GROUP

BRAKE SYSTEM 06

(2000)

SECTION 06-00 Brake System—Service

VEHICLE APPLICATION

Taurus / Sable and Taurus SHO.

DESCRIPTION

WARNING: BRAKE FLUID CONTAINS POLYGLYCOL ETHERS AND POLYGLYCOLS. AVOID CONTACT WITH EYES. WASH HANDS THOROUGHLY AFTER HANDLING. IF BRAKE FLUID CONTACTS EYES, FLUSH EYES WITH RUNNING WATER FOR 15 MINUTES. GET MEDICAL ATTENTION IF IRRITATION PERSISTS. IF TAKEN INTERNALLY, DRINK WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION IMMEDIATELY.

This Section covers the Diagnosis and Testing, and the Cleaning and Inspection procedures for the Brake system. Refer to the appropriate Section in this Group for further information.

DIAGNOSIS AND TESTING

Brake System Diagnosis

Diagnosis of mechanical and hydraulic concerns associated with the brake system is covered in this Section.

In addition to the Brake System Diagnosis charts, further specific diagnosis charts are furnished for the master cylinder, brake control valve and the vacuum brake booster.

Always check the fluid level in the master cylinder before performing the test procedures. If the fluid level is not at the MAX line to 4.0mm (0.16 inch) below on the master cylinder reservoirs, add Heavy-Duty Brake Fluid C6AZ-19542-AA (ESA-M6C25-A) or DOT-3 equivalent.

CAUTION: Use of any other than the approved DOT-3® brake fluid will cause permanent damage to brake components and will render the brakes inoperative.

If a brake is locked and the vehicle must be moved, open the bleeder screw on both front wheels to let out enough fluid to relieve the pressure. Close the bleeder screws. This bleeding operation will release the brakes but will not correct the cause of trouble.

Hydraulic System

Two major concerns can occur in hydraulic brake systems: external leaks, and master cylinder bypass (internal leak). Hydraulic brake systems and their components, the master cylinder and valves, do not cause the vehicle to vibrate or pull, the brakes to grab or squeal, or the brake pedal to pulse, except during ABS operation. In most cases, they will not even make the brakes drag. The sources of these concerns 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 concerns.

Master Cylinder

Normal Conditions

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

Condition 1: New brake systems are not designed to produce as hard a pedal effort as in the past. Complaints of light pedal efforts should be compared to pedal efforts on another vehicle, same model and year.

Condition 2: A trace of brake fluid existing on the booster shell below the master cylinder mounting flange. This results from the normal lubricating action of the master cylinder bore end seal.

Condition 3: Fluid level will decrease with front lining wear.

Abnormal Conditions

Changes in brake pedal feel or travel are indicators that something could be wrong in the brake system. The following conditions use brake pedal feel and the warning indicator along with reservoir fluid level, as indicators in diagnosing brake system concerns.

Condition 1: Pedal goes down fast. This could be caused by an external leak or internal leak.

Condition 2: Pedal eases down slowly. This could be caused by an external leak or internal leak.

Condition 3: Pedal is low and / or feels spongy. This condition may be caused by: no fluid in the reservoir, reservoir cap vent holes clogged, rear brakes out of adjustment, or air in the hydraulic system.

Condition 4: Pedal effort excessive. This may be caused by a bind or obstruction in pedal / linkage or insufficient booster vacuum.

Condition 5: Rear brake lockup during light pedal force. This may be caused by wrong tire pressure, grease or fluid on linings / damaged linings, improperly adjusted parking brakes, or damaged / contaminated pressure control valve(s).

Condition 6: Erratic pedal effort. This condition could be caused by brake booster malfunction, or extreme caliper piston knock back or improperly installed disc brake shoe and lining.

Condition 7: Brake warning indicator ON. This may be caused by low fluid level, ignition wire routing too close to fluid level indicator assembly, or float assembly damage.

NOTE: Prior to performing any diagnosis, ensure that the brake system warning indicator is functional.

The diagnosis techniques and service procedures are referenced in the Brake Master Cylinder Diagnosis charts. Refer to these charts for proper use of diagnosis techniques in diagnosing brake hydraulic system concerns.

Diagnostic Technique No. 1

External Fluid Leaks—Check

It is possible that all evidence of fluid leakage may have washed off, if the vehicle has been operated in rain or snow, as brake fluid is water soluble. Refill system, bleed, and apply the brakes several times. Examine the system to verify that the reservoir fluid level is actually dropping. Locate and correct the external leak. If fluid level drops and no external leak can be found, check for a master cylinder bore end seal leak.

Diagnostic Technique No. 2

Master Cylinder Bypass Condition Check

1. Check fluid in master cylinder. Fill reservoir if low or empty.

DIAGNOSIS AND TESTING (Continued)

2. Observe fluid level in reservoir. If after several brake applications the fluid level remains the same, measure wheel turning torque required to rotate wheels with brakes applied as follows:
   - Place transmission in NEUTRAL and raise vehicle on hoist. Refer to Section 00-02.
   - Apply brakes with a minimum of 445N (100 lbs) and hold for approximately 15 seconds. With brakes still applied, exert torque on front wheels to 101 N·m (75 lb-ft). If either wheel rotates, inspect internal components of master cylinder. Replace or service master cylinder.

Diagnostic Technique No. 3

Reservoir Sealing Points—Check

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 gasket and cap. Reposition cap and gasket.

Type 2: An external leak may occur at the reservoir mounting grommets. Service such a leak by installing new grommets.

Type 3: ABS only - An external leak may occur at either end of the HCU supply hose or the HCU reservoir.

Diagnostic Technique No. 4

Brake Pedal Reserve—Check

Where a low pedal or the feel of a bottomed out condition exists, check for brake pedal reserve.

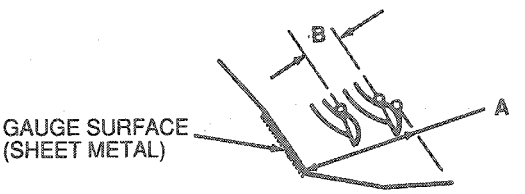
1. Operate engine at idle with the transmission in either PARK or NEUTRAL.
2. Depress brake pedal lightly three to four times.
3. Allow 15 seconds for vacuum to replenish booster.

   NOTE: This increased resistance may feel like something has bottomed out.
4. Apply brake pedal until it stops moving downward or an increased resistance to the pedal travel occurs.
5. Hold pedal in applied position and raise the engine speed to approximately 2,000 rpm.

   NOTE: The additional movement of the brake pedal is the result of the increased engine manifold vacuum which exerts more force on the brake booster during engine rundown. This means that additional stroke is available in the master cylinder, and the brake system is not bottoming out as a customer may believe.
6. Release accelerator pedal and observe that brake pedal moves downward as engine returns to idle speed.

Brake Pedal Free Height Measurements

1. Insert a slender, sharp-pointed prod through carpet and sound deadener to dash panel metal. Measure distance to center on top of brake pedal pad.
2. If the position of pedal is not within specification, check brake pedal for missing, worn, or damaged bushings, or loose retaining bolts and replace, if required.
3. If pedal free height is still out of specification, check brake pedal, booster or master cylinder to ensure correct components are installed. Replace components as necessary.



H4001-B

TYPE	PEDAL FREE HEIGHT "A" MAX.	PEDAL FREE HEIGHT "A" MIN.	MAXIMUM PEDAL TRAVEL (INCHES) "B"
Power Disc	172mm (7.0 Inches)	156mm (6.0 Inches)	59.5mm (2.34 MAX.)

NOTE: Vehicles close to maximum pedal travel specifications may be improved by bleeding the brake system.

Brake Pedal Travel Measurement

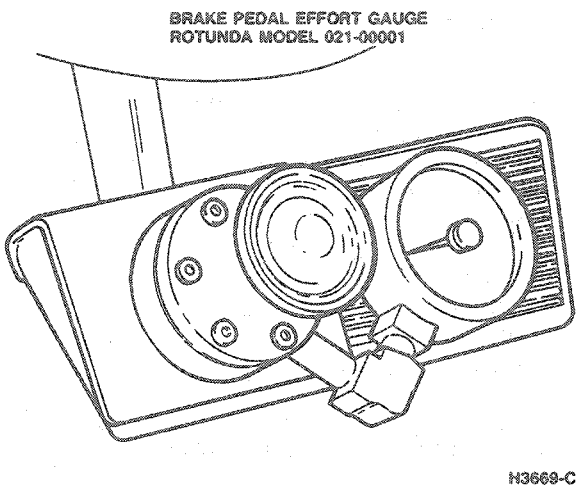
Tools Required:

- Brake Pedal Effort Gauge 021-00001

1. With engine running and transmission in PARK or NEUTRAL, block wheels and release parking brake.

DIAGNOSIS AND TESTING (Continued)

2. Install Rotunda Brake Pedal Effort Gauge 021-00001 or equivalent on the brake pedal pad.



3. Hook a steel measuring tape to the brake pedal. Measure and record the distance from the brake pedal free height position to the reference point, which is at the six o'clock position on the steering wheel rim.
4. With steel tape still hooked to brake pedal, depress brake pedal by pressing downward on Rotunda Brake Pedal Effort Gauge 021-00001 or equivalent. Apply a 111N (25 lb) load to center of pedal. Maintain the pedal load, and measure the distance from brake pedal to the fixed reference point on steering wheel rim parallel to centerline of steering column.
5. If pedal travel is more than the maximum specification on vehicles with self-adjusting / drum brakes, make several reverse stops with a forward stop before each. Move vehicle in reverse and forward for approximately 10 feet. Then, apply brakes and hold brake pedal down until vehicle is completely stopped. This will actuate brake self-adjusters. If these stops do not bring brake pedal travel within specification, make several additional forward and reverse stops as outlined above.
6. On self-adjusting rear drum brakes, if the second series of stops does not bring brake pedal travel within specification, remove brake drums, and check brake adjusters to ensure they are functioning. Check brake lining for wear or damage. Service or replace all worn or damaged components. Adjust brake. Refer to Section 06-02.
7. If all drum brake adjusters, brake drums and brake shoe linings are functional, and brake travel is not within specification, check pedal assembly for missing or loose attachments.
8. If above Steps do not bring brake travel within specification, bleed brake system.

Power Brake Functional Test

Vacuum Booster

Inspect all 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 collapsed areas. Inspect check valve on power unit for damage.

Booster Operation Check

1. Check hydraulic brake system for leaks or insufficient fluid.
2. With transmission in NEUTRAL, stop engine and apply parking brake. Depress brake pedal several times to exhaust all vacuum in the system.
3. Depress pedal and hold it in the applied position. Start engine. If vacuum system is operating, pedal will tend to move downward under constant foot pressure. If no motion is felt, the vacuum booster system is not functioning.
4. Remove vacuum hose from brake booster check valve connection. Manifold vacuum should be available at the check valve end of the hose with engine at idle speed and transmission in NEUTRAL. If manifold vacuum is available to the booster, connect vacuum hose to booster and repeat Steps 2 and 3. If no downward movement of brake pedal is felt, replace brake booster.
5. Operate engine a minimum of 10 seconds at fast idle. Stop engine, and let vehicle stand for 10 minutes. Then, depress brake pedal with approximately 89N (20 lbs) of force. Pedal feel should be the same as that noted with engine operating. If pedal feels hard (no power assist), replace check valve and retest.

   If brake pedal feels spongy, bleed hydraulic system to remove air. Refer to Section 06-06.

Refer to Vacuum Brake Diagnosis chart to assist in vacuum booster diagnosis.

DIAGNOSIS AND TESTING (Continued)

BRAKE SYSTEM DIAGNOSIS

CONDITION	POSSIBLE SOURCE	ACTION
• Brakes Do Not Apply	• Insufficient brake fluid. • Binding or damaged brake pedal linkage.	• Add fluid, bleed system, check for leaks. • Service as required.
• Excessive Pedal Travel or Pedal Goes to Floor	• Air in system. • Loose brake tube end fittings. • Malfunctioning master cylinder. • Malfunctioning ABS hydraulic unit. • Loose wheel bearings — front. • Loose or missing pedal bushings / fasteners.	• Bleed system. • Tighten to specification. • Refer to Master Cylinder Diagnosis. • Refer to ABS Diagnosis, Section 06-09. • Replace as required. • Check and replace as required.
• Excessive Pedal Effort to Stop Vehicle	• Binding or damaged pedal linkage. • Engine vacuum loss. • Booster inoperative. • Worn or contaminated linings. • Brake system.	• Inspect. Service as required. • Check engine vacuum, and vacuum at check valve to booster. Service as required. • Perform power brake function test or vacuum booster diagnosis. • Inspect. Replace if necessary. • Inspect wheel cylinders or caliper pistons, restricted lines or hoses, contaminated brake fluid, improper operation of proportioning or metering valve. Service as necessary.
• Spongy Pedal	• Air in system. • Loose or improper brake pedal, pedal support, booster, master cylinder attachment. • Brake system.	• Bleed system. • Service as required. • Inspect for damaged or distorted parts in brake caliper assemblies, cracked brake drums, mis-machined anchor plates.
• Brakes Drag, Slow or Incomplete Release	• Parking brake cable out of adjustment or binding. • Front wheel bearings worn or damaged. • Blocked master cylinder compensator ports. • On front disc brakes — loose or missing innershoe clip. • Brake adjustment (rear). • On front disc brakes — LH or RH shoes misassembled. • Restriction in hydraulic system. • Caliper piston seizure.	• Check cables for correct adjustment or bind. • Check bearings for wear, damage or bind. • Refer to Master Cylinder Diagnosis. • Inspect and replace if required. • Check and adjust. • Check and service. • Check and service. • Check and service.
• Noise at Wheels When Brakes are Applied — Snap or Clicks	• On disc brakes — loose or missing inner anti-rattle clip. • On front disc brakes — missing pin insulator. • On front disc brakes — missing or loose pins.	• Lubricate and replace[1] • Lubricate and replace[1]. • Lubricate and replace[1].
Noise at Wheels When Brakes are Applied — Scrape or Grind	• Worn brake linings. • Caliper to wheel or rotor interference. • Other brake system components: Warped or bent brake splash shield, cracked rotors. • Tires rubbing against chassis or body. • Rotor to spindle interference.	• Replace drums or rotors if heavily scored. • Replace as required. • Inspect and service. • Inspect and service. • Replace as required.

1 Use Disc Brake Caliper Slide Grease D7AZ-19590-A (ESA-M1C172-A) or equivalent.

DIAGNOSIS AND TESTING (Continued)

BRAKE SYSTEM DIAGNOSIS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
• Noise at Wheels When Brakes are Applied — Squeaks, Squeals, or Chatter. NOTE: Brake friction materials inherently generate noise and heat in order to dissipate energy. As a result, occasional squeal is normal and is aggravated by severe environmental conditions such as cold, heat, wetness, snow, salt, mud, etc. This occasional squeal is not a functional concern and does not indicate any loss of brake effectiveness.	• Rotors and pads worn or scored. • On disc brakes — missing or damaged brake pad insulators. • On disc brakes — burred or rusted calipers. • Dirty, greased, contaminated or glazed linings. • Improper lining parts.	• Inspect, service or replace. • Replace. • Clean or deburr. • Clean or replace. Lightly sand off glaze. • Inspect for correct usage. Replace.
• Noise at Wheels, Brakes Not Applied — Squeak or Squeal	• Wheelcover attachment. • Loose wheel retaining lug nuts. Other brake system components: • Loose or extra parts in brakes. • Worn, damaged, or insufficiently lubricated wheel bearings. • Improper positioning of shoe in caliper. • Outside diameter of rotor rubbing caliper housing. • Improper installation of disc brake anti-rattle clip.	• Seat covers with a rubber mallet. Service flanges or replace cover. • Tighten to specification. Replace wheel if stud holes are damaged. • Inspect, service or replace as required.
• Noise at Wheels, Brakes Not Applied — Growling, Click or Rattle	• Stones or foreign material trapped inside wheelcovers. • Loose grease cap. • Loose wheel lug nuts. • Disc brake caliper — loose or missing anti-rattle clips or support pins. • Worn, damaged or dry wheel bearings.	• Remove stones, etc. • Service or replace. • Tighten to specification. Replace if stud holes are elongated. • Inspect, service or replace. • Inspect, lubricate or replace.
• Brakes Pull to One Side	• Unequal air pressure in tires. • Grease or fluid on linings. Glazed linings. • Loose or missing disc brake caliper retaining pins. • Improper size or type lining on one wheel. • Stuck or seized calipers. • Restricted brake lines or hoses. Other brake system components: • Improper positioning of disc brake shoe and lining in the caliper. • Damaged or worn wheel bearings.	• Inflate tires to correct pressure. • Replace. • Replace missing bolts. Tighten to specification. • Replace with correct brake lining in axle sets. • Service or replace. • Service or replace. • Inspect, service or replace as required.
• Brakes Grab or Lock-up When Applied	• Tires worn or incorrect pressure. • Grease or fluid linings — damaged linings. • Improper size or type of linings. Other brake system components: • Pins for caliper attachment loose or missing. • Worn, damaged or dry wheel bearings. • Improperly adjusted parking brake.	• Inflate tires to correct pressure. Replace tires with worn tread. • Inspect, service or replace. • Replace with correct brake in axle sets. • Inspect, service or replace as required.

DIAGNOSIS AND TESTING (Continued)

BRAKE SYSTEM DIAGNOSIS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
• Brake Warning Indicator On	• Hydraulic system. • Shorted indicator circuit. • Parking brake not returned. • Brake warning indicator switch.	• Refer to Master Cylinder Diagnosis. • Correct short in warning circuit. • Refer to Parking Brake Will not Release or Fully Return below. • Replace.
• Intermittent Loss of Pedal	• Loose wheel bearings.	• Replace as required. • Perform Steps under Excessive Pedal Travel or Pedal Travel Goes to Floor.
• Rough Engine Idle or Stall, Brakes Applied	• Vacuum leak in neutral switch. • Vacuum booster.	• Check lines for leaks. Service or replace as required. • Check vacuum booster for internal leaks. Replace if required.
• Parking Brake Control Will Not Latch (Manual Release)	• Kinked or binding release cable. • Control assembly.	• Inspect, service or replace. • Inspect, service or replace.
• Parking Brake Control Will Not Latch (Automatic Release)	• Vacuum leak. • Vacuum switch. • Control assembly.	• Service as required. • Test. Replace if necessary. • Service or replace.
• Parking Brake Will Not Release or Fully Return (Manual Release)	• Cable disconnected. • Control assembly binding. • Parking brake linkage binding. • Rear brakes.	• Connect cable or replace. • Service or replace. • Service or replace. • Check rear brakes shoe retracting springs and parking brake levers. On rear disc brakes verify levers return fully to released position. Adjust cables or service caliper as required.
• Parking Brake Will Not Release or Fully Return (Automatic Release)	• Vacuum line leakage or improper connections. • Neutral switch. • Control assembly.	• Inspect and service. • Adjust or replace. • Service or replace.
• Roughness—An Unsmooth Feeling While Braking in NEUTRAL Evidenced by a Pulsating Brake Pedal	• Corrosion buildup on rotor surfaces. • Rotor thickness variation. • Rear brake roughness. • Wheel/tire imbalance. • Drivetrain imbalance. • Worn tires.	• Make 5 to 10 stops. If roughness is still present, replace or turn rotor.[2] • Replace or turn rotor.[2] • Attempt stopping the vehicle using the parking brake. If roughness is present, check drums/rotors for excessive wear or runout. Refinish or replace as necessary. • Verify and service as necessary. • Attempt stopping vehicle in NEUTRAL transmission position. If roughness is gone, drivetrain should be inspected. • Replace tires.

TH8037A

DIAGNOSIS INDEX

(Continued)

DIAGNOSIS INDEX (Cont'd)

(Continued)

2 Turning rotors is not a chargeable warranty claim except with prior approval of Ford Parts and Service Division.

DIAGNOSIS AND TESTING (Continued)

DIAGNOSIS INDEX (Cont'd)

Description	Pinpoint Test
Vacuum Brake Booster Diagnosis	
Excessive Brake Pedal Effort or Vacuum Leaks	J
Vacuum Brake Booster Noise	K
Slow or Incomplete Brake Pedal Return	L

TH5165C

PINPOINT TEST A: VIBRATION WHEN BRAKES ARE APPLIED

TEST STEP		RESULT ▶	ACTION TO TAKE
A1	VERIFY CONDITION		
	• Road test vehicle without applying brakes 40-80 km/h (25-50 mph). • **Is a vibration present?**	No ▶ Yes ▶	GO to **A2.** REFER to Section 00-04 to service this condition first. REPEAT Step.
A2	REAR BRAKE VIBRATION		
	• Road test vehicle with medium application on the parking brake only. NOTE: With manual release parking brake control, hold the parking brake release in release position during parking brake application. • **Was a vibration present?**	No ▶ Yes ▶	GO to **A3.** CHECK rear discs for excessive wear or runout. REFER to Section 06-04 for rear disc brake procedures.
A3	FRONT BRAKE VIBRATION		
	• Road test vehicle with light and medium application on the pedal. • **Was a vibration present?**	No ▶ Yes ▶	Vehicle OK. CHECK front rotors for excessive runout or cracks. REFER to Section 06-03 for disc brake rotor procedures. REPEAT Step **A3.**

TH7813B

PINPOINT TEST B: MASTER CYLINDER DIAGNOSIS PEDAL GOES DOWN FAST

TEST STEP		RESULT ▶	ACTION TO TAKE
B1	VERIFY CONDITION		
	• Road test vehicle and depress brake pedal. • **Was pedal effort normal?**	Yes ▶ No ▶	Vehicle OK. GO to **B2.**
B2	BRAKE FLUID LEVEL		
	• Check master cylinder brake fluid reservoir level. • **Is fluid level acceptable?**	Yes ▶ No ▶	GO to **B3.** CHECK reservoir sealing points (use Diagnostic Technique No. 3), ADD fluid and BLEED system. REPEAT Test **B1.**
B3	PRESSURIZE SYSTEM		
	• Pump brake pedal rapidly (five times).	Pedal height builds up, then sinks ▶ Pedal height builds up and holds ▶	GO to **B4.** CHECK rear brake adjustment and ADJUST if necessary. If condition still exists, BLEED system for air. REPEAT Test **B1.**

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: MASTER CYLINDER DIAGNOSIS PEDAL GOES DOWN FAST (Continued)

TEST STEP		RESULT ▶	ACTION TO TAKE
B4	BRAKE SYSTEM LEAKS ● Check for external brake system leaks (use Diagnostic Technique No. 1). ● **Any leaks found?**	No ▶ Yes ▶	GO to **B5.** SERVICE as necessary, ADD fluid and BLEED system. REPEAT Test **B1.**
B5	MASTER CYLINDER BYPASS TEST ● Test for master cylinder bypass (use Diagnostic Technique No. 2). ● **Was a problem found?**	No ▶ Yes ▶	System OK. REPLACE damaged parts, ADD fluid and BLEED system. REPEAT Test **B1.**

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PINPOINT TEST C: MASTER CYLINDER DIAGNOSIS PEDAL EASES DOWN SLOWLY

TEST STEP		RESULT ▶	ACTION TO TAKE
C1	VERIFY CONDITION ● Check if condition occurs during actual stopping application by depressing the brake pedal while the vehicle is moving.	Condition occurs only when vehicle is stationary ▶ Condition occurs while vehicle is moving and braking performance is affected ▶	No action required. (SEE Normal Condition No. 1) GO to **C2.**
C2	BRAKE SYSTEM LEAKS ● Check for external brake system leaks. (Refer to Diagnostic Technique No. 1) ● **Were any leaks found?**	No ▶ Yes ▶	GO to **C3.** SERVICE as necessary. ADD fluid and BLEED system. REPEAT Test **C1.**
C3	MASTER CYLINDER BYPASS TEST ● Test for master cylinder bypass. (Refer to Diagnostic Technique No. 2) ● **Was a problem found?**	No ▶ Yes ▶	System OK. REPLACE damaged parts, ADD fluid and BLEED system. REPEAT Test **C1.**

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PINPOINT TEST D: MASTER CYLINDER DIAGNOSIS PEDAL IS LOW AND/OR FEELS SPONGY

TEST STEP		RESULT ▶	ACTION TO TAKE
D0	VERIFY CONDITION ● Road test vehicle and apply brake pedal. ● **Was pedal effort normal?**	Yes ▶ No ▶	Vehicle OK. GO to **D1.**
D1	BRAKE FLUID LEVEL CHECK ● Check master cylinder brake fluid reservoir level. ● **Is fluid level acceptable?**	Yes ▶ No ▶	GO to **D2.** CHECK reservoir sealing points. (USE Diagnostic Technique No. 3). ADD fluid and BLEED system.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST D:
MASTER CYLINDER DIAGNOSIS
PEDAL IS LOW AND/OR FEELS SPONGY (Continued)

TEST STEP		RESULT ▶	ACTION TO TAKE
D2	FILLER CAP VENT CHECK		
	● Check if filler cap vent holes are clogged or dirty. ● **Was a concern found?**	No ▶ Yes ▶	GO to D3. CLEAN as necessary. REPEAT Test D0.
D3	BLEED BRAKE SYSTEM		
	● Bleed brake system as described in this section. ● **Is condition still present?**	No ▶ Yes ▶	Vehicle OK. GO to D4.
D4	FRONT HUB NUT CHECK		
	● Check front wheel hub nut for looseness (Refer to Section 04-01). ● **Was hub nut loose?**	No ▶ Yes ▶	CHECK rear brake adjustment and ADJUST if necessary. REPEAT Test D0. REPLACE with new nut and stake. **Do not reuse the nut.** REPEAT Test D0.

TH4003C

PINPOINT TEST E:
MASTER CYLINDER DIAGNOSIS—PEDAL EFFORT EXCESSIVE

TEST STEP		RESULT ▶	ACTION TO TAKE
E1	VERIFY CONDITION		
	● Depress brake pedal fully several times.	Pedal is good ▶ Pedal has long stroke and requires excessive effort ▶	Vehicle OK. GO to E2.
E2	BRAKE PEDAL LINKAGE TEST		
	● Detach booster push rod from pedal pin and depress brake pedal fully. ● **Did pedal move freely?**	Yes ▶ No ▶	CHECK booster vacuum availability as described under Vacuum Booster Diagnosis in this Section. SERVICE or REPLACE brake pedal linkage. REPEAT Test E1.

TH6375B

PINPOINT TEST F:
MASTER CYLINDER DIAGNOSIS—
REAR BRAKE LOCKUP DURING LIGHT BRAKE PEDAL FORCE

TEST STEP		RESULT ▶	ACTION TO TAKE
F1	VERIFY CONDITION		
	● Road test vehicle and apply brakes lightly. ● **Do brakes lockup?**	No ▶ RH rear lockup ▶ LH rear lockup ▶ Both lockup ▶	Vehicle OK. GO to F4. GO to F5. PERFORM Tests F4and F5.
F2	TIRE INSPECTION		
	● Check for excessive tire wear or improper tire pressures. ● **Are tires good?**	Yes ▶ No ▶	GO to F3. SUBSTITUTE known good tires if worn. INFLATE to proper pressure. REPEAT Test F1.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST F: MASTER CYLINDER DIAGNOSIS— REAR BRAKE LOCKUP DURING LIGHT BRAKE PEDAL FORCE (Continued)

TEST STEP		RESULT ▶	ACTION TO TAKE
F3	BRAKE PAD INSPECTION		
	• Inspect brake pads for grease or fluid on linings and/or wear concerns. • **Are there concerns?**	Yes ▶ No ▶	GO to F4. REPLACE if necessary. REPEAT Test F1.
F4	PRESSURE CONTROL VALVE TEST—RH REAR		
	• Install pressure gauges in the LH front and RH rear bleeder screws. Apply 6895 kPa (1000 psi) in front brake system. The rear brake pressure must be between 4692-5164 kPa (680-750 psi). • **Is rear brake pressure between 4692-5164 kPa (680-750 psi)?**	Yes ▶ No ▶	INSPECT parking brake and ADJUST as required. REPLACE RH rear valve.
F5	PRESSURE CONTROL VALVE TEST—LH REAR		
	• Install pressure gauges in RH front and LH rear bleeder screws. Apply 6895 kPa (1000 psi) in front brake system. The rear brake pressure must be between 3964-4343 kPa (575-630 psi). • **Is rear brake pressure between 3964-4343 kPa (575-630 psi)?**	Yes ▶ No ▶	INSPECT parking brake and ADJUST as required. REPLACE LH rear valve.

TH6376B

PINPOINT TEST G: MASTER CYLINDER DIAGNOSIS— EXCESSIVE AND/OR ERRATIC PEDAL TRAVEL

TEST STEP		RESULT ▶	ACTION TO TAKE
G1	ROUGH ROAD TEST		
	• Road test vehicle under rough road conditions. Apply brakes slowly. • **Are brakes good?**	Yes ▶ No ▶	Vehicle OK. GO to G2.
G2	WHEEL BEARING CHECK		
	• Check for loose wheel bearings. • **Are wheel bearings loose?**	No ▶ Yes ▶	CHECK rotor for thickness variances. (REFER to Section 06-03 for front disc overhaul procedures). REPLACE wheel bearing if damaged. TIGHTEN wheel bearing assembly to specification. REPEAT Test G1.

TH6377B

PINPOINT TEST H: MASTER CYLINDER DIAGNOSIS— BRAKE WARNING LAMP ON

TEST STEP		RESULT ▶	ACTION TO TAKE
H1	BRAKE FLUID LEVEL		
	• Check master cylinder brake fluid reservoir level. • **Is fluid level good?**	Yes ▶ No ▶	GO to H3. GO to H2.
H2	BRAKE SYSTEM LEAKAGE		
	• Check reservoir sealing points and external brake system for leakage. (Refer to Diagnostic Techniques No. 1 and 3). • **Does system leak?**	No ▶ Yes ▶	FILL reservoir. GO to H3. SERVICE as necessary, ADD fluid and BLEED system.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST H: MASTER CYLINDER DIAGNOSIS— BRAKE WARNING LAMP ON (Continued)

TEST STEP		RESULT ▶	ACTION TO TAKE
H3	IGNITION WIRING CHECK		
	• Check that ignition wiring is not within a 50.8mm (2-inches) radius of the reed switch Fluid Level Indicator (FLI) assembly. • **Is ignition wiring good?**	Yes ▶ No ▶	GO to H4. REROUTE wiring as necessary.
H4	FLOAT ASSEMBLY CHECK		
	• Check is float is stuck of if magnet is dislodged from float. • **Is float functional?**	Yes ▶ No ▶	CHECK if ignition prove out circuit is working properly. REPLACE reservoir assembly.

TH4849C

PINPOINT TEST I: MASTER CYLINDER DIAGNOSIS FRONT BRAKES DRAG

TEST STEP		RESULT ▶	ACTION TO TAKE
I1	VERIFY CONDITION		
	• Road test vehicle and apply brakes. • **Are brakes functional?**	Yes ▶ No ▶ No ▶	Vehicle OK. INSPECT fluid control valve for contamination. (REFER to Fluid Control Valve Assembly procedure in this section). REPEAT I1. CHECK vacuum booster push rod adjustment. REPEAT I1.

TH6378B

PINPOINT TEST J: EXCESSIVE BRAKE PEDAL EFFORT OR VACUUM LEAKS

TEST STEP		RESULT ▶	ACTION TO TAKE
J1	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 ▶ Pedal does not hold ▶	GO to J2. GO to J4.
J2	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. • **Does vacuum booster work?**	Yes ▶ No ▶	Vehicle OK. GO to J3.
J3	POWER SECTION CHECK VALVE TEST		
	• Disconnect vacuum hose for booster check valve at manifold. Blow into hose attached to check valve. • **Does air pass through valve?**	Yes ▶ No ▶	INSTALL new check valve and REPEAT Step J2. REPLACE booster. REPEAT Step J1.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST J: EXCESSIVE BRAKE PEDAL EFFORT OR VACUUM LEAKS (Continued)

TEST STEP		RESULT	ACTION TO TAKE
J4	POWER SECTION TEST		
• Disconnect vacuum hose from booster vacuum check valve. Run engine at idle. Check vacuum supply with a vacuum gauge.		Above 40.5 kPa (12 in-Hg) and booster does not operate	REPLACE booster. REPEAT Step **J1.**
		Below 40.5 kPa (12 in-Hg)	SERVICE or REPLACE vacuum hose and vacuum fittings. Also TUNE or SERVICE engine as required. REPEAT Step **J1.**

TH7820A

PINPOINT TEST K: VACUUM BRAKE BOOSTER NOISE

TEST STEP		RESULT	ACTION TO TAKE
K1	VERIFY CONDITION		
• Run engine at fast idle for 10 seconds or longer. Depress brake pedal and listen for noise. Compare results with known good system. • **Was a noise present?**		No	Vehicle OK.
		Yes	GO to **K2.**
K2	PUSH ROD ADJUSTMENT		
• Check and adjust booster push rod. • **Is push rod adjustment OK?**		Yes	BLEED brake system.
		No	REPLACE booster. REPEAT Step **K1.**

TH7814A

PINPOINT TEST L: SLOW OR INCOMPLETE BRAKE PEDAL RETURN

TEST STEP		RESULT	ACTION TO TAKE
L1	VERIFY CONDITION		
• Run engine at fast idle while making several brake applications. Pull brake pedal rearward with approximately 44.5 N (10 lbs) 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. • **Did pedal return to original position?**		Yes	Vehicle OK.
		No	GO to **L2.**
L2	BRAKE PEDAL BINDING		
• Check pedal to be sure it is operating freely. • **Is the pedal operating freely?**		Yes	REPLACE booster.
		No	CORRECT any sticking or binding. REPEAT **L2.**

TH7811A

CLEANING AND INSPECTION

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 the rotor and caliper assemblies, avoid deformation of brake rotor and nicking or scratching of brake linings.

   CAUTION: Do not pry on plastic piston with a screwdriver or other tools, as this will cause chipping.

2. If a caliper piston is removed for any reason, piston seal must be replaced. Exercise care not to damage plastic piston by protecting it from contact with any metal or sharp objects.
3. During removal and installation of a wheel assembly, exercise care not to interfere with and damage splash shield or bleeder screw fitting.
4. Ensure vehicle is centered on the hoist before servicing any front end components to avoid bending or damaging splash shield on full right or left wheel turns.

CLEANING AND INSPECTION (Continued)

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 the rotor braking surfaces wiped clean.
6. Calipers must be installed with bleed screws in upward position for proper bleeding of air from brake system.
7. Always replace rubber caliper pin insulators when replacing linings.

Disc Brakes

1. Raise vehicle on hoist. Refer to Section 00-02.
2. Remove wheel and tire from hub and rotor.
3. Inspect brake shoes and lining for wear. If the lining is worn to within 3mm (1/8-inch) of the shoe, replace all four shoe and lining assemblies (complete axle set) on front or rear wheels as required.
4. Visually check caliper. If caliper housing is leaking, it should be replaced. If a seal is leaking, caliper must be disassembled and new seals installed. If a piston is seized in bore, a new caliper housing is required. Care should be taken not to dent, scratch or chip the plastic piston.
5. Lower vehicle.

   Refer to Section 06-03 for disc brake rotor service procedure.

Drum Brakes

Tools Required:

- Rotunda Brake Vacuum 091-00001 or Rotunda Brake Parts Washer 065-00016
- Rotunda Brake Drum Micrometer 010-00010

1. Raise vehicle on hoist. Refer to Section 00-02.
2. Remove wheel and tire assembly from spindle.
3. Remove drum assembly from spindle. Use an industrial vacuum cleaner such as Rotunda Brake Vacuum 091-00001 or Rotunda Brake Parts Washer 065-00016 or equivalent, to remove all dust from backing plates and interior of the brake drums.
4. Inspect brake shoes for excessive lining wear or shoe damage. If lining is damaged or worn within 0.794mm (1/32-inch) of the rivet heads on riveted linings or within 1.524mm (0.060-inch) of the shoe on bonded linings, they must be replaced. Replace any lining that has been contaminated with oil, grease or brake fluid. Replace lining in axle sets. Prior to replacement of lining, drum diameter should be checked using Rotunda Brake Drum Micrometer 010-00010 or equivalent to determine that brake drum braking surface diameter is within specification. If braking surface diameter exceeds specification, drum must be replaced.
5. Check condition of brake shoes, retracting spring, hold-down springs, and drum for signs of overheating. If shoes have a slight blue coloring, indicating overheating, retracting and hold-down springs should be replaced. **Overheated springs lose their pull and could cause new lining to wear prematurely, if not replaced. If brake drums are heat spotted, indicating an overheated condition, they should be replaced.**
6. Lower vehicle.
7. Refer to Section 04-02 for hub and drum installation and bearing adjustment procedure.

Brake Booster

Check booster operation as noted under Power Brake Functional Test. If brake booster is damaged or inoperative, replace it with a new booster. **The brake booster is serviced only as an assembly, including the check valve.**

Hydraulic Lines

Double wall steel tubing is used throughout the brake system with the exception of the flexible hoses at the front and rear wheels.

Always bleed the applicable primary or secondary brake system after primary or secondary brake system hose or line replacement.

When connecting a tube to a hose, tube connector or brake cylinder, tighten the tube fitting nut to specification.

Brake Tubing

Tools Required:

- Brake Line Flaring Tool D81L-2268-A
- Lb-In Torque Wrench D81L-600-A

WARNING: COPPER TUBING SHOULD NOT BE USED IN A HYDRAULIC SYSTEM.

CLEANING AND INSPECTION (Continued)

Certain brake tube bundles are serviced as complete assemblies. If not serviced, the following service procedure should be used:

1. Obtain the recommended bulk 3/16-inch double wall steel brake tubing and the correct standard tube nuts for 3/16-inch tubing.
2. Cut tubing to length required. Clean burrs after cutting. The correct length may be obtained by measuring the removed tube with a string and adding 1.2mm (1/8 inch) for each flare.
3. Place tube nut onto tube into correct direction and flare the end of the tube with an SAE inverted flare or the metric ISO flare as required, using Brake Line Flaring Tool D81L-2268-A, or equivalent.
4. Repeat on the opposite end of the tube.
5. Bend the replacement tube to match the removed tube using a tubing bender. When the replacement brake tube is installed, maintain adequate clearance to metal edges, and moving or vibrating parts.
6. Install brake tube and torque tube nuts to 16-20 N·m (142-177 lb-in) with Lb-Inch Torque Wrench D81L-600-A, or equivalent.
7. Bleed the serviced primary or secondary circuit.

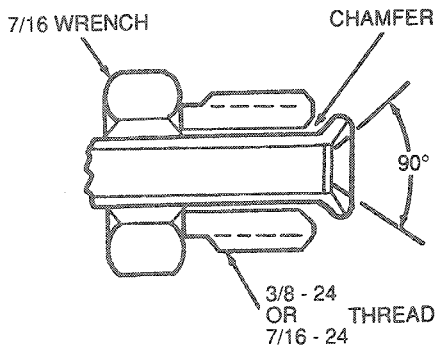
If either end of the Tube to Tube Connection requires replacement, replace both ends with the SAE double 45 degree union connection.

All brake tubing should be flared properly to provide good leakproof connections. Clean brake tubing by flushing with clean brake fluid before installation.

When connecting a tube to a hose, tube connector, or brake cylinder, tighten the tube fitting nut to specification with Lb-In Torque Wrench D81L-600-A or equivalent.

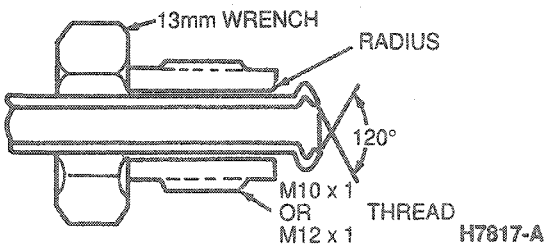
Commonly used types of brake line flared connection:

1. SAE double 45 degree flare.



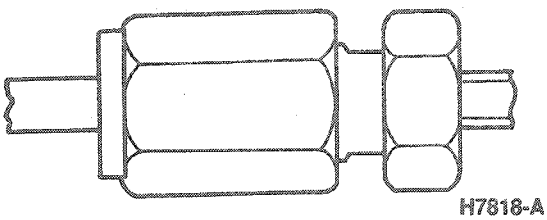
H7816-A

2. ISO Metric flare.

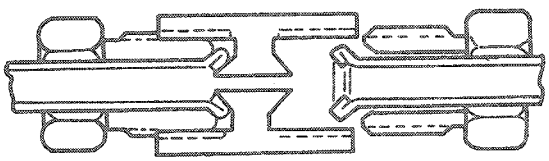


H7817-A

3. Tube to tube connection.


H7818-A

4. SAE double 45 Union (repair).


H7819-A

Brake Hose

A flexible brake hose should be replaced if it shows signs of softening, cracking or other damage.

When installing a new front brake hose, two new sealing washers should be used. Positioning of the front hose is controlled by a self-indexing brass block. When attaching brake hose connection to caliper, tighten bolt to 41-54 N·m (30-40 lb-ft). Attach intermediate bracket to shock strut and tighten screw. Engage the opposite end of hose to bracket on the body. Install the horseshoe-type retaining clip and connect tube to hose with tube nut. Inspect position of installed hose for clearance to other chassis components.

Positioning of rear brake hose is controlled by self-indexing end fittings.

Engage either end of hose to the bracket on the body. Install the horseshoe-type retaining clip and connect tube to hose with the tube fitting nut. Engage opposite end of hose to bracket on rear spindle. Install the horseshoe-type retaining clip and connect tube to hose with tube fitting nut.

Inspect position of installed hose for contact with other chassis parts.

SPECIFICATIONS

TORQUE SPECIFICATIONS

Description	N·m	Lb-Ft
Front Hub Nut	244-271	180-200
Brake Hose Connection to Caliper	41-54	30-40
Torque On Front Wheels	101	75
Hydraulic Tube Connections	16-20	142-177 (Lb-In)

ROTUNDA EQUIPMENT

Model	Description
021-00001	Brake Pedal Effort Gauge
010-00010	Brake Drum Micrometer
091-00001	Brake Vacuum
065-00016	Brake Parts Washer

SPECIAL SERVICE TOOLS

Tool Number	Description
D81L-600-A	Lb-In Torque Wrench
D81L-2269-A	Brake Line Flaring Tool

SECTION 06-02 Brakes, Rear Drum

VEHICLE APPLICATION

Taurus / Sable.

DESCRIPTION

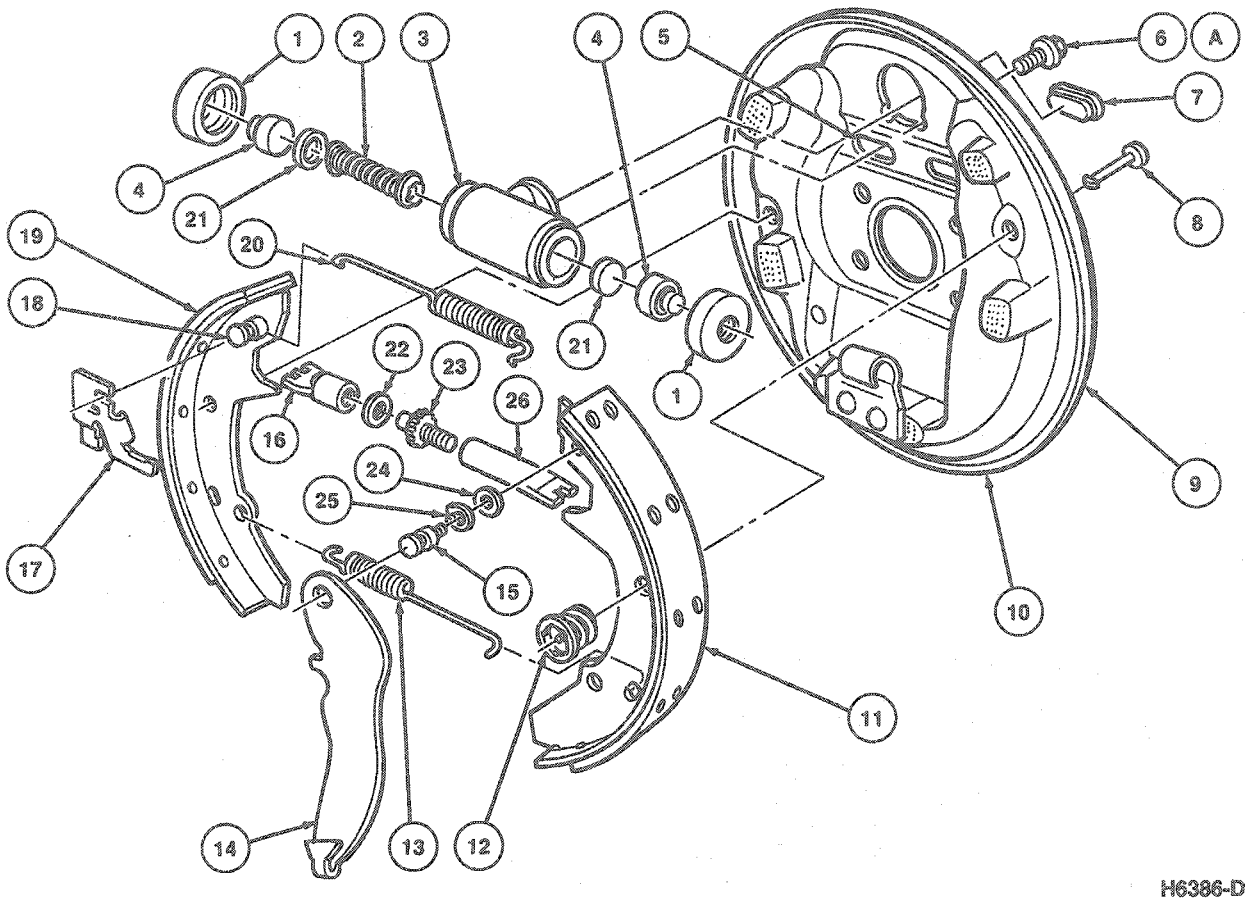
WARNING: BRAKE FLUID CONTAINS POLYGLYCOL ETHERS AND POLYGLYCOLS. AVOID CONTACT WITH EYES. WASH HANDS THOROUGHLY AFTER HANDLING. IF BRAKE FLUID CONTACTS EYES, FLUSH EYES WITH RUNNING WATER FOR 15 MINUTES. GET MEDICAL ATTENTION IF IRRITATION PERSISTS. IF TAKEN INTERNALLY, DRINK WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION IMMEDIATELY.

Brake System, Drum

Rear drum brakes are non-servo, leading-trailing shoe design. Two different rear brake assemblies are used. Taurus / Sable sedan models use a 225mm (8.85 inch) diameter brake assembly.

Taurus / Sable wagon models use a 250mm (9.84 inch) diameter brake assembly. The automatic adjustment of the 250mm and 225mm (9.84 and 8.85 inch) drum assemblies use an incremental adjuster that adjusts during braking whenever a wear gap appears sufficient to actuate the adjuster wheel. Brake adjustment occurs in forward and rearward braking.

DESCRIPTION (Continued)



H6386-D

Item	Part Number	Description
1	—	Boot (Part of 2261)
2	—	Spring Expander (Part of 2261)
3	2261	Wheel Cylinder
4	—	Piston and Insert (Part of 2261)
5	—	Shoe Adjustment Access Hole
6A	N801327	Wheel Cylinder Retaining Screw (2 Req'd)
7	2092	Access Hole Cover
8	2L265	Shoe Hold-Down Pin
9	2212 (LH) 2211 (RH)	Backing Plate Assy
10	2209 (RH) 2210 (LH)	Complete Brake Assy
11	2200	Trailing Shoe and Lining
12	2068	Shoe Hold-Down Spring Assy
13	2035	Lower Retracting Spring

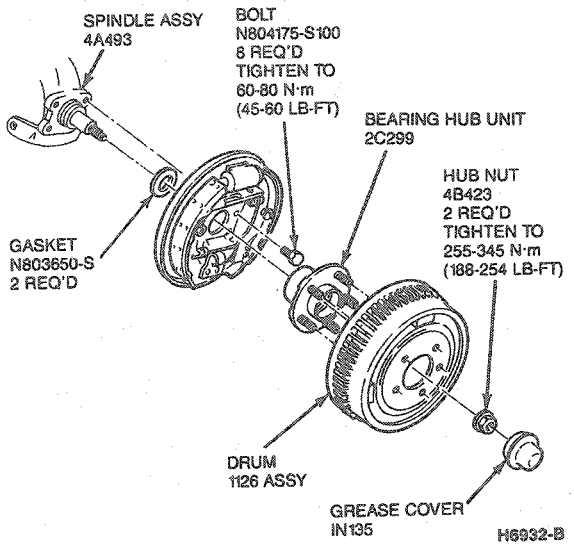
(Continued)

Item	Part Number	Description
14	2A637 (RH) 2A638 (LH)	Parking Brake Lever
15	2107	Parking Brake Lever Pin
16	2048	Adjuster Socket
17	2A177 (LH) 2A176 (RH)	Adjuster Lever
18	2107	Parking Brake Lever Pin
19	2W023 (RH) 2W024 (LH)	Leading Shoe and Lining
20	2049	Adjusting Screw Retracting Spring
21	—	Cup (Part of 2261)
22	384373-S	Washer
23	—	Adjusting Screw (Part of 2261)
24	356297-S2	Washer
25	2106	Parking Lever Retaining Clip
26	—	Adjusting Pivot Nut (Part of 2048)
A		Tighten to 12-18 N·m (106-159 Lb-in)

TH6386D

DESCRIPTION (Continued)

The rear drums are attached to the rear axle spindle by a bearing hub unit with push nuts. Wheel studs are located in the bearing hub unit for retaining the rear wheels. The wheel studs and lug nuts are metric (12mm).



REMOVAL AND INSTALLATION

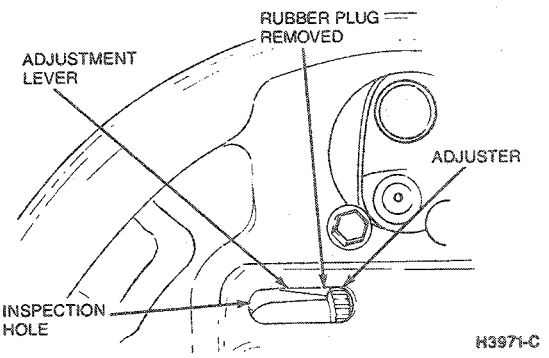
Brake Drums

Removal

1. Raise vehicle on a hoist. Refer to Section 00-02.
2. Remove wheel ornament (wheelcover) and nut covers as required.
3. Remove tire and wheel assembly. Refer to Section 04-04.
4. Remove the two drum retaining nuts.

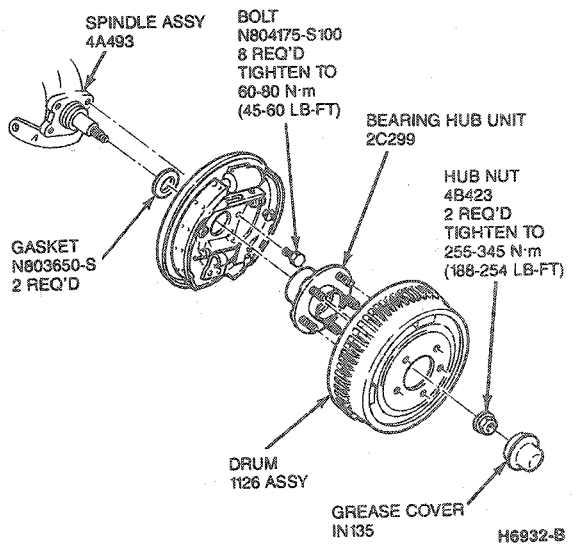
   NOTE: If the drum assembly will not come off for brake service, pry rubber plug from backing plate inspection hole and use the following procedure:

On 225mm and 250mm (8.85 inch and 9.84 inch) brakes, remove the brake line-to-axle retention bracket. This will allow sufficient room for insertion of a screwdriver and brake tools to disengage adjusting lever and back-off the adjusting screw.



Installation

1. Install drum assembly on bearing hub.
2. Install tire and wheel assembly. Refer to Section 04-04.
3. Install wheel ornament (wheelcover) and nut covers as required.
4. Lower vehicle.



Bearing Hub Unit Assembly

Removal

1. Raise vehicle on hoist. Refer to Section 00-02.
2. Remove tire and wheel assembly. Refer to Section 04-04.
3. Remove drum assembly.
4. Remove grease cap and discard.
5. Remove bearing hub nut.
6. Remove bearing hub unit from spindle.

Installation

NOTE: Bearing hub unit is lubricated for life.

REMOVAL AND INSTALLATION (Continued)

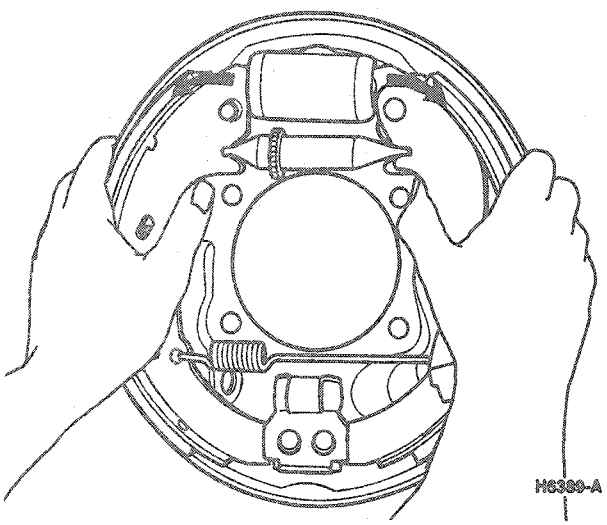
1. Position bearing hub unit assembly on spindle.
2. Install hub nut and tighten to 255-345 N·m (188-254 lb-ft).
3. Install new grease cap using a 1 7/8 inch x 3/4 inch drive socket.
4. Install drum.
5. Install tire and wheel assembly. Install wheel cover. Refer to Section 04-04.
6. Lower vehicle.

Brake Shoes

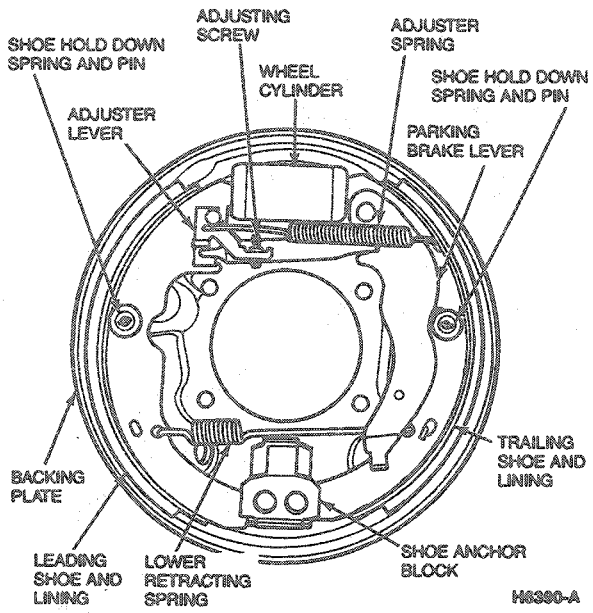
225mm and 250mm (8.85 inch and 9.84 inch)

Removal

1. Raise vehicle on a hoist. Refer to Section 00-02.
2. Remove wheel, tire, hub and drum assembly. Refer to Section 04-02.
3. Remove parking brake cable from parking brake lever.
4. Remove two shoe hold-down springs and pins.
5. Lift brake shoes, springs, and adjuster assembly off backing plate and wheel cylinder assembly. Be careful not to bend adjusting lever during assembly removal.



6. Remove retracting springs from lower brake shoe attachments and upper shoe-to-adjusting lever attachment points. This will separate brake shoes and disengage adjuster mechanism.



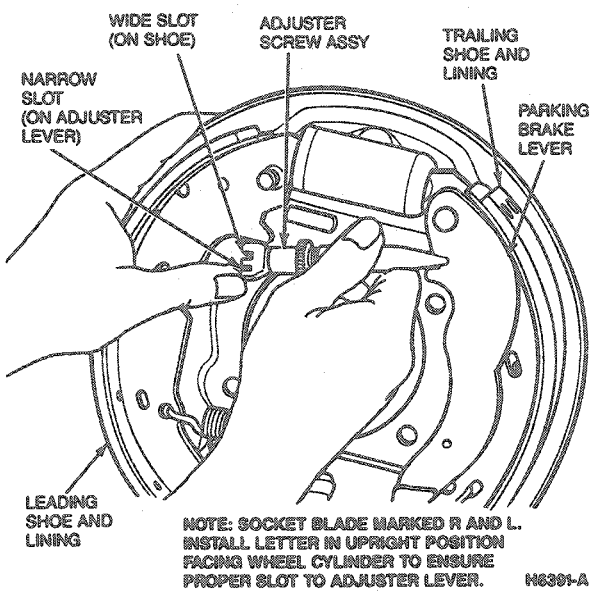
7. Remove horseshoe retaining clip and spring washer and remove from trailing shoe.

Installation

1. Apply a light coating of Disc Brake Caliper Slide Grease D7AZ-19590-A (ESA-M1C172-A) or equivalent to backing plate brake shoe contact areas.
2. Apply a light coat of Premium Long-Life Grease XG-1-C (ESA-M1C75-B) or equivalent to threaded areas of adjuster screw and socket. Assembly brake adjuster with stainless steel washer. Turn socket all the way down on screw, then back off one half turn.
3. Install parking brake lever to trailing shoe with spring washer and new retaining clip. Crimp clip to securely retain lever.
4. Position trailing shoe or backing plate and attach hand brake cable.
5. Position leading shoe on backing plate and attach lower retracting spring to brake shoes.

REMOVAL AND INSTALLATION (Continued)

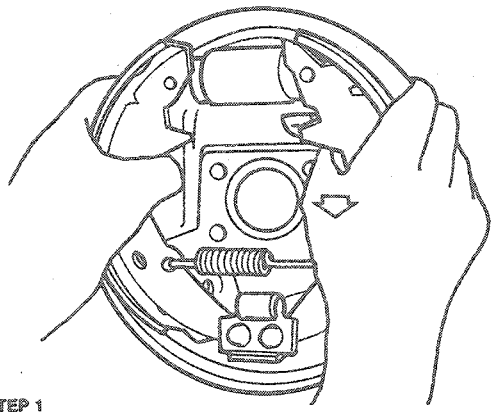
6. Install adjuster assembly to slots in brake shoes. Socket end must fit into slot in leading shoe (wider slot). Slot in adjuster nut must fit into slots in trailing shoe and parking brake lever.



7. Install adjuster lever on pin on leading shoe and to slot in adjuster socket.
8. Install upper retracting spring in slot on trailing shoe and slot in adjuster lever. Adjuster lever should contact star and adjuster assembly.
9. Install brake shoe anchor pins, springs and retainers. Remove Brake Cylinder Clamp D81L-1103-B or equivalent.

REMOVAL AND INSTALLATION (Continued)

10. Install brake drum as outlined.

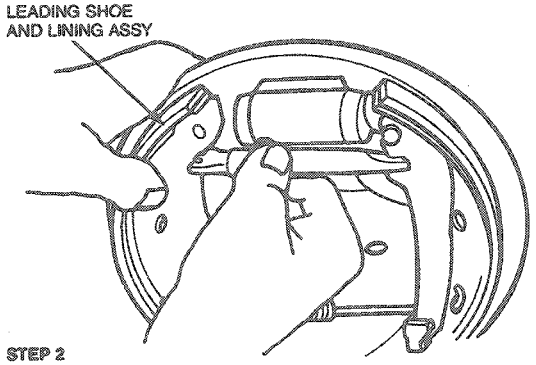


STEP 1

A. ASSEMBLE PARKING BRAKE CABLE TO TRAILING SHOE AND PARKING BRAKE LEVER

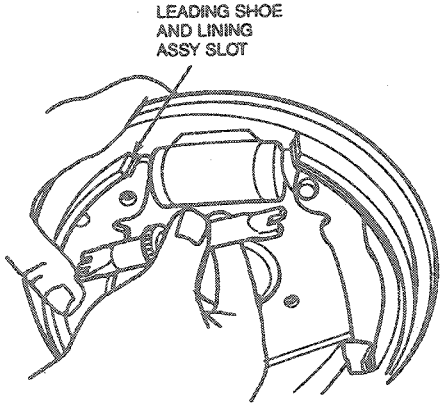
B. INSTALL LOWER RETRACTING SPRING TO LEADING-TRAILING SHOES

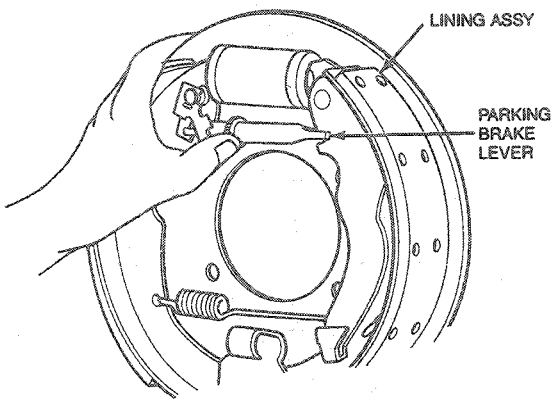
C. INSTALL THIS ASSY TO BACKING PLATE FITTING SHOES INTO THE WHEEL CYLINDER PISTON SLOTS.



STEP 2

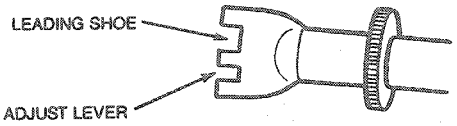
INSTALL ADJUSTER SOCKET TO LEADING SHOE AND LINING ASSY.



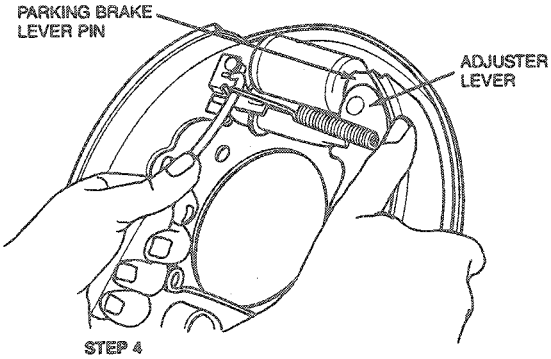


STEP 3

INSTALL ADJUSTER SCREW ASSY



NOTE: SOCKET BLADE MARKED R AND L INSTALL LETTER IN UPRIGHT POSITION TO ENSURE PROPER SLOT ENGAGEMENT TO PARKING BRAKE LEVER.



STEP 4

INSTALL THE ADJUSTER LEVER IN GROOVE OF ADJUSTER PIN ON LEADING SHOE.

STEP 5

A. INSTALL SHOE HOLD-DOWN SPRINGS AND PINS.

B. INSTALL UPPER RETRACTING SPRING TO TRAILING SHOE SLOT. STRETCH SPRING TO INSTALL TO LEADING SHOE. IF ADJUSTER LEVER DOES NOT CONTACT STAR WHEEL AFTER SPRING INSTALLATION CHECK ADJUSTER SOCKET INSTALLATION.

H6392-A

Wheel Cylinder

Removal

1. Remove wheel / tire and drum assemblies as outlined.
2. Remove brake shoe assembly as outlined.
3. Disconnect brake tube from wheel cylinder.

   NOTE: Use caution to prevent brake fluid from contacting brake linings or they must be replaced.

REMOVAL AND INSTALLATION (Continued)

4. Remove wheel cylinder retaining bolts and remove wheel cylinder.

Installation

Wipe the end(s) of the hydraulic line to remove any foreign matter before making connections.

1. Position wheel cylinder on backing plate and finger-tighten brake tube to cylinder.
2. Secure cylinder to backing plate by installing retaining bolts. Tighten bolts to 10-14 N·m (8-10 lb-ft).
3. Install tube nut fitting (using a tube nut wrench).
4. Install and adjust brakes as outlined.
5. Install drum and wheel / tire assembly. Refer to Section 04-02.
6. Bleed brake system before driving vehicle.

Brake Backing Plate

Removal

1. Remove wheel / tire assembly. Refer to Section 04-04.
2. Remove brake drum as outlined.
3. Remove and discard grease cap and retaining nut. Remove bearing hub unit from spindle.
4. Disconnect brake line from brake cylinder.
5. Remove brake shoes, adjuster assemblies, wheel cylinder and parking brake cable from backing plate.
6. Remove bolts retaining backing plate to spindle. Discard bolts.
7. Remove backing plate and foam gasket.

Installation

1. Install new foam gasket on spindle.
2. Install backing plate with new adhesive coated retaining bolts.
3. Install wheel cylinder and connect brake line as outlined.
4. Install brake shoes and adjuster assemblies. Insert parking brake cable through backing plate. Prongs must be securely locked in place. Connect parking brake cable to lever.
5. Install bearing and hub unit on spindle. Install nut and tighten to 255-345 N·m (188-254 lb-ft).
6. Install new grease cover using a 1-7 / 8 inch x 3 / 4 inch drive socket.

   Adjust brake shoes and install brake drum and wheels. Bleed brake system. Refer to Section 06-00.

   NOTE: Whenever rear brake linings are removed, the parking brake cable tension should be checked. Refer to Section 06-05 and adjust as required.

CLEANING AND INSPECTION

Tools Required:

- Rotunda Brake and Clutch Service Vacuum 091-00001

1. Use an industrial vacuum cleaner such as Rotunda Brake and Clutch Service Vacuum 091-00001 or equivalent to remove all dust from backing plates and interior of brake drums.
2. Inspect brake shoes for excessive lining wear or shoe damage. If lining is damaged or worn within 0.79mm (1 / 32 inch) of the rivet heads on riveted linings, it must be replaced. Replace any lining that has been contaminated with oil, grease or brake fluid. Replace lining in axle sets only. Never replace just one shoe of a brake assembly. Replace both leading and trailing shoes. Prior to replacement of lining, drum diameter should be checked to determine that brake drum diameter is within specification. If braking surface diameter exceeds specification, drum must be replaced.
3. Check condition of brake shoes, retracting spring, hold-down springs, and drum for signs of overheating. If shoes have a slight blue coloring, indicating overheating, retracting and hold-down springs should be replaced. Overheated springs lose their tension and could allow new lining to drag and wear prematurely, if not replaced.
4. Inspect all other brake parts and replace any that are worn or damaged.
5. Inspect brake drum and, if necessary, refinish. The maximum inside diameter is shown on each brake drum. If maximum inside diameter is exceeded either by wear or refinishing, drum must be replaced.

OVERHAUL

Brake Drum Refinishing

Tools Required:

- Brake Adjustment Gauge D81L-1103-A or Rotunda Brake Drum Micrometer 104-00046

Minor scores on a brake drum can be removed with sandpaper. Do not refinish drums to remove score marks. A drum surface which is highly polished can cause brake lockup or noise. This polished condition should be removed with sandpaper. A drum that is out of round sufficient to cause vehicle vibration or roughness when braking should be refinished. Remove only enough stock to true-up the drum. When brake drum maximum inside diameter shown on the drum is exceeded either through wear or refinishing, the drum must be replaced.

Check inside diameter of brake drum with Brake Adjustment Gauge D81L-1103-A, Rotunda Brake Drum Micrometer 104-00046 or equivalent.

After a drum is refinished, wipe refinished surface with a cloth soaked in clean, denatured alcohol. If one drum is refinished, the opposite drum on the same axle should also be refinished to the same diameter.

OVERHAUL (Continued)

Brake Shoe Relining

Brake linings on 225mm and 250mm (8.85 inch and 9.84 inch) brakes must be replaced if they are worn within 0.79mm (1/32 inch) of a rivet head or have been contaminated with brake fluid, grease or oil.

Failure to replace worn linings will result in a scored drum. **When it is necessary to replace linings, they must also be replaced on the wheel on the opposite side of the vehicle. Inspect brake shoes for distortion, cracks or looseness. If this condition exists, the shoe must be discarded. Do not attempt to service a damaged brake shoe. Never change only one brake shoe and lining in a brake assembly.**

1. Wash brake shoes thoroughly in clean solvent. Dry thoroughly. Remove all burrs or rough spots from shoes.
2. Position new lining on shoe. Starting in center, insert and secure rivets, working alternately towards each end. **Replacement linings are ground, and no further grinding is required.**

   NOTE: Whenever rear brake linings are removed, the parking brake cable tension should be checked. Refer to Section 06-05 and adjust as required.
3. Check clearance between shoe and lining. The lining must seat tightly against shoe with not more than 0.20mm (0.008 inch) clearance between any two rivets.

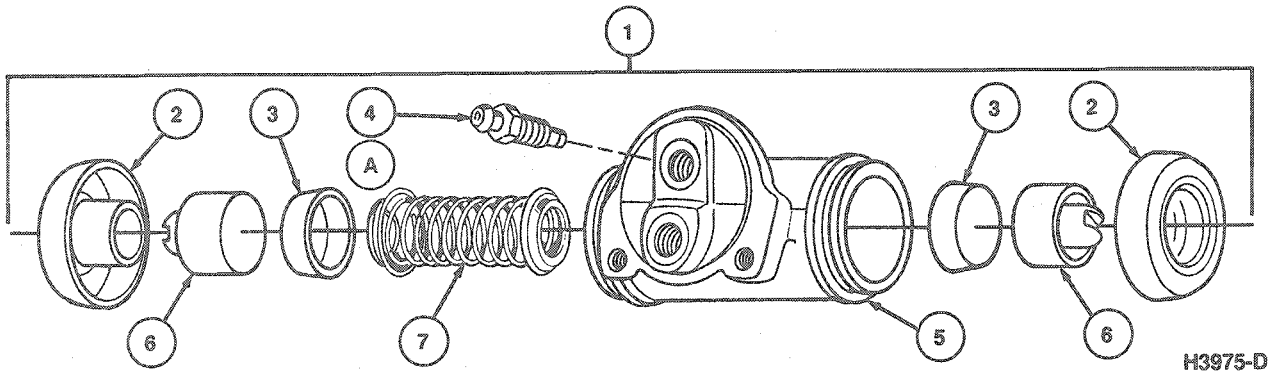
Wheel Cylinders

Wheel cylinders should not be disassembled unless they are leaking. Carefully pull lower edges of wheel cylinder boots away from cylinder, and note whether interior is wet with brake fluid. Excessive fluid at this point indicates leakage past piston cups and a need for wheel cylinder overhaul.

NOTE: A slight amount of fluid is nearly always present and acts as a lubricant for the piston. It is not necessary to remove the brake cylinder from the backing plate to disassemble, inspect, hone, and overhaul the cylinder. Removal is necessary only if the cylinder is damaged or scored beyond service.

Disassembly

1. Remove brake shoe assembly as outlined.
2. Disengage wheel cylinder boots from retaining grooves in wheel cylinder casting. Remove each boot and piston from wheel cylinder as an assembly.
3. Remove wheel cylinder rubber cups and spring and expander assemblies from wheel cylinder bore.



H3975-D

Item	Part Number	Description
1	2261	Wheel Cylinder Assy
2	—	Boot (Part of 2261)
3	—	Cup (Part of 2261)
4A	—	Wheel Cylinder Bleeder Screw (Part of 2261)
5	—	Cylinder Housing (Part of 2261)

Item	Part Number	Description
6	—	Piston (Part of 2261)
7	—	Return Spring and Cup Expander Assy (Part of 2261)
A		Tighten to 10-20 N·m (7.5-15 Lb-Ft)

TH3975D

(Continued)

4. Discard all rubber parts.
5. Remove bleeder screw from cylinder.

OVERHAUL (Continued)

6. Wash all parts in clean, denatured alcohol.
7. Inspect pistons for scratches, scoring, or other visible damage. Replace if necessary. Always replace rubber cups and dust boots.
8. Inspect cylinder bore for score marks or rust. If either condition is present, cylinder bore must be honed. However cylinder should not be honed more than 0.08mm (0.003 inch) beyond its original diameter.
9. Wash cylinder with clean, denatured alcohol after honing. Dry it with compressed air.
10. Make sure that bleeder hole is open.

Assembly

Use all parts in the wheel cylinder service kit.

1. Apply light coating of heavy-duty brake fluid to all internal parts.
2. Thread bleeder screw into cylinder.
3. Insert return spring and cup expander assembly, and pistons into their respective positions in cylinder bore. Place a boot over each end of cylinder.
4. Install brake shoe assemblies as outlined.
5. Install drum assembly and wheel assembly.
6. Bleed brake system. Refer to Section 06-00.

   NOTE: Ensure that brake line is installed in lower wheel cylinder hole and bleed screw in upper hole. Always bleed brakes before driving vehicle.

ADJUSTMENTS

Brake Shoes

Tools Required:

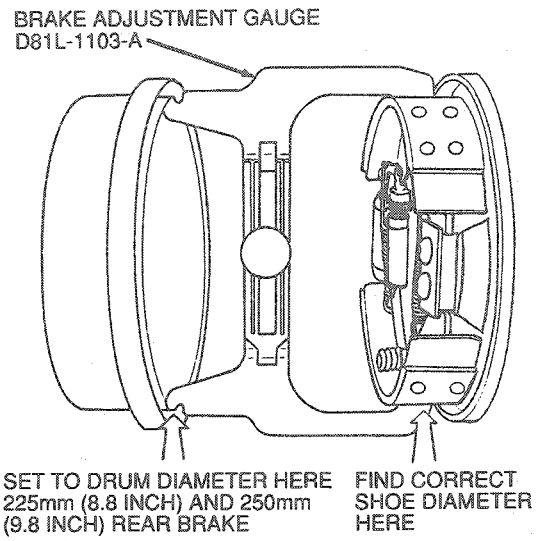
- Brake Adjustment Gauge D81L-1103-A

After any brake service work, obtain a firm brake pedal before moving the vehicle. Adjusted brakes must not drag; wheel must turn freely.

The hydraulic rear drum brakes are self-adjusting and require a manual adjustment only after the brake shoes have been relined, replaced or when the length of the adjusting screw has been changed while performing some other service operation. The manual adjustment is performed with the drum removed, using the tool and the procedure detailed below.

When adjusting the rear brake shoes, check the parking brake cables for proper adjustment. Make sure that the equalizer operates freely with the shoes centered on the backing plate.

1. Apply a small quantity of Disc Brake Caliper Slide Grease D7AZ-19590-A (ESA-M1C172-A) or equivalent to points where the shoes contact the backing plate, taking care not to get lubricant on linings.
2. Determine inside diameter of the drum braking surface using a Brake Adjustment Gauge D81L-1103-A or equivalent.



3. Adjust the brake shoe diameter to fit the gauge. Line the brake shoes up vertically so that the flats on the bottom of the brake shoes are aligned approximately 1.5mm (0.05 inch) above the bottom of the brake shoe abutment plate before setting the gauge diameter. Hold automatic adjusting lever out of engagement while rotating adjusting screw. If necessary lubricate. Make sure adjusting screw rotates freely.
4. Rotate brake shoe gauge around brake shoes to ensure proper setting.
5. Install drum as outlined. Install tire and wheel assembly. Refer to Section 04-04.
6. Install the wheelcover / ornament and nut covers as required.
7. Complete adjustment by applying brakes several times. Brakes should be applied with a minimum of 111N (25 lb) force.
8. After brake shoes have been properly adjusted, check operation of brakes by making several stops from varying forward speeds.

SPECIFICATIONS

BORE DIAMETERS

Vehicle	Brake Drum Diameter		Wheel Cylinder Bore Diameter	
	Inside Diameter (mm)	Boring Limit (Max. mm)[1]	Front[2]	Rear[2]
Taurus / Sable	225 and 250	1.5 on the diameter	—	25.4mm (1.00 inch)

1 Max. Runout .127mm (.005 inch)
2 Max. Allowable Hone 0.076mm (.003 inch)

REAR DRUM BRAKE LINING DIMENSIONS

Vehicle	Brake Shoe	Color Code	Brake Diameter		Lining Size	
			mm	Inches	mm	Inches
Sedan	Leading Trailing	None None	225 225	8.85 8.85	38 38	1.49 1.49
Wagon	Leading Trailing	None None	250 250	9.84 9.84	45 45	1.77 1.77

TORQUE SPECIFICATIONS

Description	N·m	Lb-Ft
Wheel Cylinder-to-Backing Plate Bolts	10-14	8-10
Rear Brake Backing Plate-to-Spindle	60-80	45-60
Wheel Cylinder Bleeder Screw	10-20	7.5-15.0
Lug Nuts	115-142	85-105
Bearing Hub Unit	255-345	188-254
Brake Tube to Cylinder	15-20	11-15

SPECIAL SERVICE TOOLS

Tool Number	Description
D81L-1103-A	Brake Adjustment Gauge

ROTUNDA EQUIPMENT

Model	Description
104-00046	Brake Drum Micrometer
091-00001	Brake and Clutch Service Vacuum

SECTION 06-03 Brakes, Front Disc

VEHICLE APPLICATION

Taurus / Sable.

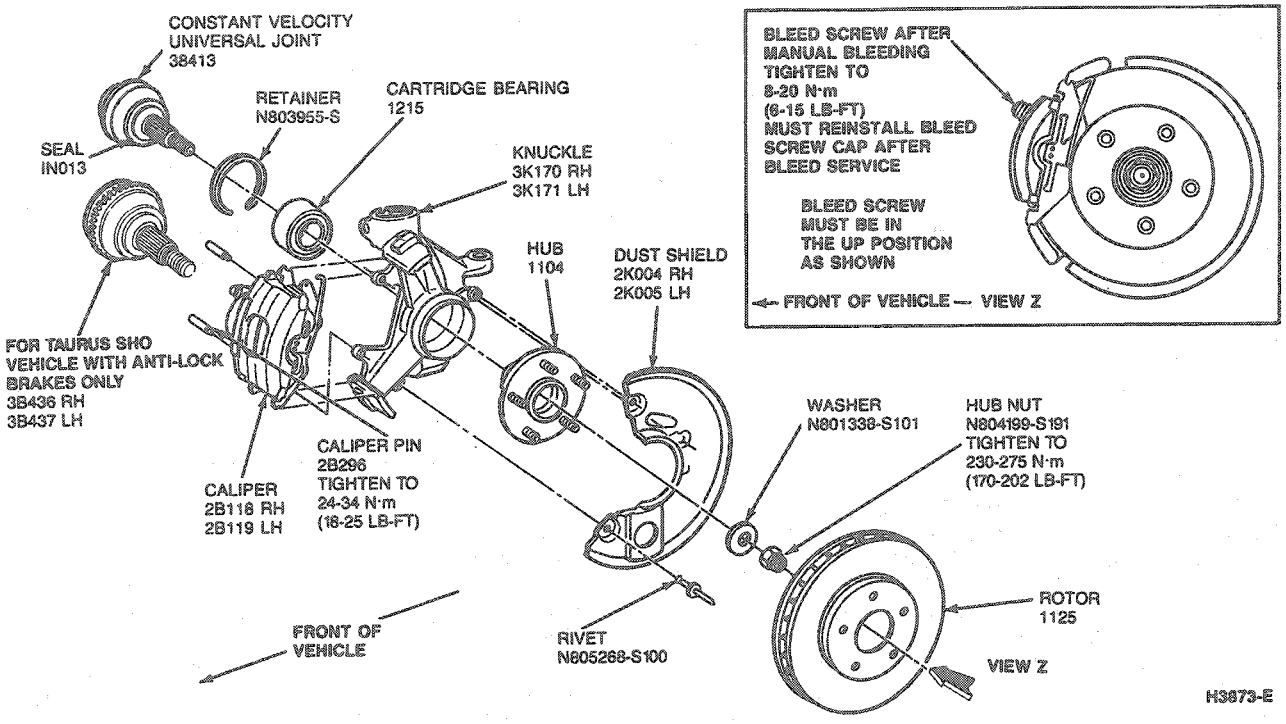
DESCRIPTION

WARNING: BRAKE FLUID CONTAINS POLYGLYCOL ETHERS AND POLYGLYCOLS. AVOID CONTACT WITH EYES. WASH HANDS THOROUGHLY AFTER HANDLING. IF BRAKE FLUID CONTACTS EYES, FLUSH EYES WITH RUNNING WATER FOR 15 MINUTES. GET MEDICAL ATTENTION IF IRRITATION PERSISTS. IF TAKEN INTERNALLY, DRINK WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION IMMEDIATELY.

Front disc brakes use pin slider-type caliper assemblies with a 258mm (10.2 inch) composite rotor. The caliper has a plastic piston with a piston seal and a press-in type dust boot (Taurus SHO vehicles and police package equipped vehicles use a steel piston). The caliper is attached to the front suspension knuckle with two Torx®-head locating pins. Rubber insulators isolate the stainless steel locating pins from direct contact with the caliper.

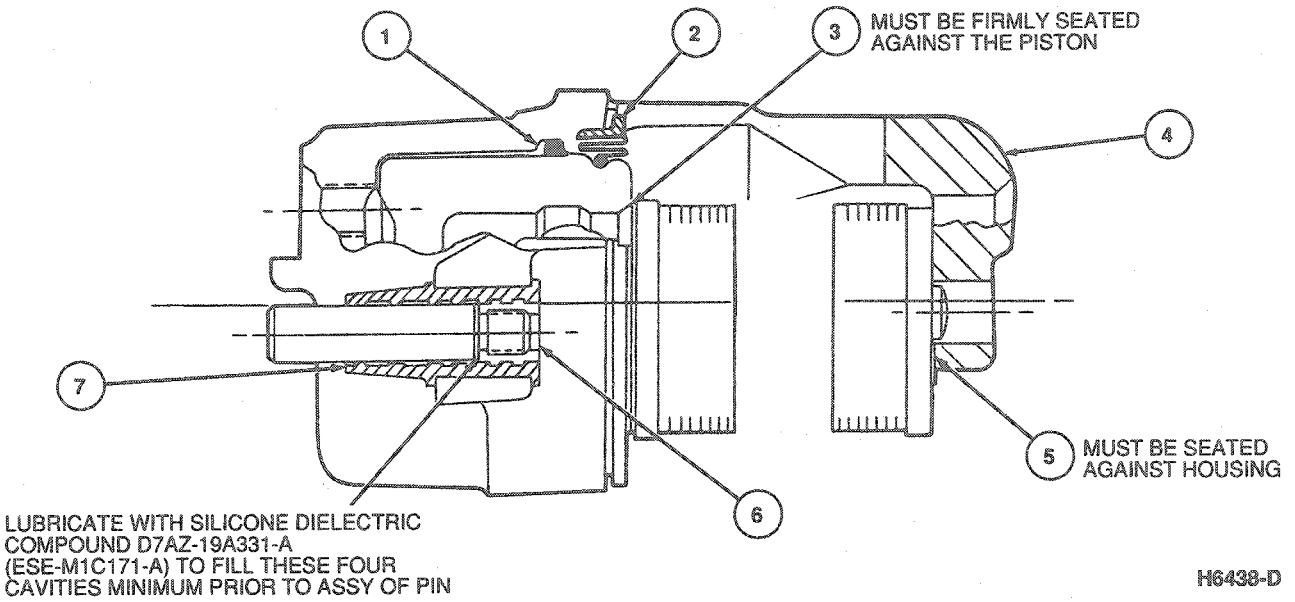
DESCRIPTION (Continued)

The vehicles are equipped with galvanized steel disc brake splash shields. The shields are attached to the front knuckle with three pop rivets per side and are not interchangeable side-to-side.



The inner shoes are interchangeable left to right and use a three-finger clip that fits inside the caliper piston. The outer shoes are not interchangeable and use a dual-purpose clip which holds the brake shoes on the caliper housing and also prevents caliper rattle. The flanges on both inner and outer shoe assemblies slide on machined surfaces of the knuckle assembly.

DESCRIPTION (Continued)



Item	Part Number	Description
1	2B115	Piston Seal
2	2207	Dust Boot
3	2019	Inner Brake Shoe Assy (Must be Firmly Seated Against the Piston)
4	2B294 RH 2B302 LH	Caliper Housing

Item	Part Number	Description
5	2018 RH 2C088 LH	Outer Brake Shoe Assy (Must Be Seated Against Housing)
6	2B296	Caliper Locating Pin
7	2B299	Insulator

TH6438D

(Continued)

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. Refer to Section 00-02.
5. Do not attempt to clean or restore oil or grease-soaked brake lining. When contaminated linings are found, brake linings must be replaced in complete axle sets and rotor braking surfaces wiped clean.
6. The LH and RH calipers must be installed on the correct side of the vehicle to be sure bleed is in the topmost position for proper purging of air from the front brake system during bleeding.

Caliper Assembly

Tools Required:

- Torx® Drive Bit D79P-2100-T40

Removal

1. Raise vehicle on hoist. Refer to Section 00-02.
2. Remove wheel and tire assembly from rotor mounting face. Use care to avoid damage or interference with bleeder screw fitting during removal.
3. Mark caliper assembly to ensure it is installed on correct knuckle during installation.

REMOVAL AND INSTALLATION (Continued)

4. Disconnect flexible brake hose from caliper. Remove hollow retaining bolt that connects hose fitting to caliper. Remove hose assembly from caliper and plug hose.
5. Remove caliper locating pins using Torx® Drive Bit D79P-2100-T40 or equivalent.

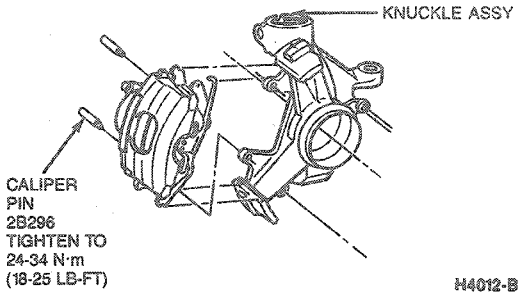
   CAUTION: Do not pry directly against plastic piston, or damage to piston will occur.
6. Lift caliper off rotor, integral knuckle and anchor plate using rotating motion.

Installation

1. Retract piston fully in piston bore. Position caliper assembly above rotor with anti-rattle spring under upper arm of knuckle. Install caliper over rotor with rotating motion. Ensure inner and outer shoes are properly positioned and outer anti-rattle spring is properly positioned.

   Ensure correct caliper assembly, as marked during removal, is installed on correct knuckle. The caliper bleed screw should be positioned on top of caliper when assembled on vehicle.

   NOTE: The caliper locating pins must be inserted and threads hand-started.
2. Lubricate locating pins and inside of insulators with Silicone Dielectric Compound D7AZ-19A331-A (ESE-M1C171-A) or equivalent. Install locating pins through caliper insulators and into knuckle attaching holes.
3. Using Torx® Drive Bit D79P-2100-T40 or equivalent, tighten caliper locating pins to 24-34 N·m (18-25 lb-ft).
4. Remove plug and install brake hose on caliper with new copper washer on each side of fitting outlet. Insert retaining bolt through washers and fittings. Tighten bolts to 41-54 N·m (30-40 lb-ft).
5. Bleed brake system. Refer to Section 06-00. Always replace rubber bleed screw cap after bleeding.
6. Fill master cylinder as required.
7. Install wheel and tire assembly. Tighten wheel lug nuts to 115-142 N·m (85-105 lb-ft).
8. Lower vehicle.
9. Pump brake pedal prior to moving vehicle to position brake linings.
10. Road test vehicle.



Brake Lining

Tools Required:

- Torx® Drive Bit D79P-2100-T40

Removal

Refer to the illustration under Caliper Assembly Installation.

1. Remove master cylinder cap and check fluid level in reservoir. Remove brake fluid until reservoir is half full. Discard removed fluid.
2. Raise vehicle on hoist. Refer to Section 00-02.
3. Remove wheel and tire assembly from rotor mounting face. Use care to avoid damage or interference with caliper splash shield or bleeder screw fitting.

   NOTE: It is not necessary to disconnect hydraulic connections.
4. Remove caliper locating pins using Torx® Drive Bit D79P-2100-T40 or equivalent. Refer to illustration under Caliper Assembly Installation.
5. Lift caliper assembly from integral knuckle and anchor plate and rotor using rotating motion. Do not pry directly against plastic piston or damage will occur.
6. Remove outer shoe and lining assembly from caliper assembly.
7. Remove inner shoe and lining assembly.
8. Inspect both rotor braking surfaces. Minor scoring or buildup of lining material does not require machining or replacement of rotor. Hand-sand glaze from both rotor braking surfaces using garnet paper 100A (medium-grit) or aluminum oxide 150-J (medium).
9. Suspend caliper inside fender housing with wire. Use care not to damage caliper or stretch brake hose.

Installation

CAUTION: Metal or sharp objects cannot come into direct contact with piston surface or damage will result.

REMOVAL AND INSTALLATION (Continued)

1. Use a 10cm (4-inch) C-clamp and wood block 70mm x 25mm (2-3/4 inch x 1 inch) and approximately 19mm (3/4 inch) thick to seat caliper hydraulic piston in its bore. This must be done to provide clearance for caliper assembly to fit over rotor during installation. Extra care must be taken during this procedure to prevent damage to plastic piston.
2. Remove all rust buildup from inside of caliper legs (outer shoe contact area).
3. Install inner shoe and lining assembly in caliper piston(s). Do not bend shoe clips during installation in piston or distortion and rattles can occur.
4. Install correct outer shoe and lining assembly. Ensure clips are properly seated.
5. Install caliper as outlined.
6. Install wheel and tire assembly. Tighten wheel lug nuts to 115-142 N·m (85-105 lb-ft).
7. Lower vehicle.
8. Pump brake pedal prior to moving vehicle to position brake linings. Refill master cylinder.
9. Road test vehicle.

Brake Rotor

Tools Required:

- 3-Jaw Puller D80L-1013-A

Removal

1. Raise vehicle on hoist. Refer to Section 00-02.
2. Remove wheel and tire assembly from rotor mounting face. Be careful to avoid damage or interference with caliper bleeder screw fitting and rotor splash shield.

   CAUTION: Handle rotor and caliper assembly in such a way as to prevent deformation of rotor, and nicking, scratching or contamination of brake linings/rotor surfaces.
3. Remove caliper assembly from rotor as outlined. If caliper does not require servicing, it is not necessary to disconnect brake hose or remove caliper from vehicle. Position caliper out of the way and support it with a length of wire to avoid damaging the caliper and hose.

   NOTE: If excessive force must be used during rotor removal, the rotor should be checked for lateral runout prior to installation.
4. Remove rotor from hub assembly by pulling it off the hub studs.

   If additional force is required to remove rotor, apply Rust Penetrant and Inhibitor D7AZ-19A501-AA (ESR-M99C56-A) or equivalent on front and rear rotor/hub mating surfaces. First, strike rotor between studs with a plastic hammer. If this does not work then attach 3-Jaw Puller D80L-1013-A or equivalent and remove rotor.

Installation

1. If rotor is being replaced, remove protective coating from new rotor with Carburetor Tune-Up Cleaner D9AZ-19579-BA (ESR-M14P9-A) or equivalent. If original rotor is being installed, make sure rotor braking and mounting surfaces are clean. Apply a small amount of Silicone Dielectric Compound D7AZ-19A331-A (ESE-M1C171-A) or equivalent to pilot diameter of rotor.
2. Install rotor on hub assembly.
3. Install caliper assembly on rotor as outlined.
4. Install wheel and tire assembly to rotor mounting face. Tighten wheel lug nuts to 115-142 N·m (85-105 lb-ft).
5. Lower vehicle.
6. Pump brake pedal prior to moving vehicle to position brake linings.
7. Road test vehicle.

Rotor Splash Shield

Tools Required:

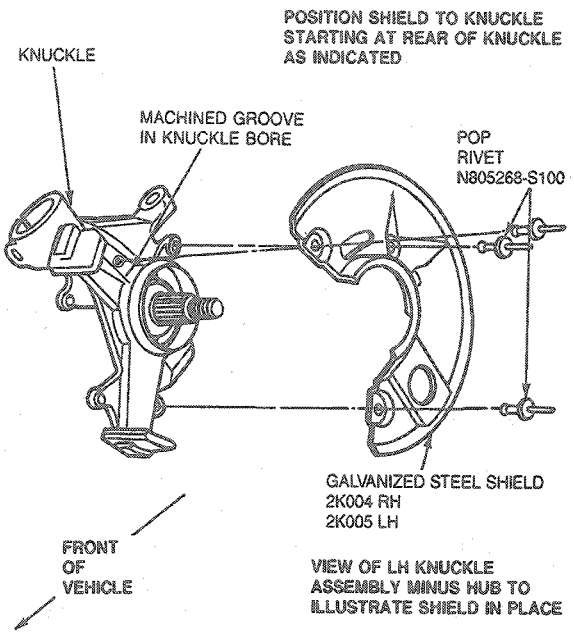
- Heavy-Duty Riveter D80L-23200-A

Removal

1. Raise vehicle on hoist. Refer to Section 00-02.
2. Remove wheel and tire assembly, caliper and rotor, as outlined. It is not necessary to disconnect hydraulic connections.
3. Remove three rivets retaining splash shield to knuckle by punching out the mandrel located in the center of the rivet. With a chisel, cut off rivet at knuckle and punch out rivet remaining in hole.

REMOVAL AND INSTALLATION (Continued)

4. Remove splash shield by pulling it outboard.



Installation

1. Locate shield until shield attachment surfaces contact knuckle mounting bosses and holes in knuckle bosses are aligned with mounting holes in shield.
2. Install new rivets using Heavy-Duty Riveter D80L-23200-A or equivalent (three per shield) through attaching holes in shield and knuckle. The rivet body head should clamp shield attachments securely to knuckle bosses.
3. Install brake rotor, caliper assembly and wheel and tire assembly as outlined.
4. Make certain splash shield does not contact rotor. Rotate wheel to visually inspect for contact.
5. Lower vehicle.
6. Pump brake pedal prior to moving the vehicle to position brake linings.
7. Road test vehicle.

OVERHAUL

Tools Required:

- Air Nozzle Assembly TOOL-7000-DE

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

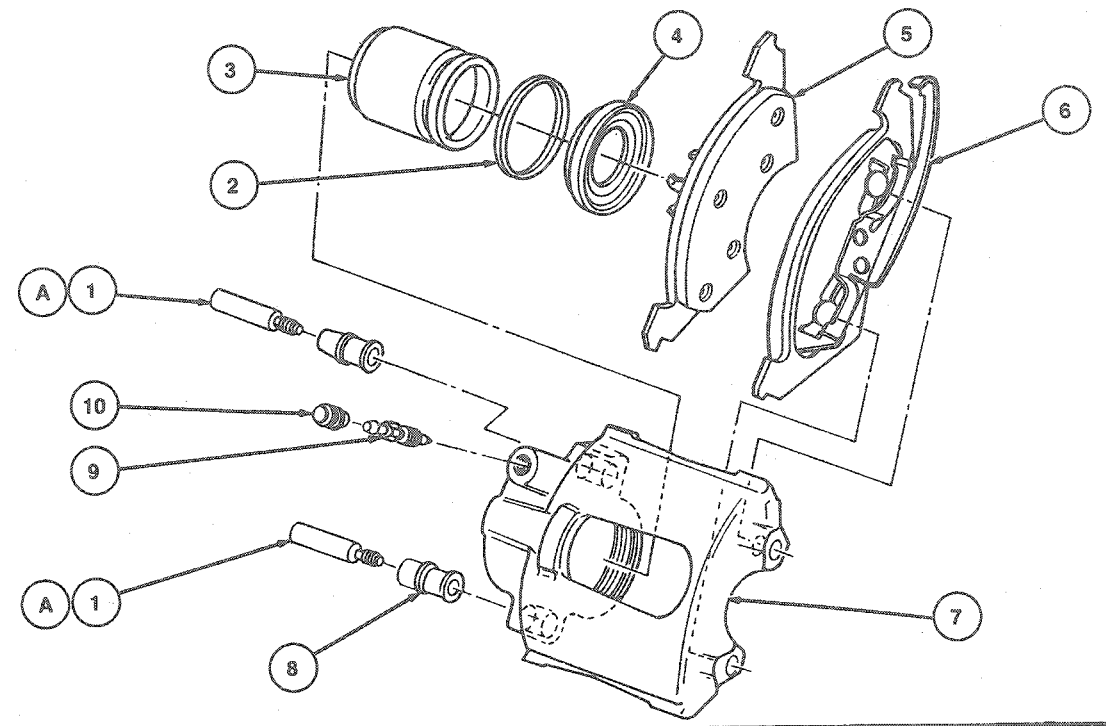
Phenolic Piston (Steel Piston For SHO and Police) and Three-Finger Inner Shoe Clip

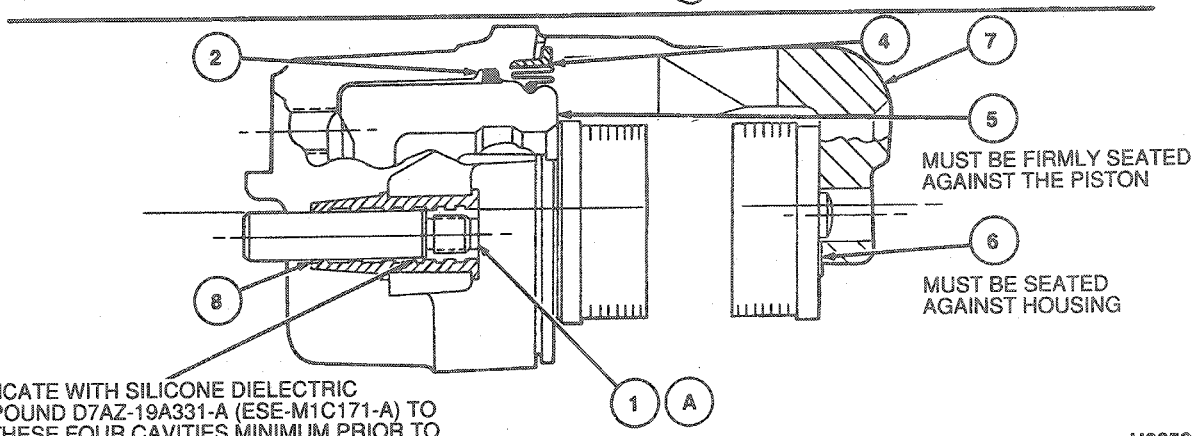
Disassembly

1. Remove caliper assembly from knuckle and rotor as outlined. Do not use screwdriver or similar tool to pry piston back into cylinder bore. Use a C-clamp. Remove outer shoe by pushing shoe to move "buttons" from caliper housing and slipping down caliper leg until clip is disengaged. Remove inner shoe by pulling it straight out of piston.

   NOTE: Inner shoe removal force may be as high as 45-90N (10-20 lbs).

OVERHAUL (Continued)





H3653-F

Item	Part Number	Description
1A	2B296	Caliper Locating Pin
2	2B115	Piston Seal
3	2196	Piston
4	2207	Dust Boot
5	2019	Inner Shoe
6	2018 RH 2C088 LH	Outer Shoe

(Continued)

Item	Part Number	Description
7	2B302 LH 2B294 RH	Caliper Housing
8	2B299	Insulator
9	8M-2208	Bleeder Screw
10	26126	Dust Cap
A		Tighten to 24-34 N·m (18-25 Lb-Ft)

TH3653F

OVERHAUL (Continued)

CAUTION: Do not use a screwdriver or any similar tool to pry piston out of bore. It will result in damage to piston. Cushion piston's impact against caliper when blowing it out of bore by placing shop towels between piston and caliper bridge. Use care because the piston can develop considerable force from pressure buildup.

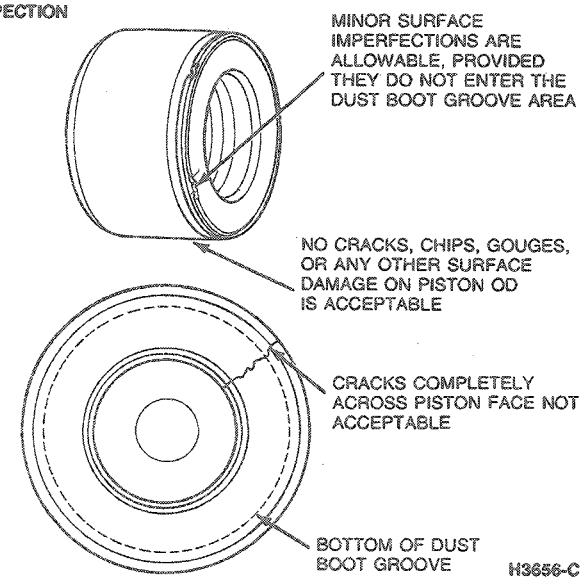
2. Disconnect the caliper from the hydraulic system, and blow the piston out by using air pressure. Apply air pressure to the fluid port in the caliper with Air Nozzle Assembly TOOL-7000-DE or equivalent to remove the piston. If the piston is seized and cannot be forced from the caliper, tap lightly around the piston while applying air pressure.
3. Remove the dust boot from the caliper assembly.
4. Remove the rubber piston seal from the cylinder and discard it.

Cleaning and Inspection

Clean all metal parts and phenolic piston with isopropyl alcohol. Then clean out and dry the grooves and passageways with compressed air. Ensure that caliper bore and component parts are thoroughly clean.

Check the cylinder bore and piston for damage or excessive wear. Replace the piston if it is pitted, scored, corroded, or the plating is worn off. Do not replace phenolic piston for cosmetic surface irregularities or small chips between the piston boot groove and shoe face.

PHENOLIC PISTON INSPECTION



Assembly

1. When assembling caliper, examine piston for surface irregularities or small chips and cracks. Replace piston if damaged. Be sure to clean foreign material from piston surfaces and lubricate with brake fluid before inserting into caliper. Always install new seal and dust boot.
2. When installing piston back into bore, use wood block or another flat stock, like an old shoe lining assembly, between C-clamp and piston. **Do not apply C-clamp directly to piston surface.** This can result in damage to piston. Be sure piston is not cocked.
3. Ensure dust boot is tight in boot groove on piston and in caliper.
4. To install inner shoe with three-finger clip attached to shoe into piston, grab each end of shoe, making it square with piston. Push firmly until shoe clip snaps into piston. Do not allow shoe or clip tangs to cock during installation.

Rotor Service

Refer to Section 06-00, Diagnosis and to the following information for servicing and conditions requiring rotor refinishing.

Brake pulsation (brake roughness) that is present during brake application is caused by either foreign material build-up or contamination on the rotor braking surface or uneven rotor thickness.

If there is a foreign material build-up or contamination found on rotor or lining surfaces, hand sand linings and rotors. Uneven rotor thickness (thickness variation) may be caused by the following:

- Rotor lateral runout in excess of 0.05mm (0.003 inch) when rotor is mounted on hub.
- Caliper drag.
- Abrasive action of brake lining.

If brake pulsation (brake roughness) is present, attempt stopping vehicle with transaxle in the NEUTRAL position. If the pulsation (roughness) is gone, the drivetrain should be inspected. If pulsation (roughness) remains, stop vehicle from 48 km/h (30 mph) using parking brake. If pulsation remains, inspect rear brakes. If pulsation is gone, inspect front brakes.

Rotor Minimum Thickness

Rotor minimum thickness must not be less than 24.75mm (0.974 inch) or less than number cast on inside of the rotor after refinishing.

Rotor Machining

Tools Required:

- Rotunda Disc Brake Lathe 054-00080

Do not machine, cut or true up new rotors prior to installation on vehicle. Making a light cut on a new rotor may cause excessive runout and result in brake shudder several thousand miles later. If is best to clean oil film off a new rotor with solvent and install it on vehicle.

OVERHAUL (Continued)

Never use a brake lathe that cuts only one face of the rotor at a time. It must be a simultaneous straddle cut. 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 refinished.

On vehicle brake lathes machine the rotor while it is on the hub and is turning perpendicular to the axis of the hub, the same axis as the hub. This procedure reduces rotor lateral runout to near zero by cutting the rotor therefore cancelling the affect of stacked tolerance of the hub, rotor and spindle. Follow the on vehicle brake lathe manufacturers instructions on machining procedures.

A bench mounted disc brake lathe machines the rotor to the axis of the lathe arbor and will not reduce total lateral runout associated with stacked tolerances of the hub, rotor and spindle. Follow the manufacturers instructions on machining procedures.

With both types of brake lathes set cutting tool to just contact the high spots on the rotor, then adjust cutting tool to the minimum depth required to clean up the rotor face. Best results are obtained with a first cut that totally removes the old rotor surfaces followed by a second light finish cut. The total material removed (combination of both sides) must not exceed the minimum discard thickness and is marked on the inside of the rotor.

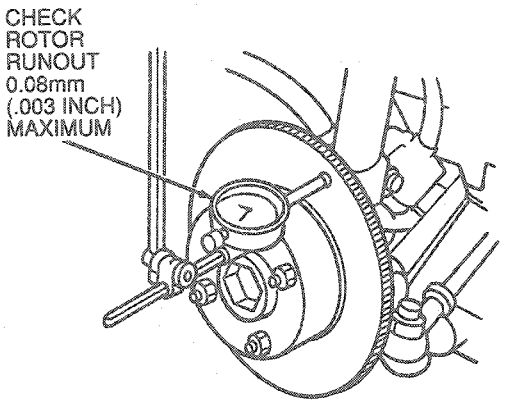
To improve initial brake pedal feel and surface finish on a machined rotor, lightly sand rotor surface with 120 grip paper prior to road testing.

Runout Check

NOTE: Whenever brake rotor has been separated from hub face, clean any rust or foreign material from mating surface on hub face and rotor. Failure to do this may result in increased lateral runout of the rotor and brake pulsation.

Install rotors on hubs and hold in place by using inverted wheel lug nuts and washers to seat rotors to hubs. Tighten wheel lug nuts to 115 N·m (85 lb-ft).

Using a dial indicator measure rotor lateral runout as shown. The dial indicator should be centered on braking surface. Rotate rotor while measuring runout. If runout is greater than 0.08mm (0.003 inch), rotor must be repositioned (indexing) on hub to obtain the lowest possible runout.

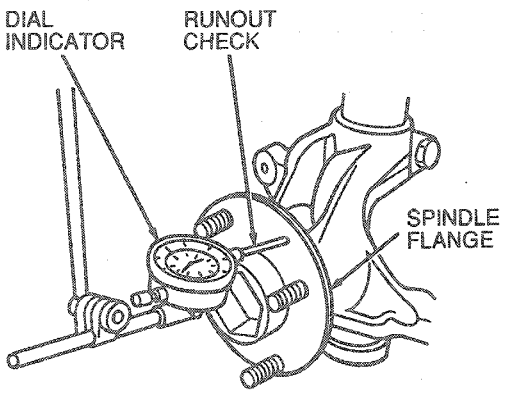


H7803-A

If lateral runout rotor is above 0.08mm (0.003 inch) after repositioning (indexing), the hub and bearing assembly must be inspected. Using a dial indicator measure hub and bearing assembly face runout as shown. Hub runout must be less than 0.06mm (0.002 inch). If hub face runout is greater than 0.06mm (0.002 inch) a new hub must be installed.

NOTE: If rotor lateral runout remains greater than 0.08mm (0.003 inch) after the following service procedures, this indicated that the brake lathe requires service:

- Rotor machining.
- Rotor repositioning (indexing) and
- Verifying hub face runout is less than 0.06mm (0.002 inch)



H7804-A

NOTE: Rotunda Disc Brake Lathe 054-00080 or equivalent should be used to refinish disc brake rotors.

Cleaning and Inspection

1. Remove wheel and tire from hub and rotor.
2. Inspect brake shoes and lining for wear. If lining is worn to within 3.2mm (1/8 inch) of shoe, replace all four shoe and lining assemblies (complete axle set) on front or rear wheels as appropriate.

OVERHAUL (Continued)

3. Visually check caliper. If caliper housing is leaking, it should be replaced. If a seal is leaking, caliper must be disassembled and new seals and dust boot installed. If a piston is seized in the bore, a new caliper housing is required. Care must be taken while removing plastic piston.

SPECIFICATIONS

FRONT DISC BRAKE DIMENSIONS

Component	Specification
Lining Material	B x D7800E ABEX 91646-Q B Non-SHO, Police
Lining Size Inner and Outer	144mm x 46mm x 9.7mm (5.7 x 1.8 x 0.38 inch) 144mm x 46mm x 10mm (5.7 inches x 1.8 inches x .3 inches) SHO Vehicles Only
Lining Wear Limit (from shoe surface)	3.175mm (0.125 inch)
Caliper Cylinder Bore Diameter	66mm (2.598 inch)
Front Rotor Nominal Thickness	26.0mm (1.024 inches)
Front Rotor Minimum Thickness[1]	24.75mm (0.974 inch)
Front Rotor Diameter	258.0mm (10.16 inches)
Front Rotor Allowable Runout On Vehicle	0.076mm max. (0.003 inch)
Front Rotor Finish	0.40-3.2 micro-meters (10-80 micro-meters)
Front Rotor Thickness Variation	0.013mm max. (0.0005 inch)

1 Minimum safe thickness is shown on each rotor.

BRAKE HYDRAULIC SYSTEM TORQUE SPECIFICATIONS

Component	N·m	Lb-Ft
Caliper Bleeder Screw	8-20	6-15
Caliper Locating Pin	24-34	18-25
Brake Hose Connection to Caliper	41-54	30-40
Hydraulic Tube Connections—	15-20	11-15
Wheel Nuts	115-142	85-105
Hub Nut	230-275	170-202

All hydraulic lines must be tightened to the specific torque value and be free of fluid leakage.

SPECIAL SERVICE TOOLS

Tool Number	Description
D79P-2100-T40	Torx® Drive Bit
D80L-1013-A	3-Jaw Puller
D80L-23200-A	Heavy Duty Riveter
TOOL-7000-DE	Air Nozzle Assembly

ROTUNDA EQUIPMENT

Model	Description
054-00080	Disc Brake Lathe