Section 7 Brake System

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POWER BRAKE SYSTEM DESCRIPTION

The hydraulic power disc brake system is a four-wheel, inboard-mounted design. The dual reservoir master cylinder stores brake fluid and converts mechanical brake pedal force to hydraulic pressure. The proportioning valve provides balanced front-to-rear braking and activates the brake warning lamp in case of a brake system malfunction. The dual reservoir master cylinder provides fluid for separate front and rear brake systems (Figure 7-1).

The hydro-boost system is equipped with an accumulator. The accumulator stores nitrogen gas under pressure in the event that both the normal assist and accumulator assist are not available. The power steering pump provides hydraulic oil pressure to operate the brake system's hydro-boost feature. If the power steering pump fails to supply hydraulic pressure to the hydro-boost, the pressure stored in the accumulator will provide enough hydraulic pressure for approximately four power-assisted stops. Applying the parking brake prevents the rear brake rotors from rotating and can also be used to help stop the vehicle in emergency situations.

The disc brakes are mounted on the output flanges of the front and rear axle assemblies.

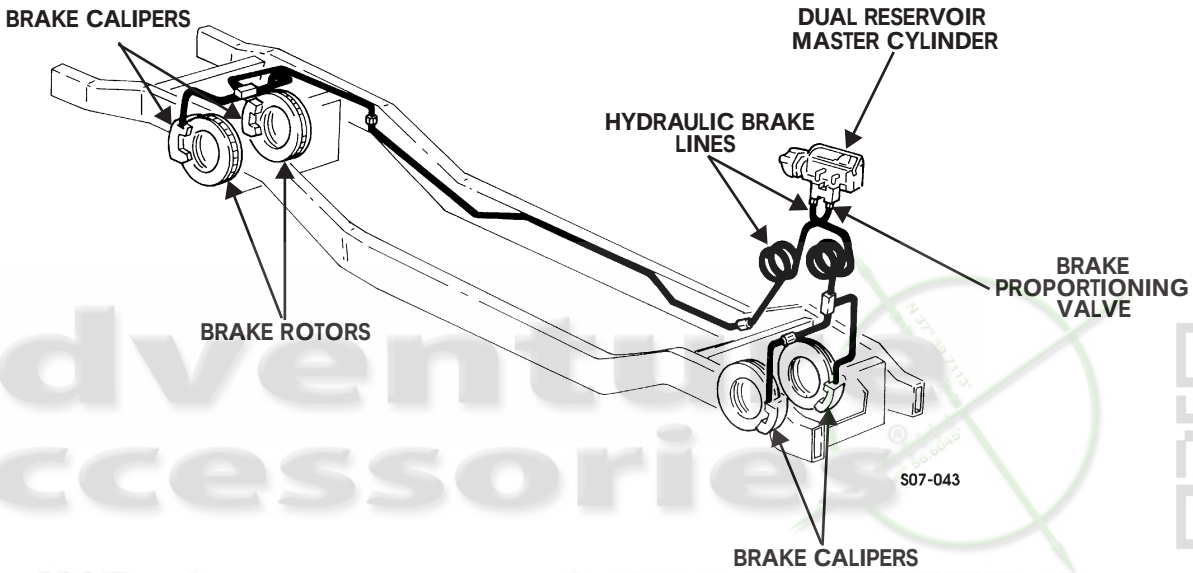

Figure 7-1: Brake System

BRAKE SYSTEM TROUBLESHOOTING AND DIAGNOSIS

Parking Brake

Parking Brake Does Not Hold Vehicle

1. Check parking brake adjustment and ensure linkage and cables operate freely. Adjust parking brake lever and/or cables or replace damaged and worn parts.
2. Inspect rear brake caliper brake pads for serviceability. Minimum brake lining thickness is 1/8 in. (3.2 mm). Replace all rear brake pads if any pad does not meet thickness specifications.
3. Check caliper for binding or dragging. Check for binding caliper guide pins.

Service Brakes

Low or Spongy Brake Pedal on First Application or Pedal Goes to Floor

NOTE: The HUMMER is equipped with DOT 5 silicone brake fluid. **Do not mix with other brake fluids**.

NOTE: When low or spongy brakes exist, the brake light on the instrument panel should illuminate when the brake pedal is applied.

WARNING: Always wear eye protection when bleeding brakes. Failure to do this may cause injury if brake fluid comes in contact with eyes.

1. Remove master cylinder cover and visually check reservoirs for low fluid level or contamination.
   a. If fluid is contaminated, flush system with clean brake fluid.

   b. If fluid is low, check for worn brake pads, observe for leakage, broken, cracked or kinked lines, worn master cylinder, etc. Replace any worn parts.
2. If fluid is not contaminated, bleed master cylinder then bleed brakes.
3. Check hydro-boost. Depress brake pedal several times, with engine off, to exhaust accumulator pressure. Depress brake pedal and start engine.
   a. Brake pedal should fall, then push back against operator's foot.
   b. Perform pressure test (Section 8).
   c. Replace hydro-boost if not operating properly.

Decreased Brake Pedal Travel or Slow Return

1. Check for worn brake pedal return spring. Replace if worn.
2. Check brake pedal bushings for signs of wear or binding. Replace if worn and lubricate as needed.
3. Check for kinked or damaged brake lines which may restrict brake fluid. Replace any damaged lines.
4. Check hydro-boost. Depress brake pedal several times, with engine off, to exhaust accumulator pressure. Depress brake pedal and start engine.
   a. Brake pedal should fall, then push back against operator's foot.
   b. Perform pressure test (Section 8).
   c. Replace hydro-boost if not operating properly.
5. Check brake calipers for binding as a result of corrosion or dirt. Check brake rotors for free movement. If rotors do not move freely, remove calipers and clean caliper guide pins.
6. Check parking brake cable for proper operation. Repair as required.

Excessive Pedal Pressure Required to Stop Vehicle

1. Remove master cylinder cover and visually check reservoirs for low fluid level or contamination.
   a. If fluid is contaminated, flush system with clean brake fluid.
   b. If fluid is low, check for worn brake pads, observe for leakage, broken, cracked or kinked lines, worn master cylinder, etc. Replace any worn parts.
2. Check fluid in power steering pump reservoir. Fill fluid to proper level (Section 1).
3. Check power steering pump belt tension. Adjust tension or replace belt (Section 8).
4. Check brake pads for proper installation, contamination, or distortion. Check brake pads for excessive wear. Minimum brake lining thickness is 1/8 in. (3.2 mm). Replace brake pads as axle sets (front or rear) if any pad does not meet specifications

NOTE: To preserve even braking, both calipers must be in equal condition.

5. Check brake calipers for binding as a result of corrosion or dirt. Check brake rotors for free movement. If rotors do not move freely, remove calipers and clean caliper guide pins.
6. Check for frozen piston in brake caliper. If inner pad is not worn to limit, but piston cannot be retracted, rebuild or replace both calipers.
7. Check for pinched or kinked supply and return lines to hydro-boost. Reposition or replace any damaged lines.
8. Check for damaged brake lines. Replace any damaged brake lines.
9. Check for malfunctioning hydro-boost. Depress brake pedal several times, with engine off, to exhaust accumulator pressure. Depress brake pedal and start engine.
   a. Brake pedal should fall, then push back against operator's foot.
   b. Perform pressure test (Section 8).
   c. Replace hydro-boost if not operating properly.
10. Check power steering system. Refer to step 6 in the Diagnostic portion of *Hard Steering* in Section 8.

Noisy Brakes

1. Check brake pads for proper installation, contamination, or distortion. Check brake pads for excessive wear. Minimum brake lining thickness is 1/8 in. (3.2 mm). Replace brake pads as sets (front or rear) if any pad does not meet specifications.
2. Check rotor for glazing or scoring. Turn the rotor if glazed or scored. Do not exceed the minimum thickness shown on the inside of the rotor hat section. It is not recommended that rotors be turned when spotted or heat checked.
3. Check halfshaft mounting.
   a. Apply a thread-locking compound to the halfshaft-to-rotor capscrews and torque to 48 lb-ft (65 N•m).
   b. Apply a thread-locking compound to the halfshaft retaining capscrew (in geared hub) and torque to 40 lb-ft (54 N•m). Tighten any loose fasteners.

Brake Chatter Noise

On some new vehicles, roughness or a chatter sound from the brakes may be noticed during low speed brake application. The noise is a result of the lining edges of an unburnished brake pad rubbing against the rotor. Burnishing is a part of the vehicle break-in process which fully seats and conditions new brake pads. Although annoying, the brake noise is not detrimental to vehicle safety or performance, and will eventually be eliminated through normal brake use.

If roughness or chatter persists on a new vehicle, then chamfering of the brake pad lining edges can be performed.

Chamfering of the brake pad is done by slightly grinding or filing the edge of the pad lining on a grinding wheel.

To complete the chamfering procedure:

1. Remove the eight service brake pads from the vehicle. Mark each pad for vehicle and caliper location.
2. Chamfer (grind) the brake pad lining edges. Ensure both brake pad lining edges are chamfered on each of the eight brake pads (Figure 7-2).
3. Install eight service brake pads at the original vehicle and caliper location.
4. Operate vehicle and check brakes for proper operation.

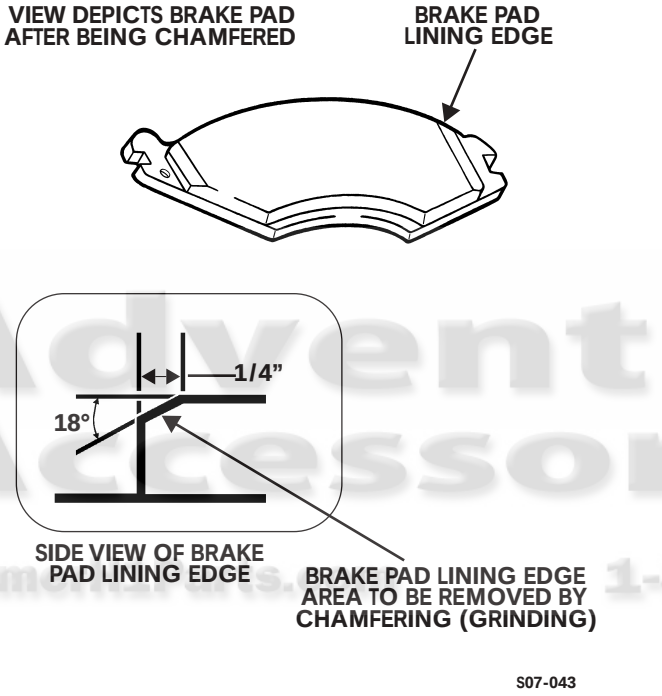

Figure 7-2: Chamfering Brake Pad

Booster or Pedal Pulsation

1. Check hydro-boost. Depress brake pedal several times, with engine off, to exhaust accumulator pressure. Depress brake pedal and start engine.
   a. Brake pedal should fall, then push back against operator's foot.
   b. Perform pressure test (Section 8).
   c. Replace hydro-boost if not operating properly.
2. Check halfshaft-to-rotor mounting for missing or loose capscrews. Torque capscrews to 48 lb-ft (65 N•m) and apply a thread locking compound.
3. Check brake rotor lateral run-out. Refinish any rotor not meeting specifications. Refer to *Checking Lateral Runout* in this section for more information.

Erratic Braking Action

1. Check for correct tire pressure.
2. Check brake pads for binding as a result of corrosion or dirt. Check brake pads for excessive wear. Minimum brake lining thickness is 1/8 in. (3.2 mm). Replace brake pads as sets (front or rear) if any pad does not meet specifications.

3. Check brake calipers for binding as a result of corrosion or dirt. Check for seized or binding brake caliper pistons. Repair any binding or seized caliper pistons. Check brake rotors for free movement. If rotors do not move freely, remove calipers and clean caliper guide pins (Figure 7-3).

NOTE: Calipers must be rebuilt or replaced in pairs.

4. Check for leaking caliper piston seals. Replace or rebuild any calipers with leaking seals.
5. Check rotor for glazing or scoring. Turn the rotor if glazed or scored. Do not exceed the minimum thickness shown on the inside of the rotor hat section. It is not recommended that rotors be turned when spotted or heat checked.
6. Check for damaged brake lines. Replace any damaged brake lines.
7. Check for faulty proportioning valve. With the vehicle at curb weight, decelerate from 20 mph (32 kph) on dry concrete road and apply sufficient pressure to lock up the brakes. If the front brakes lock up before rear brakes, replace the proportioning valve.
8. Check toe adjustment. Adjust toe, if necessary. Refer to Section 5.

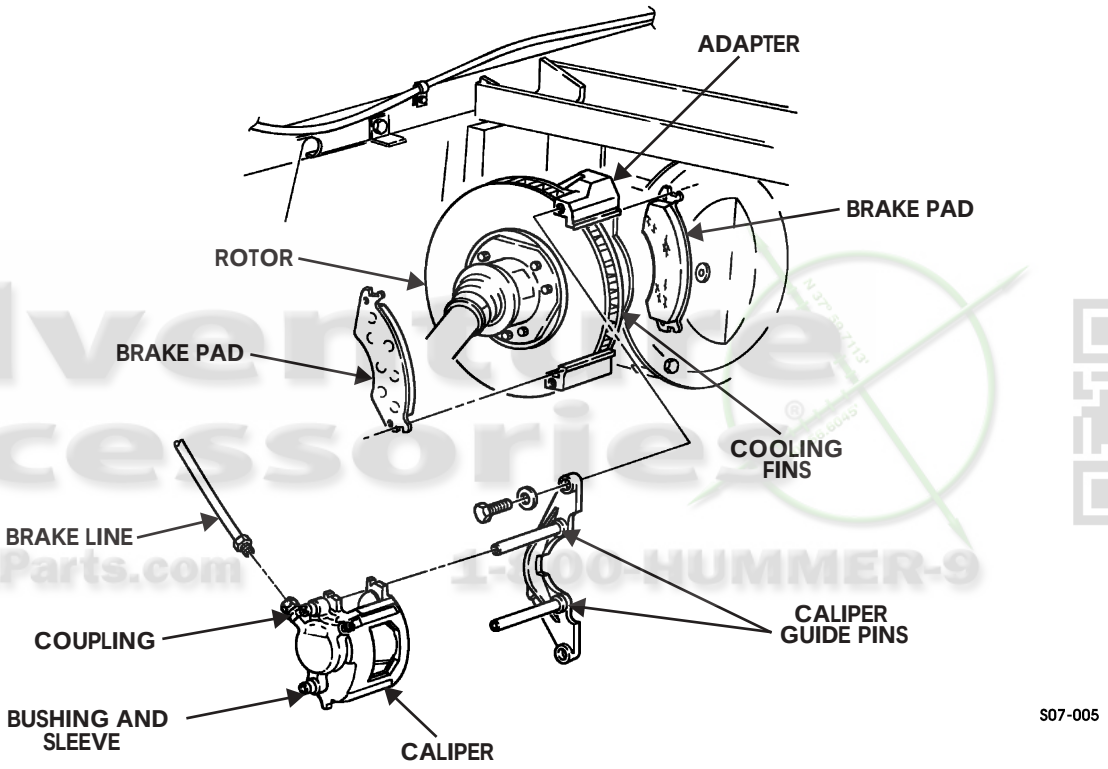

Figure 7-3: Brake Caliper and Brake Pads

HYDRO-BOOST SYSTEM DIAGNOSIS

PROBLEM	POSSIBLE CAUSE	CORRECTION
Slow Brake Pedal Return	1. Excessive seal friction in booster. 2. Faulty spool action. 3. Restriction in return line from booster to pump reservoir. 4. Damaged input rod end.	1. Replace the hydro-boost. 2. Flush the steering system while pumping the brake pedal. 3. Replace the line. 4. Replace the input rod and piston assembly.
Grabby Brakes or Booster Chatters - Pedal Vibrates	1. Faulty spool action caused by contamination. 2. Power steering pump belt slips. 3. Low fluid level in power steering pump.	1. Flush steering system while pumping brake pedal. 2. Tighten belt. 3. Fill reservoir and check for external leaks.
Accumulator Leak-Down System Does Not Hold Charge	1. Contamination in steering hydro-boost system. 2. Internal leakage in accumulator system	1. Flush steering system while pumping brake pedal. 2. Replace hydro-boost.
Excessive Brake Pedal Efforts	1. Loose, glazed, or broken pump belt. 2. No fluid in pump reservoir. 3. Leaks in system hoses. 4. Leaks at tube fittings and connections. 5. Leakage at pneumatic accumulator seal. 6. Leakage at piston seal. 7. Leakage at input seal. 8. Leakage at cover-to-housing seal. 9. Leakage at spool plug seal. 10. Leakage at ball plug	1. Tighten or replace belt. 2. Fill reservoir and check for external leaks. 3. Replace faulty parts. 4. Tighten fittings or replace tube seats or O-rings. 5. Replace O-ring. 6. Overhaul with new seal kit. 7. Overhaul with new seal kit. 8. Overhaul with new seal kit. 9. Overhaul with spool plug seal kit. 10. Replace hydro-boost.
NOTE: The power steering fluid and brake fluid cannot be mixed. If the brake seals contact steering fluid or the steering seals contact brake fluid, seal damage will result.		

Noise Diagnosis

The following noises are associated with the hydro-boost and may or may not be cause for concern. Some noises are normal and for the most part temporary in nature. Other noises may be a sign of excessive wear or the presence of air in either the booster or the steering system.

1. A moan or low frequency hum usually accompanied by a vibration in the pedal or steering column may be observed during parking maneuvers or other low-speed maneuvers. This may be caused by a low fluid level in the power steering pump or by air in the fluid. Holding the pump at relief pressure (steering wheel held all the way in one direction) for more than five seconds will cause air to enter the system. Check the fluid level and fill if needed. The system must then sit for one hour to remove the air.
2. A high-speed fluid noise may be heard when the brake pedal is fully depressed. This condition is normal.
3. Whenever the accumulator pressure is used, a slight hiss may be noticed. It is the sound of the hydraulic fluid escaping through the accumulator valve, and is completely normal.
4. After the accumulator has been emptied and the engine is started again, another hissing sound may be heard during the first brake application or the first steering maneuver. This is caused by the fluid rushing through the accumulator charging orifice. It is normal and will only be heard once after the accumulator is emptied. If this sound continues however, even though no apparent accumulator pressure assist was made, it could be an indication that the accumulator is not holding pressure and should be

checked using the procedure *Accumulator Leakdown Test* in this section.

Booster Functional Test

With the engine off, apply the brake pedal several times until the accumulator is completely depleted. Depress the brake pedal using 40 lb-ft (54 N•m) of force and start the engine. The pedal will fall and then push back against your foot.

Accumulator Leakdown Test

1. Start the engine and charge the accumulator by applying the brake pedal or by turning the steering wheel from stop to stop. Turn off the engine and let the vehicle sit for one hour. After one hour there should be at least two power-assisted applications with the engine off.
2. If the reserve system will not retain a charge for one hour, but functions normally immediately following charging, the accumulator valves are at fault. The booster must be disassembled and the accumulator valves replaced.
3. If the accumulator can be heard charging and discharging but does not hold a charge, disassemble the booster and replace the accumulator valves.
4. Deplete the accumulator by pressing the brake pedal several times. If the accumulator can has lost its charge, it is possible to rotate or wobble the accumulator can with respect to the housing. Replace the accumulator assembly.

Handling - The booster should not be carried by the accumulator nor should the booster ever be dropped on the accumulator. The snap ring which holds the accumulator into the housing should be checked for proper positioning before the booster is used. The accumulator contains high pressure gas and with any high pressure gas a certain degree of danger is present if mishandled.

Disposal - The accumulator should not be exposed to excessive heat, fire or incineration. Before discarding accumulator following replacement, drill a 1/16 in. diameter hole in the end of accumulator can to relieve the pressure. BE SAFE! Protect your eyes. Wear approved safety glasses.

SERVICE BRAKE SYSTEM BLEEDING

NOTE: If only the front or rear half of the system has been serviced, it is usually necessary to bleed only that half of the system. However, if a firm brake pedal cannot be obtained after bleeding, it will be necessary to bleed the entire system. The brake hydraulic system can be bled manually or by using a pressure tank and adapters. Each method is outlined in the following procedures.

WARNING: Always wear eye protection when bleeding brakes. Failure to do this may cause injury if brake fluid comes in contact with eyes.

Pressure Bleeding

***CAUTION**: When using a pressure bleeding tank, follow the manufacturer's instructions for its use. Use only DOT 5 silicone brake fluids when bleeding. Do not exceed the recommended working pressure when pressurizing the tank. A tank pressure of 15-20 psi (103-138 kPa) is sufficient to bleed the brake hydraulic system. Release all air pressure from the tank after using it.*

NOTE: This procedure covers bleeding at one wheel. Repeat bleeding task for remaining wheels.

1. Remove cover from master cylinder. Fill master cylinder if necessary.
2. Install pressure tank bleeder adapter to master cylinder (Figure 7-4).
3. Connect line from pressure tank to adapter.

NOTE: Bleed calipers in the following order: right rear, left rear, right front, left front.

4. Remove protective cap from bleeder screw on caliper assembly (Figure 7-5).
5. Connect short piece of hose to bleeder screw, and place other end of hose in container 3/4 full of brake fluid.
6. Open valve on line from pressure tank to master cylinder allowing pressurized brake fluid to enter system (Figure 7-4).
7. Open bleeder screw 3/4 turn and observe brake fluid in container. Close bleeder screw when brake fluid flows free of air bubbles (Figure 7-5).
8. Disconnect hose from bleeder screw and install protective cap on bleeder screw.
9. Close valve on line from pressure tank to master cylinder (Figure 7-4).
10. Disconnect line from adapter.
11. Remove adapter from master cylinder and fill master cylinder if necessary.
12. Install master cylinder cover.

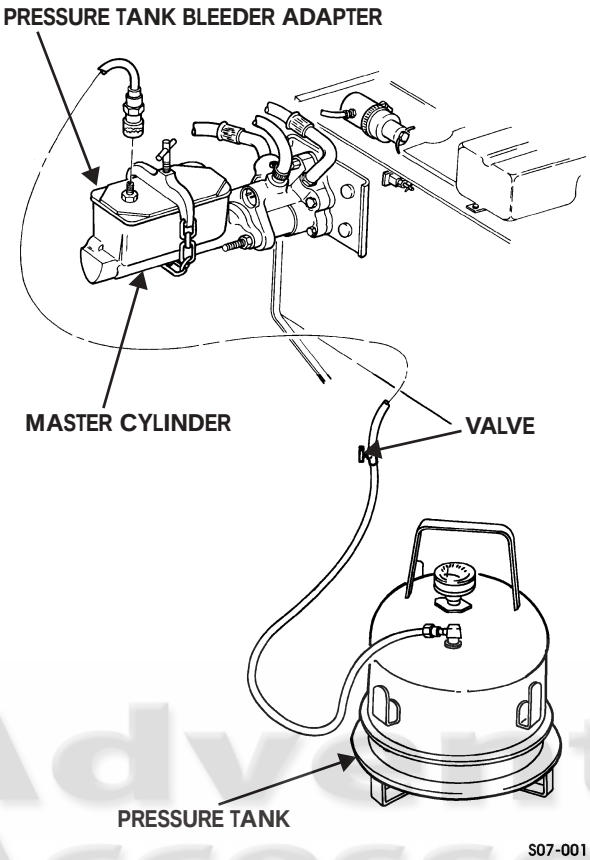

Figure 7-4: Pressure Bleeding Brake System

Manual Bleeding

NOTE: This procedure covers bleeding at one wheel. Repeat bleeding task for remaining wheels. Assistance is required to depress the brake pedal when manually bleeding brakes while mechanic opens and closes bleeder screw.

NOTE: Bleed calipers in the following order: right rear, left rear, right front, left front.

1. Remove protective cap from bleeder screw on caliper assembly (Figure 7-5).
2. Connect short piece of hose to bleeder screw, and place other end of hose in container 3/4 full of brake fluid.

***CAUTION**: Check the master cylinder fluid level frequently during the bleeding operation and refill the reservoirs as necessary. Do not allow the master cylinder to run out of fluid at any time, or additional air will be drawn into the system.*

3. Have an assistant depress the brake pedal. Open bleeder screw 3/4 turn.

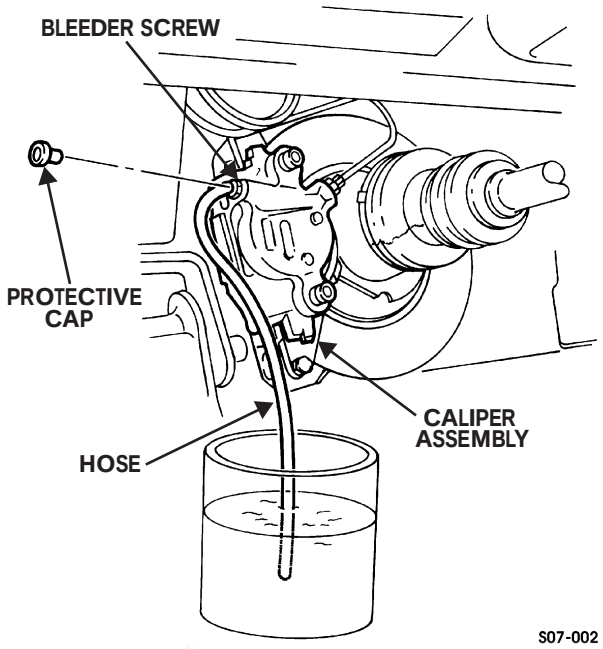

Figure 7-5: Manually Bleeding Brake System

4. When pedal reaches floor, tighten bleeder screw and have assistant slowly release brake pedal.
5. Repeat steps 3 and 4 until fluid flows clear and free of air bubbles.
6. Disconnect hose from bleeder screw and install protective cap on bleeder screw.
7. Operate vehicle and check brakes for proper operation.

SERVICE BRAKE PAD REPLACEMENT

NOTE: The following procedure applies to the front brake system only.

Removal

1. Using crowfoot, remove two capscrews and washers securing yoke and caliper to adapter.

NOTE: Note positioning of brake pad surfaces for installation.

2. Remove yoke, caliper, and two brake pads.

Cleaning and Inspection

NOTE: Clean all components, examine for wear or damage, and replace if necessary.

1. Inspect dust boot for tears or deterioration (Figure 7-6).
2. Inspect rotor for heat checks, spotting, discoloration, pitting, or scoring. Resurface rotors if discolored, pitted, or scored. It is not recommended that rotors be turned when spotted or heated checked.

NOTE: If operation in wet and muddy conditions is expected, replace brake pads if brake lining thickness is 1/8 in. (3.2 mm) or less.

3. Inspect brake pads for glazing, oil saturation, or wear. If glazed, oil saturated, or if brake lining thickness is less than 1/8 in. (3.2 mm), replace brake pads. Brake pads should be replaced as an axle set (front or rear).

Installation

WARNING: Ensure brake pads are installed with linings facing rotor. Failure to do this will cause poor performance, damage to equipment, and may result in injury.

1. Position brake pads on adapter.

NOTE: When installing yoke and caliper, use a suitable tool to compress the piston.

2. Apply a thread-locking compound to tapped holes of adapter. Using crowsfoot, secure yoke and caliper to adapter with two washers and capscrews. Tighten capscrews to 30-40 lb-ft (41-54 N•m).

LINING AND ROTOR BURNISHING

After you replace brake pads and/or refinish rotors, it is recommended that the new braking surface be broken in, or "burnished." To do this, make 20 stops, one every two miles at 30 mph, using medium pedal effort. The amount of time it takes to stop should be approximately five seconds. During this procedure, use care to avoid overheating the brakes.

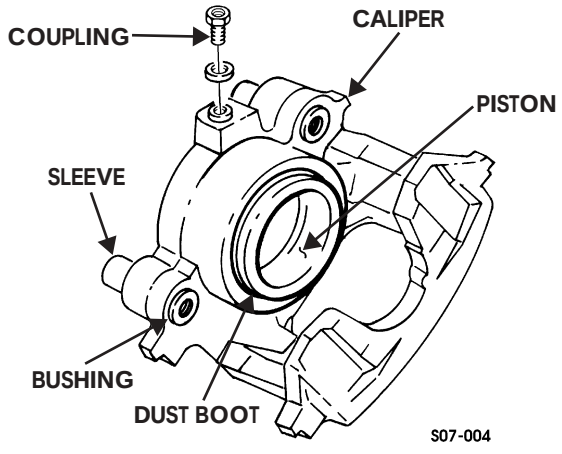

Figure 7-6: Caliper Assembly

SERVICE BRAKE CALIPER MAINTENANCE

NOTE: The following procedure applies to the front brake system only. If removing left front caliper, half-shaft must be removed.

Removal

1. Disconnect brake line from coupling (Figure 7-7).
2. Using crowfoot, remove two capscrews and washers securing yoke and caliper to adapter.

NOTE: Note positioning of brake pad surfaces for installation.

3. Remove yoke, caliper, and two brake pads from adapter.
4. Slide yoke and caliper guide pins out from caliper. Remove coupling and washer from caliper.

Cleaning and Inspection

NOTE: Clean all components, examine for wear or damage, and replace if necessary.

1. Clean mating surfaces of caliper and adapter (Figure 7-7).
2. Inspect caliper and caliper piston for pitting, or damage (Figure 7-6).
3. Inspect caliper guide pins and sleeves for wear.
4. Inspect dust boot and bushings for tears or deterioration.
5. Inspect yoke and caliper guide pins for corrosion. Perform step 6 if corroded. If not, perform step 8 (Figure 7-7).
6. Remove caliper guide pins from yoke. Discard caliper guide pins.
7. Inspect rotor for heat checks, discoloration, pitting, or scoring. Check rotor thickness variation.

NOTE: Replace brake pads in sets only. Replace brake pads if brake lining thickness is less than 1/8 in. (3.2 mm) and operation in wet and muddy conditions is expected.

8. Inspect brake pads for glazing, oil saturation, or wear. If glazed, oil saturated, or if brake lining thickness is less than 1/8 in. (3.2 mm), replace both pads and pads from opposite caliper.

Installation

1. Install a washer and coupling to caliper (Figure 7-6).

WARNING: Ensure brake pads are installed with linings facing rotor. Failure to do this will cause poor performance and damage to equipment and may result in injury.

2. Position brake pads on adapter (Figure 7-7).

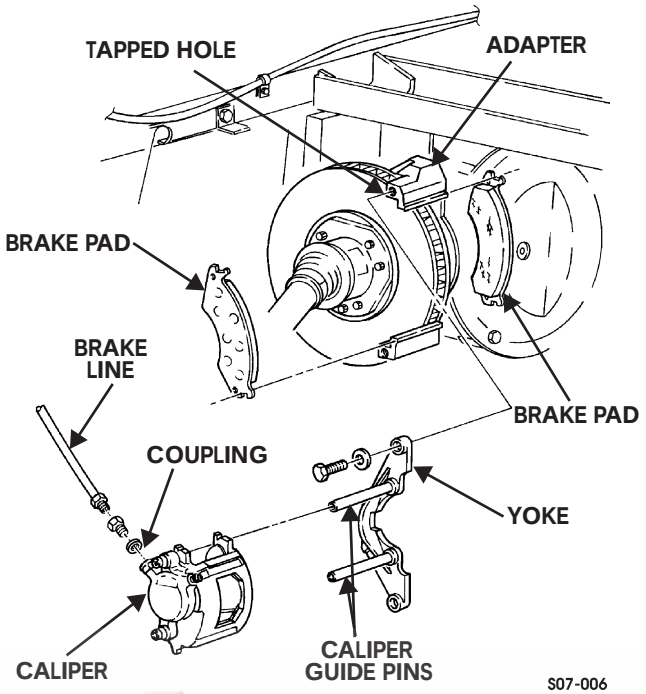

Figure 7-7: Service Brake Components

3. Apply thread-locking compound to threads of caliper guide pins and install pins into yoke (if removed during cleaning and inspection). Tighten caliper guide pins to 30 lb-ft (41 N•m).
4. Position caliper onto yoke.

NOTE: When installing calipers, use a suitable tool to bottom out piston in caliper if needed.

5. Apply thread-locking compound to tapped holes of adapter. Using crowfoot, secure yoke and caliper to adapter with two washers and capscrews. Tighten two capscrews to 40 lb-ft (54 N•m).
6. Connect brake line to coupling.
7. Bleed brake system.

MASTER CYLINDER REPLACEMENT

Removal

1. Disconnect front and rear brake lines from master cylinder (Figure 7-8).
2. Remove locknut, washer, and proportioning valve from right master cylinder mounting stud and master cylinder. Discard locknut.
3. Remove locknut, washer, capscrew, and washer securing bracket to splash shield. Discard locknut (Figure 7-9).
4. Remove locknut, washer, and bracket from hydro-boost. Discard locknut.

***CAUTION**: Do not apply excessive pressure or force on master cylinder.*

5. Remove two locknuts and master cylinder from hydro-boost. Discard locknuts (Figure 7-8).

Installation

1. Bench-bleed master cylinder.

***CAUTION:** Ensure O-ring is properly seated on master cylinder prior to installation. Damage to master cylinder may result if O-ring is not properly seated.*

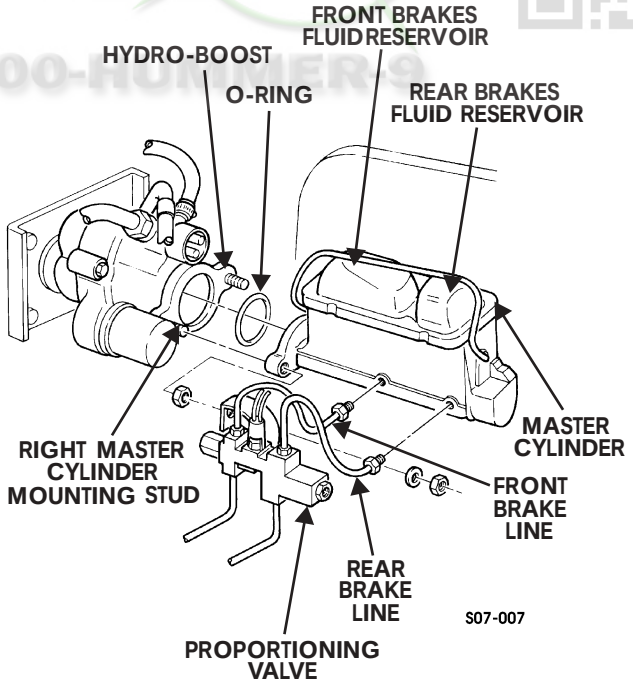

Figure 7-8: Master Cylinder

2. Install master cylinder to hydro-boost with two locknuts. Tighten locknuts to 22 lb-ft (30 N•m) (Figure 7-8).
3. Install bracket on hydro-boost with washer and locknut. Tighten locknut to 22 lb-ft (30 N•m) (Figure 7-9).
4. Install bracket to splash shield with washer, capscrew, washer, and locknut. Tighten locknut to 26 lb-ft (35 N•m).
5. Install proportioning valve to right master cylinder mounting stud with washer and locknut. Tighten locknut to 22 lb-ft (30 N•m) (Figure 7-8).
6. Install front and rear brake lines to master cylinder.

Bleeding

NOTE: Master cylinder must be filled and kept at least half full during bleeding operation (Figure 7-8).

1. Depress brake pedal slowly and hold. Loosen front brake line to purge air from the front reservoir (closest to the hydro-boost).
2. Tighten front brake line and release brake pedal.
3. Repeat steps 1 and 2 until front reservoir is purged of air.
4. Repeat steps 1 through 3 for rear reservoir with rear brake line.
5. Bleed brake system.

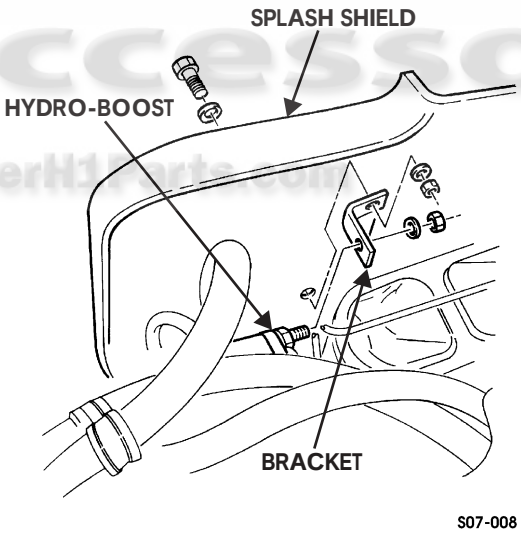

Figure 7-9: Hydro-boost Bracket

MASTER CYLINDER BENCH BLEEDING

Bleeding

NOTE: Master cylinder must be filled and kept at least half full during bleeding operation. Perform this procedure prior to installing master cylinder on vehicle.

1. Secure master cylinder flange in vise.
2. Remove cover and fill reservoirs with silicone brake fluid.
3. Screw threaded end of bleeder hose into brake line port on master cylinder and insert opposite end into reservoir. Repeat step for other bleeder hose (Figure 7-10).
4. Slowly push piston into master cylinder. Do not release piston. Air will be forced into hoses. Repeat as needed until no bubbles noted from lines. Lines must stay in fluid until installed.
5. Refill reservoirs with silicone brake fluid and repeat step 4 until no air bubbles remain in brake fluid.
6. Remove bleeder hoses from brake line ports on master cylinder.
7. Install cover on master cylinder and remove from vise.
8. Install master cylinder.
9. Bleed brake system.

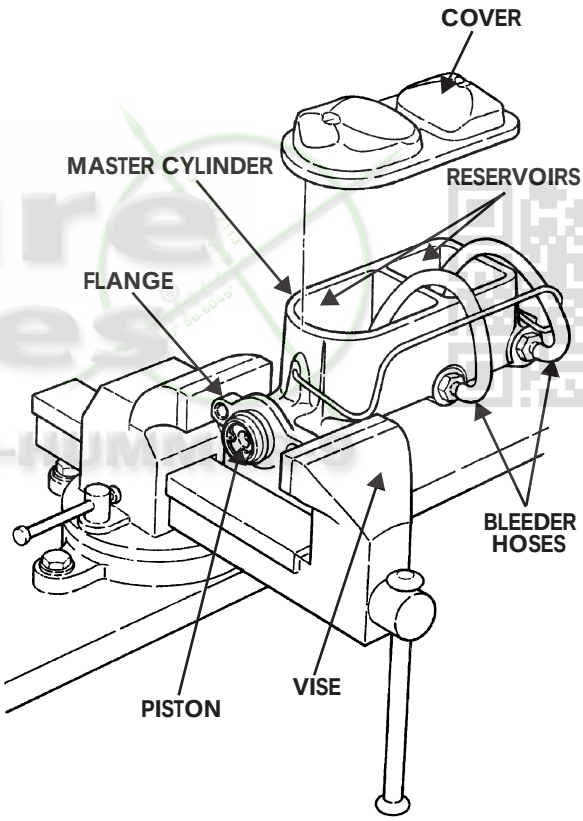

Figure 7-10: Brake Master Cylinder

HYDRO-BOOST REPLACEMENT

Removal

1. Remove master cylinder.
2. Disconnect two high pressure lines and one return line from hydro-boost (Figure 7-11).
3. Remove cotter pin, washer, and pushrod from brake pedal bellcrank. Remove spring washer from brake pedal bellcrank and discard cotter pin and spring washer.
4. Remove four nuts, lockwashers, washers, gasket, and hydro-boost from cowl. Discard lockwashers.

Installation

1. Install gasket and hydro-boost on cowl with four washers, lockwashers, and nuts (Figure 7-11).
2. Install spring washer on brake pedal bellcrank. Connect hydro-boost pushrod to brake pedal bellcrank. Install washer and cotter pin.
3. Tighten nuts to 21 lb-ft (28 N•m).
4. Connect two high pressure lines and one return line to hydro-boost.
5. Install master cylinder.
6. Bleed hydro-boost system.

BLEEDING THE HYDRO-BOOST SYSTEM

Whenever the booster is removed and installed, the steering system should be bled.

NOTE: The power steering fluid and brake fluid cannot be mixed. If the brake seals contact the steering fluid, or the steering seals contact brake fluid, seal damage will result.

1. Fill the power steering pump reservoir to the proper level and let the fluid remain undisturbed for at least two minutes.
2. Start the engine and run momentarily. Add fluid if necessary.
3. Repeat steps 1 and 2 until the fluid level remains constant after running the engine.
4. Raise the front of the vehicle so the wheels are off the ground. Support the vehicle with suitable safety stands.
5. Turn the wheels from stop to stop. Add fluid if necessary.
6. Lower the vehicle from the safety stands.
7. Start the engine and depress the brake pedal several times while rotating the steering wheel from stop to stop.
8. Turn the engine off and pump the brake pedal 4 to 5 times.
9. Check the brake fluid level. Add fluid if necessary.
10. If the fluid is extremely foamy, allow the vehicle to stand a few minutes with the engine on. Then repeat steps 7, 8, and 9.
11. Check for the presence of air in the oil. Air in the oil will give the fluid a milky appearance. Air in the system will also cause the fluid level in the pump to rise when the engine is turned off.

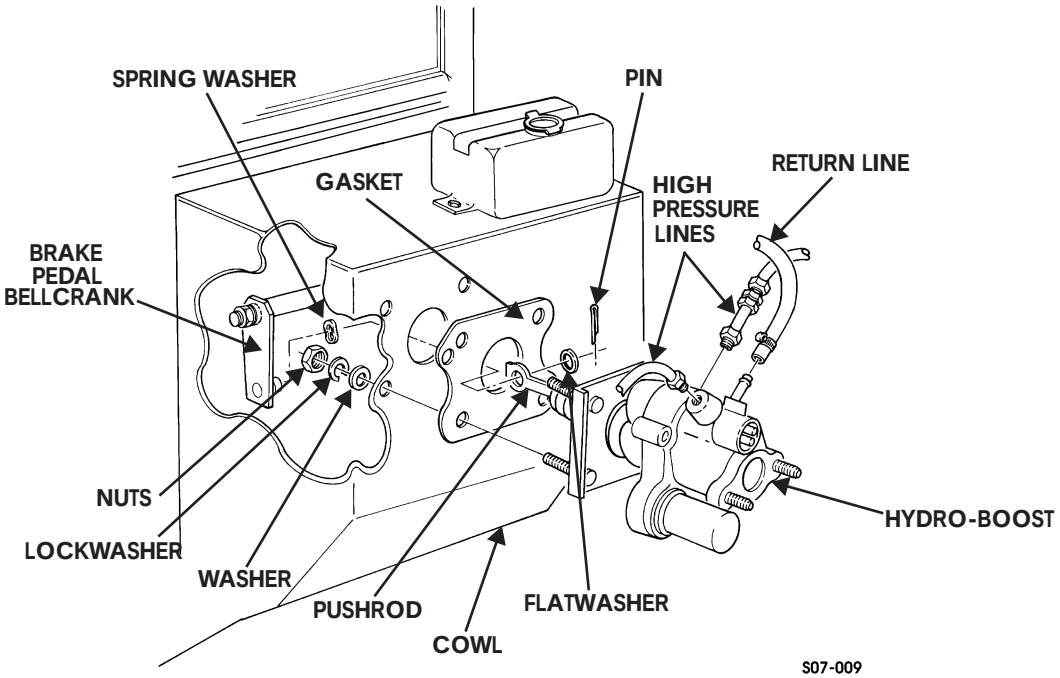

Figure 7-11: Hydro-boost Replacement Procedure

BRAKE LINES REPLACEMENT

NOTE: Brake line replacement procedures for the service brake system and the rear dual service/parking brake system are basically the same. Service brake system is shown.

NOTE: After servicing the brake system, bleed the brakes and refill as necessary.

Caliper-to-Tee Brake Line Removal

NOTE: Removal and installation procedures are basically the same for all caliper-to-tee brake lines. This procedure covers the left rear caliper-to-tee line (Figure 7-12).

1. Disconnect brake line from caliper.
2. Disconnect brake line from rear tee at forward-rear crossmember.
3. Remove capscrew and clamp securing brake line and vent line to forward-rear crossmember, and remove brake line.

Caliper-to-Tee Brake Line Installation

1. Connect brake line to rear tee at forward-rear crossmember (Figure 7-12).
2. Connect brake line to caliper.
3. Install clamp on brake line and vent line.
4. Install brake line, vent line, and clamp on forward-rear crossmember with capscrew.

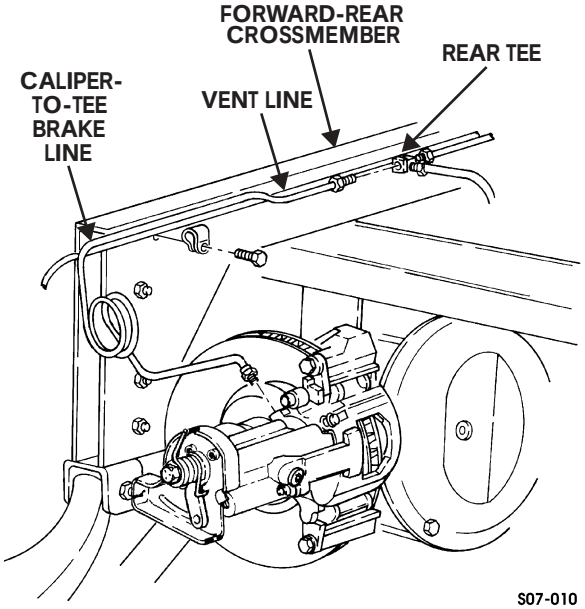

Figure 7-12: Caliper-to-Tee Brake Line

Rear Brake Line Removal

1. Disconnect rear brake line from rear tee (Figure 7-13).
2. Remove capscrew and clamp securing rear brake line to forward-rear crossmember (Figure 7-14).
3. Disconnect rear brake line from intermediate brake line and remove rear brake line.

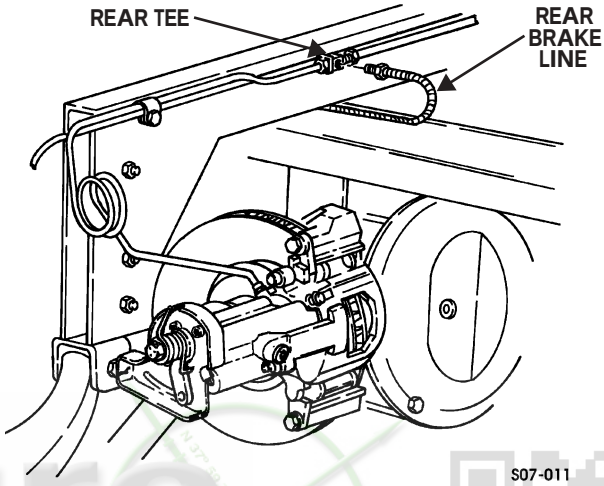

Figure 7-13: Rear Brake Line

Rear Brake Line Installation

1. Connect rear brake line to intermediate brake line (Figure 7-14).
2. Install rear brake line and clamp on forward-rear crossmember with capscrew.
3. Connect rear brake line to rear tee (Figure 7-13).

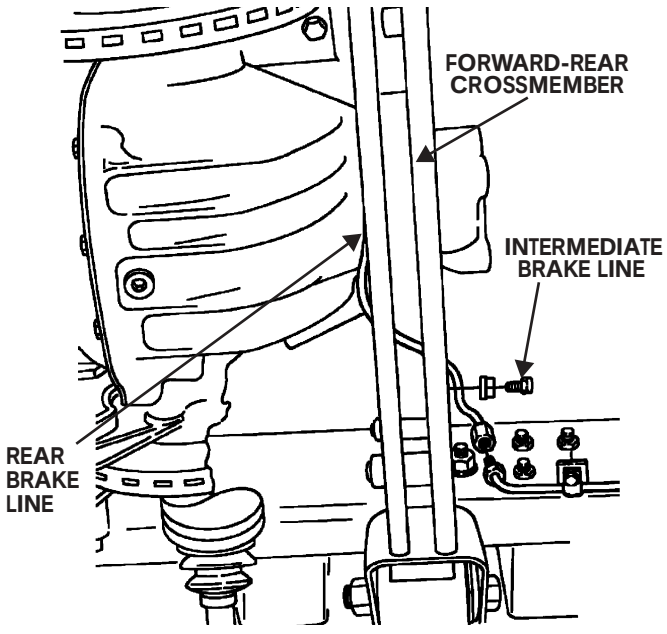

Figure 7-14: Rear Brake Line

Intermediate Brake Line Removal

1. Disconnect intermediate brake line from rear brake line (Figure 7-14).
2. Remove five capscrews, clamps, and intermediate brake line from frame (Figures 7-13 and 7-16).
3. Disconnect intermediate brake line from union brake line and remove brake line (Figure 7-17).

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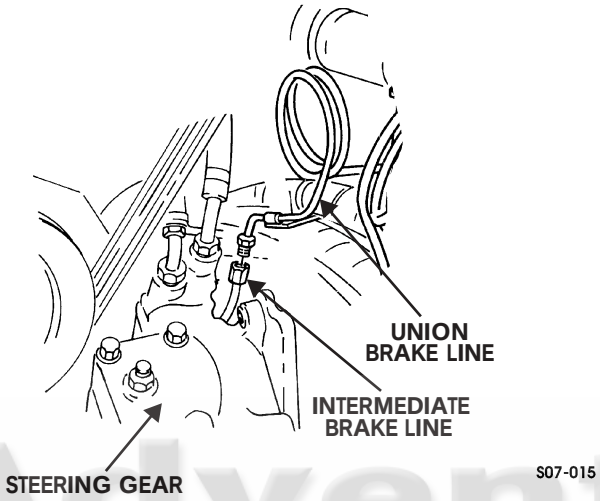

Figure 7-15: Intermediate Brake Line

Intermediate Brake Line Installation

1. Connect intermediate brake line to union brake line (Figure 7-15).
2. Connect intermediate brake line to rear brake line (Figure 7-16).
3. Install intermediate brake line and five clamps on frame with five capscrews (Figure 7-17).

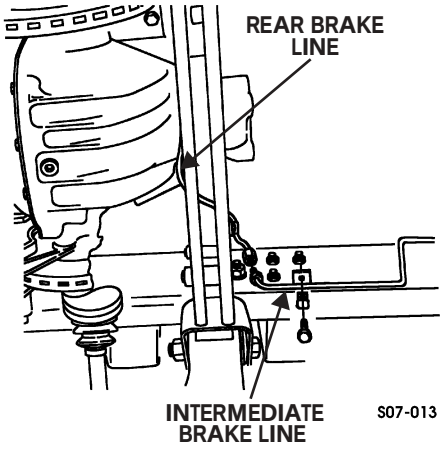

Figure 7-16: Intermediate Brake Line

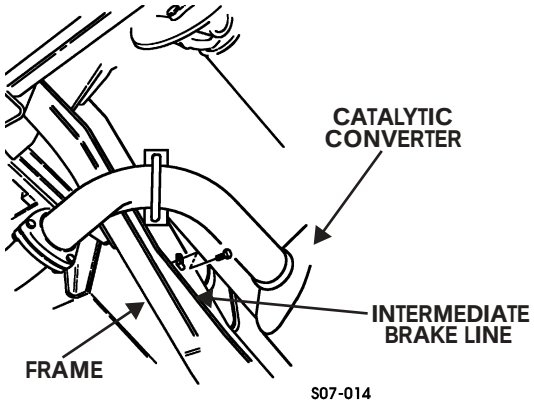

Figure 7-17: Intermediate Brake Line

Proportioning Valve to Union Brake Line Removal

1. Disconnect union brake line from proportioning valve (Figure 7-18).
2. Remove nut, washer, capscrew, and clamp securing union brake line to bracket.
3. Disconnect and remove union brake line from intermediate brake line.

Proportioning Valve to Union Brake Line Installation

1. Connect union brake line to intermediate brake line (Figure 7-18).
2. Install union brake line and clamp on bracket with capscrew, washer, and nut.
3. Connect union brake line to proportioning valve.

Proportioning Valve to Front Tee Brake Line Removal

1. Disconnect rear brake line from proportioning valve (Figure 7-18).
2. Disconnect and remove rear brake line from front tee.

Proportioning Valve to Front Tee Brake Line Installation

1. Connect rear brake line to front tee (Figure 7-18).
2. Connect rear brake line to proportioning valve.
3. Bleed brake system.

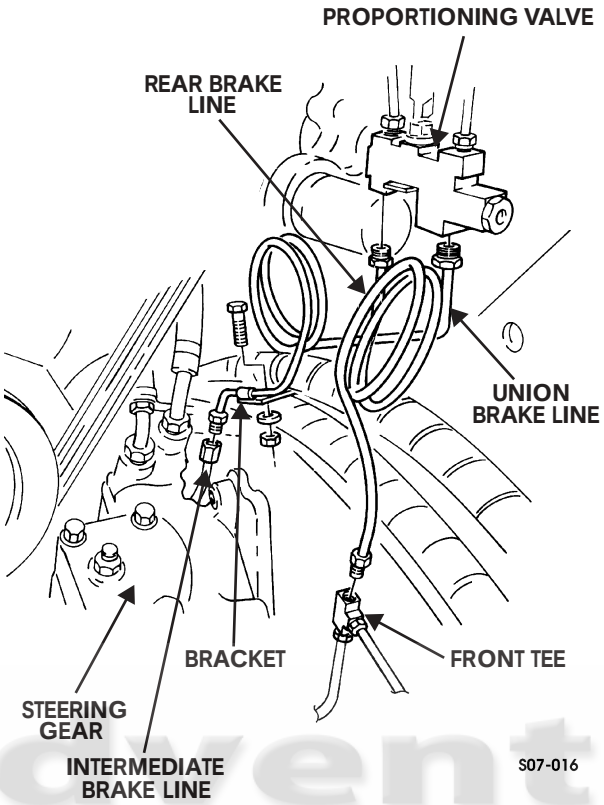

Figure 7-18: Proportioning Valve

SERVICE BRAKE PEDAL REPLACEMENT

Removal

1. Disconnect the stoplight switch (Figure 7-19).
2. Remove pushnut and disconnect stoplight switch rod (if so equipped) from brake pedal assembly. Discard pushnut. (Figure 7-19).
3. Disconnect return spring from brake pedal assembly.
4. Remove cotter pin and washer securing hydro-boost push-rod to brake pedal bellcrank, and disconnect hydro-boost pushrod from brake pedal bellcrank. Remove spring washer. Discard cotter pin and spring washer.
5. Remove nut, two washers, pivot pin, and brake pedal assembly from bracket.
6. Remove two bushings from brake pedal assembly. Discard two bushings.

Installation

1. Apply silicone grease to inside of two bushings. Install two bushings in brake pedal assembly.
2. Install brake pedal assembly on bracket with pivot pin, two washers, and nut. Using adapter and crowfoot, tighten nut to 60 lb-ft (81 N•m).
3. Install spring washer on brake pedal bellcrank. Connect hydro-boost pushrod to brake pedal bellcrank with washer and cotter pin.
4. Connect return spring to brake pedal assembly.
5. Use the pushnut to install the stoplight switch rod (if so equipped) to brake pedal assembly.

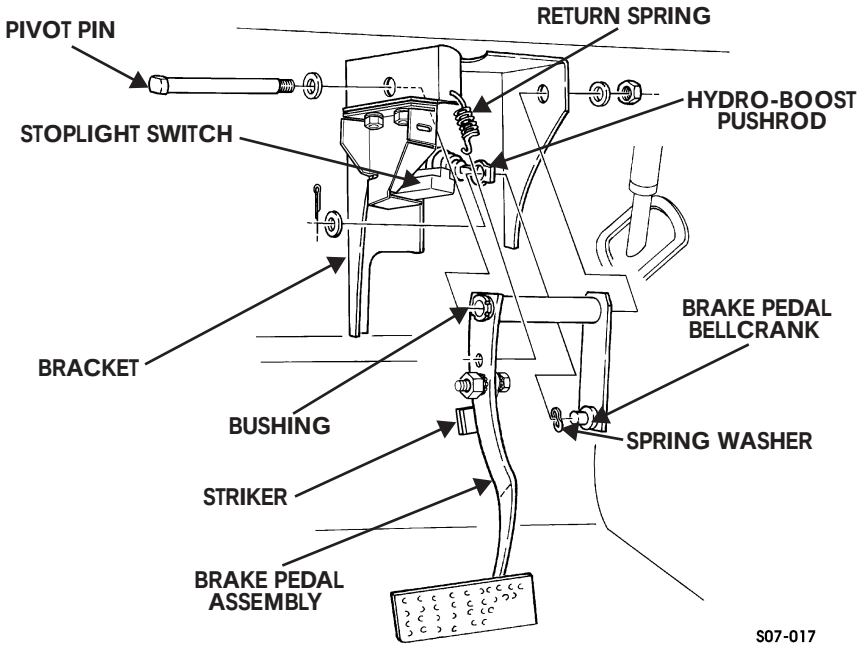

Figure 7-19: Service Brake Pedal Components

6. Connect the stoplight switch.
7. Operate vehicle and check brakes for proper operation.
8. Check brake lights for proper operation.

PROPORTIONING VALVE REPLACEMENT

Removal

1. Disconnect battery ground cable.

***CAUTION**: Do not attempt to disassemble proportioning valve. Damage to equipment will result.*

2. Disconnect electrical connector from proportioning valve (Figure 7-20).
3. Disconnect four brake lines from proportioning valve.
4. Remove locknut, washer, and proportioning valve from hydro-boost. Discard locknut.

Installation

1. Install proportioning valve on hydro-boost with washer and locknut. Tighten locknut to 22 lb-ft (30 N•m) (Figure 7-20).
2. Connect four brake lines to proportioning valve.
3. Apply lubricating oil to pin on proportioning valve.
4. Connect electrical connector to proportioning valve.
5. Connect battery ground cable.
6. Bleed brake system.
7. Operate vehicle and check brakes for proper operation.
8. Check brake lines at proportioning valve for leaks.

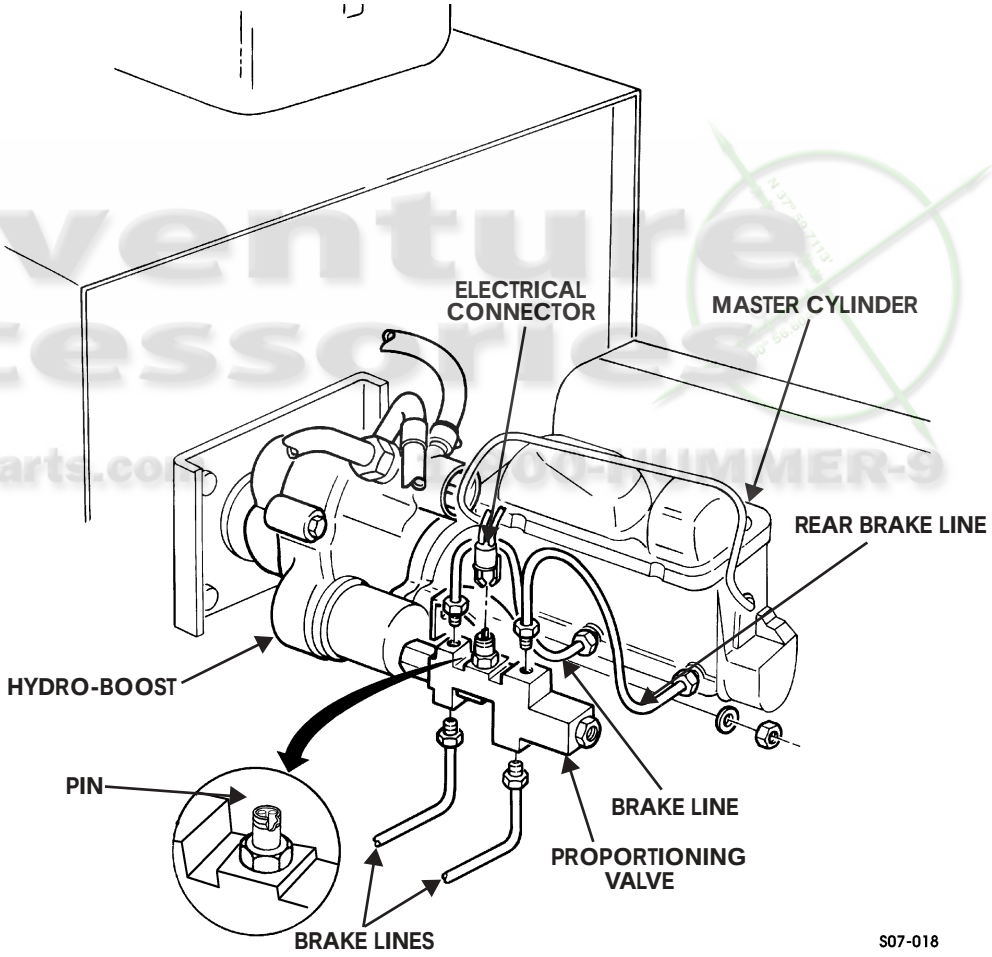

Figure 7-20: Proportioning Valve

SERVICE BRAKE ROTOR REPLACEMENT

Removal

1. Remove service brake caliper.
2. Remove six capscrews, lockwashers, halfshaft, and rotor from output flange. Discard lockwashers (Figure 7-21).

Installation

1. Apply thread-locking compound to threads of capscrews.
2. Install rotor on output flange.
3. Secure halfshaft and rotor to output flange with six lockwashers and capscrews. Tighten capscrews to 48 lb-ft (65 N•m).

4. Install service brake caliper.

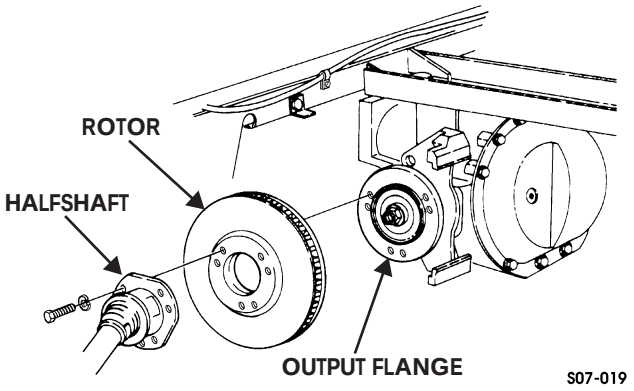

Figure 7-21: Service Brake Rotor

REAR DUAL SERVICE/PARKING BRAKE PAD REPLACEMENT

Removal

1. Put transmission in PARK, chock wheels, and release parking brake.
2. Remove cotter pin, washer, and clevis pin securing parking brake cable to lever. Discard cotter pin (Figure 7-22).
3. Remove clip securing parking brake cable to caliper cable bracket and disconnect cable from caliper cable bracket. Discard clip.

***CAUTION**: Caliper must be supported during removal to prevent damage to brake line.*

4. Remove two capscrews and washers securing yoke and caliper to adapter, and pull yoke and caliper away from rotor (Figure 7-23).

NOTE: Note positioning of brake pad surfaces for installation.

5. Remove two brake pads from adapter and rotor.

Cleaning and Inspection

NOTE: Clean all components, examine for wear or damage, and replace if necessary.

1. Clean mating surfaces of caliper and adapter and lightly lubricate adapter slides with grease (Figure 7-23).

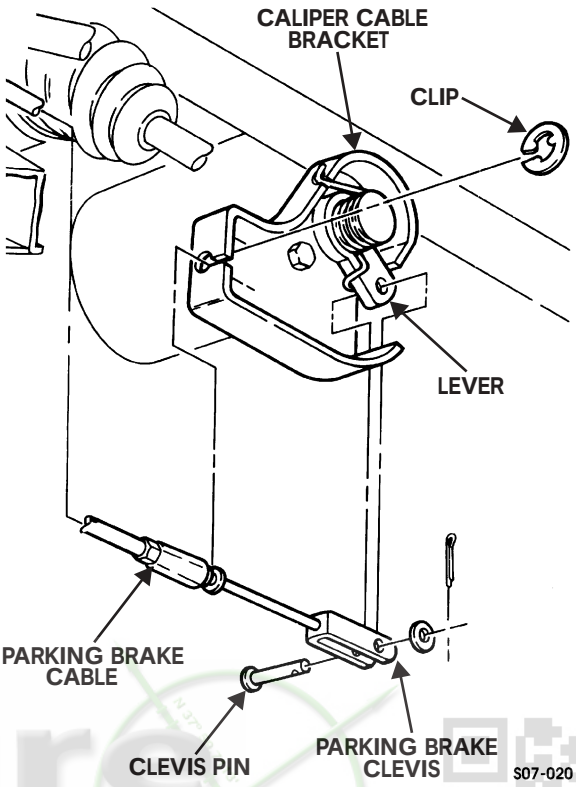

Figure 7-22: Rear Dual Brake Components

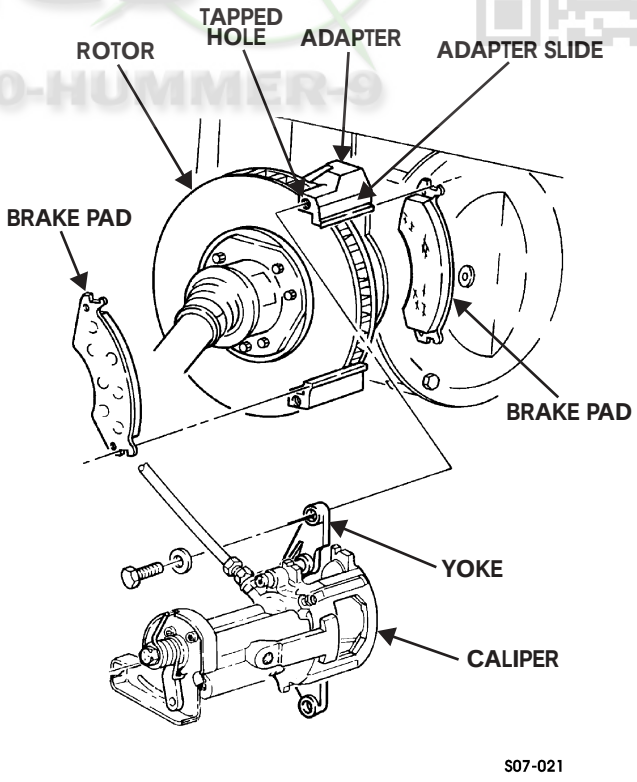

Figure 7-23: Rear Dual Brake Pad and Rotor

2. Inspect caliper and caliper piston face for pitting or damage (Figure 7-24).
3. Inspect piston dust boot and bushings for tears or deterioration.
4. Inspect caliper cable bracket for looseness, damage, and rotation.
5. Thoroughly clean and inspect rotor for heat checks, discoloration, pitting, or scoring (Figure 7-23).

***CAUTION**: Ensure that grease and oil are not in contact with rotor and/or brake pad friction surface. Failure to do so will result in damage to equipment and poor performance.*

NOTE: Replace brake pads in sets only. If operation in wet and muddy conditions are expected, replace brake pads if brake lining thickness is less than 1/8 in. (3.2 mm).

6. Inspect brake pads for glazing, oil saturation, or wear. If glazed, oil saturated, or if brake lining thickness is less than 1/8 in. (3.2 mm), replace both pads and pads on opposite caliper.

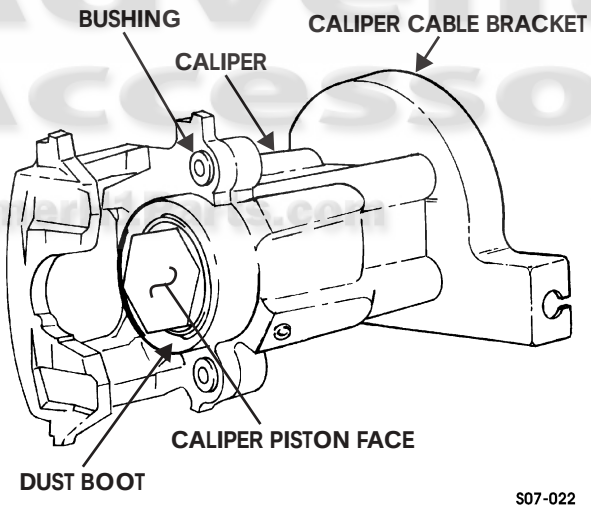

Figure 7-24: Rear Dual Brake Caliper

Installation

WARNING: Ensure brake pads are installed with linings facing rotor. Failure to do this will cause poor performance and damage to equipment and may result in injury.

1. Position linings facing rotor in adapter (Figure 7-23).

NOTE: Always apply thread-locking compound to the tapped holes.

2. Apply thread-locking compound to tapped holes of adapter.
3. Rotate caliper piston in a clockwise direction, and at the same time apply force on outer piston face until caliper piston is seated in piston bore (Figure 7-24).
4. Position caliper and yoke on adapter and rotor. Secure yoke to adapter with two washers and capscrews. Using a crowsfoot, tighten capscrews to 40 lb-ft (54 N•m) (Figure 7-23).
5. Install parking brake cable to caliper cable bracket and secure with clip (Figure 7-25).

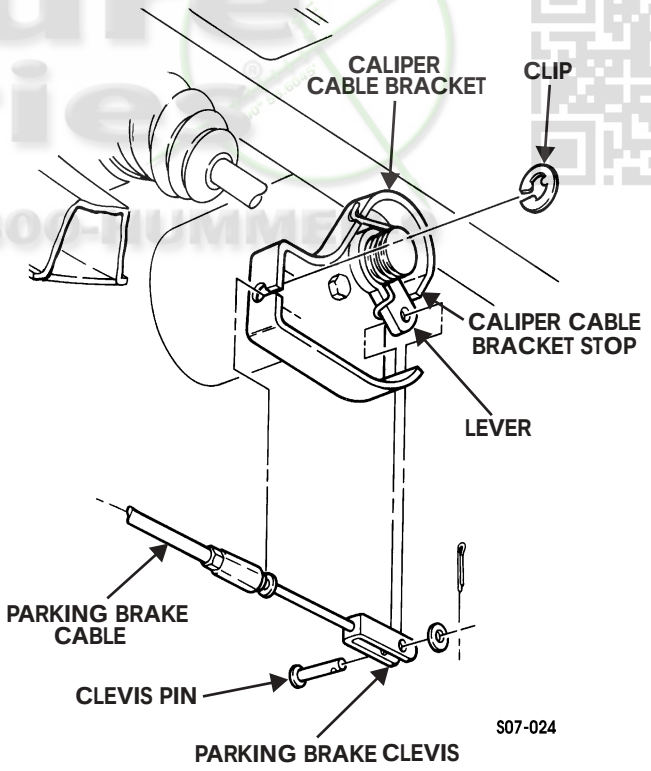

Figure 7-25: Rear Dual Brake Caliper Cable

***CAUTION**: Ensure lever is in contact with caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly. Ensure that clevis and clevis pin are aligned to the lever. Do not move lever to accommodate a maladjusted clevis. Damage to equipment and poor performance will result.*

6. Install parking brake clevis to lever with clevis pin, washer, and cotter pin. Check position of lever and ensure it is in contact with caliper cable bracket stop.
7. Adjust rear dual service/parking brake.

REAR DUAL SERVICE/PARKING BRAKE CALIPER REPLACEMENT

Removal

1. Put transmission in PARK, chock wheels, and release parking brake.
2. Remove cotter pin, washer, and clevis pin securing parking brake clevis to lever. Discard cotter pin (Figure 7-25).
3. Remove clip and parking brake cable from caliper cable bracket. Discard clip.
4. Disconnect brake line from coupling (Figure 7-26).
5. Remove coupling and copper washer from caliper.

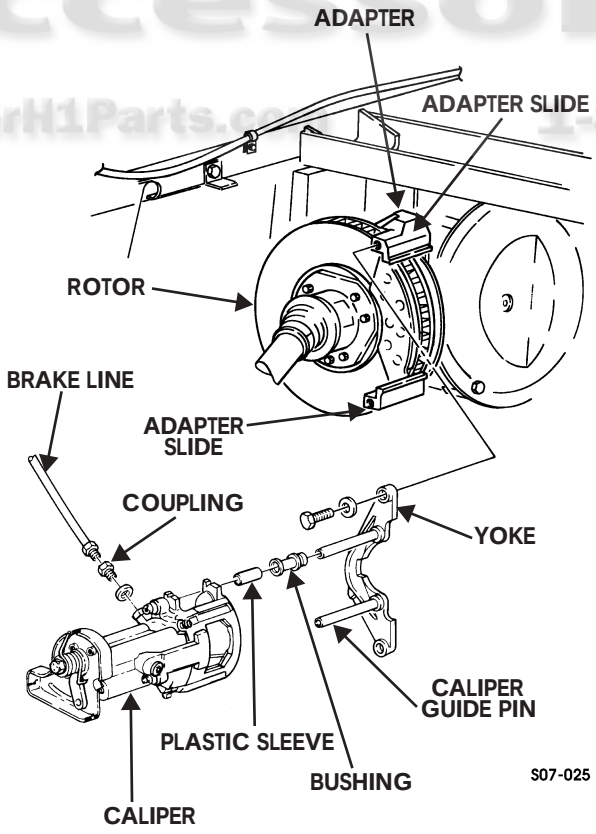

Figure 7-26: Rear Dual Brake Components

***CAUTION**: Caliper must be supported during removal to prevent damage to brake line.*

6. Remove two capscrews, washers, yoke, and caliper from adapter.
7. Slide yoke and caliper guide pins out from caliper.

Cleaning and Inspection

NOTE: Clean all components, examine for wear or damage, and replace if necessary. Apply a light coat of grease on adapter slides.

1. Clean mating surfaces of caliper and adapter and lubricate adapter slides with silicone grease (Figures 7-25 and 7-27).
2. Inspect caliper and caliper piston face for pitting or damage (Figure 7-28).
3. Inspect caliper cable bracket for looseness, damage, and rotation
4. Inspect piston dust boot and bushing for tears or deterioration.
5. Clean cooling fins of rotor (Figure 7-26).
6. Inspect rotor for heat checks, discoloration, pitting, or damage.
7. Inspect yoke and caliper guide pins for corrosion. Perform step 8 if corroded, if not, perform step 9.
8. Remove caliper guide pins from yoke. Discard caliper guide pins.
9. Inspect brake pads for glazing, oil saturation, or wear. If glazed, oil saturated, or if brake lining thickness is less than 1/8 in. (3.2 mm), replace both pads and pads on opposite caliper.

***CAUTION:** Ensure that grease and oil are not in contact with rotor and/or brake pad friction surfaces. Failure to do so will result in damage to equipment and poor performance.*

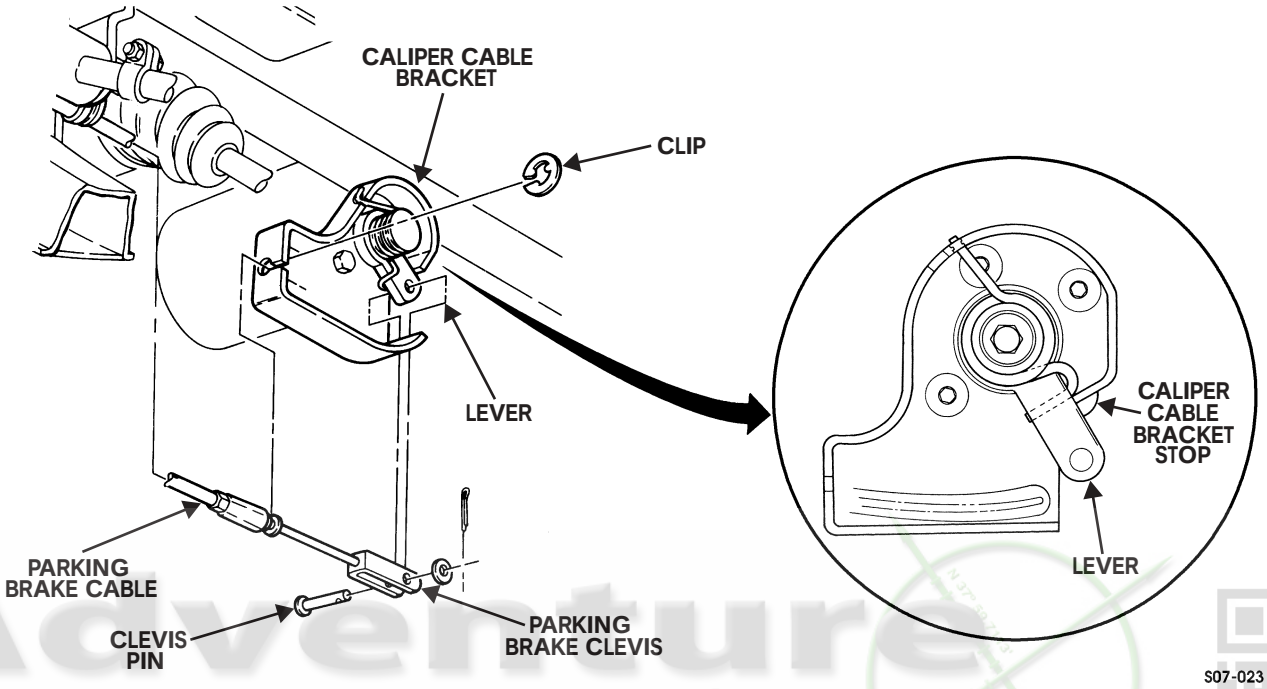

Figure 7-27: Rear Dual Service/Parking Brake Caliper Cable Bracket

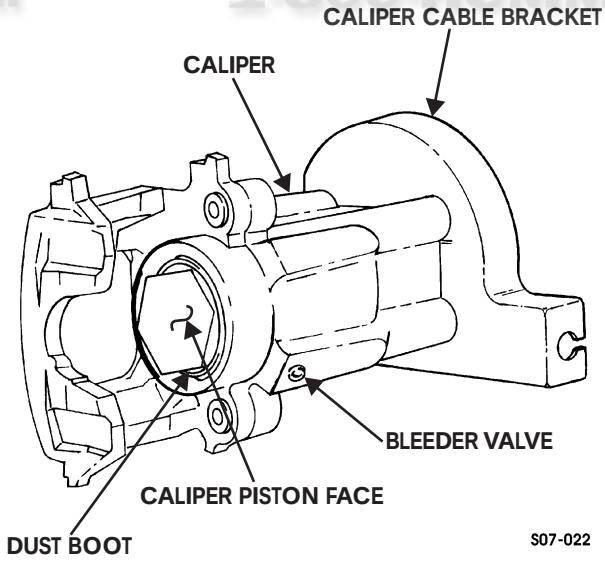

Figure 7-28: Rear Caliper and Bleeder Valve

Installation

1. Open bleeder valve and depress piston into caliper while rotating piston in a clockwise direction, and at the same time apply pressure until piston is seated in piston bore (Figure 7-28).

NOTE: Perform step 2 only if caliper guide pins were replaced.

2. Apply thread-locking compound to threads of caliper guide pins and install caliper guide pins in yoke. Tighten caliper guide pins to 30 lb-ft (41 N•m) (Figure 7-29).
3. Clean caliper guide pins and slide yoke and caliper guide pins into caliper
4. Apply thread-locking compound to tapped holes of adapters.
5. Position caliper and yoke on adapter and rotor. Install caliper and yoke on adapter with two washers and capscrews. Using crowfoot, tighten capscrews to 40 lb-ft (54 N•m).
6. Install copper washer and coupling on caliper and connect brake line to coupling.
7. Install parking brake cable on caliper cable bracket and secure with clip (Figure 7-27).

***CAUTION**: Ensure lever is in contact with caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly. Ensure that clevis and clevis pin are aligned to lever. Do not move lever to accommodate a misadjusted clevis, or damage to equipment and poor performance will result.*

8. Install parking brake clevis on lever and secure with clevis pin, washer, and cotter pin.
9. Check position of lever and ensure it is in contact with caliper cable bracket stop.
10. Bleed brake system.
11. Adjust rear dual service/parking brake.

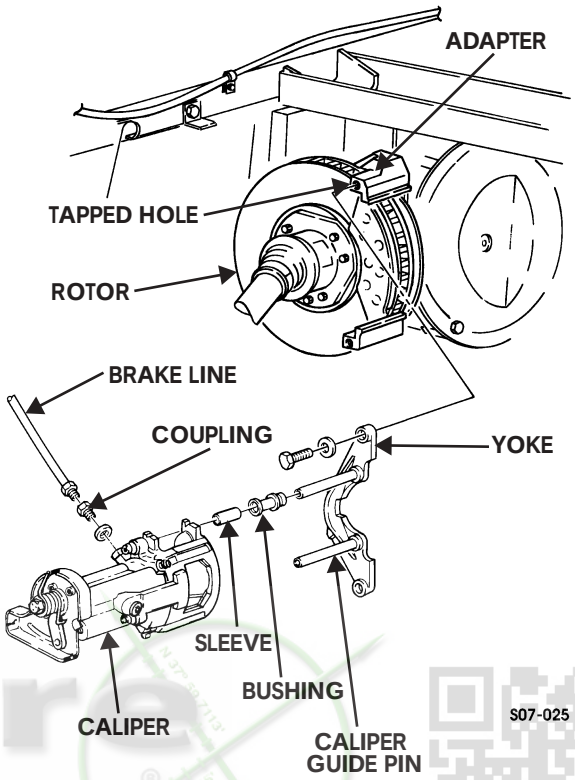

Figure 7-29: Rear Brake Components

RIGHT PARKING BRAKE CABLE REPLACEMENT

Removal

1. Put transmission in PARK, chock wheels, and release parking brake.
2. Remove cotter pin, washer, clevis pin, and brake clevis from lever. Discard cotter pin (Figure 7-30).
3. Remove clip securing cable sleeve to caliper cable bracket and remove parking brake cable assembly from caliper cable bracket. Discard clip.
4. Slide parking brake cable through parking brake cable assembly. Remove clip securing cable sleeve to C-beam. Disconnect parking brake cable from equalizer bar. Discard clip.
5. Remove two capscrews securing two clamps and parking brake cable assembly to frame.
6. Remove capscrew, lockwasher, and clamp from bracket. Discard lockwasher.

NOTE: Perform step 7 if bracket is damaged. If not replacing bracket, proceed to installation. Note position of cable, bracket, and clamp prior to removal.

7. Remove two capscrews and bracket from support bracket.

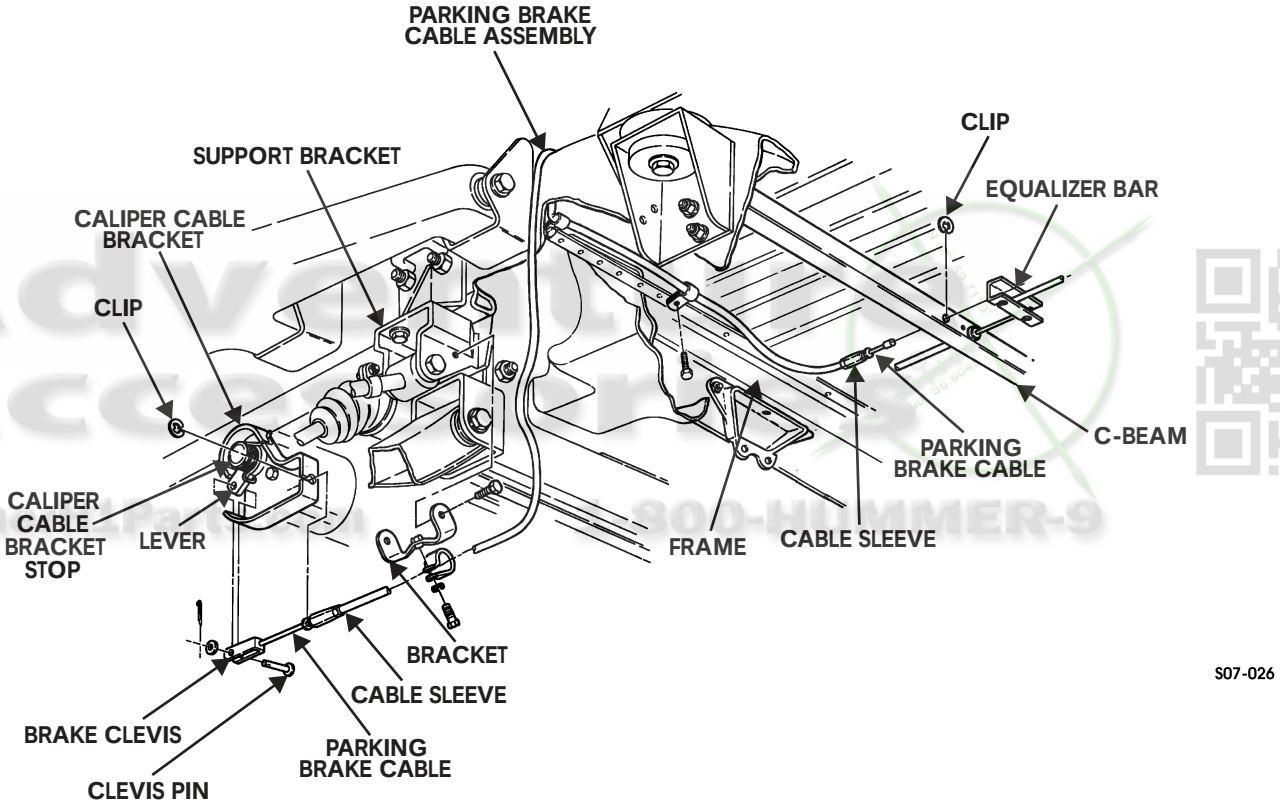

Figure 7-30: Right Parking Brake Cable Components

Installation

NOTE: Perform step 1 if clamp bracket was removed, if not, proceed to step 2.

1. Rotate bracket inward on support bracket and secure with two capscrews.
2. Install clamp on parking brake cable assembly and install clamp to bracket with lockwasher and capscrew.
3. Install two clamps on parking brake cable assembly and install clamps on frame with two capscrews.
4. Install cable sleeve on C-beam and parking brake cable on equalizer bar and secure with cable clip.

***CAUTION**: Ensure that the caliper cable bracket is secure with no signs of looseness and the lever is in contact with the caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.*

5. Install cable sleeve on caliper cable bracket with brake cable clip.

6. Install brake clevis on lever with clevis pin, washer, and cotter pin.
7. Adjust parking brake lever.

LEFT PARKING BRAKE CABLE REPLACEMENT

Removal

1. Put transmission in PARK, chock wheels, and release parking brake.
2. Remove cotter pin, washer, clevis pin, and brake clevis from lever. Discard cotter pin (Figure 7-31).
3. Remove clip and cable sleeve from caliper cable bracket. Discard clip.
4. Slide parking brake cable through parking brake cable assembly. Remove clip securing cable sleeve to C-beam. Disconnect parking brake cable from equalizer bar. Discard clip.
5. Remove capscrew, washer, nut and lockwasher assembly and washer securing clamp to mounting bracket and parking brake cable assembly. Discard nut and lockwasher assembly.
6. Remove capscrew, lockwasher, clamp, and parking brake cable assembly from bracket. Discard lockwasher.

NOTE: Perform step 7 if clamp bracket is damaged. If not replacing bracket, proceed to installation. Note position of cable, bracket, and clamp prior to removal.

7. Remove two capscrews and bracket from support bracket.

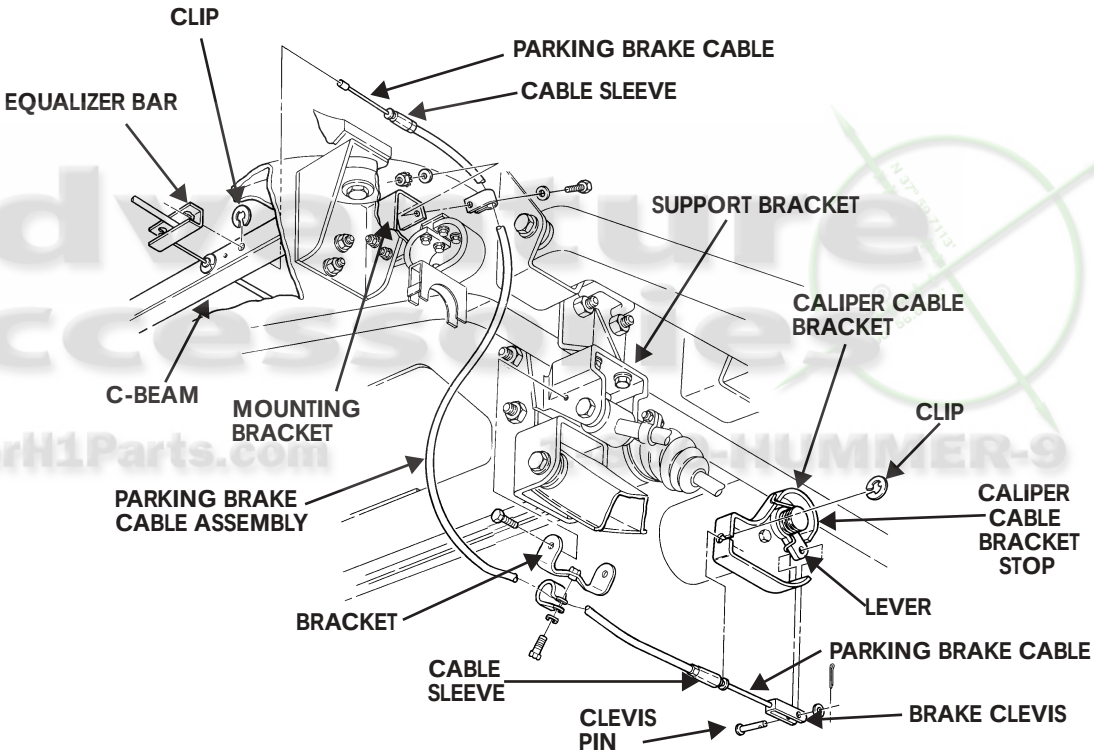

Figure 7-31: Left Parking Brake Cable Components

Installation

NOTE: Perform step 1 if clamp bracket was removed. If not, proceed to step 2.

1. Rotate bracket inward on support bracket and secure with two capscrews (Figure 7-31).
2. Install clamp on parking brake cable assembly and bracket with lockwasher and capscrew.
3. Install clamp on parking brake cable assembly and mounting bracket with washer, capscrew, washer, and nut and lockwasher assembly.
4. Install cable sleeve on C-beam and parking brake cable to equalizer bar and secure with clip.

***CAUTION**: Ensure that the caliper cable bracket is secure with no signs of looseness and the lever is in contact with the caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.*

5. Install cable sleeve on caliper cable bracket with clip.
6. Install brake clevis on lever with clevis pin, washer, and cotter pin.
7. Adjust parking brake lever.

REAR DUAL SERVICE/PARKING BRAKE ROD REPLACEMENT

Removal

1. Put transmission in PARK, chock wheels, and release parking brake.
2. Remove cotter pin, washer, clevis pin, and brake clevis from lever. Discard cotter pin (Figure 7-32).
3. Remove six clips and spread boot to allow access to cotter pin (Figure 7-33).
4. Remove cotter pin, washer, clevis pin, and clevis securing brake rod to bellcrank. Discard cotter pin.
5. Disconnect spring from bracket.
6. Remove locknut from conical washer, and brake rod from equalizer bar. Discard locknut.
7. Remove clevis, nut and spring from brake rod.

Installation

1. Install spring, nut, and clevis on brake rod.
2. Install brake rod on equalizer bar with conical washer and locknut. Tighten locknut far enough to expose 3-5 threads on the end of brake rod.
3. Connect spring to bracket.
4. Spread boot and install clevis to bellcrank with clevis pin, washer and cotter pin.
5. Install six clips on boot.

CAUTION: *Ensure that the caliper cable bracket is secure with no signs of looseness and the lever is in contact with the caliper cable bracket stop.*

6. Install brake clevis on lever with clevis pin, washer, and cotter pin (Figure 7-34).
7. Adjust rear dual service/parking brake.

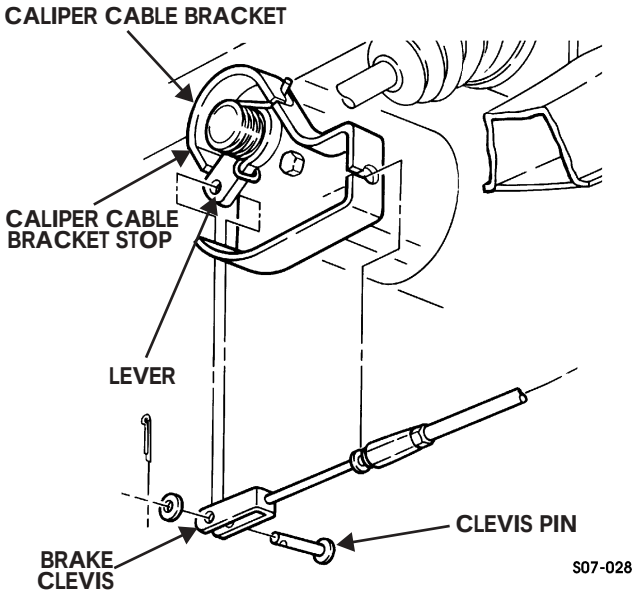

Figure 7-32: Rear Dual Brake Rod

REAR DUAL SERVICE/PARKING BRAKE ADJUSTMENT

NOTE: The integral parking/service brake mechanism has an automatic adjusting feature and does not require periodic manual adjustment. When parking brake components or rear brake pads are replaced, the parking brake linkage must be initially positioned to ensure proper parking brake system operation. The only additional adjustment necessary is accomplished with the parking brake hand lever.

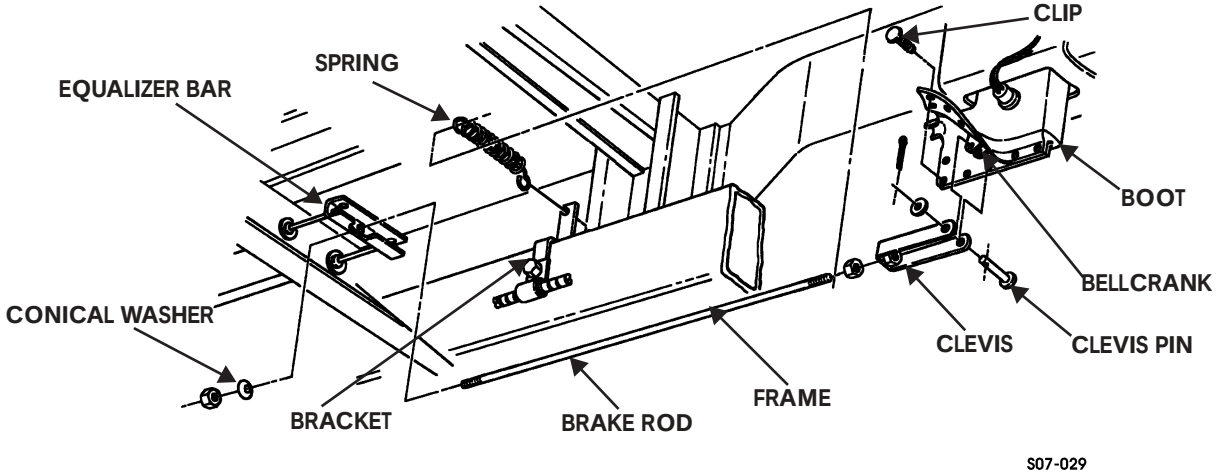

Figure 7-33: Rear Service/Parking Brake Rod Location

Adjustment

1. Put transmission in PARK, chock wheels, and release parking brake.
2. Remove six clips and spread boot to allow access to cotter pin (Figure 7-34).
3. Remove cotter pin, washer, and clevis pin securing clevis to bellcrank. Discard cotter pin.
4. Repeatedly apply and adjust parking brake hand lever until bellcrank linear travel is 0.75 in. (19 mm).

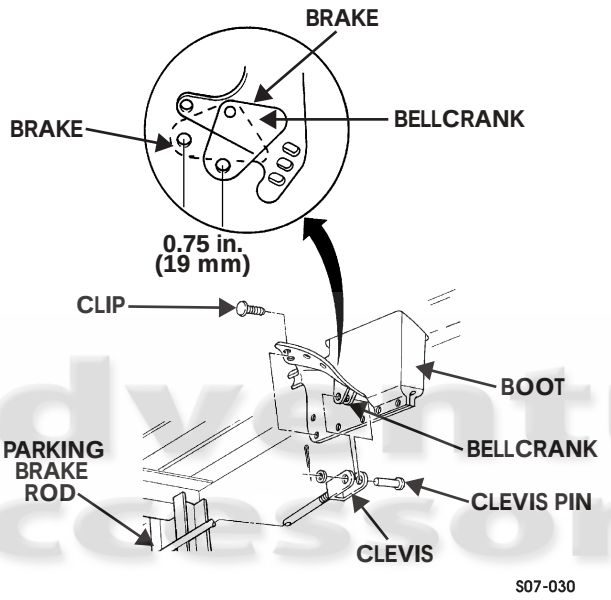

Figure 7-34: Rear Dual Brake

***CAUTION**: Holes in parking brake clevis must align with holes in adjusting bellcrank without force for proper parking brake adjustment. Failure to do this may result in damage to equipment and poor performance.*

5. Release parking brake. Loosen nut and adjust clevis so holes in clevis align with holes in bellcrank. Secure clevis to bellcrank with clevis pin, washer, and cotter pin.

***CAUTION**: Do not overtighten parking brake rod. Overtightening parking brake rod may result in dragging brakes.*

6. If necessary, remove excess slack in parking brake cables by turning the parking brake rod clockwise or counterclockwise into the clevis.

***CAUTION**: Ensure that the caliper cable bracket is secure with no signs of looseness and the lever is in contact with the caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.*

NOTE: Perform step 7 on both sides of vehicle.

7. Parking brake rod is properly adjusted if lever is in contact with caliper cable bracket stop (Figure 7-36).
8. Tighten nut against clevis.
9. Install six clips in boot (Figure 7-34).
10. Adjust parking brake lever.

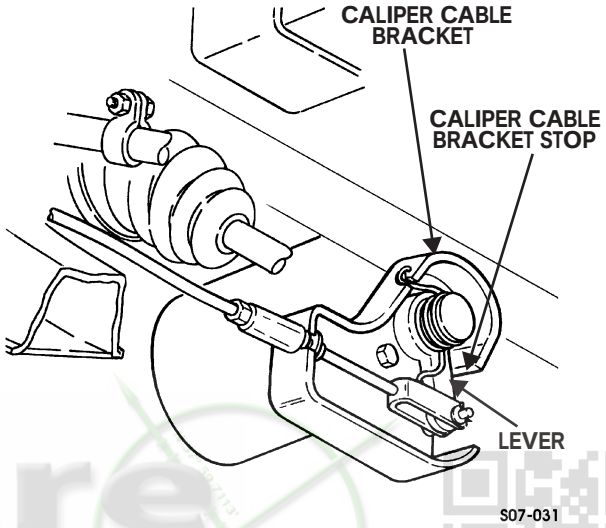

Figure 7-35: Caliper Cable Bracket Stop

PARKING BRAKE LEVER REPLACEMENT

Removal

1. Put transmission in PARK, chock wheels, and release parking brake.
2. Remove parking brake switch.
3. Remove six clips and open lower boot to allow access to clevis pin. Discard clips (Figure 7-35).
4. Remove cotter pin, washer, and clevis pin from clevis and bellcrank. Discard cotter pin.
5. Remove nut and lockwasher assembly, wiring harness clamp, nut and lockwasher assembly, and capscrew securing parking brake lever to body. Discard nut and lockwasher assemblies (Figure 7-38).
6. Remove three locknuts, washers, and capscrews securing parking brake lever to body. Discard locknuts.
7. Remove two locknuts, washers, capscrews, and washers securing parking brake lever to body and remove parking brake lever. Discard locknuts.
8. Remove upper boot from parking brake lever.
9. Remove boot from body.

Installation

1. Install boot on body. Install upper boot on parking brake lever.
2. Install parking brake lever on body and secure with two washers, capscrews, washers, and locknuts.
3. Secure parking brake lever on body with capscrew, nut and lockwasher assembly, wiring harness clamp, and nut and lockwasher assembly.
4. Secure parking brake lever on body with three capscrews, washers, and locknuts (Figure 7-37).
5. Apply parking brake lever and tighten three capscrews to 96 lb-in. (11 N•m).
6. Install clevis on bellcrank with clevis pin, washer, and cotter pin (Figure 7-36).

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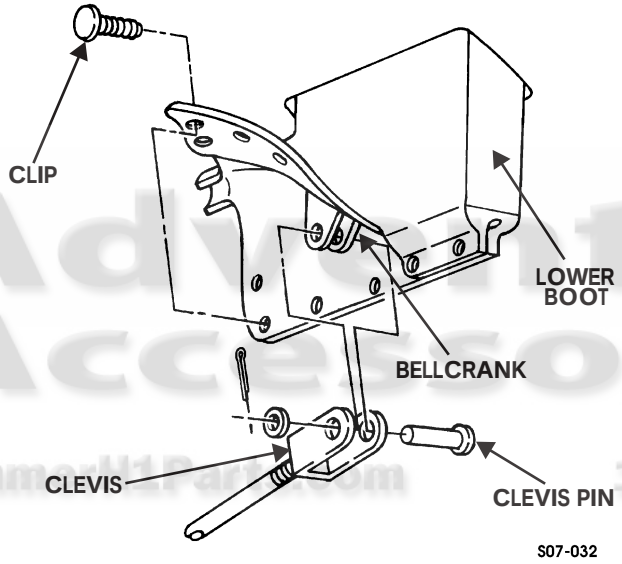

Figure 7-36: Parking Brake Lever

7. Install six clips and close lower boot.
8. Install parking brake switch.
9. Adjust parking brake lever.

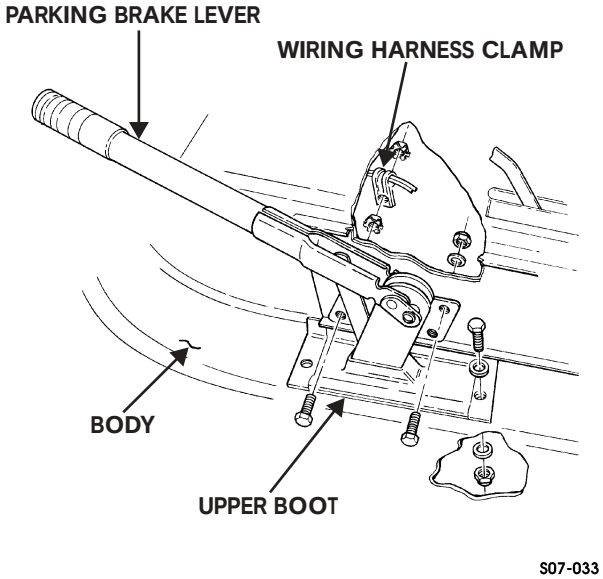

Figure 7-37: Parking Brake Lever Assembly

FRONT DISC BRAKE CALIPER REPAIR

Disassembly

1. Remove disc brake caliper.

WARNING: To avoid injury, hold caliper so piston is facing away from your body and keep fingers out of space between piston and wood block. Compressed air used for cleaning should not exceed 30 psi (207 kPa).

2. Insert wood block between jaw of caliper and piston (Figure 7-38).
3. Remove piston from caliper by applying air pressure to hose inlet of caliper.
4. Remove piston dust boot and seal from caliper bore. Discard dust boot and seal (Figure 7-39).
5. Remove bleeder screw from caliper.

Cleaning and Inspection

NOTE: Clean all components, examine for wear or damage, and replace if necessary (Figure 7-39).

1. Inspect caliper bore for scoring, nicks, or corrosion. Minor corrosion can be polished with abrasive crocus cloth or hone. Replace caliper if bore is not repairable.
2. Inspect piston outside diameter for scoring, nicks, corrosion, and worn or damaged chrome plating. Replace piston if there are any surface defects.
3. Inspect bleeder screw for damage or stripped threads. Replace if damaged.
4. Inspect bushing for damage. Replace if damaged.

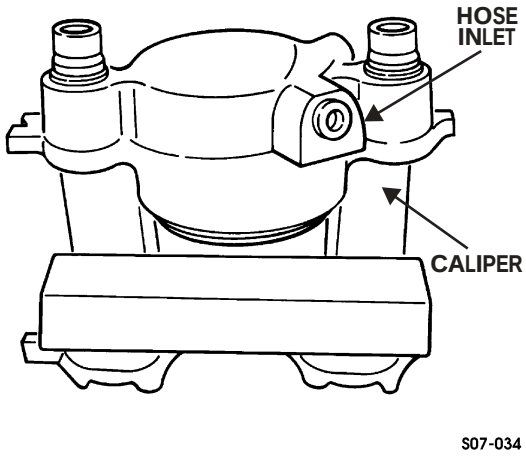

Figure 7-38: Front Disc Brake Caliper

Assembly

***CAUTION**: The HUMMER is equipped with DOT 5 silicone brake fluid. **Do not mix with other brake fluids**. Failure to use the proper brake fluid will damage brake system.*

NOTE: For general assembly instructions, refer to Section 1.

1. Lubricate caliper bore and seal with Dow Corning 111 or 103 silicone lubricant or equivalent (Figure 7-39).
2. Install seal in groove of caliper bore.
3. Lubricate piston with Dow Corning 111 or 103 silicone lubricant or equivalent and install dust boot on piston.
4. Work piston and dust boot into caliper bore.
5. Seat dust boot in caliper.
6. Install bleeder screw in caliper finger tight.
7. Install disc brake caliper.

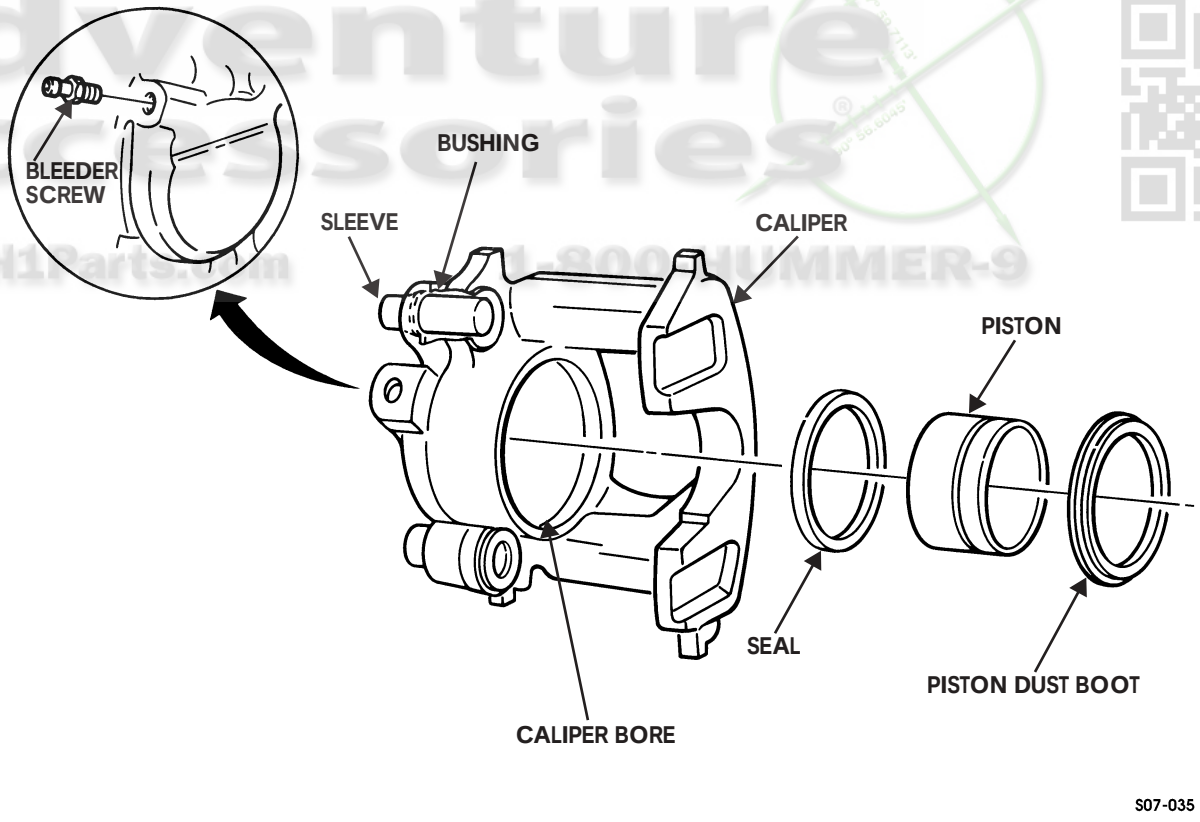

Figure 7-39: Front Disc Brake Caliper Assembly

REAR CALIPER OVERHAUL

Rear Caliper Disassembly (Figure 7-40)

1. Mount caliper in vise so parking brake lever and spring are facing upward.
2. Unseat and remove parking brake lever spring. Use large gripping pliers such as Craftsman Robo-Grip or Channel-Lock.
3. Remove bolt that secures lever retainer to thrust screw. Then remove retainer, but do not remove parking brake lever at this time.
4. Remove caliper piston as follows:
   a. Remove dust cover. Remove piston retaining screw with hex key and pencil magnet. Use magnet to withdraw screw after loosening it.
   b. Extend piston by rotating parking brake lever.
   c. Rotate caliper piston in counter-clockwise direction until it comes off thrust screw. Rotate piston by hand, or with spanner wrench positioned on piston flats.
   d. Pull piston out of dust boot and remove it from caliper.
5. Remove piston dust boot with pry tool.

***CAUTION**: Exercise care when removing the boot. Do not allow the pry tool to scratch the caliper piston bore.*

6. Remove thrust screw retaining ring. Carefully unseat ring with long, thin, flat blade screwdriver. Apply single wrap of electrical tape around screwdriver blade to avoid scratching bore, or thrust screw spring shield.
7. Grasp thrust screw and slide screw, shield, and spring out of bore as assembly. Rotate brake lever to assist removal.
8. Remove parking brake lever from actuator shaft.
9. Remove actuator shaft bearing balls with pencil magnet.
10. Remove thrust screw centering pin plug and spacer. Then reach inside caliper piston bore and push centering pin out of caliper with finger pressure.
11. Push bearing plate and actuator shaft out of caliper bore using finger pressure.
12. Remove caliper piston seal from groove in piston bore. Use wood pencil to remove seal. Do not use metal tools that will scratch bore.
13. Remove and discard actuator shaft dust seal. Discard seal.
14. Remove and discard centering pin plug O-ring.
15. Remove and discard centering pin O-ring.
16. Remove O-ring from actuator shaft. Then remove thrust bearing and race from shaft. Discard O-ring but retain bearing and race if in good condition.
17. Disassembly caliper piston as follows:
    a. Remove retaining ring with internal type ring pliers.
    b. Remove wave washer.
    c. Remove thrust washer and bearing.
    d. Remove cone clutch.

Caliper Cleaning and Inspection

Clean the caliper parts in standard parts cleaning solvent, or denatured alcohol. Dry the parts with compressed air or lint free shop towels.

Replace the caliper piston if corroded, rusted, or scored. Do not attempt to salvage any piston where rust or scoring has broken through the piston plating. Also, do not use any type of abrasive material on the piston surface. This practice will damage the plating and cause the piston to stick or seize in the bore.

Check condition of the caliper piston bore. Moderate surface discoloration is normal and not a cause for replacement. However, the caliper should be replaced if the bore is corroded, pitted, or scored. The bore can be lightly polished with crocus cloth but must not be honed or sanded.

Inspect the thrust screw and actuator shaft parts. Replace the thrust screw, spring shield, and retaining ring if damaged, or distorted. Replace the actuator shaft, bearing plate, and bearing balls if scored, cracked, worn, corroded, or pitted. Also replace the shaft bearing and race as a set if either part is worn, rough, pitted, or scored.

Replace the caliper piston cone clutch, bearing and race, or wave washer if worn, scored, or damaged.

Assembly (Figure 7-40)

1. Install new actuator shaft dust seal in caliper. Use one-inch socket to seat seal in housing. The open portion of seal metal retainer faces out. Lubricate seal lip with Dow Corning 111 silicone lubricant afterward.
2. Lubricate actuator shaft, bearings, race, and plate with Dow Corning silicone lubricant 111. Then install thrust bearing and race on shaft and secure with new O-ring.
3. Install actuator shaft in caliper. Then install plastic bearing plate and the three ball bearings.
4. Install new O-ring on thrust screw centering pin and install pin in caliper. Position pin so blade will align with slot in thrust screw.
5. Lubricate thrust screw with Dow Corning 111 silicone grease. Then install spring and retaining ring on thrust screw.
6. Install thrust screw as follows:
   a. Align slot in thrust screw with centering pin.
   b. Insert thrust screw in caliper and seat it on centering pin and on ball bearings.
   c. Compress thrust screw retaining ring with fingers and install it in caliper bore below piston seal groove.

***CAUTION**: Do not use metal tools to install the retaining ring. Metal tools will score or scratch the caliper bore.*

   d. Push assembly into bore as far as possible.
   e. Seat retaining ring using unassembled caliper piston. Lightly coat piston with silicone grease and insert it in bore. Then push piston sharply downward two or three times to seat retaining ring. Remove piston after ring is seated.
7. Install new O-ring on centering pin plug. Then position spacer on top of centering pin and install plug. Tighten plug securely with hex wrench or socket.
8. Install new caliper piston seal. Start square cut seal into groove at top of bore and work it into place with your fingers. Lubricate seal and bore with fresh brake fluid, or Dow Corning silicone grease.
9. Assembly caliper piston as follows;
   a. Install cone clutch in piston.
   b. Lubricate bearing and race with Dow Corning 111 grease and install them on cone clutch. The open side of bearing goes toward race.
   c. Install wave washer (either side up).
   d. Install retaining ring with internal-type ring pliers. Flat side of ring goes toward wave washer.
10. Install caliper piston as follows:
   a. Install new dust boot on caliper piston.
   b. Lubricate caliper piston with fresh brake fluid. Then insert it through dust boot, into caliper bore, and onto thrust screw.
   c. Install parking brake lever on actuator shaft and rotate lever to extend thrust screw.
   d. Rotate piston onto thrust screw by hand, then with suitable size socket.
   e. Turn parking lever to normal (non-applied) position and complete piston installation as needed.
   f. Seat piston dust boot in groove at top of caliper bore. Use suitable size boot installer tool or flat punch.
11. Install new O-ring on piston retaining screw and install screw. Tighten screw securely.
12. Install parking brake lever retainer and bolt. Apply 1-2 drops Loctite to bolt threads before installation.
13. Install and seat parking brake lever return spring in cable housing slot.
14. Install bleed screw, if removed. Apply anti-seize compound to screw threads beforehand.

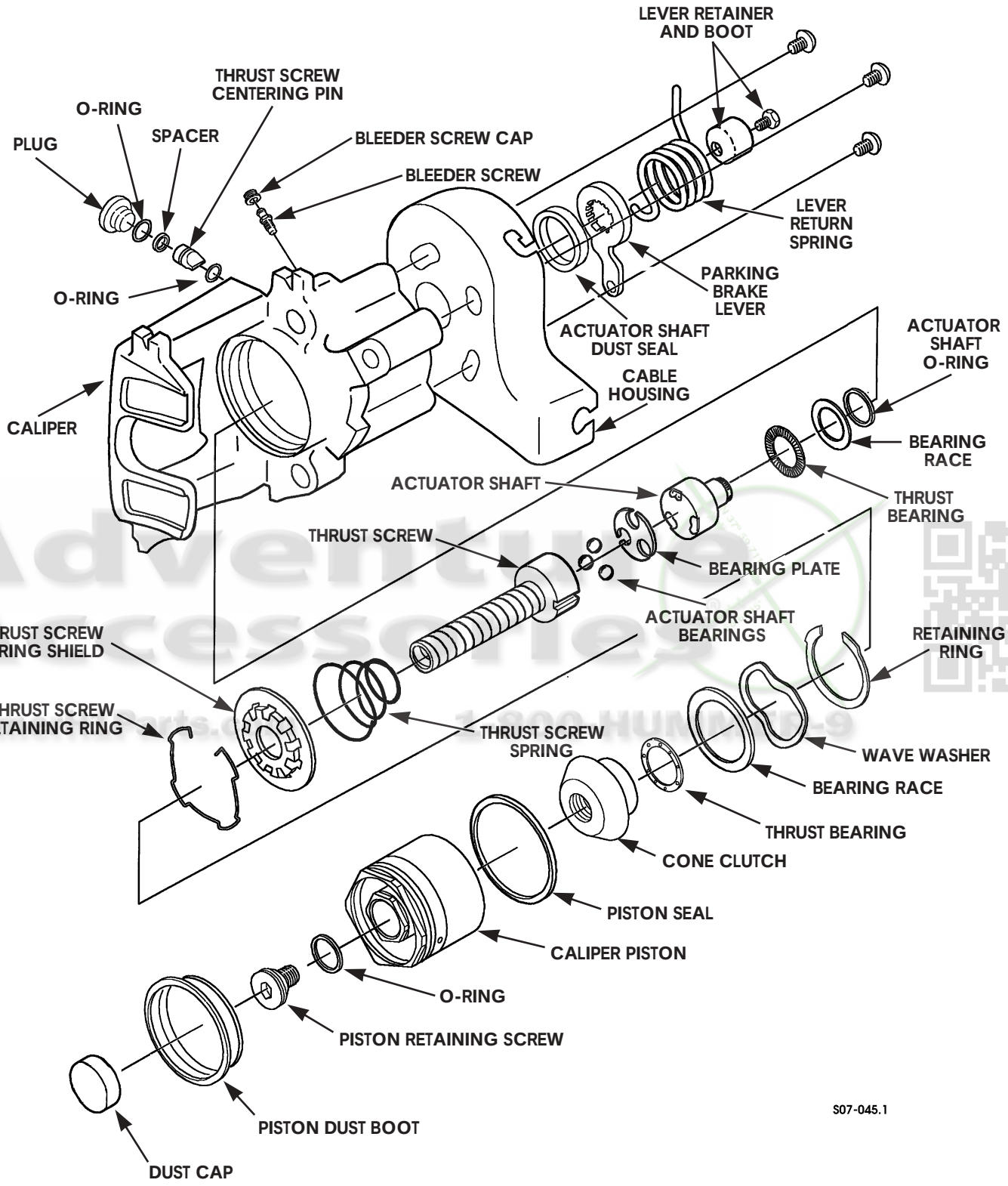

Figure 7-40: Rear Caliper

BRAKE ROTOR

Cleaning and Inspection

NOTE: Clean all components, examine for wear or damage, and replace if necessary (Figure 7-41).

1. Remove brake rotor.

NOTE: Clean rusted or scaled rotor braking surfaces before attempting inspection or measurement.

2. Mount rotor in brake lathe and turn while cleaning surfaces with abrasive crocus cloth.
3. Inspect rotor for heat checks, nicks, broken cooling fins, scoring, discoloration, and pitting. It is not recommended that rotors be turned when spotted or heat checked.

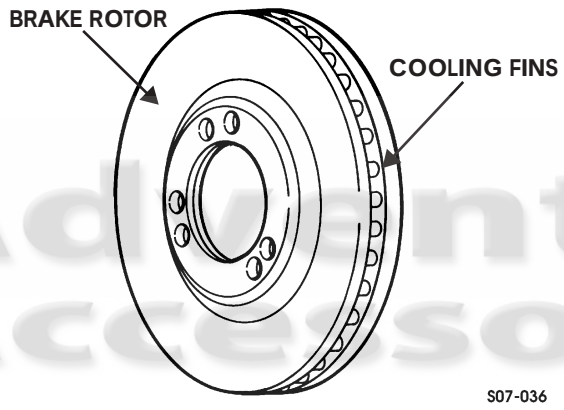

Figure 7-41: Brake Rotor and Cooling Fins

NOTE: Clean debris from cooling fins if necessary.

REFINISHING BRAKE ROTORS

Refinish rotors only under the following circumstances:

1. There is a complaint of brake pulsation.
2. There is excessive scoring.

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 dimensions shown in the specifications.

Accurate control of rotor tolerances is necessary for the proper performance of disc brakes. Machining should be done only with precision equipment. Service the machining equipment on a regular basis following the manufacturer's recommended maintenance procedures.

When you refinish rotors, make sure the attaching adapters, tool holders, vibration dampeners, and tool bits are in good condition. Always use sharp cutting tools or bits and use only replacement cutting bits recommended by the equipment manufacturer. Dull or worn tools leave a poor surface finish that will affect initial brake performance. Vibration dampening attachments should always be used when refinishing braking surfaces. These attachments eliminate tool chatter to allow for a better surface finish. Make sure these adaptors are clean and free of nicks.

Checking Lateral Runout

1. Mount dial indicator with stylus contacting rotor surface 1 in. (25 mm) in from outer edge (Figure 7-42).
2. Turn rotor 360° and note total indicator reading (TIR).

If lateral runout exceeds 0.004 in. (0.10 mm) TIR, replace or refinish rotor.

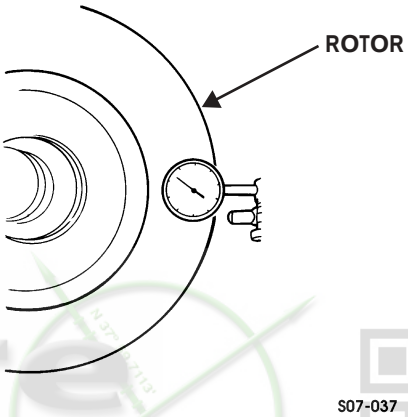

Figure 7-42: Checking Rotor for Lateral Runout

Checking Thickness Variation

1. Measuring thickness variation of rotor with micrometer at four equally-spaced points around rotor. Measure 1 in. (25 mm) in from outer edge (Figure 7-43).

NOTE: Rotor must be replaced if minimum thickness falls below 0.815 in. (20.7 mm).

2. If thickness variation exceeds 0.005 in. (0.13 mm), replace or refinish rotor.

Refinishing

1. Mount rotor on brake lathe and refinish surface.
2. Replace rotor if refinishing causes rotor to fall below minimum thickness of 0.815 in. (20.7 mm).
3. Install brake rotor.

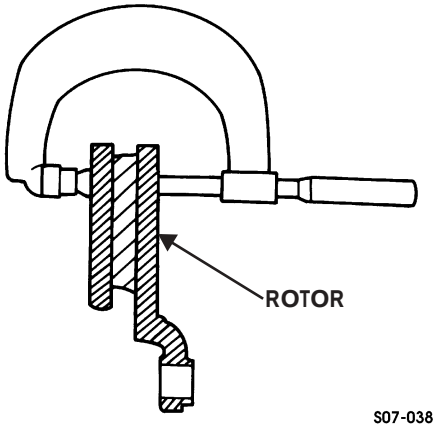

Figure 7-43: Checking Rotor Thickness

PARKING BRAKE LEVER ADJUSTMENT

Adjustment

1. Adjust linkage.
2. Put transmission in PARK, chock wheels, and release parking brake handle.
3. Turn adjusting knob clockwise as tightly as possible by hand (Figure 7-44).

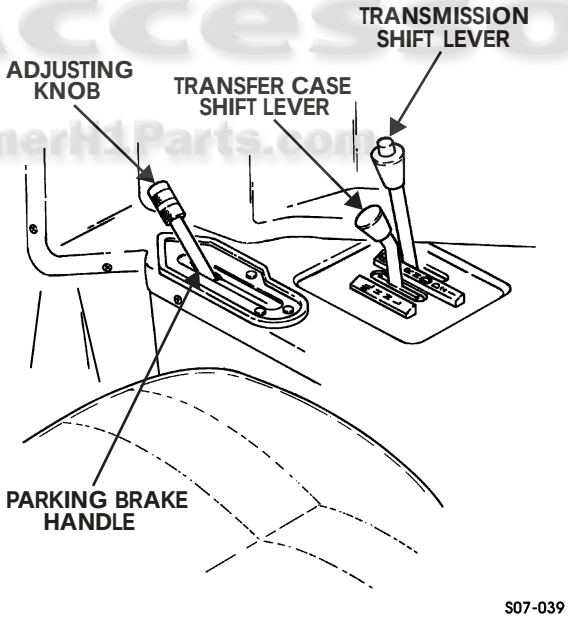

Figure 7-44: Parking Brake Lever Location

4. Apply parking brake handle.
5. If parking brake cannot be applied, turn adjusting knob counterclockwise until parking brake can be applied.
6. Test parking brake.
   a. Remove chocks.
   b. Depress service brake pedal and start engine.
   c. Place transfer case shift lever in "H" (high) and transmission shift lever in "D" (drive).
   d. Slowly let up on service brake pedal. Parking brake should hold vehicle stationary.

***CAUTION**: The HUMMER is equipped with DOT 5 silicone brake fluid. **Do not mix with other brake fluids**. Failure to use the proper brake fluid will damage brake system.*

NOTE: After operating in mud or sand, use a low pressure water source to ensure that the parking brake pads, rotor, pad-rotor contact areas, actuating lever, and spring are thoroughly cleaned of mud, sand, or other debris. Lubricate actuating lever as soon as possible (Figure 7-45).

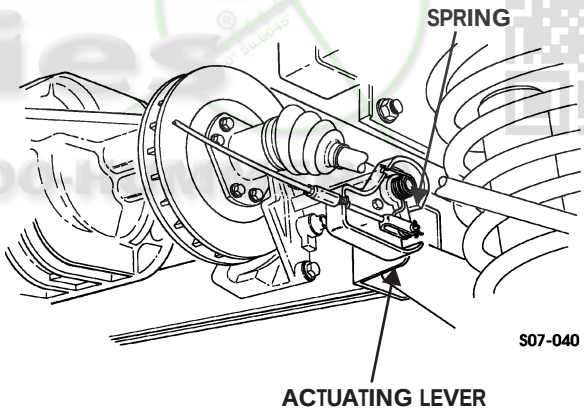

Figure 7-45: Spring and Actuating Lever for Parking Brake

PARKING BRAKE SWITCH REPLACEMENT

Removal

1. Disconnect the two harness leads from the switch leads (Figure 7-46).
2. Remove the switch from the parking brake lever.

Installation

1. Install the switch on the parking brake lever (Figure 7-46).
2. Connect two switch leads to the harness leads.
3. Ensure parking brake switch operates properly.

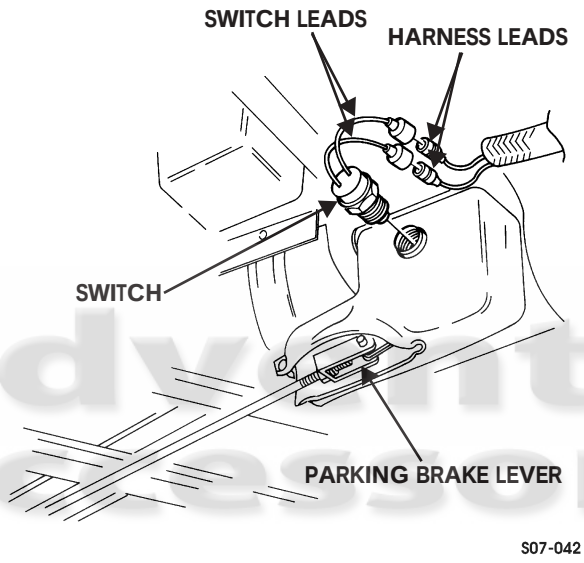

Figure 7-46: Parking Brake Switch

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