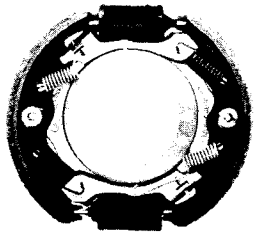
Rockwell

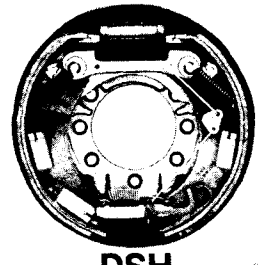
Field Maintenance
Material No.

Hydraulic and Mechanical Drum Brakes

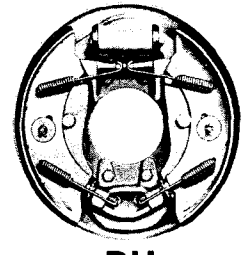
Hydraulic Brakes



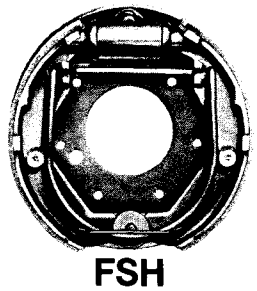
DLH



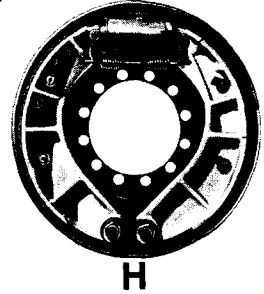
DSH



DH

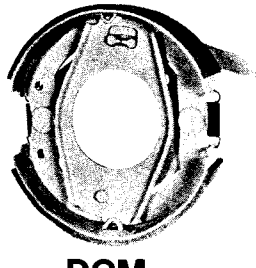


FSH

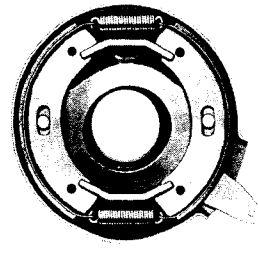


H

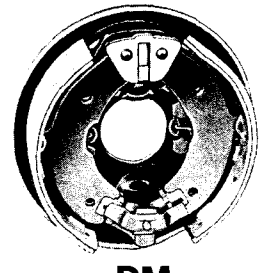
Mechanical Brakes



DCM



DLM



DM

Use only genuine Rockwell Parts.

Service Notes

This Field Maintenance Manual describes the correct service and repair procedures for Rockwell Hydraulic and Mechanical Brakes. The information contained in this manual was current at the time of printing and is subject to change without notice or liability.

You must follow your company safety procedures when you service or repair equipment. Be sure you understand all of the procedures and instructions before you begin work on the unit.

Rockwell uses the following types of notations to give warning of possible safety problems and to give information that will prevent damage to the equipment.

⚠ *WARNING*

A warning indicates procedures that must be followed exactly. Personal injury can occur if the procedure is not followed.

⚠ *CAUTION*

A caution indicates procedures that must be followed exactly. If the procedure is not followed, damage to equipment or components can occur. Personal injury can also occur in addition to damaged or malfunctioning equipment or components.

T *TORQUE*

This symbol is used to indicate fasteners that must be tightened to a specific torque value.

NOTE

A note indicates an operation, procedure or instruction that is important for correct service.

Some procedures require the use of special tools for safe and correct service. Failure to use these special tools when required, can cause injury to service personnel or damage to vehicle components.

> ⚠ ***ASBESTOS AND NON-ASBESTOS FIBER WARNING:***
>
> ***Some brake linings contain asbestos fibers, a cancer and lung disease hazard. Some brake linings contain non-asbestos fibers whose long term affects are unknown.***
>
> ***Caution should be exercised in handling both asbestos and non asbestos materials as described on page 2.***

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⚠ ASBESTOS WARNING

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution should be exercised in handling and maintenance.

Recommended Procedures for Reducing Asbestos Dust

1. *Because most brake linings contain asbestos, it is important that people who handle brake linings know the potential hazards of asbestos and the precautions to be taken. Exposure to airborne asbestos dust can cause serious and possibly fatal diseases: namely asbestosis (a chronic lung disease) and cancer, principally lung cancer and mesothelioma (a cancer of the lining of the chest or abdominal cavities). The risk of lung cancer among asbestos workers who smoke is much greater than that among non-smokers. Symptoms of these diseases are not usually seen until 15 to 20, or more, years after first exposure to asbestos.*
2. *OSHA has set the maximum allowable level for asbestos at 0.2 fibers of asbestos per cubic centimeter of air (0.2 f/cc) as an eight-hour time weighted average. There is scientific debate whether even this level will eliminate all risk of asbestos-related disease. Therefore, workers doing brake work should take steps to minimize exposure to asbestos to the extent possible.*
3. *Areas where brake work is done should be separate from other operations, if possible. OSHA requires that the following sign be posted at the entrance to areas where exposures exceed 0.2 f/cc:*

   DANGER: ASBESTOS.
   CANCER AND LUNG DISEASE HAZARD.
   AUTHORIZED PERSONNEL ONLY.
   RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA.

4. *During brake servicing, the mechanic should wear an air purifying respirator with high-efficiency filters approved by NIOSH or MSHA for asbestos dust. (Disposable dust masks are no longer allowed by OSHA.) The respirator should be worn during all procedures, starting with the removal of wheels and including reassembly.*
5. *OSHA recommends that enclosed cylinders equipped with vacuums with high-efficiency (HEPA) filters be used in brake repairs. Under this system, the entire brake assembly is placed within the cylinder and the mechanic works on the brake through sleeves attached to the cylinder. Compressed air is blown into the cylinder to clean the assembly, and the dirty air is then removed from the cylinder by the vacuum.*
6. *If such an enclosed system is not available, the mechanic must carefully clean the brake assembly in the open air. During disassembly, all parts should be carefully placed on the floor to minimize creation of airborne dust. Dust should first be cleaned from the brake drums, brake backing plates and brake assemblies using an industrial vacuum cleaner equipped with a (HEPA) filter system. After vacuum cleaning, any remaining dust should be removed using a rag soaked in water and wrung until nearly dry.*
7. *Compressed air or dry brushing should <u>never</u> be used for cleaning brake assemblies.*
8. *If grinding or other machining of brake linings is necessary, other precautions must be taken because exposure to asbestos dust is the highest during such operations. In addition to use of an approved respirator, there must be local exhaust ventilation such that worker exposures are kept as low as possible.*
9. *Work areas should be cleaned by industrial vacuums with (HEPA) filters or by wet wiping. Compressed air or dry sweeping should <u>never</u> be used for cleaning. Asbestos-containing waste, such as dirty rags, should be sealed, labeled and disposed of as required by EPA and OSHA regulations. Respirators should be used when emptying vacuum cleaners and handling asbestos waste products. Workers should wash before eating, drinking, or smoking, should shower after work, and should not wear work clothes home. Work clothes should be vacuumed after use and then laundered without shaking to prevent the release of asbestos fibers into the air.*

NOTE:

Non-asbestos brake linings may contain glass, mineral wool, aramid, ceramic or carbon fibers. Current OSHA regulations do not cover these non-asbestos fibers. Medical experts do not agree about the possible long term risks of working with and breathing non-asbestos fibers. But some experts think that long term exposure to these fibers could cause pneumonconiosis, fibrosis and cancer. <u>Therefore Rockwell recommends that workers use these same precautions (items 4 through 9) to avoid dust when working on brakes with non-asbestos linings.</u>

Introduction section 1

Rockwell supplies a complete line of brakes for heavy-duty vehicle applications. This Field Maintenance Manual No. 4H covers the hydraulic and mechanical brakes shown in the chart below.

HYDRAULIC BRAKE MODEL	SIZES
"DLH" (Dual Leading Hydraulic)	17″ x 4″
"DSH" (Duo Servo Hydraulic)	12.5″ x 2.5″
"DH" (Duplex Hydraulic)	16.5″ x 4″, 5″ and 6″
"FSH" (Floating Shoe Hydraulic)	8″ x 1.75″, 10.5″ x 1.5″ and 2.25″, and 12.5″ x 2.25″
"H" (Hydraulic Brake)	7.125″ x 2″, 10.5″ x 2.25″, 15″ x 3″, 16″ x 2.25″, 16″ x 3.5″, 16.25″ x 3.5″, 16.5″ x 5.5″, 17″ x 4″, and 17.25″ x 4″

MECHANICAL BRAKE MODEL	
"DCM" (Duplex Cam Mechanical)	10″ x 3″, 12″ x 3″, 4″ and 5″
"DLM" (Duplex Lever Mechanical)	7.25″ x 1.5″, 10″ x 1.5″ and 13.375″ x 2″
"DM" (Duplex Mechanical)	7.125″ x 2″

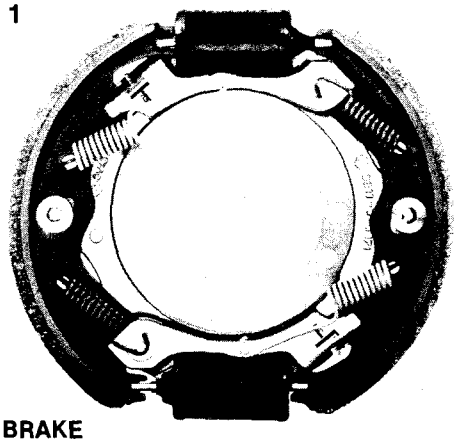
For complete instructions on other Rockwell brakes see the following Rockwell Field Maintenance Manuals:

Cam-Master Cam Brakes	FMM No. 4
Dura Disc Wet Disc Brakes	FMM No. 4C, 4G and 4L
Dura-Master Air Disc Brakes	FMM No. 4M
Heavy-Duty Stopmaster Wedge Brakes	FMM No. 4P
Stopmaster Wedge Brakes	FMM No. 4R
SCL Series Dry Disc Brakes	FMM No. 4S

section 2 Hydraulic Brakes

"DLH" Brake
(Dual Leading Hydraulic)

Figure 1



"DLH" BRAKE

The "DLH" brake is a 17″ x 4″, two cylinder hydraulic actuated brake. The dual leading shoe design permits balanced, equal torque action in both forward and reverse directions. Each shoe transfers its force into an anchor pin during forward direction stops and into an adjustment bolt during reverse direction stops. The two wheel cylinders balance the forces within the brake. The "DLH" brake has manual brake adjustment.

⚠ WARNING:

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution must be exercised in handling and maintenance as described on page 2.

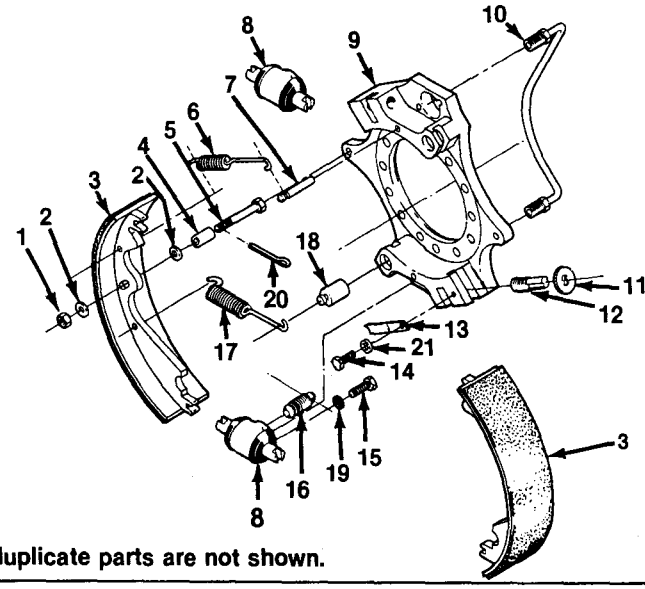
Disassembly:

⚠ WARNING:

Do not work under a vehicle supported only by jacks. Jacks can slip or tip over and cause injury.

1. Jack up the vehicle under the axle being serviced.
2. Install jack stands under the corners of the vehicle to hold it in position.
3. Remove the wheels and brake drums from the axle. If necessary, manually retract the brake shoes by rotating the adjustment bolt star wheel so that the brake drums will clear the linings.
4. Remove the four brake shoe return springs from their pins on the spider.
5. Support each shoe with one hand while you remove the two shoe guide nuts and washers from their bolts.
6. Disassemble the shoes, anchor pins, star wheel clips and adjustment bolts.

Figure 2



NOTE: Some duplicate parts are not shown.

1. Nut
2. Washer
3. Shoe and Lining Assy.
4. Shoe Guide Bolt Spacer
5. Shoe Guide Bolt
6. Shoe Return Spring
7. Brake Spring Pin
8. Wheel Cylinder Assy.
9. Spider
10. Hydraulic Tube
11. Adjuster Starwheel
12. Adjuster Bolt
13. Starwheel Clip
14. Capscrew
15. Capscrew
16. Hydraulic Fitting
17. Shoe Return Spring
18. Anchor Pin
19. Lock Washer
20. Cotter Pin
21. Washer

7. If complete disassembly is necessary, disconnect the hydraulic brake tube and hydraulic brake lines. Remove the wheel cylinder capscrews and the wheel cylinders.

Clean and Inspect all Parts:

(See page 22).

Assembly:

⚠ CAUTION:

Do not permit grease to come in contact with the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced.

1. Before assembly, apply a thin layer of brake lubricant, NLGI Grade No. 2 grease, Rockwell Specification 0-616, to the following parts:
   - **A.** Adjustment bolt assemblies.
   - **B.** Anchor pins, anchor pin holes and anchor pin slots.
   - **C.** Push rod ends of the wheel cylinders.
   - **D.** The surfaces of the guide washers that slide against the brake shoes.
2. Install the wheel cylinder to the spider. Tighten the wheel cylinder capscrews to 15-20 lb. ft. (20-27 N•m). T
3. Install the two adjustment bolt and star wheel assemblies into their threaded holes. The end of each adjustment bolt must extend into the slot for the shoe approximately 1/8 inch. Install each star wheel clip with its screw and lock washer.
4. Install the two anchor pins, with their slots in position to engage the shoes, in the anchor pin holes.
5. Install both shoe guide bolts into their holes from the back of the spider and assemble one spacer and one washer on each bolt.
6. Place one shoe in position to engage the anchor pin slot, the adjustment bolt slot and the wheel cylinder push rod. Install a shoe guide washer and nut on the shoe guide bolt.
7. Put the other shoe in position to engage the opposite anchor pin slot, adjustment bolt and wheel cylinder push rod. Install a shoe guide washer and nut to the shoe guide bolt.
8. Tighten the shoe guide nut on each shoe guide bolt until there is no clearance between the washer and the shoe. Loosen the nut 1/2 turn and install the cotter pins.
9. Install the four shoe return springs.

NOTE:

The bleeder cylinder can be installed at either the top or bottom positions on the brake. In either installation the bleeder outlet MUST be installed at the top of the cylinder. Figure 3.

10. Install the hydraulic brake tube assembly to the two wheel cylinders.
11. Connect the hydraulic line and install the brake drum and wheel.
12. Bleed the hydraulic system after all brakes are assembled and adjusted. (See page 19).

Figure 3

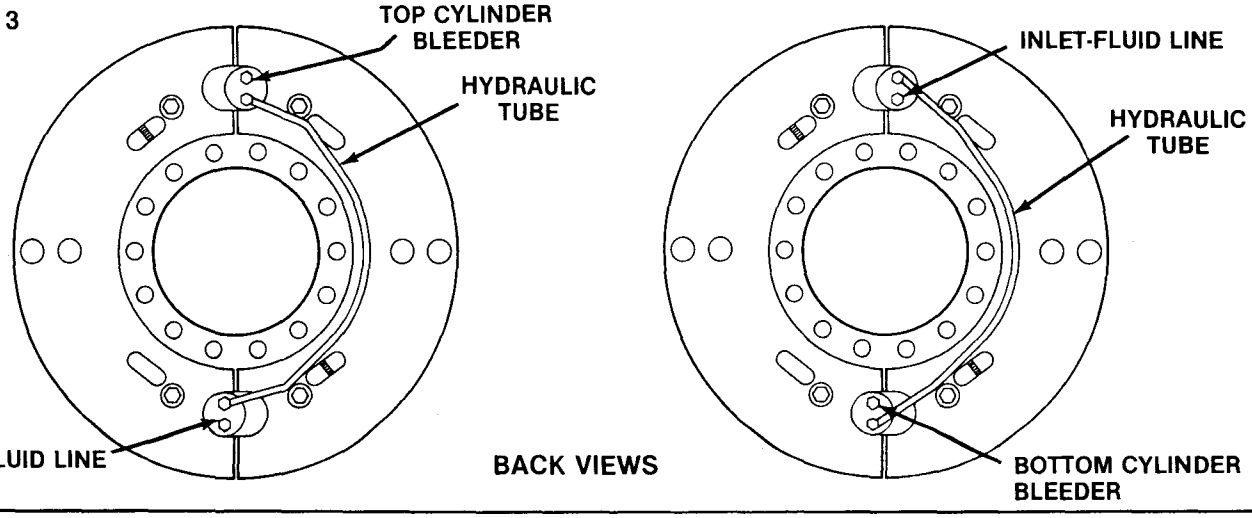
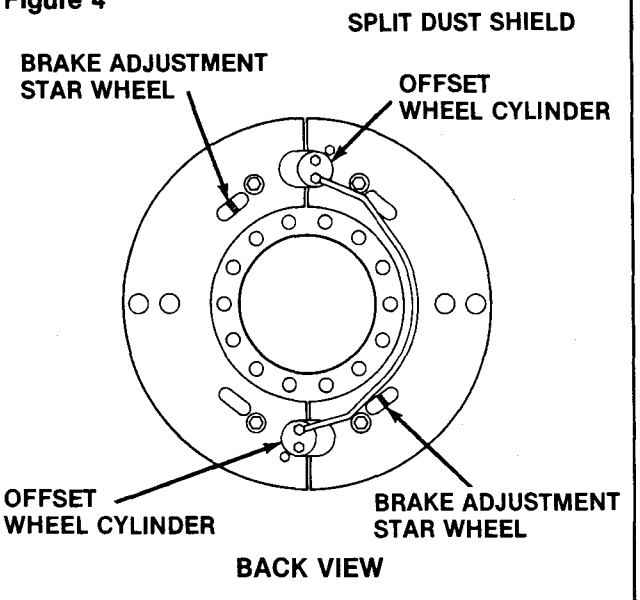


Figure 4



Brake Adjustment:

1. The "DLH" brake is adjusted manually by rotating the adjustment bolt star wheels from the back of the brake. **Figure 4.**

2. Adjust each shoe and lining assembly separately, one shoe at a time. The adjustment wheels are located opposite the wheel cylinder offset.

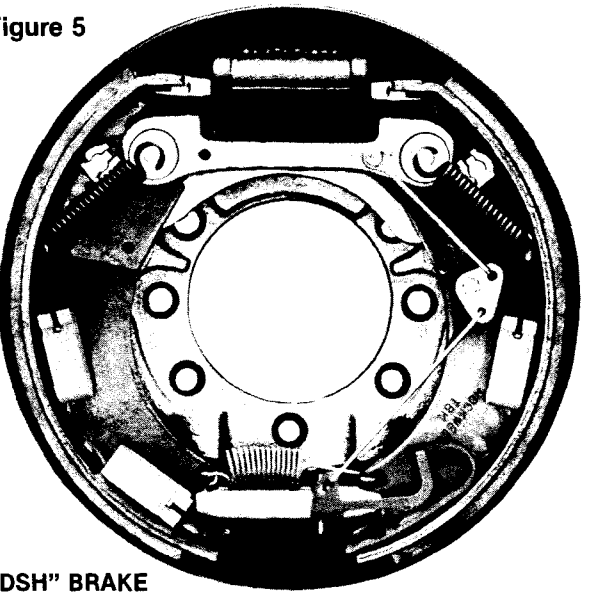
3. Adjust one shoe by rotating its star wheel with a brake adjusting spoon until a small resistance can be felt when the brake drum is rotated. Then adjust in the other direction until the brake drum can just rotate freely.

NOTE:

The adjusting tool pivots against the dust shield hole (or against the brake spider if no dust shield is used) and rotates the star wheel in the direction opposite to the handle movement. Move the handle of the adjusting tool toward the axle housing while the spoon of the tool is engaged in the star wheel to adjust the shoes closer to the brake drum. Move the handle away from the axle housing to adjust the shoes away from the brake drum.

4. Adjust the other shoe after you complete the first shoe adjustment.

Figure 5



"DSH" BRAKE

"DSH" Brake
(Duo Servo Hydraulic)

The "DSH" brake is a 12.50" x 2.50" hydraulic actuated brake. The duo servo design permits the leading shoe to transfer all of its force through the adjusting bolt to the trailing shoe. This increases the braking action because the force from both shoes is transmitted into the anchor of the trailing shoe. The brake has automatic adjustment and can be supplied with an optional cable operated lever for parking brake linkage.

⚠ *WARNING:*

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution must be exercised in handling and maintenance as described on page 2.

Disassembly:

⚠ *WARNING:*

Do not work under a vehicle supported only by jacks. Jacks can slip or tip over and cause injury.

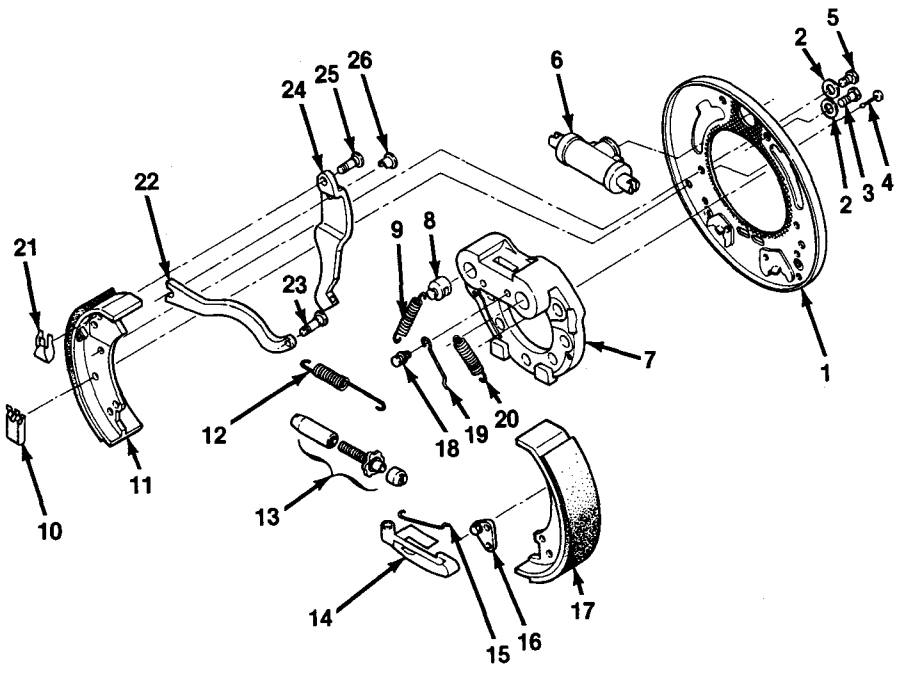
1. Jack up the vehicle under the axle being serviced.

2. Install jack stands under the corners of the vehicle to hold it in position.

3. Remove the wheels and brake drums from the axle. If necessary, manually retract the brake shoes through the forward adjustment slot so that the brake drums will clear the linings. Use a stiff wire or pick through the adjustment slot to push the automatic adjustment stamped spring away from the star wheel while using an adjusting tool to rotate the adjustment bolt star wheel.

Figure 6

TYPICAL DSH BRAKE



NOTE: Some duplicate parts are not shown.

ITEM	DESCRIPTION
1	Backing Plate
2	Lock Washer
3	Capscrew
4	Hold Down Retainer Pin
5	Capscrew
6	Wheel Cylinder Assy.
7	Spider
8	Anchor Pin
9	Shoe Return Spring (Black)
10	Shoe Hold Down Clip
11	Shoe Lining Assy. (Trailing)
12	Shoe Spring
13	Adjuster Bolt Assy.
14	Automatic Adjuster Stamped Spring
15	Automatic Adjuster Wire (Long)
16	Automatic Adjuster Pivot
17	Shoe and Lining Assy. (Leading)
18	Adjuster Wire Pin
19	Automatic Adjuster Wire (Short)
20	Shoe Return Spring (Green)
21	Parking Lever Spring Clip
22	Link
23	Pivot Pin—Link
24	Parking Lever
25	Pivot Pin—Parking Lever
26	Slide Pin—Link

4. Remove the fastener that attaches the automatic adjusting wires and the pivot to the leading shoe.

5. Remove the two brake shoe return springs from the anchor pins.

6. Support the leading shoe with one hand and remove its shoe hold-down spring clip. Lift and rotate the spring clip until it is released from the retainer pin.

7. Remove the shoe spring and the adjustment bolt at the bottom of the brake.

8. Support the trailing shoe with one hand and remove its two shoe hold-down spring clips. Lift and rotate each spring clip until it is released from the retainer pin.

9. If the brake has a parking brake lever, disassemble the link from the leading shoe by removing its spring clip. To disassemble the parking lever from the trailing shoe, remove its spring clip.

10. Remove the anchor pins from their holes.

11. If complete disassembly is necessary, disconnect the hydraulic line and remove the wheel cylinder capscrews and the wheel cylinder.

Clean and Inspect all Parts:

(See page 26).

Assembly:

1. Before assembly, apply a thin layer of brake lubricant, NLGI Grade No. 2 grease, Rockwell Specification 0-616, to the following parts:

⚠ CAUTION:

Do not permit grease to come in contact with the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced.

A. Adjustment bolt assembly.

B. All edges of brake levers and shoes that slide against each other.

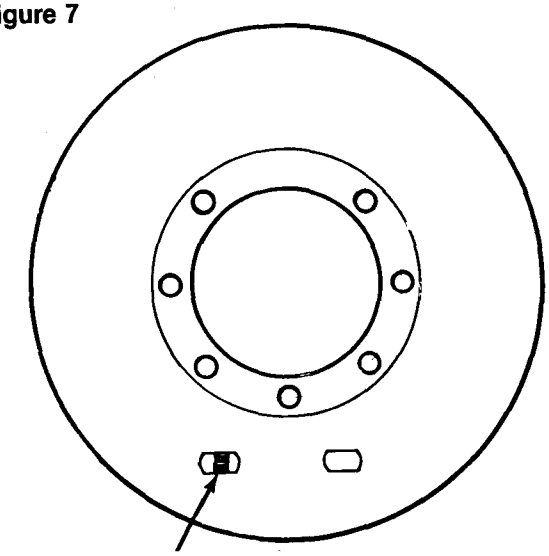
C. Push rod ends of the wheel cylinder.

D. Anchor pins, anchor pin holes and anchor pin slots.

2. Install the wheel cylinder to the backing plate. Tighten the wheel cylinder capscrews to 15-20 lb. ft. (20-27 N•m). T
3. If used, install the parking brake lever on the trailing shoe and the parking brake link on the leading shoe.
4. Install the two anchor pins in their holes in the backing plate.
5. Put the trailing shoe in position into the anchor pin slot and engaged with the wheel cylinder push rod.
6. To install the two shoe retainer clips, engage the clip on to the retainer pin and rotate the clip down until it sets flat on the shoe.
7. If used, install the parking cable through the backing plate and engage the cable in the parking brake lever. Install a cable retainer bracket (not supplied by Rockwell) where the cable enters through the backing plate.
8. Install the stamped automatic adjustment spring on the leading shoe.
9. Assemble the star wheel adjustment bolt and shoe spring on to both shoes while you put the leading shoe in position into the anchor pin slot and engage it with the wheel cylinder push rod.
10. If used, install the parking link to engage with the parking lever slide pin.
11. Hold the shoe in its correct position and install the shoe hold-down spring clip on to the retainer pin.
12. Install the green shoe return spring on to the leading shoe and the black return spring on to the trailing shoe.
13. Install the short automatic adjustment wire to connect the pivot to the pin near the anchor location. Install the long automatic adjustment wire to connect the pivot to the stamped automatic adjustment spring.
14. Install the automatic adjustment pivot and spacer to the leading shoe on its shoulder bolt fastener. Be careful that the pivot is not pinched under the edge of the shoulder.
15. Rotate the star wheel on the adjustment bolt to see that it can easily rotate with a "click" in one direction and cannot easily rotate in the other direction.
16. Connect the hydraulic line and install the brake drum and wheel.
17. Bleed the hydraulic system after all brakes are assembled. (See page 19).

Brake Adjustment:

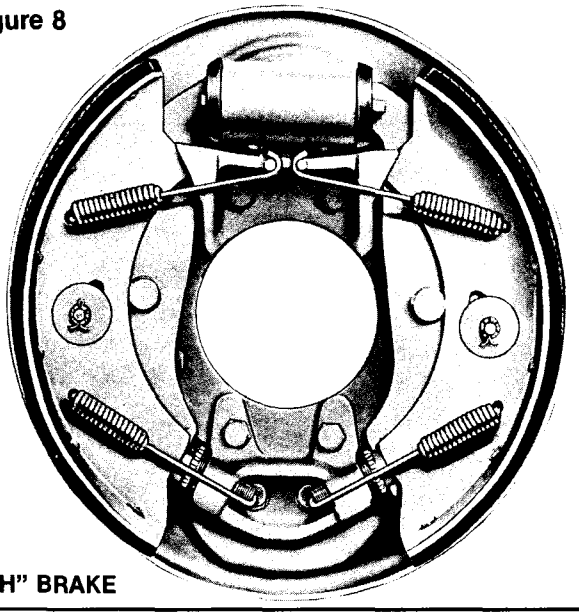
Figure 7



1. Adjust the "DSH" brake through the forward adjustment slot (toward the front of the vehicle) at the bottom of the backing plate. **Figure 7.**
2. Put an adjusting tool through the forward slot of the backing plate to engage the star wheel on the adjustment bolt. To move the shoes closer to the brake drum, move the tool handle down. The adjusting tool pivots against the backing plate slot and rotates the star wheel in the direction opposite to the handle movement.
3. Adjust the linings until a light resistance can be felt when the brake drum is rotated. Then adjust in the other direction until the brake drum can just rotate freely.
4. If the brake has a parking brake lever, adjust the parking cable until a light resistance can be felt when the brake drum is rotated. Then adjust the cable in the opposite direction until the brake drum can rotate freely. Apply and release the parking brake to see that it operates correctly.

"DH" Brake
(Duplex Hydraulic)

Figure 8



"DH" BRAKE

The "DH" brake is a dual primary shoe, hydraulic actuated brake and it is available in 16.50" x 4", 5" and 6" sizes. The brake has manual adjustment.

⚠ WARNING:

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution must be exercised in handling and maintenance as described on page 2.

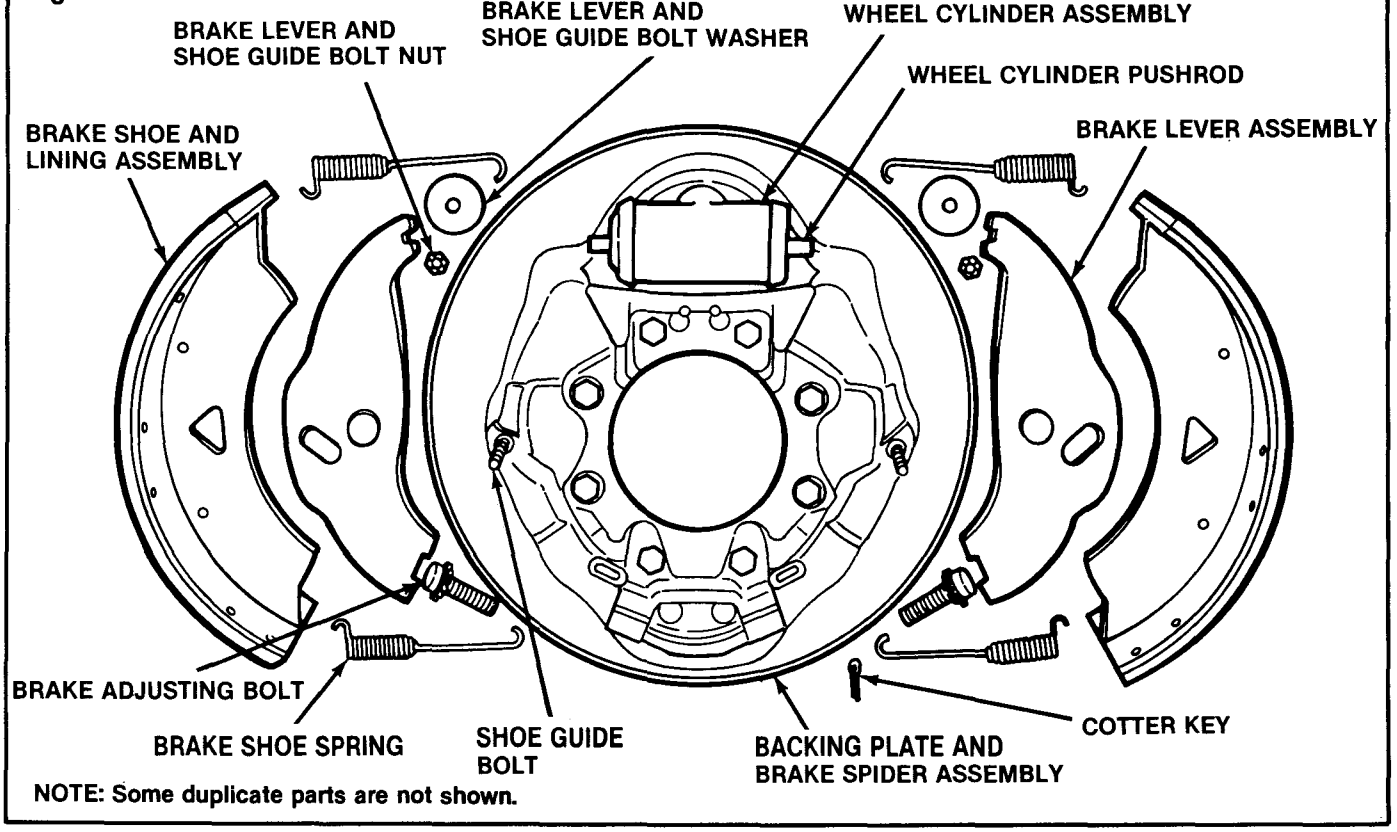
Disassembly:

⚠ WARNING:

Do not work under a vehicle supported only by jacks. Jacks can slip or tip over and cause injury.

1. Jack up the vehicle under the axle being serviced.
2. Install jack stands under the corners of the vehicle to hold it in position.
3. Remove the wheels and brake drums from the axle. If necessary, manually retract the brake shoes by rotating the adjustment bolts so that the brake drums will clear the linings.

Figure 9



NOTE: Some duplicate parts are not shown.

4. Remove the cotter keys from the two shoe guide bolts.
5. Install a wheel cylinder clamp to hold the pistons in the wheel cylinder.
6. Push one shoe against the backing plate with one hand and remove the shoe guide bolt nut and washer with the other hand.
7. Allow the shoe to rotate about the abutment ends until the return spring tension is relaxed. Remove the return springs, brake shoe and the brake lever assembly.
8. Use the same procedure (Steps 6 and 7) to disassemble the other brake shoe and lever.
9. Remove the brake shoe adjusting bolts.
10. If complete disassembly is necessary, disconnect the hydraulic line, remove the wheel cylinder capscrews and the wheel cylinder.

Clean and Inspect all Parts:

(See page 26).

Assembly:

⚠ CAUTION:

Do not permit grease to come in contact with the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced.

1. Before assembly, apply a thin layer of brake lubricant, NLGI Grade No. 2 grease, Rockwell Specification 0-616, to the following parts:
   - **A.** Brake shoe adjustment bolts.
   - **B.** The edges of the brake levers and shoes that slide against each other.
   - **C.** Push rod ends of brake levers and cylinder.
2. Install the wheel cylinder to the backing plate. Tighten the wheel cylinder capscrews to 25-35 lb. ft. (34-47 N•m). (T)
3. Install the two brake shoe adjusting bolts until they are fully retracted.
4. Install the brake levers in position so that their ends match with the push rod at the top and the adjusting bolts at the bottom.

NOTE:

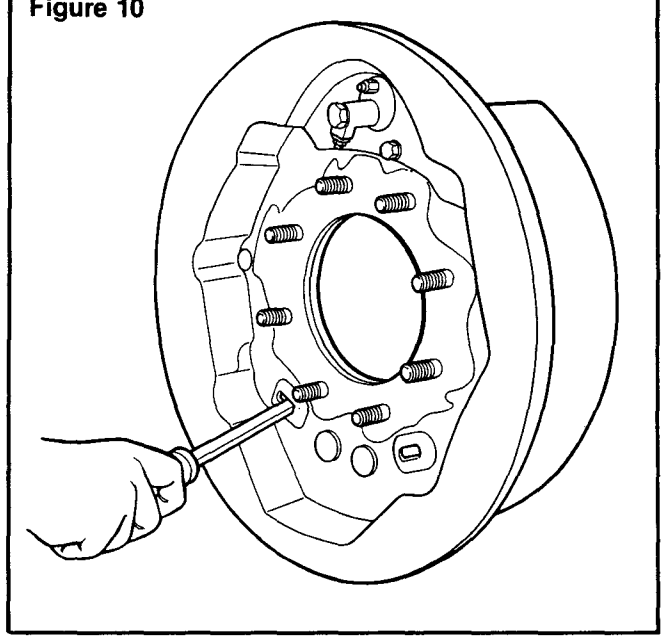
There are right and left hand brake levers. Make sure that the levers are installed in the correct positions.

5. Attach the short ends of the shoe return springs into the brake shoe web holes of one brake shoe.
6. Attach the long end of the upper shoe return spring to the pin on the spider.
7. Attach the long end of the lower shoe return spring into the end of the adjusting bolt.
8. Lift the shoe and lining assembly over the shoe guide bolt and into position on the brake lever, pivoting about the abutments.
9. Assemble the washer and nut on the shoe guide bolt. Tighten the nut until the cotter key can be put into its hole in the guide bolt. The shoe and lever must be able to move freely.
10. Lock the guide bolt nut with the cotter key.
11. Use the same procedure (Steps 5 - 10) to install the other shoe.
12. Connect the hydraulic line.
13. Bleed the hydraulic system after all brakes are assembled. (See page 19).

Brake Adjustment:

1. The DH brakes are adjusted through the slots in the rear of the backing plate.

Figure 10



2. Adjust each shoe and lining separately, one shoe at a time.

3. Put an adjusting tool through the slots to engage the lugs on the adjusting bolts. To expand the shoes, move the handle of the tool down when in the left hand slot and move the handle up when in the right hand slot. **Figure 10.**

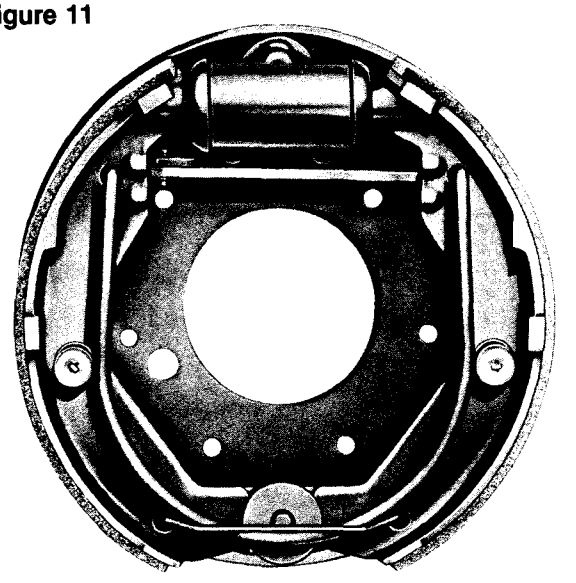
4. Adjust one shoe until a small resistance can be felt when the brake drum is rotated. Then adjust in the other direction until the brake drum can just rotate freely.

5. Adjust the other shoe after you complete the first shoe adjustment.

"FSH" Brake
(Floating Shoe Hydraulic)

The FSH brakes are floating shoe, hydraulic actuated brakes. They are available in 8″ x 1.75″, 10.5″ x 1.5″, 2.25″, 12.5″ x 2.25″, and 14″ x 2.25″ sizes. The brake can be supplied with an optional mechanical parking brake and automatic or manual brake adjustments.

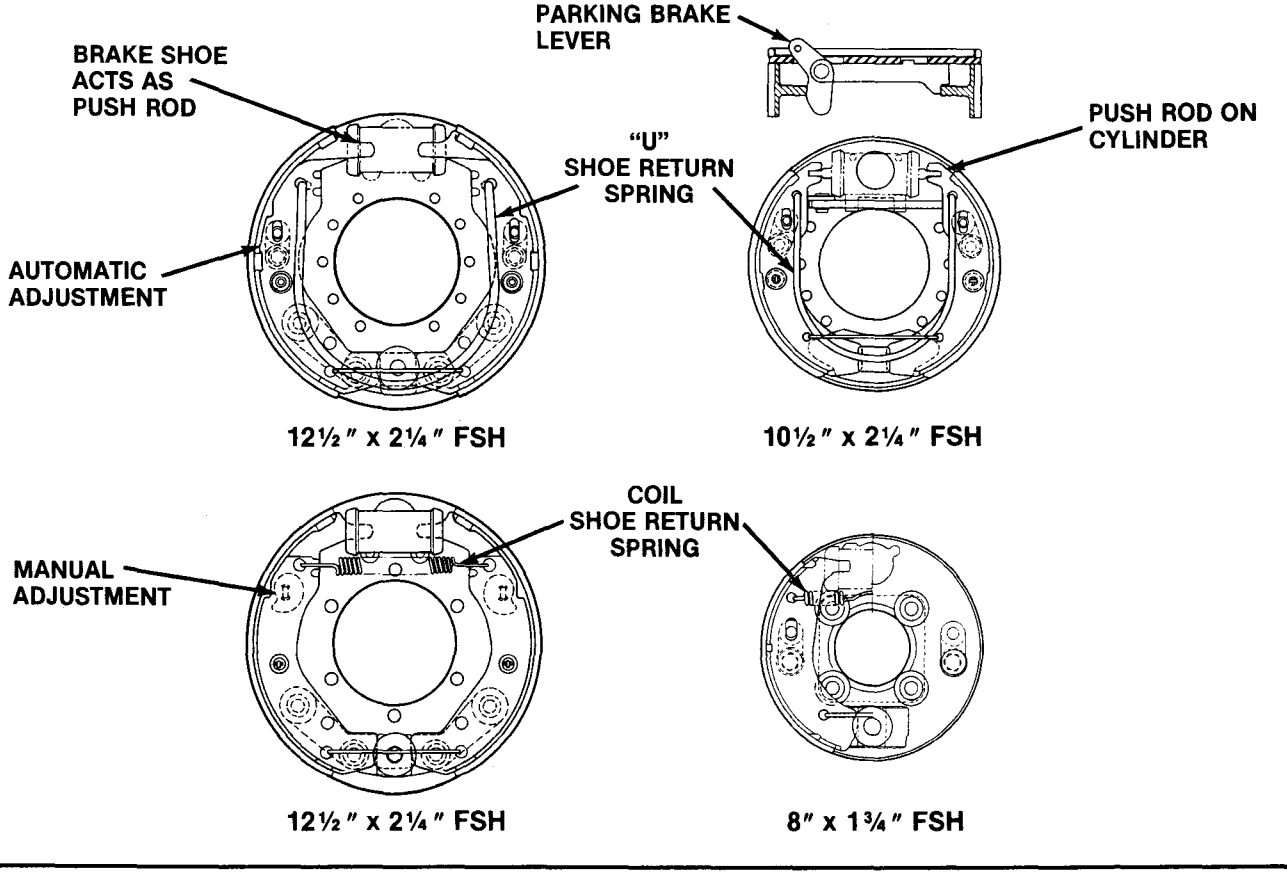
Figure 11



"FSH" BRAKE

Some of the designs of the FSH brake are shown in Figure 12.

Figure 12



⚠ WARNING:

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution must be exercised in handling and maintenance as described on page 2.

Disassembly:

⚠ WARNING:

Do not work under a vehicle supported only by jacks. Jacks can slip or tip over and cause injury.

1. Jack up the vehicle under the axle being serviced.

2. Install jack stands under the corners of the vehicle to hold it in position.

⚠ CAUTION:

Do NOT apply more than 20 lb. ft. (27 N.m) torque to the heads of the adjustment bolts in step 3. More torque can damage the automatic adjustment assemblies. Do NOT use a power wrench on the adjustment bolts.

3. Remove the wheels and brake drums from the axle. If necessary, manually retract the brake shoes by rotating the adjustment bolts so that the brake drums will clear the linings. To retract each brake shoe rotate the adjustment bolt heads 1/8 turn. **Figure 13.**

Figure 13

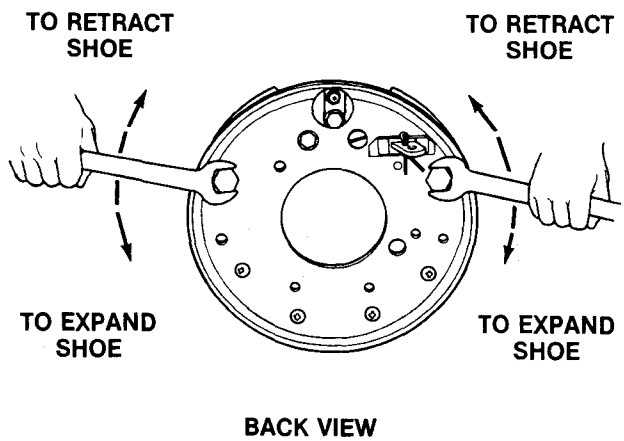
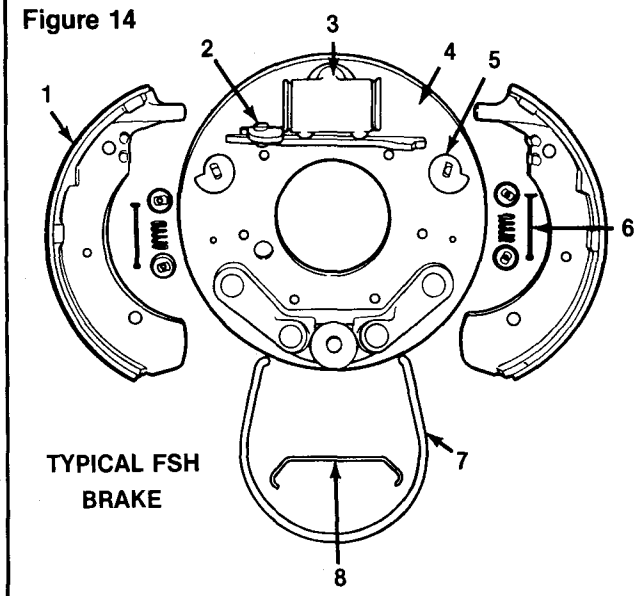


Figure 14



1. Shoe and Lining Assy.
2. Parking Brake Lever Assy.
3. Wheel Cylinder Assy.
4. Backing Plate Assy.
5. Manual Shoe Adjustment Shown
6. Shoe Hold Down Spring Assy.
7. "U" Return Spring
8. Retainer Spring Clip

4. Remove the retainer spring clip from over the "U" spring.

NOTE:

Some FSH brakes, which do not have an optional parking brake, have an upper coil shoe return spring in place of the "U" spring.

5. Release and remove the shoe return spring.

6. Push down on the shoe retainers so that the retainer nails can be reached with pliers. Hold the retainers so that they do not twist while you rotate the nails 1/4 turn. Remove the retainers, springs and retainer nails.

7. Remove the brake shoes.

8. On brakes with the mechanical parking brake, remove the cotter key, spacer, spring clip and lever assembly.

9. If complete disassembly is necessary, disconnect the hydraulic line, remove the wheel cylinder attaching capscrews and wheel cylinder.

Clean and Inspect all Parts:

(See page 26).

Assembly:

1. Before assembly, apply a thin layer of brake lubricant, NLGI Grade No. 2 grease, Rockwell Specification 0-616, to the following parts:

⚠ CAUTION:

Do not permit grease to come in contact with the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced.

   A. Push rod ends of shoes and cylinder.

   B. Surfaces of the adjusting cams and the matching surfaces of the brake shoes.

   C. Surfaces of the shoe support pads on the backing plate assembly and the ends of the shoe webs that slide against the anchor bracket.

2. Install the wheel cylinder to the backing plate. Tighten the wheel cylinder attaching screw and capscrew to 25-35 lb. ft. (34-47 N•m). (T)

3. Connect the hydraulic line.

4. If a mechanical parking brake is used, install the lever assembly, spring clip, spacer and cotter key.

5. Install the brake shoes in position so that the push rod ends of the shoes are engaged with the wheel cylinder or push rods.

6. Assemble the retainer nails, springs and retainers. Lock the nails in position by pushing down on the retainers while you twist the nails 1/4 turn with pliers.

7. To assemble the shoe return spring, put one hook in position in a brake shoe. Pull the spring open to install the opposite hook in the other shoe.

8. Assemble the retainer spring clip into the brake shoes.

9. On brakes with automatic adjustment, you must tap in the shoes with a soft mallet until the brake assembly will fit into the brake drum.

10. Bleed the hydraulic system after all the brakes are assembled. (See page 19).

Brake Adjustment:

1. FSH brakes with automatic adjustment will adjust to the correct lining to brake drum clearance when you push down on the brake pedal. These brakes have 9/16 or 3/4 inch adjustment bolt heads. **Do NOT manually adjust FSH brakes with automatic adjustment.**

2. The manual adjustment FSH brakes have two eccentric cams that can be adjusted with either an 11/16 or a 15/16 inch open end wrench on the two adjustment bolt heads. Each brake shoe MUST be adjusted separately.

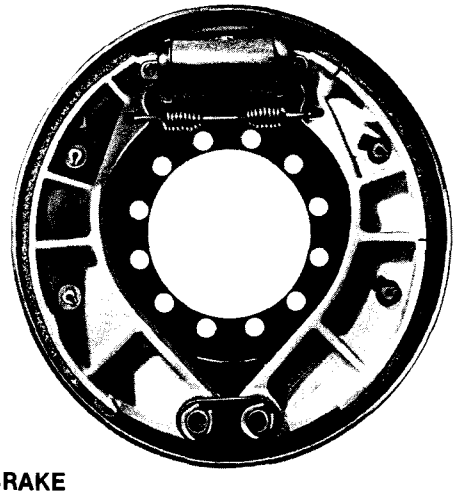
   A. Position the wrench handle horizontally, out away from the brake, then rotate the handle down to move the lining closer to the brake drum. Adjust the shoes until a small resistance can be felt when the brake drum is rotated by hand. **Figure 13.**

   B. Then turn the adjustment bolt head in the opposite direction until the brake drum can just rotate freely.

   C. Adjust the other shoe after you complete the first shoe adjustment.

"H" Brake
(Hydraulic)

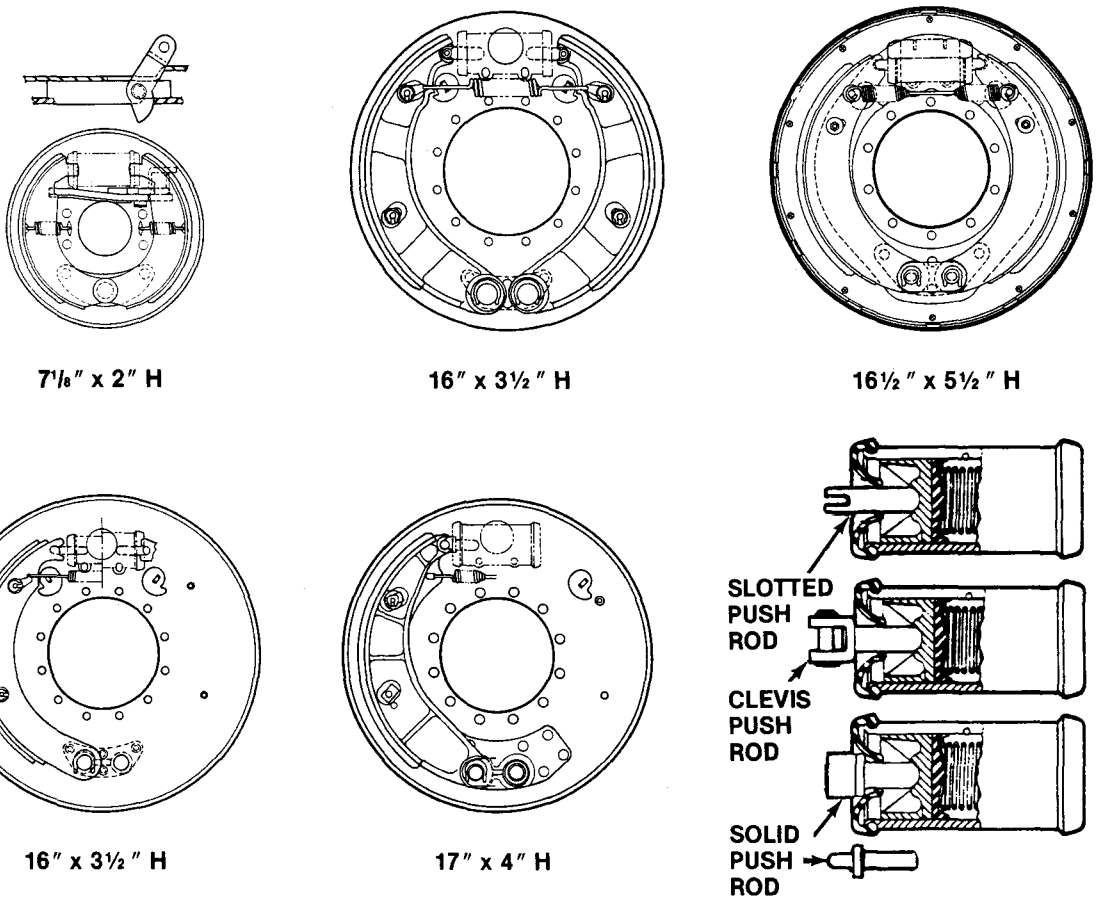
Figure 15



"H" BRAKE

The "H" brakes are two shoe hydraulc brakes, mounted on backing plates or on planetary axle housings. Many of the "H" brakes have adjustable anchor pins to permit the centering of the brake

Figure 16



shoe arc with the drum and eccentric cams for secondary brake shoe adjustment. "H" brakes are available in nine different sizes from 7.125" x 2" to 17.25" x 4".

There are several design variations within the nine models of "H" brakes. Several of the designs are shown in Figure 16.

⚠ WARNING:

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution must be exercised in handling and maintenance as described on page 2.

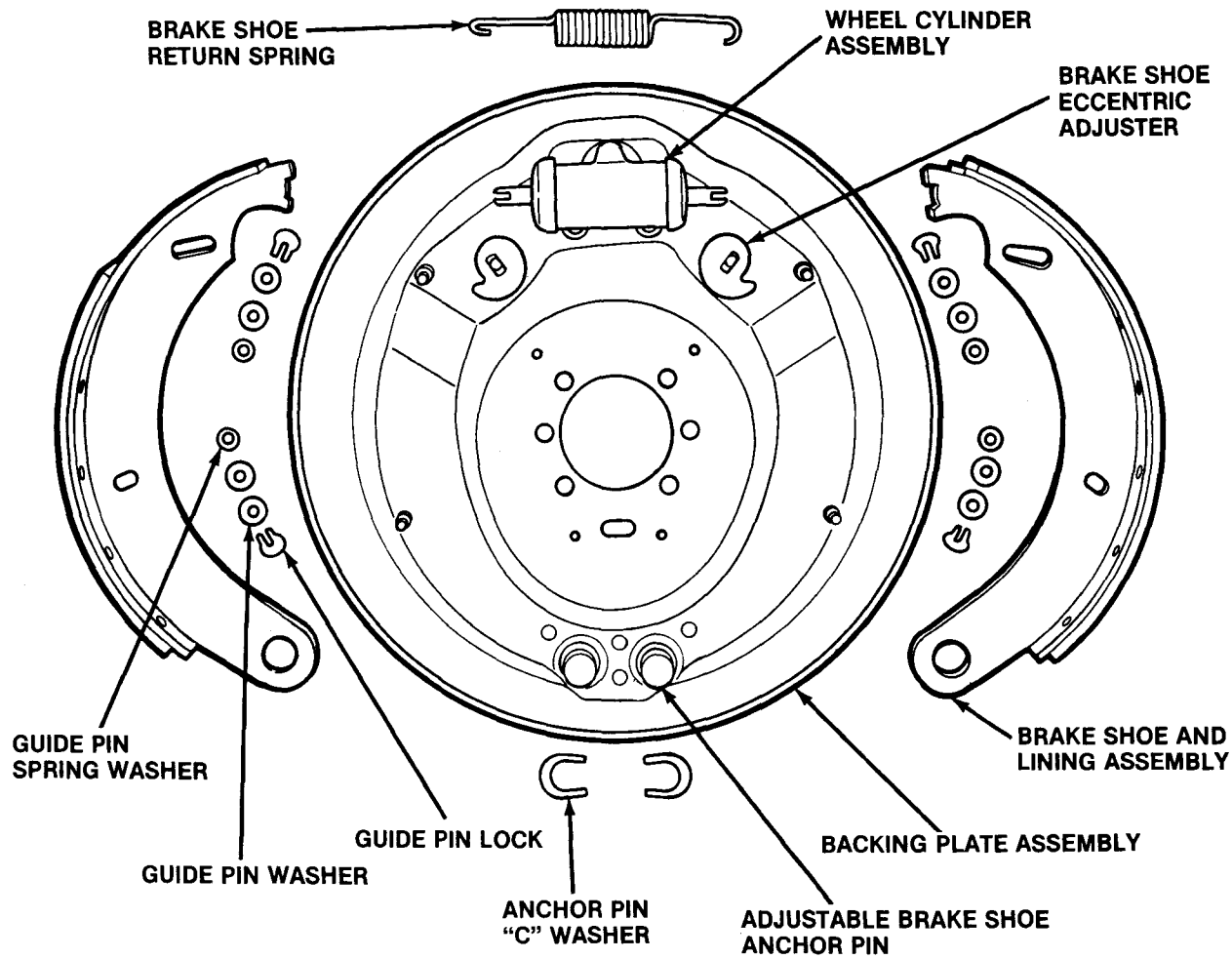
Disassembly:

⚠ WARNING:

Do not work under a vehicle supported only by jacks. Jacks can slip or tip over and cause injury.

1. Jack up the vehicle under the axle being serviced.
2. Install jack stands under the corners of the vehicle to hold it in position.
3. Remove the wheels and brake drums from the axle. If necessary, manually retract the brake shoes by rotating the adjustment cams from the back of the brake so that the brake drums will clear the linings.

Figure 17



4. Disconnect the brake shoe return spring or springs.
5. Remove the anchor pin "C" washers and the guide pin locks and washers.
6. Remove the brake shoe and lining assemblies.
7. Remove the anchor pin lock nuts, lock washers and anchor pins.
8. If complete disassembly is necessary, remove the capscrews, washers and wheel cylinder assembly. Disconnect the hydraulic lines.

Clean and Inspect all Parts:

(See page 26).

Assembly:

1. Before assembly, apply a thin layer of brake lubricant, NLGI Grade No. 2 grease, Rockwell Specification 0-616, to the following parts:

⚠ CAUTION:

Do not permit grease to come in contact with the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced.

A. Surfaces of the adjusting cams and the matching surfaces of the shoe webs.

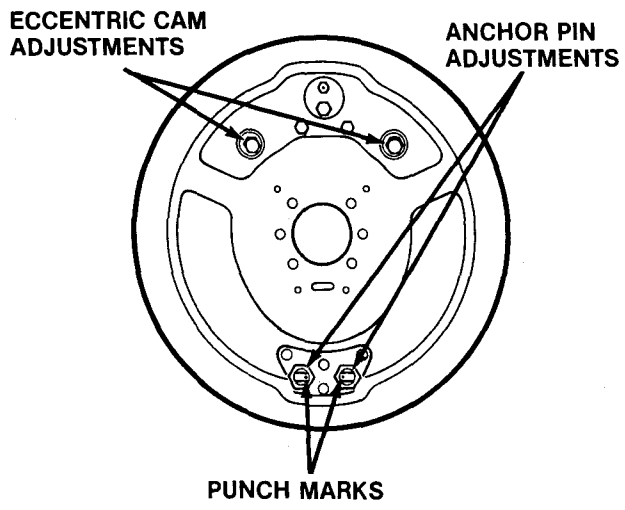
B. Push rod ends of shoes and cylinder.

C. Surfaces of anchor pins and matching surfaces of shoe webs.

2. Install the wheel cylinder to the backing plate. Tighten the capscrews and lock washers to 25-35 lb. ft. (34-47 N•m). T

3. Connect the hydraulic lines.

Figure 18



4. Assemble the anchor pins to the backing plate with the washers and lock nuts.

IMPORTANT:

The punch marks on the base of the adjustable anchor pins must be together and the flat sides of the anchor pins aligned. Figure 18.

5. Put the shoe and lining assemblies in correct position over the guide pins. Install the guide pin washers, lock rings and the anchor pin "C" washers.

6. Turn the adjusting cams so that the push rod ends of the shoes are engaged with the wheel cylinder push rods.

7. To assemble the shoe return spring, put one hook in position in the brake shoe. Pull the spring open to install the opposite hook in the other shoe.

8. Bleed the hydraulic system after all the brakes are assembled. (See page 19).

Brake Adjustment:

NOTE:

If adjustable anchor pins are not used, omit Brake Adjustment Steps 2 and 3.

The first adjustment after assembly must be carefully made to put the shoes in the correct position in the brake drum. **Each shoe must be adjusted separately.**

1. Turn the eccentric cam adjustment so that the lining just touches the brake drum. **Figure 18.**

2. Turn the anchor pin adjustment, if used, until the brake drum just rotates freely. **Figure 18.**

3. Repeat Steps one and two until additional rotation of the anchor pin no longer decreases the the brake drum resistance.

4. Tighten the anchor pin lock nut to the torque shown below: T

   For .750-16 Thread Size:
   Tighten to 85-115 lb-ft (115-156 N.m) when using a 13X-13 jam nut.
   Tighten to 100-145 lb-ft (136-197 N.m) when using a standard height nut.

   For .875-14 Thread Size:
   Tighten to 150-190 lb-ft (203-258 N.m).

   For .875-11 Thread Size:
   Tighten to 180-230 lb-ft (244-312 N.m).

5. Turn the adjusting cam in the opposite direction until the brake just can rotate freely.

6. Use the same procedure (Steps 1 -5) to adjust the other shoe.

7. Further adjustment for lining wear must be made with the adjustment cams only. Adjust the lining until a slight resistance can be felt when the brake drum is rotated. Then turn the cams in the opposite direction until the brake drum just can rotate freely.

Wheel Cylinder Maintenance

⚠ CAUTION:

These hydraulic brakes are all internal wheel cylinder brakes. If master cylinders and/or power units are being serviced, it is required that they be of a type that will maintain 12 - 20 PSI residual line pressure. Otherwise these internal wheel cylinder brakes will not perform properly.

When the brake shoes are replaced or a cylinder is leaking, check to see if the wheel cylinders need overhauling or replacing.

There are two types of wheel cylinder failures:

1. Leaks

⚠ CAUTION:

Leaks which coat the outside of the boot and cylinder with fluid, cause a decreased fluid level in the reservoir or dampen and stain the brake linings are dangerous. These leaks can cause the brakes to "grab" or fail and must be immediately corrected. Contaminated linings MUST be replaced.

Cylinder leaks can be caused by:

A. Wrong type of brake fluid causing the seals to leak.

⚠ CAUTION:

Some hydraulic brake systems use a non-petroleum hydraulic brake fluid (SAE-J-1703 or SAE-J-1702f) and other systems use petroleum brake fluids (mineral oil). Make sure that you use the correct brake fluid and seals as required in the vehicle brake system specifications. The use of the wrong brake fluid can damage the cup seals of the wheel cylinder. Different types of brake fluids MUST NOT be mixed.

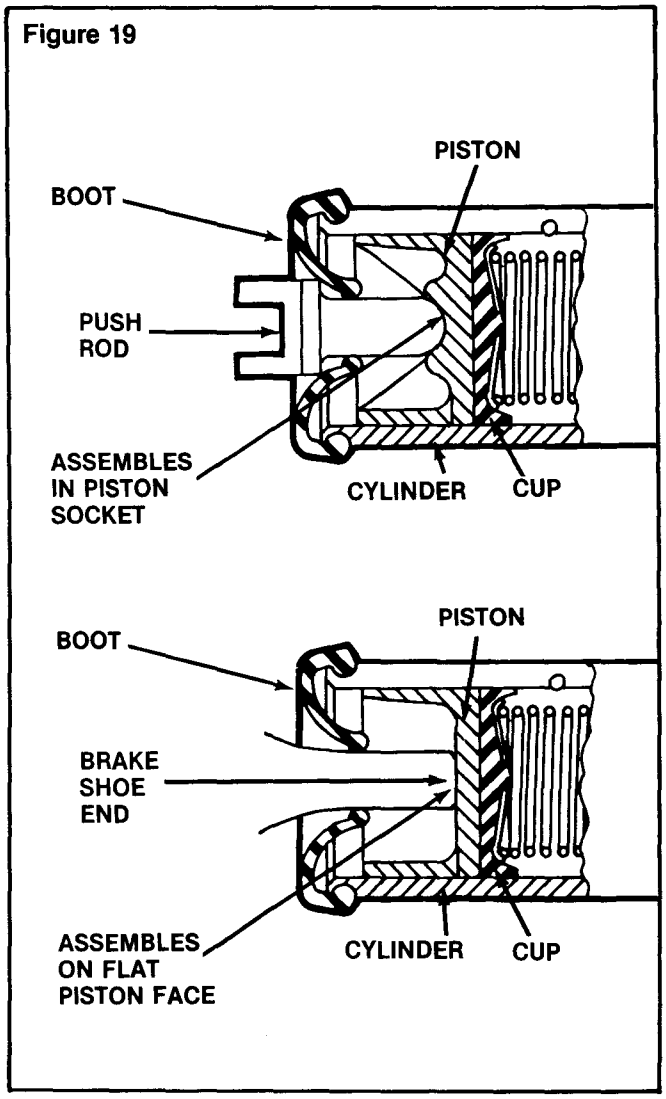
B. Corrosion or damage on the surface of the cylinder bore.

C. Worn or oversize cylinder bore.

D. Damaged seal cups.

To find leaks that are not immediately visible, pull back the cylinder boot. A small amount of fluid on the inside of the boot is normal. Unless other conditions causing poor brake performance are known, the wheel cylinder must be checked.

Figure 19



2. Poor Cylinder Action

Cylinder binding can be caused by:

A. Corrosion or deposits in the cylinder bore.

B. Swollen cups caused by contaminated or wrong type of brake fluid.

C. Cups wedged into excessive clearance between the piston and the cylinder bore.

D. Wrong type of pistons for push rods or brake shoe ends. **Figure 19.**

Light corrosion or rough areas can be removed with crocus cloth or a cylinder hone. Use brake fluid as a lubricant when cleaning the cylinder. If the bore cannot be easily cleaned, the cylinder must be replaced.

⚠ CAUTION:

Hydraulic system parts must not come in contact with oil or grease. Even a small amount of a petroleum product from dirty hands is enough to damage the rubber parts.

Disassemble the Wheel Cylinder:

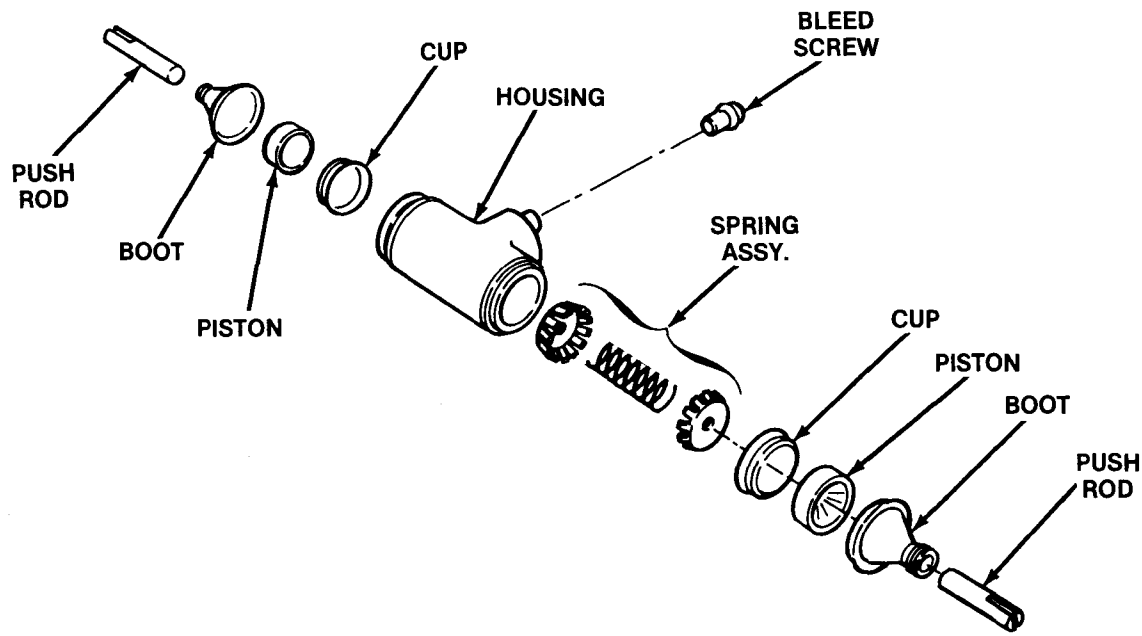
1. Pull the dust boots off of the cylinder.
2. Remove the internal parts of the cylinder from the housing. If necessary, use a wood dowel driver or apply low pressure compressed air to the fluid inlet port.

IMPORTANT:

Parts which cannot be easily removed indicate that they are damaged beyond repair and the cylinder must be replaced.

3. Clean the cylinder and the parts in the correct brake fluid for the vehicle. Do NOT use gasoline or other petroleum products. Use only lint-free wiping rags.
4. Use crocus cloth to clean small scratches, signs of rust, corrosion or discoloration from the cylinder bore and pistons. Use the crocus cloth in a circular movement, not a lengthwise movement. A clean-up hone can be used. Remove any burrs at the edge of the fluid intake or bleeder screw ports.
5. After the cylinder is cleaned, check the clearance of the piston in the cylinder. A cylinder with more than .002 inch (.05 mm) diameter clearance must be replaced.

Figure 20



TYPICAL WHEEL CYLINDER

Assemble the Wheel Cylinder:

1. Before the cylinder is assembled, lubricate the **new** cups and the piston with the correct brake fluid.
2. If the boots are deteriorated, or do not fit tightly on the push rods and the cylinder housing, replace the boots.
3. Wash the wheel cylinder with brake fluid.
4. Install the spring in the cylinder.
5. Install the cups in each end of the cylinder with the open ends of the cups toward each other.
6. Install the pistons in each end of the cylinder with the recessed end of the pistons toward the open ends of the cylinder.
7. Install dry boots over each end of the cylinder.

Bleeding the Hydraulic System

After servicing the brakes it is necessary to bleed all of the components of the hydraulic system. Follow the bleeding instructions in the OEM's vehicle maintenance manual. If the manual is not available, the following procedures will provide a proper bleed:

Bleeding must start first with the hydrovac, power cluster or master cylinder. The first wheel cylinder to be bled MUST be the one that is the greatest distance from the master cylinder.

⚠ *CAUTION:*

Some hydraulic brake systems use a non-petroleum hydraulic brake fluid (SAE-J-1703 or SAE-J-1702f) and other systems use petroleum brake fluids (mineral oil). Make sure that you use the correct brake fluid and seals as required in the vehicle brake system specifications. The use of the wrong brake fluid can damage the cup seals of the wheel cylinder. Different types of brake fluids MUST NOT be mixed.

1. Fill the master cylinder with brake fluid. Connect one end of the bleeder hose to the bleeder screw and hang the other end of the hose in a clean container. **Do not get fluid on the lining.**
2. Loosen the bleeder screw and slowly push the brake pedal to the floor. Close the bleeder screw before you release the brakes. If the bleeder hose is kept submerged in the container of brake fluid, it is not necessary to close the bleeder screw on each application. Repeat this procedure eight or ten times on each component bled.
3. Fill the master cylinder or power cluster with the correct hydraulic fluid and check the brake pedal for correct pressure and travel. (The brakes must be in correct adjustment).

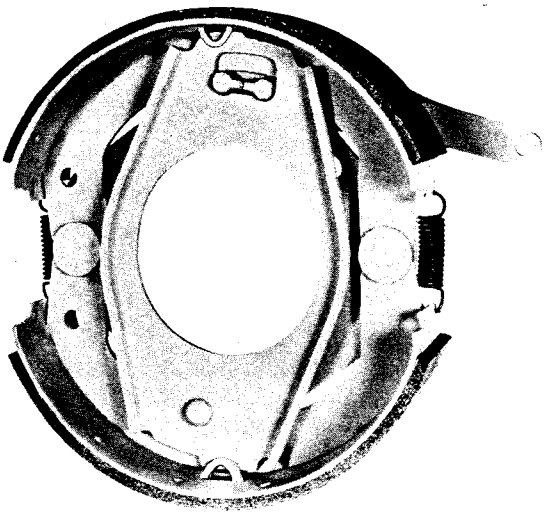
   If pressure bleeding equipment is used, connect the outlet hose to the master cylinder or power cluster and bleed the system following the same procedures as above. The flow of the brake fluid must be checked while the bleeder hose is kept submerged in the brake fluid in the container. When the air bubbles are eliminated and the brake fluid runs in a clean, solid flow, the bleeding is complete.

   If vacuum bleeding equipment is used, small air bubbles can be drawn past the cylinder seals into the wheel cylinders. A conventional bleed of each wheel cylinder should be performed after a vacuum bleeding.
4. Repeat this procedure at each wheel cylinder. Fill the master cylinder reservoir after each wheel cylinder is bled.
5. When bleeding is complete, check the fluid level of the master cylinder. If necessary, fill to the specified level.

section 3 Mechanical Brakes

"DCM" Brake
(Duplex Cam Mechanical)

Figure 21



"DCM" BRAKE

The "DCM" brake is a two shoe mechanically actuated brake. The brake is available in 10" x 3" and 12" x 3", 4" and 5" sizes.

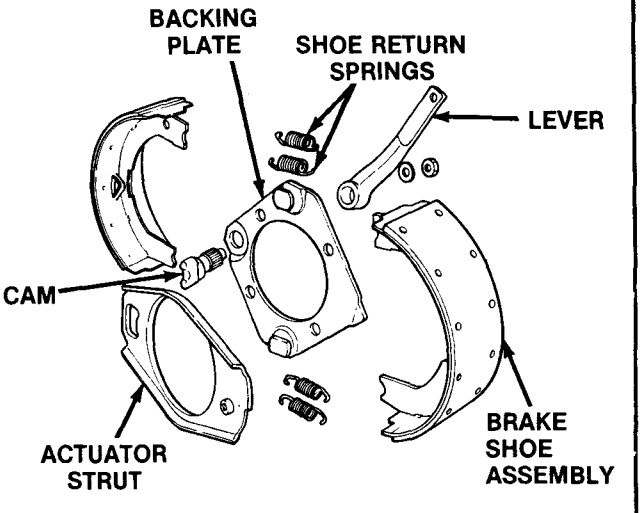
⚠ *WARNING:*

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution must be exercised in handling and maintenance as described on page 2.

Disassembly:

1. Put blocks at all the wheels so that the vehicle does not roll when you remove the brake.
2. Disconnect the drive shaft using standard procedures.
3. Release the brake.
4. Remove the brake drum using standard procedures.

Figure 22



5. Remove the nut and washer that hold the cam to the lever.
6. Remove the cam and the lever.
7. Use a brake shoe return spring removal tool to remove the two or four brake shoe return springs from the ends of the brake shoes. Discard the springs and replace them with **four** new springs at assembly.
8. Remove both brake shoes and mark them to identify their original position so that they are installed in the same position at assembly.
9. Remove the actuator strut.
10. If complete disassembly is necessary, remove the four brake backing plate capscrews and washers.

IMPORTANT:

Make a note of how the brake backing plate is mounted. Use the position of the cam as the reference point.

Clean and Inspect all Parts:

(See page 26).

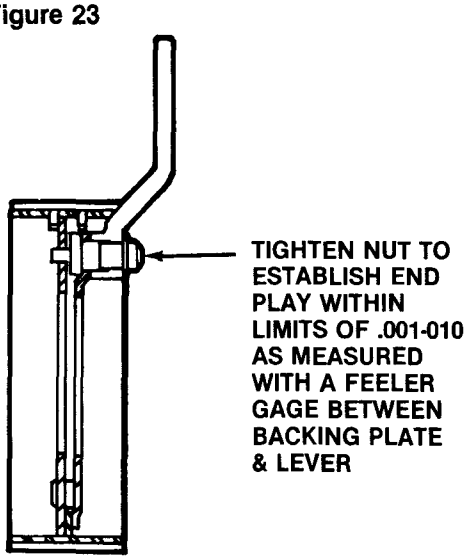
Assembly:

⚠ CAUTION:

Do not permit grease to come in contact with the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced.

1. Before assembly, apply a thin layer of brake lubricant, NLGI Grade No. 2 grease, Rockwell Specification 0-616, to the following parts:
   - **A.** Cam head face and journals.
   - **B.** The sides of the shoe webs and the actuator strut that slide together.
   - **C.** Both sides of the backing plate at the cam hole.
2. If it was removed, install the brake backing plate in the same position as marked in Step 10 of the Disassembly Section. Tighten the four capscrews to the specifications set by the vehicle builder.
3. Install the brake shoes in the same position as marked in Step 8 of the Disassembly Section with the web ends in position on the backing plate bosses.
4. Use a brake shoe installation tool to install the **four new** brake shoe return springs at the ends of the brake shoes.

Figure 23



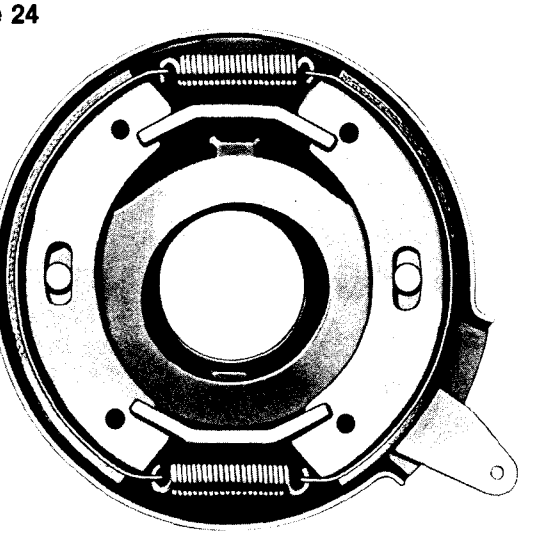
5. Assemble the cam through the backing plate, lever, lock washer and nut. Tighten the nut to give an end play of .001" to .010" as measured with a feeler gauge between the backing plate and the lever. **Figure 23.**
6. Install the actuator strut with the pressure points against the shoe web pressure points and the cam head in position in the slot of the strut.
7. Assemble the brake drum and drive shaft using standard procedures.

Brake Adjustment:

Equal adjustment of the brake shoes is controlled by the actuating lever. The only required adjustment is through the connecting linkage to the lever arm. The adjustment can be made after the brake drum and drive shaft are assembled.

"DLM" Brake
(Duplex Lever Mechanical)

Figure 24



"DLM" BRAKE

The "DLM" brake is a two shoe mechanically actuated brake. The brake is available in 7.25″ x 1.5″, 10″ x 1.5″ and 13.375″ x 2″ sizes.

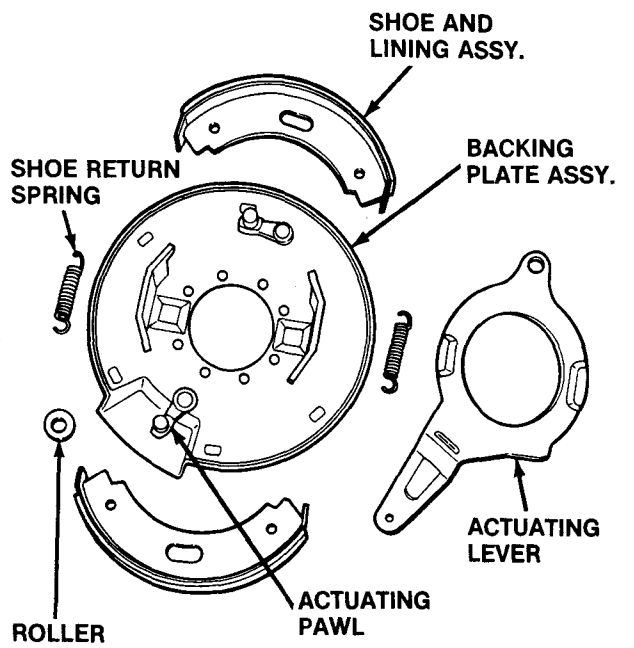
⚠ WARNING:

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution must be exercised in handling and maintenance as described on page 2.

Disassembly:

1. Put blocks at all the wheels so that the vehicle does not roll when you remove the brake.
2. Disconnect the drive shaft using standard procedures.
3. Release the brake.
4. Remove the brake drum using standard procedures.

Figure 25



5. Use a brake shoe return spring removal tool to remove the two brake shoe return springs.
6. Remove both brake shoe and lining assemblies.
7. Lift the brake actuator lever from the pawls and remove the roller from the actuator pawl pin under the arm of the lever.

NOTE:

On some smaller size "DLM" brakes two rollers are used, one on each pawl.

8. If complete disassembly is necessary, remove the brake backing plate capscrews and washers.

IMPORTANT:

Make a note of how the brake backing plate is mounted. Use the position of the actuator lever opening as a reference point.

Clean and Inspect all Parts:

(See page 26).

Assembly:

1. Before assembly, apply a thin layer of brake lubricant, NLGI Grade No. 2 grease, Rockwell Specification 0-616, to the following parts:

⚠ *CAUTION:*

Do not permit grease to come in contact with the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced.

   A. The sides of the brake lever and shoes that slide against each other.
   B. The ends of the shoe webs.
   C. The surfaces of the wear pads and actuating pawls.

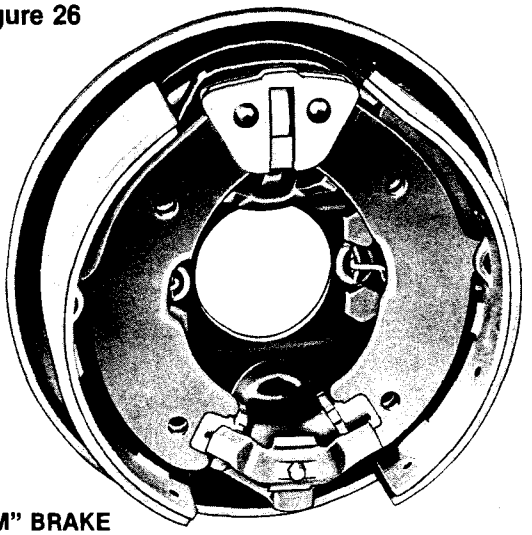
2. If it was removed, install the brake backing plate in the same position as marked in Step 8 of the Disassembly Section. Tighten the capscrews to the specifications set by the vehicle builder.
3. Put the roller(s) in position on the actuator pawl pin at the lever opening on the backing plate.
4. Install the brake actuator lever with the large hole in the tab over the pawl pin that is opposite the actuator pawl. Set the lever arm in the backing plate opening with the outer edge of the lever next to the roller.
5. Install the brake shoes with the webs against the actuator lever and the pawl pins through the web slots.
6. Use a brake shoe return spring installation tool to connect the shoe return springs to the brake shoes in the slots nearest the backing plate.
7. Assemble the brake drum and drive shaft using standard procedures.

Brake Adjustment:

Equal alignment of the brake shoes is controlled by the actuating lever. The only required adjustment is through the connecting linkage to the lever arm. The adjustment can be made after the brake drum and drive shaft are assembled.

"DM" Brake
(Duplex Mechanical)

Figure 26



"DM" BRAKE

The DM brake is a two shoe mechanically actuated brake. The brake is available in a 7.125″ x 2″ size.

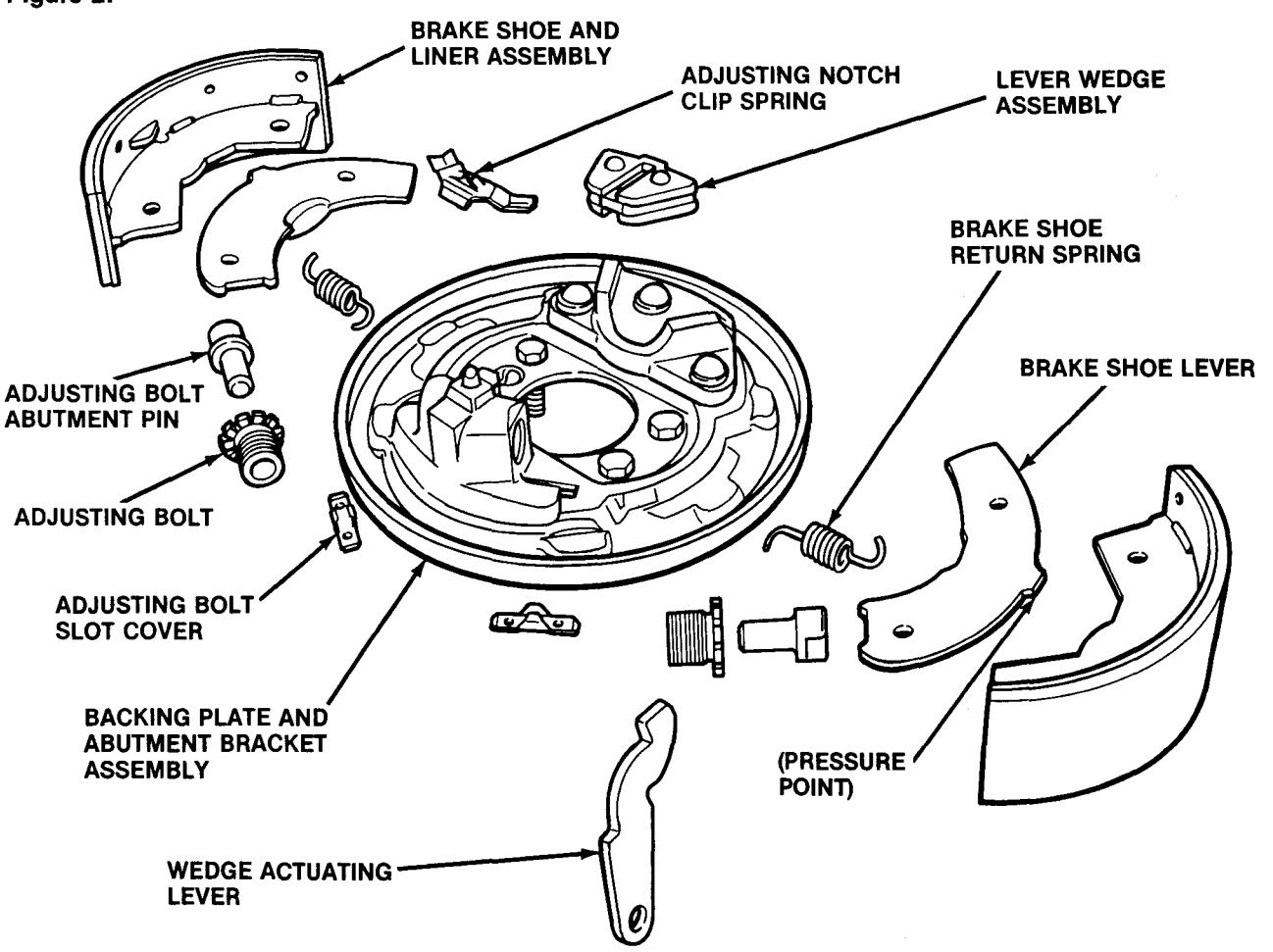
⚠ WARNING:

Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution must be exercised in handling and maintenance as described on page 2.

Disassembly:

1. Put blocks at all the wheels so that the vehicle does not roll when you remove the brake.
2. Disconnect the drive shaft using standard procedures.
3. Release the brake.
4. Remove the brake drum using standard procedures.

Figure 27



5. Disconnect and remove the shoe return springs with a "button hook" type of spring tool.
6. Remove the shoe and lining assemblies.
7. Disassemble the actuating lever, both shoe levers and the wedge assembly.
8. Remove the adjusting bolt spring clip.
9. Pull the abutment pins from the bores inside the adjusting bolts.
10. Remove both adjusting bolts.
11. If complete disassembly is necessary, remove the four brake backing plate capscrews and washers.

IMPORTANT:

Make a note of how the brake backing plate is mounted. Use the position of the slot for the actuator lever as the reference point.

Clean and Inspect all Parts:

(See page 26).

Assembly:

1. Before assembly, apply a thin layer of brake lubricant, NLGI Grade No. 2 grease, Rockwell Specification 0-616, to the following parts:

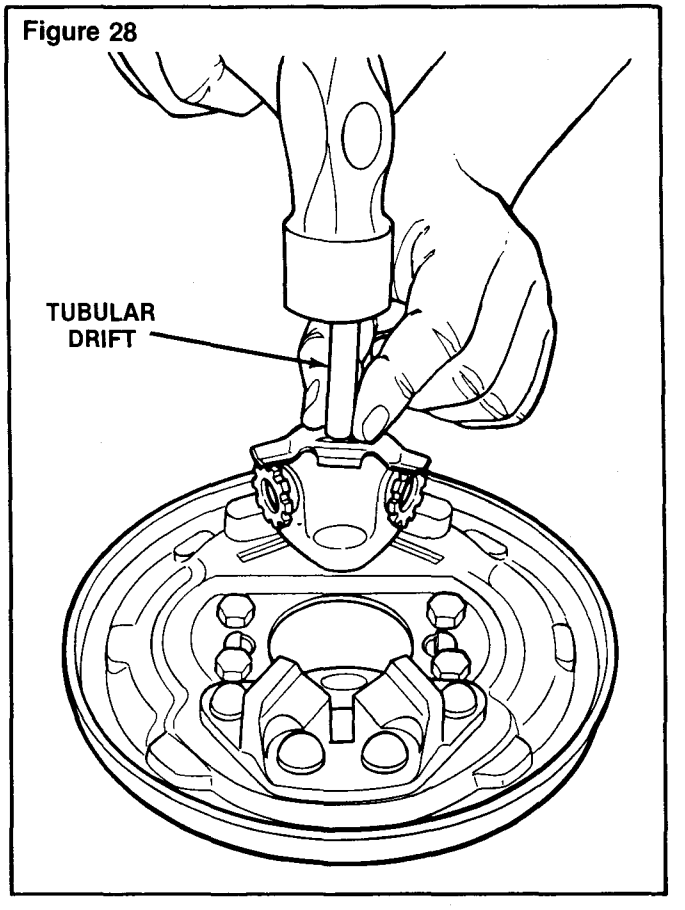
⚠ *CAUTION:*

Do not permit grease to come in contact with the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced.

   A. Adjusting bolts.
   B. Side slots and the actuator lever groove in the wedge assembly.
   C. The sides of the brake levers and shoes that slide against each other.

2. Install both adjusting bolts.
3. Put the abutment pins in the adjusting bolt bores.

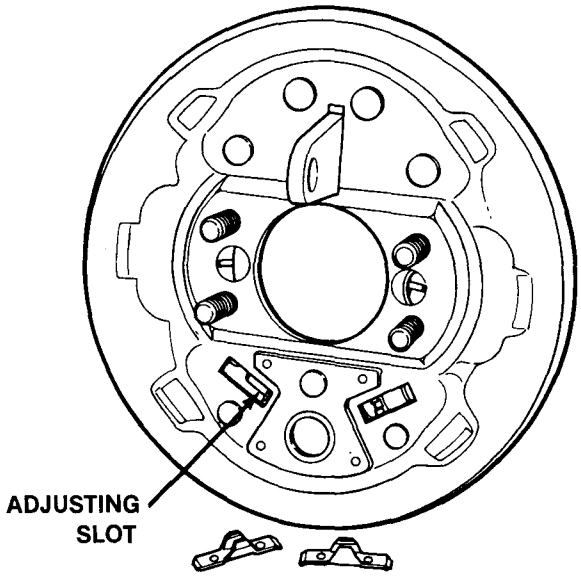
Figure 28



4. Install the adjusting bolt spring clip with a tubular drift. **Figure 28.**
5. Install shoe and lining assemblies on the backing plate with the web pressure points above the center line.
6. Put the straight ends of the shoe return springs in the shoe webs and install the round ends in the backing plate slots.
7. Install the brake shoe levers with their pressure points against the pressure points on the webs of the shoes.
8. Put the actuator lever through the slot in the back of the backing plate. Pull apart the shoe and shoe lever assemblies to install the wedge assembly.
9. Assemble the brake drum and drive shaft using standard procedures.

Brake Adjustment:

Figure 29



1. Use an adjusting tool through the holes in the backing plate to engage the teeth on the adjusting bolts. To expand the shoes, move the tool handle down when in the right hand slot, and move the hand up when in the left hand slot. **Figure 29.**

2. Adjust the lining tight against the brake drum, then release the adjustment until the brake drum just can rotate freely.

IMPORTANT:

Each brake shoe MUST be adjusted separately.

3. Install the adjusting slot covers.

section 4 Prepare Parts for Assembly

⚠ CAUTION:

Do not use cleaning solvents on hydraulic seals, boots or pistons. Cleaning solvents can damage these components. Protect the brake lining from solvents, lubricants, rust inhibitors, or other contaminants that can change the friction properties of the lining. Contaminated linings MUST be replaced.

1. Clean Ground or Polished Parts:

   A. Use a cleaning solvent to clean ground or polished parts and surfaces. Kerosene or diesel fuel can be used for this purpose. DO NOT USE GASOLINE.

⚠ WARNING:

Be careful when you use cleaning solvents. Follow the instructions supplied by the solvent manufacturer to prevent injury.

   B. DO NOT clean ground or polished parts in a hot solution tank or with water, steam or alkaline solutions. These solutions will cause corrosion of the parts.

2. Clean Rough Parts:

   A. Rough parts can be cleaned with the ground or polished parts.

   B. Rough parts also can be cleaned in hot solution tanks with a weak alkaline solution.

   C. Parts must remain in the hot solution tanks until they are completely cleaned and heated.

⚠ WARNING:

Be careful when you use hot solution tanks and alkaline solutions. Follow the instructions supplied by the alkaline manufacturer to prevent injury.

3. Dry Cleaned Parts:

   A. Parts must be dried immediately after they are cleaned.

   B. Dry parts with clean paper or rags, or compressed air.

4. Prevent Corrosion and Rust on Cleaned Parts:

⚠ CAUTION:

Wheel cylinders and cup seals must only be lubricated with the fluid used in vehicle brake system. Cylinder boots must be kept dry.

   A. Apply axle lubricant to the cleaned and dried metal parts that are not damaged and are to be immediately assembled.

   B. If parts are to be stored, apply a special material that prevents rust and corrosion to all surfaces. Also, put a cover over the parts of a special paper or other material that prevents corrosion and rust.

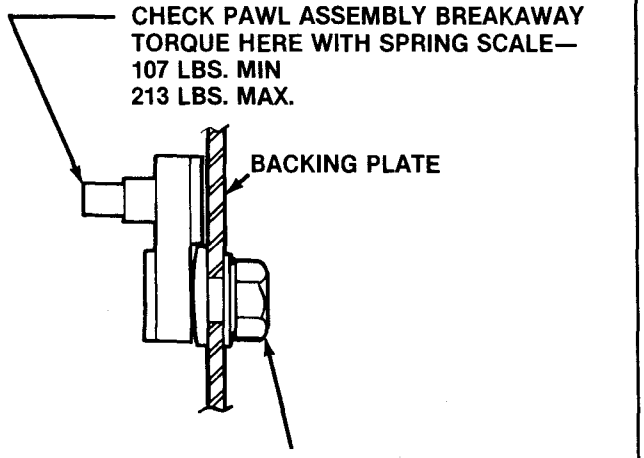
5. Inspect Parts:

   It is important that you carefully inspect all parts before assembly starts. Check all parts for wear or damage and repair or replace them as required. Replacement of these parts now can prevent failure of the assembly later.

   A. Check all castings and backing plates for cracks, loose rivets and correct alignment. Replace all damaged parts.

   B. Check all adjusting bolts, guide pins and pawl pins for corrosion and wear. Replace or repair damaged parts.

Figure 30



C. If the brake has automatic adjuster pawls, check the pawl breakaway torque with a torque wrench to verify that the torque is between 120-240 lb. in. (13-27 N•m). **Figure 30.** T

D. Check brake shoes for rust, expanded rivet holes, broken welds and correct alignment. Replace damaged shoes.

E. Check anchors, anchor pins and shoe bushings for wear or damage. Replace as necessary.

F. Replace all shoe return springs at time of brake overhaul.

G. Check the brake drums for cracks, severe heat checking, heat spotting, scoring, pitting and distortion. Replace damaged brake drums.

H. Inspect wheel cylinders for leaks and smooth action. (See page 17).

section 5 Recommended Periodic Service

A schedule for periodic adjustment, cleaning, inspection, and lubricating of the brake equipment must be made according to experience, type of brake and type of vehicle operation. Each operator must establish maintenance frequencies based on vehicle applications. Start with inspections every two months and adjust the frequencies as necessary. Severe service and high levels of contamination must have more frequent brake adjustments and inspections.

Brakes must be cleaned, inspected, lubricated and adjusted every time the wheel hubs are removed. Do NOT clean or contaminate the linings with any fluid.

Minor Inspection — Hydraulic Brakes:

1. Check the brake pedal travel (with brake drums assembled). Too much travel can indicate the need for brake adjustment.
2. Check the brake adjustment (Unless the brakes are equipped with automatic adjustment.)
3. Check the operation of the parking brake by actuating and releasing the parking brake control and observing the brake actuation and release.
4. Check lining wear.
   - **A.** Check the wear, side to side and end to end.
   - **B.** The lining wear must be even on both shoes of the brake and on both sides of the axle.
5. Check the lining to brake drum contact pattern. Contact must be the same on both shoes of the brake and on both sides of the axle.
6. Check the operation of the brake by pressing and releasing the brake pedal in the cab and observing the brake actuation and release.

Major Inspection — Hydraulic Brakes:

Major inspection must be made at every reline. Severe duty cycles or environmental conditions require more frequent major inspections.

1. Check all of the points described in the minor inspection procedures.
2. Check the anchors and the shoe bushings for wear.
3. Check the levers for rust, bending or seizing.
4. Check the adjustment components for rust, bending or seizing.
5. Check the shoe return springs to see that they are not too loose.
6. Check for loose or broken lining rivets.
7. Check for brake fluid, grease or oil on the linings. Do NOT reuse contaminated linings.
8. Check the brake shoes for rust and bending.
9. Check the brake drums for wear or damage.
10. Check the brake lines for cracking, pinching and corrosion.
11. Check the wheel cylinders for leaking and binding. (See page 17).
12. Before assembly, lubricate the sliding parts with a thin layer of brake lubricant. (Rockwell Specification 0-616).
13. Assemble the brakes.
14. Bleed the hydraulic system. (See page 19).

Minor Inspection — Mechanical Brakes:

1. Check lining wear. Lining wear must be even on both shoes.
2. Check the lining to brake drum contact pattern. Contact must be the same on both shoes.
3. Check the operation of the brake by actuating and releasing the brake control and observing the actuation and release.
4. Check the brake adjustment.

Major Inspection — Mechanical Brakes:

Major inspections must be made at every reline and when there is a drop in brake performance.

1. Check all the points described in the minor inspection procedures.
2. Check for worn or corroded areas where components contact or slide against each other.
3. Replace all shoe return springs.
4. Check the cam (if used) for wear, rust, bending and seizing.
5. Check the actuator lever for rust, bending, seizing or other damage.
6. Check the spider or backing plate for looseness and elongated mounting holes.
7. Check for loose or broken lining rivets.
8. Check for grease or oil on the lining. Do NOT reuse contaminated linings.
9. Check the brake shoes for bending and rust.
10. Check the actuator pawl, if used, for wear and correct alignment.
11. Check the brake drums for wear and damage.
12. Before assembly, lubricate the sliding parts with a thin layer of brake lubricant (Rockwell Specification 0-616.

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