SINGLE PISTON DISC BRAKE
ALL SERIES

CONTENTS

DESCRIPTION AND OPERATION

DESCRIPTION

The major components of the disc brake mechanism are the hub and rotor assembly, the caliper assembly, and the shoe and lining assemblies.

The single piston disc brake is constructed from a single casting which contains one large piston bore in the inboard section of the casting. The fluid inlet hole and bleeder valve hole are machined into the inboard section of the caliper and connect directly to the piston bore. See Figure 5B-1.

The shoe and lining assemblies are constructed of a stamped metal shoe with the lining riveted to the shoe. The outboard shoe and lining differs from the inboard shoe and lining as shown in Figure 5B-2.

1. The outboard shoe and lining assembly has a thinner metal shoe with slightly thinner lining.

2. The outboard shoes have ears near the outer edge which are bent over at right angles to the shoe. The top ends of the shoe have looped ears with holes in them which the caliper retaining bolts fit through. The large tab at the bottom of the shoe is bent over at a right angle and fits in the cut-out in the outboard section of the caliper. The inboard shoe and lining has ears on the top ends which fit over the caliper retaining bolts. A special spring inside the hollow piston supports the bottom edge of the inboard shoe.

3. A lining wear sensor has been incorporated on each inboard brake shoe. This lining wear sensor will produce an audible warning high-frequency sound similar to brake squeak at the beginning of front brake lining wear-out.

A plastic bleeder screw protector will be installed on all front disc brake calipers. These protectors will minimize corrosion and seizure of bleeder screws in the caliper casting. See Figure 5B-3.

Combination Valve - Description

A combination valve is used on all cars equipped with disc brakes. The valve combines the functions of a front brake hold-off (metering) valve, a rear brake pressure proportioning valve, and a hydraulic differential pressure switch; hence, the name "combination" valve. The valve is mounted on the left front side rail of the frame and is connected to the master cylinder and wheel cylinders through hydraulic lines

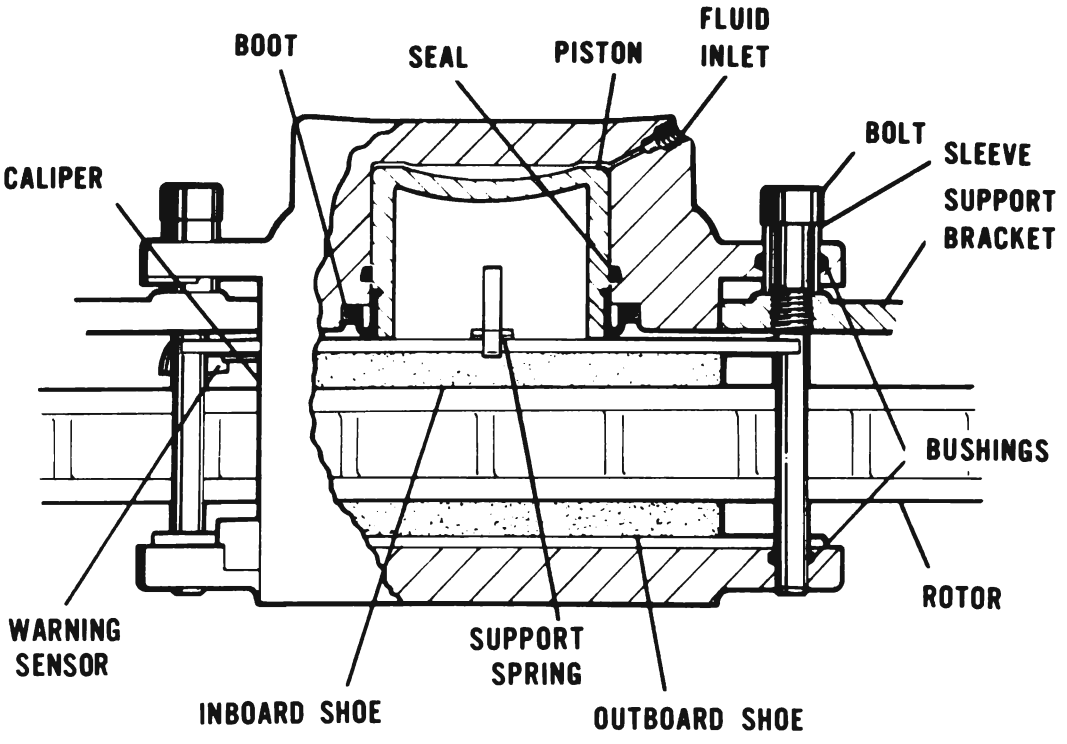

Figure 5B-1 - Single Piston Disc Brake

(see Figure 5B-4). A wiring harness connects the electrical terminal of the differential pressure switch to the brake warning light on the instrument panel.

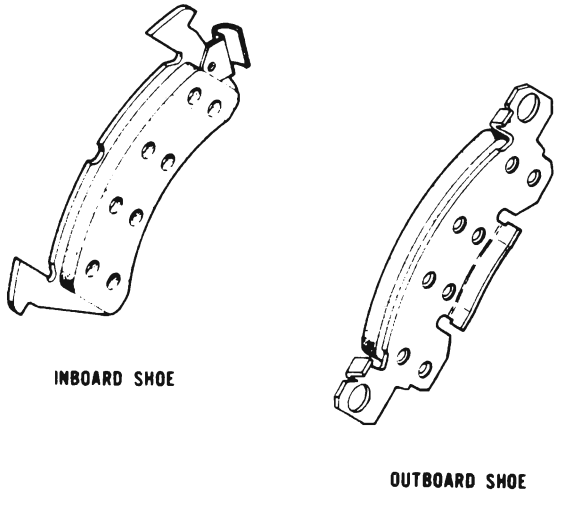

Figure 5B-2–Brake Shoe and Lining Assemblies

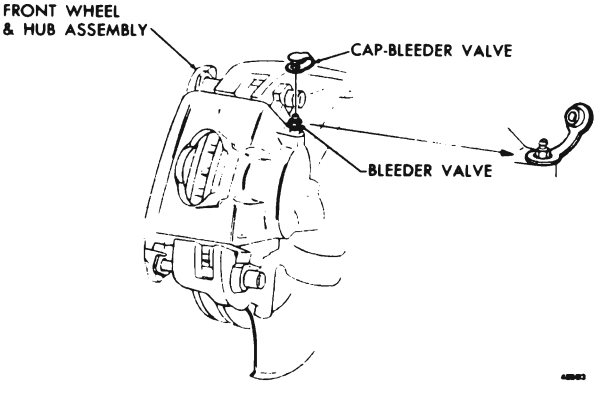

Figure 5B-3 Bleeder Valve Cap

OPERATION

The significant feature of the single piston caliper operation is that it is free to slide on the two mount-

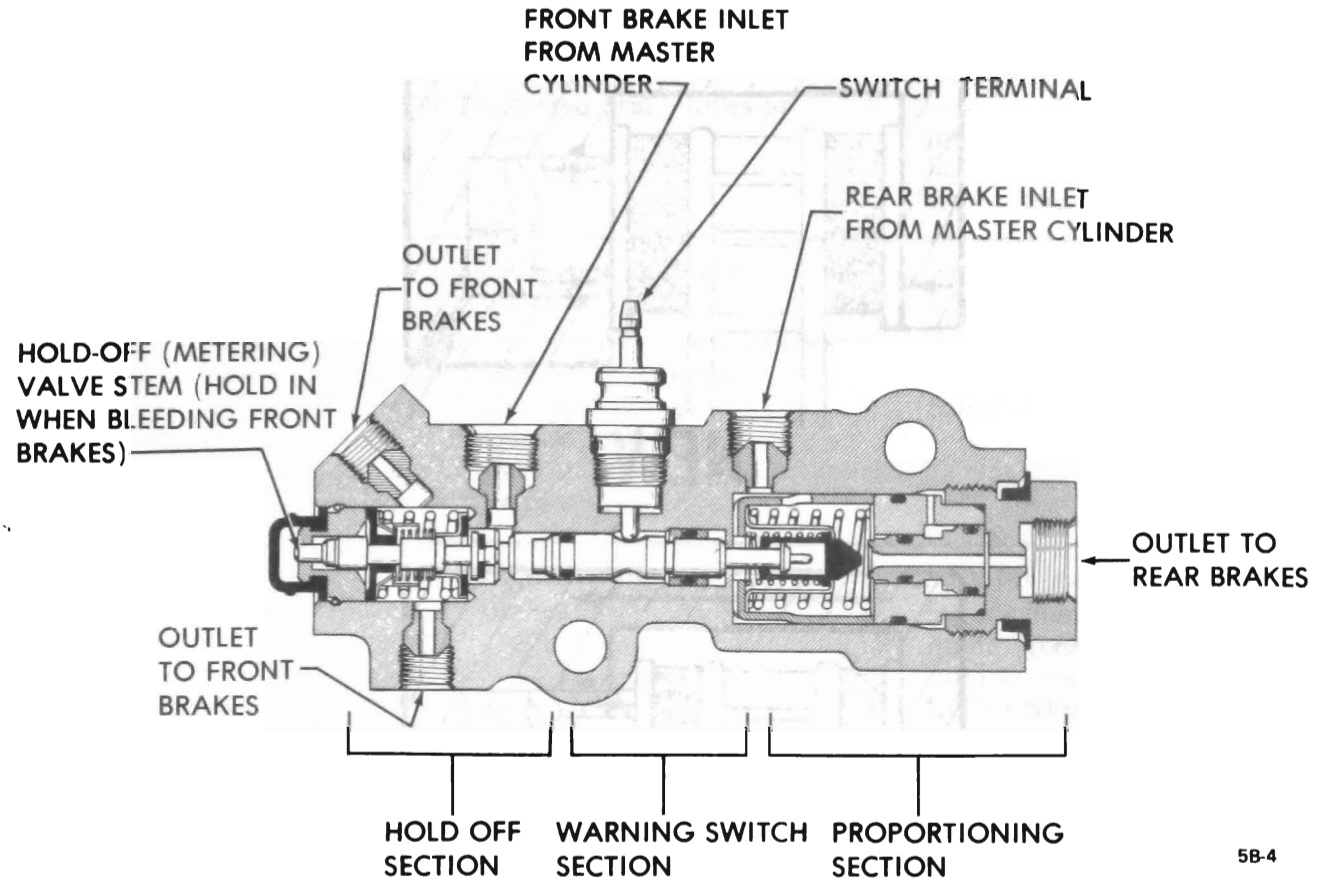

Figure 5B-4 - Combination Valve

ing bolts which thread into the support bracket. Figure 5B-5 shows a simplified cross section of the caliper, with both new and worn linings, and the forces at work when the brakes are applied.

Upon application of the brakes, the fluid pressure behind the piston increases. Pressure is exerted equally against the bottom of the piston and also against the bottom of the piston bore. The pressure applied to the piston is transmitted to the inboard shoe and lining, forcing the lining against the inboard rotor surface. The pressure applied to the bottom of the piston bore forces the caliper to slide or move on the mounting bolts toward the inboard side, or toward the car. Since the caliper is one piece, this movement toward the car causes the outboard section of the caliper to apply pressure against the back of the outboard shoe and lining assembly, forcing the lining against the outboard rotor surface. As the line pressure builds up, the shoe and lining assemblies are pressed against the rotor surfaces with increased force, bringing the car to a stop.

Combination Valve - Operation

The hold-off section of the valve limits pressure to the front disc brakes until a pre-determined front input pressure is reached. There is no restriction at inlet pressures below 3 psi. The purpose of the hold-off valve is to limit pressure to the front disc brakes until the rear drum brakes are activated (rear line pressure must overcome the rear brake shoe return spring tension before the rear brakes actuate).

The proportioning section of the valve proportions outlet pressure to the rear brakes after a pre- determined rear input pressure has been reached. This is done to prevent rear wheel lock-up on vehicles with light rear wheel loads. Certain models having high rear wheel loads do not have the proportioning feature. The valve is designed to have a "by-pass" feature which assures full system pressure to the rear brakes in the event of a front brake system failure.

The differential pressure warning switch is designed to constantly compare front and rear brake pressure from the master cylinder and energize the warning light on the dash in the event of a front or rear system failure. The valve and switch are so designed that the switch will latch in the "warning" position once a failure has occurred. The only way the light can be turned off is to repair the failure and apply a pedal force as required to develop up to 450 psi line pressure.

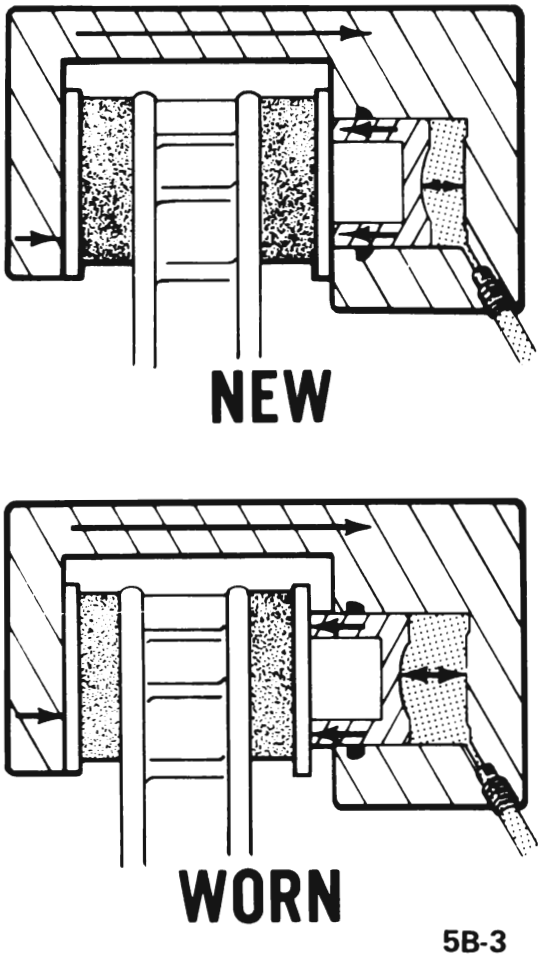

Figure 5B-5 Simplified Cross Section

DIAGNOSIS

SINGLE PISTON DISC BRAKE TROUBLE DIAGNOSIS

Condition	Possible Cause	Correction
Pulls	1. Incorrect tire pressures.	1. Inflate evenly on both sides to the recommended pressures.
	2. Front end out of line	2. Check and align to manufacturer's specifications.
	3. Unmatched tires on same axle.	3. Tires with approximately the same amount of tread should be used on the same axle.

Condition	Possible Cause	Correction
	4. Restricted brake tubes or hoses.	4. Check for soft hoses and damaged lines. Replace with new hoses and new double-walled steel brake tubing.
	5. Malfunctioning caliper assembly.	5. Check for stuck or sluggish pistons, proper lubrication.
	6. Defective or damaged shoe and lining (grease or brake fluid on lining or bent shoe).	6. Install new shoe and lining in complete axle sets.
	7. Malfunctioning rear brakes.	7. Check for inoperative auto adjusting mechanism, defective lining (grease or brake fluid on lining) or defective wheel cylinders. Repair as necessary.
	8. Loose suspension parts.	8. Check all suspension mountings.
	9. Loose calipers.	9. Check and torque bolts to specifications.
Noise (high pitched squeak without brake applied).	1. Front linings worn out.	1. Replace linings.
Brake Roughness or Chatter (Pedal Pulsates)	1. Excessive lateral runout.	1. Check per instructions and replace or machine the rotor, if not within specifications.
	2. Parallelism not within specifications.	2. Check per instructions and replace or machine the rotor, if not within specifications.
	3. Wheel bearings not adjusted.	3. Adjust wheel bearings to correct specifications.
	4. Rear drums out of round.	4. Check runout and, if not within specifications, turn the drums (not over maximum of 0.060 on the diameter).
	5. Shoe reversed (steel against iron).	5. Replace shoe and lining and machine rotor within specifications.
Excessive Pedal Effort	1. Malfunctioning power brake.	1. Check power brake and repair if necessary.

Condition	Possible Cause	Correction
	2. Partial system failure.	2. Check front and rear brake system and repair, if necessary. Also, check brake warning light, if a failed system is found and light did not function.
	3. Excessively worn shoe and lining.	3. Check and replace in axle sets.
	4. Piston in caliper stuck or sluggish.	4. Remove caliper and rebuild.
	5. Fading brakes due to incorrect lining.	5. Remove and replace with original equipment lining.
Excessive Pedal Travel	1. Partial brake system failure.	1. Check both front and rear system for a failure and repair. Also check warning light. It should have indicated a failure.
	2. Insufficient fluid in master cylinder.	2. Fill reservoirs with approved brake fluid. Check for leaks. Check warning light.
	3. Air trapped in system.	3. Bleed system.
	4. Rear brake not adjusting.	4. Adjust rear brakes and repair auto adjusters.
	5. Bent shoe and lining.	5. Replace axle set of shoe and lining.
Dragging Brakes (A very light drag is present in all disc brakes immediately after pedal is released).	1. Master cylinder pistons not returning correctly.	1. With reservoir cover off, check for fluid spurt at bypass holes as pedal is depressed. Adjust push rod, if necessary, or rebuild master cylinder.
	2. Restricted brake tubes or hoses.	2. Check for soft hoses or damaged tubes and replace with new hoses and new double-walled steel brake tubing.
	3. Incorrect parking brake adjustment on rear brakes.	3. Check and readjust to correct specifications.
	4. Check valve installed in outlet to front disc brakes.	4. Check master cylinder outlet and remove check valve if present.
Grabbing or Uneven Braking Action	1. All conditions listed under "PULLS".	1. All corrections listed under "PULLS".

Condition	Possible Cause	Correction
	2. Malfunction of combination valve.	2. Replace and bleed system.
	3. Malfunction of power brake unit.	3. Check operation and repair, if necessary.
	4. Binding brake pedal mechanism.	4. Check and lubricate, if necessary.
Pulsation (roughness) Felt in car during normal brake application.	Uneven Rotor wear causing a thickness variation between the two braking surfaces.	1. Machine Rotor as follows: a. Machine rotors to obtain a thickness variation no greater than .0005" and a lateral runout no greater than .004". b. Check caliper freeness. With rotor removed, install caliper and mounting bolts (pins). Check for .005"-.012" clearance at both top and bottom of caliper. See Figure 5B-6. If less than .005: is found, file with a flat file until at least .005" is obtained. DO NOT EXCEED A MAXIMUM of .012" per end or .024" total clearance. Caliper clearance to inboard and outboard reaction pads must be equal within .004" both at the top and bottom of the caliper. This is to ensure correct alignment of caliper to knuckle during a brake application. c. Remove caliper after freeness check. Clean pins and sleeves, replace "O" rings, and apply a light coating of silicone grease or equivalent to all contact points and "O" rings. d. Install reconditioned rotors and set bearing adjustment end play. e. Inspect linings - clean foreign material from rivet holes. f. Reinstall calipers. g. Pump brake pedal to seat shoes before attempting to move car.

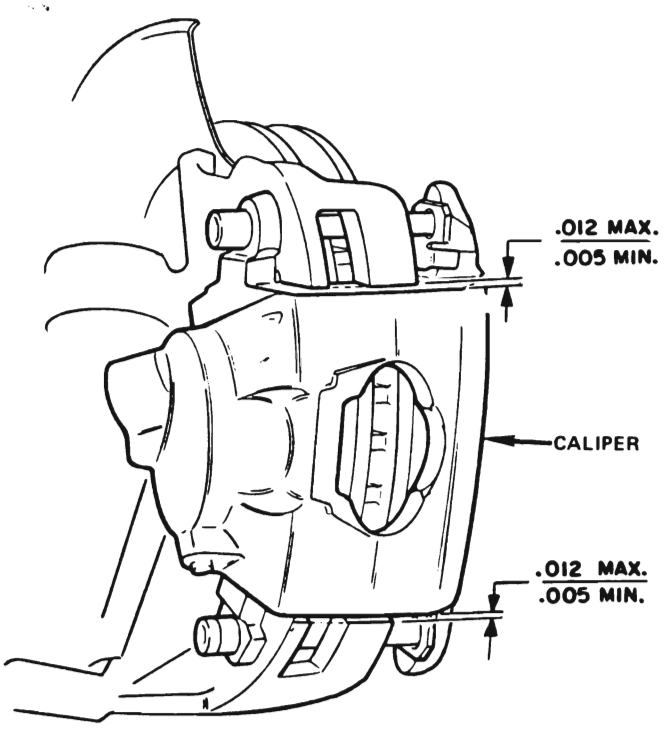

Figure 5B-6

Testing Electrical Circuit of Combination Valve

1. Disconnect wire from switch terminal and use a jumper to connect wire to a good ground.

2. Turn ignition key to "On" - warning lamp should

light. If lamp does not light, bulb is burned out or electrical circuit is defective. Replace bulb or repair electrical circuit as necessary.

3. When warning lamp lights, turn ignition switch off. Disconnect jumper and reconnect wire to switch terminal.

Testing Warning Light Switch Portion of Combination Valve

1. 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. Be sure master cylinder reservoirs are full.

2. Turn ignition switch to "On" - open bleeder screw while a helper applies moderate pressure to the brake pedal. Warning lamp should light. Close bleeder screw before helper releases brake pedal. Reapply brake pedal with moderate-to-heavy pressure. Light should go out.

3. Attach the bleeder hose to a front brake bleeder screw and repeat above test. Warning lamp action should be the same as in Step No. 2. Turn ignition switch off.

4. If warning lamp does not light during Steps 2 and 3 but does light when a jumper is connected to ground, the warning light switch portion of the combination valve is defective. Do not attempt to disassemble the combination valve. If any portion of the combination valve is defective, it must be replaced with a new combination valve.

MAINTENANCE AND ADJUSTMENTS

SHOE AND LINING REPLACEMENT

Lining Inspection

Inspect the brake linings every 6,000 miles and any time that the wheels are removed (tire rotation, etc.). Check both ends of the outboard shoe by looking in at each end of the caliper. See Figure 5B-7. These are the points at which the highest rate of wear normally occurs. However, at the same time, check the lining thickness on the inboard shoe to make sure that it has not worn prematurely. Look down through the inspection hole in the top of the caliper to view the inboard shoe. Whenever the thickness of any lining is worn to within .020 of rivet at either end of the shoe, all disc brake shoe and lining assemblies should be replaced at the same time. See Figure 5B-8.

Caliper Removal

1. Remove two thirds of the total fluid capacity from the front master cylinder reservoir. Removal of the fluid is necessary to prevent reservoir overflow when the caliper piston is pushed back in its bore to remove the caliper. This may be done by breaking the front line connection at the master cylinder and bleeding down the fluid level. Do not remove the brake line or completely empty the reservoir or it will be necessary to bleed the hydraulic system. Discard -- do not attempt to reuse -- the brake fluid removed.

2. Raise the car and remove the wheel covers and wheel assemblies. Position a 7 inch "C" clamp on the caliper so that the solid side of the clamp rests against the inside of the caliper and the screw end rests against the metal part of the outboard shoe. See

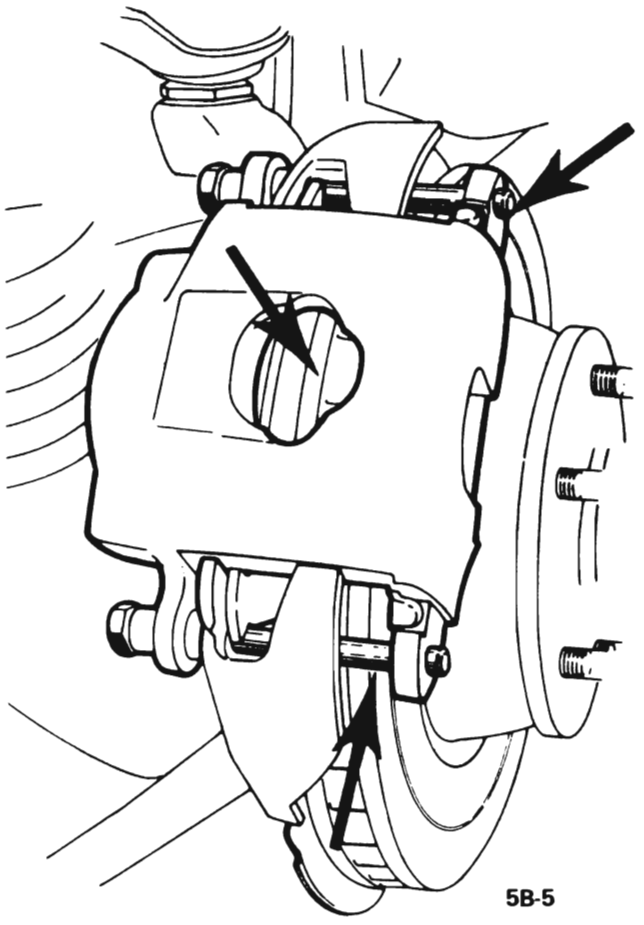

Figure 5B-7–Lining Inspection

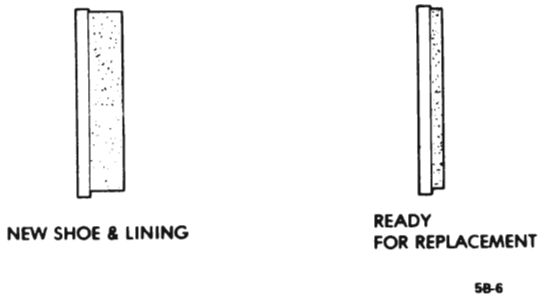

Figure 5B-8–New and Worn Linings

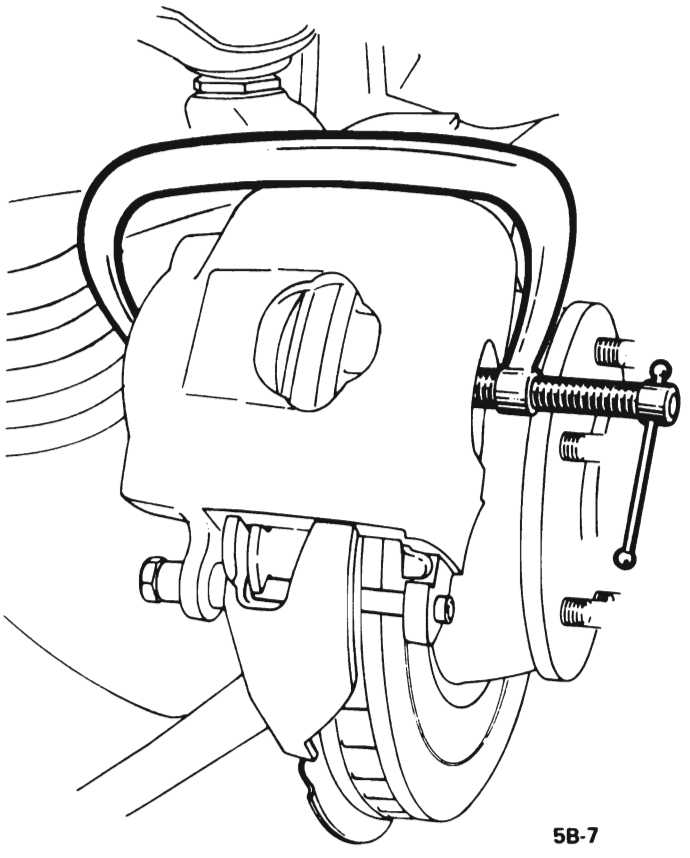

Figure 5B-9 Use of C Clamp

Figure 5B-9. Tighten the "C" clamp until the caliper moves away from the car far enough to push the piston to the bottom of the piston bore. This will allow the shoes to back off from the rotor surfaces. Remove the "C" clamp.

3. It is not necessary to disconnect the brake hose for shoe and lining replacement. Remove the two mounting bolts which attach the caliper to the support bracket. See Figure 5B-10. Lift the caliper off the rotor and remove the inboard shoe. *Dislodge the outboard shoe and position the caliper on the front suspension arm so that the brake hose will not support the weight of the caliper. Remove the shoe support spring from the cavity in the piston.*

4. Using tool, No. J-22835, remove the sleeves from the inboard ears of the caliper. See Figure 5B-11. Next, remove the rubber bushings from the grooves in each of the four caliper ears.

Cleaning and Inspection

1. Thoroughly clean the holes and the bushing grooves in the caliper ears. Wipe all dirt from the mounting bolts. Do not use abrasives on the bolts since this will damage the plating. If the bolts are corroded, or damaged, they should be replaced.

2. Examine the inside of the caliper for evidence of

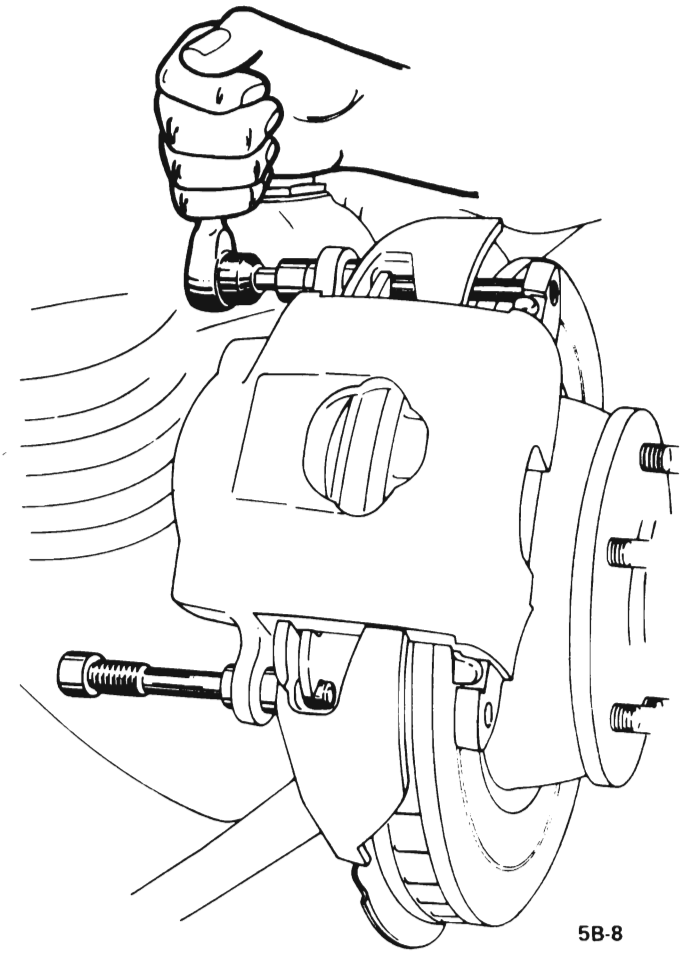

Figure 5B-10–Removing Mounting Bolts

fluid leakage. If leakage is noted, the caliper should be overhauled. Wipe the inside of the caliper clean, including the exterior of the dust boot. Check the boot for cuts, cracks or other damage. Make sure

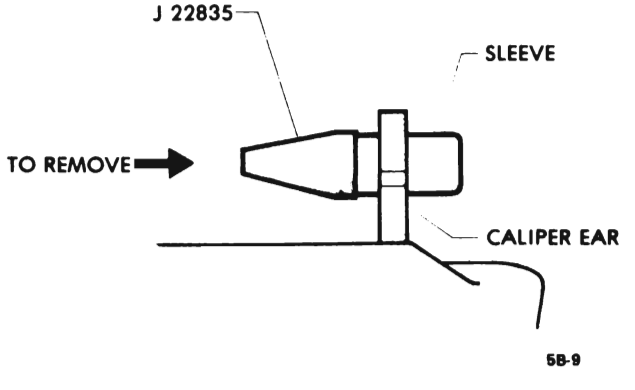

Figure 5B-11 - Remove Sleeves

that the boot is properly engaged in the groove in the piston and also in the caliper counter-bore. See Figure 5B-12.

CAUTION: *Do not use compressed air to clean the inside of the caliper since this may cause the dust boot to become unseated.*

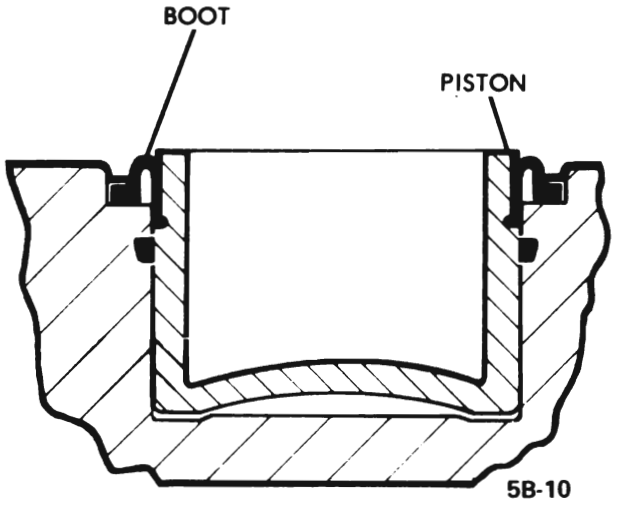

Figure 5B-12–Boot Installation

3. If the vehicle has a brake problem and diagnosis points to the rotor, it should be inspected and checked for runout at this time.

Caliper Installation

1. Using Buick Silicone Lube, No. 1050243, or equivalent, lubricate new sleeves, on all surfaces. Lubricate new rubber bushings, bushing grooves and the small ends of bushings in all four caliper ears. See Figure 5B-13. Install rubber bushings in all four caliper ears.

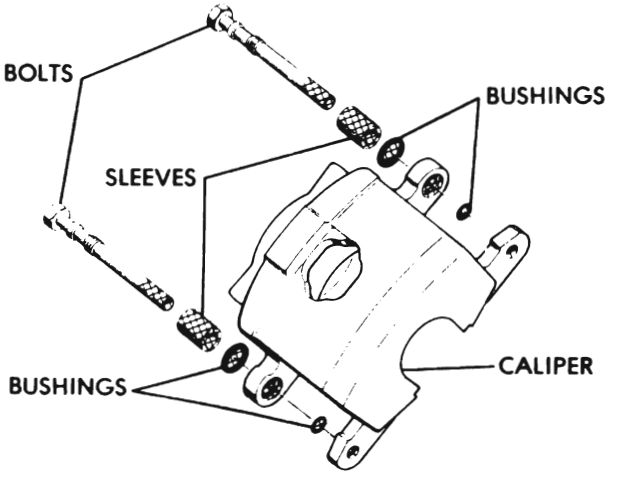

Figure 5B-13–Lubrication

CAUTION: *It is essential that the new sleeves and rubber bushings be used and that lubrication instructions be followed in order to insure the proper functioning of the sliding caliper design.*

2. Use Tool, J-22835, to install the sleeves. See Figure 5B-14. Position the sleeves so that the end toward the shoe and lining assemblies is flush with the machined surface of the ear.

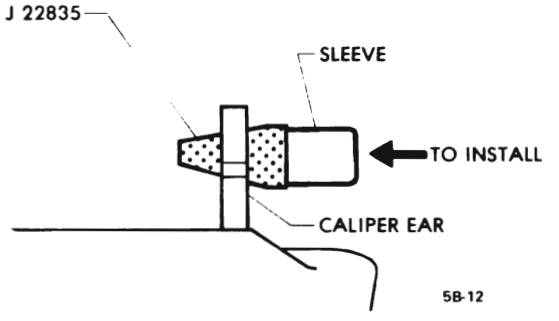

Figure 5B-14–Sleeve Installation

3. Install the shoe support spring by replacing the single tang end of the spring over the notch in the center of the edge of the shoe. Then press the two tangs at the spring end of the inboard shoe spring over the bottom edge of the shoe so that they engage the shoe securely, as shown in Figure 5B-15.

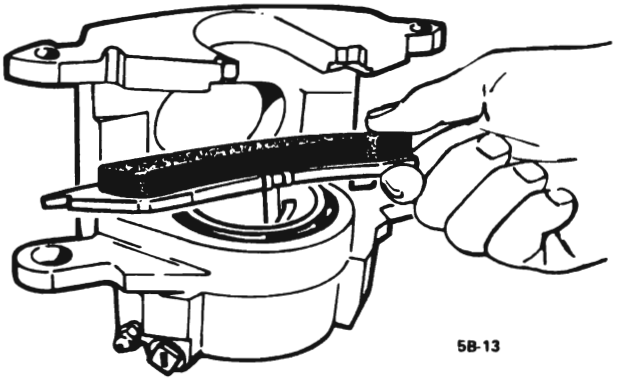

Figure 5B-15–Inserting Shoe Support Spring

4. Position the inboard shoe and lining assembly (with spring attached) in the caliper so that the ear

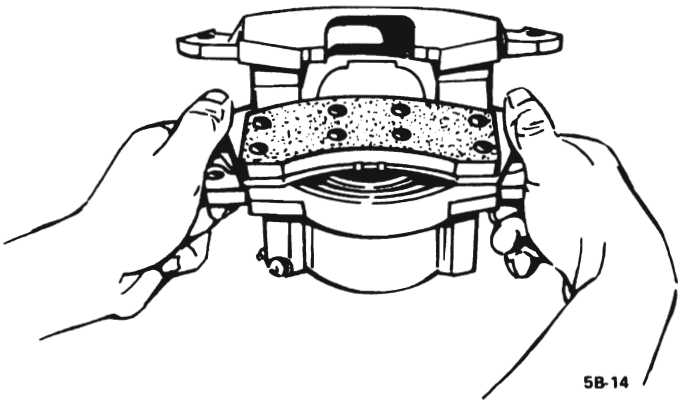

Figure 5B-16–Installing Inboard Shoe

end of the shoe and lining is down and the bottom end up at an angle with the spring resting on the piston I.D. See Figure 5B-16. Press down on both ends of the shoe until the shoe is in a flat position, resting on the piston. The spring end of the inboard shoe support spring should be resting on the I.D. of the piston.

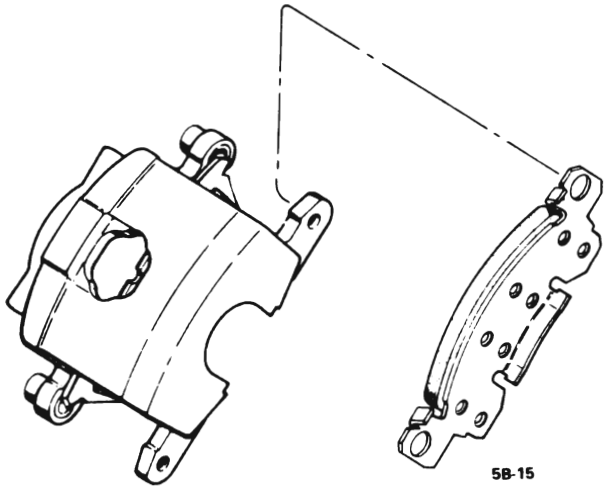

Figure 5B-17–Installing Outboard Shoe

5. Position the outboard shoe in the caliper, with the ears at the top of the shoe over the caliper ears and the tab at the bottom of the shoe engaged in the caliper cut-out. See Figure 5B-17. Be sure to note right and left brake shoes.

6. Position the caliper over the rotor, lining up the holes in the caliper ears with the holes in the mounting bracket. *Make sure that the brake hose is not twisted or kinked.* Start the bolts through the sleeves in the inboard caliper ears and through the mounting bracket, making sure that the ends of the bolts pass under the retaining ears on the inboard shoe. See Figure 5B-18. Push bolts on through to engage the holes in the outboard shoes and the outboard caliper ears at the same time, threading the bolts into the mounting bracket. Torque the bolts to 35 lb.ft.

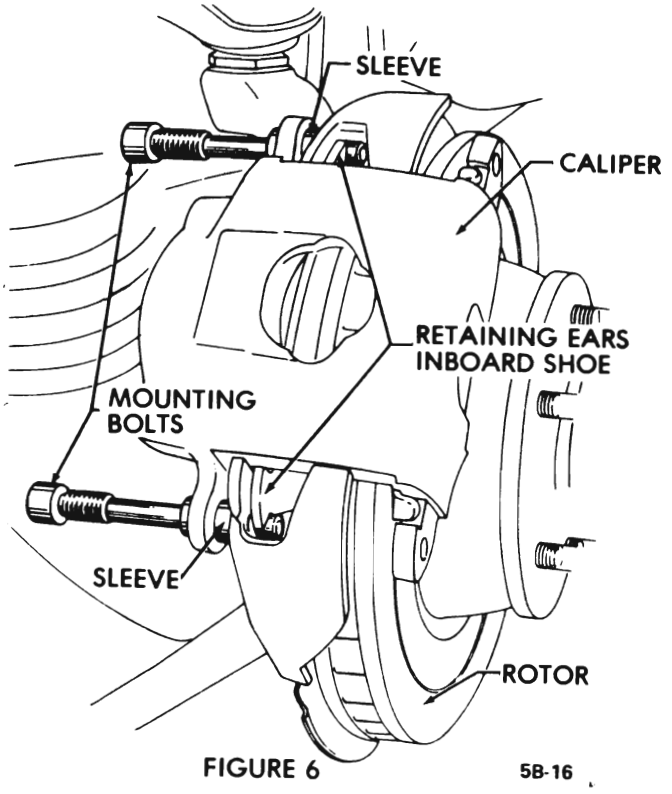

Figure 5B-18 Installing Mounting Bolts

CAUTION: *This disc brake caliper attachments fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

7. Add fresh approved brake fluid to the master cylinder reservoirs to bring the level up to within 1/8 inch of the top.

8. Pump brake pedal to seat linings against rotor.

9. Clinch upper ears of outboard shoe by positioning channel lock pliers with one jaw on top of upper ear and one jaw in notch on bottom of shoe opposite upper ear. See Figure 5B-19.

10. After clinching ears are to be flat against caliper housing with no radial clearance.

11. If radial clearance exists, repeat clinching procedure.

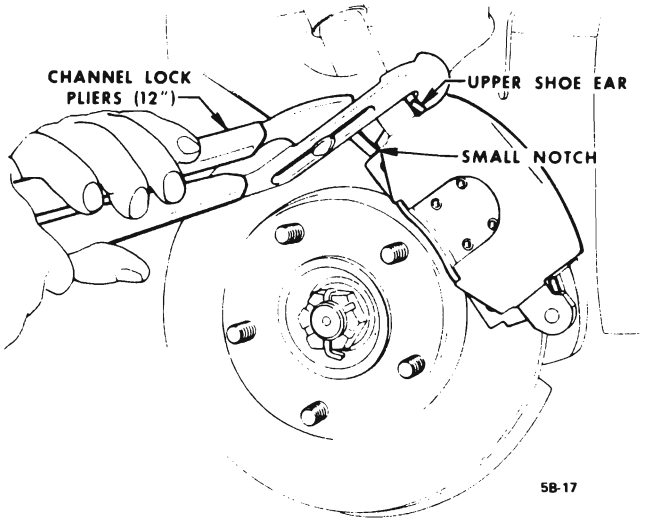

Figure 5B-19 Clinching Outboard Shoe

Completion

1. Replace the shoe and linings on the other front wheel disc brake in exactly the same manner as just described. Relining is to be done in full axle sets only. When completed, reinstall the wheel and tire assemblies. Torque wheel nuts to 70 lb. ft. Install wheel covers and lower the car to the floor. safely stopped.

CAUTION: *This wheel to brake drum and-/or axle shaft fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

2. Whenever the front wheel disc brakes are relined, the rear drum brakes should be checked also.

COMBINATION VALVE REPLACEMENT

The combination valve is not repairable and must be serviced as a complete assembly. See Figure 5B-20.

1. Disconnect hydraulic lines at combination valve. Plug lines to prevent loss of fluid and entrance of dirt. Disconnect warning switch wiring harness from

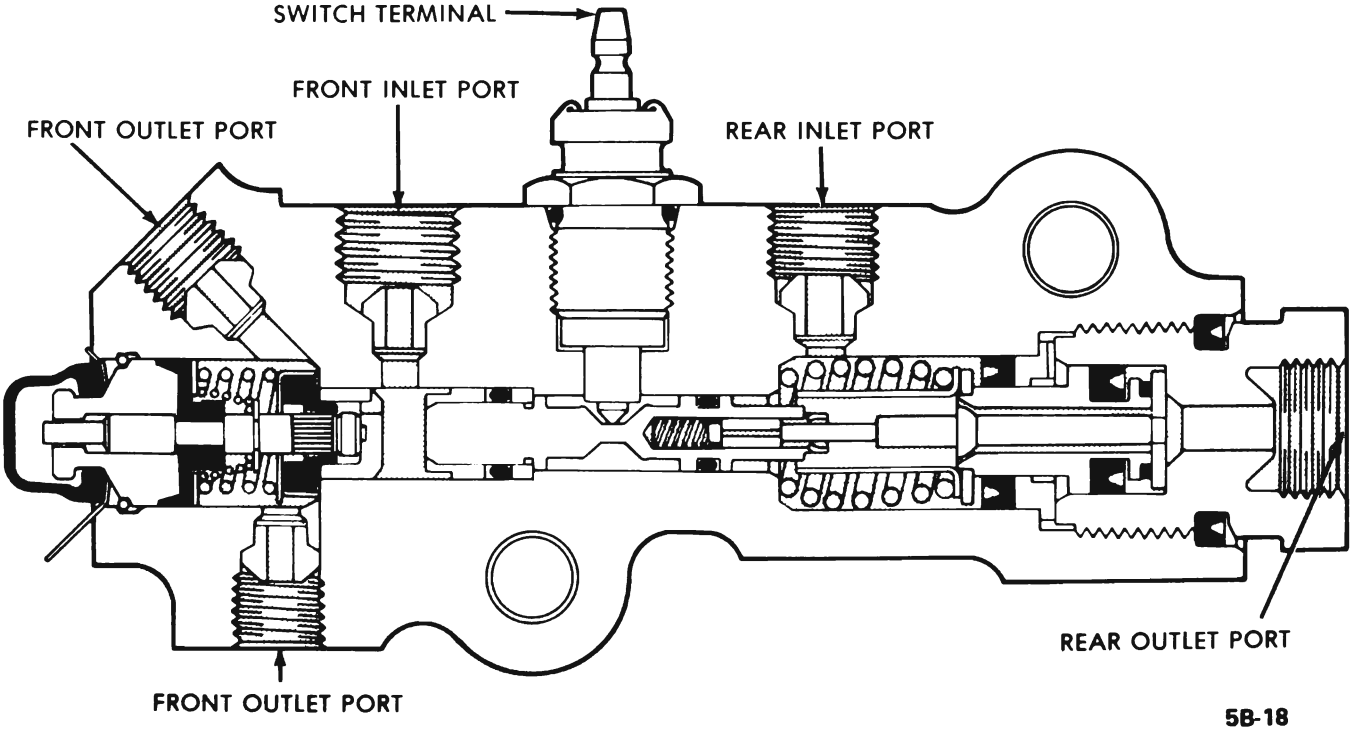

Figure 5B-20–Disc Brake Combination Valve

valve switch terminal.

2. Remove combination valve.

3. Install combination valve by reversing removal steps.

4. Bleed entire brake system. Do not move car until a firm brake pedal is obtained.

BLEEDING DISC BRAKES

Pressure Bleed

Disc brake equipped vehicles require a manual override of the front brake metering valve to permit flow to the front brakes. This is done by depressing the pin, under the rubber boot on the front end of the combination valve using special Tool J-23770. It is not necessary to remove rubber boot covering the metering pin.

1. Charge bleed ball to between 35 and 45 psi or use maximum pressure the bleed ball will take without leaking.

Bleed master cylinder first. After bleeding master cylinder, bleed both rear brakes and then both front brakes simultaneously.

2. With the proper size box-end wrench or tool J-21472 over bleeder valves, attach bleeder tubes to bleeder valves and allow tubes to hang submerged in brake fluid in a clean glass jar.

3. Open bleeder valves at least 3/4 turn and allow fluid to flow until no air is seen in the fluid. Induced pulsation while the bleeder valves are open tends to purge the system. This pulsation can be created by the pedal a maximum of 1/2" travel.

4. Close the bleed valves.

5. Check the brake pedal, feel for "sponginess" and repeat entire bleeding operation if necessary.

Manual Bleed

If the car is equipped with power brakes, deplete the vacuum reserve by applying the brakes several times.

1. Fill master cylinder with brake fluid and keep at least one-half full of fluid during bleeding operation.

Bleed master cylinder first. After bleeding master cylinder, bleed right rear brake, left rear brake, right front brake and left front brake.

2. With the proper size Box End wrench or tool J-21472 over bleeder valve, attach bleeder tube to valve and allow tube to hang submerged in brake fluid in a clean glass jar.

3. Open the bleeder valve and fully depress the brake pedal.

4. Close bleeder valve and release brake pedal.

5. Repeat steps 3 and 4 until all air is evacuated.

Check and refill master cylinder reservoir as required to prevent air from being drawn through master cylinder.

6. Repeat the bleeding procedure at all wheels if the entire system is to be bled.

7. Check the brake pedal, feel for "sponginess" and repeat entire bleeding procedure if necessary.

MAJOR REPAIR

CALIPER OVERHAUL

Removal

1. Removal of the caliper for overhaul is the same as for shoe and lining replacement except that it will be necessary to disconnect the brake hose.

2. First, disconnect the hose from the steel brake line and cap the fittings to prevent dirt from entering the line or the hose. Then, remove the U-shaped retainer from the hose fitting. Withdraw the hose from the frame support bracket and remove the caliper -- with hose attached -- to a work bench for overhaul.

Disassembly

1. Before beginning disassembly, thoroughly clean the exterior of the caliper using brake cleaner. Place the caliper on a clean work surface.

2. Remove the brake hose from the caliper, discarding the copper gasket. Check the hose for worn spots, cracks or other signs of deterioration. Discard the hose, if damaged, to be replaced with a new hose at reassembly. Drain brake fluid from the caliper.

3. Use clean shop towels to pad the interior of the caliper and remove the piston by directing compressed air into the caliper inlet hole. See Figure 5B-21.

> **CAUTION:** *Use just enough air pressure to ease the piston out of the bore. If the piston is blown out--even with padding provided--it may become damaged.*

WARNING: DO NOT PLACE THE FINGERS IN FRONT OF THE PISTON IN AN ATTEMPT TO CATCH OR PROTECT IT WHEN APPLYING COMPRESSED AIR. THIS COULD RESULT IN SERIOUS INJURY.

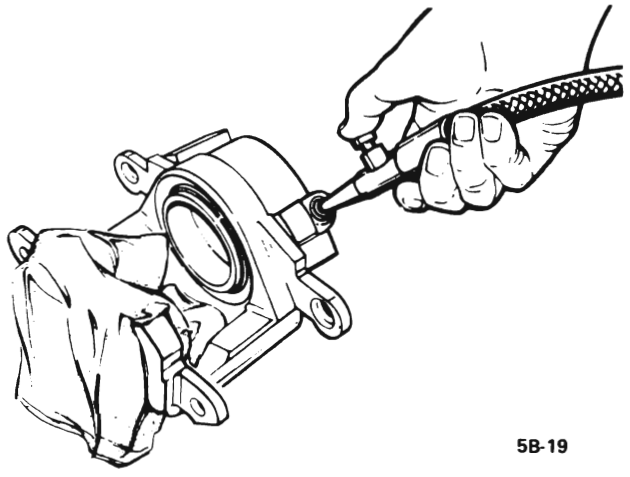

Figure 5B-21-Removing Piston

4. Use a screwdriver to pry the boot out of the caliper. Extend the screwdriver across the caliper bore, under the boot, and pry up. Be careful not to scratch the caliper bore.

5. Use a piece of wood or plastic -- a plastic toothpick is ideal -- to remove the piston seal from its groove in the caliper bore. DO NOT USE A METAL TOOL OF ANY TYPE FOR THIS OPERATION.

6. Remove the bleeder valve from the caliper.

Cleaning and Inspection

1. The boot, piston seal, rubber bushings and sleeves are to be replaced each time the caliper is overhauled. Discard, do not bother to clean and and inspect, these parts.

2. Clean all other parts in clean denatured alcohol or brake cleaner. Use dry, filtered compressed air to dry parts and blow out all passages in the caliper and bleeder valves.

The use of lubricated shop air will leave a film of mineral oil on the metal parts. This may damage rubber parts when they come in contact after reassembly.

3. Check the mounting bolts for corrosion, breaks in the plating or other damage. Do not use abrasives in an attempt to clean the bolts -- replace them.

4. Carefully examine the piston OD for scoring, nicks, corrosion and worn or damaged chrome plating. If any surface defects are detected, replace the piston.

5. Check the bore in the caliper for the same defects as the piston with the exception of plating damage. The piston bore is not plated and stains or minor corrosion can be polished with crocus cloth. Do not use emery cloth. Thoroughly clean the caliper after the use of crocus cloth. If the bore cannot be cleaned up in this manner, replace the caliper.

Reassembly

1. Lubricate the bore in the caliper and the new piston seal with clean brake fluid. Position the seal in the caliper bore groove. Lubricate the piston with clean brake fluid and assemble a new boot into the groove in the piston so that the fold faces the open end of the piston. Insert the piston into the caliper bore, using care not to unseat the seal and force down to the bottom in the bore. This will require a force of 50 to 100 pounds. Position the OD of the boot in the caliper counterbore and seat with tool No. J-22904. See Figure 5B-22.

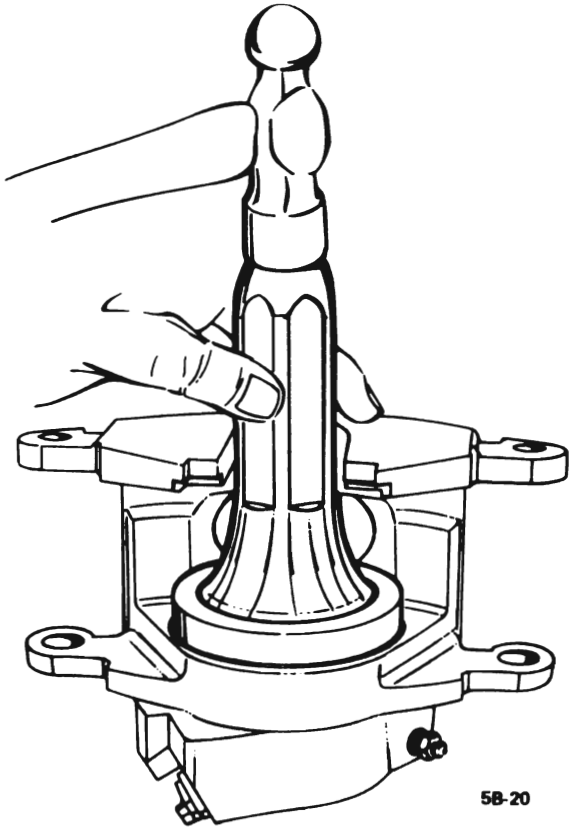

Figure 5B-22-Seating Boot

2. Check the boot installation to make sure that the retaining ring molded into the boot is not bent and that the boot is installed fully, below the caliper face, and evenly all around. See Figure 5B-22. Otherwise dirt or moisture may enter the bore and cause damage or corrosion.

3. Install the brake hose in the caliper inlet using a new copper gasket.

Installation

1. Installation of the caliper and mounting parts (rubber bushings, sleeves, shoe and lining assemblies, and bolts) is the same as for lining replacement except for the following:

(a) The brake hose must be connected to the brake line at the frame bracket.

Use extreme care to orient the hose so that the keyed hose end fitting aligns with the slot in the bracket without twisting or kinking the hose.

(b) After overhaul -- or any time that the brake hose or line is disconnected -- the calipers must be bled. Use either the manual or pressure tank method.

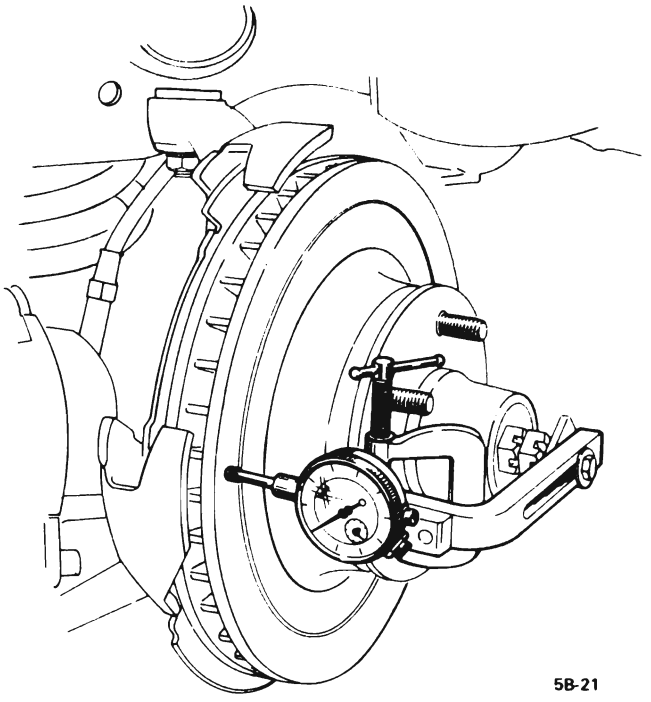

Figure 5B-23 -Checking Rotor For Lateral Runout

ROTOR SERVICING

Checking Lateral Runout

1. Lateral runout is the movement of the rotor from side to side as it rotates on the steering knuckle spindle. This could be described as "rotor wobble."

2. The movement of the rotor from side to side in the lateral plane causes the brake shoe and lining and pistons to be knocked back into their bores. This results in additional pedal travel required and a vibration during the braking action.

3. To check lateral runout, first tighten the wheel bearings until all of the play is out of the bearings. Fasten a dial indicator to some portion of the suspension so that the point of the stylus contacts the rotor face approximately one inch from the rotor edge. See Figure 5B-23. Set the dial at zero. Move the rotor one complete rotation, checking the indicator as the rotor moves.

4. Lateral runout should not be over .004 total indicator reading.

Parallelism Check

1. Parallelism is the measurement of the thickness of the rotor at four or more points around the circumference of the rotor. All measurements must be made at the same distance in from the edge of the rotor.

2. A rotor that varies over .0005 causes pedal vibration, as well as front end vibration during brake applications. A rotor that does not meet these specifications may be refinished to specifications if precision equipment is available.

Rotor Tolerance and Surface Finish

In manufacturing the brake rotor, tolerances of the rubbing surfaces for flatness, for parallelism and for lateral runout are held very close. The maintenance of these close controls on the shape of the rubbing surfaces is necessary to prevent brake roughness.

In addition to these tolerance the surface finish must be held to a specified range. The control of the rubbing surface finish is necessary to avoid pulls and erratic performance and to extend lining life.

Acceptable Defects

Light scoring of the rotor surfaces not exceeding .015 in depth, which may result from normal use, is not detrimental to brake operation.

Machining

Since accurate control of the rotor tolerances is necessary for proper performance of the disc brakes, machining of the rotor should be done only with precision equipment.

WARNING: ALL BRAKE ROTORS HAVE A MINIMUM THICKNESS DIMENSION CAST INTO THEM. THIS DIMENSION IS THE MINIMUM WEAR DIMENSION AND NOT A REFINISH DIMENSION. DO NOT USE A BRAKE ROTOR THAT WILL NOT MEET THE SPECIFICATIONS, AS SHOWN BELOW, AFTER REFINISHING. REPLACE WITH A NEW BRAKE ROTOR.

ROTOR THICKNESS

X-A-Series 1.040

B-C-E-Series 1.290

MINIMUM THICKNESS AFTER REFINISH

X-A-Series .980

B-C-E-Series 1.230

DISCARD THICKNESS

X-A-Series .965

B-C-E-Series 1.215

WHEEL BOLT REMOVAL AND INSTALLATION

Disc Brakes

1. Remove hub and rotor assembly from car.

2. Mark rotor to hub location and remove 5 bolts attaching hub to rotor.

3. The wheel bolts on disc brakes can be pressed out from the outside of the hub and installed from inside the rotor by pressing into place. No drilling or cutting is required.

4. Reinstall assembly and adjust wheel bearings.

SPECIFICATIONS

SINGLE PISTON DISC BRAKE SPECIFICATIONS

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	Location	Thread Size	Torque Lb.Ft.
Bolt	Brake Hose to Caliper	7/16-20	22
Bolt	Splash Shield and Mounting Bracket to Knuckle (Upper)	5/8-18	10
Bolt	Caliper to Mounting Bracket	Special	35
Screw	Combination Valve Mounting	5/16-18	12
Nut	Wheel Attaching		
	X-A Series	Special	70
	B-C-E Series	Special	75

General Specifications

Disc Brake Type	Sliding Caliper - Disc
Location	Front Wheels Only
Disc Type	Ventilated - Cast Iron
Disc Diameter	
X-A Series	11.00"
B-C-E Series	11.86"
Disc Runout (Maximum)	
A Series	.004"
X-B-C-E Series	.005"
Disc Surface Finish	30-80 Micro-Inch
Disc Thickness (Maximum)	
X-A Series	1.040"
B-C-E Series	1.290"
Disc Thickness (Minimum)	
X-A Series	.965"
B-C-E Series	1.215"
Disc Parallelism (Thickness Variation)	.0005"
Brake Shoe and Lining Type	Riveted

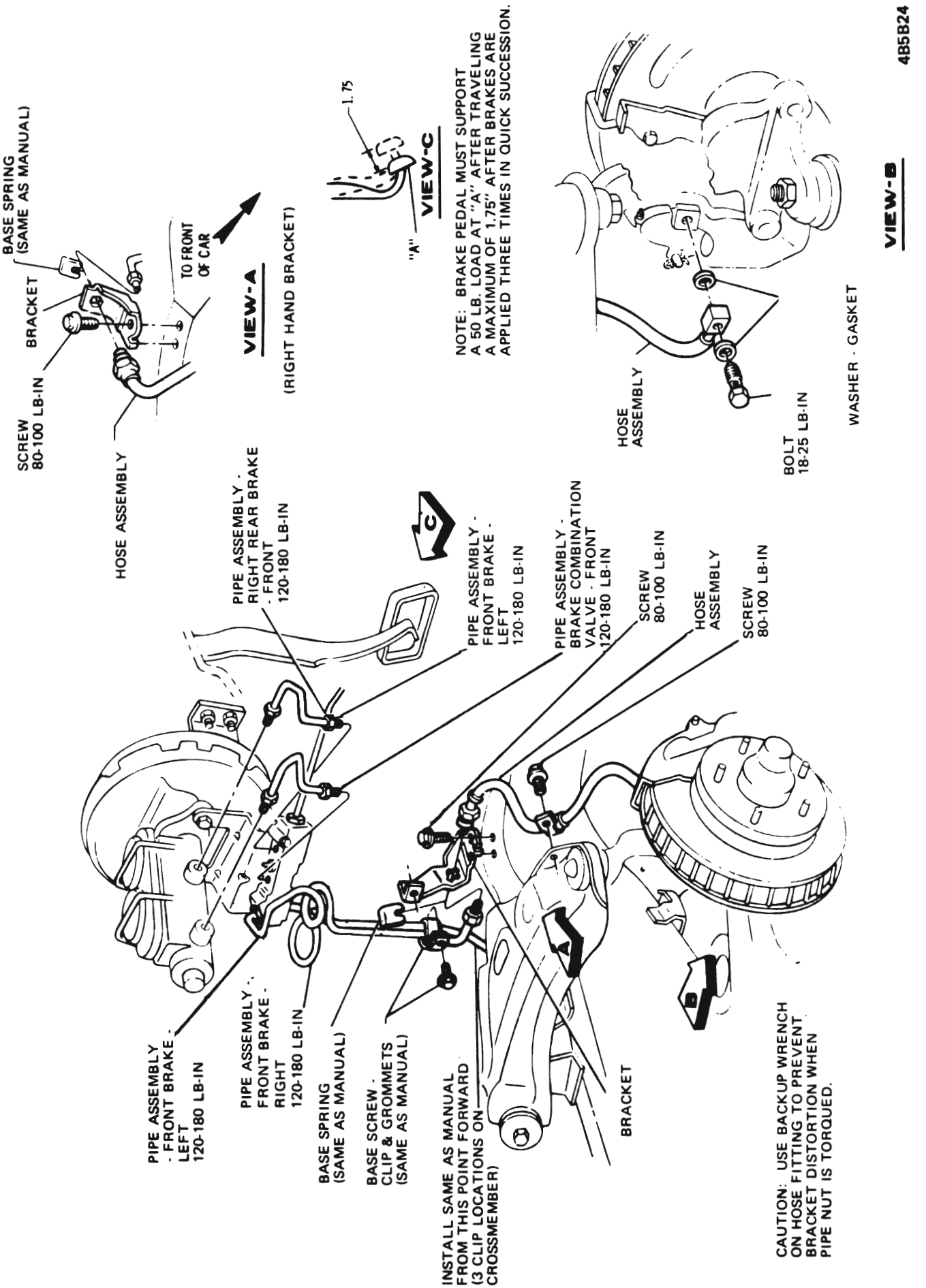

Figure 5B-24 Front Brake Pipes - X Car

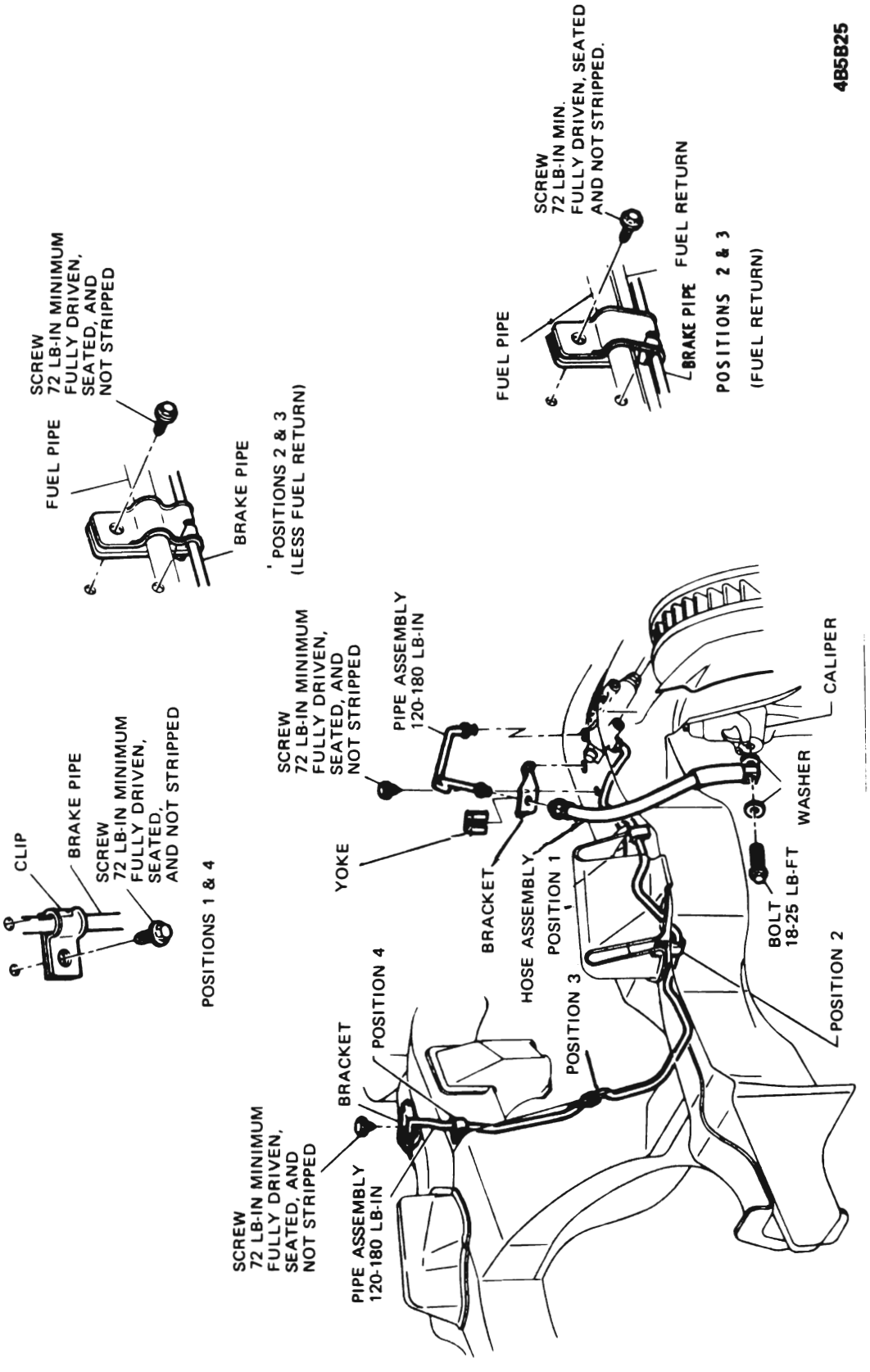

Figure 5B-25 Front Brake Pipes - A Car

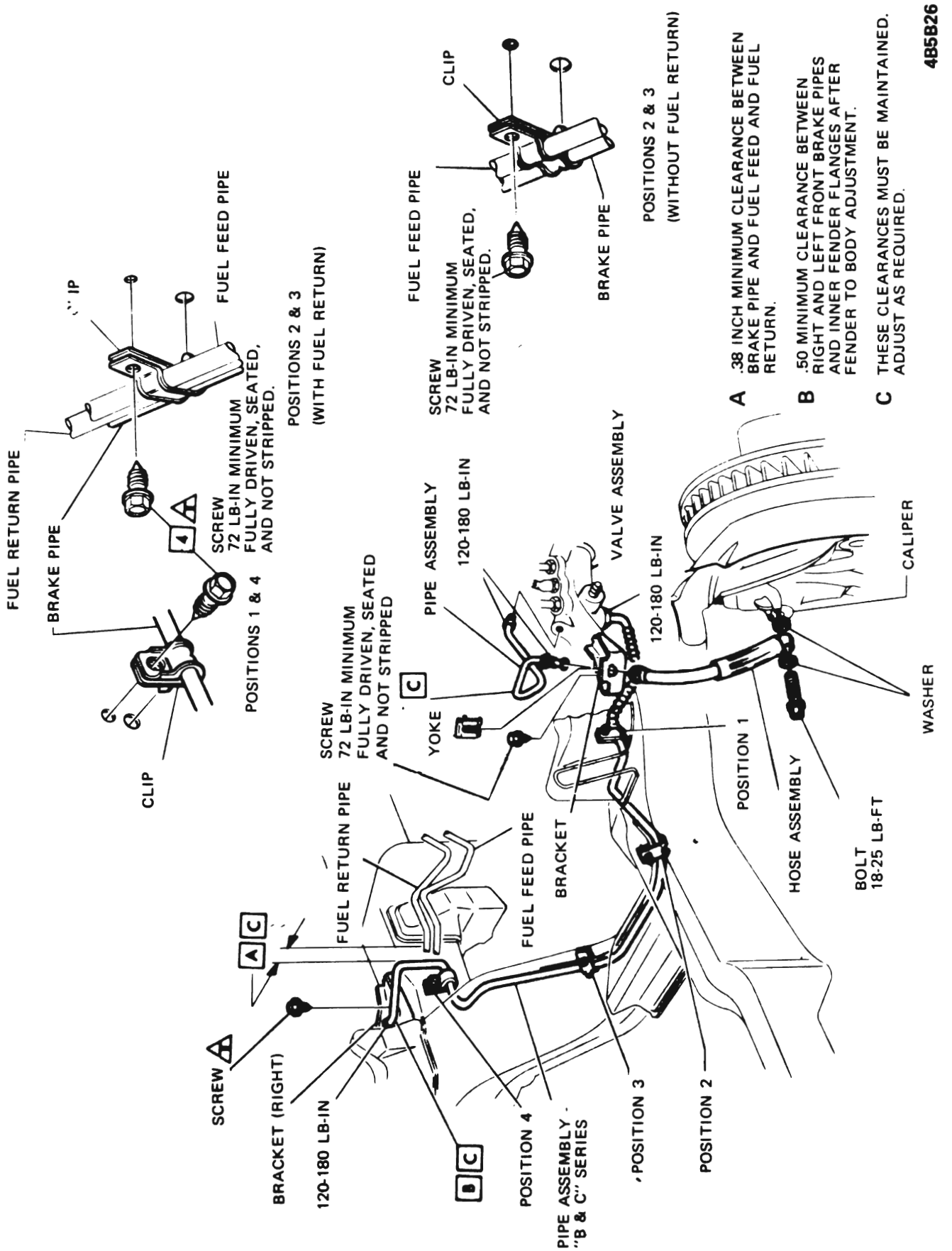

Figure 5B-26 Front Brake Pipes - B-C-E Car