GROUP

BRAKES 12

(2000)

SECTION 12-01 Brakes, Hydraulic—Service

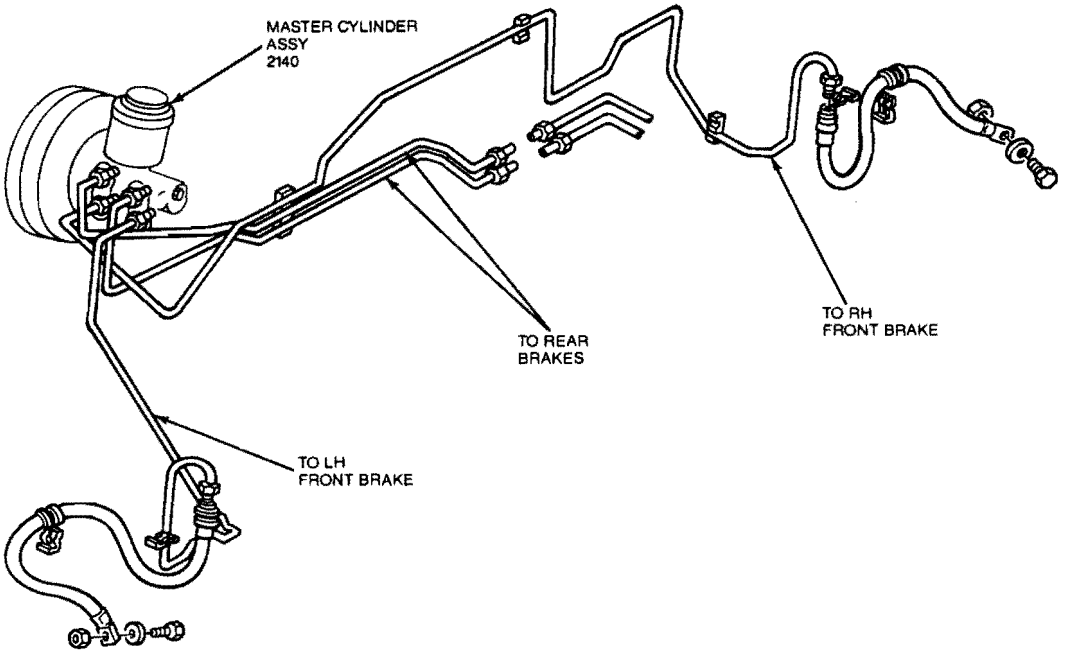
VEHICLE APPLICATION

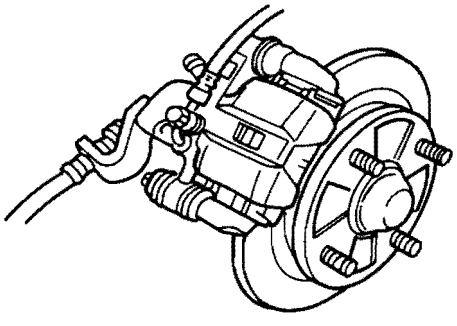
Capri.

DESCRIPTION

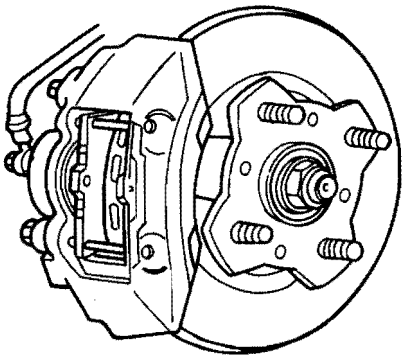
Brake System—Dual

The dual hydraulic brake system is a conventional, pedal-actuated system with a master cylinder, pressure control valve, brake tubes and hoses. The hydraulic brake line routing has been diagonally split left front to right rear and right front to left rear. The master cylinder has a reservoir, brake pressure control valve, and pressure differential warning indicator, all combined in one assembly.





REAR DISC BRAKE (SOLID)



FRONT DISC BRAKE (VENTILATED)

H6888-A

DESCRIPTION (Continued)

Road Test

A road test should be performed to compare actual vehicle braking performance with the performance standards expected by the driver.

This experience has to include a thorough knowledge of brake system operation, acquired general performance guidelines and the ability to recognize brake performance that is characteristic of the vehicle being tested.

An experienced brake technician will always establish a route that will be used for all brake diagnosis road tests. The road selected will be reasonably smooth and level. Gravel or bumpy roads are unsuitable because the surface does not allow the tires to grip the road equally. Crowned roads are avoided because of the large amount of weight shifted to the low set of wheels. Once the route is established and consistently used, the road surface variable is eliminated from the test results.

Before a road test, get a complete description of the customer's complaint or suspected condition. From the description, experience will begin to match possible causes with symptoms. Certain components will be tagged as possible suspects, while others are eliminated by the evidence. More importantly, the description can uncover unsafe conditions which should be checked or corrected before the road test. The description will also help form the basic approach to the road test by narrowing the problem to specific components, vehicle speed or conditions.

Begin the road test with a general brake performance check. Keeping the description in mind, test the brakes at different vehicle speeds using both light and heavy pedal pressure. To determine if the problem is in the front or rear brake system, first use the service brake pedal, then the parking brake. If the condition (i.e., pull, vibration, pulsation) occurs only with the hand brake, the problem is in the rear system. If the condition occurs when the service brake pedal is pressed, the problem is in the front system.

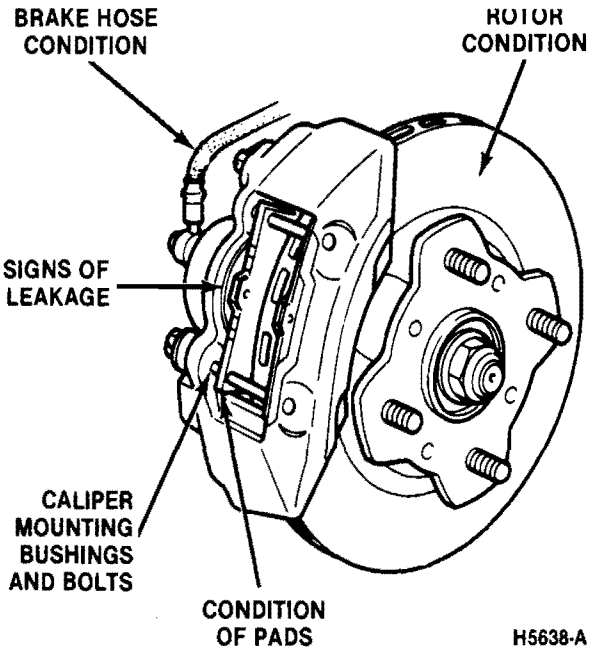
Avoid locking the brakes and sliding the tires. Locked brakes and sliding tires do not indicate brake efficiency. A heavily braked, but turning wheel will stop the vehicle in less distance than locked brakes. If the problem becomes evident during this check, make sure it fits the description given before the road test. If the problem is not evident, attempt to duplicate the condition using information from the description.

INSPECTION

Disc Brakes, Front

Inspect the caliper and caliper mounting for loose or damaged parts. Make sure the caliper and anchor attaching bolts are tightened to the specified torque.

Check the brake hose and caliper fitting for leaks or damage. Carefully check the caliper for wet areas that might indicate a leaking caliper seal. Unless the damage is obvious, a visual inspection of the rotor will not determine the required rotor service—resurface, recondition or replace. Tolerances on rotor thickness, parallelism, and runout are very critical and must be measured with precision tools. Use the Brake Rotor Troubleshooting Chart in Section 12-20 as a guide for visual inspection and necessary measurements.



Whenever the pads are inspected, check for brake fluid contamination which might indicate a leaking caliper seal. If a seal is leaking, the caliper must be disassembled and inspected. Refer to Section 12-20.

Check for even wear from side to side. If the set of pads on one side of the vehicle is excessively worn, the caliper piston may be seized in the bore. If a seized piston is suspected, the caliper must be disassembled and inspected. Refer to Section 12-20.

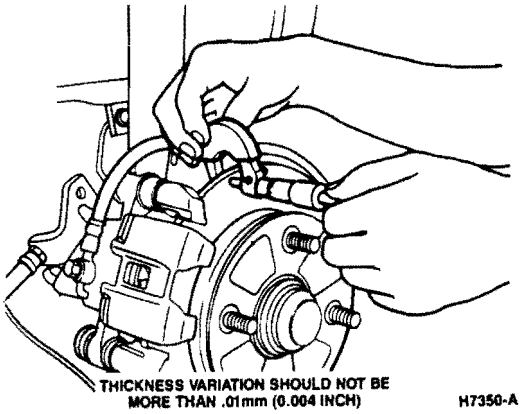
Disc Brakes, Rear

The operation and diagnostic procedures on a rear disc brake are very similar to a front disc brake. The following items should be inspected when diagnosing rear disc brakes:

1. Check for leakage at the hose fittings.
2. Inspect the flex hose for cuts, abrasions, cracking and leakage.
3. Inspect the pads for general wear, gouges, scoring, cracking and contamination. Brake pad thickness cannot be less than 1.0mm (0.04 inch).

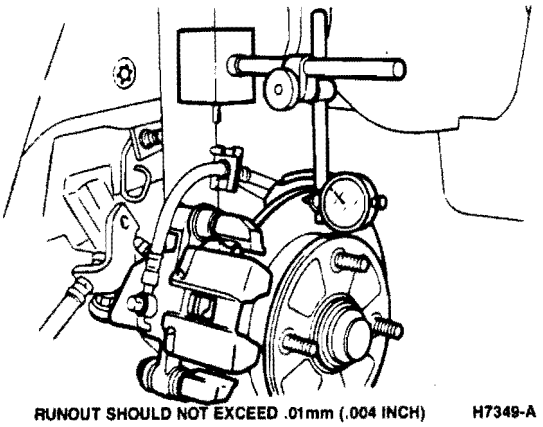
INSPECTION (Continued)

4. If there is uneven pad wear at the same caliper, check that the caliper moves back and forth easily on the anchor bolts. Check the condition of the anchor bolts. Be sure they are properly lubricated.
5. Check for a frozen caliper piston. Raise the rear of the vehicle. Refer to Section 10-04. Apply the brakes with a force of 60 Kg (132.3 lbs.) and then release the brakes. Each wheel should then turn over easily by hand. If they do not, the caliper piston is probably frozen. Before rebuilding the caliper, be sure the problem is not caused by the caliper not moving freely on the anchor bolts.
6. Check for rotor parallelism, or thickness variation. The rotor thickness should not vary more than 0.01mm (0.004 inch).



THICKNESS VARIATION SHOULD NOT BE MORE THAN .01mm (0.004 INCH) H7350-A

7. Using a Dial Indicator with Bracketry TOOL-4201-C or equivalent, check for rotor runout. Runout should not be greater than 0.01mm (0.004 inch).
8. Refer to Section 12-25 for further inspection and diagnostic procedures.



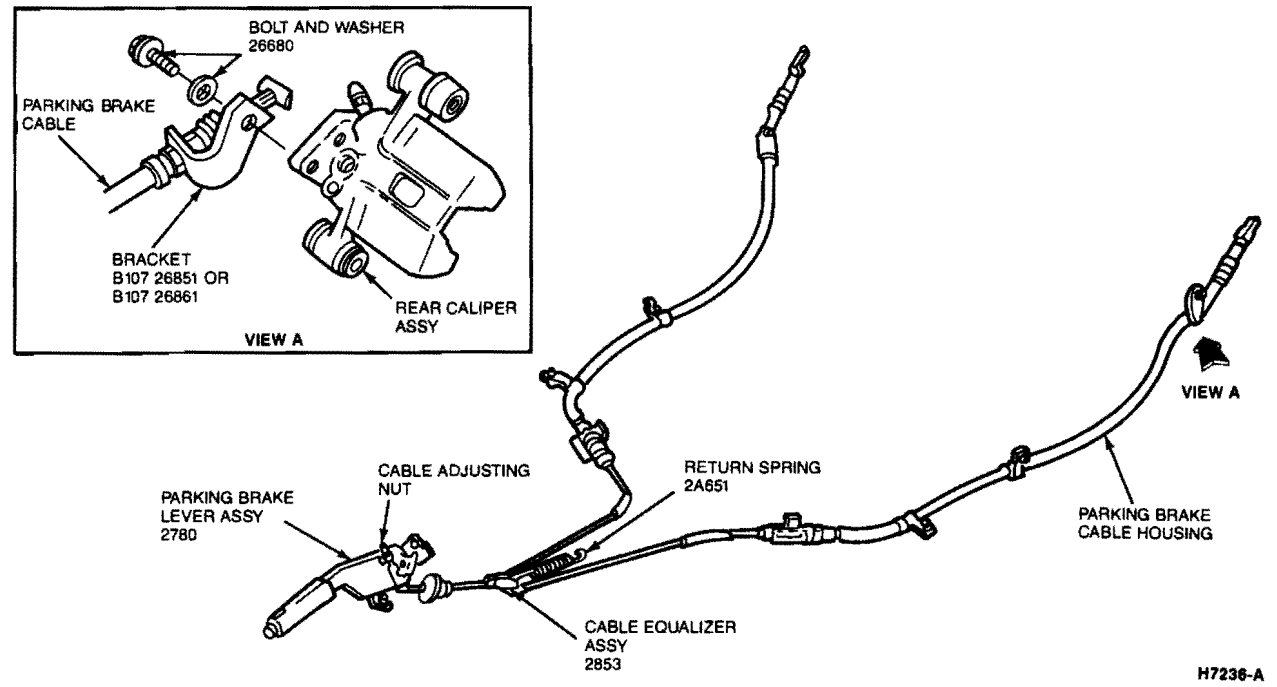
RUNOUT SHOULD NOT EXCEED .01mm (.004 INCH) H7349-A

Parking Brake

Check the parking brake cable for damage and proper routing. If the cable is damaged it should be replaced. Refer to Section 12-70.

Operate the parking brake lever and check for conditions that may cause binding and incomplete release of the parking brake. If the parking brake components are in good condition, check the cable adjustment.

INSPECTION (Continued)



Hydraulic System

An inspection of the brake hydraulic system begins with a fluid level check at the reservoir. If the fluid level is below the MIN line in the reservoir, add the required amount of fluid. Make sure the brake fluid meets specifications. While in the master cylinder area, check the brake lines and master cylinder mounting. The brake lines and attaching nuts must be tight. The brake line fittings must not show any signs of leakage.

The following conditions are considered normal and are not indications that the master cylinder is in need of service.

Condition 1: Low fluid level without signs of leakage. This condition is caused by displacement of fluid from the reservoir to the calipers to compensate for normal lining wear. Add fluid as needed.

Condition 2: A momentary or slight squirt of brake fluid from the master cylinder reservoir upon application of the brake pedal. This condition is caused by the fluid displacement through the reservoir compensating port as the master cylinder pistons move forward in the bore when the brakes are applied.

Condition 3: A slight turbulence in the reservoir fluid occurring when the brake pedal is released. Turbulence occurs as brake fluid returns to the master cylinder after releasing the brakes.

Condition 4: A trace of brake fluid exists on the booster shell below the master cylinder mounting flange. This condition results from the lubricating action of the master cylinder wiping seal.

Under the vehicle, inspect the brake lines for damage and proper routing. Look at the hoses connecting the brake lines to the calipers and the brake lines attached to the rear suspension control arms. The hoses must not show any signs of damage, cracking or softening. The hose fittings must be tight without signs of leakage.

If signs of leakage are not present and yet the master cylinder is low, it is possible that all evidence of fluid leakage may have been washed off by rain or snow because brake fluid is water soluble. Refill the system, bleed the system, and apply the brakes several times. Examine the system to verify the reservoir level is actually dropping. Locate and correct the external leak.

Internal and external leaks are the two problems that can affect a brake hydraulic system. The hydraulic brake system does not cause the vehicle to vibrate, pull, brakes to grab, squeal, or the brake pedal to pulse. In most cases the hydraulic system will not even make the brakes drag. The sources of these problems are found elsewhere in the brake system. But it is always a good policy to first check the entire hydraulic system for leaks before continuing to diagnose any other brake problems.

DIAGNOSIS AND TESTING

If a problem exists, use the Troubleshooting Chart to isolate it to a specific subsystem and condition description. From this description, a source list of possible causes can be used to further narrow the cause to a specific component or condition.

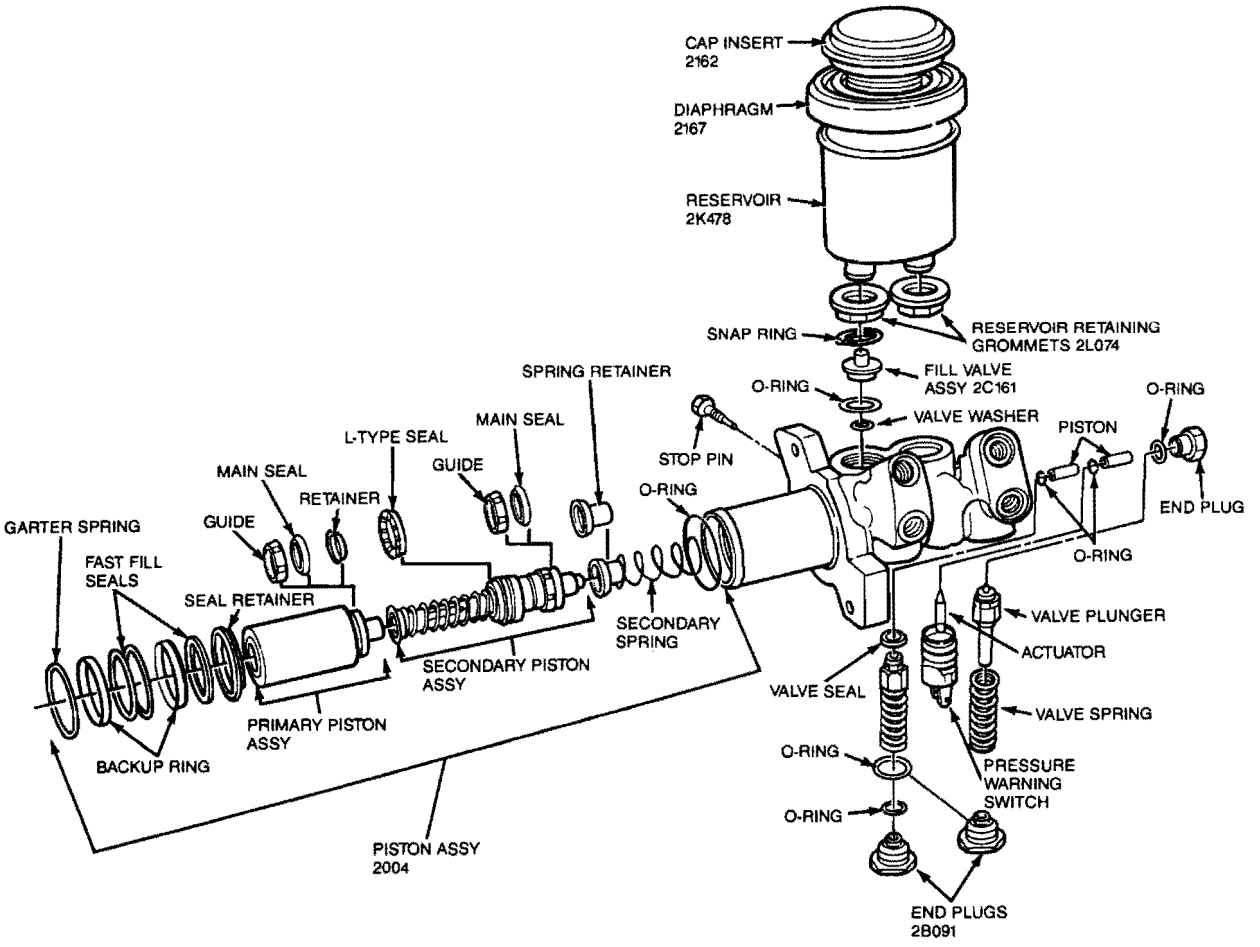
Master Cylinder

NOTE: Always check the fluid level in the master cylinder before performing the test procedures. If the fluid level is not at the correct level indicated on the master cylinder reservoir, add brake fluid, Ford Part No. C6AZ-19542-A or Dot-3 equivalent.

Usually, the first and strongest indicator of anything wrong in the brake system is a feeling through the brake pedal. The Master Cylinder chart uses pedal feel as evidence of a brake problem. It also employs two other problem indicators, such as the illumination of the brake warning lamp and the brake fluid level in the master cylinder's reservoir.

Note that the Master Cylinder Diagnosis Chart refers to the use of diagnostic techniques. These techniques (Numbers 1 through 6) follow the diagnostic chart.

NOTE: Prior to performing any diagnosis, make certain that the brake system warning lamp is functional.



DIAGNOSIS AND TESTING (Continued)

MASTER CYLINDER DIAGNOSIS

BRAKE PEDAL FEEL CONDITIONS	DIAGNOSTIC ACTION
Condition 1 — Pedal goes down fast and brake warning lamp comes on.	Pump brake pedal rapidly: If the brake pedal height builds up and holds, check for the presence of air. (Use Diagnostic Technique No. 1.) If the brake pedal height builds up and then sinks down, check for an external leak. (Use Diagnostic Technique No. 4), or a master cylinder by-pass (Use Diagnostic Technique No. 2.) If the brake pedal height fails to build up, check the fluid level in the master cylinder reservoir: If a reservoir is empty, add fluid; bleed the system: and check for external leak. (Use Diagnositc Techniques No. 3 and No. 4.) If the reservoirs are full, check for a gross master cylinder by-pass. (Use Diagnostic Technique No. 2).
Condition 2 — Pedal eases down slowly and brake warning lamp comes on.	This condition could be caused by an external leak in the brake system or an internal by-pass in the master cylinder. Apply the brakes several times while observing the fluid levels in the reservoirs: If the net fluid level in a reservoir eases down with each stroke cycle, check for an external leak. (Use Diagnostic Technique No. 4.) **If the fluid level in a reservoir rises while the pedal eases down and drops when the pedal is released, but the net fluid level remains unchanged, then service the master cylinder for a fluid by-pass condition.**
Condition 3 — Pedal is low and brake warning lamp does not come on.	This condition may be caused by: air in the hydraulic system, or no fluid in one reservoir. If the reservoir is empty, add fluid, bleed, and check the system for external leaks. (See Diagnostic Techniques No. 3 and No. 4.) If the reservoir is full, check for the presence of air in the hydraulic system. (Use Diagnositc Technique No. 1.) If this condition happens occasionally, check the wheel bearings for looseness. (Loose wheel bearings allow the disc rotor to knock the caliper piston back, creating excessive lining clearance.)
Condition 4 — Pedal feels spongy.	This may be normal as newer brake systems are not designed to produce as hard a pedal as in the past. To verify this, compare the pedal feel with another like vehicle. Check for the presence of air in the hydraulic system. (Use Diagnostic Technique No. 1).
Condition 5 — Pedal erratic and no brake warning lamp.	This may be caused by incomplete brake release, loose wheel bearings, incorrect parking brake adjustment or blocked compensator holes in the master cylinder. To verify, check wheel rotation and bearing free play, parking brake tension and refer to Diagnostic Technique No. 6 for master cylinder compensator hole check.

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DIAGNOSIS AND TESTING (Continued)

BRAKE SYSTEM DIAGNOSIS

CONDITION	POSSIBLE SOURCE	ACTION
• Brake Warning Lamp in Instrument Cluster On	• Low fluid level. • Leaking master cylinder primary piston cup. • Parking brake not fully released. • Parking brake wiring ground switch grounded.	• Fill system. Check for leaks. • Overhaul or replace master cylinder. • Free up and adjust parking brake. Replace damaged parts. • Service wiring. Replace switch.
• Low Pedal	• Caliper piston or slide pins sticking. • Loose wheel bearings.	• Service or replace caliper or slide pins. • Disassemble front spindles and inspect bearings.
• Pedal Goes to Floor	• Leak in hydraulic system. • Air in system. • Worn master cylinder piston cups or scored cylinder bore. • Disc brake "knock back" (pads push caliper piston back into caliper. Caused by excessive rotor lateral runout or loose wheel bearings.)	• Service leak. Check entire hydraulic system. Refill and bleed. • Bleed brakes. Check for leaks. • Overhaul or replace master cylinder. • Check rotor runout, machine or replace rotor. Adjust front wheel bearings.
• Brakes Grab	• Brake pads contaminated by grease or brake fluid. • Loose caliper slide pins or anchor bolts. • Hot spotted rotors. • Binding caliper pistons. • Frozen or incorrectly adjusted parking brake components.	• Replace brake pads. Service cause of contamination. • Tighten slide pins or bolts. Check for hole elongation. • Replace rotors. • Overhaul or replace calipers. • Service or replace frozen components.
• Brakes Drag	• Frozen or incorrectly adjusted parking brake components. • Caliper pistons frozen. • Brake pedal binding at pivot points. • Stop switch lamp incorrectly adjusted, not letting pedal return. • Power booster binding push rod adjustment or binding assist unit. • Master cylinder compensating ports plugged.	• Service or replace frozen components. • Overhaul or replace calipers. • Service or replace brake pedal bushings or pedal assembly. • Adjust stop lamp switch. • Replace binding power booster. • Unplug compensating ports using compressed air. Replace if obstruction cannot be removed.
• Brake Pedal Pulsates	• Disc rotors have excessive lateral runout. • Loose wheel bearings. • Bent front / rear spindles. • Bent or distorted hub mounting flange.	• Machine rotors, replace if necessary. • Adjust wheel bearings. • Replace spindle. • Replace hub.
• Brake Noise	• Worn brake pads. • Cracked or heat checked rotors. • Loose or missing disc brake anti-rattle springs. • Loose caliper mounting bolts.	• Replace pads. • Replace rotors. • Service or replace anti-rattle springs. • Tighten mounting bolts, check for hole elongation.

Diagnostic Technique No. 1

Air Trapped in Brake System

1. Check the master cylinder fluid level.

2. Place the reservoir cap loosely on the master cylinder reservoir.

DIAGNOSIS AND TESTING (Continued)

3. With one technician acting as an observer at the master cylinder, and another technician applying the brakes, pump the brakes rapidly 20 times.
4. On the final application, hold the pedal in the applied position.
5. Remove the cap, and observe the fluid in the reservoir. Quickly release the brake pedal. A spout of fluid will appear in the reservoir if the system has air in it.

   NOTE: Pumping the brake pedal compresses trapped air. When the brake pedal is released, the compressed air expands, forcing brake fluid back into the master cylinder with sufficient force to form a spout of fluid.
6. Bleed the system in which the spout of fluid occurs as outlined.

Diagnostic Technique No. 2

Master Cylinder Bypass Condition—Check

1. Check the master cylinder fluid level.
2. With the reservoir cap removed, observe the fluid level when the brake pedal is slowly depressed for one stroke and then quickly released.
3. If the fluid level in the reservoir rises while the pedal goes down and drops when the pedal is released, but the overall fluid level in the reservoir remains unchanged, the master cylinder is bypassing. Service master cylinder as outlined.

Diagnostic Technique No. 3

Checking the Cause of an Empty Reservoir Without an External Pressure Leak

An empty reservoir condition may be caused by two types of non-pressure external leaks.

Type 1: An external leak may occur at the master cylinder reservoir cap because of improper positioning of the cap.

Type 2: An external leak may occur at the mounting end of the master cylinder because of a bore end seal leak. Service the master cylinder as outlined.

Diagnostic Technique No. 4

Checking for External Fluid Leaks in the Brake System

Refer to Hydraulic System Visual Inspection as outlined.

Diagnostic Technique No. 5

Brake Pedal Reserve—Check

1. With the engine off, pump the brake pedal several times to deplete the vacuum reserve in the power booster.
2. Install Brake Pedal Effort Gauge 021-00001 or equivalent.
3. Press on the brake pedal with a force of about 220 N (50 lbs) and measure the pedal height. Refer to the Brake Pedal Travel Measurement.

   If pedal travel is greater than 70mm (about 2-3/4 inches), bleed the brakes and recheck pedal travel.

   If the brake pedal is still believed to be bottoming out, pedal reserve can be confirmed as follows:

   a. Press the brake pedal with moderate to severe pressure and note the amount of brake pedal travel.

   b. Open a bleeder screw at one front and one rear caliper. Press the brake pedal and note the amount of pedal travel.

   c. Close the bleeder screws and refer to the Troubleshooting Charts for causes of excessive pedal travel.

Diagnostic Technique No. 6

Checking the Master Cylinder for Open Compensator Port

If it is believed that the master cylinder is failing to return to the fully released position, proceed as follows:

1. Raise vehicle on hoist. Refer to Section 10-04.
2. With brakes released, attempt to rotate both front wheels by hand. To minimize brake pad drag, rock the wheel on the spindle as it is rotated.

   If an excessive amount of brake drag is apparent at both wheels, the master cylinder may not be returning to the released position. Proceed to the next step.

   If an excessive amount of brake drag is apparent at only one wheel, it indicates a possible seized caliper piston.
3. Check the brake lamp switch adjustment to make sure the switch is not holding the brake pedal in the partially applied position. If the brake lamp switch is properly adjusted, proceed to the next step.

   CAUTION: Pump brake pedal several times to exhaust any vacuum in the booster. This will prevent brake fluid from coming in contact with painted surfaces.

DIAGNOSIS AND TESTING (Continued)

4. Loosen the nuts attaching the master cylinder to the power booster and pull the master cylinder away from the booster. If the brake drag disappears, the power booster is binding and should be replaced. If the brake drag continues, the master cylinder is not operating properly and should be serviced as outlined.

Brake Booster Functional Test

Inspect all vacuum hoses and connections. All unused vacuum connectors should be capped. Hoses and their connections should be properly secured and in good condition with no holes or no collapsed areas. Inspect the hose containing the check valve on the power booster for damage. Check the booster operation as follows:

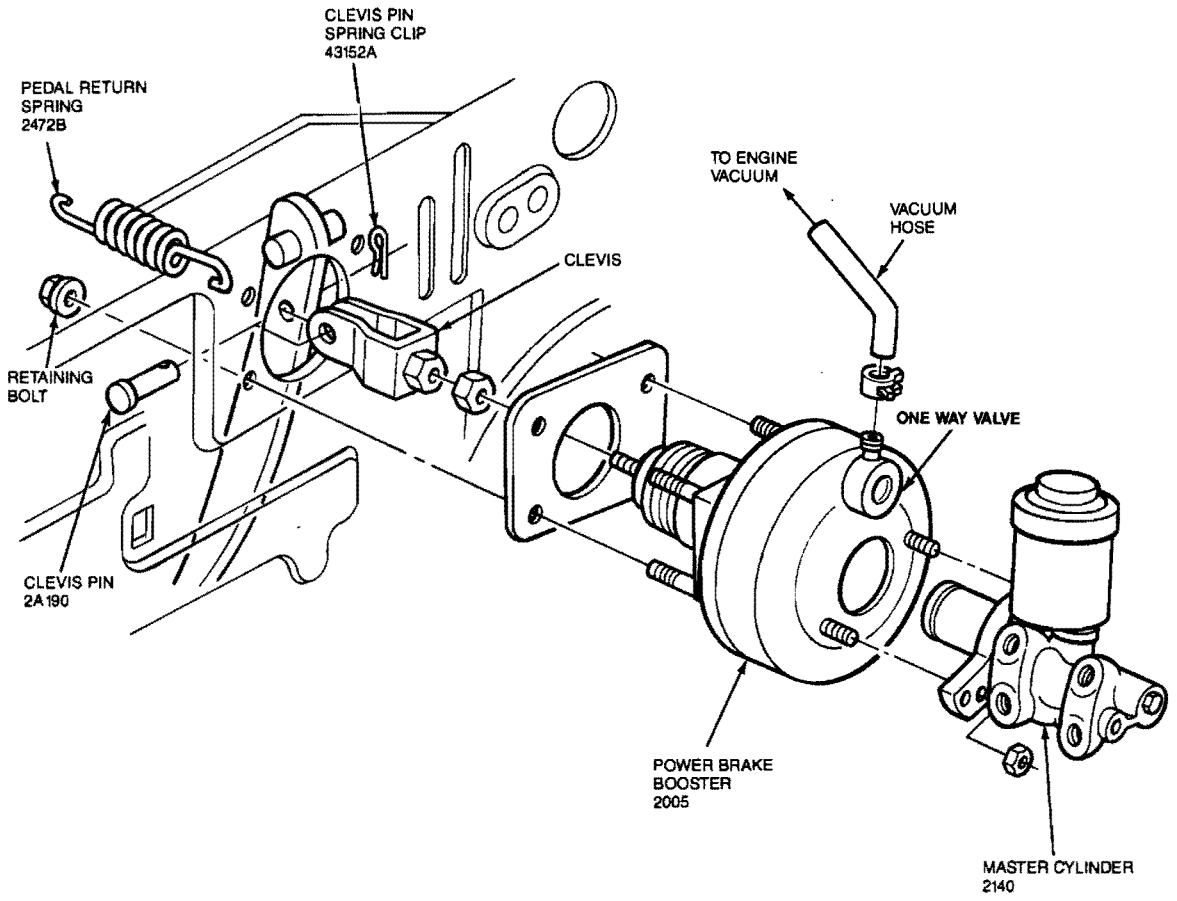
1. Check the hydraulic brake system for leaks or insufficient fluid.
2. With the transaxle in PARK or NEUTRAL, stop the engine, and apply the parking brake. Depress the service brake pedal several times to exhaust all vacuum in the system.
3. With the engine turned off and all vacuum in the system exhausted, depress the service brake pedal and hold it in the applied position. Start the engine. If the vacuum system is operating, the pedal will tend to move downward under constant foot pressure. If no motion is felt, the vacuum booster system is not functioning.
4. Remove the vacuum hose from the brake booster. Manifold vacuum should be available at the booster end of the hose with the engine at idle speed and the transaxle in NEUTRAL. Ensure that all unused vacuum outlets are properly secured, and vacuum hoses are in good condition.

   When it is established that manifold vacuum is available to the booster, connect the vacuum hose to the booster and repeat Step 3. If no downward movement of the brake pedal is felt, replace the brake booster.
5. Operate the engine a minimum of 10 seconds at fast idle. Stop the engine, and let the vehicle stand for 10 minutes; then, depress the brake pedal with approximately 89 N (20 lbs) of force.

   The pedal feel (brake application) should be the same as that noted with the engine operating. If the pedal feels hard (no power assist), replace the one way check valve, then repeat the test. If the pedal still feels hard, replace the brake booster.

   If the brake pedal movement feels spongy, bleed the hydraulic system to remove air from the system as outlined. Refer to the Brake Booster Troubleshooting Chart for vacuum booster diagnosis.

DIAGNOSIS AND TESTING (Continued)



6. Run engine at fast idle for a minimum of 10 seconds. Depress brake pedal and listen for noise. Compare results with a known good system. If brake booster is noisy, replace it.

DIAGNOSIS AND TESTING (Continued)

VACUUM BRAKE BOOSTER DIAGNOSIS
EXCESSIVE BRAKE PEDAL EFFORT OR VACUUM LEAKS

	TEST STEP	RESULT	ACTION TO TAKE
B0	VERIFY CONDITION		
	• With engine OFF, depress and release brake pedal five times to deplete all vacuum from booster. Depress pedal, hold with light pressure. Start engine.	Pedal falls slightly, then holds	GO to **B1**.
		(OK)	GO to **B3**.
B1	VACUUM BOOSTER LEAK TEST		
	• Run engine to medium speed, release accelerator and turn engine off. Wait 90 seconds and apply brakes. Two or more applications should be power assisted.	(OK)	Vehicle OK.
		(OK)	GO to **B2**.
B2	POWER SECTION CHECK VALVE TEST		
	• Disconnect vacuum hose for booster check valve at manifold. Blow into hose attached to check valve.	Air passes through check valve	INSTALL new check valve and REPEAT Step **B1**.
		(OK)	REPLACE booster. REPEAT Step **B0**.
B3	POWER SECTION TEST		
	• Disconnect vacuum hose from booster. Run engine at idle. Check vacuum supply with a vacuum gauge.	Above 40.5 kPa (12 inches Hg) and booster does not operate	REPLACE booster. REPEAT Step **B0**.
		Below 40.5 kPa (12 inches Hg)	REPLACE or SERVICE vacuum hose and vacuum fittings. Also TUNE or SERVICE engine as required. REPEAT Step **B0**.

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DIAGNOSIS AND TESTING (Continued)

VACUUM BRAKE BOOSTER DIAGNOSIS
SLOW OR INCOMPLETE BRAKE PEDAL RETURN

TEST STEP		RESULT ▶	ACTION TO TAKE
D0	VERIFY CONDITION		
• Run engine at fast idle. Pull brake pedal rearward with approximately 10 pounds force. Release the pedal and measure the distance to the toe board. Make a heavy brake application. Release the brake pedal and measure the pedal to toe board distance. The pedal should return to its original position.		(OK) ▶ (OK) ▶	Vehicle OK. GO to **D1.**
D1	BRAKE PEDAL BINDING		
• Check pedal to be sure it is operating freely.		(OK) ▶ (OK) ▶	GO to **D2.** CORRECT any sticking or binding. REPEAT Step **D0.**
D2	PUSHROD ADJUSTMENT		
• Remove master cylinder reservoir cover and depress brake pedal rapidly. Fluid surface should have some movement or spout in forward reservoir.		(OK) ▶ (OK) ▶	Vehicle OK. ADJUST pushrod. REPEAT Step **D0.**

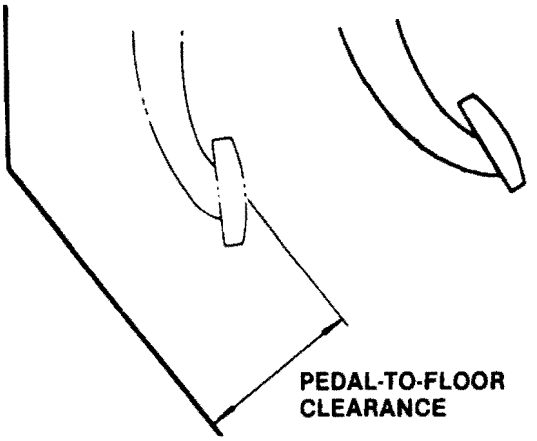
H5648-A

Brake Pedal Height

A low brake pedal complaint can occur because the owner's previous vehicle had different brake pedal feel. To determine if pedal height and travel are within specification, use the following procedures.

With the engine running for full power brake operation and the parking brake fully released, measure the brake pedal free height. Then, check brake pedal travel with the use of Rotunda Brake Pedal Effort Gauge 021-00001 or equivalent, as follows:

1. Depress the pedal with a force of 588 N (132 lbs). Measure the distance between the center top of the brake pedal pad and the floor.
2. If the brake pedal position is not 83mm (3.27 inches), check the brake pedal for missing, worn, or damaged bushings, or loose attaching bolts. Replace them if required. Also check that the floorpan has not been distorted or the brake pedal bent.
3. If the pedal free height is still out of specification, check the brake pedal, booster, or master cylinder to ensure the correct parts are installed. Replace the worn or damaged parts as necessary. Refer to Section 12-50 for proper brake booster adjustment procedures.



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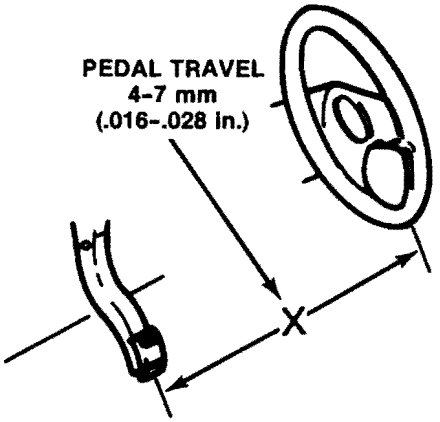
Brake Pedal Travel Measurement

1. Ensure the parking brake is released.
2. Make sure the master cylinder is filled to the correct level.
3. Install Rotunda Brake Pedal Effort Gauge 021-00001 or equivalent on the brake pedal pad.

DIAGNOSIS AND TESTING (Continued)

4. Make sure the rear brakes are fully adjusted by applying a 500 N (110 lbs) load to the pedal.

BRAKE PEDAL TRAVEL MEASUREMENT



H5627-A

5. Attach a steel measuring tape to the brake pedal. Measure and record the distance from the brake pedal free height position to the reference point at the six o'clock position on the steering wheel rim.
6. With steel tape still attached to the brake pedal, depress the brake pedal by pressing downward on the Brake Pedal Effort Gauge. Apply a 22N (5 lb) load to the center of the pedal. Maintain the pedal load and measure the distance from the brake pedal to the fixed reference point on the steering wheel rim parallel to the centerline of the steering column.
7. The difference between the brake pedal free height and the depressed pedal measurement under a 22N (5 lb) load should be 4-7mm (0.16-0.28 inch).
8. If the brake travel is not within specification, check the pedal assembly for missing or worn bushings or loose attachments.
9. If the above steps do not locate the problem, bleed the brake system.

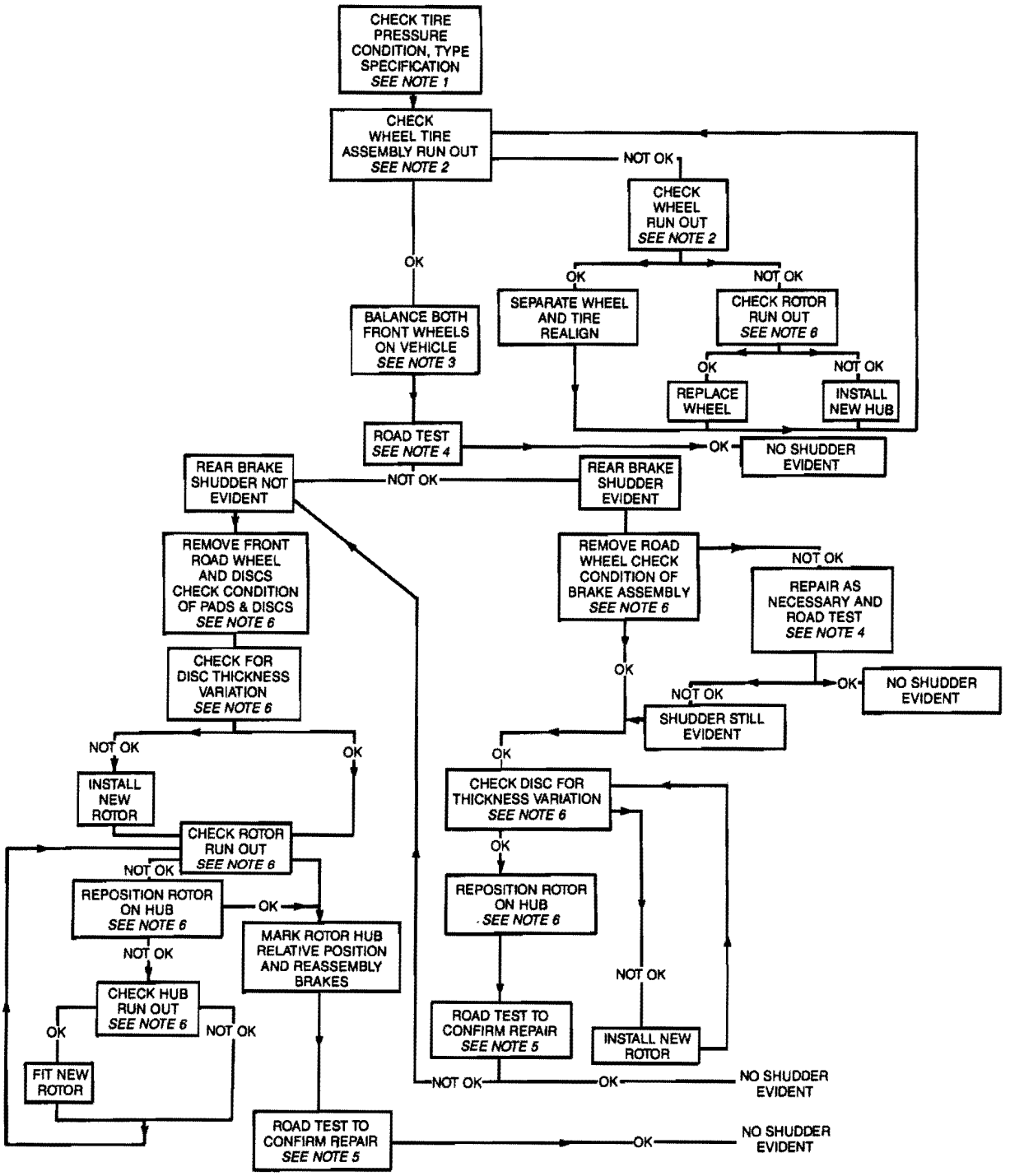
Brake Shudder

When investigating complaints of brake shudder, it is important that the condition is accurately diagnosed before carrying out corrective actions. Failure to do this may result in unnecessary work and replacement of serviceable components without correcting the problem.

Therefore, should a customer express concern about brake shudder, the sequence and procedures detailed in this procedure must be followed exactly to ensure that the shudder condition is eliminated.

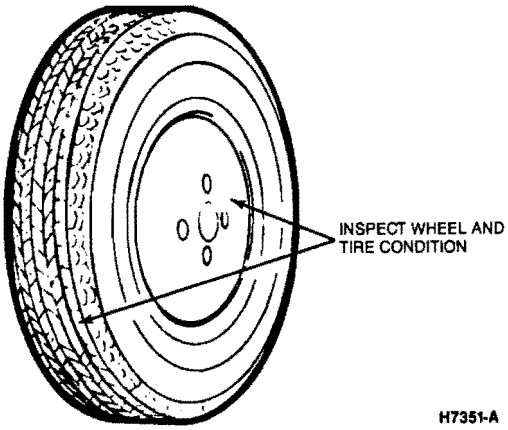
This procedure is divided into two sections, a diagnostic procedure chart and explanatory notes for the chart.

DIAGNOSIS AND TESTING (Continued)



DIAGNOSIS AND TESTING (Continued)

Note 1: Tire Condition / Specification Pressure



Visually examine front and rear tires and wheel assemblies for damage such as uneven wear, tread wash-outs, or sidewall damage. Ensure the tires are of the same size, type and when possible same manufacture. Any tire or wheel that is damaged should be replaced. Refer to Section 11-01.

Wheels and tires must be cleared of any foreign matter and tire pressures adjusted to the correct specification. Refer to Section 11-01.

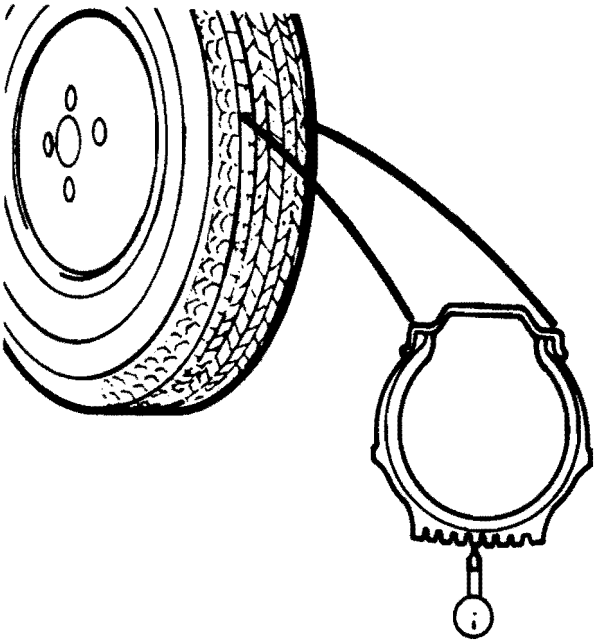
If tires exhibit uneven wear or feathering, the cause must be corrected. Check steering and suspension components for damage / wear and, if necessary, check and adjust steering alignment and rear toe alignment. Refer to Section 14-01 or 14-32.

Note 2: Front Wheel, Tire and Hub Radial Runout

Wheel and tire assembly runout check:

Raise the front or rear of the vehicle, and place a support underneath the control arm to prevent suspension movement. Refer to Section 10-04. Using a Dial Indicator With Bracketry TOOL-4201-C or Rotunda Radial Runout Gauge 007-00014 or equivalent measure the radial runout of the tire at the center and outside ribs of the tread face. Mark low and high positions of radial runout. Radial runout must not exceed 1.59mm (0.062 inch).

Readjust the gauge mounting brackets and using a dial gauge, measure the wheel rim runout and record high and low positions. The wheel rim runout must not exceed 1.0mm (0.039 inch). Measure wheel radial runout at the wheel rim along the inside edge of the flange. If indicator reading is in excess of 1.0mm (0.039 inch), the hub radial runout must be checked as follows.



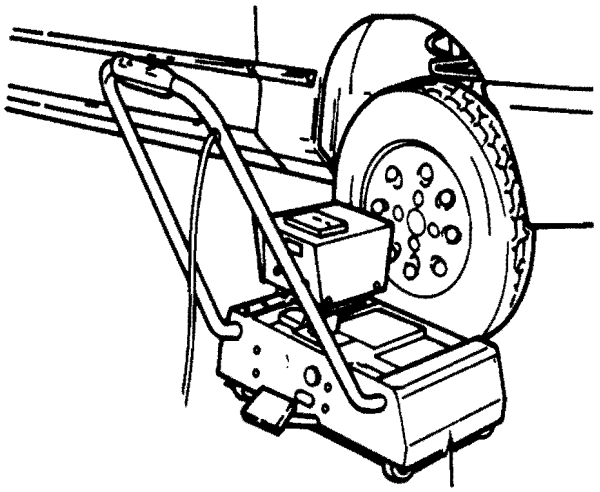
NOTE: If the reading for wheel runout is within specification and tire runout is outside specification, rotate tire on the wheel rim until the tire runout is within specification. Check tire radial runout until an acceptable specification is obtained.

Remove the wheel, reposition the dial indicator and measure the hub radial runout. The total indicator reading of the runout must not exceed 0.1mm (0.004 inch).

NOTE: If the hub runout is within specification, this indicates the wheel runout is out of specification and must be replaced. If the hub runout is out of specification, the hub should be replaced. Refer to Sections 11-10 and 11-15.

DIAGNOSIS AND TESTING (Continued)

The wheel / tire and hub assembly radial runout should be checked until an acceptable condition is reached.



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Note 3: Check Tire Balance

Check wheel and tire assembly balance. Refer to Section 11-01.

Wheels must be balanced on the vehicle, both statically and dynamically.

Note 4: Road Test One

Complaints of brake shudder can often be influenced by factors independent of the braking system. Therefore, it is important that you adhere as closely as possible to the procedures detailed below so that the causes of the problem can be accurately identified.

1. Drive the vehicle up to speed.

   NOTE: Brake shudder has been found to be most apparent when braking from speeds around 112 to 120 km / h (70 to 75 mph). Therefore, subject to local road conditions / speed limits, the vehicle should be driven as near to the speed as possible during the road test.
2. When safe to do so, apply the foot brake and brake lightly to a stop, noting the speeds at which shudder is apparent. (Identified by steering wheel vibration and brake pedal pulsation.)
3. Repeat Steps 1 and 2 twice more, to confirm the critical speed ranges.

   NOTE: Allow 1.6 km (1 mile) between each application to allow the brakes to cool.
4. Return to the critical shudder speed, but instead of applying the foot brake, apply the handbrake lightly with the release button depressed. Check for vibration through the handbrake and / or steering wheel.

   If vibration is apparent when carrying out the handbrake test, rear brake shudder is present. This must be investigated and eliminated before investigating whether front brake shudder is also present.

   If vibration is only apparent when the foot brake is applied, it can be assumed the rear brakes are functioning satisfactorily. In these circumstances continue with the front brake diagnostic sequence.

Note 5: Road Test Two

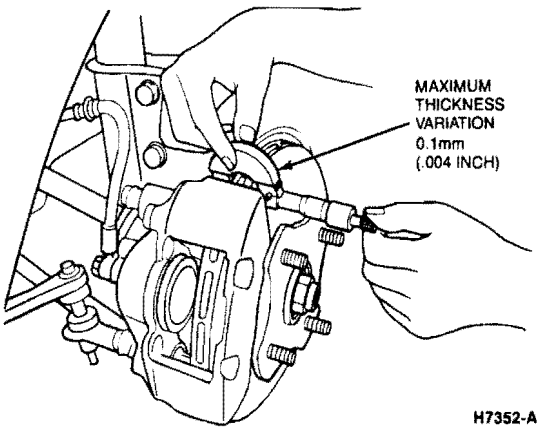
Road test the vehicle as outlined in Road Test One, Steps 1, 2, and 3 only. Continue with the front brake diagnostic sequence only if foot brake shudder is still apparent.

Note 6: Front or Rear Brake Shudder

If the road test has established a brake shudder condition, the following procedure should be used to isolate the cause.

1. Raise the vehicle. Refer to Section 10-04.
2. Remove the lug nuts. Before removing the wheel, mark the wheel and one of the wheel studs so that the wheel can be installed in its original position.
3. Examine the condition of the rotor and pad assemblies. If there is visible evidence of lining deposits or light corrosion on the rotor, this should be removed using emery paper and a flat block.
4. Check the thickness variation of the rotor using a suitable micrometer. Measure the rotor at eight positions, 45 degrees apart, about 12.7mm (1 / 2 inch) in from the outside diameter. If the difference between the highest and lowest readings varies by 0.1mm (0.004 inch) or more, the rotor should be reconditioned or new rotors should be installed. Refer to Section 12-20.

   NOTE: It is important to always check at a constant radius.



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DIAGNOSIS AND TESTING (Continued)

5. Using a suitable dial indicator and holding fixture, measure the rotor runout. Measure the runout about 10mm (7 / 16 inch) in from the outside diameter.
6. Rotate the hub and rotor assembly. Record indicator reading. If runout is greater than 0.1mm (0.004 inch) total indicator reading, the hub and rotor assembly must be removed and turned in a brake lathe. Refer to Sections 11-10 and 12-20 for front rotors or 11-15 and 12-25 for rear brakes.
7. Install the rotors, brake calipers, pads and wheel. Tighten the lug nuts.
8. Perform a road test to confirm repair.

REMOVAL AND INSTALLATION

Master Cylinder

Removal

NOTE: Pump brake pedal several times to exhaust any vacuum in the booster.

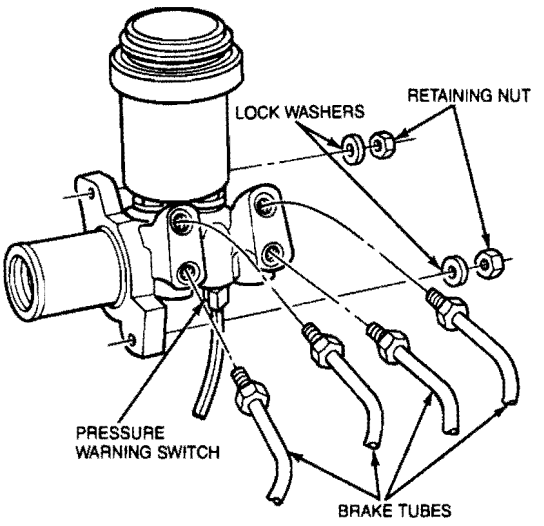
1. Remove brake tubes from master cylinder.
2. Cap brake tubes and master cylinder ports to prevent contamination.
3. Remove vacuum valve from booster.
4. Disconnect pressure warning switch connector.
5. Remove two nuts and lockwashers retaining master cylinder to brake booster assembly.
6. Remove master cylinder from brake booster.

   NOTE: It may be necessary to insert a small pry bar between the booster and the master cylinder to free the master cylinder.

   CAUTION: Brake fluid will damage painted surfaces. Be sure to throughly remove any fluid that may have contacted any paint surface.

Installation

1. Position master cylinder onto booster assembly studs.
2. Install two lockwashers and nuts retaining master cylinder. Tighten nuts to 9.8-16 N·m (7.2-12 lb-ft).
3. Remove caps from brake tubes and master cylinder ports.
4. Install brake tubes to master cylinder.
5. Install vacuum valve to booster.
6. Connect pressure warning switch connector.
7. Fill reservoir to the proper level with Heavy-Duty Brake Fluid C6AZ-19542-AA or equivalent.
8. Bleed brake system as outlined.
9. Check and if necessary, adjust stoplamp switch.



Proportioning Valve

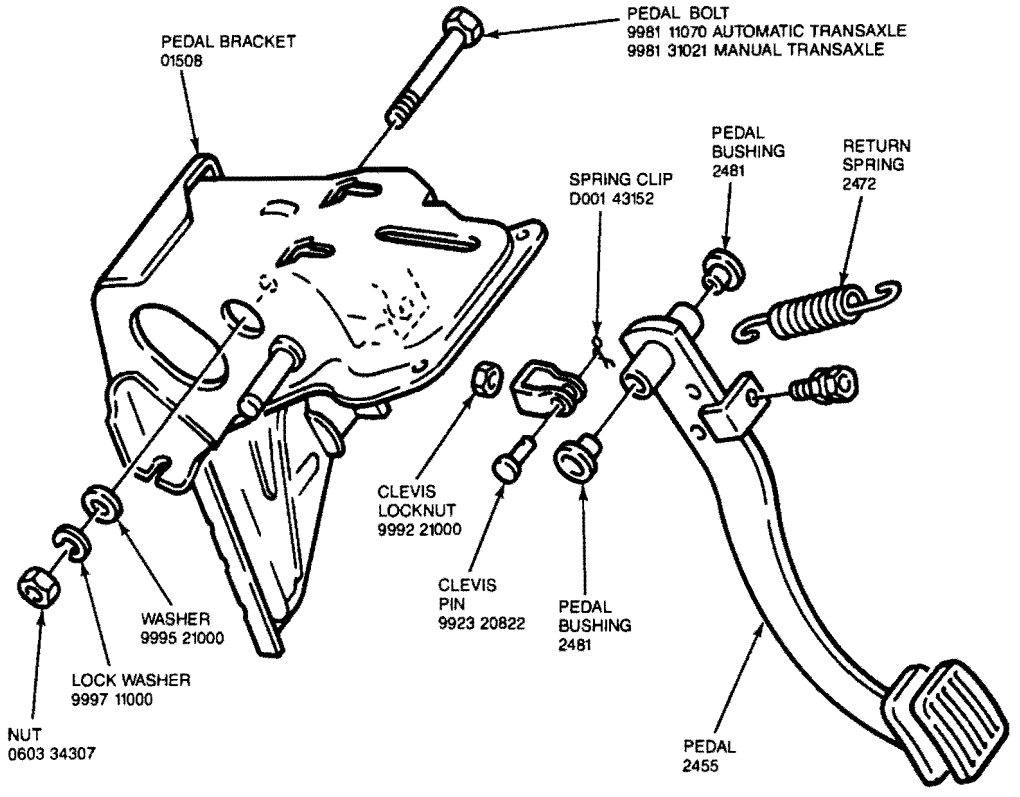
The proportioning valves are an integral part of the master cylinder. If service is required, refer to Master Cylinder, Disassembly and Assembly.

Brake Pedal

Removal

1. Remove the spring clip and clevis pin from the brake pedal.

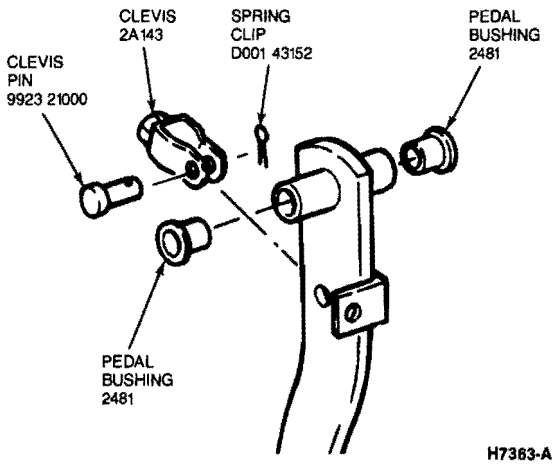
REMOVAL AND INSTALLATION (Continued)



2. Remove the nut, lockwasher and washer from the pedal bolt.
3. Remove the pedal bolt from the pedal and pedal bracket.
4. Remove the pedal from the pedal bracket and disconnect the return spring.
5. Remove the pedal bushings from the pedal.

Installation

1. Apply white lithium grease to pedal bushings and clevis pin.
2. Install the pedal bushings in the pedal.
3. Attach the return spring and position the pedal in the pedal bracket.
4. Install the pedal bolt in the pedal and pedal bracket.
5. Install the washer, lockwasher, and nut on the pedal bolt.
6. Position the clevis on the brake pedal.
7. Install the clevis pin in the clevis and brake pedal. Install the spring clip on the clevis pin.

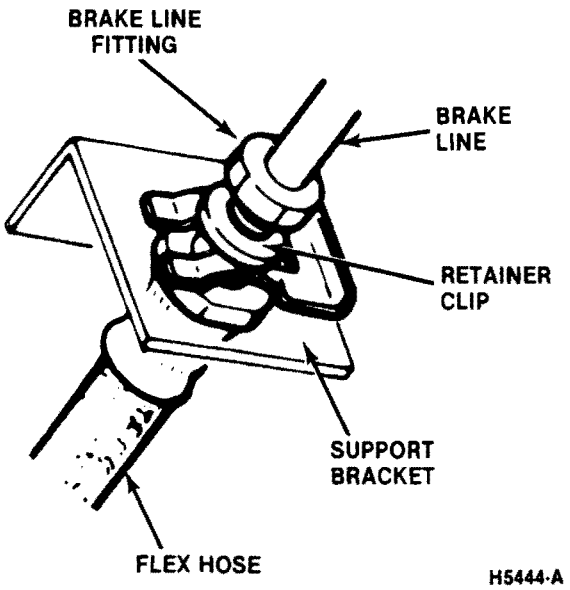


REMOVAL AND INSTALLATION (Continued)

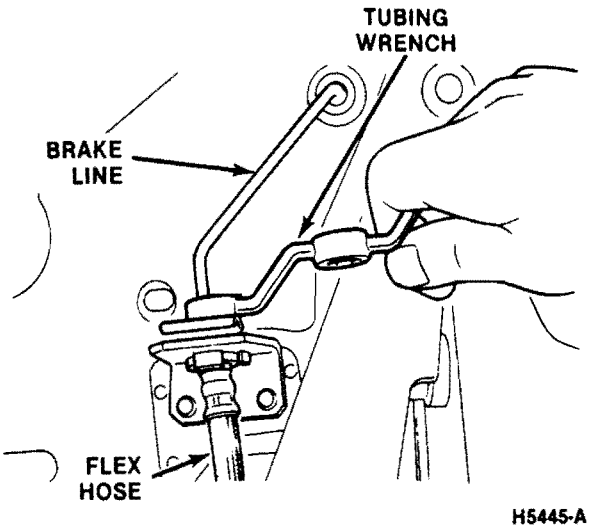
Caliper Hose

Removal

1. Remove the retainer clip from the flex hose attaching it to the strut.



2. Using a tubing wrench, loosen and remove the brake line fitting where it attaches to the flex hose.
3. Remove the retainer clip from the end of the flex hose.
4. Remove the banjo bolt from the flex hose and separate it from the caliper.
5. Discard the two copper washers that seal the banjo fitting.



Installation

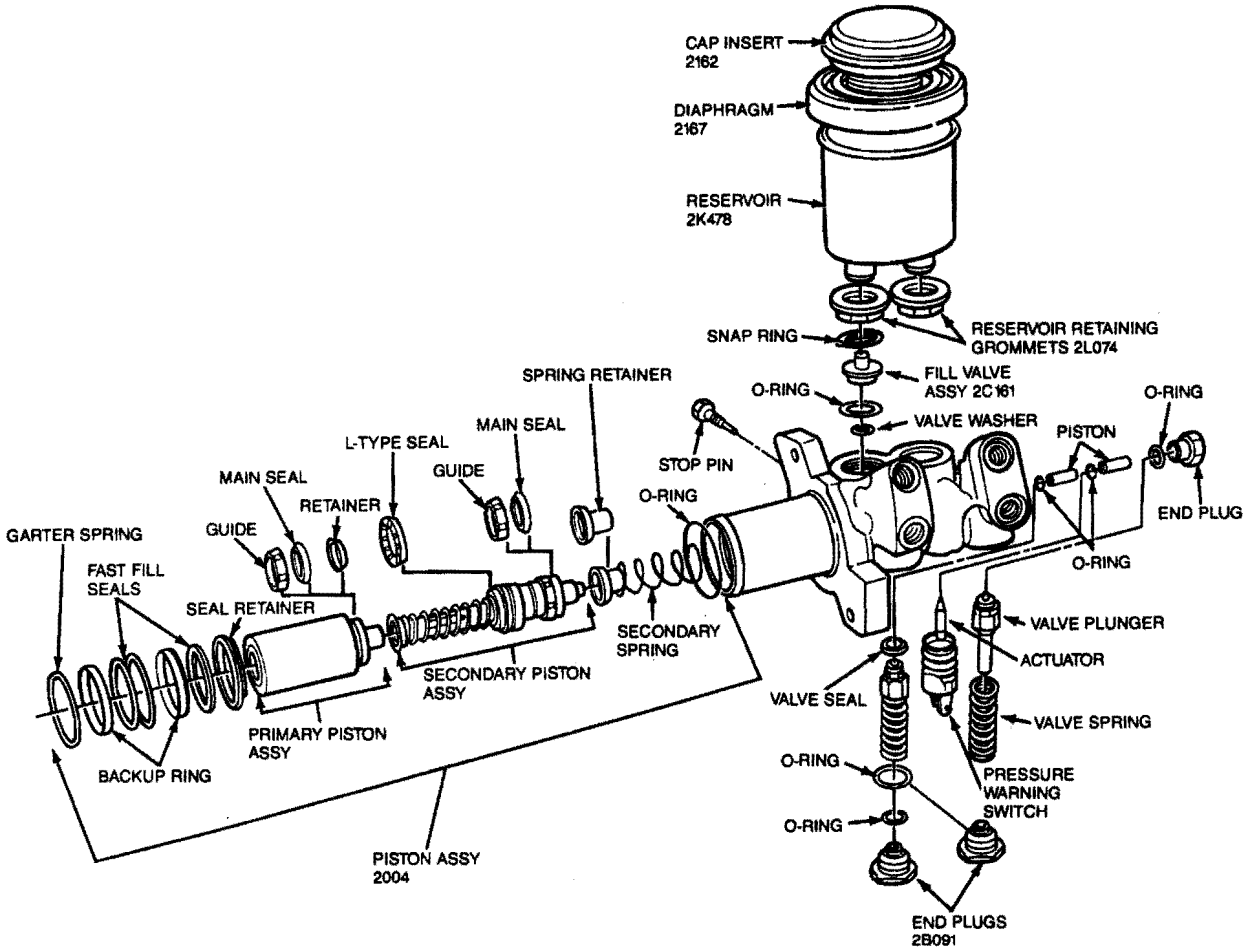
1. Install two new copper washers and the banjo bolt on the banjo fitting.
2. Position the flex line against the caliper and loosely install the banjo bolt.
3. Position the other end of the flex line in its bracket on the body and loosely install the brake line fitting.
4. Install the two retainer clips at the support brackets.
5. Tighten the banjo bolt at the caliper and the brake line fitting at the other end of the flex hose.
6. Bleed brake system as outlined.

DISASSEMBLY AND ASSEMBLY

Master Cylinder

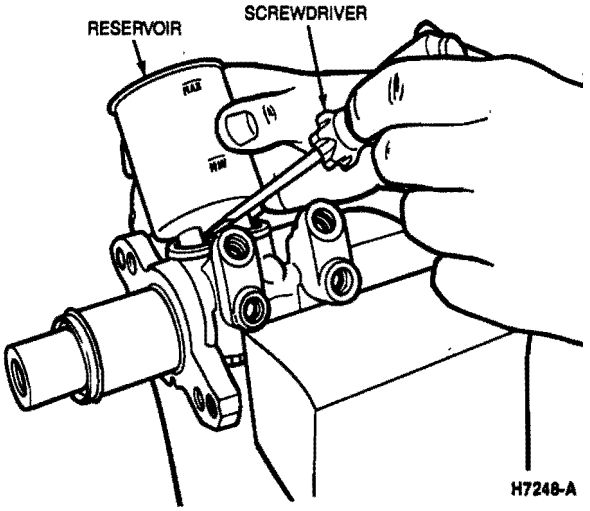
Disassembly

Master Cylinder—Disassembled View

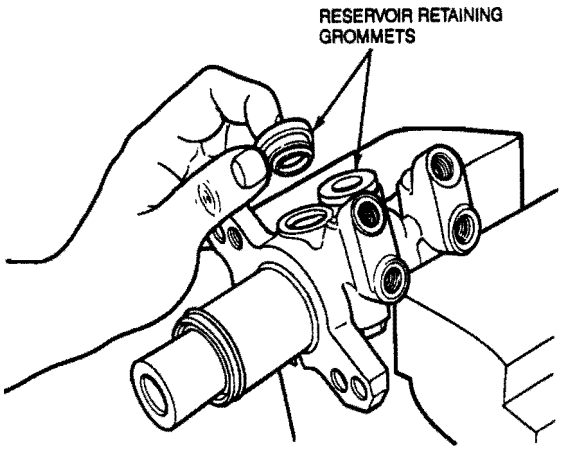


DISASSEMBLY AND ASSEMBLY (Continued)

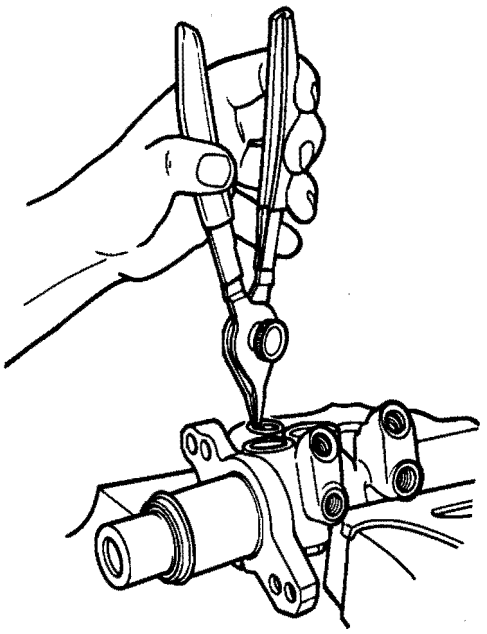
1. Remove master cylinder as outlined.
2. Thoroughly clean outside of master cylinder. Remove cap. Remove and discard all brake fluid from cylinder.
3. Mount the master cylinder in a soft-jawed vise.
4. Gently pry up on the reservoir with a small screwdriver and remove it from the master cylinder.



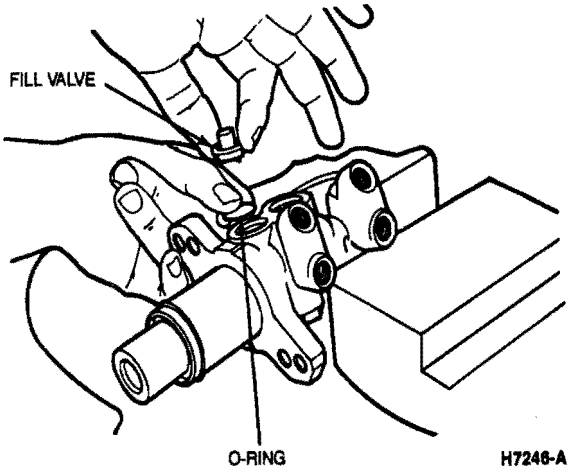
5. Remove reservoir retaining grommets.



6. Remove snap ring from primary reservoir.

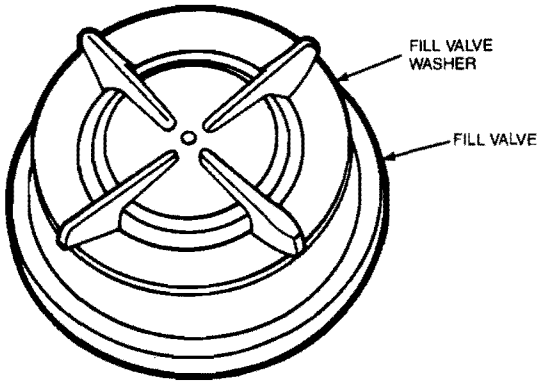


7. Remove fill valve and O-ring from port.



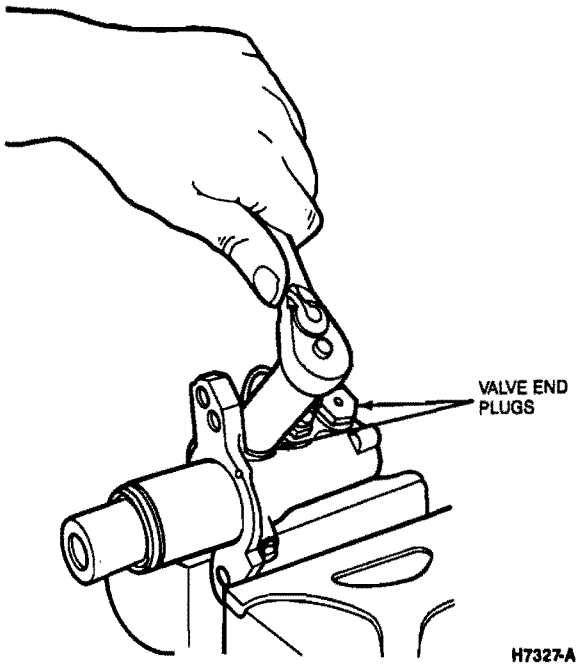
DISASSEMBLY AND ASSEMBLY (Continued)

8. Remove fill valve washer.

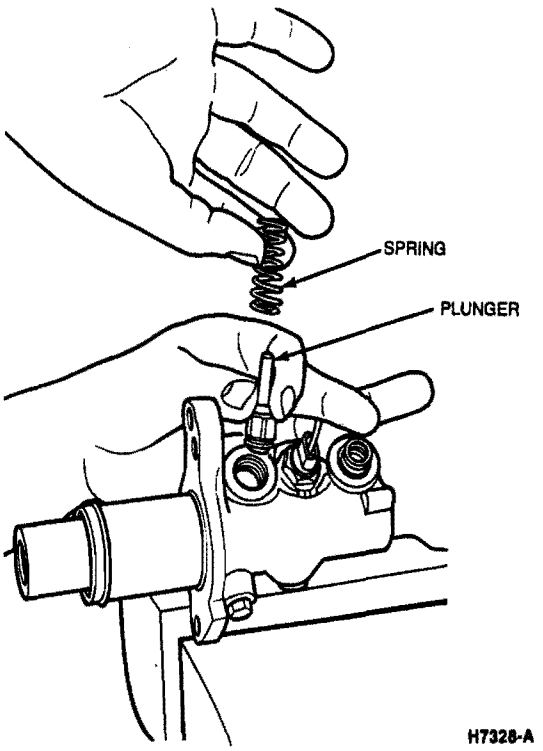


9. Remove proportioning valve end plugs.

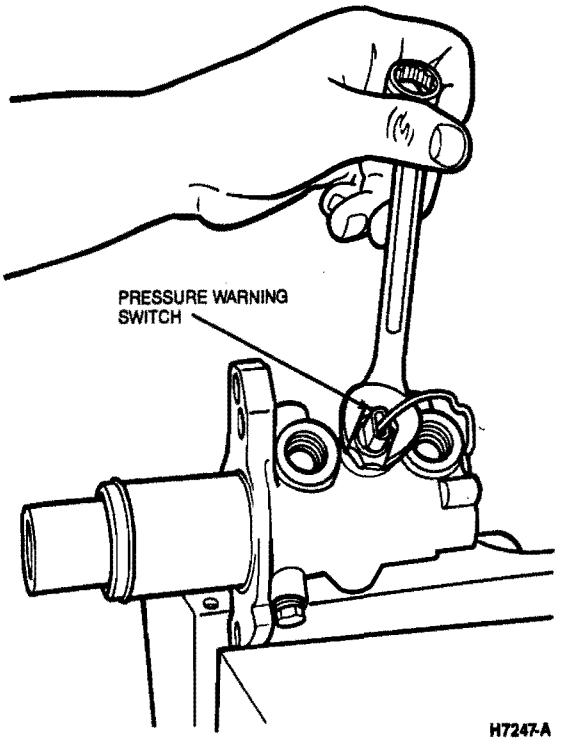
WARNING: VALVE END PLUGS ARE UNDER SPRING TENSION.



10. Remove internal and external O-rings valve end plugs.
11. Remove valve springs and plungers.

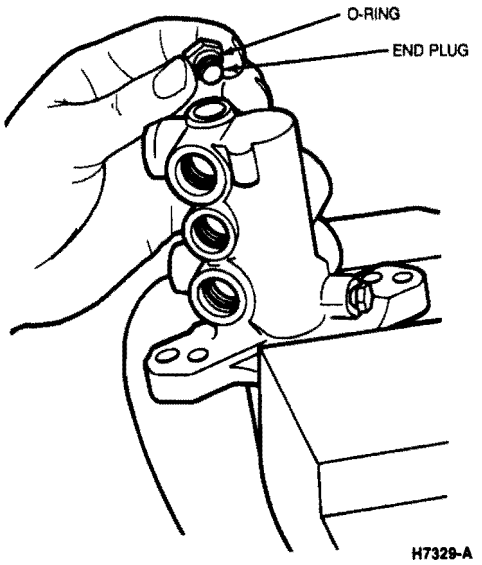


12. Remove valve seals from plungers.
13. Remove pressure warning switch and actuator from body.

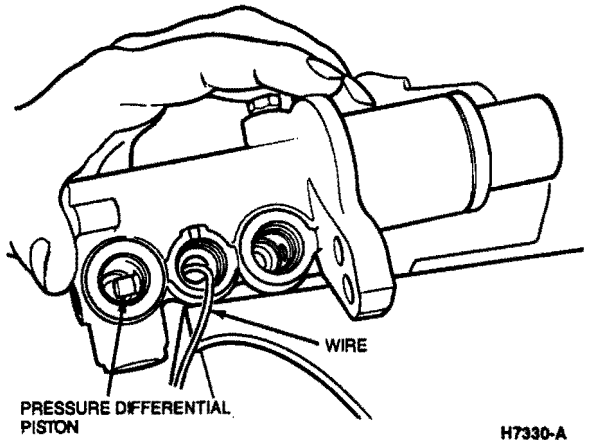


DISASSEMBLY AND ASSEMBLY (Continued)

14. Remove end plug from body. Remove O-ring from end plug.

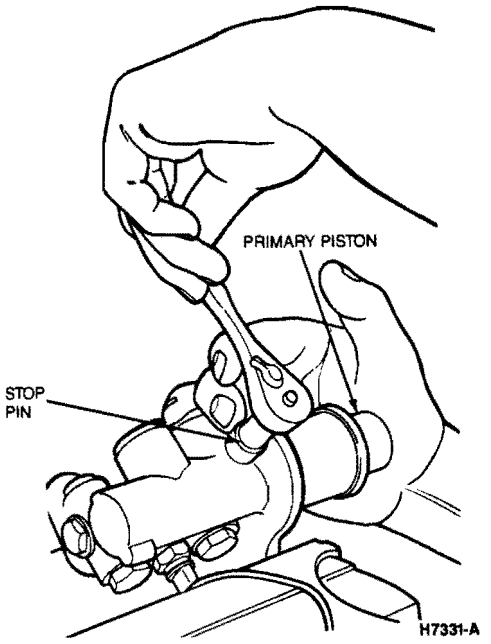


15. Using a piece of wire remove pressure differential pistons. Remove O-rings from pistons.



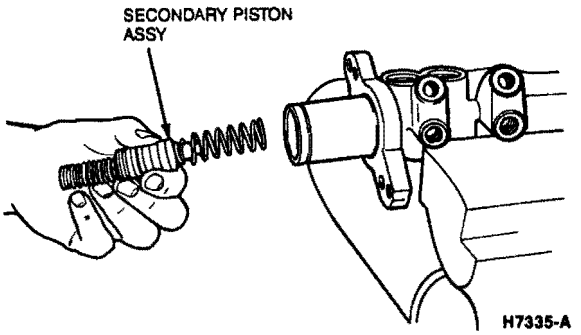
16. Push in on the primary piston and remove the secondary piston stop pin.

WARNING: USE CARE WHEN RELEASING PRIMARY PISTON. IT IS UNDER SPRING PRESSURE.



17. Remove secondary piston from bore.

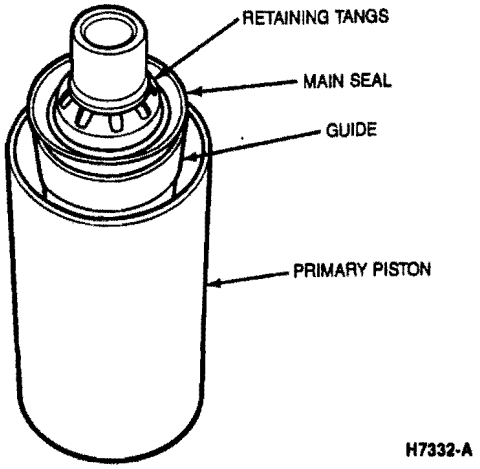
    NOTE: It may be necessary to tap body on a piece of wood to remove piston from bore.



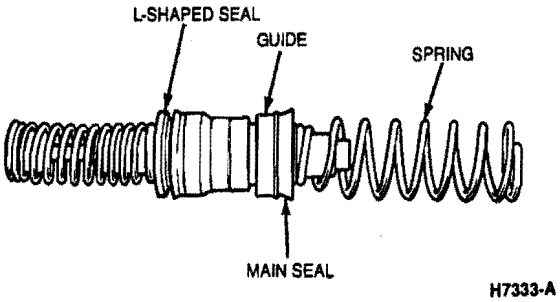
18. Remove retainer, main seal and guide from primary piston.

DISASSEMBLY AND ASSEMBLY (Continued)

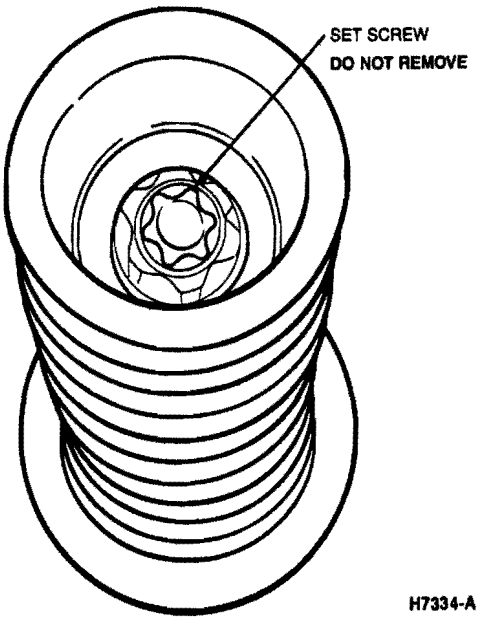
NOTE: Remove retainer by prying up on tangs.



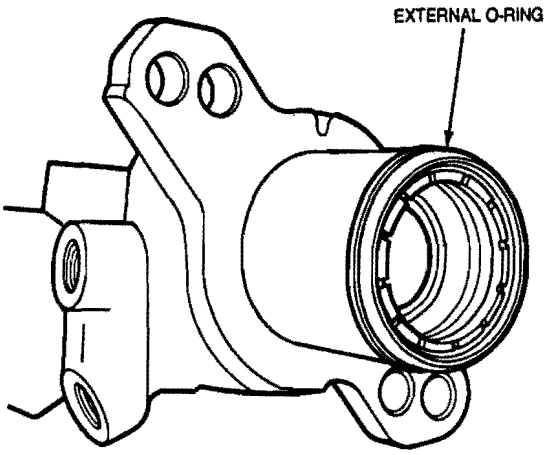
19. Remove spring, main seal, and guide from secondary piston.
20. Remove L-shaped seal from secondary piston by stretching it out and over piston.



CAUTION: The secondary piston has a set screw that has a factory preset length and must not be removed.



21. Remove two fast fill seals from cylinder housing using a hook-type tool. Use care not to damage bore when removing seals.
22. Remove garter spring, backup rings, and retainer.
23. Remove O-ring on outside of cylinder housing.

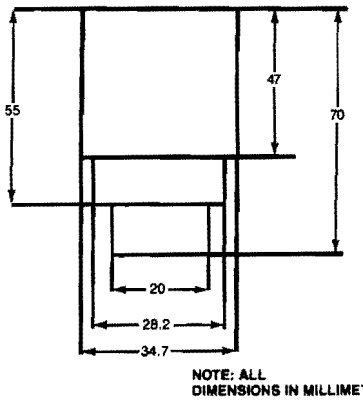


Assembly

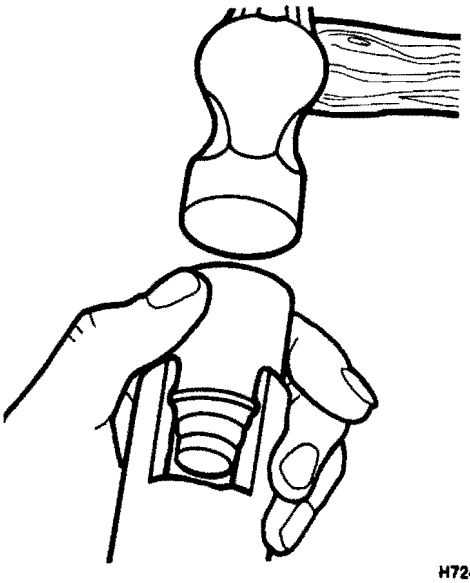
1. Install seal retainer into bore with small diameter of seal facing inward.
2. Install first fast fill seal with lip of seal facing inward against seal retainer.
3. Install first backup ring with large diameter facing inward.

DISASSEMBLY AND ASSEMBLY (Continued)

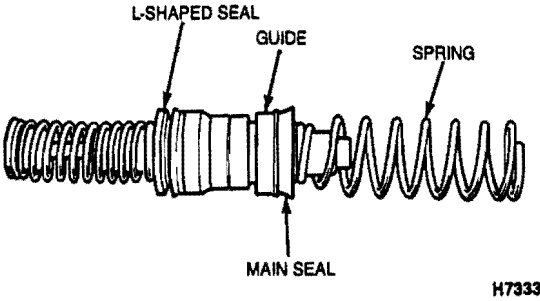
4. To install first garter spring in cylinder bore, a fabricated drift of nylon or aluminum is required. Fabricate tool to dimensions shown.



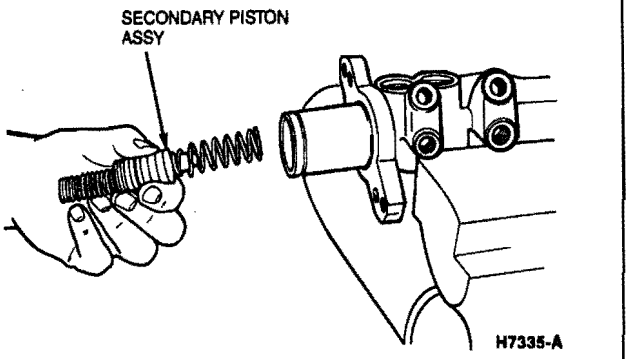
5. Position drift in cylinder bore against garter spring. Lightly tap drift to position garter spring in location groove.



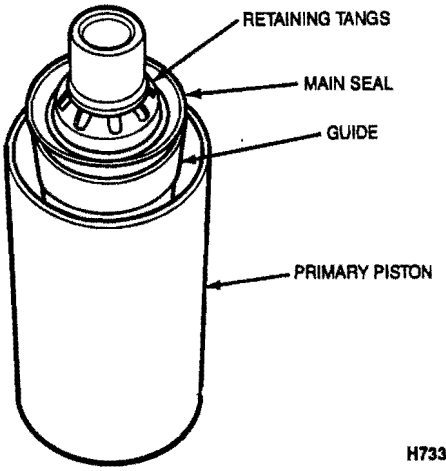
6. Install second fast fill seal with lip of seal facing inward against garter spring.
7. Install second backup ring with large diameter facing inward.
8. Install second garter spring against backup ring using fabricated drift.
9. Coat secondary piston L-shaped seal with brake fluid.
10. Install seal over secondary piston. Ensure seal lip is facing spring and nylon spacer is against back of seal.
11. Install guide on secondary piston (large diameter first) and main seal (with lip facing away from spring).
12. Lubricate secondary piston with brake fluid. Install secondary spring and retainer onto piston.



13. Install secondary piston into bore.

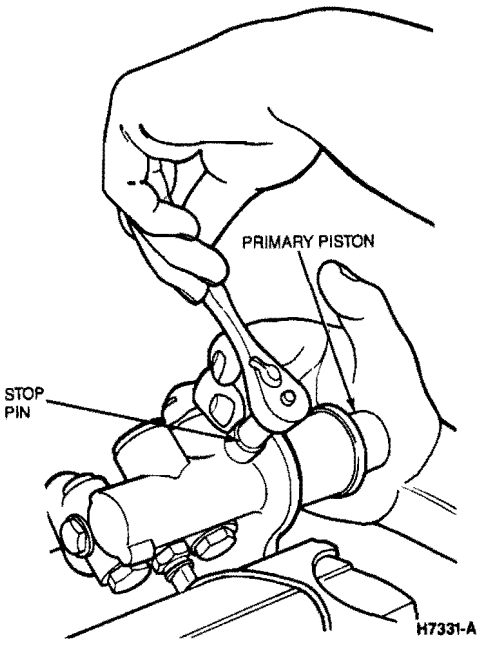


14. Install primary piston guide (large inter diameter first) and main seal with lip toward end of piston.
15. Install a new retainer over piston and ensure tangs of retainer snap into position.

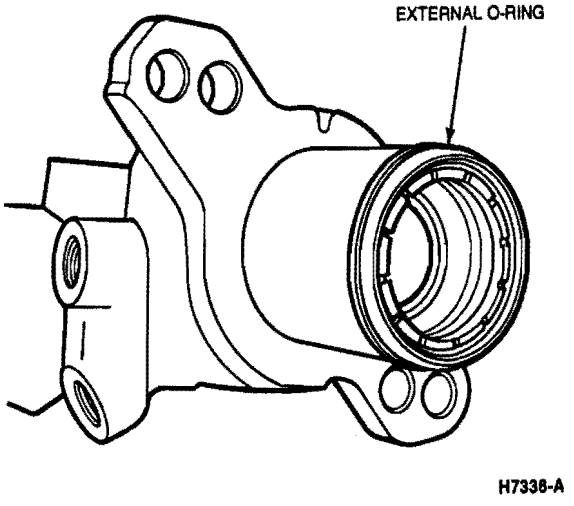


DISASSEMBLY AND ASSEMBLY (Continued)

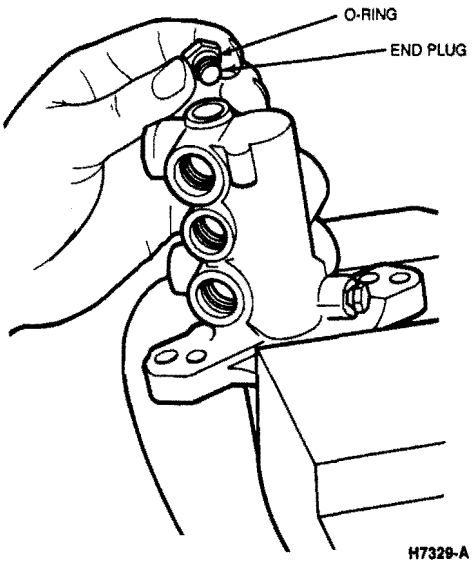
16. Lubricate primary piston with brake fluid. Install piston into cylinder bore, compress piston assembly and install stop pin.



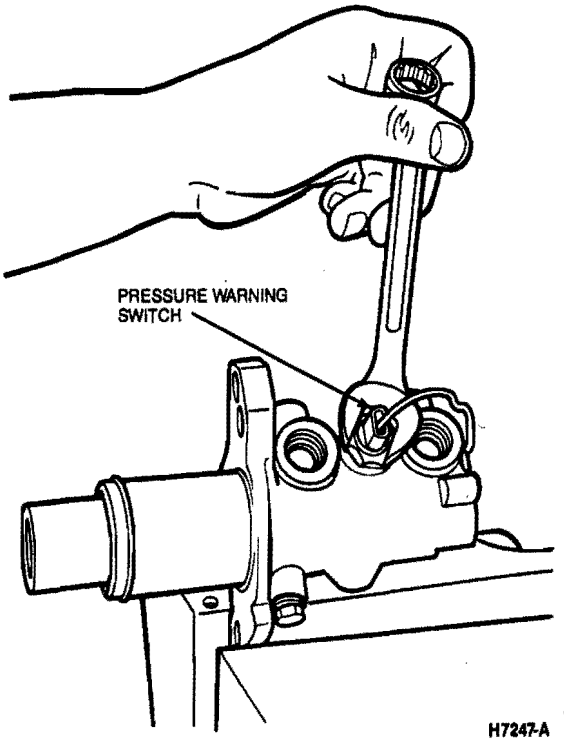
17. Install new O-ring on outside of cylinder housing.



18. Install new O-rings on pressure differential pistons, coat with brake fluid and install into cylinder bore.
19. Install new O-ring onto end plug.
20. Install end plug. Tighten to 9-12 N·m (6.6-8.8 lb-ft).

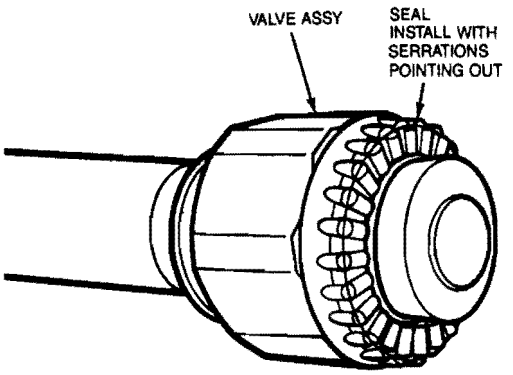


21. Check position of pressure differential pistons through switch hole. There must be enough clearance between pistons for switch actuation rod installation.
22. Install pressure warning switch and switch actuation rod. Screw switch in until detents contact cylinder housing then tighten one-half additional turn.



DISASSEMBLY AND ASSEMBLY (Continued)

23. Install new valve seal onto valve plungers with serrations on seal face away from plungers.



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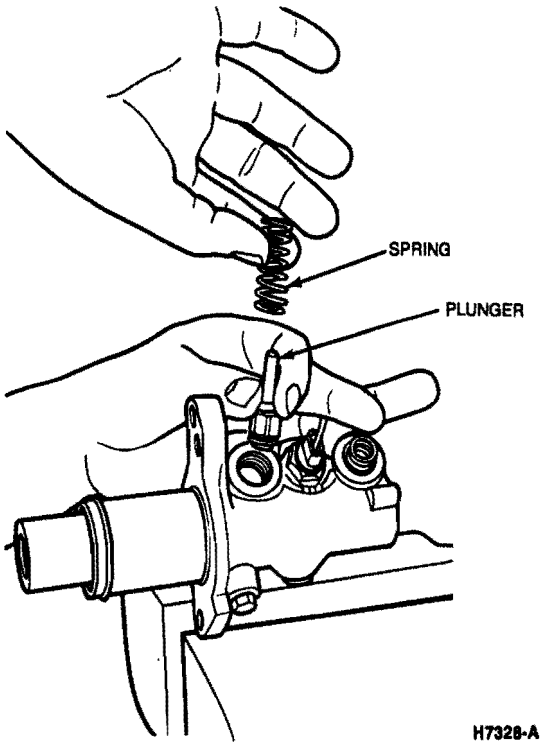
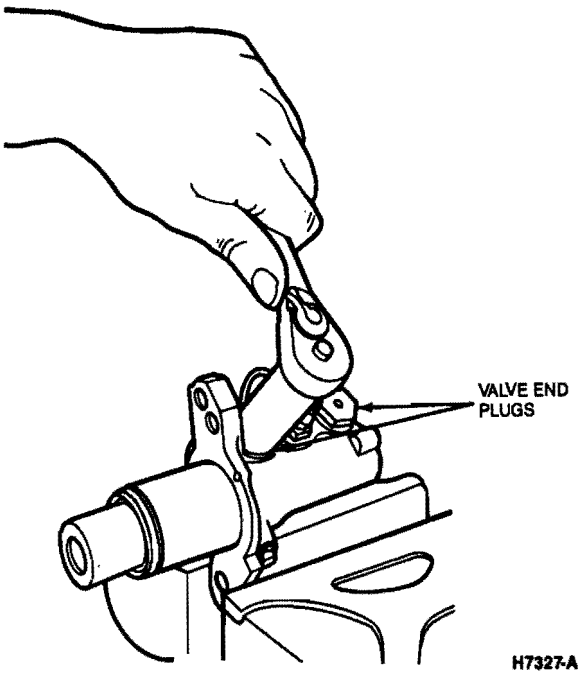
24. Install new internal and external O-rings on proportioning valve end plugs.
25. Lubricate plunger seals, install valve springs over plungers and position valves into cylinder bores.



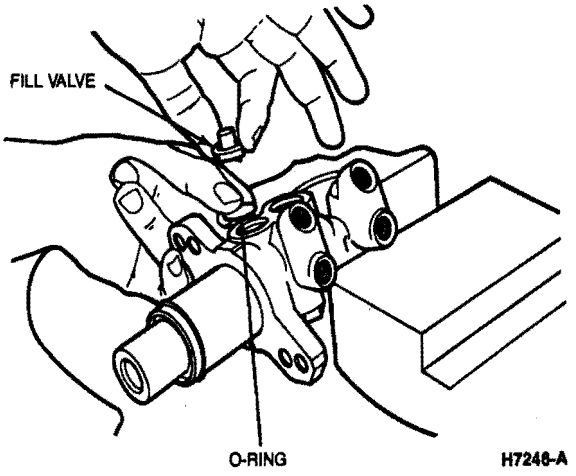
H7328-A

26. Install proportioning valve end plugs. Tighten to 23-27 N·m (17-20 lb-ft).



H7327-A

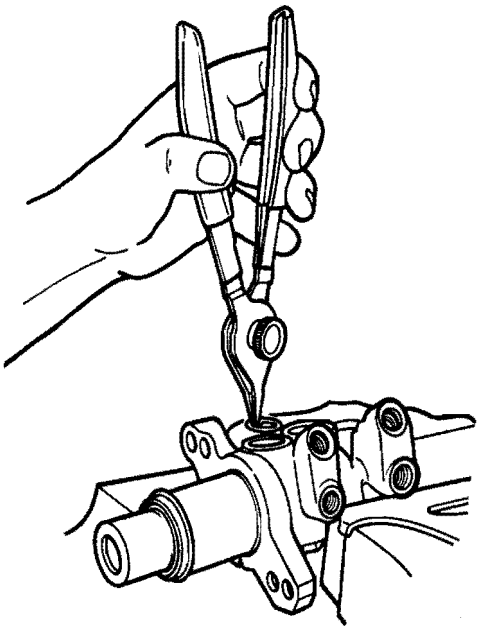
27. Install a new fill valve O-ring and new fast fill valve washer over a new fast fill valve. Install fast fill valve into port.



H7248-A

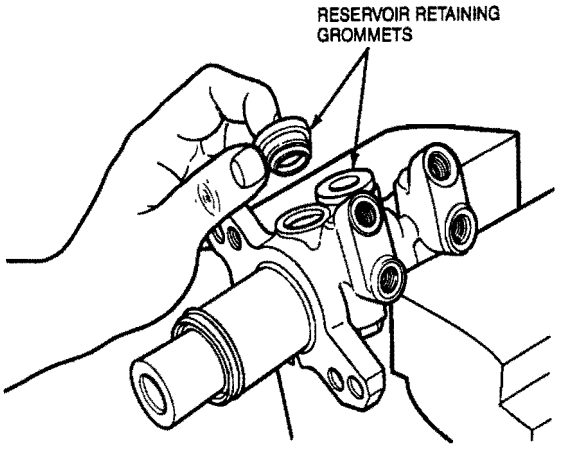
DISASSEMBLY AND ASSEMBLY (Continued)

28. Install fast fill valve retaining snap ring. Ensure snap ring is fully seated in the groove.



H7250-A

29. Lubricate new reservoir grommets and install into cylinder.



H7249-A

30. Install master cylinder brake reservoir.
31. Install a new cap insert into a new diaphragm and install cap.
32. Install master cylinder as outlined.

ADJUSTMENTS

Push Rod Length

NOTE: Push rod length is not adjustable. To ensure the master cylinder is free to return to its rest position with no residual pressure, verify stoplamp switch adjustment. Refer to Section 32-20.

Hydraulic System Bleeding

When any part of the brake hydraulic system has been disconnected for service, air will enter the system and cause spongy pedal action. To remove the air, the system must be bled using either pressure bleeding equipment Rotunda Brake Bleeder 104-00064 or equivalent, or the manual method. If only one system has been opened, normal pedal feel can usually be restored by bleeding only the opened system. This vehicle uses a diagonally split system. The left front and right rear are on one brake circuit, while the right front and left rear are on another brake circuit. When bleeding brakes, go to the rear brake first and then the front caliper on the same circuit. This will ensure that the longest line in either system is being bled first.

Manual Bleeding

1. Clean all dirt from the master cylinder filler cap.
2. If the master cylinder is known or suspected of having air in the bore, it must be bled before any of the calipers. To bleed the master cylinder, follow the procedures under System Priming.
3. To bleed the calipers, proceed as follows:
   a. Begin at the RH rear bleeder screw.
   b. Attach a rubber drain hose to the bleeder screw. The end of the tube should fit snugly around the end of the bleeder screw.
   c. Place the free end of the hose in a container partially filled with clean brake fluid.
   d. Have assistant apply and maintain pressure on the brake pedal.
   e. Loosen the bleeder screw approximately 3/4 turn. It is very important the helper maintain constant pressure on the pedal until the pedal drops all the way down and the bleeder screw is closed again. If pedal pressure is released, air will be drawn back into the system.
   f. Tighten the bleeder screw and release the brake pedal.
   g. Repeat this operation until the fluid is clear and air bubbles no longer appear at the submerged end of the rubber hose.
   h. Repeat these steps at the other calipers. Proceed to LH rear, RH front, then LH front. Maintain proper fluid level in reservoir at all times.
4. Top up brake fluid when bleeding is completed.

   NOTE: Never reuse brake fluid.

ADJUSTMENTS (Continued)

Pressure Bleeding

For pressure bleeding, use only diaphragm-type bleeder such as Rotunda Brake Bleeder 104-00064 or equivalent and follow the manufacturer's instructions.

System Priming

When a new master cylinder has been installed or the brake system emptied or partially emptied, fluid may not flow from the bleed screws during normal bleeding. It may be necessary to prime the system using the following procedure:

1. Using a tubing wrench, remove the brake lines from the master cylinder.
2. Install short brake lines in the master cylinder and position them so that they point back into the reservoir and the ends of the pipes are submerged in brake fluid.
3. Fill the reservoir with Heavy-Duty Brake Fluid C6AZ-19542-AA or equivalent.
4. Cover the reservoir with a shop towel.
5. Pump the brakes until clear, bubble-free fluid comes out of both brake lines. If any brake fluid spills on the paint, wash it off immediately with water.
6. Remove the short brake lines and reinstall the ones from the vehicle.
7. Bleed each brake line at the master cylinder using the following procedure:
   a. Have assistant pump the brake pedal 10 times and then hold firm pressure on the pedal.
   b. Crack the rearmost brake line fittings with a tubing wrench until a stream of brake fluid comes out. Have assistant maintain pressure on the brake pedal until the brake line fitting is tightened again.
   c. Repeat this operation until clear, bubble-free fluid comes out from around the tubing fitting.
   d. Repeat this bleeding operation at the front brake line fitting.
8. If any of the brake lines or calipers have been removed, it may be helpful to prime the system by gravity bleeding it. This should be done after the master cylinder is primed and bled.

   To prime the brake system:
   a. Fill the master cylinder with Heavy-Duty Brake Fluid C6AZ-19542-AA or equivalent.
   b. Loosen both rear caliper bleeder screws and leave them open until clear brake fluid flows out. Be sure to frequently check the reservoir fluid level and not let it run dry.
   c. Tighten the caliper bleeder screws.
   d. One at a time, loosen the front caliper bleeder screws. Leave the bleeder screw open until clear fluid flows out. Be sure to frequently check the reservoir level and not let it run dry.
   e. Tighten the bleeder screws.
9. After the master cylinder has been primed, the lines bled at the master cylinder, and the brake system primed, normal brake system bleeding can resume at each wheel.

Brake Tube Replacement

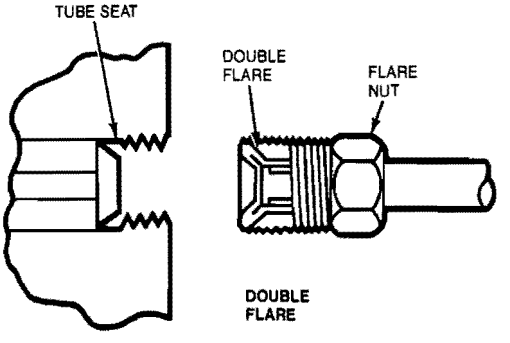
CAUTION: Never use copper tubing because copper is subject to fatigue, cracking, and corrosion which could result in brake failure. Use double-walled steel tubing only.

To replace a brake tube, use the following general procedure.

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

   NOTE: All tubing fittings used on this vehicle are metric.
2. Cut the tubing to length. Correct length may be determined by measuring the old tubing using a cord and then adding 3mm (1/8 inch) for each double flare.
3. Ensure the fittings are installed before starting a flare.
   - Double flare all tubing ends using suitable flaring tool. Follow instructions included in the tool set.

   NOTE: Double flaring tools must be used since single flaring tools cannot produce a flare strong enough to hold the necessary pressure.
4. Bend the new pipe assembly to match the old pipe by using a tubing bender. Clearance of 6mm (3/4 inch) must be maintained at all moving or vibrating parts.



SPECIFICATIONS

Description	Type	Diameter
Master Cylinder	Tandem, Integral Proportioning Valves	20.6mm (0.811 inch)
Front Caliper	Single Piston	50.8mm (2.0 inches)
Rear Caliper	Single Piston	30.2mm (1.19 inches)
Brake Booster Unit	Vacuum Diaphragm	228.6mm (9 inches)

CH6895-A

Description	Diameter	Wear Limit	Maximum Runout
Brake Disc, Front	18mm (0.71 inch)	16mm (0.63 inch)	0.01mm (.004 inch)
Brake Disc, Rear	10mm (0.39 inch)	9mm (0.35 inch)	0.01mm (.004 inch)

CH7353-A

Description		N·m	Lb-Ft
Master Cylinder Bracket		20-34	15-25
Slide Pin	Upper	16-25	12-18
	Lower	20-29	15-22
Knuckle to Torque Member		55-65	41-48
Flexible Hose to Caliper		22-29	16-22
Flare Nut		13-22	9-16

CH6896-A

SPECIAL SERVICE TOOLS

Tool Number	Description
D81L-1103-A	Brake Adjustment Gauge
TOOL-4201-C	Dial Indicator with Bracketry

ROTUNDA EQUIPMENT

Model	Description
007-00014	Radial Runout Gauge
021-00001	Brake Pedal Effort Gauge
104-00064	Brake Bleeder

SECTION 12-20 Brakes, Disc—Single Piston, Sliding Caliper—Front

VEHICLE APPLICATION

Capri.

DESCRIPTION

WARNING: CONTAINS ASBESTOS FIBERS. AVOID BREATHING DUST . BREATHING ASBESTOS DUST MAY CAUSE ASBESTOSIS AND CANCER.

BREATHING ASBESTOS DUST IS HAZARDOUS TO YOUR HEALTH.

DUST AND DIRT PRESENT ON WHEEL BRAKE AND CLUTCH ASSEMBLIES MAY CONTAIN ASBESTOS FIBERS THAT ARE HAZARDOUS TO YOUR HEALTH WHEN MADE AIRBORNE BY CLEANING WITH COMPRESSED AIR OR BY DRY BRUSHING.

WHEEL BRAKE ASSEMBLIES AND CLUTCH FACINGS SHOULD BE CLEANED USING A VACUUM CLEANER RECOMMENDED FOR USE WITH ASBESTOS FIBERS. DUST AND DIRT FROM THE VACUUM SHOULD BE DISPOSED OF IN A MANNER THAT PREVENTS DUST EXPOSURE, SUCH AS SEALED BAGS. THE BAG MUST BE LABELED PER OSHA INSTRUCTIONS AND THE TRASH HAULER NOTIFIED AS TO THE BAG'S CONTENTS.

IF A VACUUM SUITABLE FOR ASBESTOS IS NOT AVAILABLE, CLEANING SHOULD BE DONE WET. IF DUST GENERATION IS STILL POSSIBLE, TECHNICIANS SHOULD WEAR GOVERNMENT-APPROVED TOXIC DUST PURIFYING RESPIRATORS.

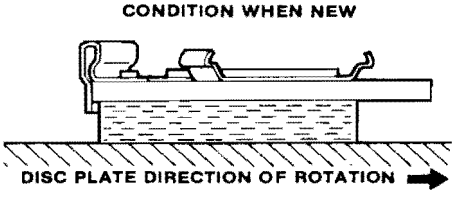
GRINDING OR SANDING ON BRAKE LININGS, PADS, ROTORS, DRUMS OR CLUTCH FACINGS SHOULD BE DONE ONLY WHILE USING PROPERLY EXHAUST-VENTILATED EQUIPMENT.

OSHA REQUIRES AREAS WHERE ASBESTOS DUST GENERATION IS POSSIBLE TO BE ISOLATED AND POSTED WITH WARNING SIGNS. ONLY TECHNICIANS CONCERNED WITH PERFORMING BRAKE OR CLUTCH SERVICE SHOULD BE PRESENT IN THE AREA.

Front braking is provided by a single piston, floating caliper, and disc brakes. The caliper slides on hollow, stainless steel guide pin bushings. Caliper bolts attach the guide pin bushings and the caliper to the anchor plate. The pads are held in the caliper by two pins and may be replaced without removing the caliper.

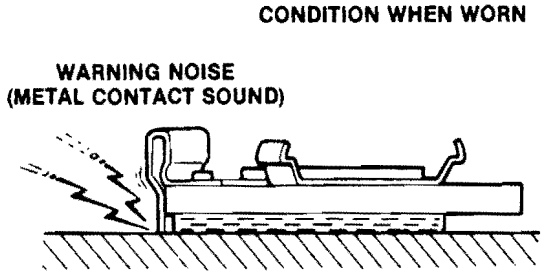
Brake Pads

The brake pads are equipped with a wear indicator that will make a squealing noise when the pads are worn. This is a warning to service the brakes before any rotor damage occurs.

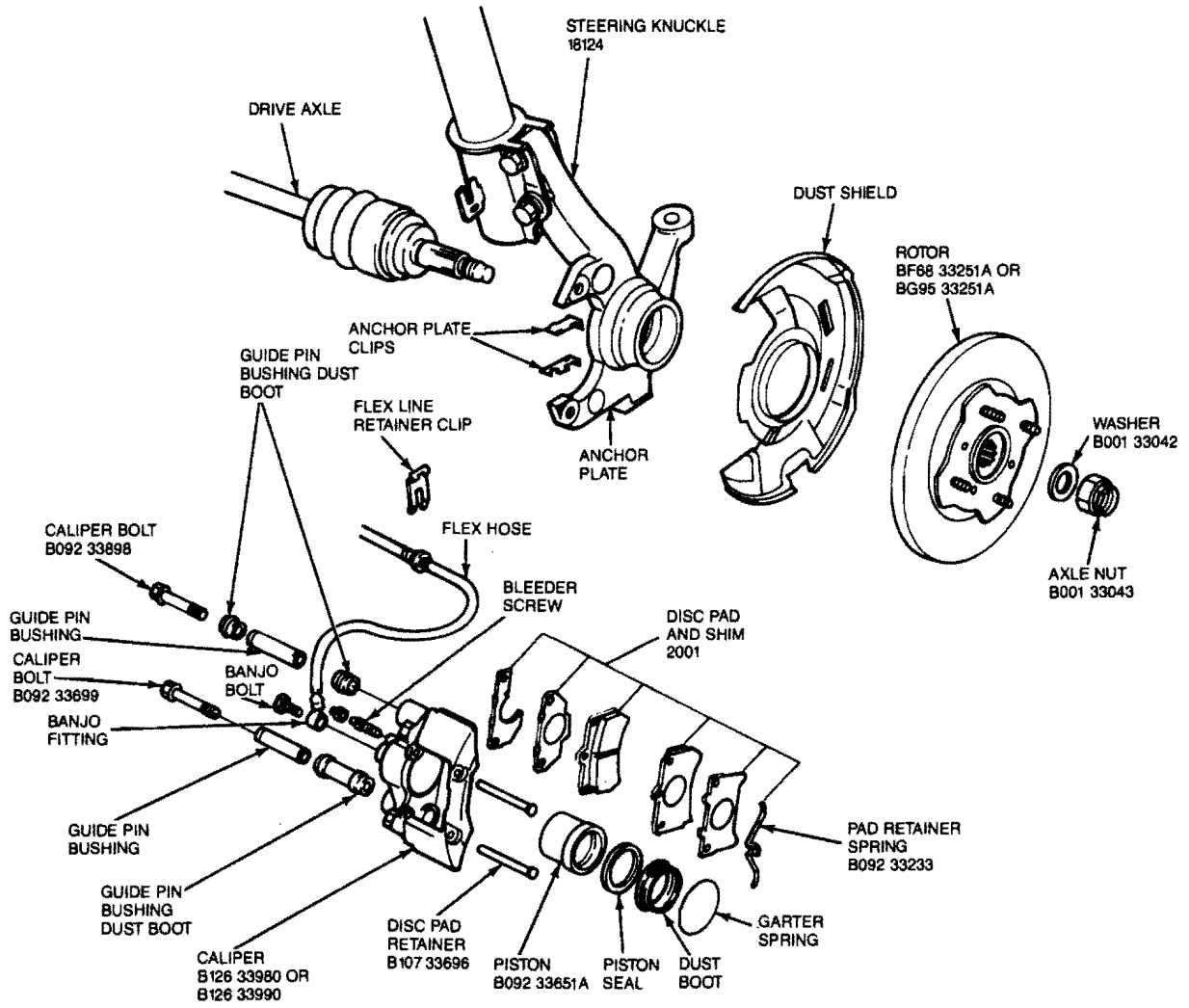


H5354-A

DESCRIPTION (Continued)



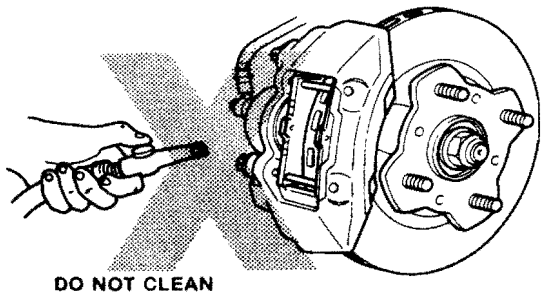
H5355-A



H7364-A

DESCRIPTION (Continued)

When servicing the brake system, clean all metal parts with isopropyl alcohol. Then, clean out and dry grooves and passageways with compressed air. Make sure caliper bore and component parts are thoroughly clean.



H5331-A

Check cylinder bore and piston for damage or excessive wear.

CAUTION: Do not use denatured alcohol for flushing system or cleaning assemblies where alcohol could be trapped and subsequently contaminate brake fluid. Contaminated fluid may cause eventual failure of rubber components in the system.

REMOVAL AND INSTALLATION

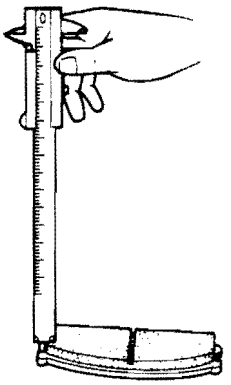
Service Precautions

1. Grease or any other foreign material must be kept off lining surfaces and braking surfaces of rotor, and external surfaces of hub during service operation. In handling rotor and caliper assemblies, avoid deformation, nicking or scratching of brake linings and rotor.
2. If a caliper piston is removed for any reason, piston seal and dust boot must be replaced. Exercise care not to damage plastic piston by protecting it from contact with any metal or sharp-edged objects.
3. During removal and installation of a wheel assembly, exercise care not to interfere with, or damage caliper splash shield, if so equipped, or the bleeder screw fitting.
4. Vehicle must be centered on hoist before servicing any front end components to avoid bending or damaging rotor splash shield, if so equipped, on full right or left wheel turns.
5. Do not attempt to clean or restore oil or grease-soaked brake linings. When contaminated linings are found, brake linings must be replaced in complete axle sets and rotor braking surfaces wiped clean.
6. Calipers must be installed with bleed screws in upward position for proper purging of air from the front brake system during bleeding.

Brake Pads

NOTE: Whenever servicing brake pads, inspect the pads for the following:

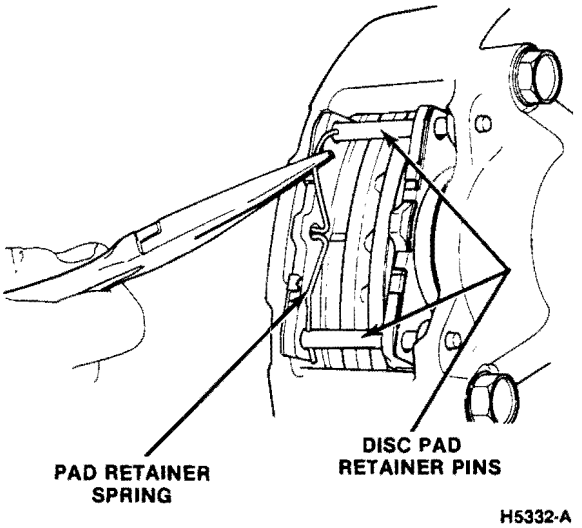
- Oil or grease on the face.
- Abnormal wear or cracking.
- Deterioration or damage due to heat.
- Minimum thickness of 3mm (.12 inch) or greater.



H5356-A

Removal

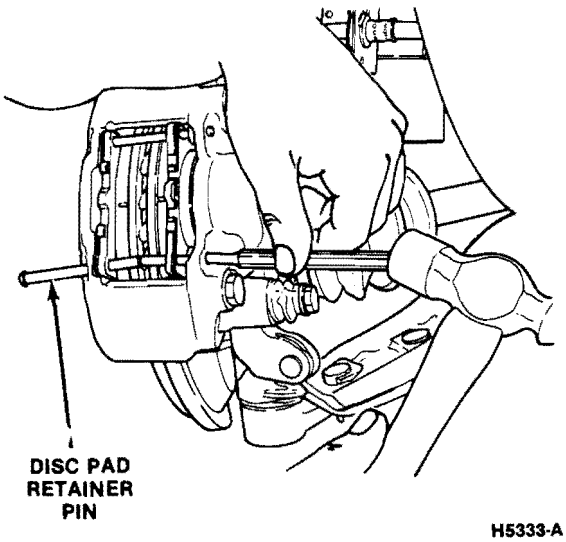
1. Remove approximately two-thirds of the brake fluid from the master cylinder.
2. Remove wheel and tire assembly.
3. Using a pair of needle nose pliers, remove the pad retainer spring that locks in the disc pad retainer pins.



H5332-A

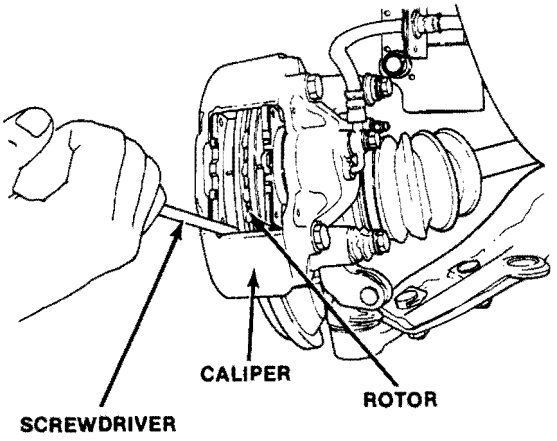
REMOVAL AND INSTALLATION (Continued)

4. Remove the disc pad retainer pins using a hammer and pin punch.



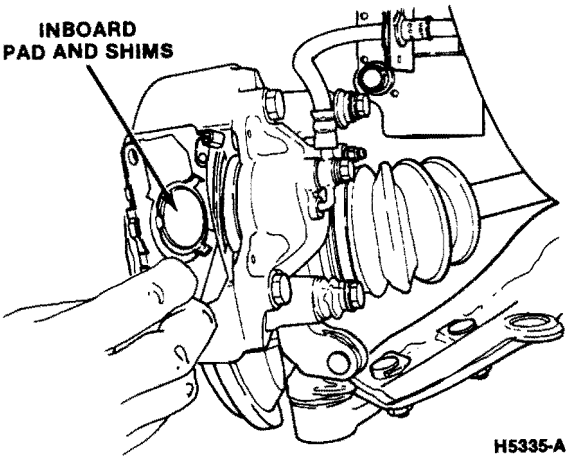
H5333-A

5. Using a screwdriver, pry the caliper outboard and remove the outboard brake pad and shim. Tag the shims so they can be installed in their original position.



H5334-A

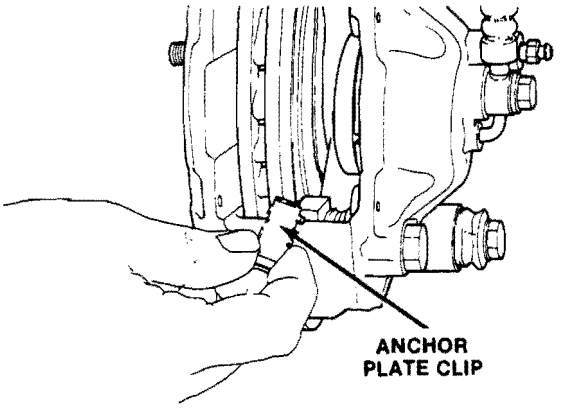
6. Push the caliper inboard with one hand and remove the inboard brake shoe and shims with the other hand.



H5335-A

CAUTION: Use care to prevent damage to the caliper piston dust boot.

7. Remove the anchor plate clips from the caliper anchor plate. Attach tape to the anchor plate clips and label "top" and "bottom".



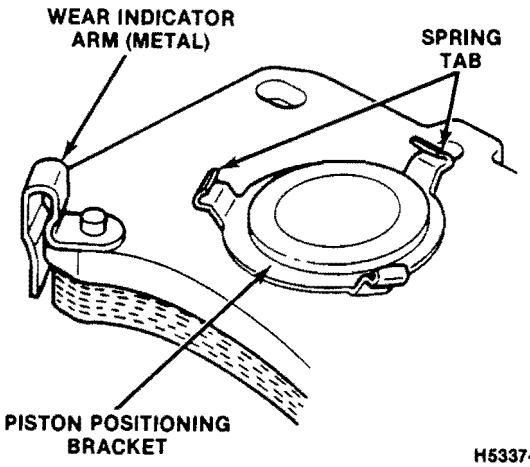
H5336-A

Installation

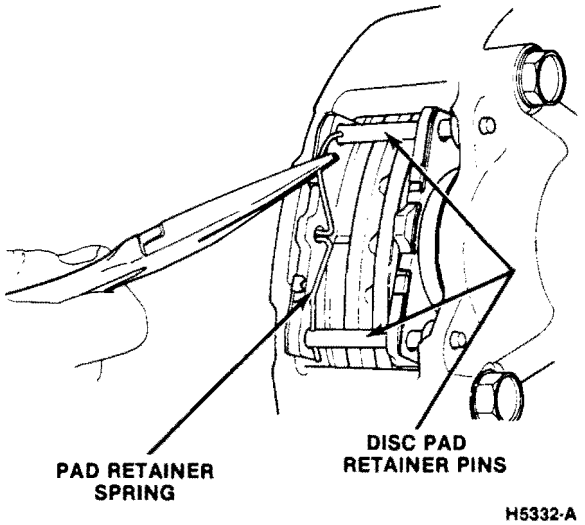
1. Install the anchor plate clips. If they are not installed in their original locations, the locating tabs may contact the rotor.
2. Push the caliper inboard and install the inboard brake pad and shims.

REMOVAL AND INSTALLATION (Continued)

CAUTION: Make sure the spring tabs on the back of the brake pad are properly aligned and fully seated in the caliper piston.



3. Pry the caliper outboard. Install the outboard brake pad and shim.
4. Install the brake shoe retaining pins.
5. Install the retaining spring.

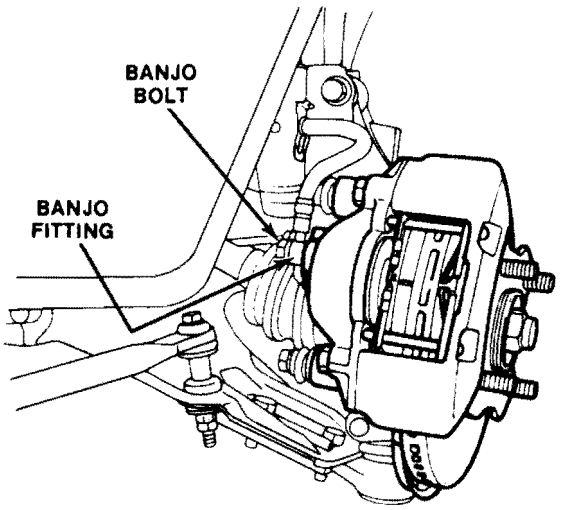


6. Install the wheel and tire assembly. Tighten retaining nuts to 90-120 N·m (65-88 lb-ft).
7. Pump the brake pedal several times to seat the brake pads.
8. If necessary correct the level of the brake fluid in the master cylinder.

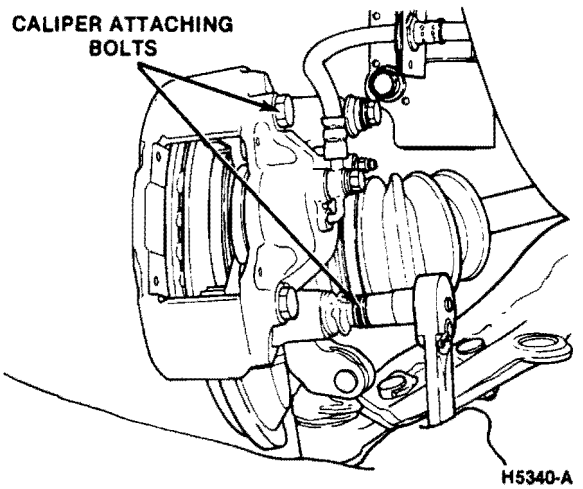
Caliper

Removal

1. Remove the wheel and tire assembly.
2. Remove the brake pads as outlined.
3. Remove the banjo bolt attaching the brake flex hose to the caliper.



4. Remove the two copper washers that seal the flex hose banjo fitting, and discard.
5. Remove the caliper retaining bolts.
6. Lift the caliper off the rotor.

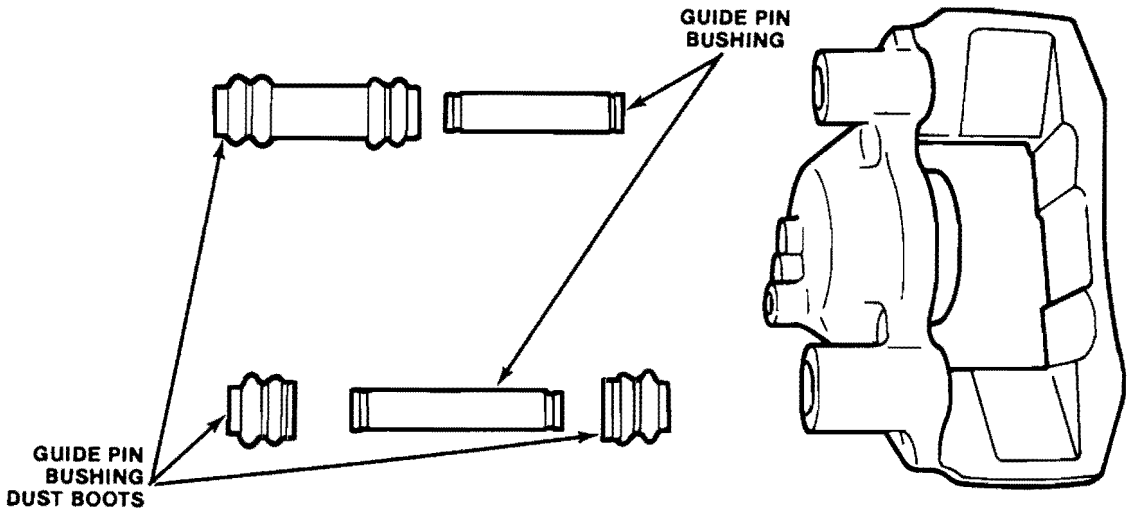


Installation

1. Before installing the caliper, remove the guide pin bushing dust boots and push out the caliper guide pin bushings.
2. Lubricate the guide pin bushings with Disc Brake Caliper Slide Grease D7AZ-19590-A or equivalent, and install them in the caliper. Install the guide pin bushing dust boots.
3. Position the caliper over the rotor.

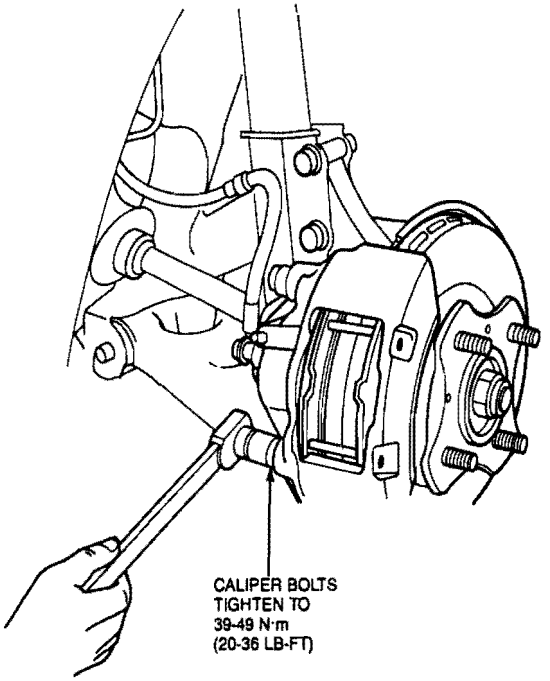
REMOVAL AND INSTALLATION (Continued)

NOTE: To provide the necessary clearance it may be necessary to pull outward slightly on the caliper bushings.



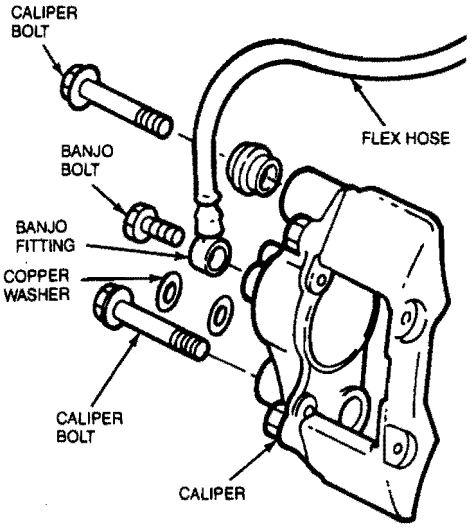
H5341-A

4. Install the caliper retaining bolts. Tighten to 39-49 N·m (29-36 lb-ft).



H7239-A

5. Install two new copper washers and the banjo bolt on the flex hose banjo fitting.



H7365-A

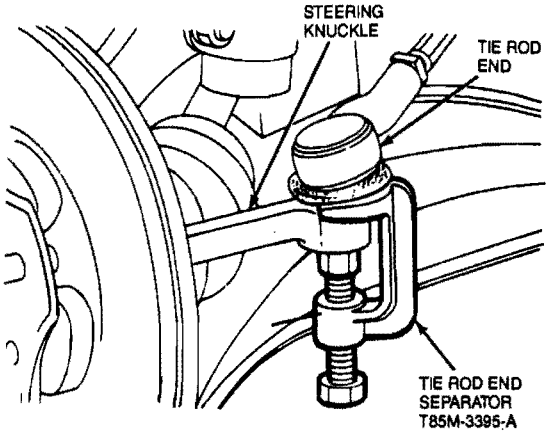
6. Position the flex hose on the caliper and install the banjo bolt. Tighten to 22-29 N·m (17-21 lb-ft).
7. Install brake pads and shims as outlined.
8. Bleed the front brakes either manually or with a pressure bleeder such as Rotunda Brake Bleeder 104-00064 or equivalent. Refer to Section 12-01.
9. Install wheel and tire assembly. Tighten retaining nuts to 90-120 N·m (65-88 lb-ft).

REMOVAL AND INSTALLATION (Continued)

Rotor

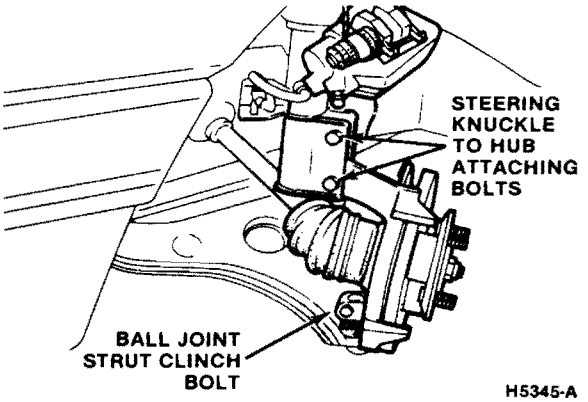
Removal

1. Remove wheel and tire assembly.
2. Using a cape chisel, unstake and remove halfshaft retaining nut and washer. Discard nut; do not reuse. Refer to Section 11-10.
3. Remove brake pads and caliper from the steering knuckle as outlined. Support the caliper by a wire strung from the coil spring. Do not disconnect the brake line from the caliper.
4. Using Tie Rod End Separator, T85M-3395-A or equivalent, disconnect the tie rod end from the steering knuckle.



H7339-A

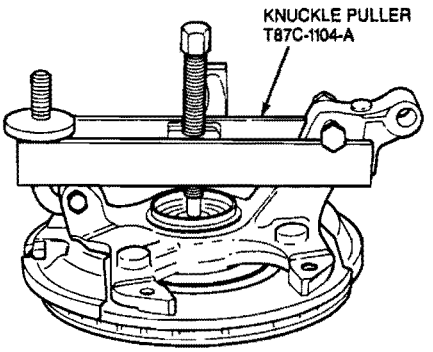
5. Remove ball joint pinch bolt. Separate control arm from steering knuckle. Refer to Section 14-10.
6. Remove steering knuckle to strut assembly retaining bolts.



H5345-A

7. Remove the rotor and hub assembly from the steering knuckle using Knuckle Puller T87C-1104-A and Step Plate D80L-630-3 or equivalent.

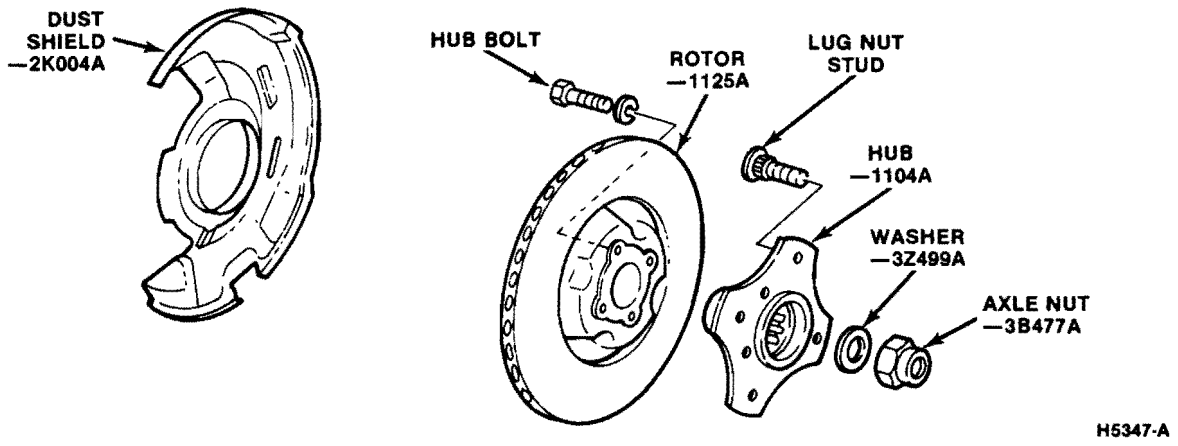
   NOTE: The dust shield is pressed onto the steering knuckle. If the bearings are not being serviced, leave the dust shield attached to the knuckle.



H6877-A

8. Remove rotor from hub.

REMOVAL AND INSTALLATION (Continued)



Installation

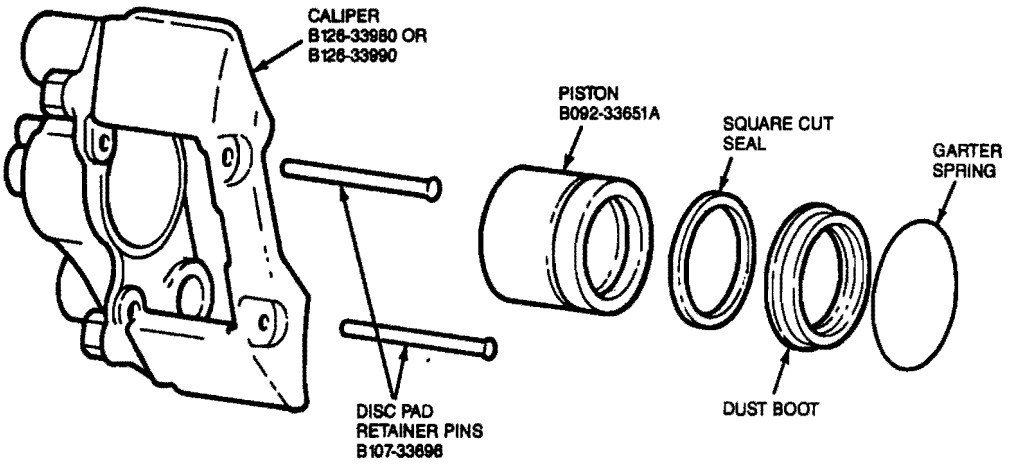
1. Install rotor to the hub. Tighten retaining bolts to 44-54 N·m (33-39 lb-ft).
2. Press the hub and rotor assembly into the steering knuckle. Refer to Section 11-10.
3. Position the steering knuckle on the MacPherson strut and install the retaining bolts. Tighten bolts to 93-117 N·m (69-86 lb-ft).
4. Raise the lower control arm and position the lower ball joint stud in the steering knuckle. Install the ball joint pinch bolt. Tighten to 43-54 N·m (32-39 lb-ft). Refer to Section 14-10.
5. Install caliper and brake pads as outlined.
6. Install new halfshaft retaining nut. Tighten to 157-235 N·m (116-174 lb-ft).
7. Install wheel and tire assembly. Tighten retaining nuts to 90-120 N·m (65-88 lb-ft).

DISASSEMBLY AND ASSEMBLY

NOTE: The caliper bore, piston seal groove and piston must be inspected for cuts, deep scratches and pitting whenever the caliper is rebuilt. The piston and bore may be lightly polished with crocus cloth but if deep scratches remain, they must be replaced. The seal groove in the caliper must be free of deep scratches that would prevent the seal from working properly.

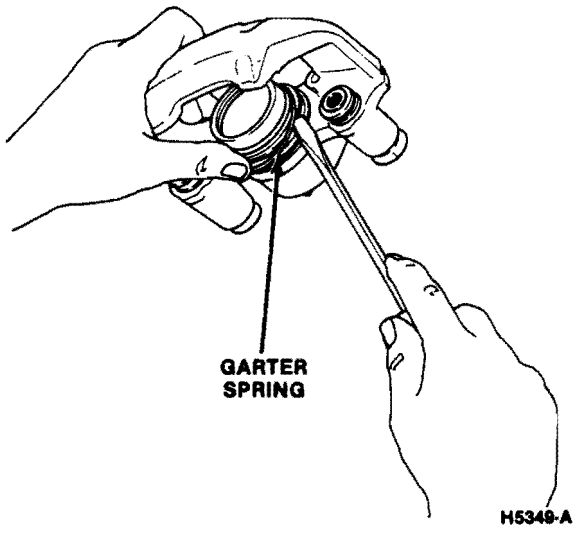
DISASSEMBLY AND ASSEMBLY (Continued)

Caliper



Disassembly

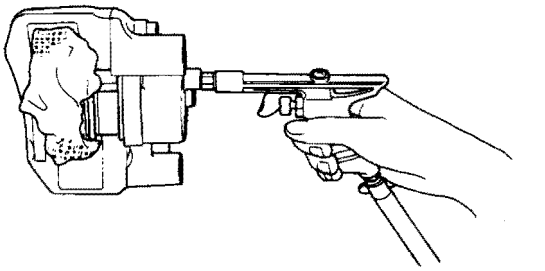
1. Open the bleeder screw and drain the brake fluid from the caliper through the brake hose fitting. Close the bleeder screw.
2. Remove brake pads and shims as outlined.
3. Remove the caliper as outlined.
4. Remove the caliper guide bushing and dust boots.
5. Pry the garter spring off the dust boot with a screwdriver.



6. Position a wood block, or a roll of shop towels between the piston and caliper.

WARNING: DO NOT USE AN EXCESSIVE AMOUNT OF AIR PRESSURE TO REMOVE THE PISTON. EXCESSIVE PRESSURE CAN FORCE THE PISTON OUT OF THE CALIPER BORE WITH ENOUGH FORCE TO CAUSE PERSONAL INJURY. NEVER ATTEMPT TO CATCH THE PISTON BY HAND AS IT COMES OUT OF ITS BORE.

7. To remove the piston, apply air pressure through the brake hose fitting.



NOTE: Apply only enough air pressure to ease the piston out of the caliper.

8. Remove the dust boot and discard.
9. Remove the piston seal from the caliper and discard.

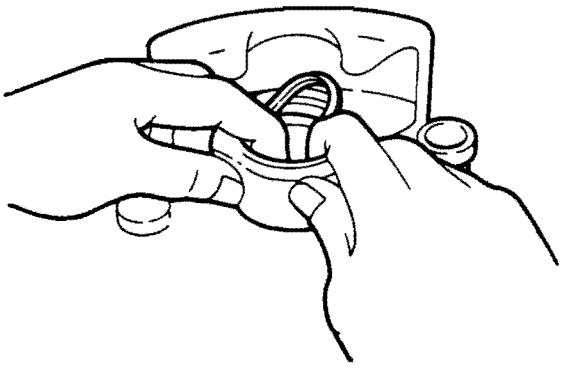
CAUTION: Use a plastic or wooden pick to remove the seal. A metal tool can scratch or nick the seal groove resulting in a possible seal leak.

DISASSEMBLY AND ASSEMBLY (Continued)

Assembly

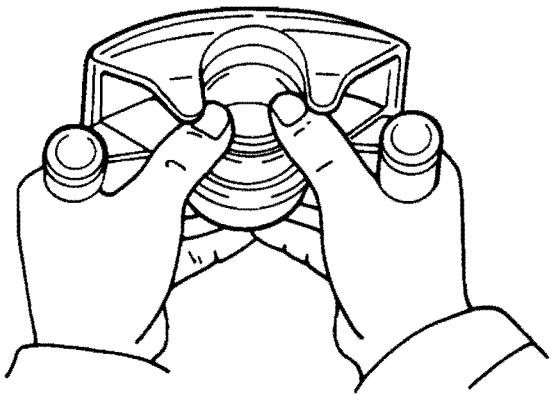
1. Lubricate a new piston seal with brake fluid and install the seal in the caliper groove. Lubricate the caliper bore and the piston with brake fluid.

   CAUTION: Be sure the seal does not become twisted and that it is firmly seated in the caliper bore.



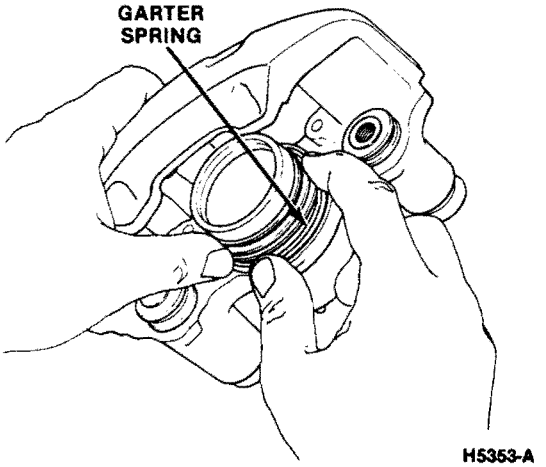
H5351-A

2. Install the dust boot on the piston and slide the dust boot into its groove.
3. Install the piston in the caliper bore and push it down into the bottom of the bore with a gentle rocking motion.



H5352-A

4. Slide the dust boot over the boss on the caliper bore and install the wire garter spring.



H5353-A

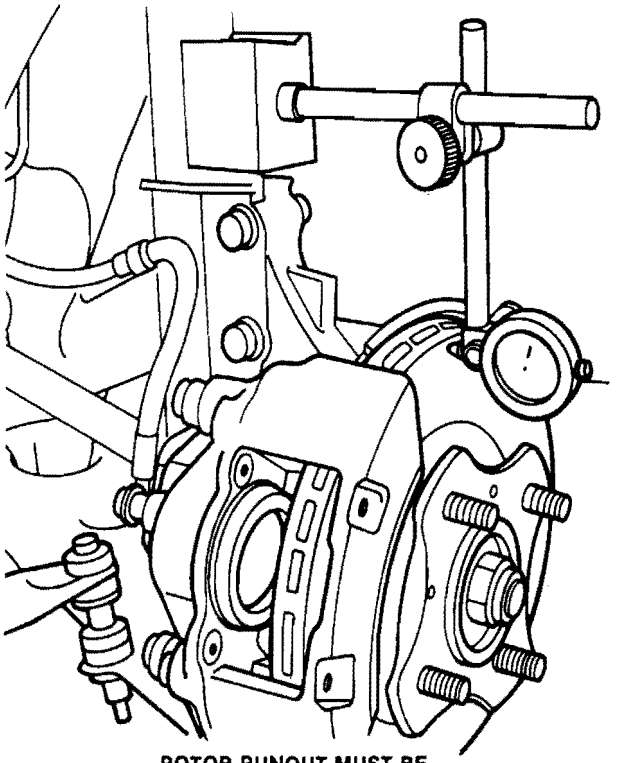
5. Install the caliper bushings and bushing boots.
6. Install the caliper on the anchor plate.
7. Install the caliper retaining bolts and tighten to 39-49 N·m (29-36 lb-ft).
8. Install the anchor plate clips, brake pads, shims, retainer pins and spring retainer as outlined.
9. Bleed the front brakes either manually or with a pressure bleeder, such as Rotunda Brake Bleeder 104-00064 or equivalent. Refer to Section 12-01.
10. Pump the brake pedal several times to seat the pads.
11. Check master cylinder reservoir and add fluid if needed.
12. With the transmission shift lever in the NEUTRAL position, spin each rotor to make sure the brakes are not dragging.
13. Install both front tire and wheel assemblies. Tighten retaining nuts to 90-120 N·m (65-88 lb-ft).

OVERHAUL

Any time brake service is performed, the rotor must be visually inspected to check for any abnormal wear, and checked with a micrometer to make sure the thickness is within specification. Minimum thickness for the rotor is 16mm (0.630 inch).

OVERHAUL (Continued)

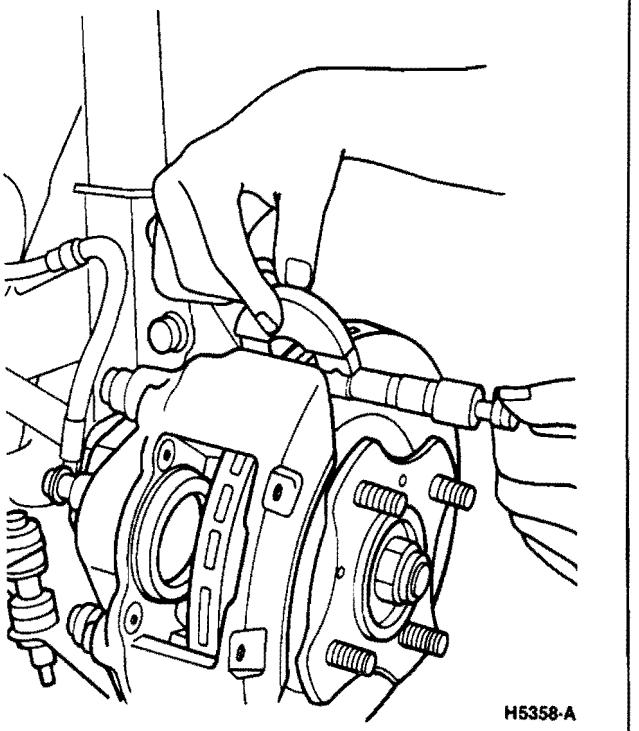
If the owner has complained of a pulsating brake pedal, the rotor must be checked for runout (warped rotor) and parallelism (thickness variation). Rotor runout is checked by mounting a magnetic based Dial Indicator D78P-4201-B or equivalent on the strut and measuring the rotor. Rotor runout cannot be more than 0.1mm (0.004 inch).



ROTOR RUNOUT MUST BE LESS THAN .1 mm (.004 in) H5357-A

NOTE: There must be no wheel bearing free play when checking brake rotor runout. Measure rotor runout at the outermost diameter of the contact surface of disc pads.

Parallelism is checked by measuring the rotor thickness in several places with a micrometer. Rotor thickness variation must not vary more than 0.025mm (0.001 inch). Rotors that are not within specification must be replaced.



H5358-A

Brake Rotor Refinishing

If there are just surface irregularities, the rotor may be resurfaced by lightly sanding the face with fine emery cloth as follows:

1. Remove the wheel and tire assembly.
2. Remove the caliper and support it by wire as outlined.
3. Lightly sand both sides of the rotor. The back side of the rotor can be sanded at the anchor plate where the caliper normally rides. If scratches or scoring exceed 0.22mm (0.009 inch) the rotor must be resurfaced.

If the rotor has deep scratches or grooves, rotor runout (warped rotor) or incorrect parallelism (thickness variation), it must be resurfaced off the vehicle on a brake drum / rotor lathe as follows:

1. Remove the wheel and tire assembly.
2. Remove the caliper and support it by a wire as outlined.
3. Remove the rotor from the vehicle as outlined.
4. Resurface the rotor on a rotor lathe. Follow the manufacturer's instructions for the rotor refinishing equipment being used.

   NOTE: The rotor must be machined while it is bolted to the hub. The rotor and hub are mounted as an assembly on the rotor lathe, and then the rotor is turned. Machining the rotor separately and then bolting it back on to the hub may cause rotor runout.

OVERHAUL (Continued)

Minimum Thickness

Brake rotor minimum thickness is stamped on each rotor. This is the thickness at which the rotor becomes unsafe to use. The discard thickness is 16mm (0.630 inch). To find the minimum thickness to which the rotor can be machined, add 0.762mm (0.030 inch) to the minimum thickness, 16mm (0.630 inch) discard limit marked on the rotor. This 16.762mm (0.660 inch) machining limit allows for rotor wear after it has been resurfaced and returned to use.

If the thickness of the rotor is less than the minimum thickness, discard the rotor and install a new one.

Machining a rotor thinner than the machining limit could permit the rotor to wear past the safe discard point before the lining wears out. It may also result in severe overheating and fade because the thin rotor may be unable to absorb the heat generated during braking.

SPECIFICATIONS

TORQUE SPECIFICATIONS

Description	Nm	Lb-Ft
Caliper Retaining Bolts	39-49	29-36
Banjo Bolt	22-29	17-21
Rotor-to-Hub Bolts	44-54	33-39
Knuckle-to-Strut Bolts	93-117	69-86
Knuckle-to-Lower Ball Joint Bolt	43-54	32-39
Wheel Retaining Nuts	90-120	65-88
Halfshaft Retaining Nuts	157-235	116-174

SPECIAL SERVICE TOOLS

Tool Number	Description
T85M-3395-A	Tie Rod End Separator
T87C-1104-A	Knuckle Puller
D80L-630-3	Step Plate
D78P-4201-B	Dial Indicator

ROTUNDA EQUIPMENT

Model	Description
091-00001	Brake and Clutch Service Vacuum
104-00064	Brake Bleeder

SECTION 12-25 Brakes, Disc—Single Piston, Sliding Caliper—Rear

VEHICLE APPLICATION

Capri.

DESCRIPTION

WARNING: CONTAINS ASBESTOS FIBERS. AVOID BREATHING DUST. BREATHING ASBESTOS DUST MAY CAUSE ASBESTOSIS AND CANCER.

BREATHING ASBESTOS DUST IS HAZARDOUS TO YOUR HEALTH.

DUST AND DIRT PRESENT ON WHEEL BRAKE AND CLUTCH ASSEMBLIES MAY CONTAIN ASBESTOS FIBERS THAT ARE HAZARDOUS TO YOUR HEALTH WHEN MADE AIRBORNE BY CLEANING WITH COMPRESSED AIR OR BY DRY BRUSHING.

WHEEL BRAKE ASSEMBLIES AND CLUTCH FACINGS SHOULD BE CLEANED USING A VACUUM CLEANER RECOMMENDED FOR USE WITH ASBESTOS FIBERS. DUST AND DIRT FROM THE VACUUM SHOULD BE DISPOSED OF IN A MANNER THAT PREVENTS DUST EXPOSURE, SUCH AS SEALED BAGS. THE BAG MUST BE LABELED PER OSHA INSTRUCTIONS AND THE TRASH HAULER NOTIFIED AS TO THE BAG'S CONTENTS.

IF A VACUUM SUITABLE FOR ASBESTOS IS NOT AVAILABLE, CLEANING SHOULD BE DONE WET. IF DUST GENERATION IS STILL POSSIBLE, TECHNICIANS SHOULD WEAR GOVERNMENT-APPROVED TOXIC DUST PURIFYING RESPIRATIORS.

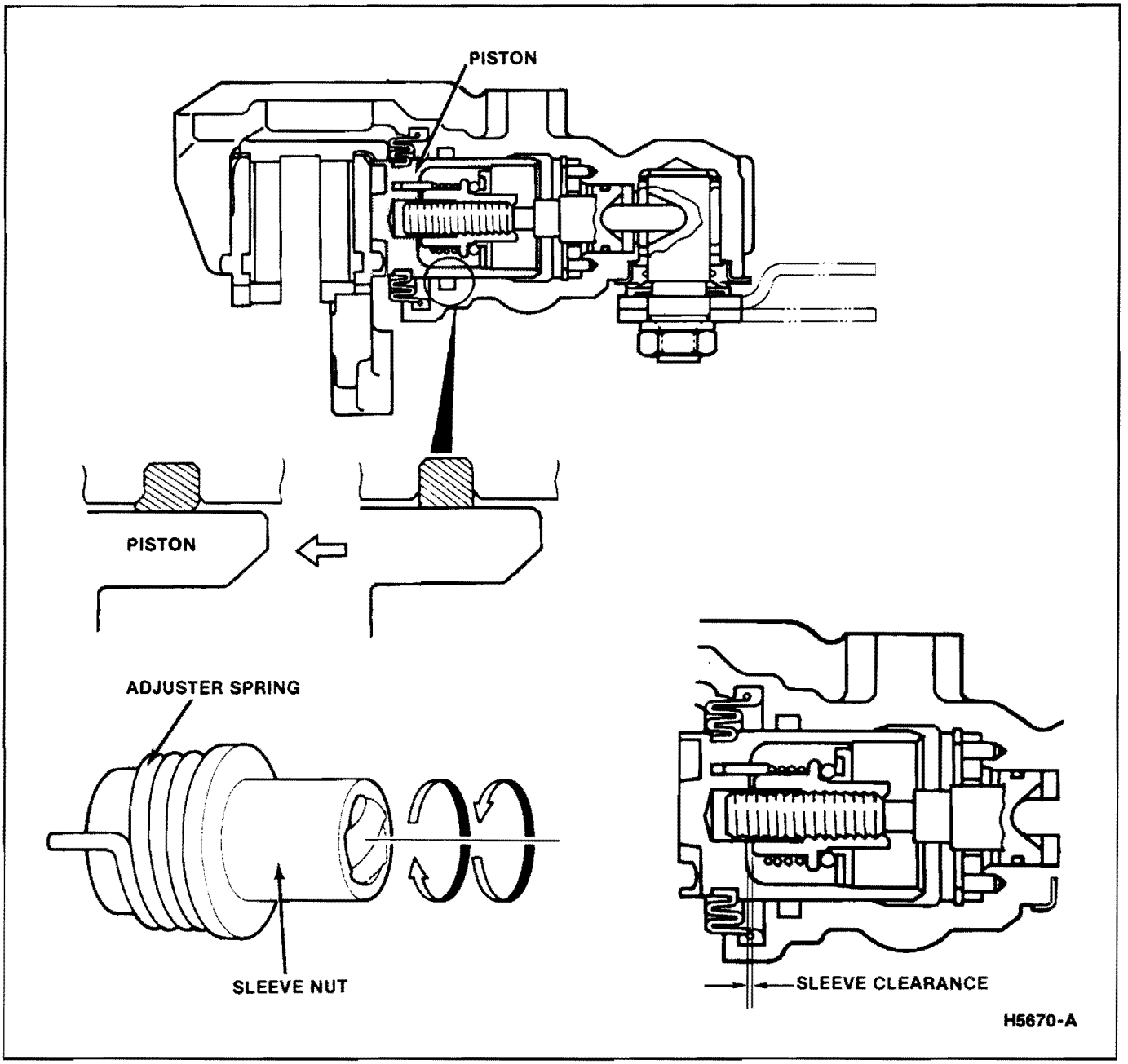
GRINDING OR SANDING ON BRAKE LININGS, PADS, ROTORS, DRUMS OR CLUTCH FACINGS SHOULD BE DONE ONLY WHILE USING PROPERLY EXHAUST-VENTILATED EQUIPMENT.

OSHA REQUIRES AREAS WHERE ASBESTOS DUST GENERATION IS POSSIBLE TO BE ISOLATED AND POSTED WITH WARNING SIGNS. ONLY TECHNICIANS CONCERNED WITH PERFORMING BRAKE OR CLUTCH SERVICE SHOULD BE PRESENT IN THE AREA.

Rear braking is provided by a single piston, floating caliper, and disc brakes. The caliper slides on a hollow, stainless steel guide pin in bushings.

A caliper bolt attaches the lower guide pin bushing and the caliper to the anchor plate. The pads are held in place by the caliper and the anchor plate.

DESCRIPTION (Continued)



During normal operation, hydraulic pressure from the master cylinder pushes the piston forward and applies pressure on the inboard brake pad. This pressure also causes the caliper to slide inboard on the upper guide pin and lower guide pin bushing. As the brakes are applied, the square cut piston seal distorts.

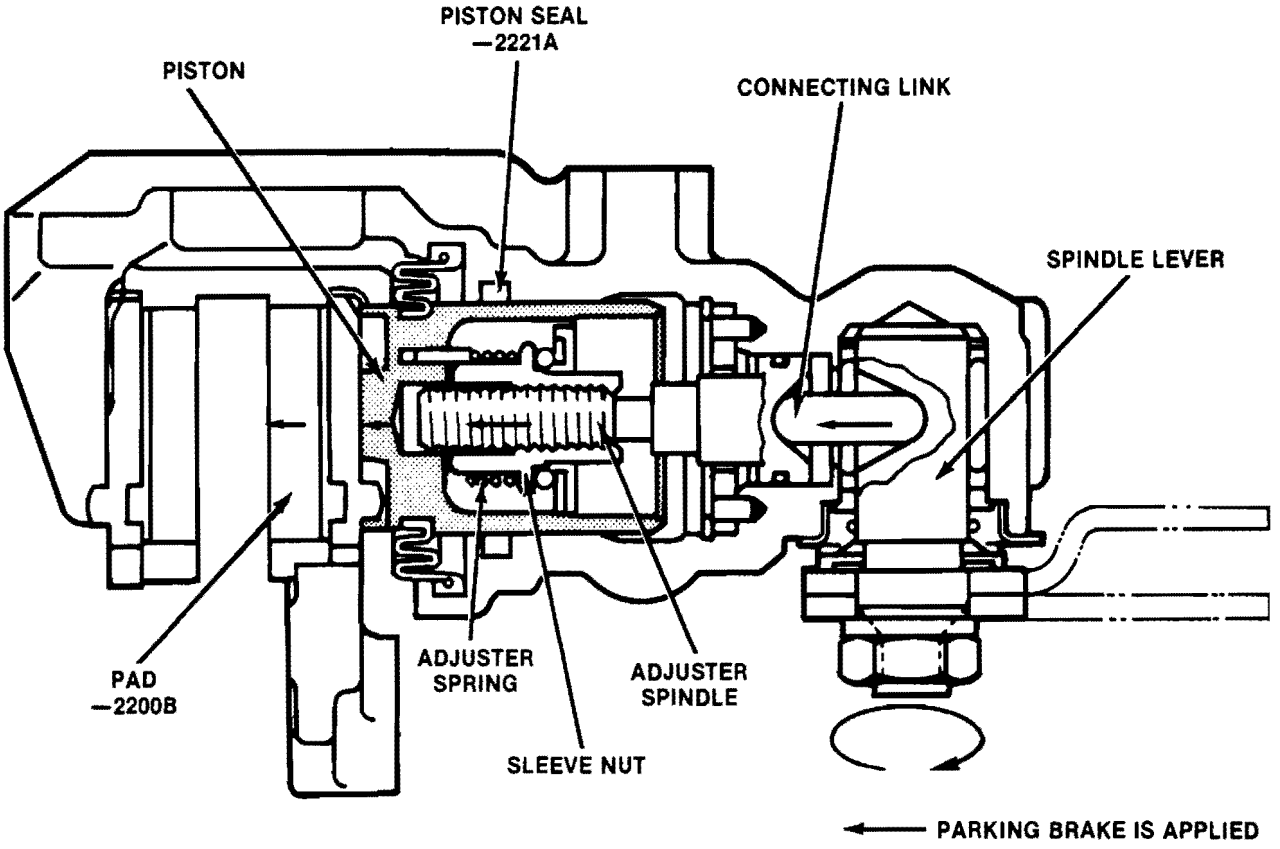
When the brake pedal is released, the square cut seal returns the piston to normal position. If the piston travels no further than the square cut seal can return it, no self-adjustment takes place.

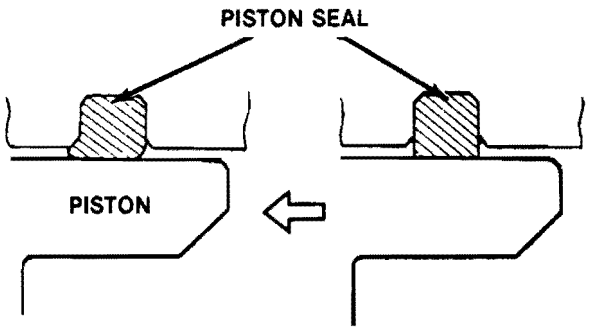
But if the movement of the piston is greater than the deformation limit of the square cut piston seal, the piston and sleeve nut will travel on the threads of the spindle. This is because the loosened adjuster spring allows the sleeve nut to rotate. When the brake pedal is released, the piston returns to the amount the square cut seal was deformed, but does not return to its original position. This is because the tightened adjuster spring does not allow the sleeve nut to rotate and travel on the thread. The piston can adjust outward from the caliper housing but it cannot move inward.

DESCRIPTION (Continued)

Brakes, Parking

When the parking brake lever is applied inside the vehicle, the parking brake cable then moves the caliper mounted parking brake lever or "spindle lever." This causes force to be applied to the connecting link, which then pushes the piston against the inboard pad. The pressure of the piston against the inboard pad causes the caliper to slide on the upper guide pin and lower guide pin sleeve thereby applying pressure to the outboard pad. As the piston moves outward in the caliper housing, it causes the square cut piston seal to distort. When the parking brake lever is released, the square cut seal returns the piston to normal position and releases the brakes.





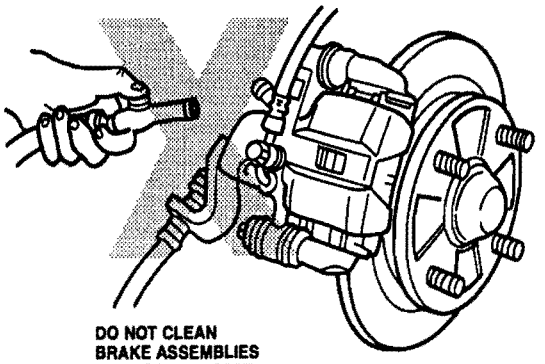
H5871-A

DESCRIPTION (Continued)

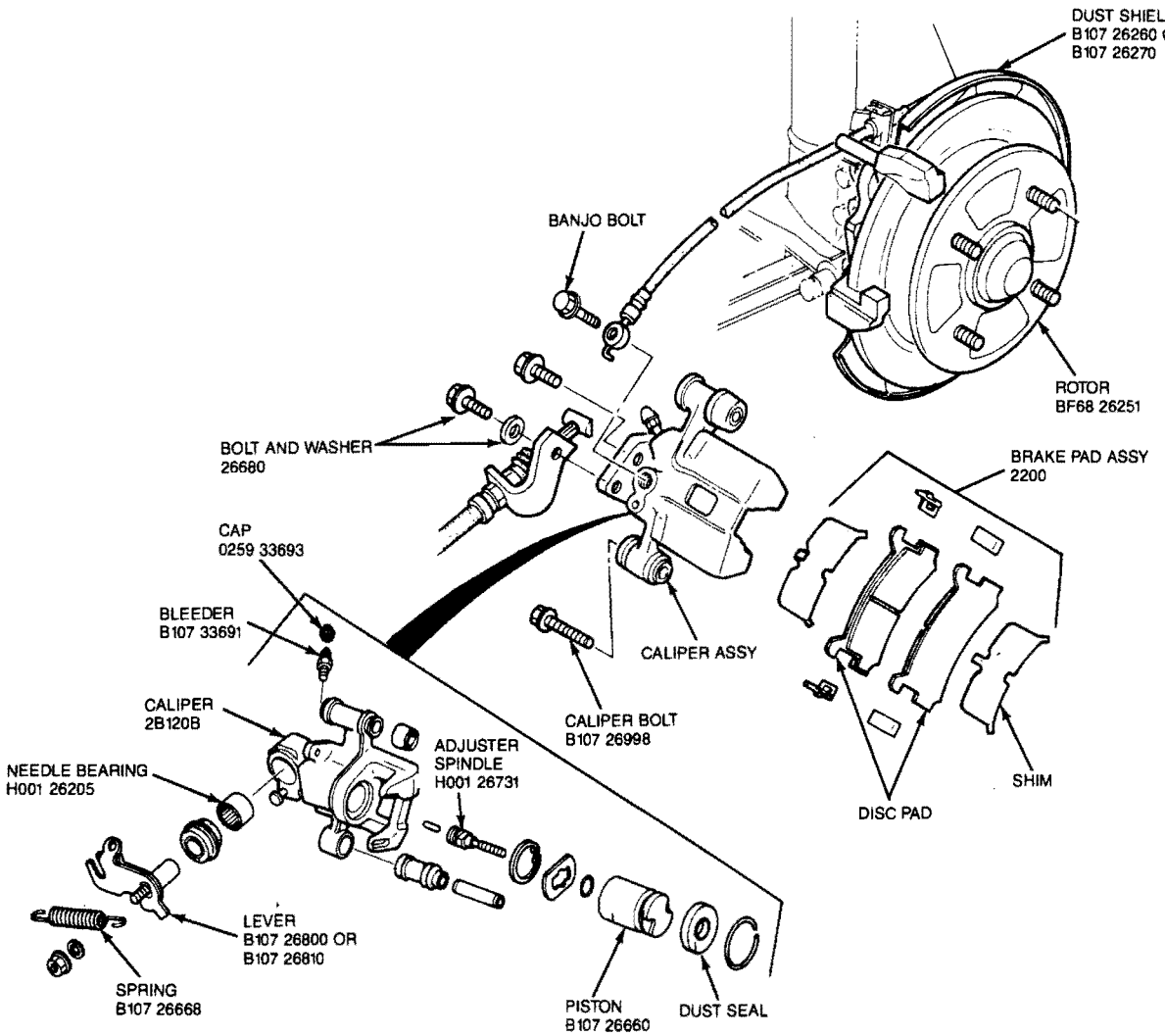
Brake Pads

The brake pads are equipped with a wear indicator that will make a squealing noise when the pads are worn. This allows for service before any rotor damage occurs.

CAUTION: Do not use denatured alcohol for flushing system or cleaning assemblies where alcohol could be trapped and subsequently contaminate brake fluid. Contaminated fluid may cause eventual failure of rubber components in the system.



H7238-A



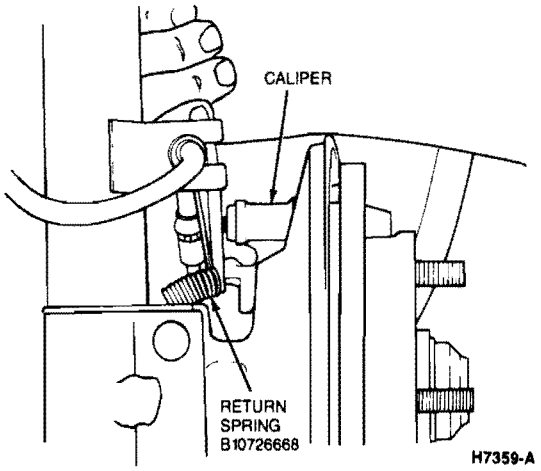
H7355-A

REMOVAL AND INSTALLATION

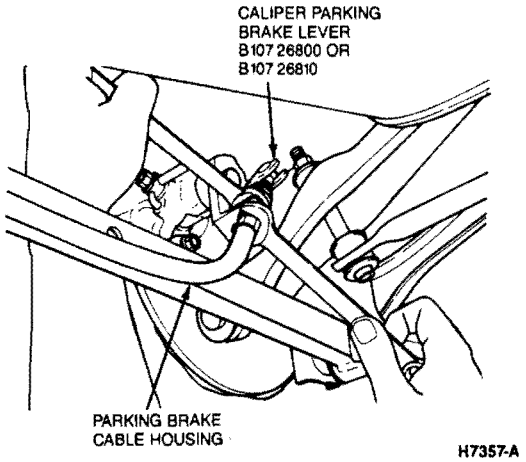
Brake Pads

Removal

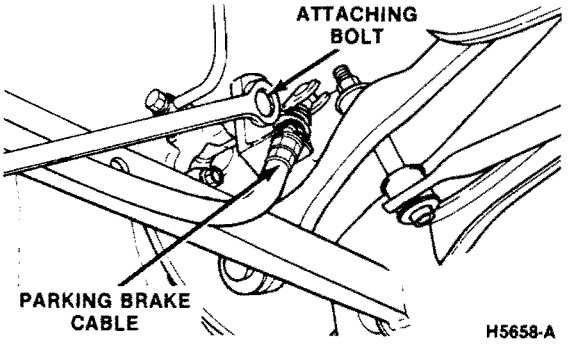
1. Remove approximately two-thirds of the brake fluid from the master cylinder.
2. Raise vehicle. Refer to Section 10-04.
3. Remove wheel and tire assembly.
4. Using a pair of needle nose pliers, remove parking brake return springs at the back of the caliper.



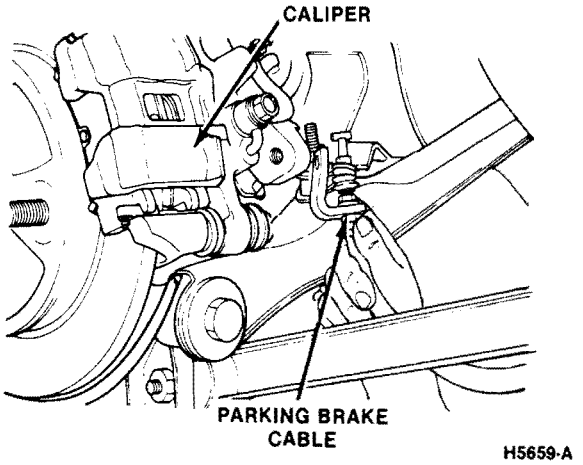
5. Loosen the parking brake cable housing adjusting nut. Remove the cable housing from the bracket on the rear lower control arm.



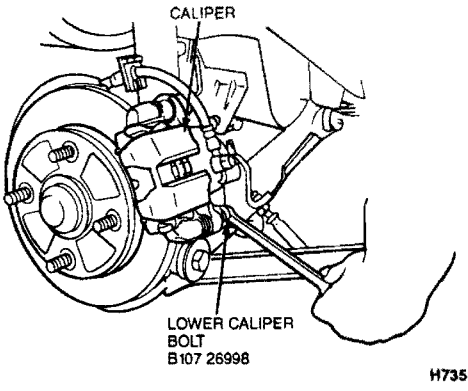
6. Loosen the attaching bolt connecting the parking brake cable bracket to the rear caliper.



7. Remove parking brake cable from the rear caliper.

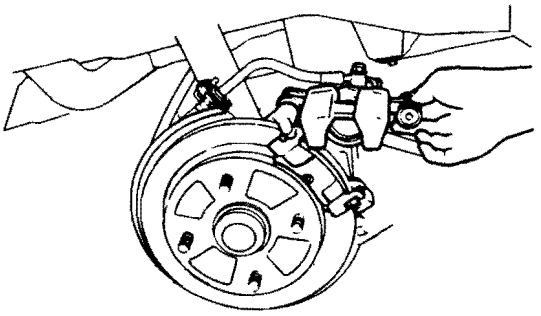


8. Loosen lower caliper bolt.



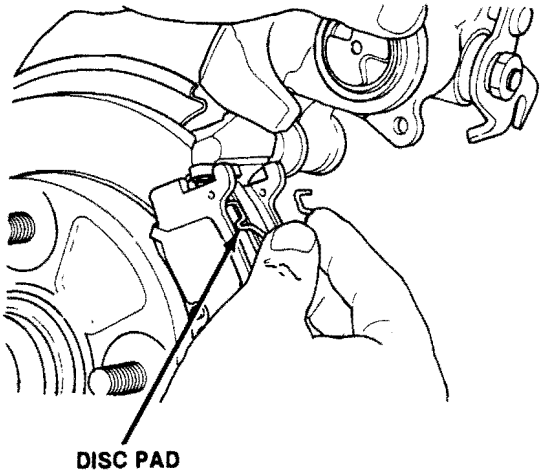
REMOVAL AND INSTALLATION (Continued)

9. Pivot the caliper upward on the upper caliper guide pin.



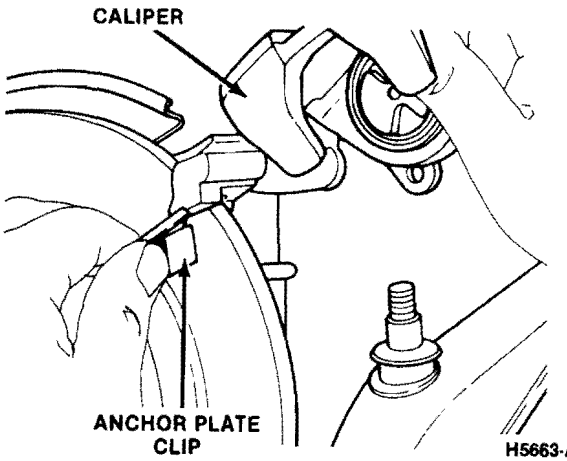
H5661-A

10. Remove the disc pad retaining spring.



H5662-A

11. Remove disc pads and shims.
12. Remove anchor plate clips from the caliper anchor plate. Attach tape to the anchor plate clips and label "top" and "bottom".



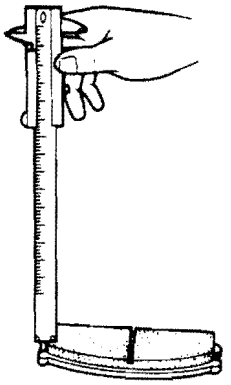
H5663-A

13. Remove and resurface the rotor if necessary, as outlined.

Inspection

Inspect the pads for:

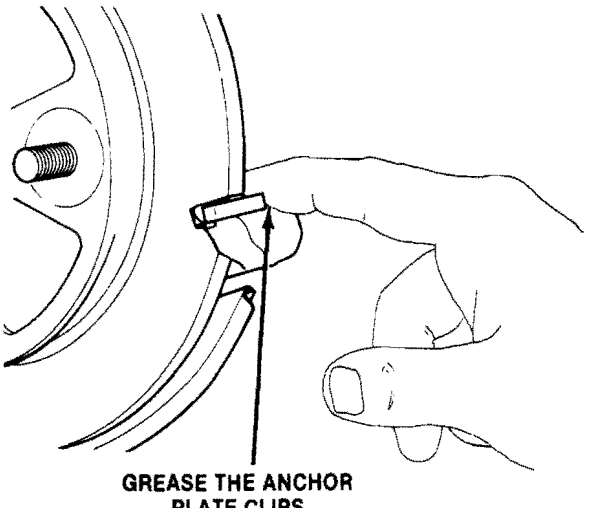
- Grease on the face.
- Abnormal wear or cracking.
- Deterioration or damage due to heat.
- Minimum thickness of 3mm (0.12 inch).



H5356-A

Installation

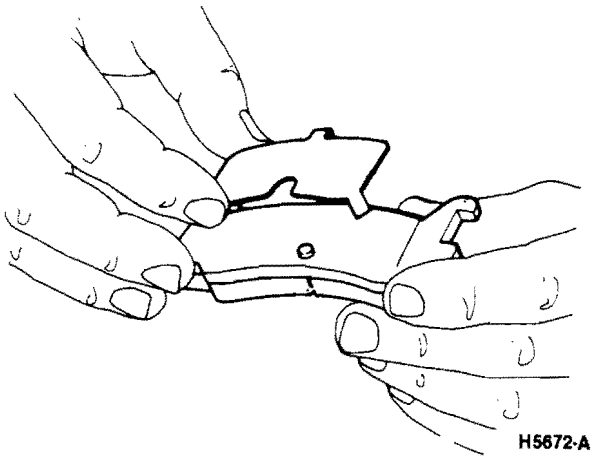
1. Install anchor plate clips. If not installed in their original locations, the locating tabs may contact the rotor.
2. Lubricate the anchor plate clips with Disc Brake Caliper Slide Grease D7AZ-19590-A or equivalent.



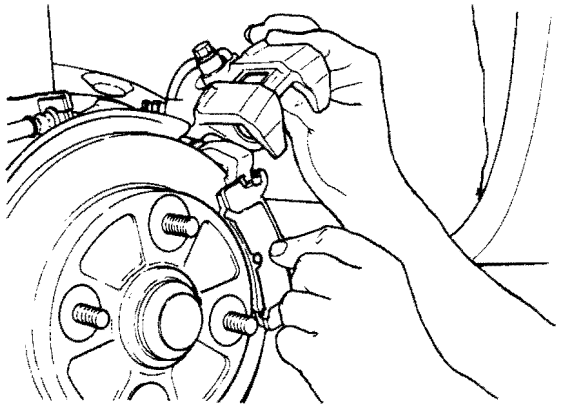
H5664-A

REMOVAL AND INSTALLATION (Continued)

3. Install shims on the backs of the pads and install in the anchor plate.

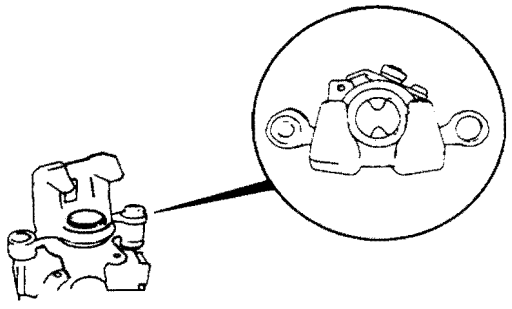


H5672-A



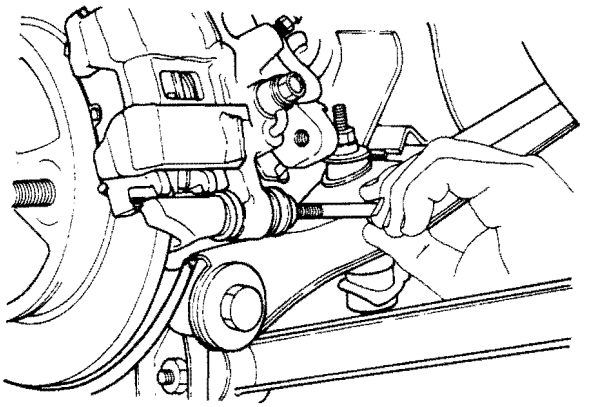
H5666-A

4. Install the disc pad retaining spring.
5. Pivot the caliper down over the pads. If necessary, rotate the disc brake piston.



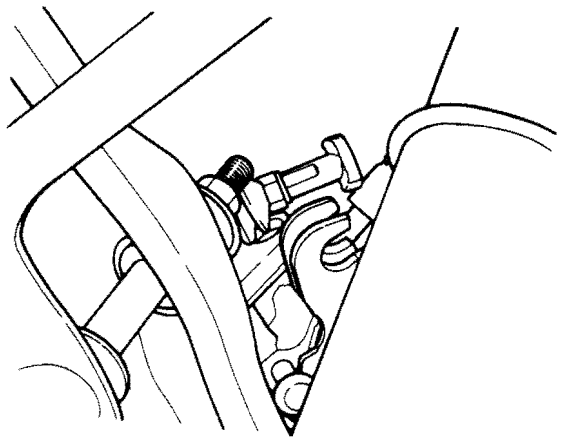
H5665-A

6. Install the lower caliper bolt.



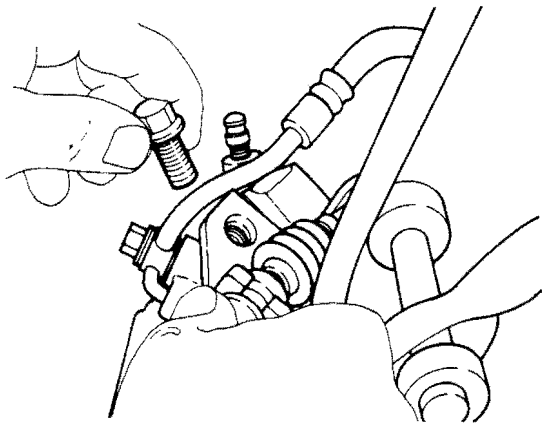
H5667-A

7. Install the parking brake cable in the caliper parking brake lever.



H5668-A

8. Position the parking brake cable bracket against the rear caliper. Install the parking brake cable attaching bolt.



H5669-A

9. Install wheel and tire assembly. Tighten retaining nuts to 90-120 N·m (65-87 lb-ft).

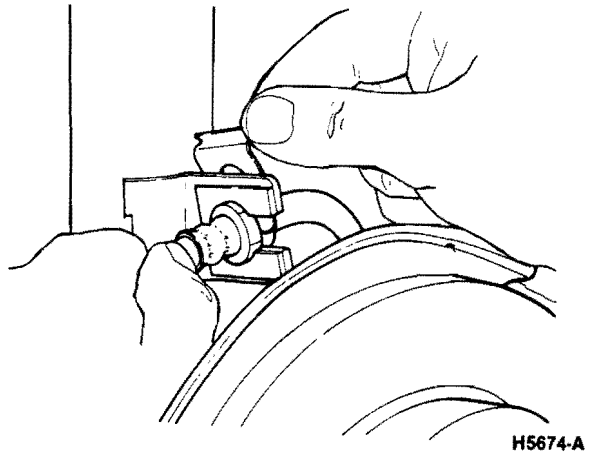
REMOVAL AND INSTALLATION (Continued)

10. Pump the brake pedal several times to seat the brake pads.
11. Check, and if necessary, add fluid in the master cylinder.
12. With the wheels off the ground, spin each wheel several times to be sure the calipers are not frozen and the parking brake is not adjusted too tight.

Caliper

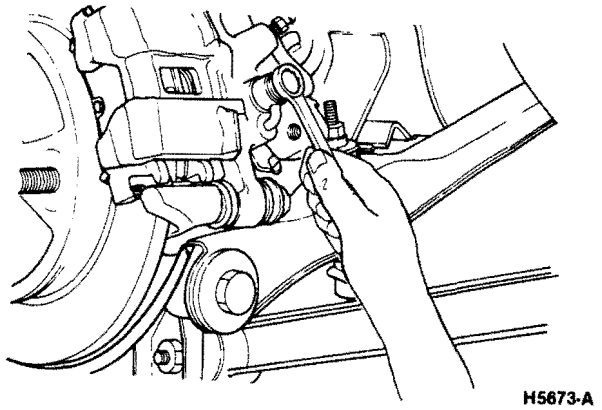
Removal

1. Raise vehicle. Refer to Section 10-04.
2. Remove wheel and tire assembly.
3. Remove brake pads as outlined.
4. Remove the attaching clip from the brake flex hose.



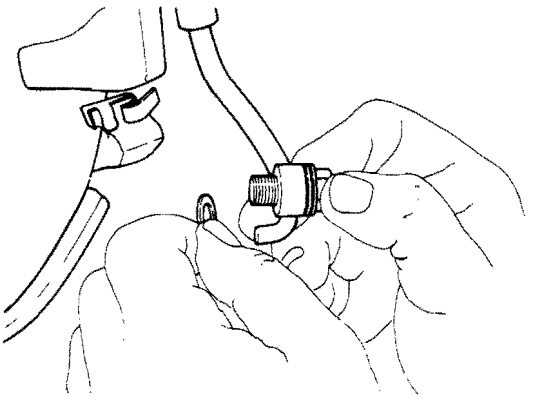
H5674-A

5. Remove the banjo bolt attaching the brake flex hose to the caliper.



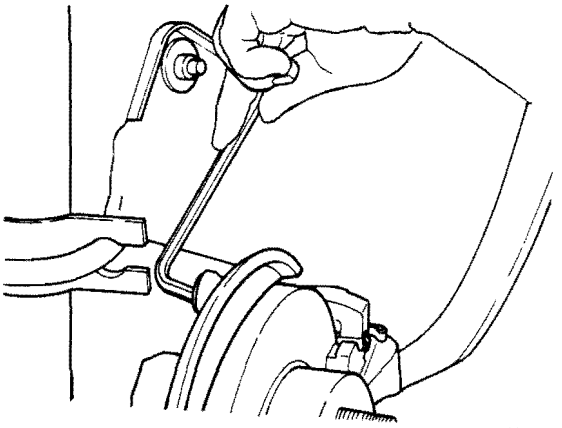
H5673-A

6. Remove the two copper washers that seal the flex hose banjo fitting, and discard.



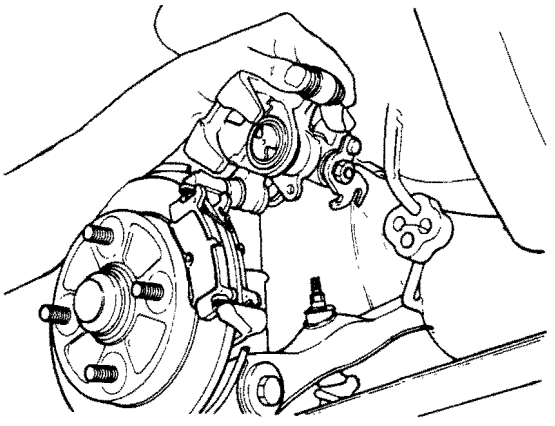
H5675-A

7. Remove the lower caliper attaching bolt.
8. Using a cold chisel, remove the upper caliper guide pin dust cap. This will give access to the Allen head on the guide pin.
9. Using an Allen wrench, loosen and remove the upper caliper guide pin.



H5676-A

10. Lift the caliper off the rotor.

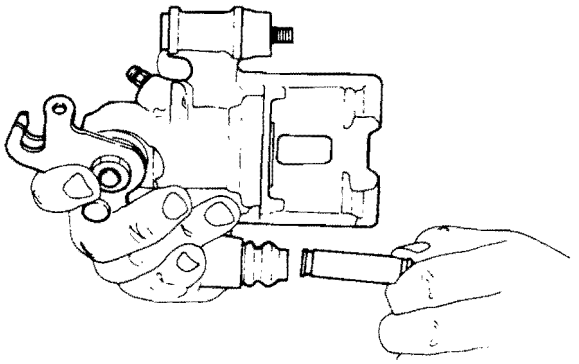


H5677-A

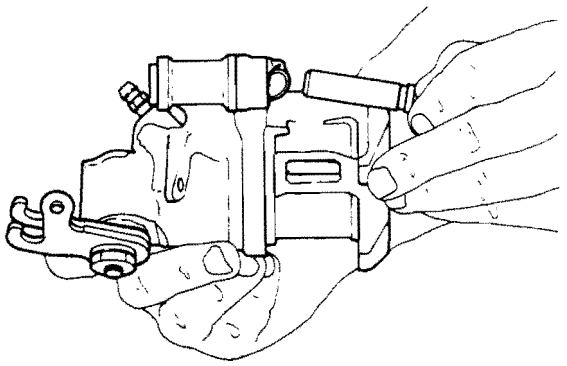
REMOVAL AND INSTALLATION (Continued)

Installation

1. Install the brake pads and shims as outlined.
2. Before installing the caliper, remove the upper guide pin and the lower guide pin bushing.



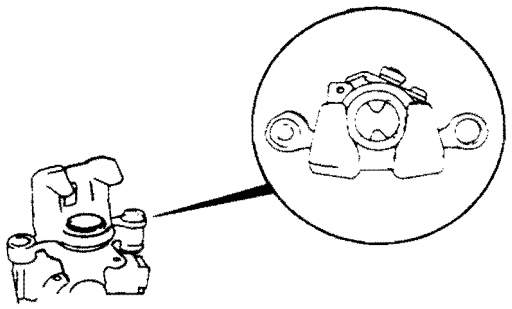
H5678-A



H5679-A

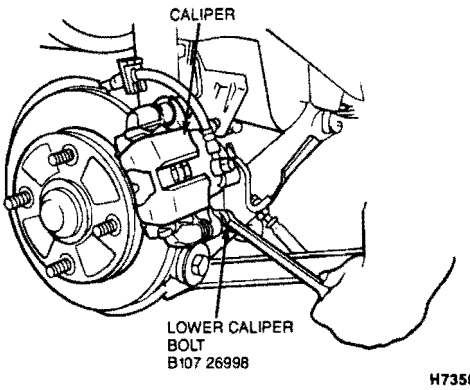
3. Remove the guide pin and guide pin bushing dust boots.
4. Lubricate the upper guide pin and lower guide pin bushing with Disc Brake Caliper Slide Grease D7AZ-19590-A or equivalent. Install the guide pin and guide pin bushing dust boots.
5. Position the caliper over the rotor.

   NOTE: To provide the necessary clearance, it may be necessary to rotate the piston.



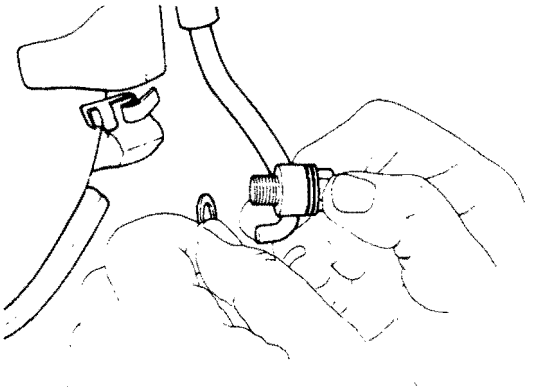
H5665-A

6. Tighten the upper guide pin with an Allen wrench, and install the dust cap with a plastic hammer.
7. Install the lower caliper attaching bolt through the lower caliper guide pin bushing. Tighten to 39-49 N·m (29-36 lb-ft).



H7358-A

8. Install two new copper washers and banjo bolt on the flex hose banjo fitting.



H5675-A

9. Position the flex hose on the caliper and install the banjo bolt. Tighten the bolt to 22-29 N·m (17-21 lb-ft).
10. Bleed the brakes, either manually or with Brake Bleeder 104-00064 or equivalent. Refer to Section 12-01.
11. Install the wheel and tire assembly. Tighten retaining nuts to 90-120 N·m (65-87 lb-ft).

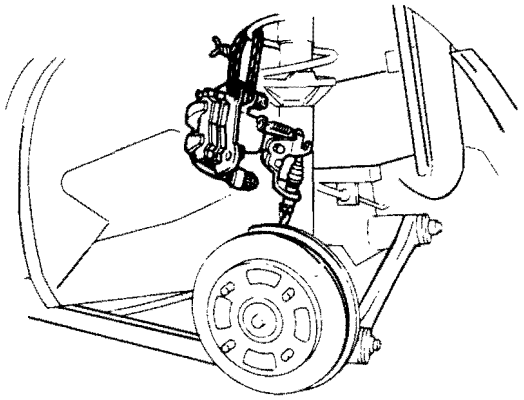
Rotor

Removal

1. Raise vehicle. Refer to Section 10-04.
2. Remove wheel and tire assembly.

REMOVAL AND INSTALLATION (Continued)

3. Using a cape chisel, unstake and remove the halfshaft retaining nut and washer. Discard nut it; cannot be reused. Refer to Section 11-15.
4. Remove the disc brake pads and caliper from the anchor plate as outlined. Support the caliper by a wire strung from the coil spring. Do not disconnect the brake line from the caliper.



H5688-A

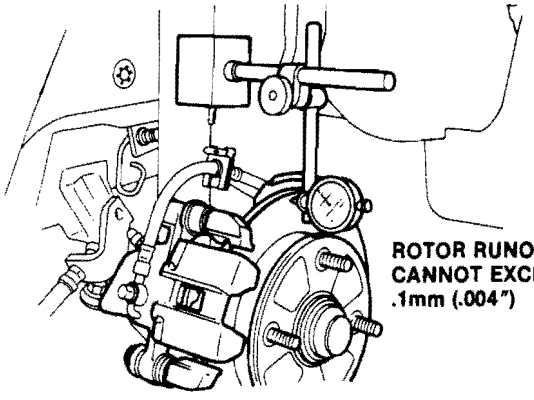
5. Remove the rotor. Refer to Section 11-15.

Inspection

Any time brake service is performed, the rotor must be visually inspected to check for any abnormal wear, and checked with a micrometer to make sure the thickness is within specification. Minimum thickness for the rotor is 9mm (0.350 inch).

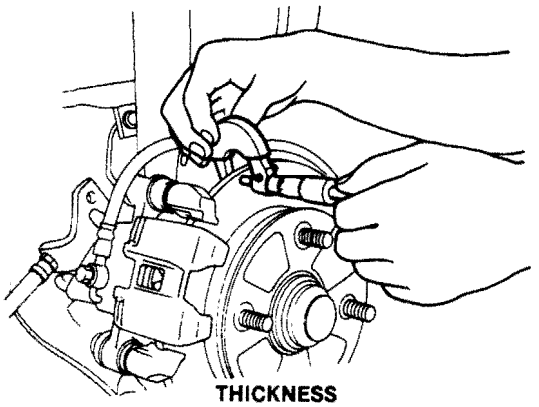
If the vehicle owner has complained of a pulsating brake pedal, the rotor must be checked for runout (warped rotor) and thickness variation.

Rotor runout is checked by mounting a Magnetic base Dial Indicator D78P-4201-B or quivalent on the strut and measuring the rotor. Rotor runout cannot be more than 0.1mm (0.004 inch).



H5686-A

Thickness variation is checked by measuring the rotor thickness in several places with a micrometer. Rotor thickness variation must not vary more than 0.025mm (0.001 inch). Rotors that are not within specification must be replaced.



H5687-A

Rotor Refinishing

If there are just surface irregularities, the rotor may be resurfaced by lightly sanding the face with fine emery cloth. To perform this:

1. Remove the wheel.
2. Remove the caliper as outlined.
3. Lightly sand both sides of the rotor. The back side of the rotor can be sanded at the anchor plate where the caliper normally rides. If scratches or scoring exceed 0.22mm (0.009 inch) the rotor must be resurfaced.

If the rotor has deep scratches or grooves, rotor runout (warped rotor) or incorrect thickness variation, it must be resurfaced off the vehicle on a brake drum / rotor lathe as follows:

1. Remove the wheel and tire assembly.
2. Remove the caliper and support it by a wire as outlined.
3. Remove the rotor from the vehicle as outlined.
4. Resurface the rotor on a rotor lathe. Follow the manufacturer's instructions for the rotor refinishing equipment being used.

   NOTE: The rotor must be machined while it is bolted to the hub. The rotor and hub are mounted as an assembly on the rotor lathe, and then the rotor is turned. Machining the rotor separately and then bolting it back onto the hub may cause rotor runout.

REMOVAL AND INSTALLATION (Continued)

Minimum Thickness

Brake rotor minimum thickness is shown on each rotor. This is the thickness at which the rotor becomes unsafe to use. It is called the discard thickness. The discard thickness is 9mm (0.350 inch). To find the minimum thickness to which you can machine the rotor, add 0.762mm (0.030 inch) to the minimum thickness, 9mm (0.350 inch) discard limit marked on the rotor. This 9.762mm (0.380 inch) machining limit allows for rotor wear after it has been resurfaced and returned to use.

If the thickness of the rotor is less than the minimum thickness, discard the rotor and install a new one.

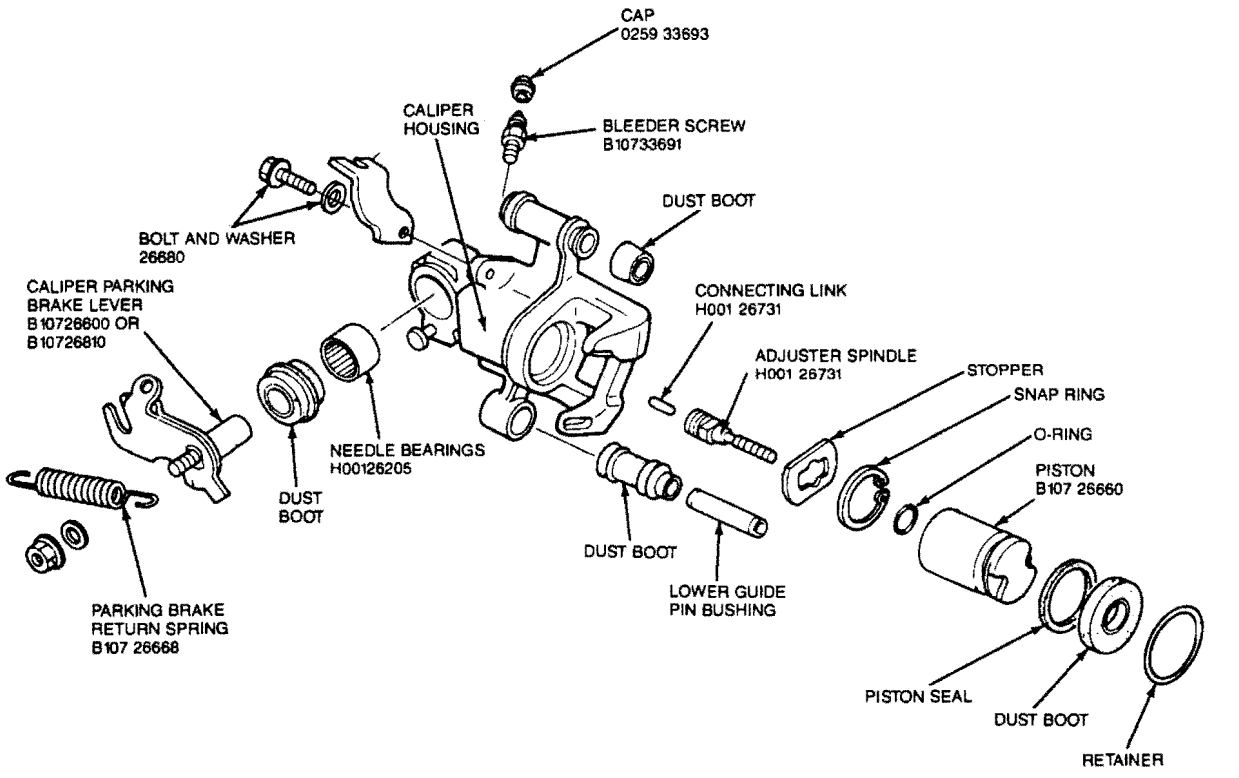
CAUTION: Machining a rotor thinner than the machining limit could permit the rotor to wear past the safe discard point before the lining wears out. It may also result in severe overheating and fade because the thin rotor may be unable to absorb the heat generated during braking.

Installation

1. Install the rotor on the spindle. Refer to Section 11-15.
2. Install the caliper and brake pads. Refer to Section 11-15.
3. Install the wheel and tire assembly. Tighten retaining nuts to 90-120 N·m(65-87 lb-ft).

DISASSEMBLY AND ASSEMBLY

Caliper

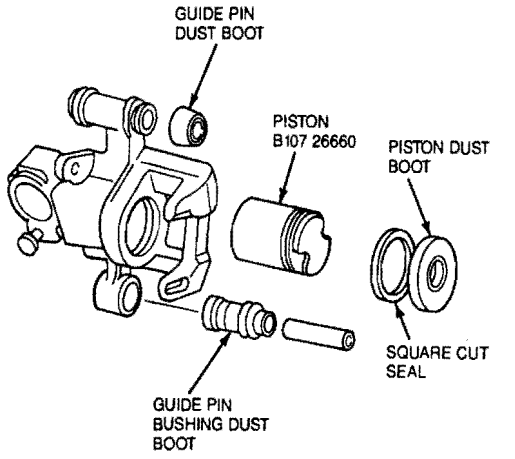


Disassembly

1. Remove disc pads and shims.
2. Remove the caliper as outlined.

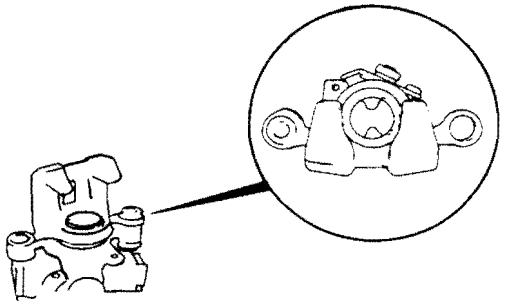
DISASSEMBLY AND ASSEMBLY (Continued)

3. Open the bleeder screw and drain the brake fluid from the caliper through the brake hose fitting. After draining the fluid, close the bleeder screw.
4. Remove the caliper guide bushing and dust boots.



H6425-A

5. Pry the retaining spring off the dust boot with a screwdriver.
6. Remove the piston.



H5665-A

7. Remove the dust boot and discard.
8. Remove the piston seal from the caliper and discard.

   CAUTION: Use a plastic or wooden pick to remove the seal. A metal tool can scratch or nick the seal groove resulting in a possible seal leak.
9. Remove the parking brake mechanism from the caliper housing.

Inspection

The caliper bore, piston seal groove and piston must be inspected for cuts, deep scratches and pitting whenever the caliper is rebuilt. The piston and bore may be lightly polished with crocus cloth, but if deep scratches remain they must be replaced.

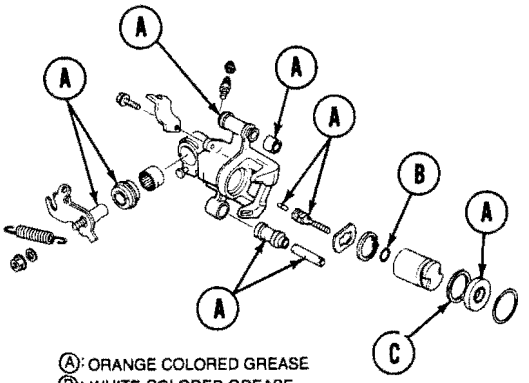
The seal groove in the caliper must be free of deep scratches that would prevent the seal from working properly.

Inspect the upper guide pin and lower guide pin bushing for wear.

Inspect the upper guide pin and lower guide pin bushing dust boots for damage and poor sealing.

Assembly

1. Lubricate the needle bearings with the special grease included in the caliper rebuilding kit. Install the needle bearings, dust boot, and parking brake lever.

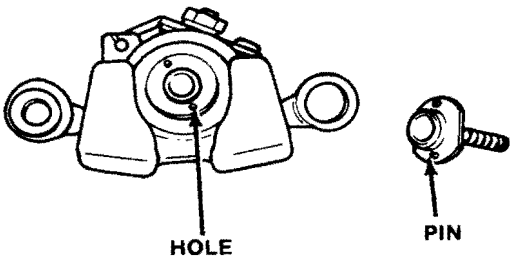


Ⓐ: ORANGE COLORED GREASE
Ⓑ: WHITE COLORED GREASE
Ⓒ: RED COLORED GREASE

NOTE:
APPLY THE GREASE SUPPLIED IN THE SEAL KIT TO THE PLACES SHOWN IN THE FIGURE

H7361-A

2. Install the adapter spindle in the caliper by aligning the pins of the adjuster spindle with the holes of the caliper.



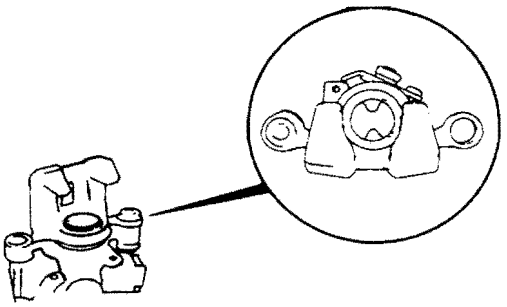
H5683-A

3. Lubricate a new piston seal with brake fluid and install in the caliper groove. Lubricate the caliper bore and the piston with brake fluid.

   CAUTION: Be sure the seal does not become twisted and that it is firmly seated in the caliper bore.
4. Install the dust boot in the caliper bore and install the wire retainer spring.

DISASSEMBLY AND ASSEMBLY (Continued)

5. Install the piston in the caliper bore by rotating the piston.



H5665-A

6. Install the upper guide pin dust boot and lower guide pin bushing dust boot.
7. Install the caliper upper guide pin and lower guide pin bushing.
8. Install the anchor plate clips, brake pads, shims, and spring retainer as outlined.
9. Install the caliper on the anchor plate as outlined.
10. Tighten the upper guide pin with an Allen wrench and install the dust cap with a plastic hammer.
11. Install the lower caliper bolt and tighten to 39-49 N·m (29-36 lb-ft).
12. Bleed the brakes, either manually or with Brake Bleeder 104-00064 or equivalent. Refer to Section 12-01.
13. Pump the brake pedal several times to seat the pads.
14. Check the fluid level in the master cylinder reservoir and add fluid if needed.
15. Spin each rotor to make sure the brakes are not dragging.
16. Install both tire and wheel assemblies. Tighten retaining nuts to 90-120 N·m (65-87 lb-ft).

SPECIFICATIONS

TORQUE SPECIFICATIONS

Description	Nem	Lb-Ft
Caliper Attaching Bolts	39-49	29-36
Banjo Bolt	22-29	17-21

SPECIAL SERVICE TOOLS

Tool Number	Description
D78P-4201-B	Dial Indicator

ROTUNDA EQUIPMENT

Model	Description
091-00001	Brake and Clutch Service Vacuum
104-00064	Brake Bleeder

SECTION 12-50 Brake Booster, Vacuum—Dash Mounted

VEHICLE APPLICATION

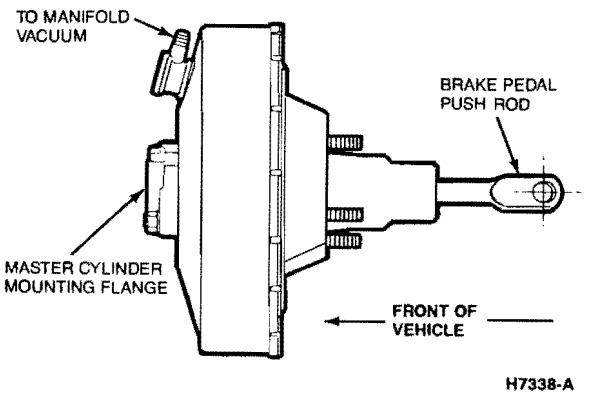
Capri.

DESCRIPTION

The brake booster reduces the effort required to push the brake pedal when applying the brakes. Power assist occurs due to a pressure differential within the brake booster. When the brakes are not applied and the engine is running, engine vacuum is present on both sides of the booster diaphragm. As the brake pedal is pressed, the input rod assembly moves forward inside the valve body until the vacuum port closes. At this point vacuum is still present on each side of the diaphragm. Then as the input rod assembly continues to move forward, an atmospheric port is opened and atmospheric pressure enters the rear half of the brake booster. Engine vacuum on the front side of the diaphragm and atmospheric pressure on the back side of the diaphragm assist the input rod in pushing the diaphragm plate forward and the master cylinder push rod against the master cylinder piston.

When the brake pedal is held in this position the diaphragm will momentarily continue to move forward and compress the outer edges of the reaction disc. This movement causes the center of the disc to press the input rod back and thus close the vacuum port or the atmospheric port depending on whether the brake pedal is released or depressed further.

The rubber vacuum hose from the engine is attached to the brake booster by a check valve which closes when the engine is shut off. The closed valve traps engine vacuum in the booster. This reserve vacuum allows several assisted brake applications with the engine off.



ADJUSTMENTS

Push Rod Length

NOTE: Push rod length is not adjustable. To ensure the master cylinder is free to return to its rest position with no residual pressure, verify stoplamp switch adjustment. Refer to Section 32-20.

REMOVAL AND INSTALLATION

Brake Booster

Removal

NOTE: Pump brake pedal several times to exhaust any vacuum in the booster.

1. Remove the battery. Refer to Section 31-02.
2. Remove the master cylinder. Refer to Section 12-01.
3. Remove the rubber hose connecting the intake manifold to the power brake booster.
4. Working under the instrument panel, remove the spring clip in the brake pedal clevis pin.
5. Remove the brake pedal clevis pin and the brake pedal push rod from the brake pedal.
6. Remove the four retaining nuts that hold the booster to the dash panel.
7. Remove the power brake booster.

Installation

1. Have an assistant position the power brake booster on the dash panel so that the four retaining studs protrude through the dash panel into the passenger compartment.
2. Working under the instrument panel, install the four retaining nuts.
3. Apply Multi-Purpose Grease D7AZ-19584-AA or equivalent to the clevis pin and install it through the brake pedal push rod and the brake pedal.
4. Install the clevis pin spring clip in the clevis pin.
5. From under the hood, install the rubber hose connecting the power brake booster to the intake manifold. Ensure the hose is installed correctly.
6. Install the master cylinder. Refer to Section 12-01.
7. Install the battery. Refer to Section 31-02.

INSPECTION

Power Booster

1. Wipe all rubber parts free of fluid and carefully inspect them for cuts, nicks and other damage.
2. Check the power piston for cracks, distortion, chipping or damaged seats.
3. Inspect the reaction disc rubber for deterioration.
4. Check that the seats of the valve rod and plunger are smooth and free of nicks and dents. Replace if damaged.
5. Inspect the front and rear shells for scratches, scores, pits, dents and other damage.
6. Check the diaphragm for cuts and other damage.

Vacuum Hose and Check Valve

1. Inspect the hose for cuts, abrasions, and cracking.
2. Disconnect the vacuum hose (check valve) from the engine side.
3. Apply suction and pressure to the hose from the engine side. Be sure air flows only toward the engine.

   NOTE: The check valve is attached to the end of the vacuum hose.

SECTION 12-70 Parking Brake, Cable Actuated—Rear Wheels

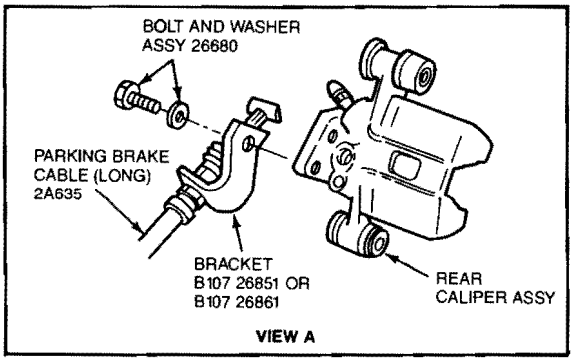
VEHICLE APPLICATION

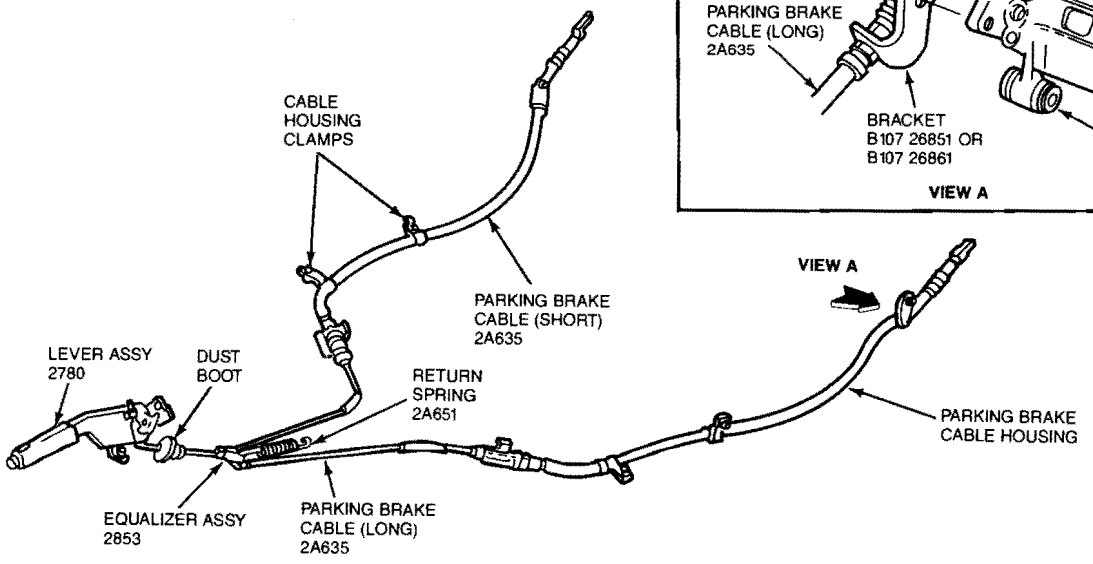
Capri.

DESCRIPTION

The parking brake is a mechanical method of applying the rear brakes.

The parking brakes are applied when the hand lever located in the console is pulled upward. The lever motion is transferred to the rear calipers through a short cable, an equalizer, and two long cables. The two long cables connect to a parking brake lever located at each rear caliper.

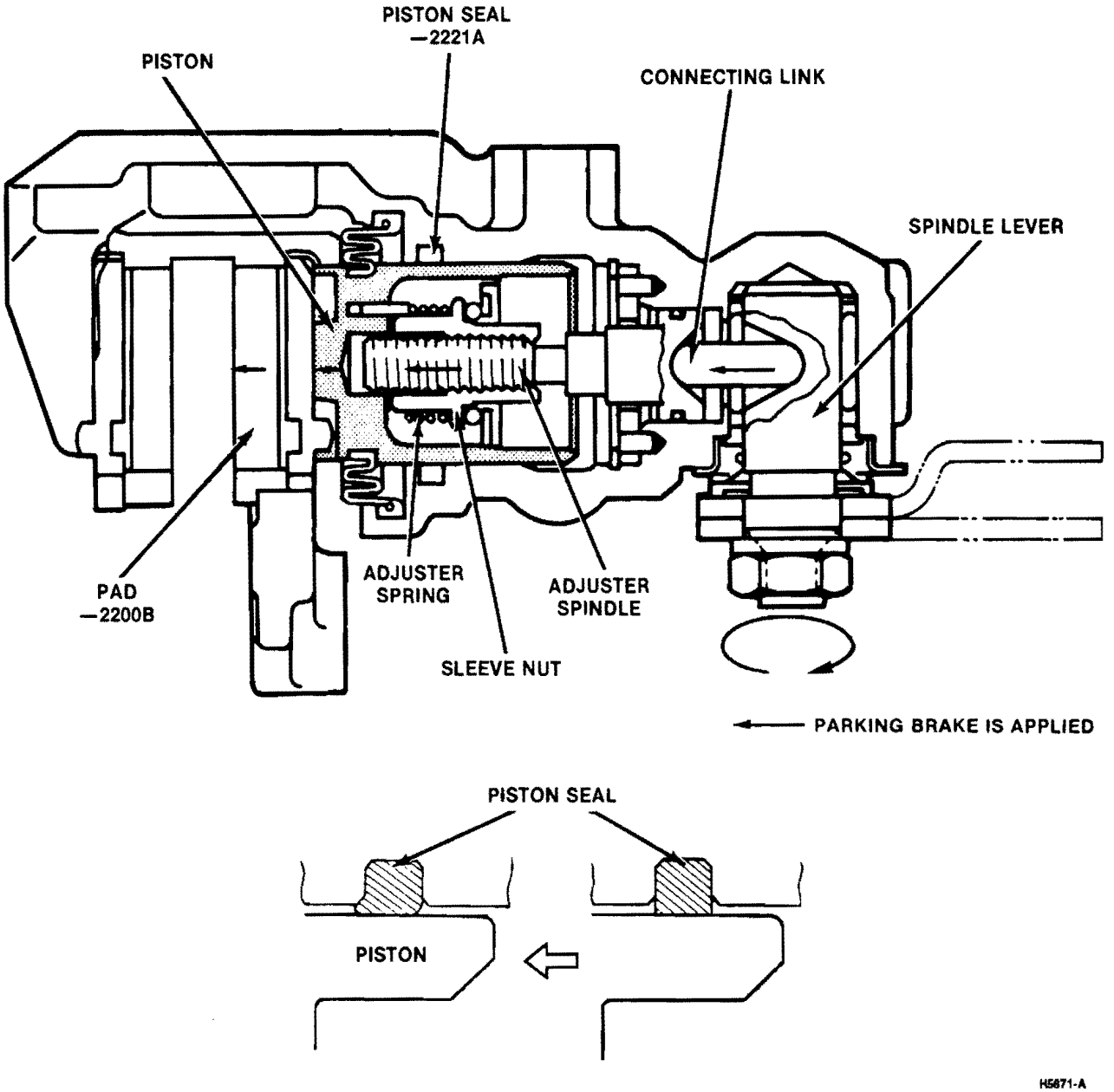




DESCRIPTION (Continued)

When the parking brake lever is applied, the parking brake cables move the caliper mounted parking brake lever or "spindle lever". This causes force to be applied to the connecting link which then pushes the piston against the inboard pad. This causes the caliper to slide on the upper guide pin and lower guide pin sleeve thereby applying pressure to the outboard pad.

As the piston moves outward in the caliper housing, it causes the square cut seal to distort. When the parking brake lever is released, the square cut seal returns the piston to its normal position and releases the rear brakes.



ADJUSTMENTS

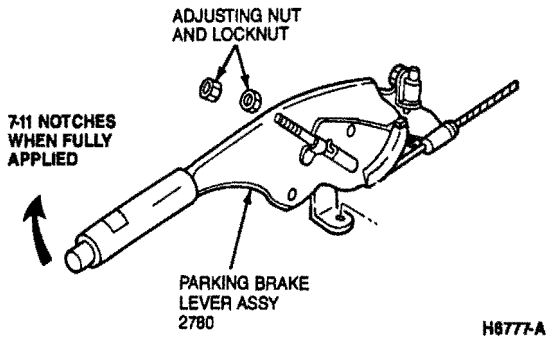
Cable, Parking Brake

NOTE: Make sure rear brake pads are within wear limits and that parking brake cable follows the correct path and is properly secured in its guides.

1. Remove the rear console. Refer to Section 45-31.
2. Loosen locknut.

ADJUSTMENTS (Continued)

3. Loosen or tighten the adjusting nut so that the parking brake begins to apply when the lever is pulled up 5 notches and is fully set at 7 to 11 notches. Using Spring Scale T74P-3504-Y or equivalent, check the force required to apply the parking brake. A properly operating system will require 195N (44 lbs) of force to fully apply the parking brakes.
4. Tighten locknut.
5. Make sure the brakes do not drag when parking brake lever is released.
6. Make sure the brake warning lamp illuminates when parking brake lever is raised.

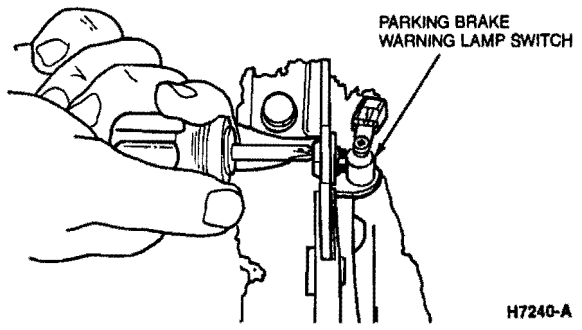


REMOVAL AND INSTALLATION

Parking Brake Lever

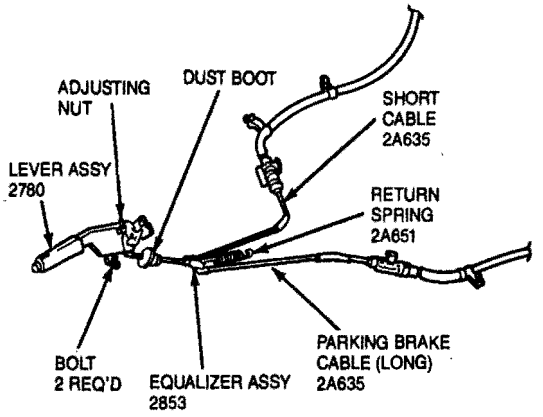
Removal

1. Remove the floor console. Refer to Section 45-31.
2. Remove the retaining screws and the parking brake warning lamp switch located on the parking brake lever.



3. Using a 10mm wrench, remove locknut and adjusting nut.
4. Remove two retaining bolts and parking brake lever.
5. Remove short cable from parking brake lever.

   NOTE: It may be necessary to remove the ends of the long cables from the rear calipers in order to remove the equalizer and short cable.
6. From under the vehicle, remove the return spring from the equalizer.
7. Remove the cable boot from the tunnel access cover.
8. Remove the parking brake equalizer and short cable from the tunnel access plate.



Installation

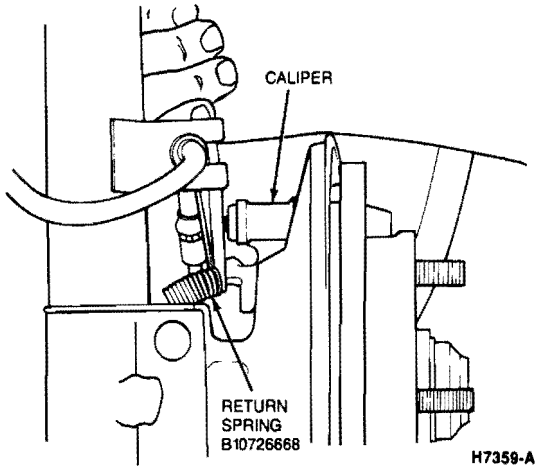
1. From under the vehicle, install the parking brake equalizer, short cable, and cable boot into the access plate.
2. From inside the vehicle, install the cable into the parking lever and loosely install the adjusting nut and locknut.
3. Position the parking brake lever and install two retaining bolts.
4. Install the parking brake warning lamp switch with two retaining screws.
5. From under the vehicle install the two long cables into the equalizer.
6. Connect long cables to rear calipers as outlined.
7. Install return spring at equalizer.
8. Adjust parking brake as outlined.
9. Install console. Refer to Section 45-31.

REMOVAL AND INSTALLATION (Continued)

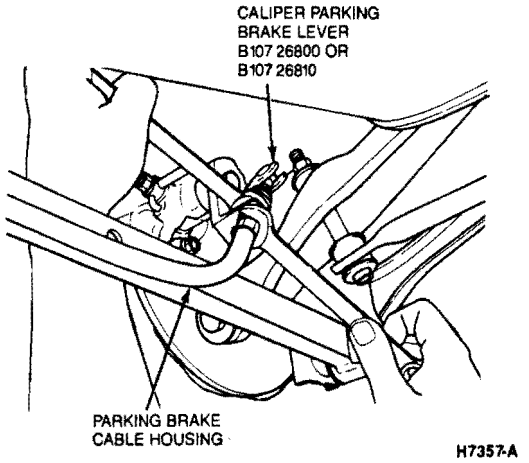
Cables, Long

Removal

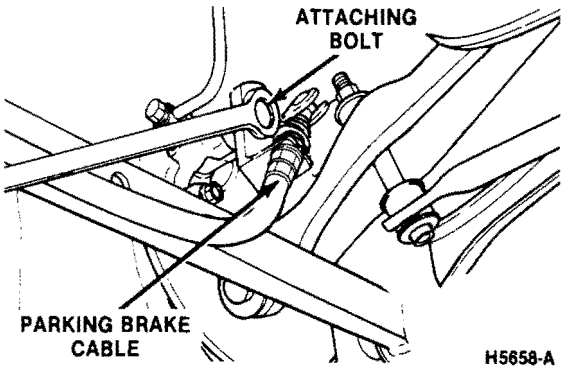
1. Using a pair of needle nose pliers, remove the parking brake return springs at the back of each caliper.



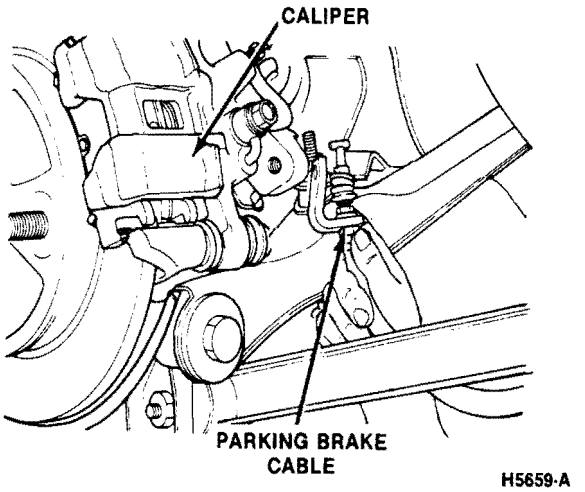
2. Loosen the parking brake cable housing adjusting nut.



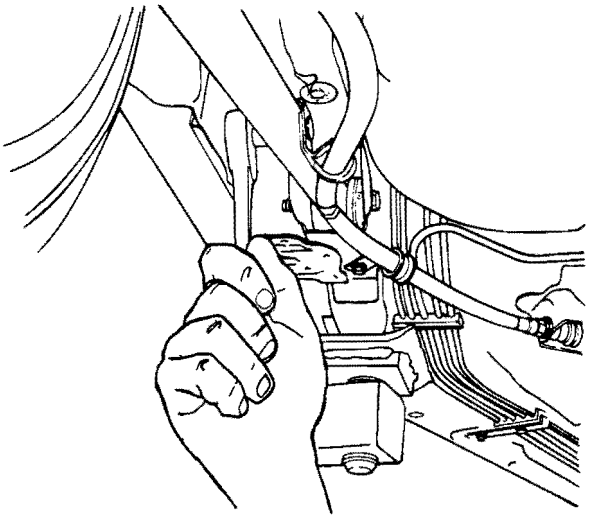
3. Loosen the attaching bolt connecting the parking brake cable bracket to the rear caliper.



4. Remove the parking brake cable from both calipers.

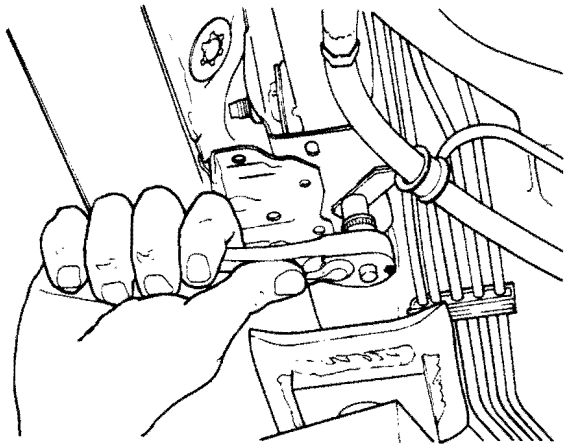


5. Remove the cable housing clamps from the rear suspension trailing arms.



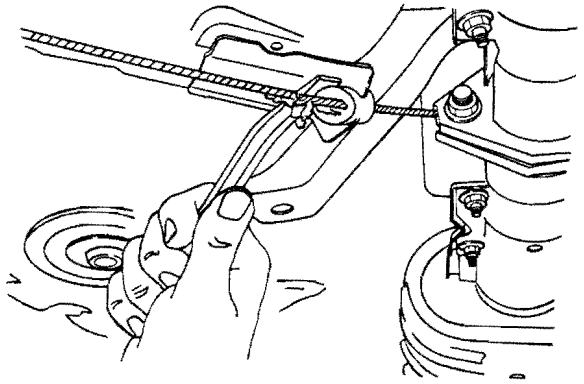
REMOVAL AND INSTALLATION (Continued)

6. Remove the cable housing clamp from the trailing arm support bracket.



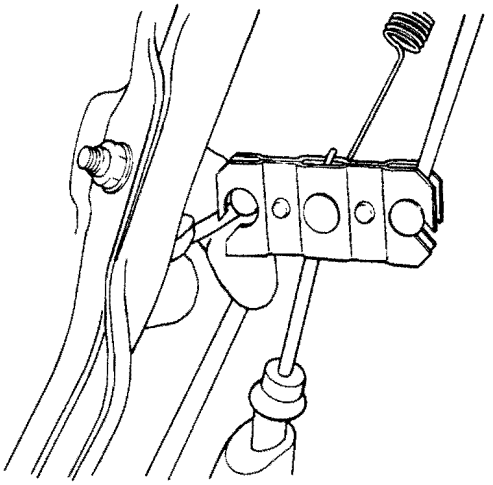
H5377-A

7. With a small pry bar, gently ease the plastic cable bushings out of the brackets.



H5379-A

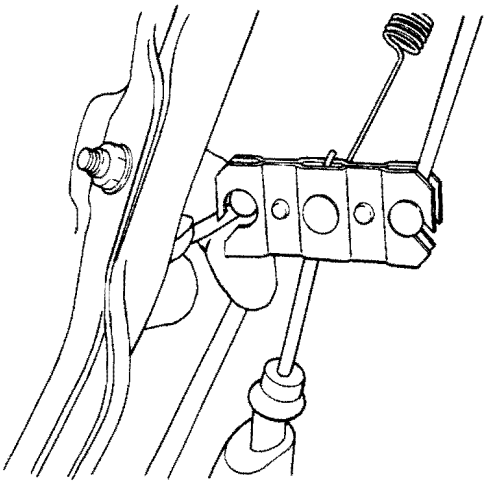
8. Disconnect the parking brake return spring from the equalizer.
9. Remove each cable from the equalizer.



H5380-A

Installation

1. Install the two cable ends in the parking brake equalizer.

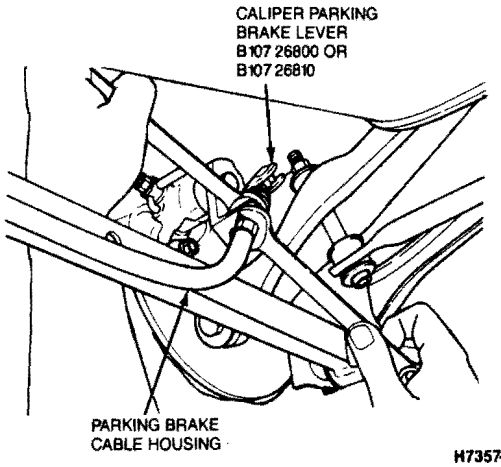


H5380-A

2. Install the two plastic cable guides into the brackets using a plastic hammer.

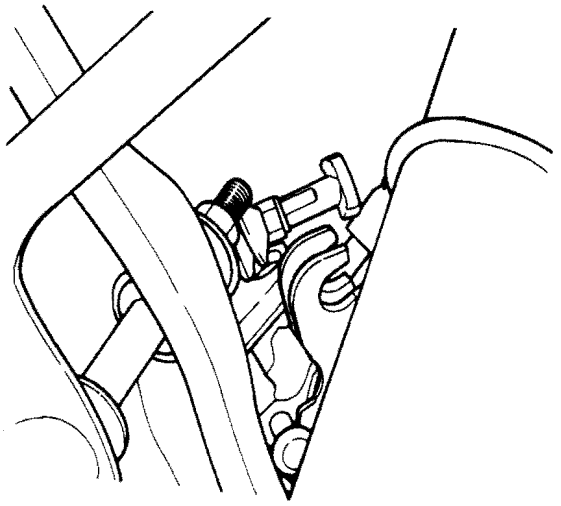
REMOVAL AND INSTALLATION (Continued)

3. Install the threaded ends of the cable housings into the brackets and install adjuster nuts. Tighten securely.

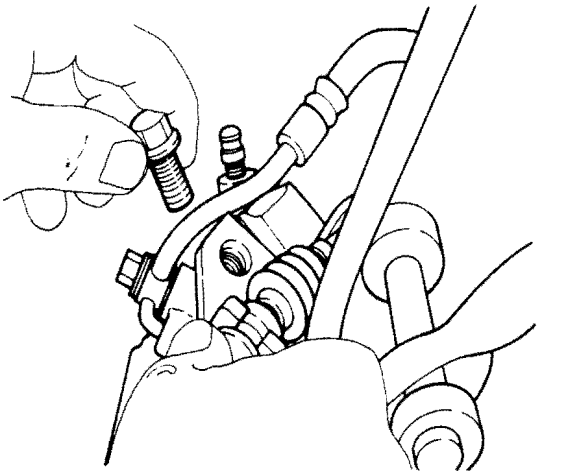


H7357-A

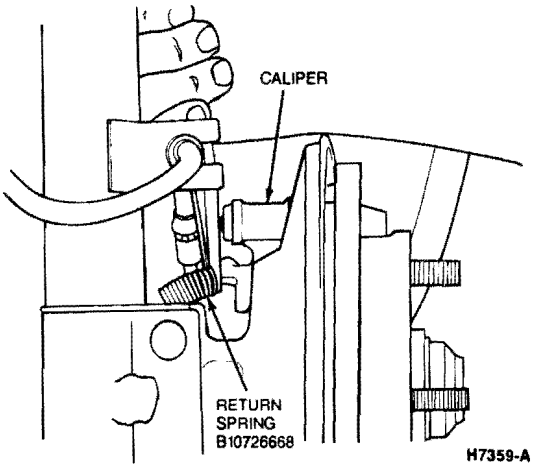
4. Install the parking brake cable in the caliper parking brake lever.


H5668-A

5. Position the parking brake cable bracket against the rear caliper. Install the parking brake cable attaching bolt.


H5669-A

6. Install parking brake return springs at the back of each caliper.



H7359-A

7. Install the cable housing support clamps.
8. Install the equalizer return spring.
9. Adjust parking brake cables as outlined.

SPECIAL SERVICE TOOLS

Tool Number	Description
T74P-3504-Y	Spring Scale