

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

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VEHICLE APPLICATION

Mark VII.

DESCRIPTION

A hydraulic actuation assembly provides the power assist and anti-lock function for the four-wheel disc brake system.

Except for the parking brake mechanism, the rear caliper assembly is basically similar to the pin slider front brake caliper. The added parking brake lever on the back of the caliper is cable-operated by the parking brake pedal located below the instrument panel, similar to rear drum brake installations. The parking brake is self-adjusting.

NOTE: If there is a partial system brake failure and only the rear brakes are operational, it is possible to overadjust the rear disc brakes. If this occurs, adjust the piston position, and perform the caliper adjustment procedure.

Caliper Assembly

The caliper assembly consists of a pin slider caliper housing with single piston and parking brake mechanism, inner shoe and lining assembly, outer shoe and lining assembly, anti-rattle clip and anchor plate. The caliper assembly slides on two greased locating pins that act as attaching bolts between the caliper and the anchor plate. Rubber insulators isolate the pins from direct contact with the caliper.

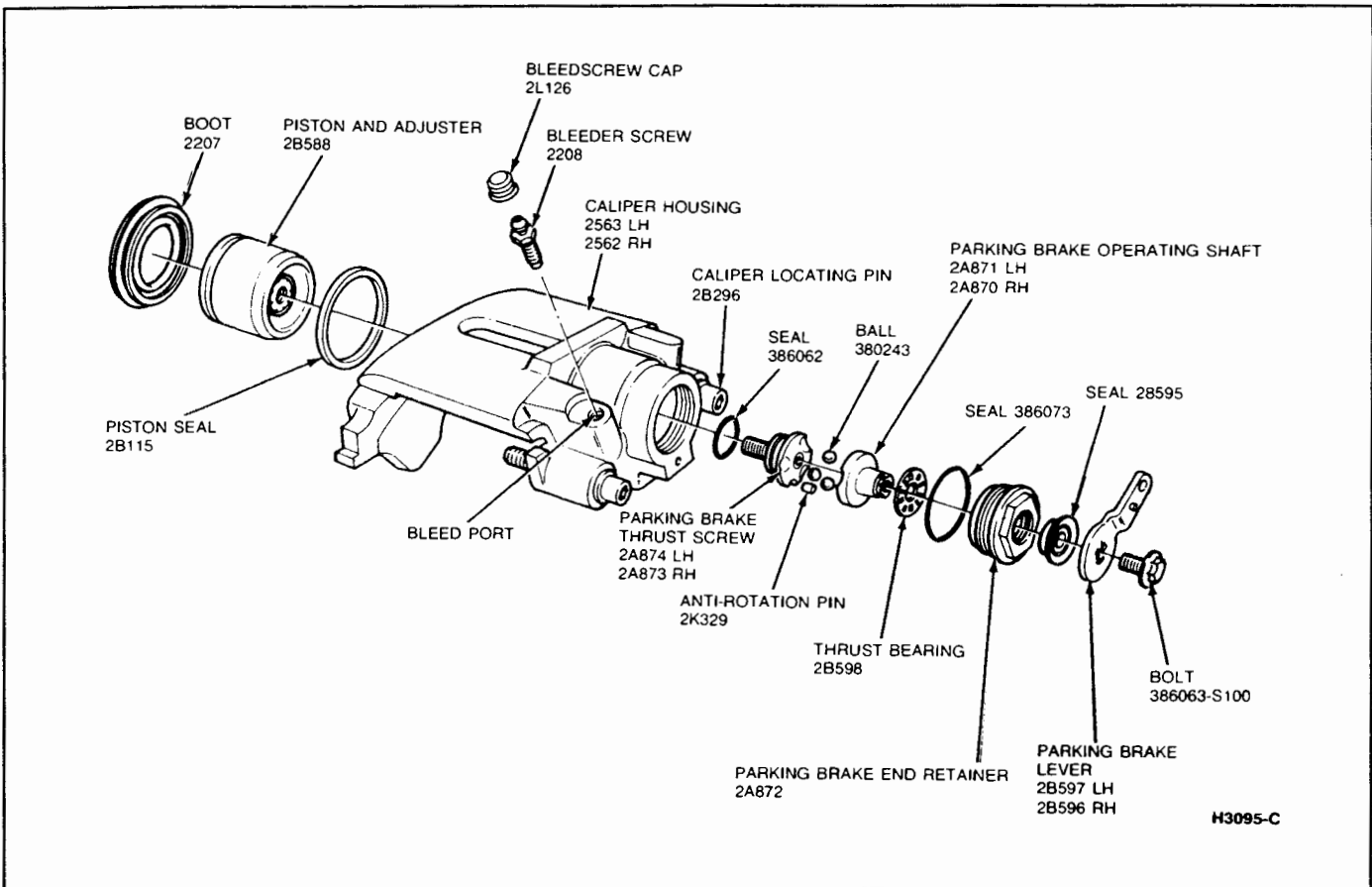
Caliper Housing Assembly

The component parts of the housing assembly are as outlined under Caliper Assembly, Removal and Installation. The piston has a moulded rubber dust boot on its outer end that attaches to a cylinder bore which provides sealing between the housing and the piston. A rubber O-ring seal is positioned in a groove in the thrust screw to provide sealing between the thrust screw and housing, preventing entry of brake fluid into the parking brake mechanism cavity. A moulded lip seal is pressed into the outboard side of the end retainer to prohibit entry of water and contaminants between the parking brake operating shaft and end retainer. A rubber O-ring on the end retainer stops water from entering into the caliper through the end retainer threads. The components in the parking brake mechanism cavity in the back of the caliper housing are lubricated with Silicone Dielectric Compound D7AZ-19A331-A or equivalent silicone grease.

The parking brake lever is secured to the operating shaft by a nylon-patched screw. When the parking brake is applied, the cable rotates the lever and operating shaft. The three steel balls, located in pockets on the opposing heads of the operating shaft and thrust screw, roll between ramps formed in these ball pockets. The balls force the thrust screw away from the operating shaft, driving the piston and shoe lining assembly against the rotor, creating the braking force.

An automatic adjuster in the piston moves on the thrust screw to compensate for lining wear, thereby, maintaining a proper clearance in the parking brake mechanism.

DESCRIPTION (Continued)

**Shoe and Lining Assembly**

The inner and outer shoe and lining assemblies are attached to the anchor plate rails. The inner assembly is common for RH and LH sides. The outer assembly is common for RH and LH sides.

NOTE: Brake friction materials inherently generate noise and heat in order to dissipate energy. As a result, occasional squeal is possible, and it is aggravated by severe environmental conditions such as cold, hot, wet, snow, salt, mud, etc.

Anti-Rattle Clip

The anti-rattle clip/spring is positioned between the anchor plate rail and the inner and outer shoe to prevent shoe rattle. It is common for LH and RH.

Parking Brake Cable Bracket

The parking brake rear cable bracket is attached to the caliper housing by two nylon patched bolts. The bracket has a stop which locates the parking brake actuating lever.

Anchor Plate

The anchor plate transmits braking torque from the inner and outer shoe and lining assemblies to the brake adapter. The RH and LH anchor plates are common.

Rotor and Splash Shield

The rear disc brake rotors are a ventilated design. Ventilation is provided by fins between the braking surfaces that cause the rotor to act as an air pump. Because the rotor fins are designed to take advantage of the forward motion of the vehicle, they are not interchangeable. They are identified by Right or Left stamped on the hat section of the rotor. The rotor attaches to the rear axle shaft flange in the same manner as a rear drum.

A splash shield attached to the brake adapter protects the rotor inboard surface from road splash contaminants. The wheel guards the outboard surface of the rotor. The splash shield is common for right and left and has tabs that will interfere with the brake adapter to prevent incorrect installation.

Brake Adapter

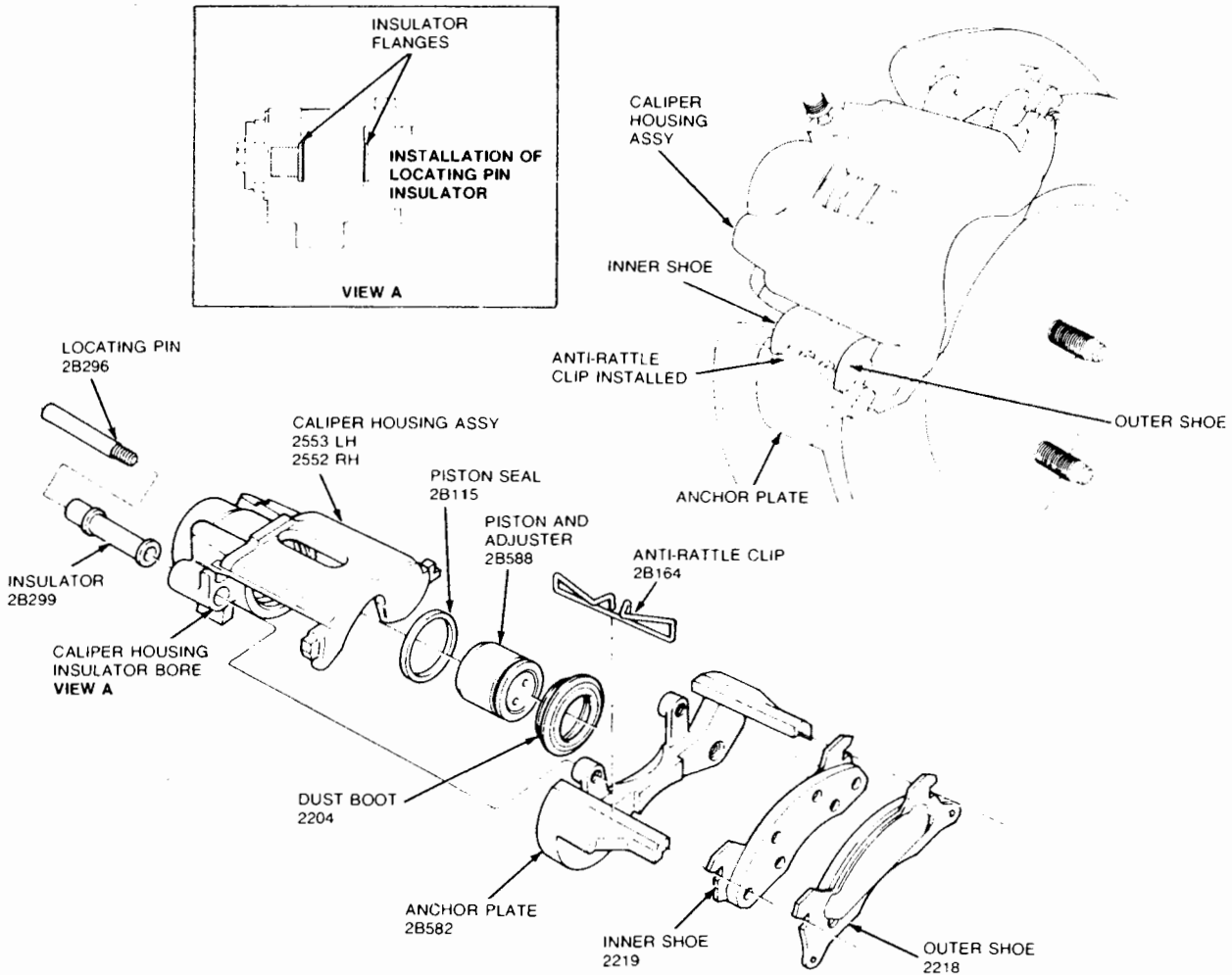
The brake adapter supports the caliper and anchor plate assembly and transmits braking torque to the axle tube. The adapters are identified as LH or RH.

REMOVAL AND INSTALLATION

Caliper Assembly

During service, handle the caliper assembly and rotor in such a way as to avoid nicking, scratching contamination and deformation of the rotor.

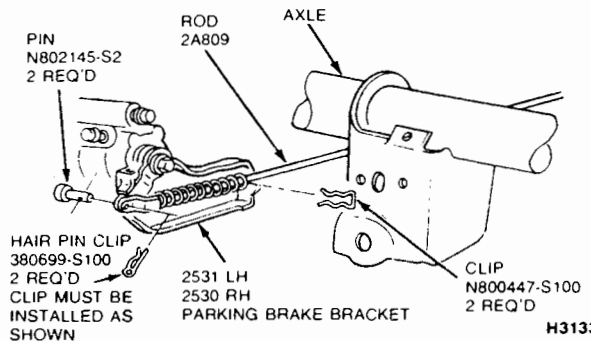
After any service work, pump the brake pedal to obtain a firm brake pedal before moving the vehicle. Riding the brake pedal (common with left-foot application) must be avoided when driving the vehicle.



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Removal

1. Raise vehicle on a hoist. Refer to Pre-Delivery manual, Section 50-04.
2. Remove the wheel and tire assembly from the axle. Use care to avoid damage or interference with the splash shield.
3. Disconnect the parking brake cable from the lever and bracket. Use care to avoid kinking or cutting the cable or return spring.



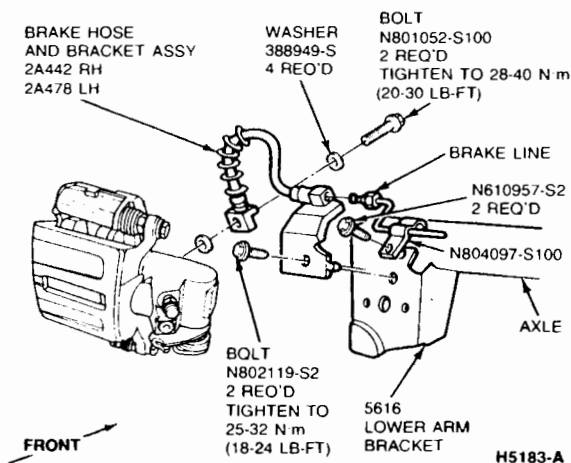
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REMOVAL AND INSTALLATION (Continued)

4. Remove the caliper locating pins.
5. Lift the caliper assembly away from the anchor plate by pushing the caliper upward toward the anchor plate, and then rotate the lower end out of the anchor plate.
6. If insufficient clearance between the caliper and shoe and lining assemblies prevents removal of the caliper, it is necessary to loosen the caliper end retainer one-half turn, maximum, to allow the piston to be forced back into its bore. To loosen the end retainer, remove the parking brake lever, then mark or scribe the end retainer and caliper housing to ensure the end retainer is not loosened more than one-half turn. Force the piston back in its bore, and then remove the caliper.

CAUTION: If the retainer must be loosened more than one-half turn, the seal between the thrust screw and the housing may be broken, and brake fluid may leak into the parking brake mechanism chamber. In this case, the end retainer must be removed, and the internal parts cleaned and lubricated. Refer to Caliper Overhaul.

7. Remove the outer shoe and lining assembly from the anchor plate. Mark shoe for identification if it is to be reinstalled.
8. Remove the two rotor retainer nuts and the rotor from the axle shaft.
9. Remove the inner brake shoe and lining assembly from the anchor plate. Mark shoe for identification if it is to be reinstalled.
10. Remove anti-rattle clip from anchor plate.
11. Remove the flexible hose from the caliper by removing the hollow retaining bolt that connects the hose fitting to the caliper.



12. Clean the caliper, anchor plate and rotor assemblies and inspect for signs of brake fluid leakage, excessive wear, or damage. The caliper must be inspected for leakage both in the piston boot area and at the operating shaft seal area.

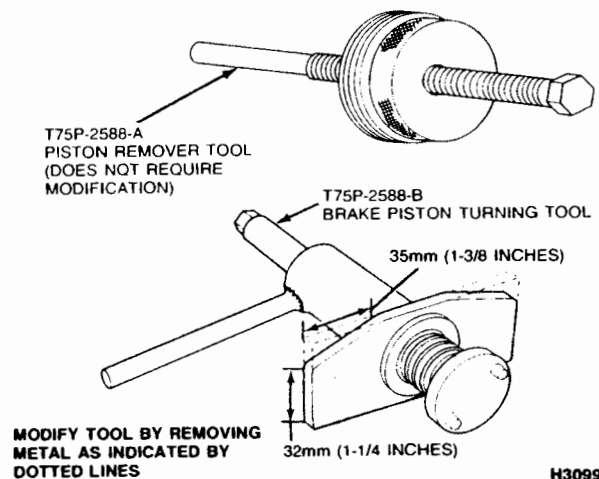
Lightly sand or wire brush any rust or corrosion from the caliper and anchor plate sliding surfaces as well as the outer and inner brake shoe abutment surfaces. Inspect the brake shoes for wear. If either lining is worn to within 3.1mm (1/8-inch) of the shoe surface, both shoe and lining assemblies must be replaced.

Installation

1. If the end retainer has been loosened only one-half turn, install the caliper in the anchor plate without shoe and lining assemblies. Tighten the end retainer to 101-130 N·m (75-96 lb-ft).

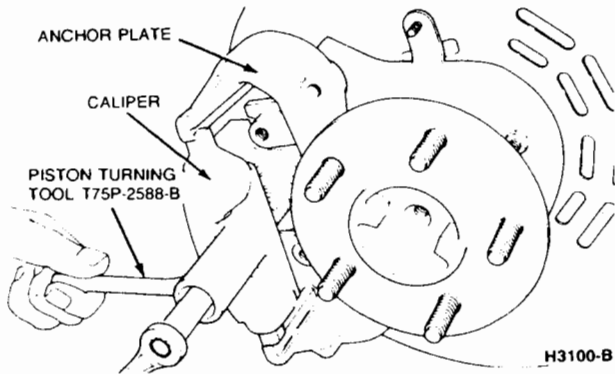
Install the parking brake lever on its keyed spline. The lever arm must point down and rearward. The parking brake cable will then pass freely under the axle. Tighten the retainer screw to 22-29 N·m (16-22 lb-ft). The parking brake lever must rotate freely after tightening the retainer screw. Remove the caliper from the anchor plate.

2. If new shoe and lining assemblies are to be installed, the piston must be screwed back into the caliper bore, using Brake Piston Remover Tool T75P-2588-B or equivalent to provide installation clearance. This tool requires a slight modification. This modification will not prevent using the tool on prior year applications. New tools purchased from the Special Service Tool catalog under the Brake Piston Remover Tool T75P-2588-B number will already be modified.



REMOVAL AND INSTALLATION (Continued)

Remove the rotor, and install the caliper, less shoe and lining assemblies, in the anchor plate. While holding the shaft, rotate the tool handle counterclockwise until the tool is seated firmly against the piston.

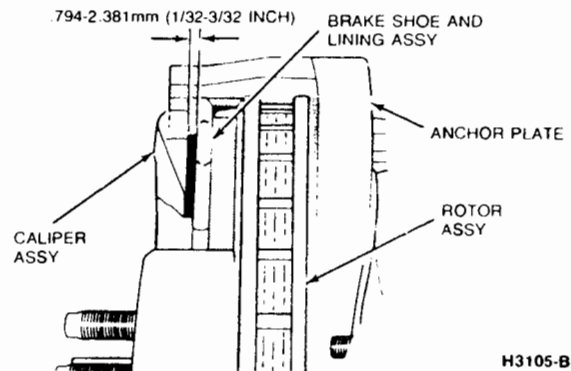


Loosen the handle about one-quarter turn. While holding the handle, rotate the tool shaft clockwise until the piston is fully bottomed in its bore. The piston will continue to turn even after it becomes bottomed. When there is no further inward movement of the piston and the tool handle is rotated until there is firm seating force, the piston is bottomed. Remove the tool and the caliper from the anchor plate.

3. Lubricate anchor plate sliding ways with Disc Brake Caliper Slide Grease D7AZ-019590-A or equivalent. Use only specified grease because a lower temperature type of lubricant may melt and contaminate the brake pads. Use care to prevent any lubricant from getting on the braking surface.
4. Install the anti-rattle clip on the lower rail of the anchor plate.
5. Install inner brake shoe and lining assembly on the anchor plate with the lining toward the rotor. Ensure shoes are installed in their original positions as marked for identification before removal.
6. Install rotor and two retainer nuts.
7. Install the correct hand outer brake shoe and lining assembly on the anchor plate with the lining toward the rotor.
8. Install the flexible hose by placing a new washer on each side of the fitting outlet and inserting the attaching bolt through the washers and fitting. Tighten to 27-40 N·m (20-30 lb-ft).
9. Position the upper tab of the caliper housing on the anchor plate upper abutment surface.
10. Rotate the caliper housing until it is completely over the rotor. Use care so that the piston dust boot is not damaged.

11. **Piston Position Adjustment:** Pull the caliper outboard until the inner shoe and lining is firmly seated against the rotor. Measure the clearance between the outer shoe and caliper. The clearance must be 0.8 to 2.4mm (1/32 to 3/32-inch). If it is not, remove the caliper, then readjust the piston to obtain required gap. Follow the procedure in Step 2, and rotate the shaft counterclockwise to narrow gap and clockwise to widen gap (one-quarter turn of the piston moves it approximately 1.6mm (1/16-inch).

CAUTION: A clearance greater than 2.4mm (3/32-inch) may allow the adjuster to be pulled out of the piston when the service brake is applied. This will cause the parking brake mechanism to fail to adjust. It is then necessary to replace the piston/adjuster assembly following the procedures under Overhaul.



12. Lubricate locating pins and inside of insulator with Silicone Dielectric Compound D7AZ-19A331-A or equivalent.
13. Add one drop of Threadlock and Sealer E0AC-19554-A or equivalent to locating pin threads.
14. Install the locating pins through caliper insulators and into the anchor plate. The pins must be hand inserted and hand started. Tighten to 40-50 N·m (29-37 lb-ft).
15. Connect the parking brake cable to the bracket and the lever on the caliper.
16. Bleed the brake system. Replace rubber bleed screw cap after bleeding.
17. Fill master cylinder as required to MAX level on reservoir.

REMOVAL AND INSTALLATION (Continued)

18. **Caliper Adjustment:** With the engine running, pump the service brake lightly (approximately 62N (14 lbs) pedal effort) about 40 times. Allow at least one second between pedal applications. As an alternative, with the engine off, pump the service brake lightly (approximately 387N (87 lbs) pedal effort) about 30 times. Check the parking brake for excessive travel or very light effort. In either case, repeat pumping the service brake, or if necessary, check the parking brake cable for proper tension. The caliper levers must return to the OFF position when the parking brake is released. Refer to Section 12-70.
19. Install the wheel and tire assembly. Tighten the wheel lug nuts to specification. Install the wheelcover. Remove the safety stands and lower vehicle.
20. Ensure a firm brake pedal application is obtained, and then road test for proper brake operation, including parking brakes.

Brake Shoe and Linings

Removal

1. Perform the Caliper Assembly Removal procedure, previously outlined. If service is not necessary to the caliper assembly, it is not necessary to disconnect the flexible hose from the caliper in this operation.

Support the caliper with a wire hook or other means, so that the flexible hose is not stretched or twisted. Inspect the brake linings for wear. If either lining is worn to within 3.2mm (1/8-inch) of the shoe, both shoe and lining assemblies must be replaced. Also, if it is necessary to replace the shoe and lining assemblies on one wheel, they must be replaced on both wheels in order to maintain equal brake action.

2. Remove and discard the caliper pin insulators. These parts must not be reused.

NOTE: Minor scoring or buildup of lining material does not require machining or replacement of rotor.

Installation

1. Lightly sand or wire brush any rust or corrosion from the caliper housing insulator bores.
2. Install new pin insulators in the caliper housing. Check to see if both insulator flanges straddle the housing holes. Perform the Caliper Assembly Installation procedure.

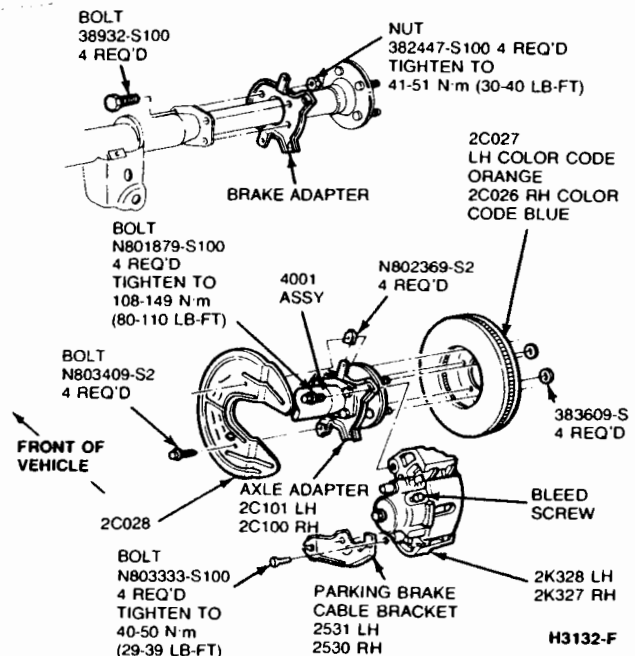
Rotor

Removal

1. Remove the parking brake cable clip and cable. Support the caliper and anchor plate assembly with a wire hook or other means, so that the flexible hose is not stretched or twisted.
2. Remove the two bolts that attach the anchor plate to the brake adapter.
3. Remove the two retainer nuts. Remove the rotor from the axle shaft.

Installation

1. If rotor is being replaced, remove protective coating from new rotor with carburetor degreaser.
2. Install the rotors on the axle shaft flange. Install the two retainer nuts securely.
3. Clean the adapter plate and attaching bolt threads. Add one drop of Threadlock and Sealer meeting specification EOAC-19554-A or equivalent to each bolt and attach the caliper anchor assembly to the adapter. Tighten the bolts to 105-135 N·m (80-100 lb-ft).
4. Mount the caliper assembly on the anchor plate slides. Refer to Caliper Assembly, Installation.



REMOVAL AND INSTALLATION (Continued)**Anchor Plate****Removal**

NOTE: Do not remove the anchor plate unless it is being replaced.

1. Perform the Caliper Assembly Removal procedure. If service is not necessary to the caliper assembly, it is not necessary to disconnect the flexible hose from the caliper in this operation. Support the caliper with a wire hook or other means, so that the flexible hose is not stretched or twisted.
2. Remove and discard both the upper and lower anchor plate-to-axle adapter mounting bolts. Remove the anchor plate.

Installation

1. Clean all foreign material and locking compound residue from the mating surfaces of the axle adapter and anchor plate.
2. Position the anchor plate on the axle adapter. Install new upper and lower mounting bolts finger-tight.
3. Tighten both bolts to 108-149 N·m (80-110 lb-ft). The tightening order is not important.
4. Install the caliper assembly. Refer to Caliper Assembly, Installation.

Rotor Splash Shield**Removal**

1. Remove the three screws that attach the splash shield to the brake adapter.
2. Remove the splash shield.

Installation

1. If the shield is bent, straighten it before installation.
2. Position the shield to the axle adapter. Install the mounting screws, and tighten them to 8-14 N·m (6-10 lb-ft). Note that the tabs on the shield should not interfere with the adapter shield mounting flange.

NOTE: RH and LH shields are interchangeable.

Brake Adapter**Removal**

1. Perform the Caliper Assembly Removal procedure. If service is not necessary to the caliper assembly, it is not necessary to disconnect the flexible hose from the caliper in this operation.

Support the caliper with a wire hook or other means, so that the flexible hose is not stretched or twisted.

2. Remove the anchor plate as outlined.
3. Remove splash shield as outlined.
4. Remove screw attaching anti-lock sensor connector to adapter.
5. Remove axle shaft assembly. Refer to Group 15 for the appropriate axle.
6. Remove four attaching nuts. Remove adapter.

Installation

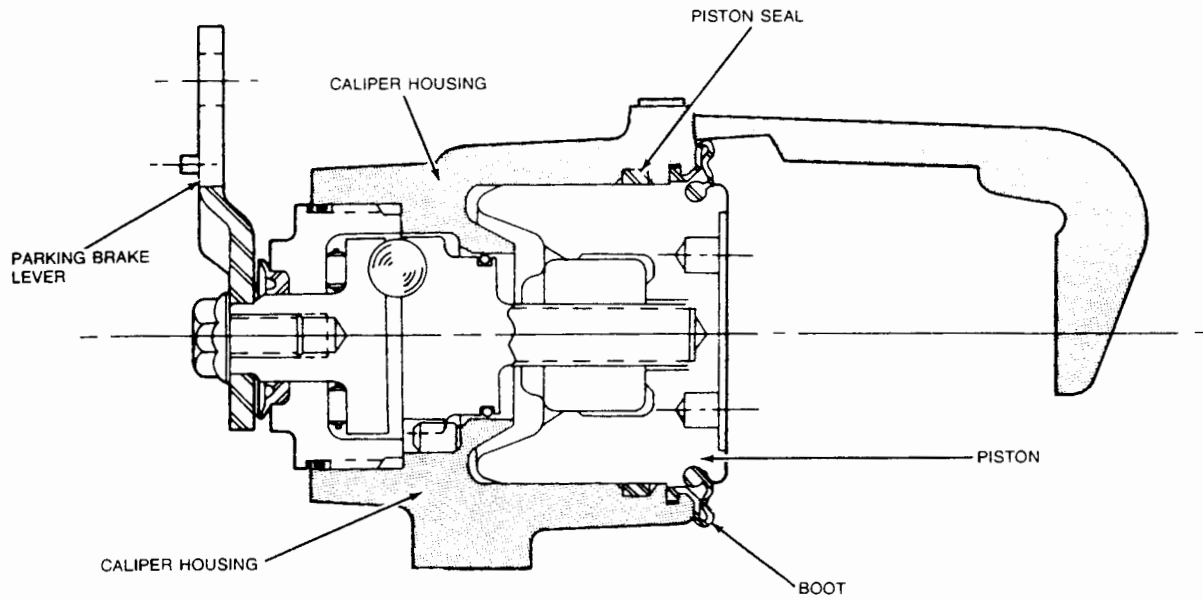
1. Install adapter on axle.

NOTE: Adapters are not interchangeable from right to left and are identified LH and RH.

2. Install four attaching nuts, and tighten to 41-54 N·m (30-40 lb-ft).
3. Install axle shaft. Refer to Group 15 for the appropriate axle.
4. Position anti-lock sensor connector on adapter. Tighten to 1.1-5.6 N·m (10-50 lb-in).
5. Install splash shield anchor plate, rotor and caliper assembly.
6. Clean adapter plate and attaching bolt threads. Add one drop of Threadlock and Sealer meeting specification EOAC-19554-A or equivalent to each bolt and attach the anchor to the adapter. Tighten the bolts to 105-135 N·m (80-100 lb-ft).
7. Install rotor and caliper as outlined.

OVERHAUL**Caliper Assembly****Disassembly**

1. Remove caliper assembly from vehicle as outlined.
2. Remove the parking brake cable bracket and caliper end retainer.



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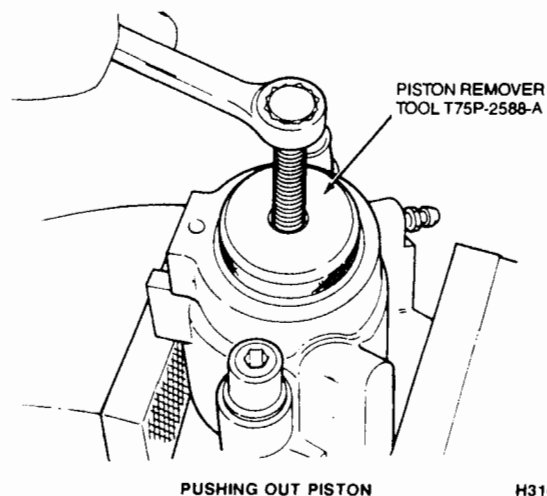
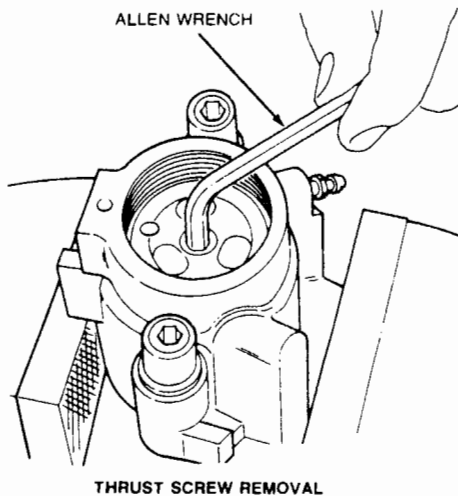
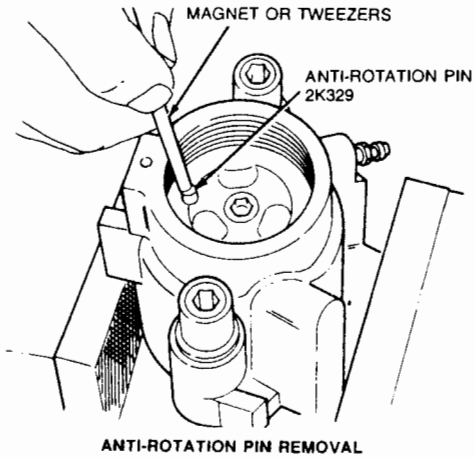
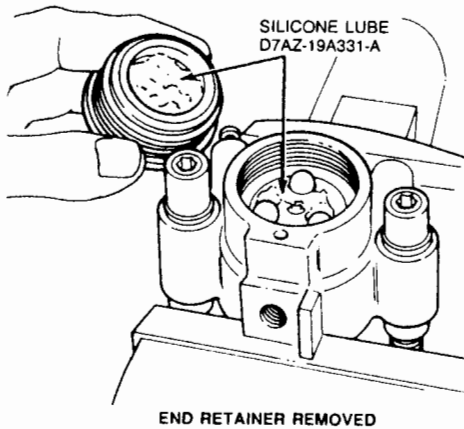
OVERHAUL (Continued)

3. Lift out the operating shaft, thrust bearing and balls.
4. Remove the thrust screw anti-rotation pin with a magnet or tweezers.

NOTE: Some anti-rotation pins may be difficult to remove with a magnet or tweezers. In that case, use the following procedure:

- a. Adjust the piston out from the caliper bore using the modified piston adjusting tool. The piston should protrude from the housing at least 25.4mm (1 inch).

- b. Push the piston back into the caliper housing with the adjusting tool. With the tool in position on the caliper, hold the tool shaft in place, and rotate the handle counterclockwise until the thrust screw clears the anti-rotation pin. Remove the thrust screw and the anti-rotation pin.
5. Remove the thrust screw by rotating it counterclockwise with a 1/4-inch Allen wrench.



H3108-C

6. Remove the piston adjuster assembly by installing Piston Remover Tool T75P-2588-A or equivalent through the back of the caliper housing and pushing the piston out.

CAUTION: Use care not to damage the polished surface in the thrust screw bore,

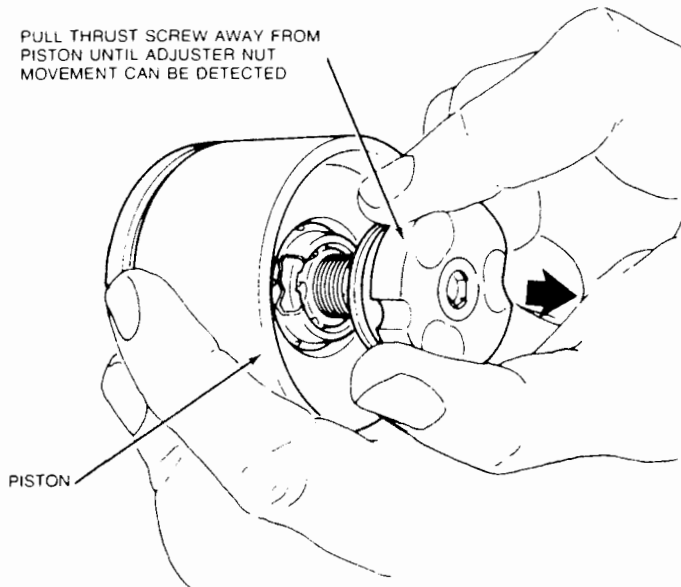
and do not press or attempt to move the adjuster can. It is a press fit in the piston.

7. Remove and discard the piston seal, boot, thrust screw C-ring seal, end retainer O-ring seal, end retainer lip seal and pin insulators.

OVERHAUL (Continued)**Cleaning and Inspection**

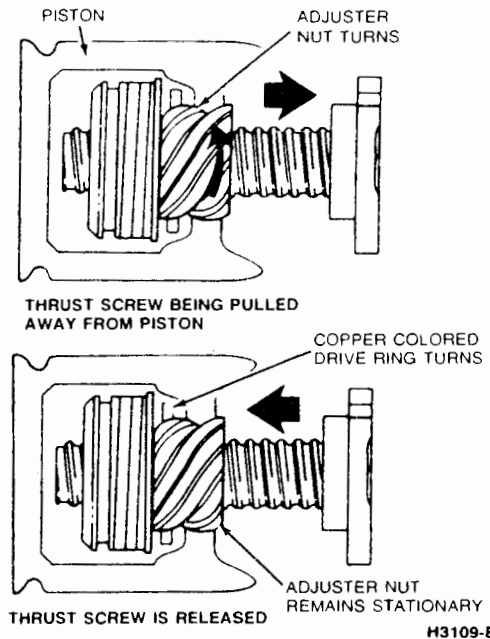
1. Clean all metal parts with isopropyl alcohol. Use clean, dry, compressed air to clean out and dry the grooves and passages. Ensure the caliper bore and compartment parts are completely free of any foreign material.
2. Inspect the caliper bores for damage or excessive wear. The thrust screw bore must be smooth and free of pits. If the piston is pitted, scored, or the chrome plating is worn off, replace the piston/adjuster assembly.
3. The adjuster can must be bottomed in the piston to be properly seated and provide consistent brake function. If the adjuster can is loose in the piston, appears high in the piston, or is damaged, or if brake adjustment is regularly too tight, too loose, or nonfunctioning, replace the piston/adjuster assembly.

PULL THRUST SCREW AWAY FROM PISTON UNTIL ADJUSTER NUT MOVEMENT CAN BE DETECTED



NOTE: Do not attempt to service the adjuster at any time. When service is necessary, replace the piston/adjuster assembly.

4. Check adjuster operation by first assembling the thrust screw into the piston/adjuster assembly, pulling the two pieces apart by hand approximately 6.35mm (1/4 inch), and then releasing them. When pulling on the two pieces, the brass drive ring must remain stationary, causing the nut to rotate. When releasing the two parts, the nut must remain stationary, and the drive ring must rotate. If the action of the components does not follow this pattern, replace the piston/adjuster assembly.

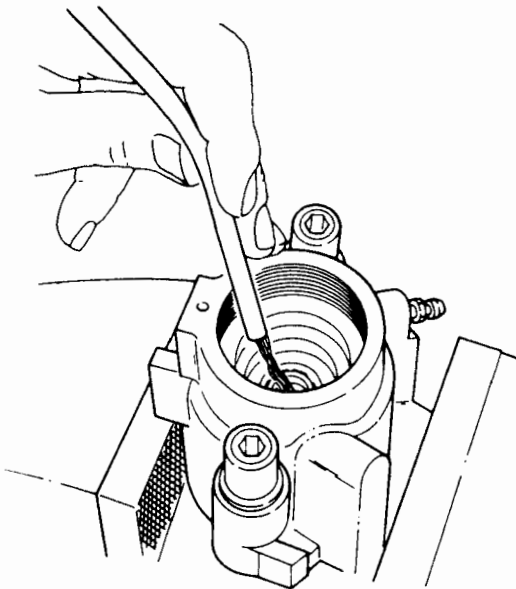


5. Inspect ball pockets, threads, grooves and bearing surfaces of the thrust screw and operating shaft for wear, pitting, or brinnelling. Inspect balls and anti-rotation pin for wear, brinnelling or pitting. Replace operating shaft, balls, thrust screw, and anti-rotation pin if any of these parts are worn or damaged. A polished appearance on the ball paths is acceptable if there is no sign of wear into the surface.
6. Inspect the thrust bearing for corrosion, pitting or wear. Replace if necessary.
7. Inspect the bearing surface of the end plug for wear or brinnelling. Replace if necessary. A polished appearance on the bearing surface is acceptable if there is no sign of wear into the surface.
8. Inspect the lever for damage. Replace if necessary.
9. Lightly sand or wire brush any rust or corrosion from the caliper housing insulator bores.

OVERHAUL (Continued)

Assembly

1. Apply a coat of clean brake fluid to the new caliper piston seal, and install it in the cylinder bore. Ensure the seal is not twisted and that it is seated fully in the groove.
2. Install a new dust boot by seating the flange squarely in the outer groove of the caliper bore.
3. Coat the piston/adjuster assembly with clean brake fluid, and install it in the cylinder bore. Spread the dust boot over the piston, like it is installed. Seat the dust boot in the piston groove.
4. Install the caliper in a vise. Fill the piston/adjuster assembly with clean brake fluid to the bottom edge of the thrust screw bore.

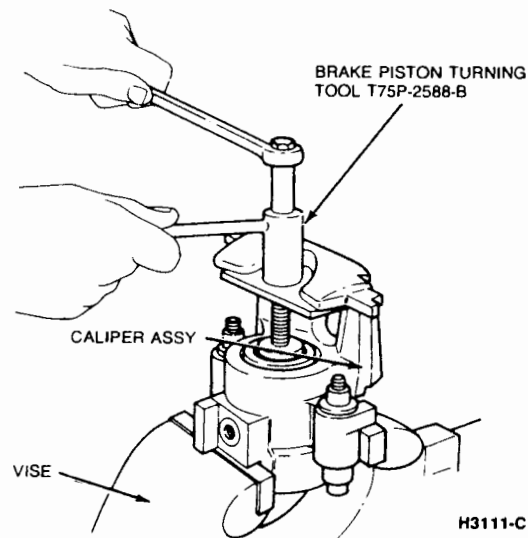


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5. Coat a new thrust screw O-ring seal with clean brake fluid, and install it in the groove in the thrust screw.
6. Install the thrust screw by turning it into the piston/adjuster assembly with a 1/4-inch Allen wrench until the top surface of the thrust screw is flush with the bottom of the threaded bore. Use care to avoid cutting the O-ring seal. Index the thrust screw, so that the notches on the thrust screw and caliper housing are aligned. Then install the anti-rotation pin.

NOTE: The thrust screw and operating shaft are not interchangeable from side-to-side because of the ramp direction in the ball pockets. The pocket surface of the operating shaft and the thrust screw are stamped with the proper letter (R or L), indicating part usage.

7. Place a ball in each of three pockets of the thrust screw, and apply a liberal amount of Silicone Dielectric Grease D7AZ-19A331-A or equivalent on all components in the parking brake mechanism.
8. Install the operating shaft on the balls.
9. Coat the thrust bearing with Silicone Dielectric Grease D7AZ-19A331-A or equivalent. Install it on the operating shaft.
10. Install a new lip seal and O-ring on the end retainer.
11. Coat the O-ring seal and lip seal with a light film of silicone grease, and install end retainer in caliper. Hold the operating shaft firmly seated against the internal mechanism while installing the end retainer to prevent mislocation of the balls. If the lip seal is pushed out of position, reseal the seal. Tighten end retainer to 101-130 N·m (75-96 lb-ft).
12. Install the parking brake lever on its keyed spline. The lever arm must point down and rearward. The parking brake cable will then pass freely under the axle. Tighten the lever retaining screw to 22-29 N·m (16-22 lb-ft). The parking brake lever must rotate freely after tightening.
13. Arrange the caliper in a vise and bottom the piston with modified Brake Piston Turning Tool T75P-2588-B or equivalent.



H3111-C

14. Install new pin insulators in the caliper housing. Check to see if both insulator flanges straddle the housing holes.
15. Install the caliper on the vehicle.

OVERHAUL (Continued)

16. **Piston Position Adjustment:** Pull caliper outboard until inner shoe and lining is firmly seated against rotor, and measure clearance between outer shoe and caliper. The clearance must be 0.8 to 2.4mm (1/32 to 3/32 inch). If it is not, remove the caliper, then readjust the piston to obtain required gap. Perform Step 2 under Caliper Assembly-Installation and rotate shaft counterclockwise to narrow gap and clockwise to widen gap (one-quarter turn of the piston moves it approximately 1.6mm (1/16 inch).

CAUTION: A clearance greater than 2.4mm (3/32-inch) may allow the adjuster to be pulled out of the piston when the service brake is applied. This will cause the parking brake mechanism to fail to adjust. It is then necessary to replace the piston/adjuster assembly as described in this Section.

17. Install parking brake cable brackets on caliper housing. Before tightening attaching bolts, apply service brake lightly, approximately 62N (14 lbs) pedal effort with engine running; approximately 387N (87 lbs) pedal effort with engine off. While brake is applied, rotate parking brake bracket until the bracket lever stop contacts the actuating lever. Hold the bracket in this position while tightening bolts to 40-60 N·m (30-44 lb-ft).
18. Complete caliper installation on the vehicle.

Rotor Refinishing

The rear disc rotor is a hat section-type composite rotor of steel and cast iron. A new simplified method of measuring maximum allowable stock removal using a standard hand micrometer eliminates the need for special tools as on previous rear disc rotors. However, a Rotunda Mounting Adapter 054-00032 or equivalent will be required for use on the brake lathe for refinishing.

All rotor refinishing must adhere to the rule that equal amounts of rotor stock are removed from each braking surface each time a rotor is refinishing.

The minimum allowable overall rotor thickness continues to be stamped on the rotor and must not be exceeded.

- With a suitable micrometer, measure the overall thickness of the rotor braking surface at four equally spaced points around the rotor.
- Using the lowest reading from Step 1, subtract the minimum allowable thickness stamped into the rotor (22.75mm). The difference, if any, represents the total amount of material available for machining. A thickness reading less than the minimum rotor thickness requires rotor replacement.

NOTE: Using a micrometer to measure rotor thickness simplifies previous rotor measurement procedure, but it is mandatory that an equal amount of material be removed from each side of the rotor each time the rotor is turned.

- After measuring the rotor, the rotor should be installed in the lathe arbor using the special adapter that is required for proper rotor alignment. Never use a lathe that cuts only one face of the rotor at a time, it must be a simultaneous straddle cut. Install a dial indicator to read rotor lateral runout near the center of the rotor face. If runout is 0.050mm (0.002-inch) or below, proceed to machine rotor. If runout is over 0.050mm (0.002-inch), loosen rotor on the arbor, and rotate the rotor 90 degrees. Reread the runout, and if it is below 0.050mm (0.002-inch), proceed to machine the rotor. If runout is still over 0.050mm (0.002-inch), again loosen the rotor, and rotate it an additional 90 degrees. Recheck the runout. If runout is 0.050mm (0.002-inch) or less, proceed to machine the rotor. If the runout still exceeds 0.050mm (0.002-inch), return the rotor to the best runout position obtained. If the rotor runout can be brought below 0.127mm (0.005-inch), proceed to machine the rotor. If the rotor cannot be brought below 0.127mm (0.005-inch) runout, it must be replaced.
- Set the cutting tool to just contact the high spots on the rotor, then adjust the cutting tool to the minimum depth required to clean up the rotor face. Equal material must be removed from each side. Do not exceed the allowable stock removal. Clean all cuttings and chips from the rotor before installing it to the axle.

SPECIFICATIONS**TORQUE SPECIFICATIONS**

Description	N-m	Lb-Ft
Caliper End Retainer	101-160	75-118
Parking Brake Cable Retaining Screw	22-29	16-22
Flex Hose-to-Caliper Retaining Bolt	27-40	20-30
Caliper Locating Pins	40-50	29-37
Anchor Plate Retaining Bolts	108-149	80-110
Splash Shield Retaining Screws	8-14	6-10
Axle Adapter Retaining Bolts	41-54	30-40
Parking Brake Lever Retaining Screw	22-29	16-22
Parking Brake Cable Bracket-to-Caliper	40-50	30-37

CH6360-A

SPECIFICATIONS (Continued)

BRAKE DIMENSIONS		
Description	Specification Metric (U.S.) ^②	
Lining Material	Riveted	
Lining Size Inner and Outer	152.9 x 48.26 (6.02 x 1.9)	
Lining Wear Limit (From Shoe Surface)	3.18 (0.125)	
Caliper Cylinder Bore Diameter	53.34 (2.1)	
Rear Rotor Nominal Thickness	24 (.945)	
Rear Rotor ^① Minimum Thickness	22.75 (.895)	
Rear Rotor Diameter	Inner	197.9 (7.79)
	Outer	287.5 (11.31)
Rear Rotor Allowable Runout	0.10 (0.004)	
Rear Rotor Finish ^③	3.2/04 μm (16-125μ in.)	
Rear Rotor Thickness Variation	0.013 (0.0005)	

^①Minimum safe thickness is shown on each rotor.
^②mm (inches) unless specified.
^③μm micrometer (μ in. micro inches)

CH6362-A

SPECIAL SERVICE TOOLS

Tool Number	Description
T75P-2588-B	Brake Piston Turning Tool
T75P-2588-A	Disc Brake Piston Remover
T87P-2588-A	Piston Remover Tool
T87P-2588-B	Rear Brake Snap Ring Installer

CH3144-D

ROTUNDA EQUIPMENT

Model	Description
054-00020	Disc Brake Rotor Lathe
054-00032	Rotor Mounting Adapter

CH5197-A

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

SUBJECT	PAGE	SUBJECT	PAGE
ADJUSTMENTS		REMOVAL AND INSTALLATION (Cont'd.)	
Parking Brake	12-70-2	Cable, Intermediate	12-70-6
DESCRIPTION		Cable, Transverse	12-70-6
Control Assemblies	12-70-1	Cables, Rear	12-70-6
DIAGNOSIS AND TESTING		Control Assembly	12-70-4
Vacuum Release Parking Brake	12-70-2	SPECIAL SERVICE TOOLS	12-70-7
REMOVAL AND INSTALLATION		SPECIFICATIONS	12-70-7
Cable, Front	12-70-6	VEHICLE APPLICATION	12-70-1

VEHICLE APPLICATION
Mark VII.

DESCRIPTION

Control Assemblies

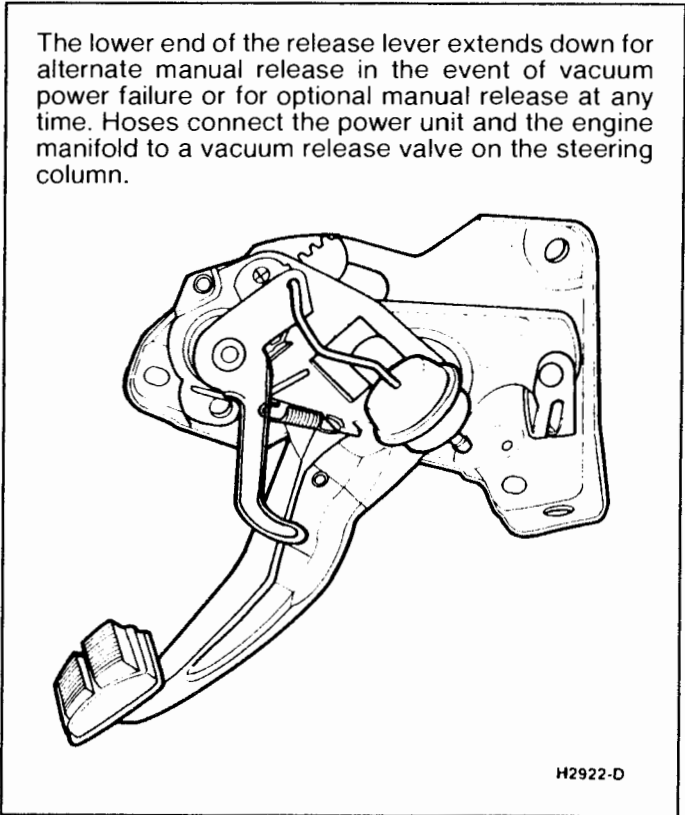
An independent foot-operated parking brake control actuates the rear wheel brake shoes through a cable system.

A parking brake warning lamp is part of the system, indicating to the driver whether the parking brake is applied or released.

The automatic (vacuum) release type is standard equipment on Mark VII vehicles.

On the automatic-type, the vacuum power unit with mounting bracket is bolted to the control assembly. The vacuum-actuated piston within the unit is connected by a rod to the upper end of the release lever.

The vacuum motor is actuated to release the parking brake whenever the engine is running and the transmission is in forward driving gear.



DIAGNOSIS AND TESTING

Vacuum Release Parking Brake

Look closely at the operation of the brake linkage as the brake pedal is depressed. Check the operation of the brake linkage when the manual release lever is activated. These checks will indicate whether the manual parking brake control linkage is operating properly or requires service or adjustment due to inability of the parking brake to hold against moderate vehicle movement. Perform tests of the parking brake system and controls after making sure the linkage and manual controls operate properly.

When testing a parking brake vacuum release system, a minimum of 34 kPa (10 in-Hg) should be available at all points where vacuum is applied. This can be checked with a gauge, such as Rotunda Vacuum Tester 021-00014 or equivalent.

Failure to maintain 34 kPa (10 in-Hg) during vacuum system tests could be caused by a loose hose connection, resulting in a vacuum leak. When checking for vacuum between two points, trace the hose along its entire routing to ensure it is not crossed with another hose or connected to the wrong connection.

All of the vacuum parking brake control checks are to be performed with the engine running at idle speed.

To detect any leaks in the parking brake hoses or to find disconnected or improperly connected hoses, listen for a hissing sound along the hose routing.

CAUTION: Do not apply air pressure to the vacuum system under any circumstances because the actuator diaphragm in the parking brake vacuum motor may be damaged.

1. Start engine, and run it at idle speed. With the transmission shift control in NEUTRAL, depress the parking brake pedal to apply the parking brake. Move the transmission shift control to D range, and observe the parking brake sector to see that the sector returns to its zero travel position when the parking brake releases. If parking brake releases, the parking vacuum control is working properly.

NOTE: The parking brake vacuum release does not operate with the transmission in REVERSE.

2. If the parking brake does not release, test for vacuum at the vacuum line connected to the parking brake release vacuum motor. This can be accomplished by removing the hose from each component and attaching it to the vacuum gauge. Connect two distributor tester vacuum hose adapters together with a coupling as a connector attaching the gauge. A minimum of 34 kPa (10 in-Hg) is required to actuate the parking brake vacuum motor. If a minimum reading is not present when checking each of the above components, they must be replaced.

Operation Test

Check operation of the parking brake with vehicle on a hoist and parking brake fully released. Refer to the Pre-Delivery manual, Section 50-04. If there is any slack in the cables or if the rear brakes drag when wheels are turned, adjust as required.

Verify that the levers on the rear calipers are fully returned to the stop on the parking brake cable bracket. If not, adjust as required.

ADJUSTMENTS

Parking Brake

Cable Adjustment

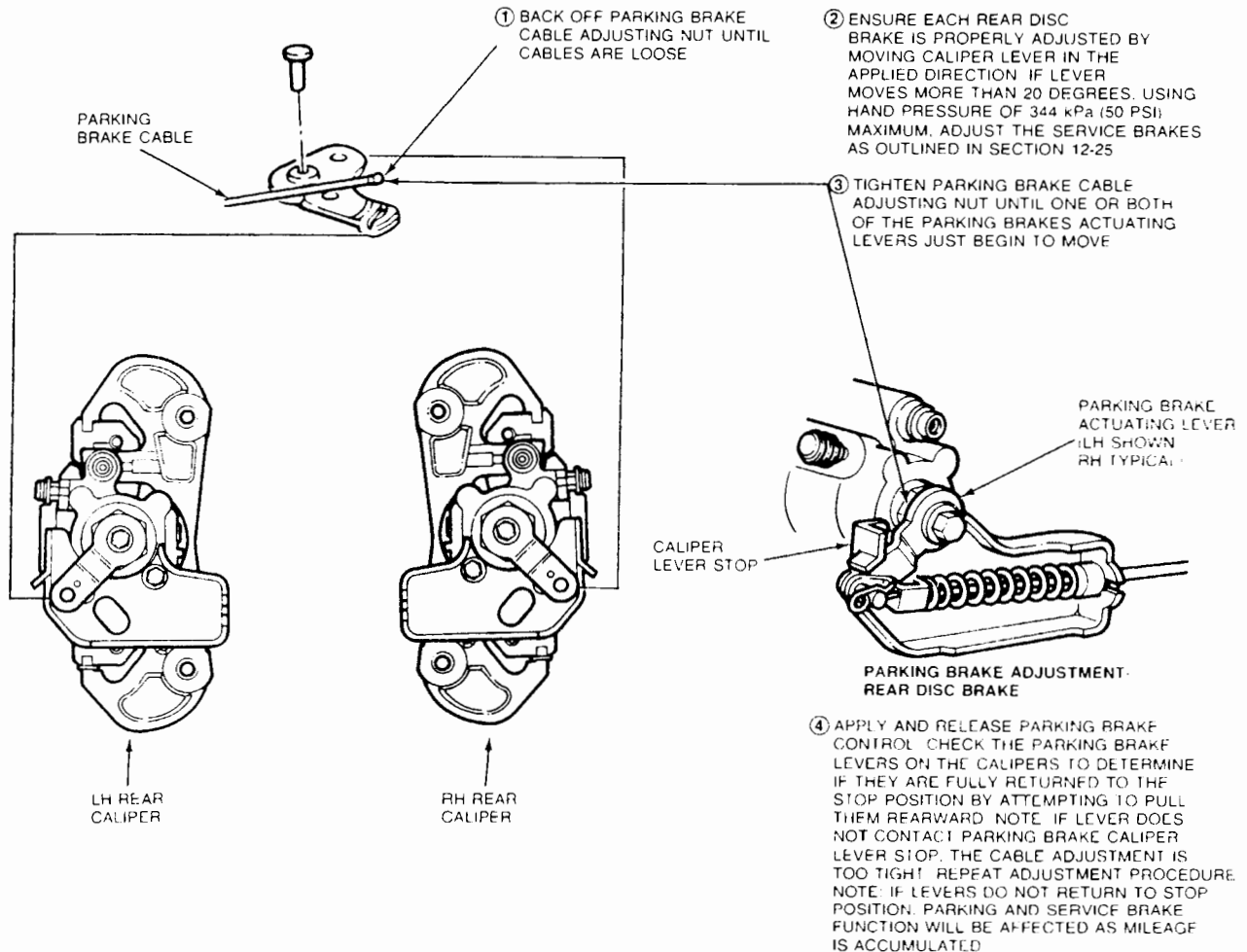
1. Make sure the parking brake is fully released.
2. Place the transmission in NEUTRAL. Raise the vehicle on an axle-type hoist. Refer to the Pre-Delivery manual, Section 50-04.
3. Tighten the adjusting nut against the cable equalizer, causing a rear wheel brake drag. Loosen the adjusting nut until the rear brakes are fully released. There should be no brake drag. If brake cables are replaced in any system having a foot-operated control assembly, stroke the parking brake control with approximately 450N (100 lbs) pedal effort, then release control and repeat this step.
4. Lower vehicle, and check operation of the parking brake.

ADJUSTMENTS (Continued)

Disc Brakes, Rear

Adjust the rear disc parking brakes as shown.

NOTE: If caliper has been overhauled or shoe lining changed, be sure to pump pedal lightly, approximately 30 times, before adjusting parking brake.



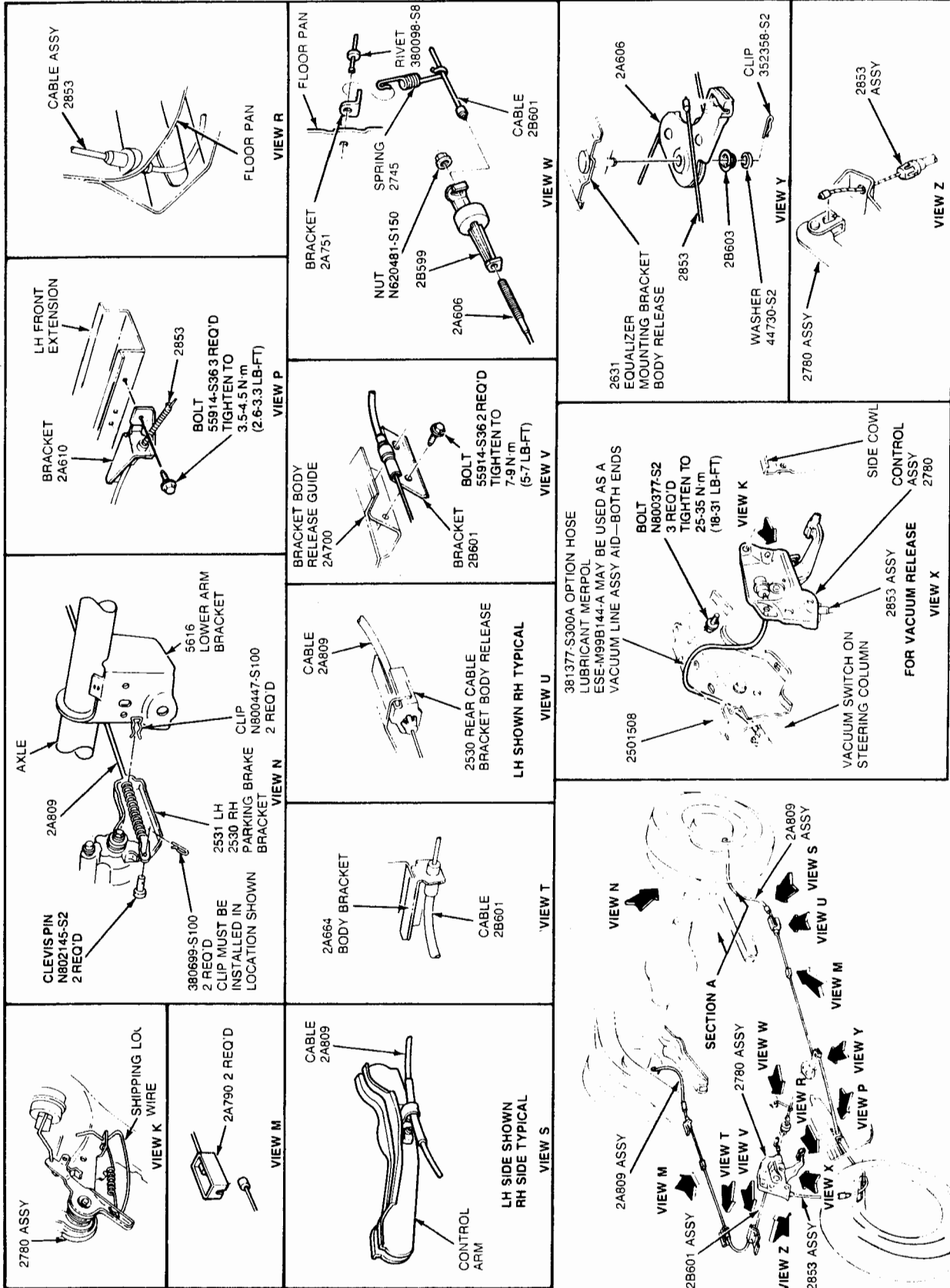
REMOVAL AND INSTALLATION**Control Assembly****Removal**

1. Fully release the parking brake.
2. Remove all tension from the rear cables by backing off the adjusting nut from the equalizer or adjuster.
3. Disconnect vacuum hose from vacuum release motor.
4. Disconnect the wiring connector from the parking brake warning lamp switch.
5. Remove the three screws attaching the control assembly to the cowl side panel.
6. Remove the front cable and push-in prong retainer from the control assembly housing using a 13mm box end wrench to depress retaining prong.
7. Remove the control assembly from vehicle.

Installation

1. Position the control assembly in vehicle.
2. Fit the cable assembly through its mounting hole. Connect the cable end fitting to the control clevis.
3. Install the attaching screws to the cowl side bracket. Tighten the screws to 17-33 N·m (12-24 lb-ft).
4. Connect the vacuum hose to the vacuum release actuator.
5. Connect the wiring connector to the parking brake warning lamp switch.
6. Check the operation of the parking brake. Adjust the parking brake as required.

REMOVAL AND INSTALLATION (Continued)



H3077-F

REMOVAL AND INSTALLATION (Continued)**Cable, Front****Removal**

1. Raise the vehicle on a hoist. Refer to the Pre-Delivery manual, Section 50-04.
2. Loosen the adjusting nut at the adjuster assembly.
3. Disconnect the front cable from the equalizer lever assembly.
4. Remove the cable from the body bracket.
5. Lower vehicle.
6. From inside the passenger compartment, remove tabbed retainer holding the cable conduit to the parking brake control.
7. Remove the cable assembly from inside the vehicle.

NOTE: On cable assemblies with snap-in fittings, compress tangs and remove from mounting surface.

Installation

1. Insert cable through the provided openings in the floorpan, and place it in the approximate installation position.
2. Position upper end of the front cable to the control assembly with the cable cylindrical end through the control assembly attachment hole. Press cable prongs into the control assembly.
3. Raise vehicle and install cable conduit through the hole into body bracket. Press the tabbed conduit retainer into the bracket hole.
4. Under vehicle, install cable to the equalizer lever assembly.
5. Adjust parking brake.

Cable, Intermediate**Removal**

1. Raise vehicle on a hoist. Refer to the Pre-Delivery manual, Section 50-04.
2. Remove the cable adjusting nut.
3. Disconnect the intermediate cable ends from the LH rear and the transverse cable.
4. Remove the cotter pin, washer and spring from the pin protruding through the equalizer lever assembly, and remove the lever.

NOTE: The intermediate cable cannot be separated from the lever assembly.

Installation

1. Install lever equalizer assembly on pin. Hold it in position while installing spring, washer and cotter pin into pin.
2. Connect intermediate cable ends to LH rear cable and the transverse cable.
3. Adjust parking brakes as outlined under Adjustments.
4. Lower vehicle.

Cable, Transverse**Removal**

1. Raise vehicle on a hoist. Refer to the Pre-Delivery manual, Section 50-04.
2. Loosen the adjusting nut on the adjusting rod until nut is off rod. Refer to illustration following Control Assembly, Installation.
3. Remove the cable ends from the RH rear and intermediate cables.
4. Remove hairpin clips, if present, or conduit bracket as required to remove transverse cable from vehicle.

Installation

1. Hold transverse cable in position, and install hairpin clips, if present, or screws for conduit bracket, as required.
2. Connect cable ends to RH rear and intermediate cables.
3. Tighten adjusting nut. Adjust parking brake.
4. Lower vehicle.

Cables, Rear**Removal**

Refer to illustration following Control Assembly, Installation.

1. Loosen the adjusting nut at the adjuster assembly.
2. With the cables slackened, disconnect the rear cables from the RH and LH rear cable connectors. The LH cable connects to end of the intermediate cable. The RH cable connects to the transverse cable.
3. If the equalizer assembly or transverse cable is to be removed, the attaching brackets should be removed at this point along with the connection at the adjuster assembly.
4. If the rear cable(s) is to be removed, disconnect the cable(s) from the body bracket(s) or caliper bracket(s) at the rear of vehicle.
5. Remove the rear brake self-adjuster spring to allow clearance to remove the cable end from the parking brake lever and the pronged cable retainer from the backing plate.
6. Slide the cable out of the brake backing plate, and remove cable from vehicle. Remove the clevis pin at the caliper actuating arm.

REMOVAL AND INSTALLATION (Continued)**Installation**

1. On rear drum brake vehicles, install the rear cable(s) to the body bracket.
2. Insert the rear end of the cable(s) through the hole in the backing plate. Attach the cable to the parking brake lever on the brake shoe.
3. Push the cable through the hole in the backing plate until the cable retaining prongs are securely positioned on the backing plate.
4. Install the rear brake self-adjuster spring, and attach the forward end of the rear cable(s) to the connector. If the equalizer assembly or transverse cable(s) have been removed, they should be installed at this time and attached to the connectors at the rear cable(s) to complete the system.
5. Install the clevis pin, connecting the caliper actuating arm to the rear cable.
6. Install adjusting nut to the adjuster assembly. Adjust parking brake.

SPECIFICATIONS**TORQUE SPECIFICATIONS**

Description	N-m	Lb-Ft
Parking Brake Control Assembly Cap Screws	17-33	12-24

CH2924-F

SPECIAL SERVICE TOOLS**ROTUNDA EQUIPMENT**

Model	Description
021-00014	Vacuum Tester

CH3076-C