DRUM BRAKE, PARKING BRAKE AND WHEEL CYLINDER

CONTENTS

DESCRIPTION AND OPERATION

DESCRIPTION OF BRAKE MECHANISM

The brake mechanism includes a brake drum and a brake assembly at each wheel and two separate and independent systems for applying the brakes:

(1) A mechanical parking brake system which operates the rear wheel brakes only.

(2) A hydraulic service brake system which operates both front and rear wheels and has a self-adjusting mechanism.

Wheel Brake Assemblies

Each wheel brake assembly is enclosed by a finned brake drum.

The brake assembly at each rear wheel uses a primary (front) and secondary (rear) brake shoe and is held against a backing plate by a hold down spring, pin and cap which allows free movement of the brake shoe. See Figure 5D-1.

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 and provides adjustment for the shoes.

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

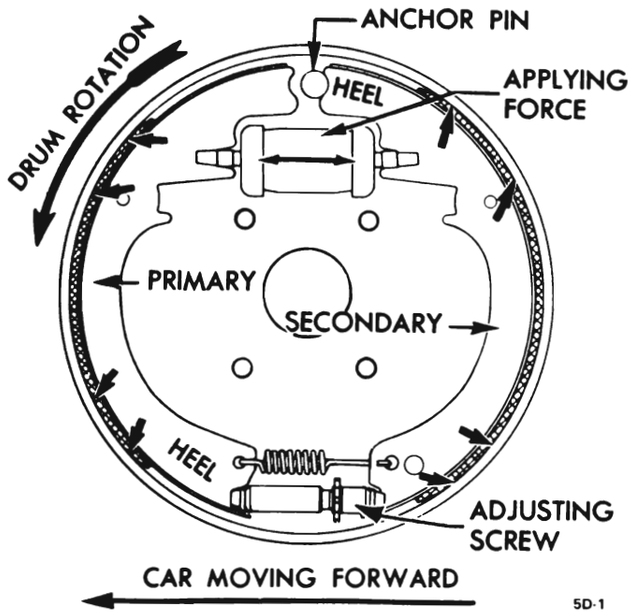


Figure 5D-1 Brake Shoe Action

applying the shoes when used as parking brakes. See Figure 5D-2.

Parking Brake System

The parking brake system, which applies only the rear wheel brakes, uses a foot-operated lever, 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.

The center cable attaches at either end to a rear cable assembly. Each rear cable connects to the lower end of a brake shoe lever. These levers (one in each rear shoe assembly) pivot on the secondary shoes. Struts are mounted between the brake shoe levers and the primary shoes. When the parking brake pedal is depressed, the rear brake shoes are expanded against the drums. See Figure 5D-2.

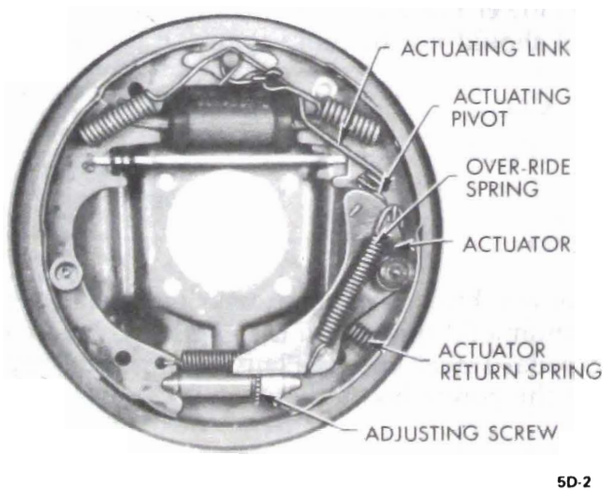


Figure 5D-2 Rear Wheel Brake Assembly

Service Brake System

The service brake 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 cylinder mounted between the brake shoes at each wheel. A brake pipe connects the front portion of the master cylinder to the front portion of a brake warning light switch and distributor assembly located on the left frame rail. his switch provides a warning to the driver if one part of the hydraulic system fails. See Figures 5D-13, 5D-14 and 5D-15.

The master cylinder contains two fluid reservoirs and two cylinderical pressure chambers in which force applied to the brake pedal is transmitted to the fluid which actuates the brake shoes.

Each wheel cylinder contains two pistons, two rubber cups, and a coil spring with cup expanders. The inlet port for brake fluid is located between the pistons so that when fluid pressure is applied, both pistons move outward. The pistons push on the brake shoes by means of connecting links. A valve for bleeding the brake pipes and wheel cylinder is located above the inlet port. See Figure 5D-3.

Self-Adjusting Mechanism

The self-adjusting brake mechanism consists of an acutator pivot, actuator return spring, override spring and an actuating link. The self adjusting brake mechanism is mounted on the secondary shoe and operates only when the brakes are applied while the car is backing up. As the linings wear, brake shoe movement will increase until the actuator lever moves the adjuster one tooth. See Figure 5D-4.

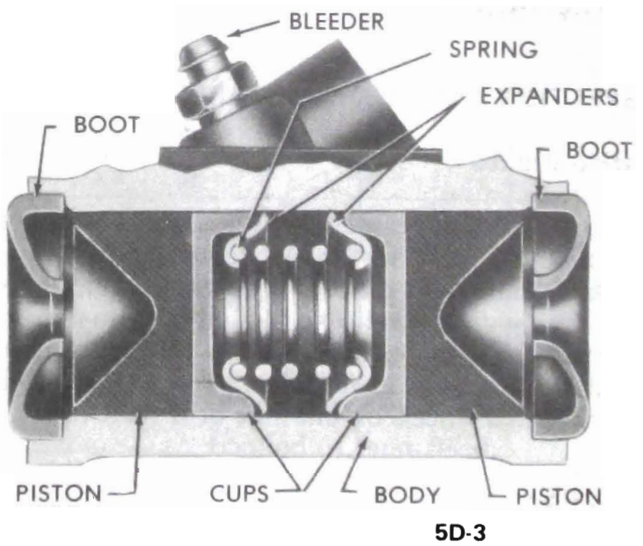


Figure 5D-3 Typical Wheel Cylinder

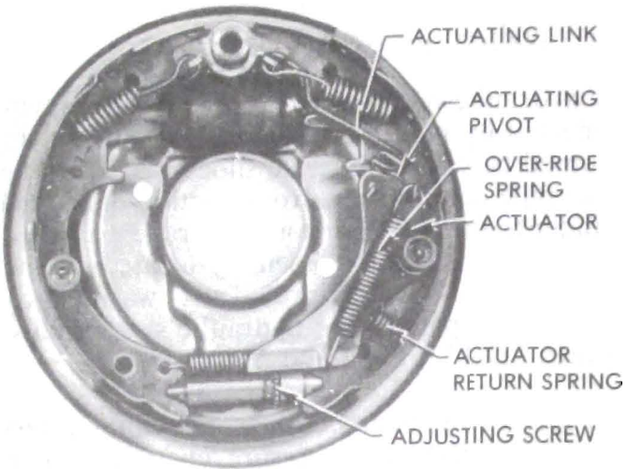


Figure 5D-4 Self Adjuster Assembly

OPERATION OF A BRAKE MECHANISM

When the brake pedal is depressed, the master cylinder primary piston moves forward. Under normal conditions, the combination of hydraulic pressure and the force of the primary piston spring move the secondary piston forward at the same time. When the pistons have moved forward so that their primary cups cover the bypass holes, hydraulic pressure is transmitted to the front and rear wheels. Hydraulic pressure forces the wheel cylinder pistons outward, applying the brakes.

As pressure drops in the master cylinder, shoe springs retract all brake shoes and the connecting links push the wheel cylinder pistons inward, forcing fluid back to the master cylinder. See Figure 5D-16.

DIAGNOSIS

INSPECTION AND TESTING BRAKES

Testing Brakes

Brakes should be tested on dry, clean, reasonably smooth and level roadway. A true test of brake performance cannot be made if roadway is wet, greasy or covered with loose dirt so that all tires do not grip the road equally. Testing will also be adversely affected if roadway is crowned so as to throw weight of car toward wheels on one side or if roadway is so rough that wheels tend to bounce.

Test brakes at different car speeds with both light and heavy pedal pressure; however, avoid locking the wheels and sliding the tires on roadway. Locked wheels and sliding tires do not indicate brake efficiency since heavily braked, but turning wheels will stop car in less distance than locked wheels. More tire-to-road friction is present with a heavily braked turning tire than with a sliding tire.

External Conditions that Affect Brake Performance

1. Tires. Tires having unequal contact and grip on road will cause unequal braking. Tires must be equally inflated and tread pattern of right and left tires must be approximately equal.

2. Car Loading. When car has unequal loading, the most heavily loaded wheels require more braking power than others. A heavily loaded car requires more braking effort.

3. Front Wheel Bearings. A loose front wheel bearing permits the drum to tilt and have spotty contact with the brake shoe linings causing erratic brake action.

4. Front End Alignment. Misalignment of the front end particularly in regard to limits on camber and theoretical king pin inclination will cause the brakes to pull to one side.

MAINTENANCE AND ADJUSTMENTS

SERVICE BRAKE ADJUSTMENT

Preliminary Checks

1. At reasonable frequent intervals, the brakes should be inspected for pedal travel, which is the distance the pedal moves toward the floor from a fully-released position. Inspection should be made with the brake pedal firmly depressed (approximately 100 lbs. pedal load) while the brakes are cold. Pedal travel can be measured with a steel tape located on the top of the pedal pad and indicating off of the lower portion of the steering wheel rim. Pedal travel should not be more than the following:

"A" Car	Manual Disc	4 3/4"
All	Power Disc	1 3/4"

On power brake-equipped cars, pump the pedal a minimum of 3 times with the engine off before making pedal travel checks. This exhausts all vacuum from the power booster.

Stop Light Switch Adjustment

With pedal in fully released position, the stop light switch plunger should be fully depressed against the

CAUSE / SYMPTOM	Excessive Brake Pedal Travel	Brake Pedal Travel Gradually Increases	Excessive Brake Pedal Effort	Excessive Braking Action	Brakes Slow to Respond	Brakes Slow to Release	Brakes Drag	Uneven Braking Action (Side to Side)	Uneven Braking Action (Front to Rear)	Scraping Noise from Brakes	Brakes Squeak During Application	Brakes Squeak During Stop	Brakes Chatter (Roughness)	Brakes Groan at End of Stop	Brake Tell-Tale Glows During Stop
Leaking Brake Line or Connection	X	XX									X				XX
Leaking Wheel Cylinder or Piston Seal	X	XX		X						X					X
Leaking Master Cylinder	X	XX													X
Air In Brake System	XX										X				XX
Contaminated or Improper Brake Fluid					X	X	X								X
Leaking Vacuum System			XX		X										
Restricted Air Passage in Power Head			X		XX	X									
Damaged Power Head			X	X	X	X	X								
Improperly Assembled Power Head Valving			X	X	X	X	XX								
Worn Out Brake Lining - Replace			X	X					X	X	X	X	X		X
Uneven Brake Lining Wear - Replace and Correct	X			X					X	X	X	X	XX		X
Glazed Brake Lining - Sand Lightly			XX		X				X	X		X	X		
Incorrect Lining Material - Replace			X	X					X	X			X		X
Contaminated Brake Lining - Replace				XX					XX	XX	X	X	X		X
Linings Damaged by Abusive Use - Replace			X	XX					X	X	X	X	X		X
Excessive Brake Lining Dust - Remove with Air			X	XX					XX	XX		X	XX		X
Heat Spotted or Scored Brake Drums or Rotors				X					X	X		X	X	XX	X
Out-of-Round or Vibrating Brake Drums													X	XX	
Out-of-Parallel Brake Rotors														XX	
Excessive Rotor Run-Out														X	
Faulty Automatic Adjusters	X								X	X	X				X
Incorrect Wheel Cylinder Sizes			X	X						X	X				
Weak or Incorrect Brake Shoe Retention Springs				X			X	X	XX	X	X	XX	X	XX	
Brake Assembly Attachments - Missing or Loose	X								X	X	X	X		X	X
Insufficient Brake Shoe Guide Lubricant							X	X	X	X	X	XX	XX		
Restricted Brake Fluid Passage or Sticking Wheel Cylinder Piston		X	X		X	X	X	X	X						
Faulty Metering Valve (Disc Only)	X		X	X	X	X	X		X						X
Brake Pedal Linkage Interference or Binding			X		X	XX	XX								
Improperly Adjusted Parking Brake							X								
Drums Tapered or Threaded										XX					
Incorrect Front End Alignment								XX							
Incorrect Tire Pressure								X	X						
Incorrect Wheel Bearing Adjustment	X									X				X	
Loose Front Suspension Attachments								X		XX				X	X
Out-of-Balance Wheel Assemblies														XX	
Operator Riding Brake Pedal	X	X	X				X		X						X
Improperly Adjusted Master Cylinder Push Rod	X						X	XX							X
Sticking Wheel Cylinder or Caliper Pistons			X				X	X	X	X					
Faulty Proportioning Valve			X		X		X	X							

^X - Indicates more probable cause(s) X - Indicates causes

5D-5

Figure 5D-5 Brake Trouble Diagnosis Chart

pedal shank. Adjust switch by moving in or out as necessary.

Adjustment at Rear Wheels

1. Using a punch knock out lanced area in brake backing plate. If this is done with the drum installed on the car, the drum must be removed and all metal cleaned out of the brake compartment. Be sure to procure a new hole cover and install it in the backing plate after adjustment to prevent dirt and water from getting into the brakes. Use J-6166 to turn brake adjusting screw; expand brake shoes at each wheel until the wheel can just be turned by hand. The drag should be equal at all wheels.

2. Back off brake adjusting screw at each wheel 30 notches. If shoes still drag lightly on drum, back off adjusting screw one or two additional notches. Brakes should be free of drag when screw has been backed off approximately 12 notches. Heavy drag at this point indicates tight parking brake cables.

3. Install adjusting hole cover in brake backing plate.

4. Check parking brake adjustment.

Adjustment of parking brake cable is necessary whenever the rear brake cables have been disconnected. Need for parking brake adjustment is indicated if the service brake operates with good reserve, but the parking brake pedal can be depressed more than 8 ratchet clicks on cars and 16 clicks on B-C-E cars under heavy foot pressure.

1. Depress parking brake pedal exactly three ratchet clicks.

2. Loosen jam nut located at rear of equalizer adjusting nut. See Figures 5D-11 or 5D-12. Then tighten adjusting nut until rear wheels can just be turned rearward using two hands but are locked when forward rotation is attempted. Tighten jam nut against adjusting nut.

3. With mechanism totally disengaged, rear wheels should turn freely in either direction with no brake drag.

It is very important that parking brake cables are not adjusted too tightly to cause brake drag.

MAJOR REPAIR

WHEEL CYLINDER OVERHAUL

Removal of Brake Wheel Cylinder

1. Remove wheel, drum and brake shoes. Be careful not to get grease or dirt on brake lining.

2. Remove wheel cylinder from backing plate.

Disassembly of Brake Wheel Cylinder

1. Inspect cylinder bore for scoring or corrosion. It is best to replace a corroded cylinder.

2. Polish any discolored or stained area with crocus cloth by revolving cylinder on cloth supported by a finger.

3. Rinse cylinder in clean brake fluid.

4. Shake excessive rinsing fluid from cylinder. Do not use a rag to dry cylinder, as lint from the rag cannot be kept from cylinder bore surfaces.

Assembly of Brake Wheel Cylinder

1. Lubricate cylinder bore and counterbore with clean brake fluid and insert spring-expander assembly.

2. Install new cups. (Be sure cups are lint and dirt free). Do not lubricate cups prior to assembly.

3. Install new Durex pistons.

4. Press new boots into cylinder counterbores by hand. Do not lubricate boots prior to assembly.

Installation of Brake Wheel Cylinder

1. Install wheel cylinder on brake backing plate and connect brake pipe or hose. Torque rear wheel brake pipe to wheel cylinder to 100 lb. in.

2. Install brake shoes, drum and wheel; then flush and bleed hydraulic system.

PARKING BRAKE CABLE REPLACEMENT

Front Parking Brake Cable Replacement

1. Raise car.

2. Remove jam nut and adjusting nut from equalizer. See Figures 5D-11 or 5D-12.

3. Remove retainer clip from rear portion of front cable at frame on A Series cars and from lever arm on B-C-E Series cars.

4. Using a pair of pliers, bend snap-in retainer fingers in, so that cable can be removed on A Series cars.

5. Disconnect front brake cable from parking brake pedal assembly. Remove front brake cable. On some models it may assist installation of new

cable if a heavy cord is tied to either end of cable in order to guide new cable through proper routing.

6. Install cable by reversing removal procedure.

7. Adjust parking brake.

Center Parking Brake Cable Replacement

1. Raise car.

2. Remove jam nut and adjusting nut from equalizer.

3. Unhook connector at each end and disengage hooks and guides.

4. Install new cable by reversing removal procedure.

5. Adjust parking brake.

6. Apply parking brake 3 times with heavy pressure and repeat adjustment.

Rear Parking Brake Cable Replacement

1. Raise car.

2. Remove rear wheel and brake drum.

3. Loosen jam nut and adjusting nut at equalizer.

4. Disengage rear cable at connector.

5. Remove two bolts attaching cable assembly to backing plate on Estate Wagons Bend retainer fingers on all series except Estate Wagons.

6. Disengage cable at brake shoe operating lever.

7. Install new cable by reversing removal procedure.

8. Adjust parking brake.

WHEEL BOLT REMOVAL AND INSTALLATION

Drum Brakes

1. Remove hub and drum assembly from car.

2. Secure hub and drum assembly in a vise and mark center of the bolt head with a center punch. Drill 1/8" pilot hole in head of bolt; redrill head using a 9/16" bit. Cut off any remaining portion of bolthead using a chisel and then drive out bolt with drift. See Figure 5D-6.

3. Press new wheel bolt into place in drum and

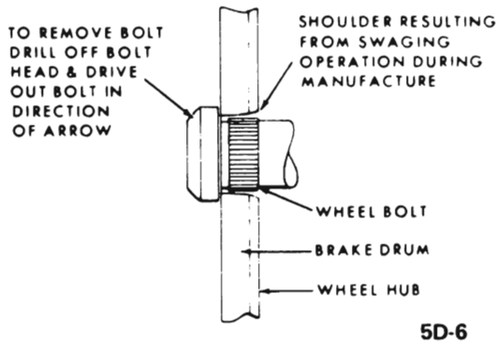


Figure 5D-6 Bolt Pressed Into Place

reinstall assembly onto car.

4. Refer to Group 3 for correct wheel bearing adjustment.

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 as stated in Group 3.

REPLACING BRAKE PIPES

WARNING: Never use copper tubing because copper is subject to fatigue cracking which would result in brake failure.

1. Procure the recommended tubing and steel fitting nuts of the correct size. (Outside diameter of tubing is used to specify size.)

2. Cut tubing to length. Correct length may be determined by measuring old pipe using a cord and adding 1/1" for each double flare.

3. Double flare tubing ends using a suitable flaring tool such as Kent-Moore J-23530. Follow instructions included in tool set.

Make sure fittings are installed before starting second flare.

WARNING: Double flaring tool must be used as single flaring tools cannot produce a flare strong enough to hold the necessary pressure.

4. Bend pipe assembly to match old pipe using a

tubing bender. Clearance of .750 must be maintained to all moving or vibrating parts.

INSPECTING AND RECONDITIONING BRAKE DRUMS

Whenever brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves and out-of-round.

Cracked, Scored, or Grooved Drum

A cracked drum is unsafe for further service and must be replaced. Do not attempt to weld a cracked drum.

Smooth up any slight scores by polishing with fine emery cloth. Heavy or extensive scoring will cause excessive brake lining wear, and it will probably be necessary to rebore in order to true up the braking surface.

If the brake linings are slightly worn and the drum is grooved, the drum should be polished with fine emery cloth but should not be turned. At this stage, eliminating all grooves in drum and smoothing the ridges on lining would necessitate removal of too much metal and lining, while if left alone, the grooves and ridges match and satisfactory service can be obtained.

If brake linings are to be replaced, a grooved drum should be turned for use turned for use with oversize linings (Subparagraph c, following). A grooved drum, if used with new lining, will not only wear the lining, but will make it difficult, if not impossible to obtain efficient brake performance.

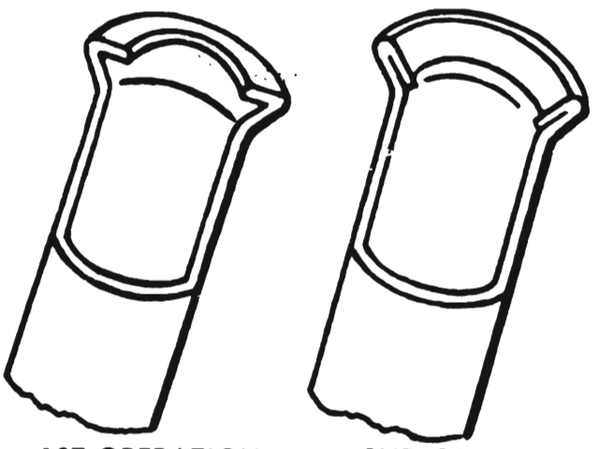


Figure 5D-7

Out-Of-Round of Tapered Drum

An out-of-round drum makes accurate brake shoe adjustment impossible and is likely to cause excessive wear of other parts of brake mechanism due to its eccentric action. An out-of-round drum can also cause severe and irregular tire tread wear as well as a pulsating brake pedal. When the braking surface of a brake drum exceeds the factory specification limits in taper (and/or) being out-of-round, the drum should be turned to true up the braking surface. Out-of-round as well as taper and wear can be accurately measured with an inside micrometer fitted with proper extension rods.

When measuring a drum for out-of-round, taper and wear, take measurements at the open and closed edges of machined surface and at right angles to each other.

Turning Brake Drums

If a drum is to be turned, only enough metal should be removed to obtain a true, smooth braking surface. If a drum does not clean-up when turned to a maximum diameter as shown in the general specification, it must be replaced. Removal of more metal will affect dissipation of heat and may cause distortion of the drum.

All brake drums have a maximum diameter cast into them. This diameter is the maximum wear diameter and not a refinish diameter. Do not refinish a brake drum that will not meet the specifications, as shown below, after refinishing.

ORIGINAL DIAMETER

A- Car	9.500
B-C-E-Car	11.000
Estate Wagon	12.000

MAXIMUM REBORE DIAMETER

A-Car	9.560
B-C-E-Car	11.060
Estate Wagon	12.060

DISCARD DIAMETER

A-Car	9.590
B-C-E-Car	11.090
Estate Wagon	12.090

Brake Drum Balance

During manufacture, brake drums are balanced within two ounce inches (A Car) and three ounce inches (B-C-E Car). These weights must not be removed.

After drums are turned, or if difficulty is experienced in maintaining proper wheel balance, it is recommended that brake drums be checked for balance. Brake drums may be checked for balance on most off-the-car balancers.

REPLACE OR RELINE BRAKE SHOES

Removal and Inspecting

1. Jack up car and remove wheel and brake drum (rear).

It may be necessary to back off the brake shoe adjustment before the brake drums can be removed. To back off shoe adjustment, rotate shoe adjusting screw upward.

2. Unhook the primary and secondary shoe return springs using large pliers.

3. Remove shoe hold down springs.

4. Lift up on actuator, unhook acutating link from anchor pin, then remove.

5. Spread shoes to clear wheel cylinder connecting links, remove parking brake strut and spring, disconnnect cable from parking brake lever, remove shoes from the backing plate.

6. Separate the brake shoes by removing adjusting-screw and lock spring. Remove parking brake lever and secondary brake shoe. See Figure 5D-2.

7. Clean all dirt out of brake drum, using care to avoid getting dirt into front wheel bearings. Inspect drums and replace or recondition if required.

8. Blow all dirt from brake assemblies and inspect for any unusual condition.

9. Wheel cylinders having torn, cut, or heat-cracked boots should be completely overhauled.

Inspection for leakage may be accomplished at the boot center hole after removal of link pin. Fluid coatings on piston within cylinder and on end of link pin removed from boot are normal, as cylinder contains a proous DUREX PISTON WHICH IS IMPREGNATED WITH A CORROSION INHIBITING FLUID. Fluid spilling from boot center hole, after link pin is removed, indicates cup leakage and necessity for completely over-hauling cylinder.

10. If working at rear wheels, inspect backing plate for oil leak past wheel bearing oil seals. Correct any leak by installation of new seals (Group 4).

11. Check all backing plate attaching bolts to make sure they are tight. Using fine emery cloth, clean all rust and dirt from shoe contact surfaces on plate.

Relining Brake Shoes

If old brake shoes are to be relined, inspect shoes for distortion and for looseness between the rim and web; these are causes for discarding any shoe. If shoes are serviceable, be governed by the following points in installing new linings:

1. Remove old linings by drilling out rivets. Punching rivets out will distort shoe rim. Throroughly clean surface of shoe rim and file off any burrs or high spots.

2. Use Buick brake lining or equivalent and the rivets included in lining package which are of the correct size. The rivets must fit the holes with the solid body of rivet extending through the shoe rim, but no farther.

Keep hands clean while handling brake lining.

3. Start riveting at center of shoe and lining and work toward the ends. Use a roll set for riveting; a star set might split the tubular end and then the rivet would not fill the hole. The primary lining is shorter than secondary lining; therefore, the rivet holes at each end of the shoe rim are not used.

4. After riveting is completed, lining must seat snugly against shoe with no more than .005" separation midway between rivets. Check with a .004" (go) and a .006" (No Go) feeler gage.

Installation and Adjustment

1. On rear brakes only, lubricate fulcrum end of parking brake lever with Delco Brake Lubricant or equivalent, then attach lever to secondary shoe. Make sure that lever is free moving.

2. Connect brake shoes together with adjusting screw spring, then place adjusting screw in position. When installing the adjusting screw spring and adjusting screw, make sure the spring does not touch the starwheel portion of the adjusting screw; and, also, when installing adjusting screw, make sure right hand thread adjusting screw is on left side of car and left hand thread adjusting screw is on right side of car. Make certain starwheel lines up with adjusting hole in backing plate.

3. Lubricate shoe contact surfaces on backing plate with a thin coating of Delco Brake Lubri-

cant or equivalent. On rear brakes, sparingly apply same lubricant where brake cable contacts backing plate.

4. Place brake shoes on backing plate, at the same time engaging shoes with wheel cylinder links. The primary shoe (short lining) goes toward front of car. On rear brakes, connect cable to parking brake lever and install strut and spring between lever and primary shoe.

5. Install acutator, actuator return spring and actuating link. If old brake shoe return springs are nicked, distorted or of doubtful strength (discolored from heat), it is advisable to install new parts.

6. Install shoe hold down springs.

7. Install the primary and secondary shoe return springs using large pliers. Be careful not to distort springs.

8. Measure brake drum I.D. using inside caliper portion of Tool J-21177. Adjust brake shoes to dimension obtained on outside caliper portion of Tool J-21177.

9. Lubricate and adjust front wheel bearings. Install brake drums and wheels.

10. If any hydraulic connections were disturbed, bleed hydraulic system.

11. Adjust parking brake.

12. Inspect all brake pipes, hoses and connections for evidence of fluid leakage. Tighten any leaking connection. Then apply heavy pedal pressure to brake pedal and recheck connections.

13. Check fluid level in master cylinder and add fluid if necessary.

14. Check brake pedal for proper feel and for proper return.

15. Remove jacks and road test car for proper brake action. Brakes must not be severely applied immediately after installation of new brake shoes or linings. Severe application may permanently damage new linings and may score brake drums. When linings are new, they must be given moderate use for several hundred miles of burnishing.

Repair Brake Lining

This procedure is to be used when brake action is unequal, severe, hard, noisy or otherwise unsatisfactory and when brake linings have had little wear.

1. Check fluid in master cylinder and add fluid if necessary.

2. Check brake pedal for proper feel and for proper return.

3. Jack up car in a safe manner and remove all wheels.

4. Remove all brake drums. Brake pedal must not be operated while drums are removed.

5. Clean all dirt out of brake drums, using care to avoid getting dirt into front wheel bearings. Inspect drums and replace or recondition if required.

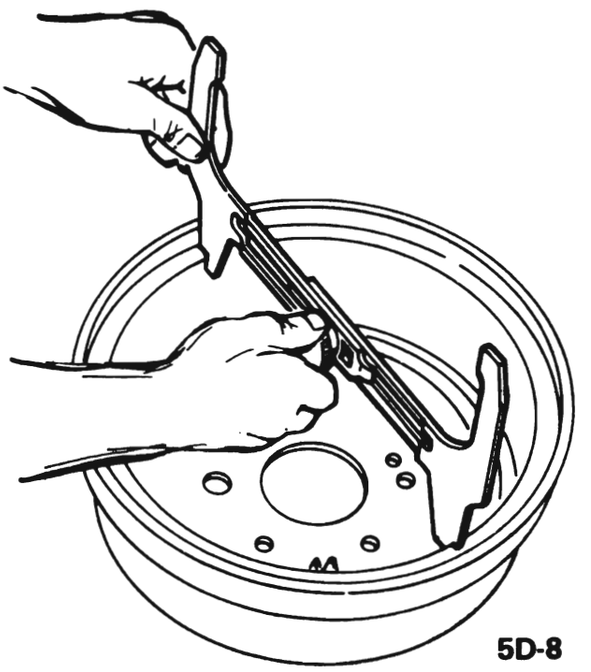
6. Blow all dirt from brake assemblies, then inspect brake linings for uneven wear, oil soaking, loose rivets or imbedded foreign particles. If linings are oil soaked, replacement is required.

7. If linings are otherwise serviceable, tighten or replace loose rivets and thoroughly clean all steel or other imbedded particles from surfaces and rivet counterbores of linings.

8. If brake linings at any wheel show a spotty wear pattern indicating uneven contact with brake drum, it is advisable to true up the linings with a light grinding cut, if suitable grinding equipment is available. If brake action is unequal, severe or hard, indicating that brake shoes are not centralized in drums, the grinder may also be used to correct this condition.

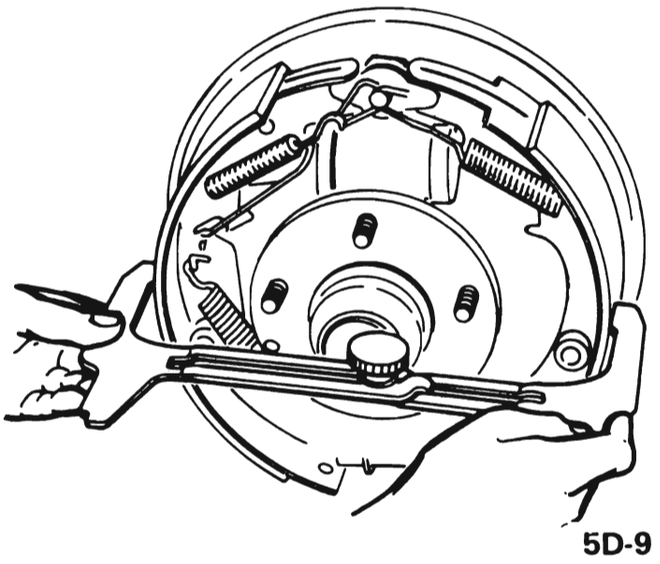
9. Check all backing plate bolts to make sure they are tight.

10. Measure brake drum I.D. using inside caliper portion of Tool J-21177. Adjust brake shoes to dimension obtained, on outside caliper portion of Tool J-21177. See Figures 5D-8 and 5D-9.



5D-8

Figure 5D-8 Measuring Brake Drum I.D.



Figures 5D-9 Adjusting Brake Shoes

11. Install drum and wheel and tire assemblies.

12. Remove jacks and road test car for proper brake action. Brakes must not be severely applied immediately after installation of reground brake shoes or linings. Severe application may permanently damage new linings and may score brake drums. When linings are new, they must be given moderate use for several hundred miles of burnishing.

BLEEDING AND FLUSHING BRAKE SYSTEM

Bleeding Brake Hydraulic System

A bleeding operation is necessary to remove air whenever it is introduced into the hydraulic brake system.

It may be necessary to bleed the hydraulic system at all four wheel cylinders if air has been introduced through low fluid level or by disconnecting brake pipes at master cylinder. If brake pipe is disconnected at any wheel cylinder, then that wheel cylinder only need be bled. If pipes are disconnected at any fitting located between master cylinder and wheel cylinders, then all wheel cylinders served by the disconnected pipe must be bled.

On all power brake equipped models, the master cylinder and power brake unit is mounted at an angle on the dash. Two bleeder valves are located on the master cylinder. Because of the mounting angle, it will be necessary to bleed the master cylinder first and then the wheel cylinders whenever the master cylinder reservoir has become empty or whenever the master cylinder is removed from car.

Sequence for Bleeding Wheel Cylinders

It is advisable to bleed one wheel cylinder at a time to avoid allowing fluid level in reservoir to become dangerously low. The correct sequence of bleeding is to bleed wheel cylinder, either front or rear system, nearest master cylinder first. This sequence expels air from lines and wheel cylinders nearest to master cylinder first and eliminates possibility that air in a line close to master cylinder may enter a line farther away after it has been bled.

Do not perform bleeding operation while any brake drum is removed.

Bleeding Wheel Cylinder Without Pressure Tank

1. Fill master cylinder.

2. Install bleeder Wrench J-21472 on bleeder valve. Slip a brake bleeder tube over ball of wheel cylinder bleeder valve. Place lower end of bleeder tube in a glass jar that is partially filled with clean brake fluid. Position end of tube so that it will remain submerged under fluid during bleeding operation. Unscrew bleeder valve 3/4 of a turn. See Figure 5D-10.

3. Depress brake pedal a full stroke, close bleeder valve, and then allow pedal to return slowly to released position. Allowing pedal to return quickly may draw air into system. Continue operating pedal in this manner until fluid flows from bleeder tube into glass jar in a solid stream that is free of air bubbles, then close the bleeder valve securely and remove bleeder tube and wrench.

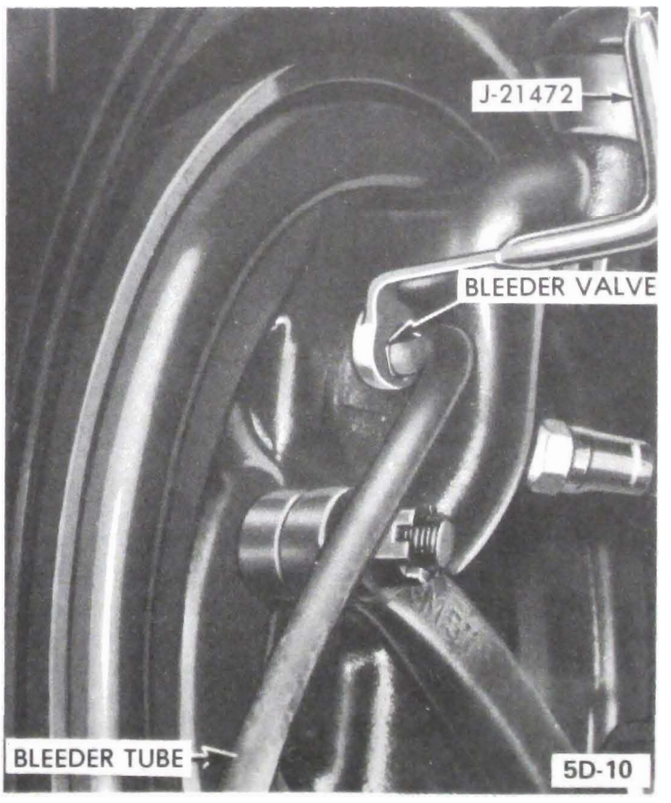


Figure 5D-10 Bleeding Wheel Cylinder

4. Frequently check master cylinder to make sure that it contains fluid. Allowing reservoir to be emptied will cause air to be drawn into hydraulic system.

5. When bleeding operation is completed at all wheel cylinders where needed, make sure that fluid level is 1/4" (plus or minus) 1/8" below lip of reservoir, then install rubber diaphragm and cover.

6. Discard the brake fluid deposited in glass jar during bleeding operation.

Bleeding Wheel Cylinder With Pressure Tank

When using a pressure tank, air bubbles may form in the tank and enter the brake hydraulic system. To avoid this, observe the following points when handling a pressure tank: (1) Do not shake or agitate the pressure tank after air pressure has been added or is being added. (2) Allow pressure tank to stand in one position as much as possible and bring air hose over to tank when adding head of air. (3) Make certain the valves on the pressure tank lines are not defective allowing air to be sucked in when fluid passes through the lines. (4) Pressure tank should be kept at least 1/3 full of fluid to avoid air bubbles forming, (5) If pressure tank is full of air bubbles, release air pressure and those bubbles will increase in size, be forced to top of fluid and escape.

It is recommended that pressure bleeding equipment must be of the diaphragm type.

1. Thoroughly clean master cylinder reservoir cover and surrounding area; then remove cover and diaphragm.

2. Make sure that pressure tank is at least 1/3 full of specified brake fluid and that hose and master cylinder reservoir are filled with fluid. Attach hose to master cylinder reservoir adapter J-23518.

3. Install Bleeder Wrench J-21472 on bleeder valve. Slip a brake bleeder tube over ball of wheel cylinder bleeder valve. Place lower end of bleeder tube in a clean jar. Unscrew bleeder valve 3/4 of a turn

4. Open pressure tank hose valve to apply fluid to master cylinder under pressure that does not exceed 35 pounds. It is not necessary to pump the brake pedal when using pressure tank.

5. When fluid flows from bleeder tube into glass jar in a solid stream that is free of air bubbles, that particular cylinder and line are bled; tighten bleeder valve securely and remove bleeder tube.

6. When bleeding operation is completed at all wheel cylinders, where needed, make sure that fluid level is 1/4" (plus or minus 1/8") from the lowest portion of the top of each reservoir. Install rubber diaphragm and cover.

Flushing Brake Hydraulic System

It is recommended that the entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in the hydraulic system.

Flushing is also recommended if there is any doubt as to the grade of fluid in the system or if fluid has been used which contains the slightest trace of mineral oil.

SPECIFICATIONS

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.
Nut	Brake Cylinder and Pedal Mounting Bracket to Dash	3/8-16	24
Nut	Push Rod Clevis Locking - A Cars (Power Brakes)	3/8-24	14
Nut	Brake Pedal and Clutch Pedal Pivot Shaft to Mounting Bracket - A Cars	7/16-14	25
Nut	Parking Brake Mounting to Dash	5/16-18	72-180 Lb.In.
Screw	Parking Brake Mounting to Instrument Panel	1/4-20	90 Lb.In.
Nut	Parking Brake Front Cable to Equalizer	5/16-18	5
Bolt	Wheel Cylinder to Backing Plate Mounting - B-C-E Cars	5/16-18	200 Lb.In.
Bolt & Nut	Front Brake Assembly and Steering Arm to Knuckle - A Cars	1/2-20	85
Bolt & Nut	Front Brake Assembly and Steering Arm to Knuckle - B-C-E Cars	1/2-13	80
Bolt	Front Brake Anchor Pin - A Cars	1/2-20	93
Bolt & Nut	Rear Brake Assembly to Axle Housing	3/8-24	35
Nut	Wheel and Tire Assembly to Drum - A Cars	7/16-20	70
Nut	Wheel and Tire Assembly to Drum - B-C-E Cars	1/2-20	75
Nut	Push Rod Clevis to Push Rod - A Cars (Manual Brakes)	3/8-24	14

General Specifications

Operating Mechanism, Service Brake	Hydraulic
Operating Mechanism, Parking Brakes	Lever and Cables
Operation of Service Brakes Independent of Parking Brakes	Yes
Wheels Braked, Service	Front and Rear
Brake Pedal Height Adjustment	None
Brake Drum Type, Front - A Cars	Composite Cast Iron
Brake Drum Type, Rear - All Series	Composite Cast Iron
Master Cylinder Piston Diameter, Drum Brakes	1"
Master Cylinder Piston Diameter, Disc Brakes	1-1/8"
Wheel Cylinder Size Front - A Cars	1-1/8"
Wheel Cylinder Size Rear - A Cars	7/8"
Wheel Cylinder Size Front - All Series Disc Brakes	2-15/16"
Wheel Cylinder Size Rear - B-C Cars Series	15/16"
Wheel Cylinder Sze Rear - E Cars	15/16"
Wheel Cylinder Size Rear - Estate Wagons	1"
Approved Hydraulic Brake Fluid	GM or Delco Supreme No. 11 or Equivalent
Fluid Level, From Lowest Portion of Top of Each Reservoir	1/4±1/8"
Brake Drum Inside Diameter, New - A - Cars	9.495-9.505"
Brake Drum Inside Diaemter, Rear Only - B-C Cars	10.997-11.007"
Brake Drum Inside Diameter, Rear Only - Estate Wagons	11.997-12.007"
Brake Shoe Lining Length x Width A Cars Front (Drum Brakes)	Primary 7.65" x 2.50"
A Cars Front (Drum Brakes)	Secondary 9.92"x2.50"
A Cars Rear	Primary 7.65"x2.00"
A Cars Rear	Secondary 9.92"x2.00"
B-C-E Cars Rear	Primary 8.93"x2.00"
B-C-E Cars Rear	Secondary 11.58"x2.00"
Estate Wagons Rear	Primary 9.90"x2.00"
Estate Wagons Rear	Secondary 12.85"x2.00"
Brake Drum Rebore, Max. Allowable Inside Diameter - A Cars	9.590"
B-C-E Cars	11.090"
Estate Wagons	12.090"
Max. Allowable Taper - All Series	.003"
Max. Allowable Out-of-Round of Drim - B-C-E Cars	.002"
A Cars	Front .001"
	Rear .005"
Max. Allowable Out-of-Round of Drum - A Cars	2 Oz.In.
Max. Allowable Out-of-Round of Drum - B-C-E Cars	3 Oz.In.
Max. Allowable Space Between Lining and Shoe Rim After Riveting	.005"

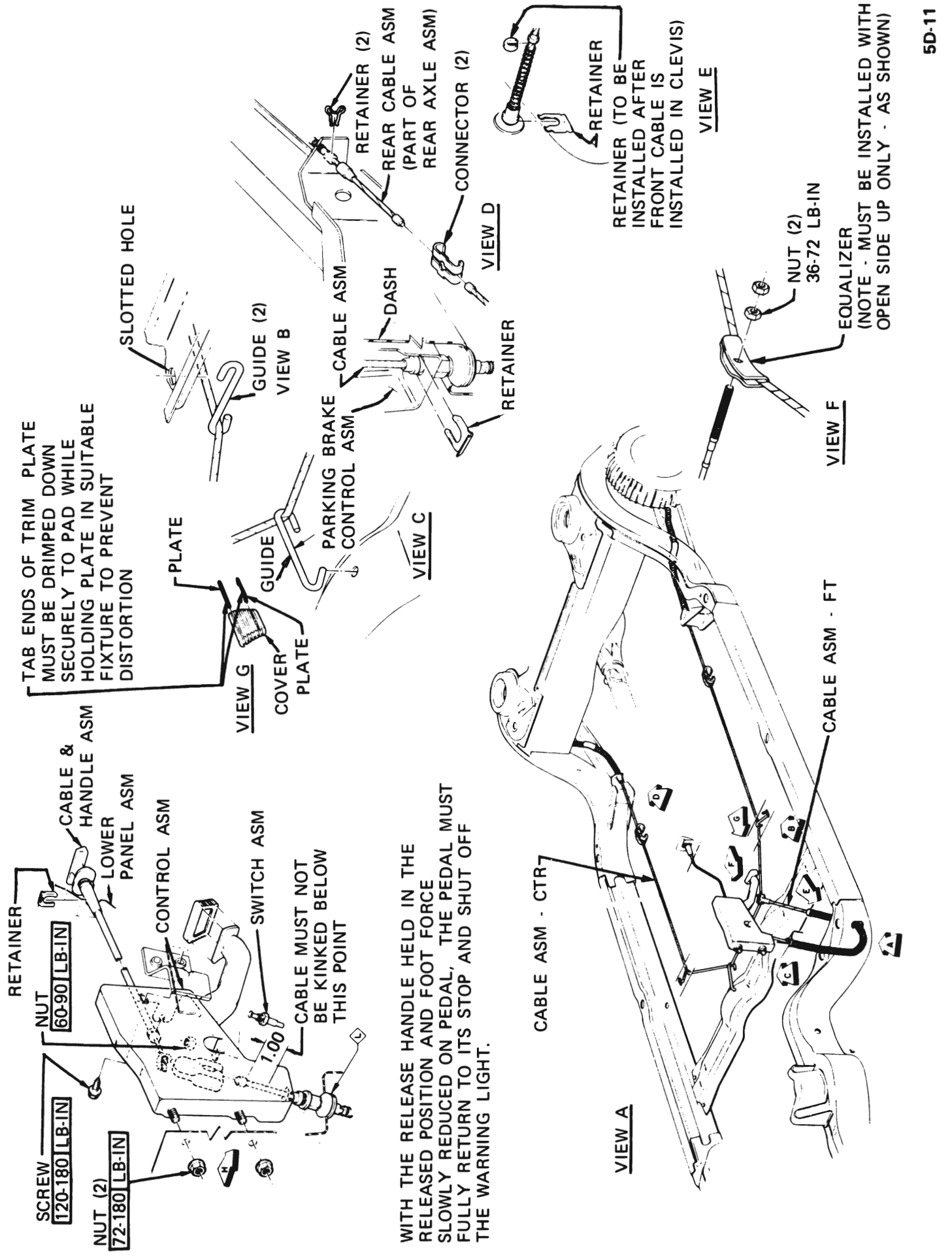


Figure 5D-11 Parking Brake Control System - B-C-E Series

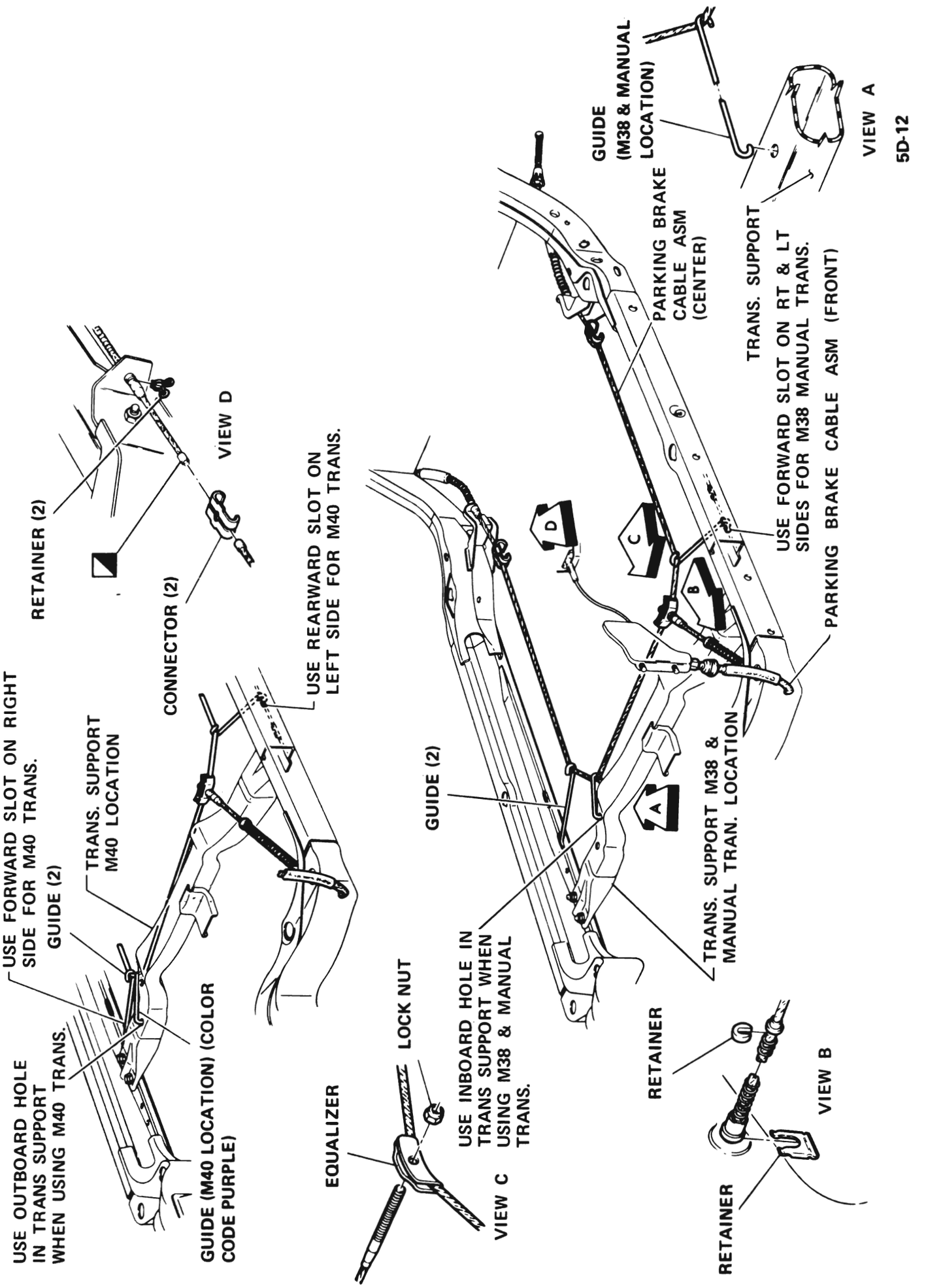


Figure 5D012 Parking Brake Control System - A Series

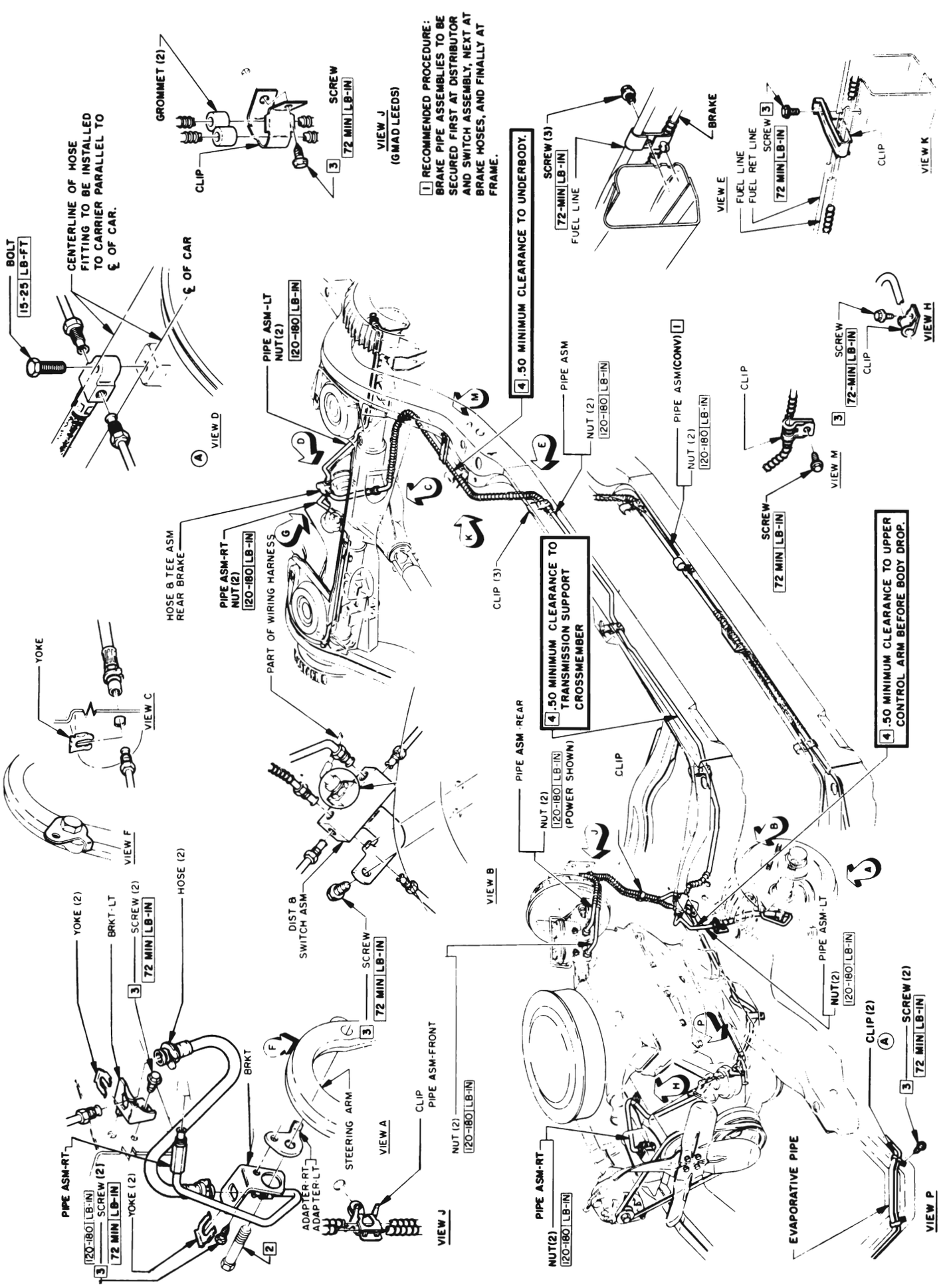


Figure 5D-13 Service Brake Control System - A Series

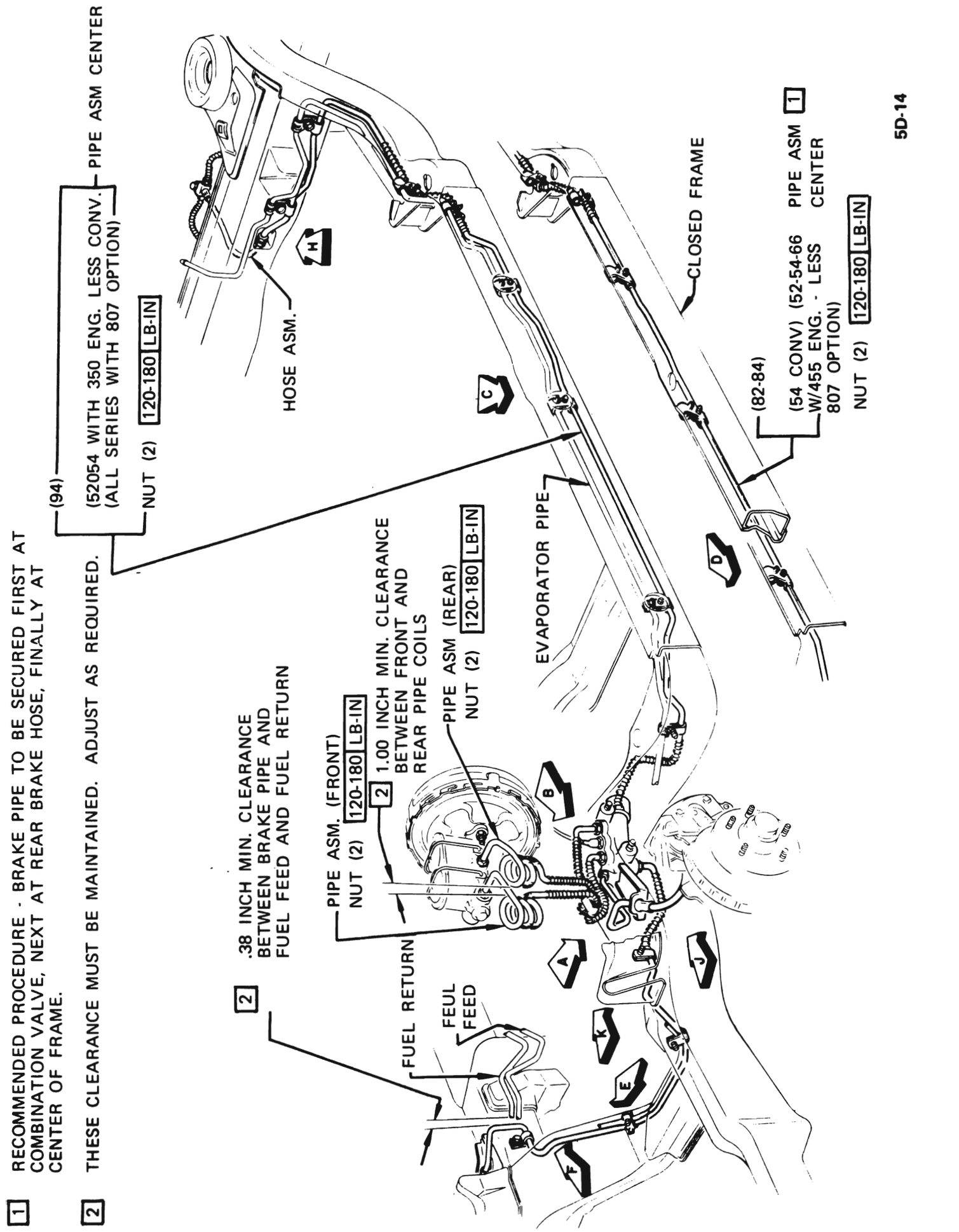


Figure 5D-14 Service Brake Control System - B-C-E Series (Less Estate Wagon)

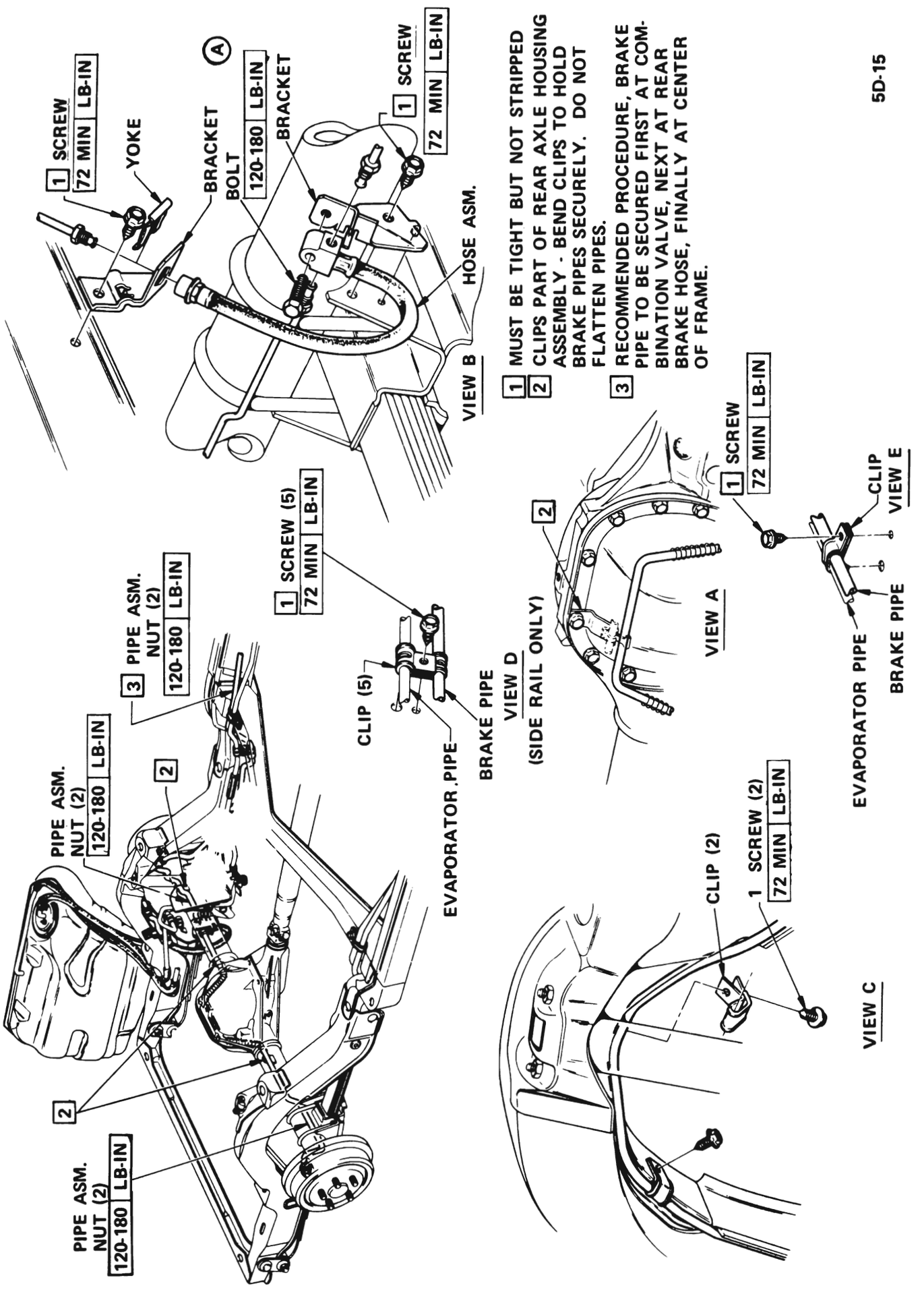


Figure 5D-15 Service Brake Control System - Estate Wagon

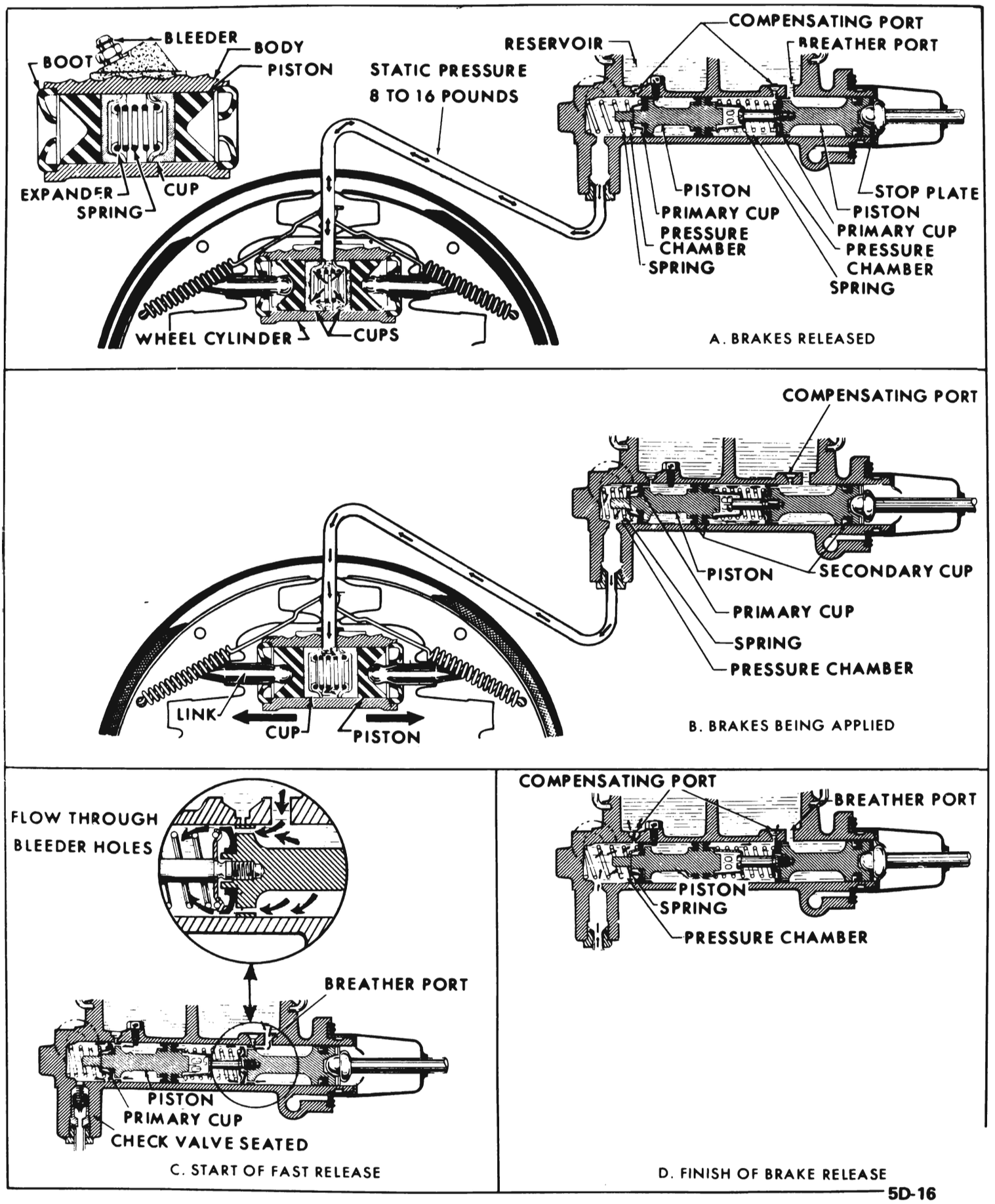


Figure 5D-16 Operation of Brake Hydraulic System

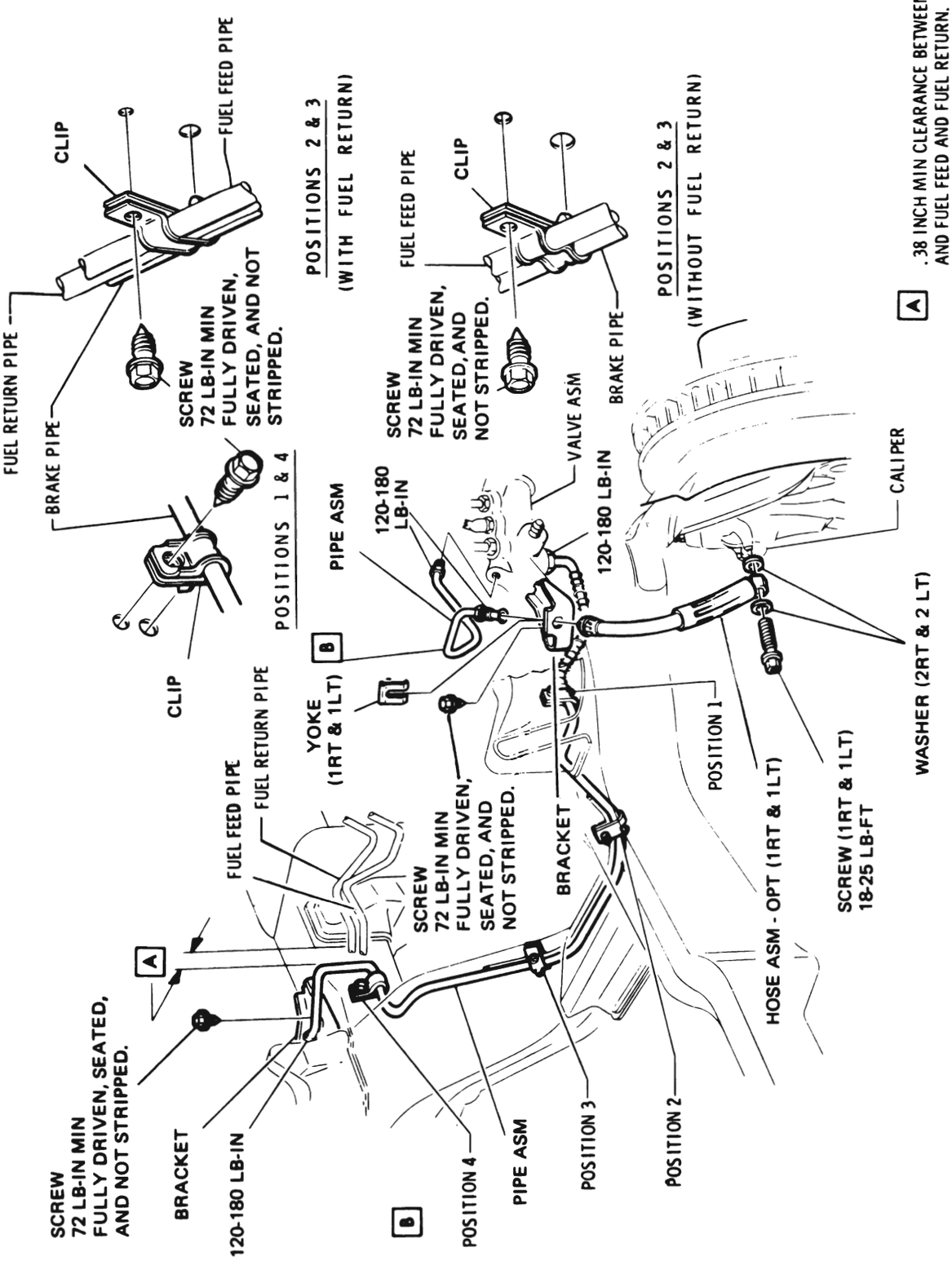


Figure 5D-17 Brake Lines - Front - B-C-E Series

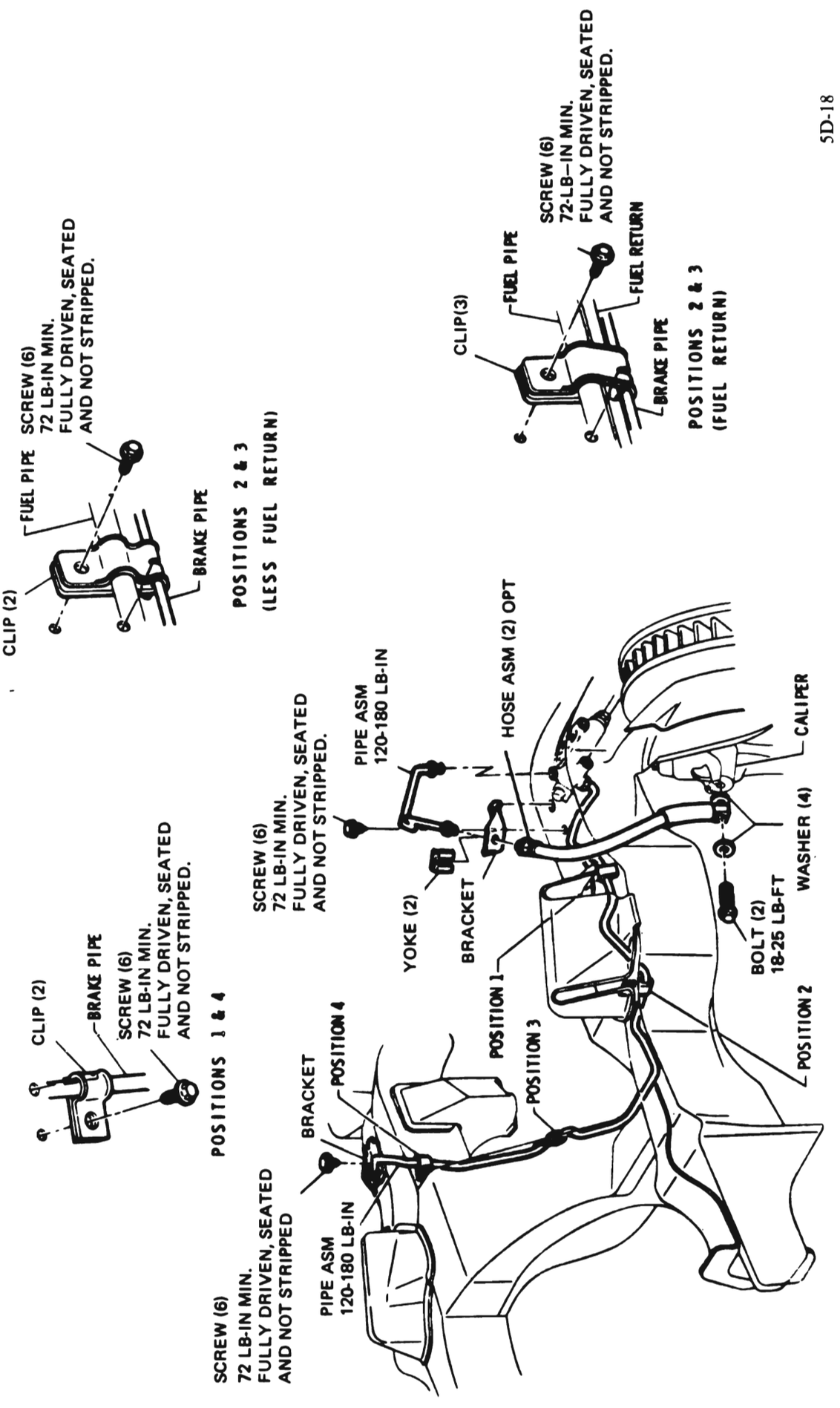
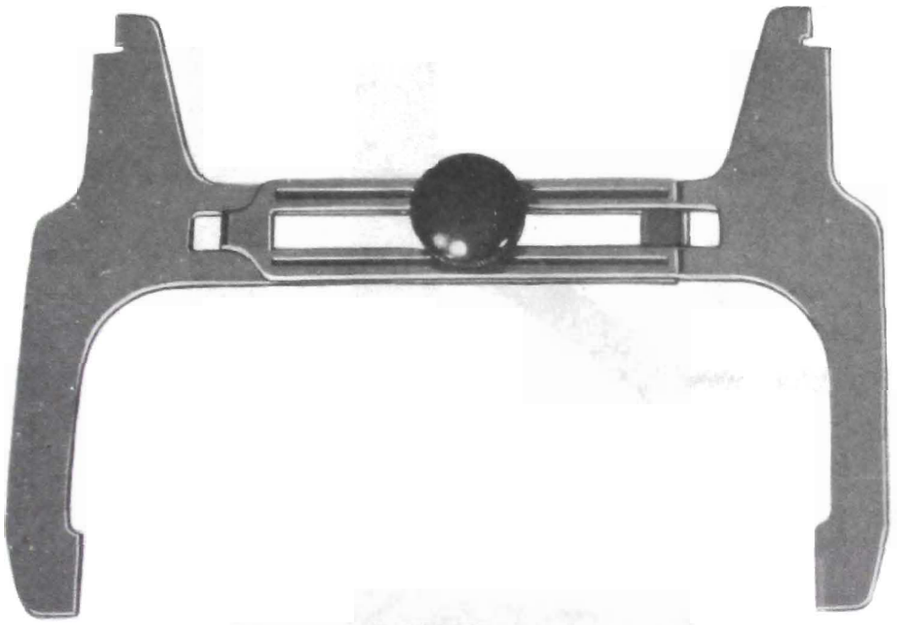
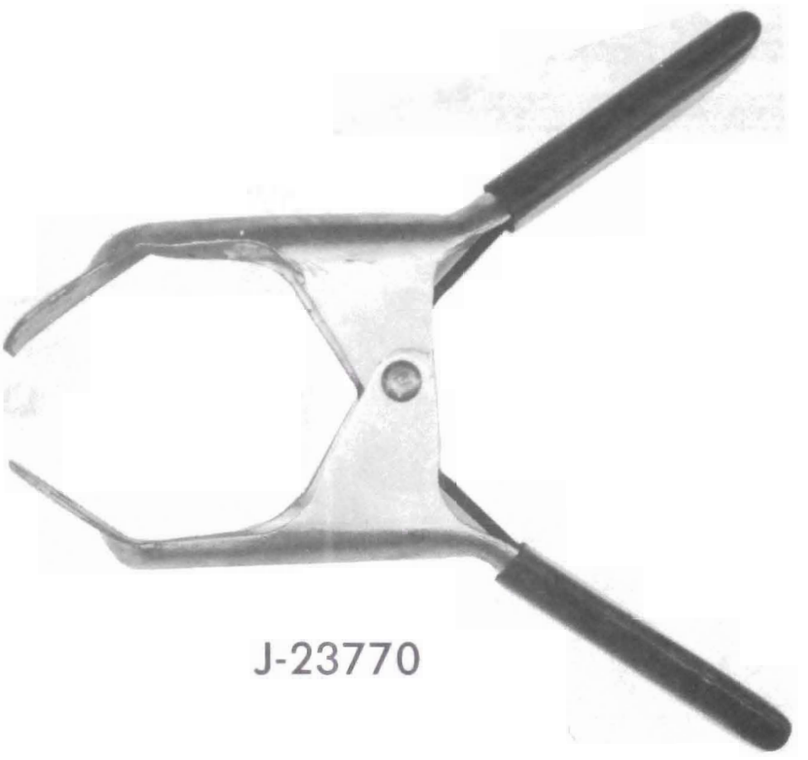


Figure 5D-18 Brake Lines - Front - A Series



J-21177	BRAKE SHOE GAGE
J-21472	BRAKE BLEEDER WRENCH

Figure 5D-19 Special Tools



J-23770 DISC BRAKE METERING VALVE PIN DEPRESSOR

Figure 5D-20 Special Tools

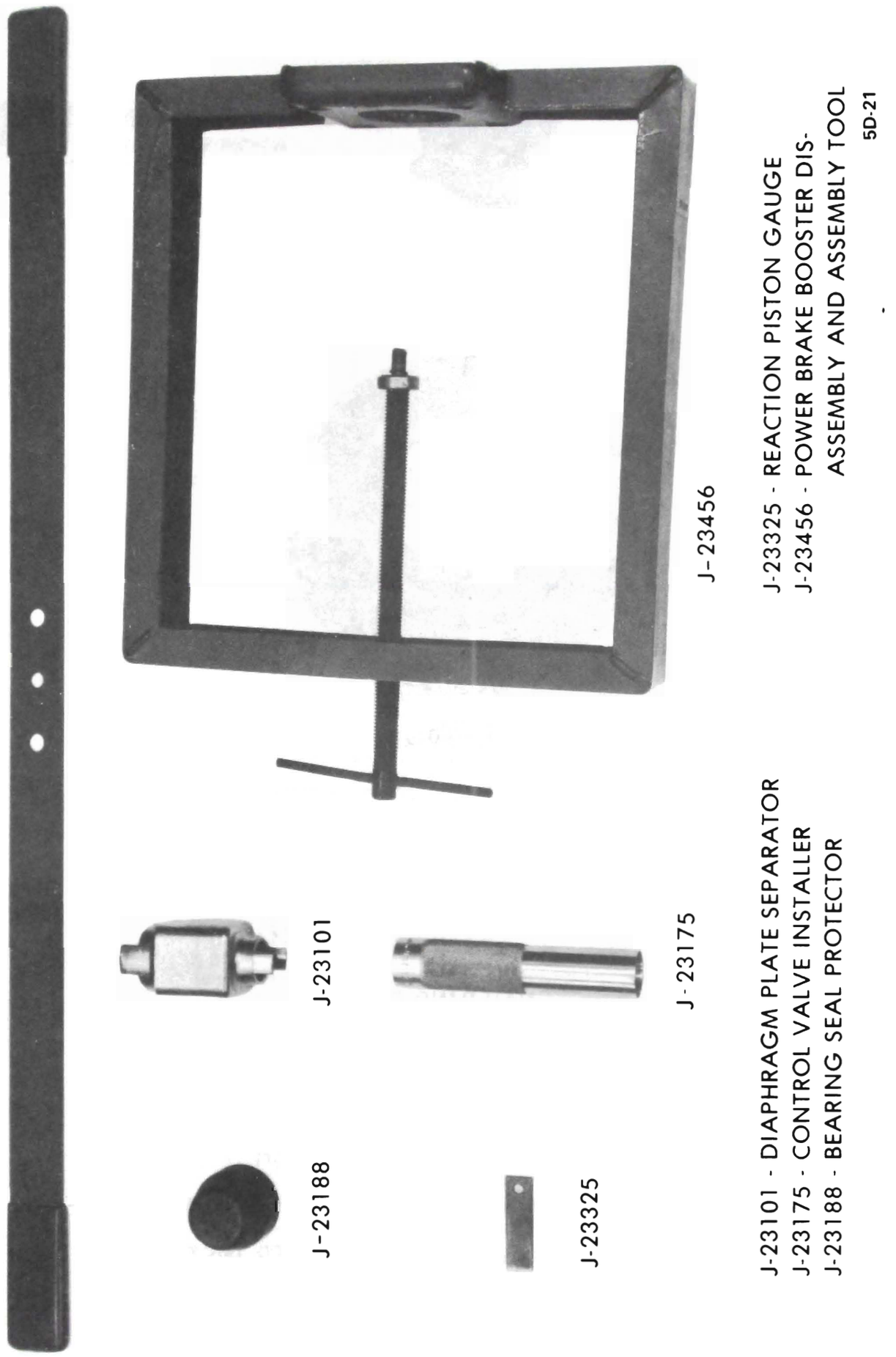
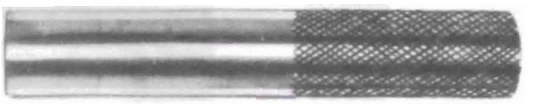


Figure 5D-21 Special Tools

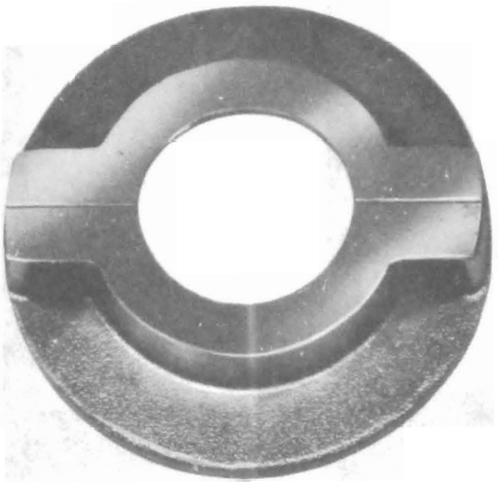
J 22647

J 21524



J 21601-01

J 4880



J 9746

J 21472

J 4880	-	SNAP RING PLIERS
J22647	-	POWER BRAKE PUSH ROD HEIGHT GAGE
J 9746	-	REAR PINION BEARING REMOVER
J 21472	-	BRAKE BLEEDER WRENCH
J 21524	-	POWER PISTON REMOVER AND INSTALLER
J 21601-01	-	POWER BRAKE RETAINER INSTALLER

Figure 5D-22 Special Tools