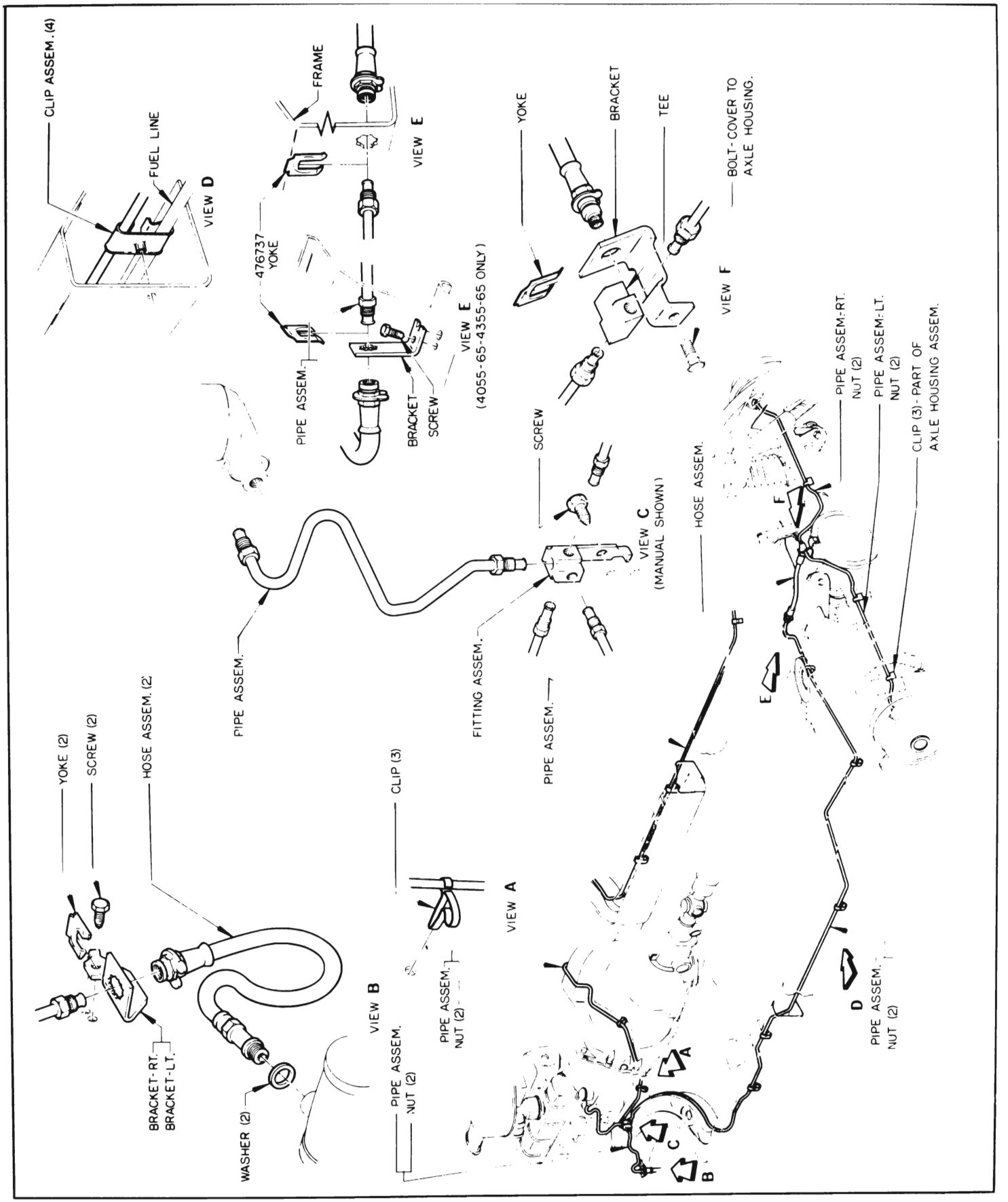

Figure 9-4—Service Brake Control System

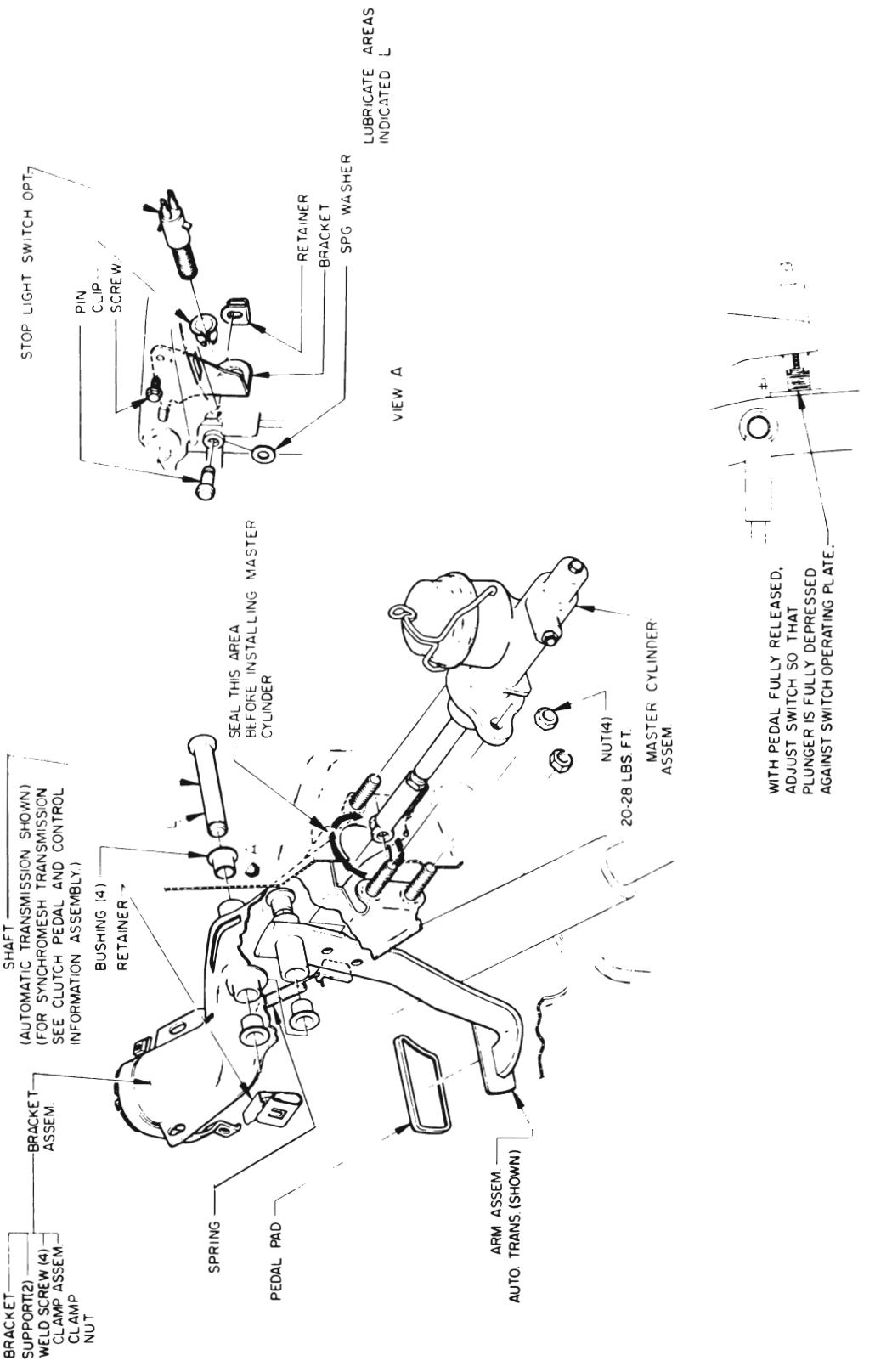

Figure 9-5—Mounting of Brake Pedal and Master Cylinder

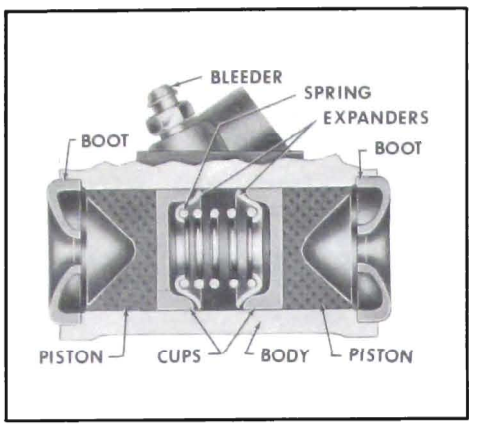

Figure 9-6—Wheel Cylinder Assembly

are held in contact with the pistons by a central coil spring with cup expanders to provide a fluid-tight seal. The wheel cylinders 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 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. A valve for bleeding the brake pipes and wheel cylinder is located above the inlet port. See Figure 9-6.

d. Self Adjusting Brake

The self adjusting brake mechanism consists of an actuator, actuator pivot, actuator return spring, override spring, and an actuating link. The self adjusting brake mechanism is mounted on the secondary shoes and operates only when the brakes are applied while the car is moving in a rearward direction and only when the secondary shoe moves a predetermined distance toward the brake drum. See Figure 9-7.

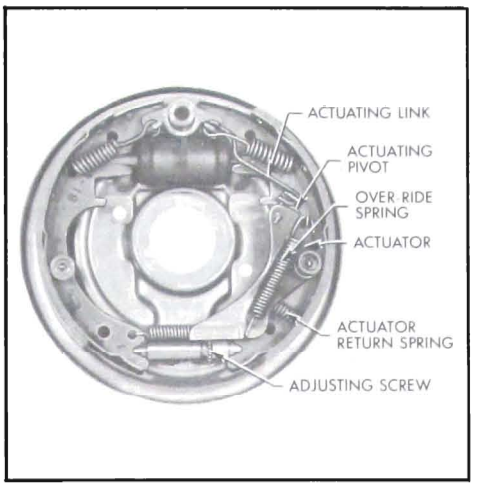

Figure 9-7—Front Left Brake Self-Adjuster Assembly

When the car is moved in a rearward direction and the brakes are applied, friction between the primary shoe and the drum forces the primary shoe against the anchor pin. Hydraulic pressure in the wheel cylinder forces the upper end of the secondary shoe away from the anchor pin, and the upper end of the actuator is prevented from moving by the actuating link. This will cause the actuator to pivot on the secondary shoe forcing the actuator lever against the adjusting screw star wheel. If the brake linings are worn enough to allow the secondary shoe to move the predetermined distance, the actuator will turn the adjusting screw one tooth. If the secondary shoe does not move the predetermined distance, movement of the actuator will not be great enough to rotate the adjusting screw.

When the brakes are released, the actuator return spring will return the actuator to adjusting position on the adjusting screw.

9-3 OPERATION OF HYDRAULIC SERVICE BRAKES

When the brakes are fully released, the master cylinder piston is held against the stop plate and the primary cup is held just clear of the compensating port by the master cylinder spring, which also holds the check valve against its seat on the valve seat washer. The pressure chamber is filled with fluid at atmospheric pressure due to the open compensating port and the flexible reservoir diaphragm. All pipes and wheel cylinders are filled with fluid under a "static" pressure of 8-16 pounds, which helps to hold the lips of the wheel cylinder cups in firm contact with cylinder walls to prevent loss of fluid or entrance of air. See Figure 9-8, view A.

When the brake pedal is depressed to apply the brakes, the push rod forces the master cylinder piston and primary cup forward. As this movement starts, the lip of the primary cup covers the compensating port to prevent escape of fluid into the reservoir. Continued movement of the piston builds pressure in the pressure chamber and fluid is then forced through holes in the check valve and out into the pipes leading to all wheel cylinders. Fluid forced into the wheel cylinders between the pistons and cups causes the pistons and connecting links to move outward and force the brake shoes into contact with the drums. See Figure 9-8, view B.

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

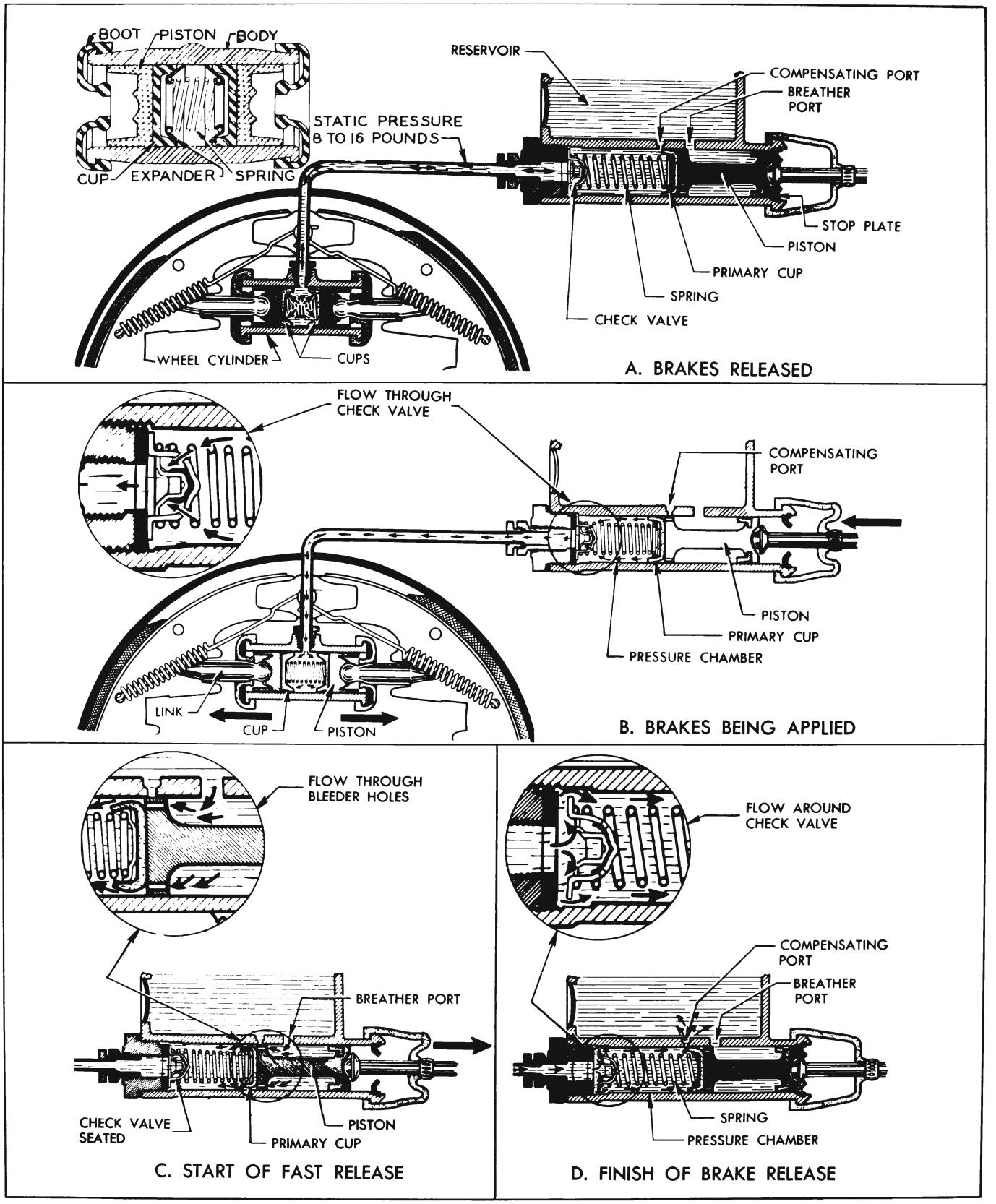

Figure 9-8—Operation of Brake Hydraulic System

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 57% at front wheels and 43% at rear wheels.

When the brake pedal is released, the master cylinder spring forces the pedal back until the push rod contacts the stop plate in master cylinder. This spring also forces the piston and primary cup to follow the push rod and presses the check valve firmly against its seat.

At 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 pressure chamber. Fluid supplied through the breather port is then drawn through the bleeder holes in piston head and past the primary cup to keep the pressure chamber filled. See Figure 9-8, View C.

As pressure drops in master cylinder the shoe springs retract all brake shoes and the connecting links push the wheel cylinder pistons inward, forcing fluid back to master cylinder. Pressure of returning fluid causes a rubber disc to close all holes in the check valve and forces the check valve off its seat against the tension of master cylinder spring; fluid then flows around the check valve into the pressure chamber. With the piston bearing against the stop plate and the lip of the primary cup just clear of the compensating port, excess fluid which entered through the bleeder holes, or was created by expansion due to increased temperature, now returns to reservoir through the uncovered compensating port. See Figure 9-8, view D.

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