

Field Maintenance  
Manual No. 415

# ***Stopmaster Off-Highway Heavy-Duty Brakes***



***Use only genuine Rockwell Parts***

## Service Notes:

This Field Maintenance Manual describes the recommended safety, service and repair procedures for Rockwell Stopmaster Heavy-Duty Brakes.

The information in this manual was current at the time of printing. The information is subject to change without notice or liability.

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

Rockwell uses the following types of notes to give warning of possible safety problems and to give information that will prevent damage to 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 and components can occur. Personal injury can also occur in addition to damaged or malfunctioning equipment or components.*



### **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. A note can also give information that will make service quicker and easier.*

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.

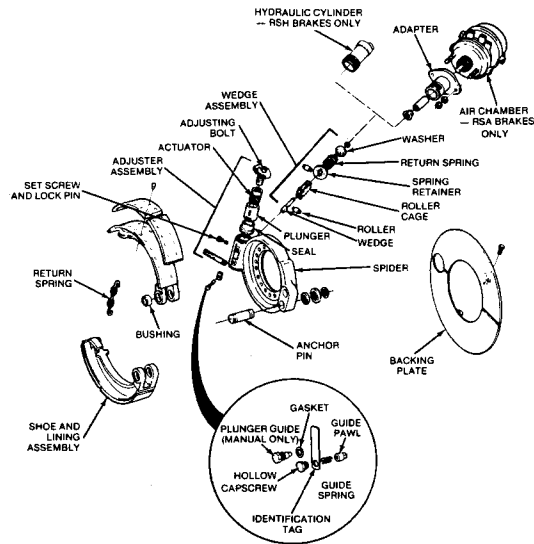


### **ASBESTOS WARNING:**

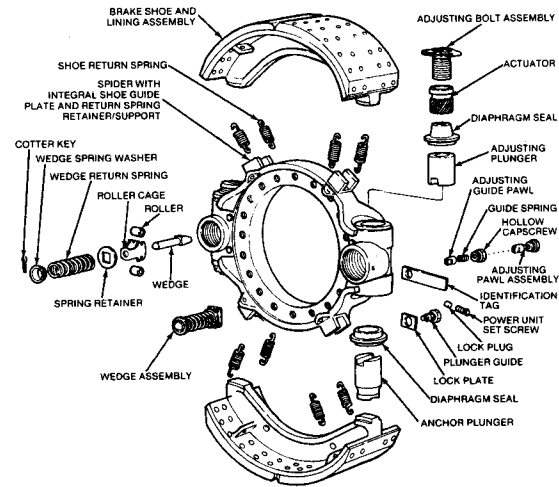
*Many brake linings contain asbestos fibers, a cancer and lung disease hazard. Caution should be exercised in handling and maintenance as described on page 2.*

*The manual is written in Rockwell Universal Language System (RULS).  
Copyright 1987 Rockwell International.*

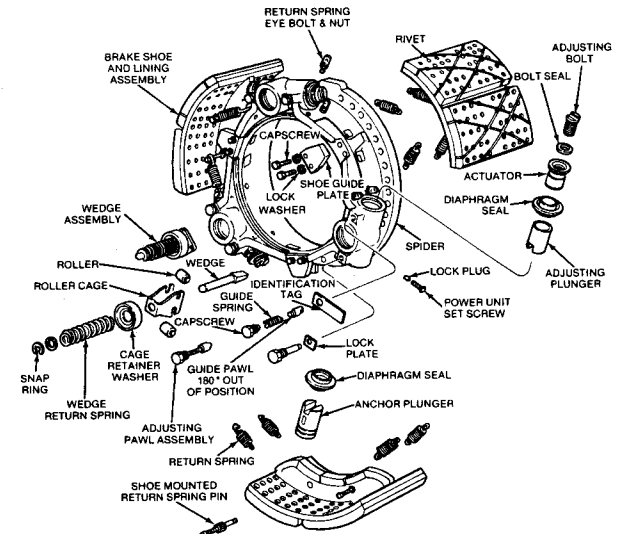
## STOPMASTER RS-SERIES EXPLODED VIEW—TYPICAL

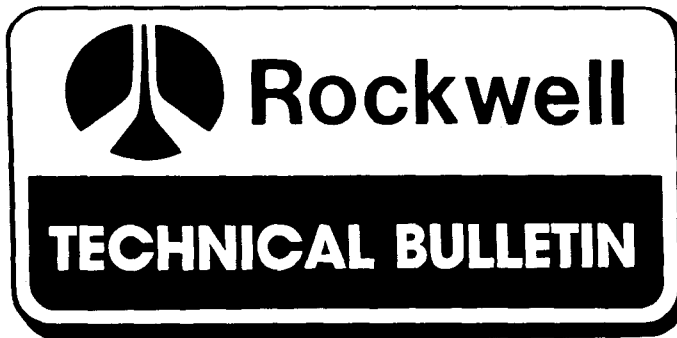


## STOPMASTER RD-SERIES EXPLODED VIEW—TYPICAL



## STOPMASTER RT-SERIES EXPLODED VIEW—TYPICAL





## **Recommended Procedures for Reducing Asbestos Dust, a Cancer and Lung Disease Hazard.**

### **For All Rockwell Brake Linings with Asbestos.**

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 the 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 and at 1.0 fiber per cubic centimeter (1.0 f/cc) averaged over a 30-minute sampling period. There is scientific debate whether even these levels 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 either 0.2 f/cc (as an eight hour time weighted average) or 1.0 f/cc (averaged over a 30-minute sampling period).

**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 **never** 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 **never** 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.

→ **Arrows  
denote changes**



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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, A CANCER AND LUNG DISEASE HAZARD.**

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 nonsmokers. Symptoms of these diseases are not usually seen until 15 to 20, or more, years after 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 **never** 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 **never** 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.

# Description and Introduction

# section 1

## Description

Rockwell heavy-duty Stopmaster brakes are wedge actuated. Hydraulic cylinders are used as power units to operate most of the brakes. Some of the smaller brakes have air chambers for power units. A spring brake can be installed on most Stopmaster brakes to actuate a parking or secondary brake system.

### NOTE:

*See Section 2, Exploded Views for illustrations of the brake models.*

The design and operation are the same for all Stopmaster brakes, but there are several options available. These options include:

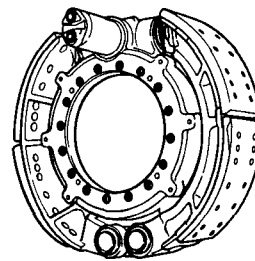
- Automatic adjustment of the clearance between the linings and drum.  
—or—
- Manual adjustment of the clearance between the linings and drum.
- A brake support that is a cast spider with built-in plunger (actuation) housings.  
—or—
- A stamped backing plate with plunger housings that are fastened on with bolts.
- A standard design in which the drum must be removed before the brake shoes can be removed.
- or—
- Guide plates that permit removal of the shoes from large diameter brakes while the drum is installed.

## Identification Codes

There are five types of heavy-duty Stopmaster brakes. **Figures 1, 2 and 3.**

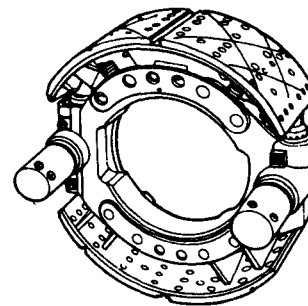
**Figure 1**

### RSH SERIES



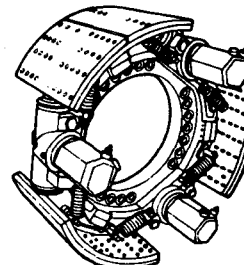
**Figure 2**

### RD SERIES



**Figure 3**

### RT SERIES



# Description and Introduction

Chart 1

FIRST LETTER	SECOND LETTER	THIRD LETTER
R = Stopmaster Wedge Brake	S = Single Actuated (one-power unit) D = Double Actuated (two-power units) T = Triple Actuated (three-power units)	H = Hydraulic Operated A = Air Operated

Each type of brake is identified by a three-letter code: RSH, RSA, RDH, RDA or RTH. See **Chart 1** to determine how the letters are used to identify the brakes.

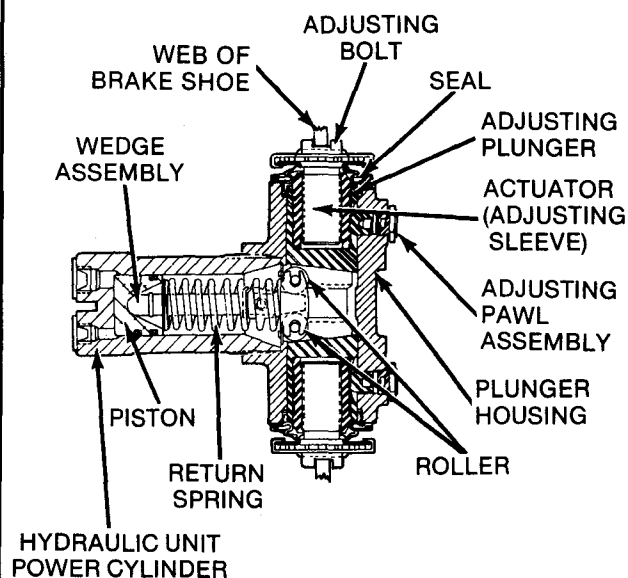
## Actuation Systems

All Stopmaster brakes, both manual and automatic, work on the same principle: a wedge forces apart the plungers and brake shoes and forces the linings against the drums.

**Figure 4** shows a typical actuation system for a hydraulic Stopmaster brake with automatic adjustment. **Figure 5** shows the same actuation system for an air operated brake. The main difference between a hydraulic brake and an air brake is the power unit. The components inside the actuation housing are similar for both types of brakes.

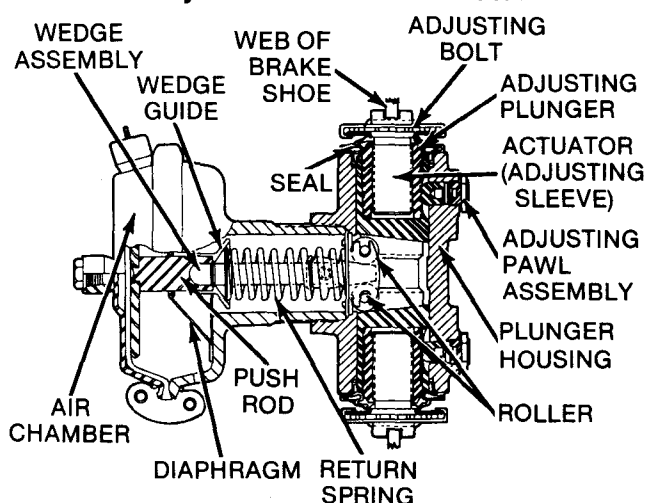
**Figure 4**

### Typical Hydraulic Actuation System — Cutaway View RS-Series Illustrated



**Figure 5**

### Typical Air Actuation System — Cutaway View RS-Series Illustrated



On double (RD-Series) or triple (RT-Series) actuated brakes, there is only one adjusting plunger in each plunger housing. The second plunger in each housing is an anchor (solid) plunger. A plunger guide is used with an anchor plunger instead of a pawl assembly. **Figure 6.**

The power unit is installed into the plunger housing. The wedge assembly is inside the power unit. A pair of rollers are held in place against the head of the wedge by a roller cage. Each roller is engaged with a slot in the inner end of a plunger. The outer ends of the plungers are engaged with and support the brake shoes.

When the brake is applied, hydraulic pressure in the power unit moves the piston inside the power unit. In the air chamber, air pressure moves the diaphragm and push rod. The piston or the push rod pushes the wedge deeper between the rollers. The wedge forces the rollers and plungers apart which forces the shoe and lining assemblies out against the brake drum.



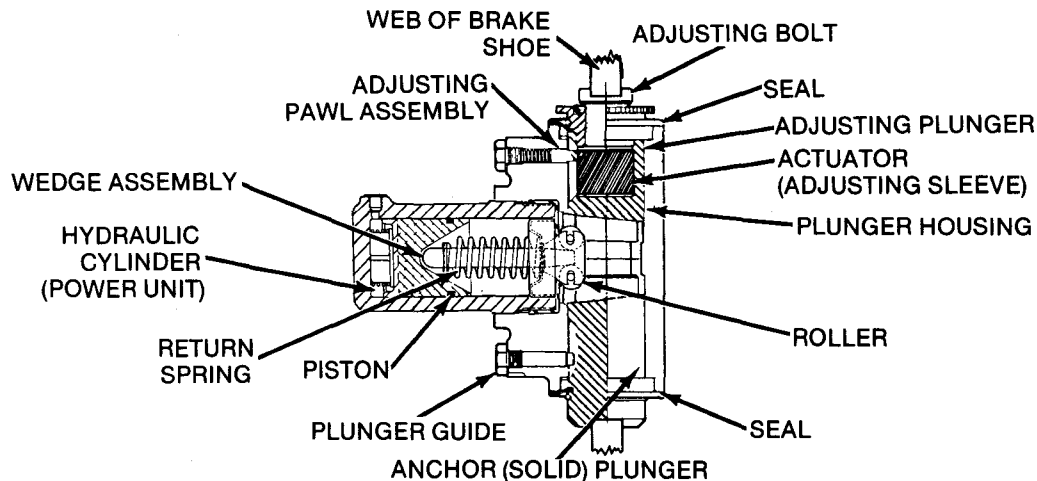
# Description and Introduction

section 1

When the brake is released, the return spring for the wedge returns the wedge and the piston or the push rod and diaphragm to their starting positions. At the

same time, the shoe return springs pull the brake shoes back to their starting positions which forces the plungers back to their starting positions.

**Figure 6** Typical Hydraulic Actuation System — Cutaway View RD-Series And RT-Series Illustrated

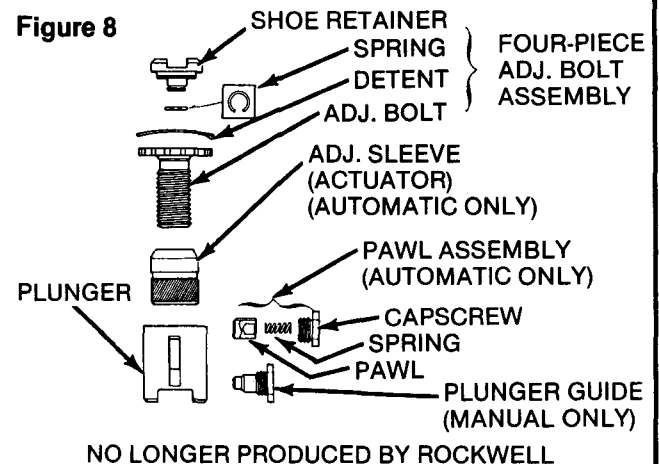


## Adjustment Systems

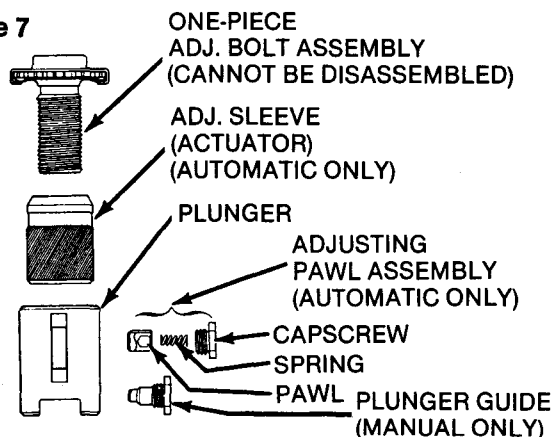
Adjusting plunger assemblies are used to adjust the brakes. These assemblies are part of the actuation system. There are two types of adjustment systems, automatic and manual. There are four different designs of adjustment plungers used on different brake models, but all the designs do the same function. The most important differences between the four designs are the adjusting bolt, the detent, and the actuator.

Each of the four designs can be automatic or manual, but different components are used in the automatic and manual systems of the same design. **Figures 7-10.**

**Figure 8**

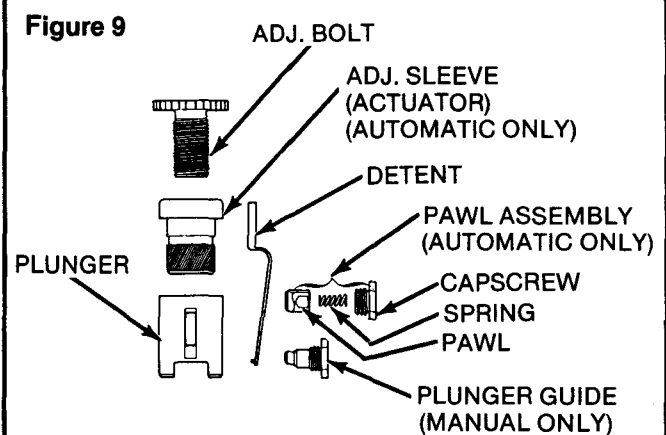


**Figure 7**



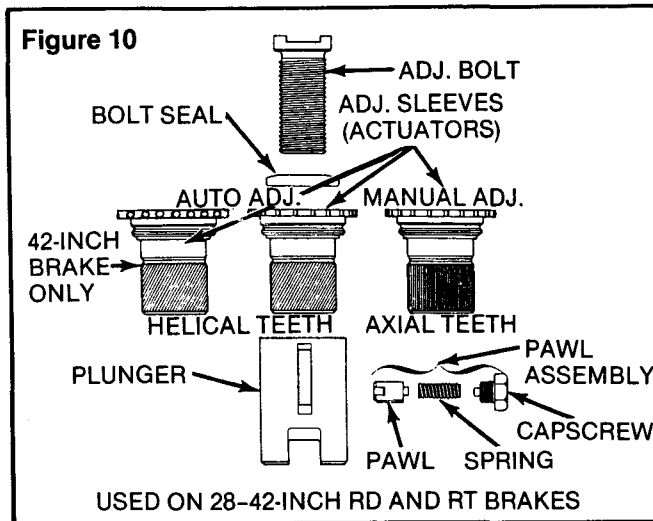
USED ON MOST 17-26-INCH RS AND RD BRAKES

**Figure 9**



USED ON 17¼-INCH RS BRAKES WITH SPIDER

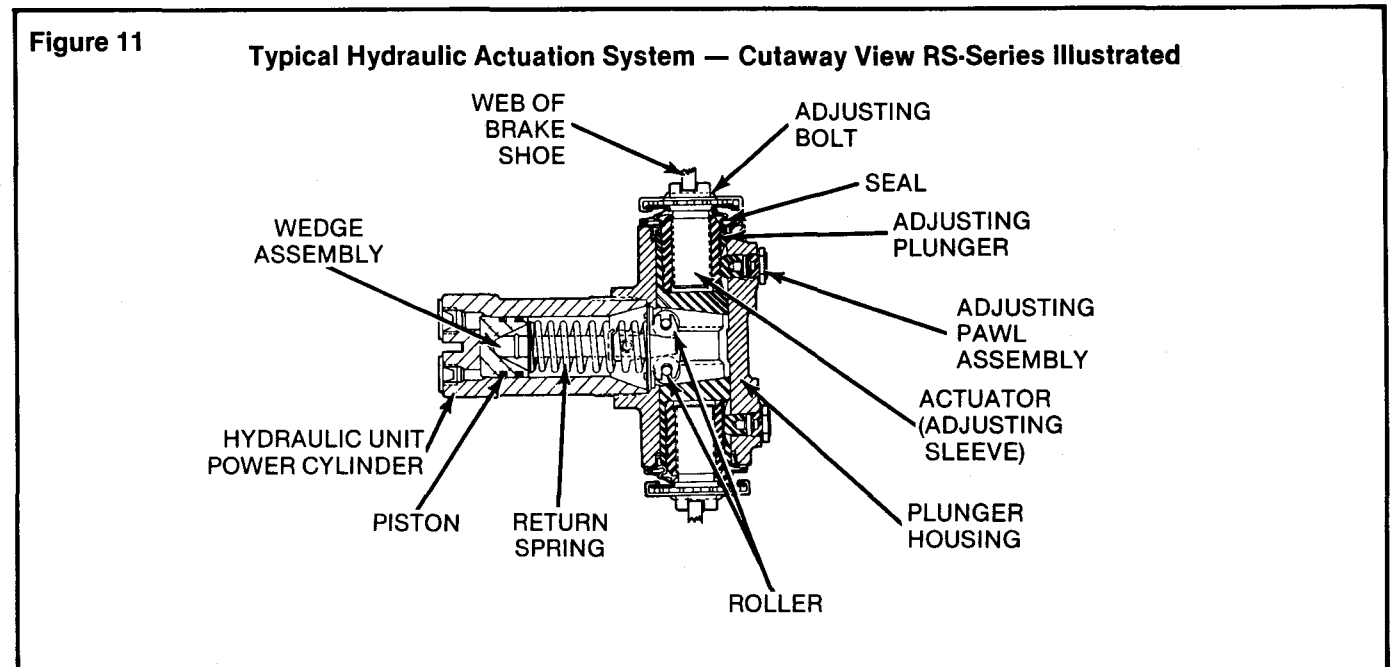
# Description and Introduction



## Automatic Adjustment

**Figure 11** shows an actuation system for a brake with automatic adjustment. An automatic adjustment assembly includes four components:

- Adjusting plunger
- Adjusting sleeve (actuator)
- Adjusting bolt assembly
- Adjusting pawl assembly



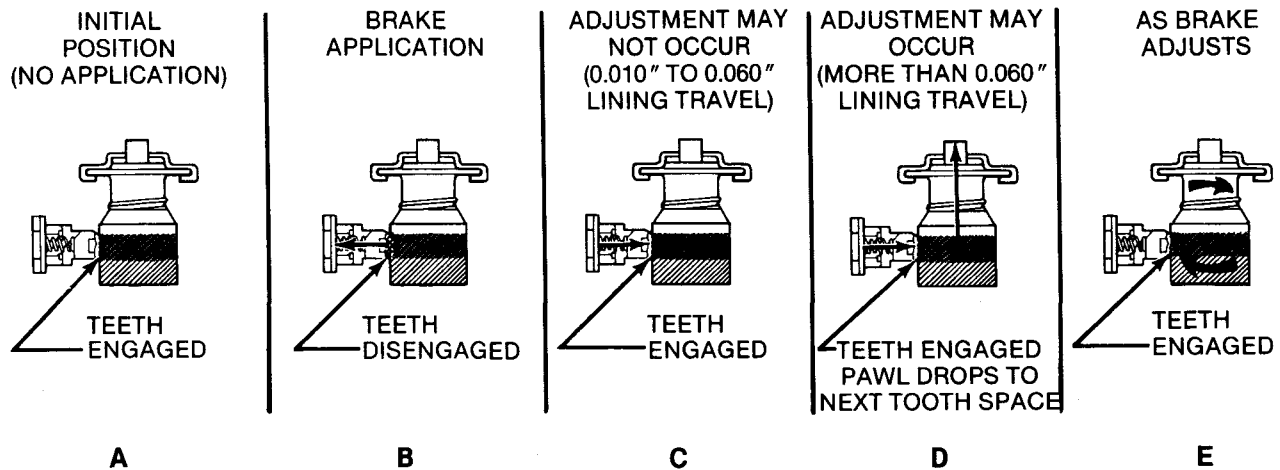
The adjusting bolt is threaded into the actuator. The actuator fits freely into the adjusting plunger, which fits freely into the plunger housing. The pawl extends through the slot in the plunger to prevent the plunger from twisting in the plunger housing. Teeth on the end of the pawl engage the teeth on the actuator. **Figures 11 and 12A.**

When the brake is actuated, the wedge forces out the plunger, actuator and adjusting bolt. (The plunger is not shown in **Figure 12.**) The sloped face of the actuator teeth lift and push against the

sloped face of the pawl teeth and force the pawl back against the spring. **Figure 12B.** When the brake is released, all the parts return to their starting positions. **Figure 12C.** When the lining wears, the plunger stroke increases and the pawl is lifted further. When the actuator moves enough so that the teeth completely disengage, the pawl drops into the next tooth space on the actuator. **Figure 12D.** This time when the brake is released and the parts return, the flat face of the pawl teeth cause the actuator to rotate and extend the adjusting bolt. **Figure 12E.** This action decreases the lining to drum clearance and the cycle begins again.

**Figure 12**

## Automatic Adjusting Functions



### NOTE:

*If new or relined linings are installed, the specified clearance must exist between the drum and the linings. The clearance is necessary for the pawl and the actuator to operate correctly. To get the specified clearance see Section 9, Adjusting the Brakes.*

### Manual Adjustment

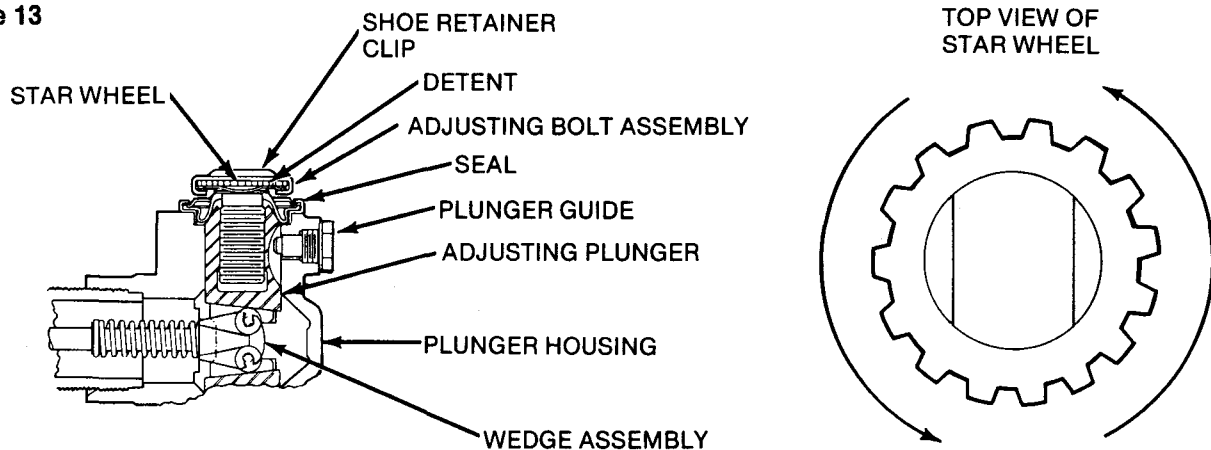
When a brake with manual adjustment is released, the components that actuate the brake always return to their starting positions. When the linings wear, the clearance between the linings and drum increases. To adjust the brake, you must manually turn the star wheel on the adjustment assembly.

### 17-26-Inch Brakes

Figure 13 shows the manual adjustment system used on 17-26-inch brakes. The system includes three components:

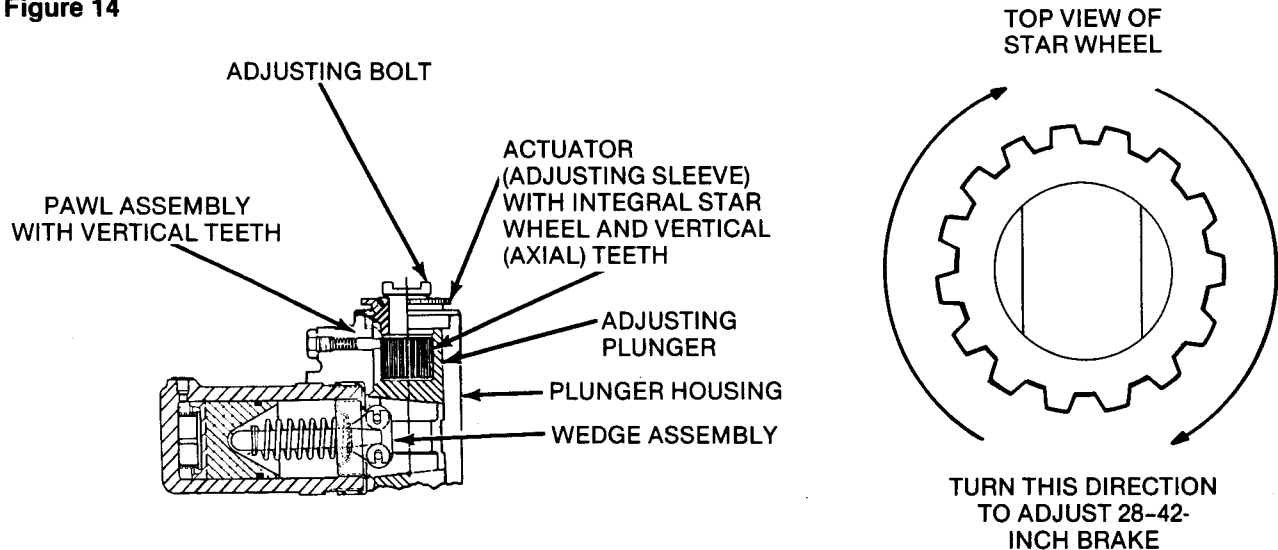
- Adjusting bolt assembly
- Adjusting plunger
- Plunger guide screw

**Figure 13**



# Description and Introduction

**Figure 14**



The adjusting bolt is threaded into the plunger. The plunger fits freely into the plunger housing. The guide screw fits into the slot in the plunger to prevent the plunger from twisting in the plunger housing. The head of the adjusting bolt is a star wheel to make it easy to turn the bolt and adjust the brake. A detent engages the star wheel to prevent the adjusting bolt from turning until you turn it. There are three different types of detent used on 17-26-inch brakes. To adjust the brake, you must turn the star wheel in the direction shown in **Figure 13**.

## 28-42-Inch Brakes

**Figure 14** shows the manual adjustment system used on 28-42-inch brakes. The system includes four components:

- Adjusting bolt
- Adjusting sleeve (actuator) with axial teeth
- Adjusting plunger
- Adjusting pawl assembly

The manual adjusting system on 28-42-inch brakes is similar to the automatic system used on the same brakes. The difference is that the actuator and the pawl have vertical teeth instead of helical teeth.

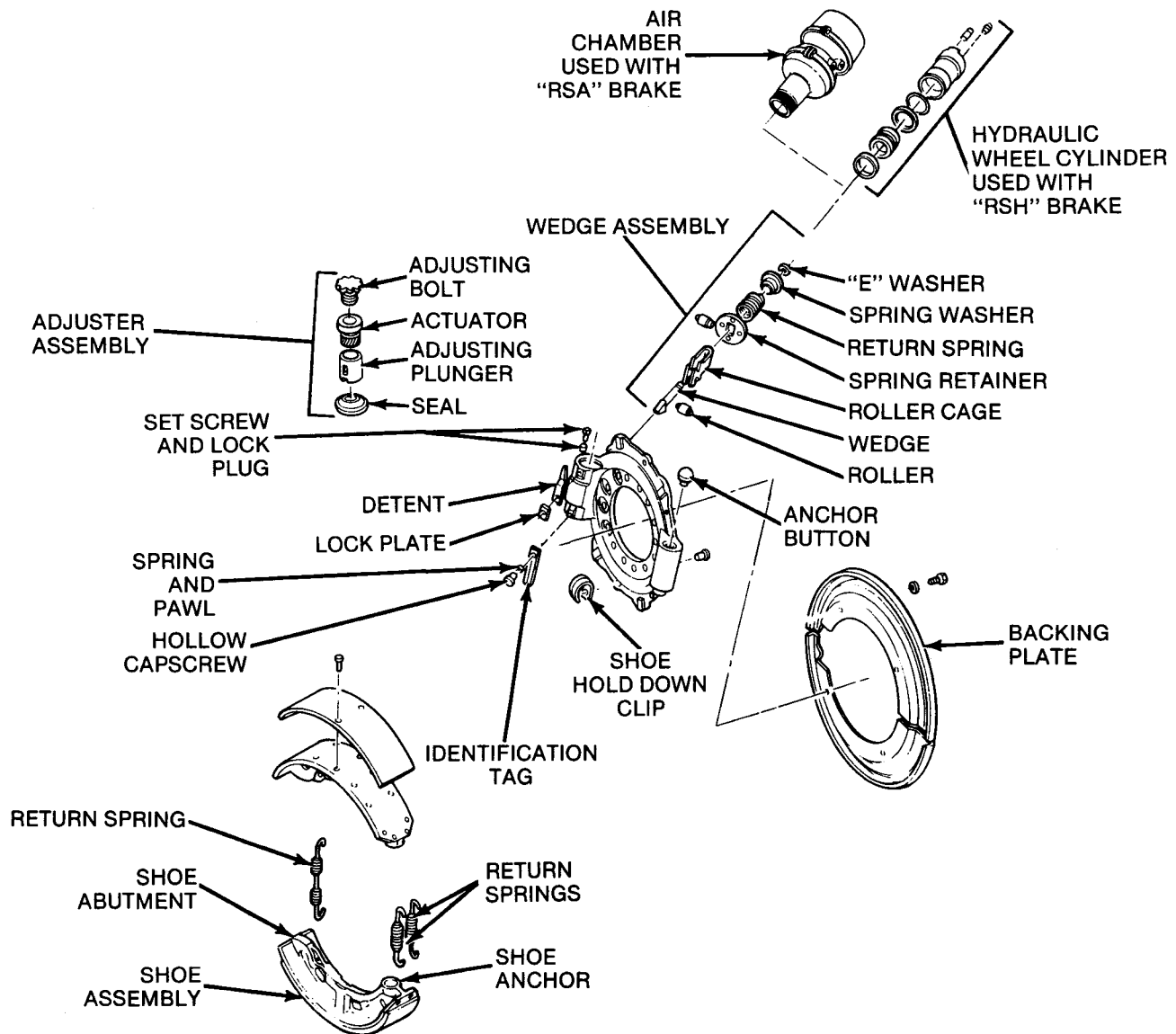
The adjusting bolt is threaded into the plunger. The actuator fits freely into the adjusting plunger which fits freely into the plunger housing. The pawl extends through the slot in the plunger to prevent the plunger from twisting in the plunger housing. Teeth on the end of the pawl engage the teeth on the actuator to prevent the actuator from rotating. The head of the actuator is a star wheel or castle nut to make it easy to turn the actuator and adjust the brake. To adjust the brake, you must first remove the pawl assembly and then turn the star wheel in the direction shown in **Figure 14**.

## NOTE:

*Periodically check that the specified clearance exists between the drum and the linings. The clearance is necessary for the correct operation of the brakes. If the clearance is not at the specified distance, the star wheel on the adjusting bolt is rotated until the specified clearance exists between the drum and the linings. To check and adjust the clearance between the drum and the linings, see Section 10, Adjusting the Brakes.*

# section 2 Exploded Views

## RS Heavy-Duty Stopmaster 17¼-Inch Diameter Spider Mounted

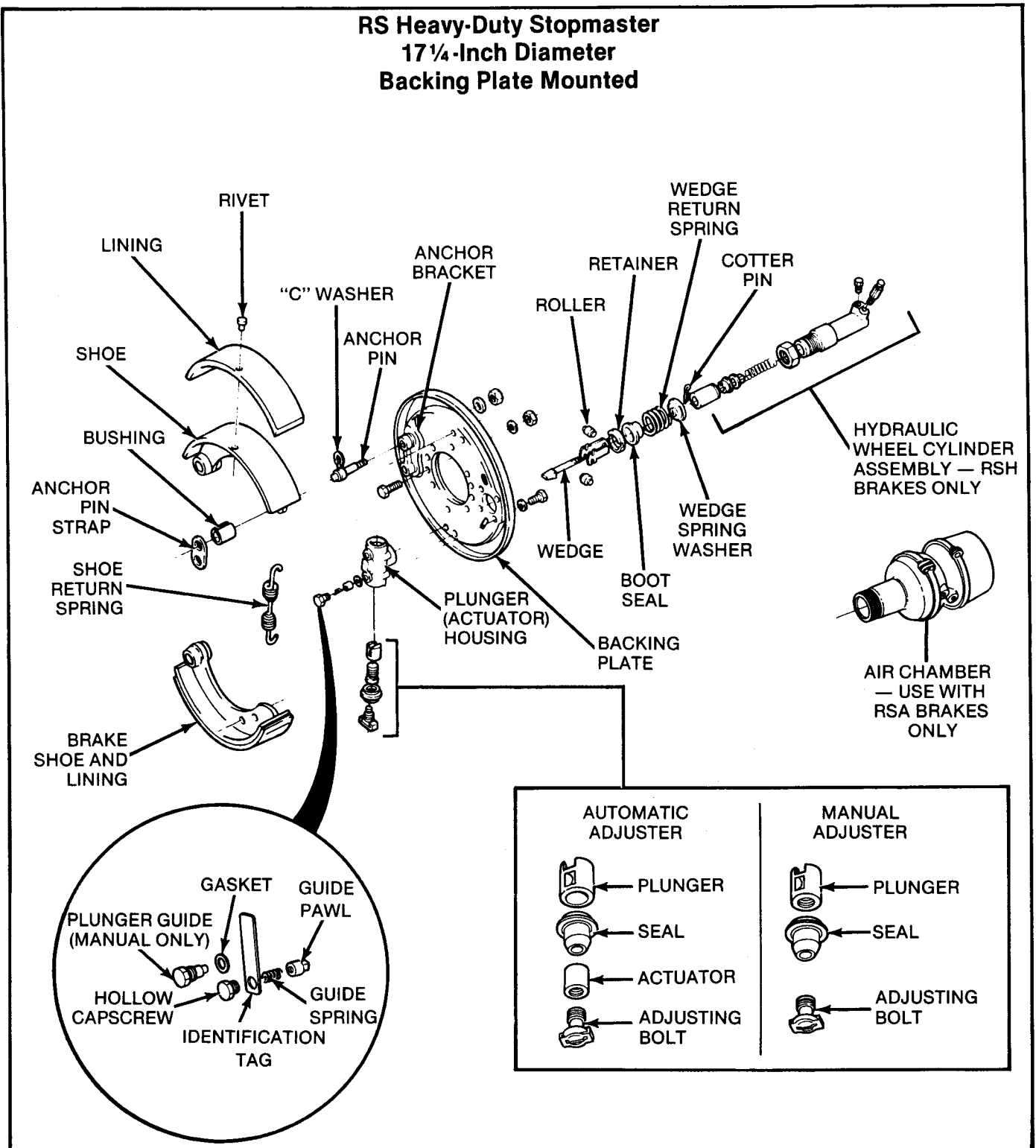


This brake is single actuated (RS). It has a cast, one-piece spider with a built-in plunger housing. The spider is mounted to the axle housing flange with bolts. The anchor side of the spider has shoe pivots in the shape of balls instead of anchor pins. The power unit can be an air chamber or a hydraulic

cylinder. The brake shoes can be adjusted automatically or manually. The illustration shows automatic adjustment. The brake shoes are held in position with retainer clips and three return springs. The drum must be removed before the brake shoes can be removed.

# 2 Exploded Views

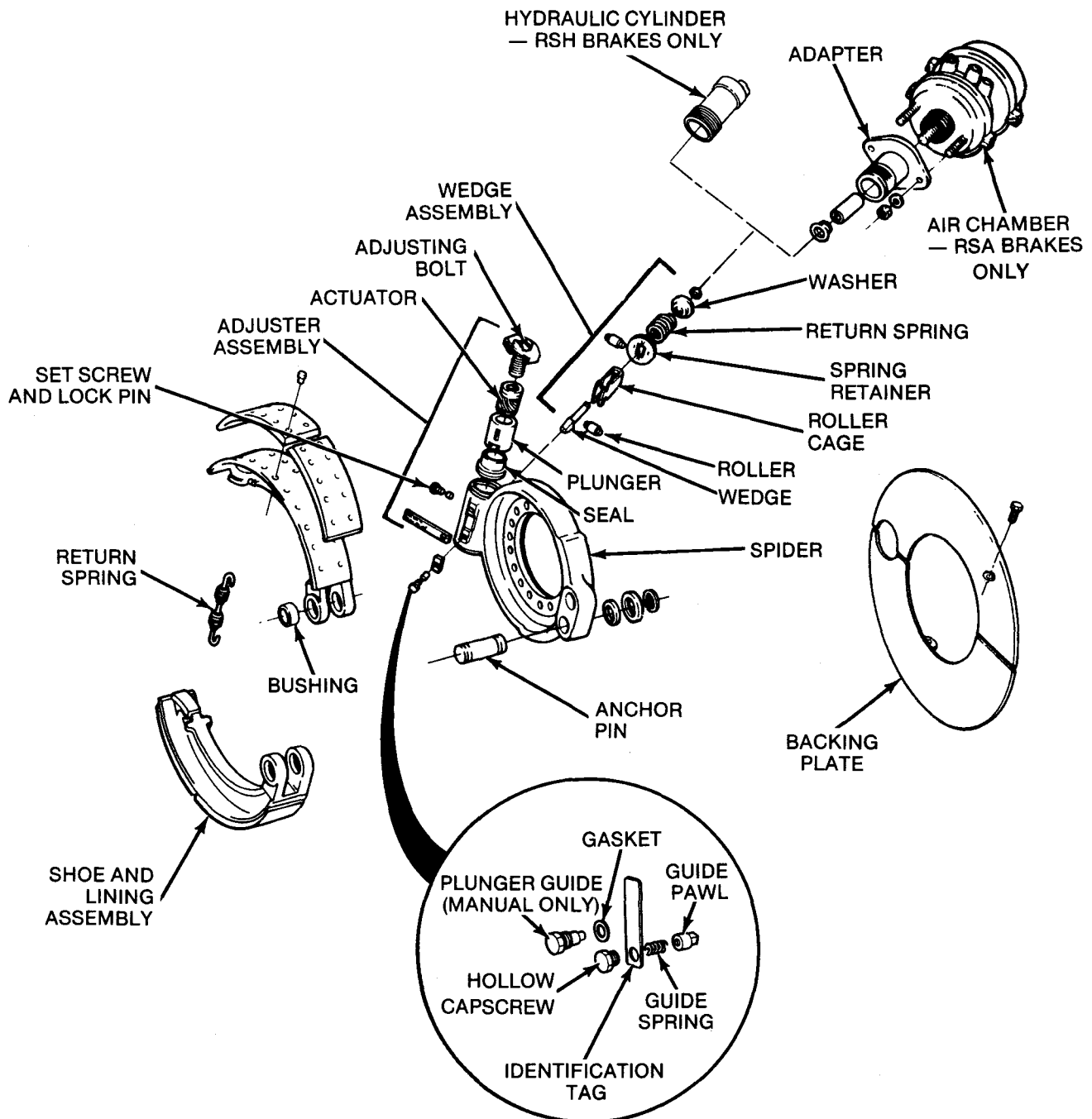
## RS Heavy-Duty Stopmaster 17 1/4-Inch Diameter Backing Plate Mounted



This brake is single actuated (RS). It is mounted to a backing plate that is stamped. The backing plate is mounted to the axle housing flange with bolts. The plunger housing is attached to the backing plate with bolts. The power unit can be an air chamber or hydraulic cylinder. The brake shoes can be adjusted

automatically or manually. The illustration shows both the automatic and the manual adjusting components. The brake shoes are held in position with an anchor bracket, anchor pins and bushings, and one return spring. The drum must be removed before the brake shoes can be removed.

## RS Heavy-Duty Stopmaster 20-Inch and 20¼-Inch Diameter Spider Mounted

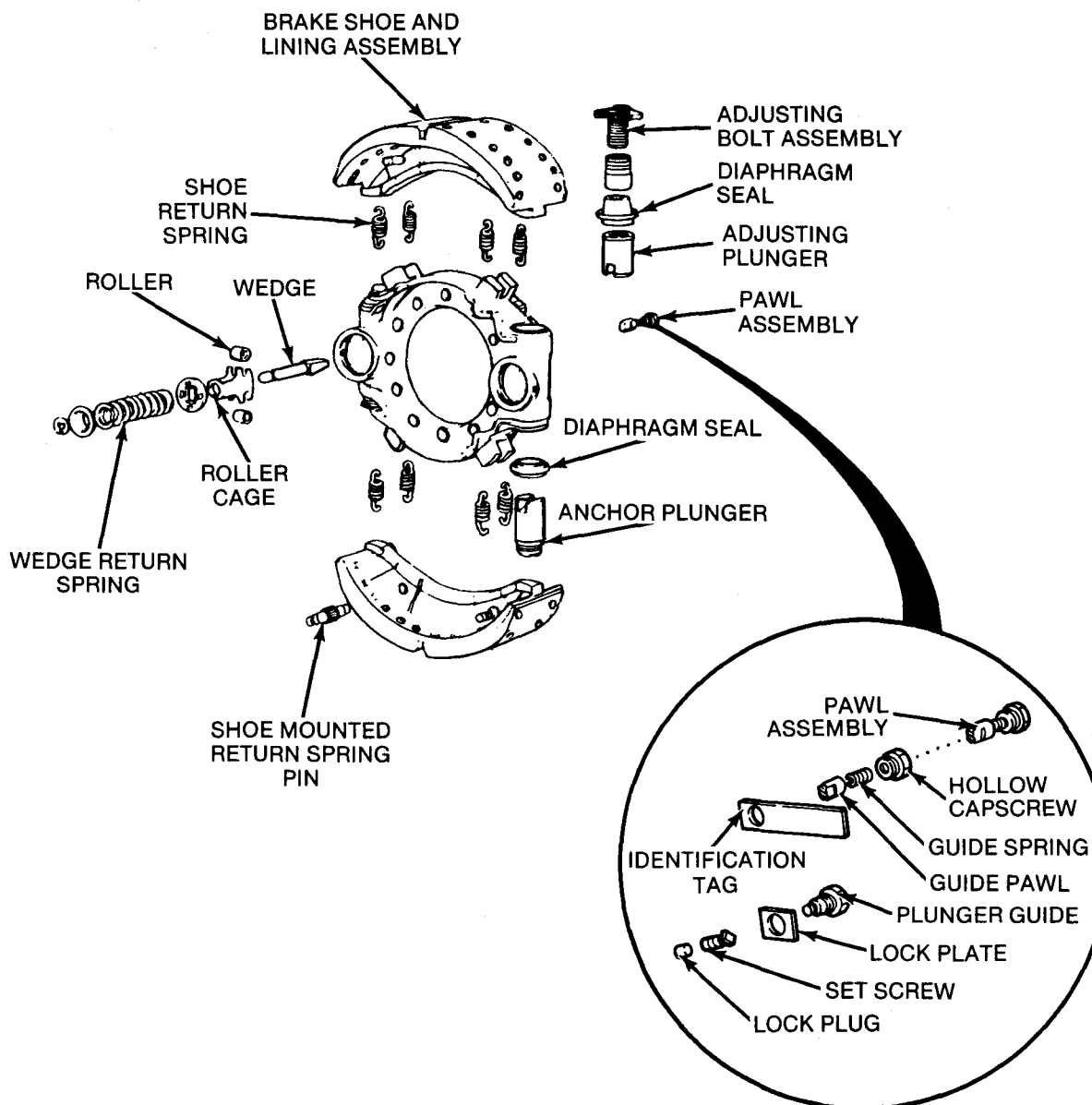


This brake is single actuated (RS). It has a cast one-piece spider with a built-in plunger housing. The spider is mounted to the axle housing flange with bolts. The anchor side of the spider has anchor pins. The power unit can be either an air chamber or a hydraulic cylinder. The brake shoes can be ad-

justed automatically or manually. The illustration shows automatic adjustment. The brake shoes are held in position with anchor pins and a return spring. The drum must be removed before the brake shoes can be removed.

# section 2 Exploded Views

## RD Heavy-Duty Stopmaster 20-Inch and 20¼-Inch Diameter Spider Mounted

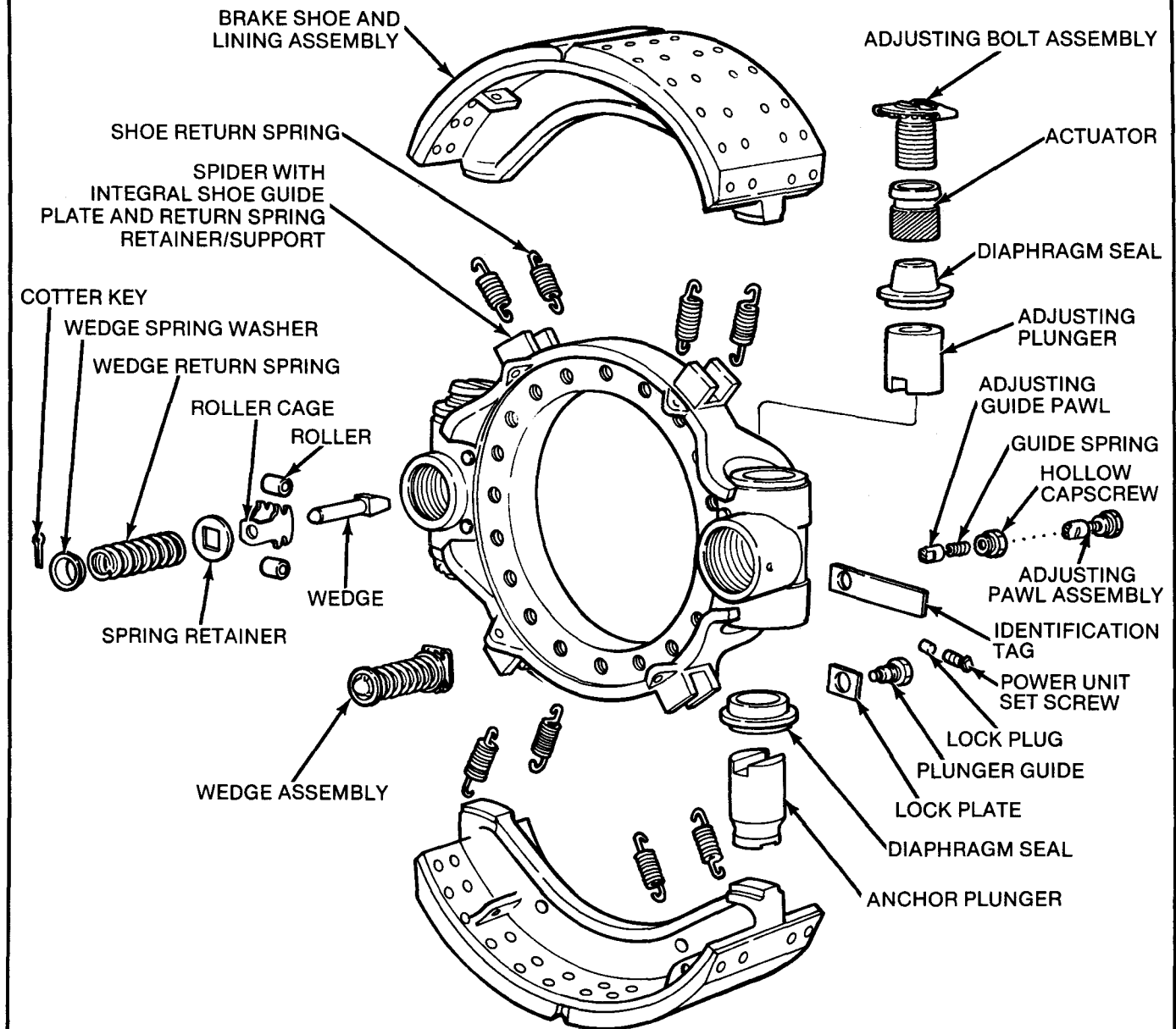


This brake is double actuated (RD). It has a cast, one-piece spider with built-in plunger housings, guide plates for the shoes and retainers for the return springs. The spider is mounted to the axle housing flange with bolts. The power units can be air chambers or hydraulic cylinders. The brake

shoes can be adjusted automatically or manually. **Figure 14** shows automatic adjustment. The brake shoes are held in position with the shoe guide plates and eight return springs. The drum must be removed before the brake shoes can be removed.



## RD Heavy-Duty Stopmaster 26-Inch Diameter Spider Mounted (Standard Shoe Removal)

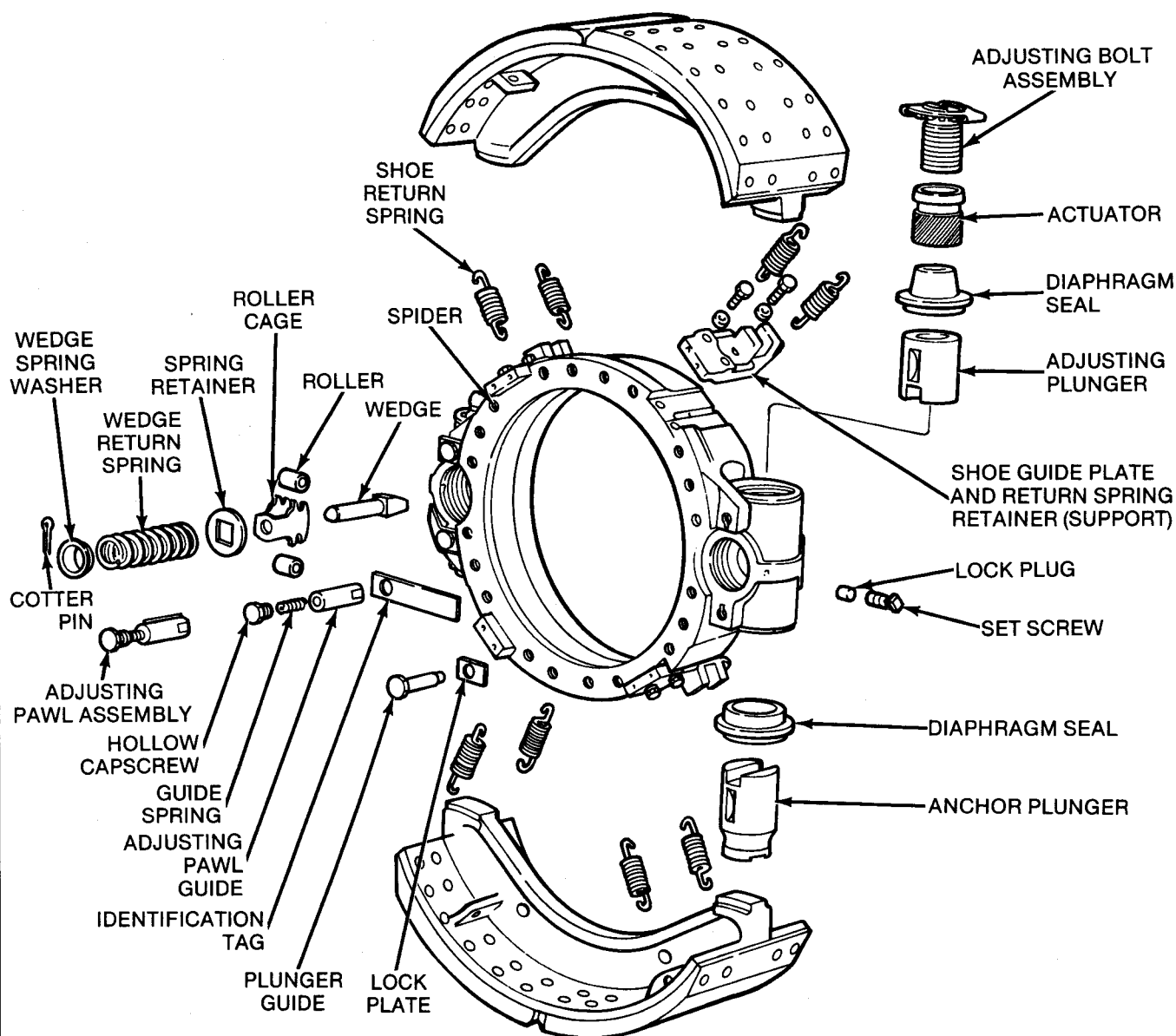


This brake is double actuated (RD). It has a cast, one-piece spider with built-in plunger housings, guide plates for the shoes, and retainers for the return springs. The spider is mounted to the axle housing flange with bolts. The power units are hydraulic cylinders. The brake shoes can be ad-

justed automatically or manually. The illustration shows automatic adjustment. The brake shoes are held in position with the shoe guide plates and eight return springs. The drum must be removed before the brake shoes can be removed.

# section **2** Exploded Views

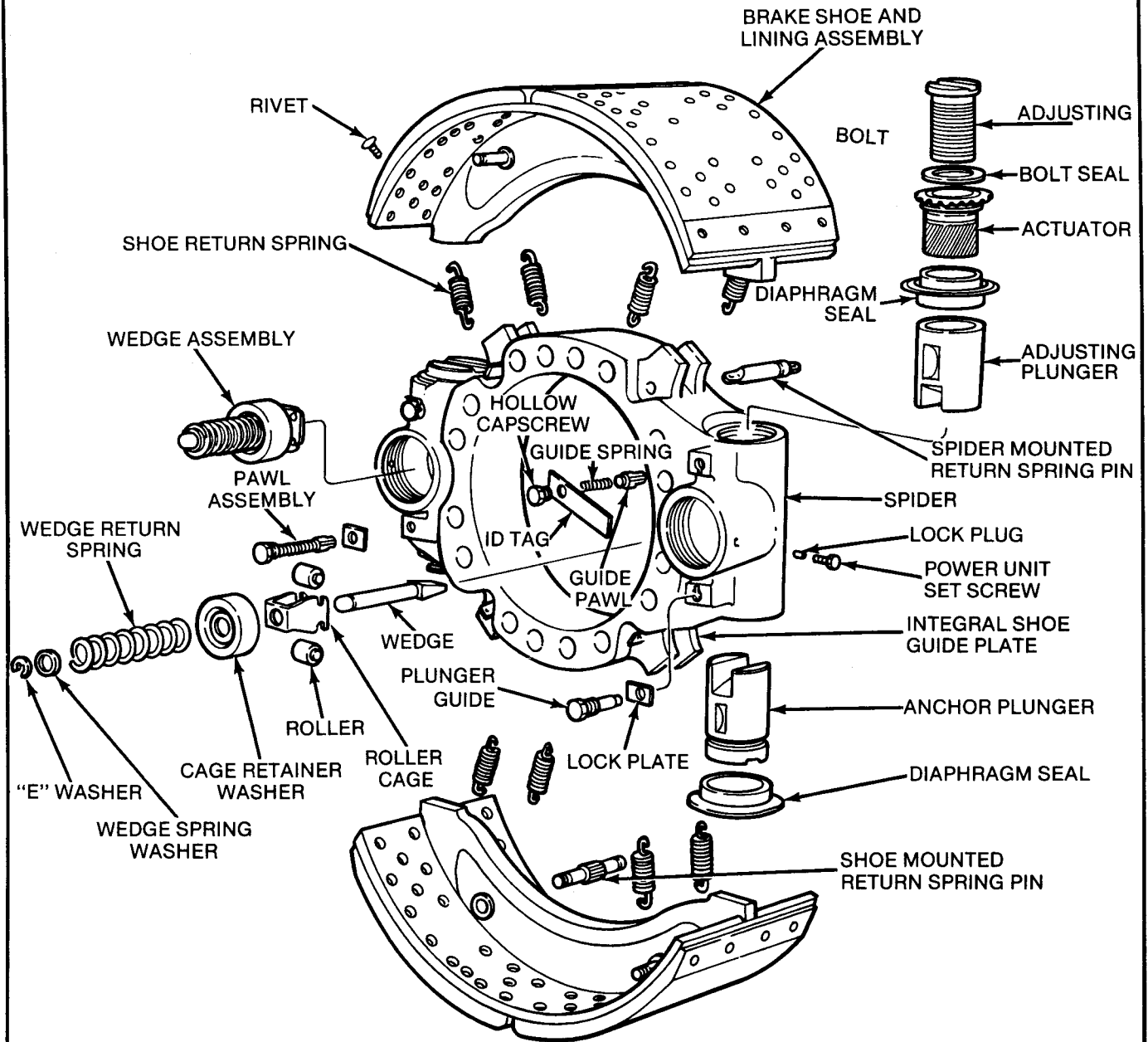
## RD Heavy-Duty Stopmaster 26-Inch Diameter (Shoe Removable Feature) Spider Mounted



This brake is double actuated (RD). It has a cast, one-piece spider with built-in plunger housings. The spider is mounted to the axle housing flange with bolts. The power units are hydraulic cylinders. The brake shoes can be adjusted automatically or manually. The illustration shows automatic adjust-

ment. The brake shoes are held in position with eight return springs and guide plates that are attached to the spider with bolts. The guide plates can be removed, so the brake shoes can be removed, while the drum is installed.

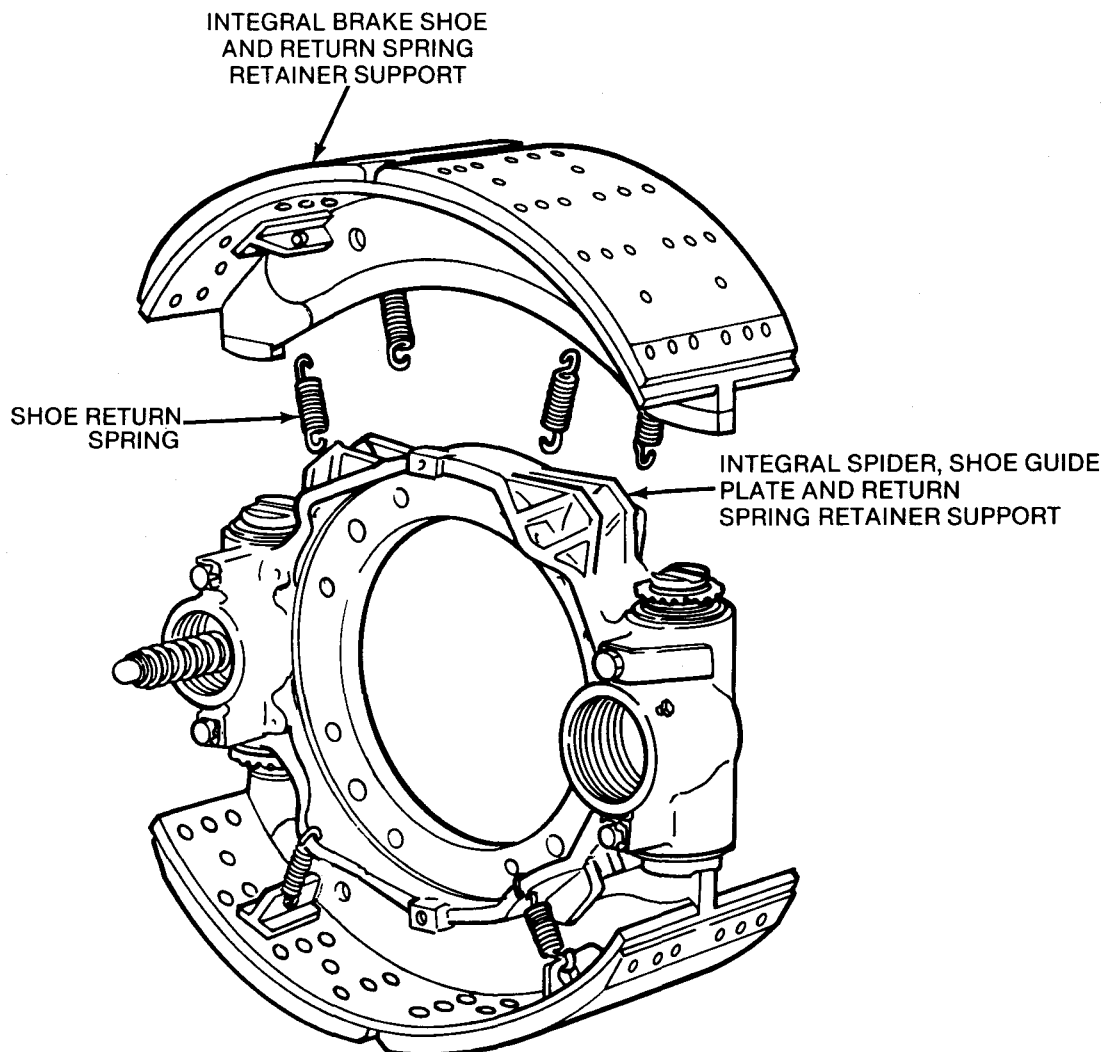
## RD Heavy-Duty Stopmaster 28-Inch Diameter Spider Mounted



This brake is double actuated (RD). It has a cast, one-piece spider with built-in plunger housings, guide plates for the shoes, and retainers for the return springs. The spider is mounted to the axle housing flange with bolts. The power units are hydraulic cylinders. The brake shoes can be

adjusted automatically or manually. The illustration shows automatic adjustment. The brake shoes are held in position with the shoe guide plates and eight return springs. The drum must be removed before the brake shoes can be removed.

## RD Heavy-Duty Stopmaster 30-Inch Diameter Spider Mounted

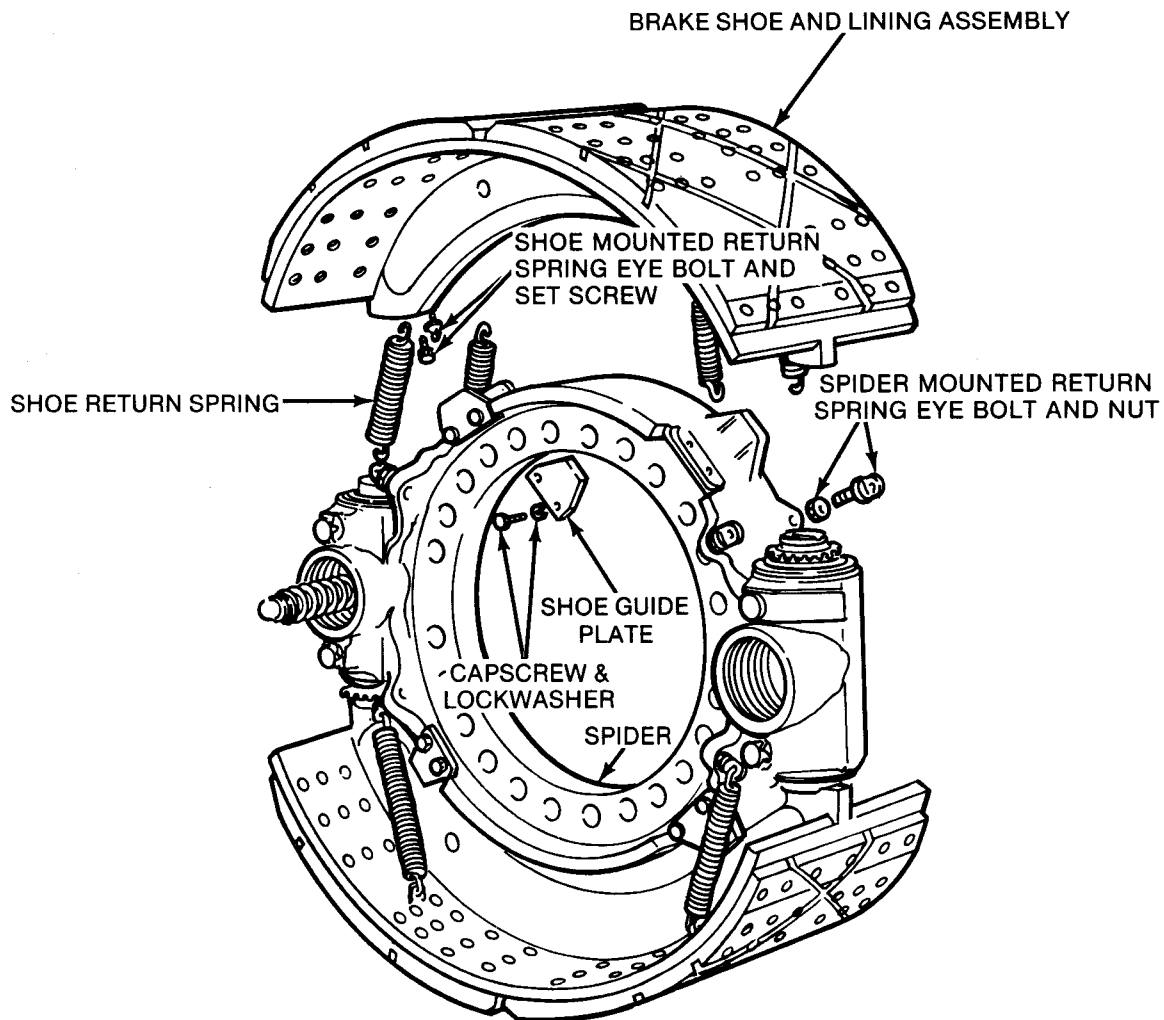


NOTE: ALL OTHER PARTS NOT CALLED OUT ARE  
SIMILAR TO THOSE OF THE 28-INCH DIA. RD STOPMASTER

This brake is double actuated (RD). It has a cast, one-piece spider with built-in plunger housings, guide plates for the shoes, and retainers for the return springs. The spider is mounted to the axle housing flange with bolts. The power units are hydraulic cylinders. The brake shoes can be adjusted automatically or manually. The illustration

shows automatic adjustment. The brake shoes are held in position with the shoe guide plates and eight return springs. The drum must be removed before the brake shoes can be removed. The linings used on this brake are available with or without grooves.

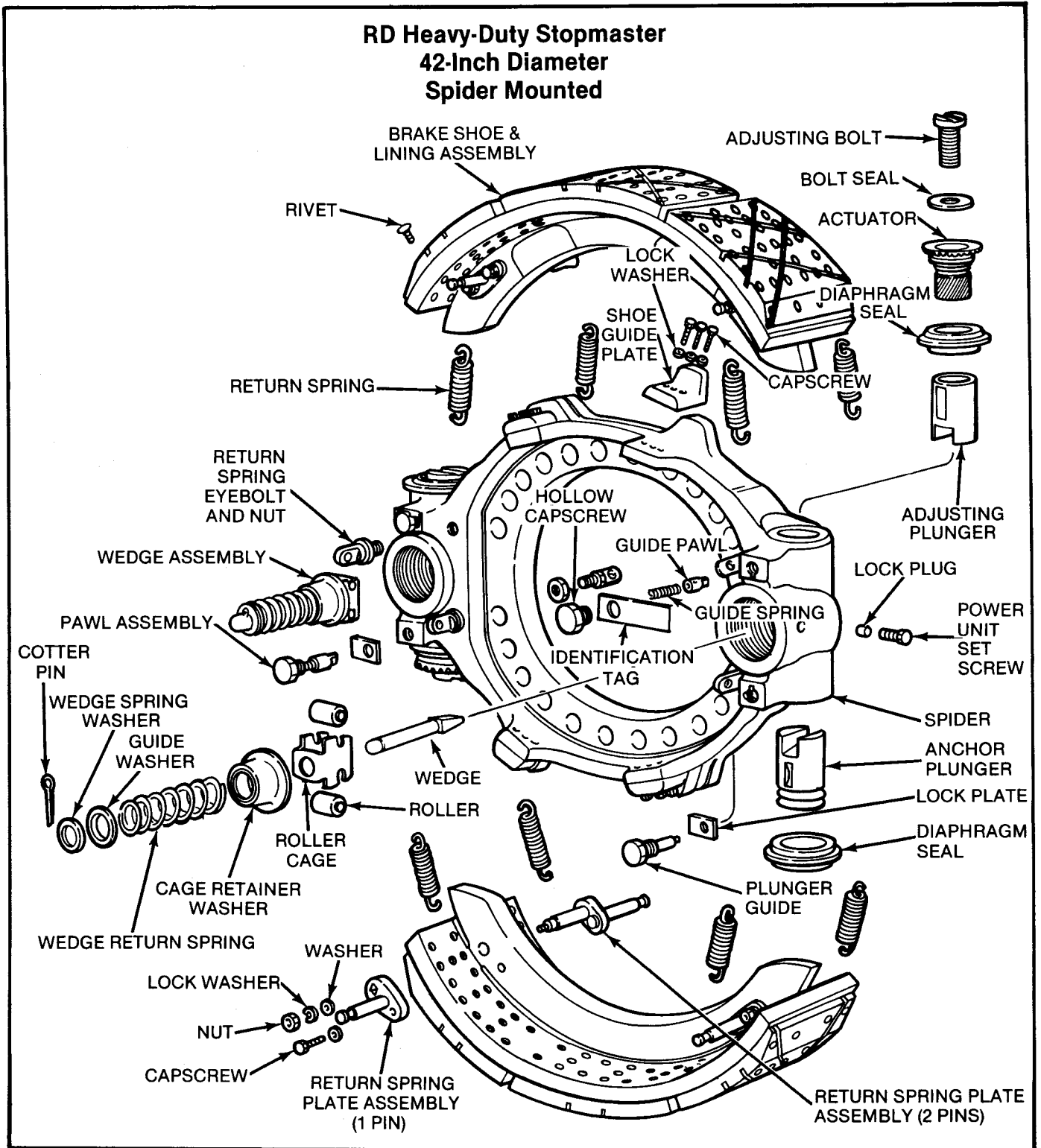
## RD Heavy-Duty Stopmaster 36-Inch Diameter Spider Mounted



NOTE: ALL OTHER PARTS NOT CALLED OUT ARE  
SIMILAR TO THOSE OF THE 28-INCH DIA. RD STOPMASTER

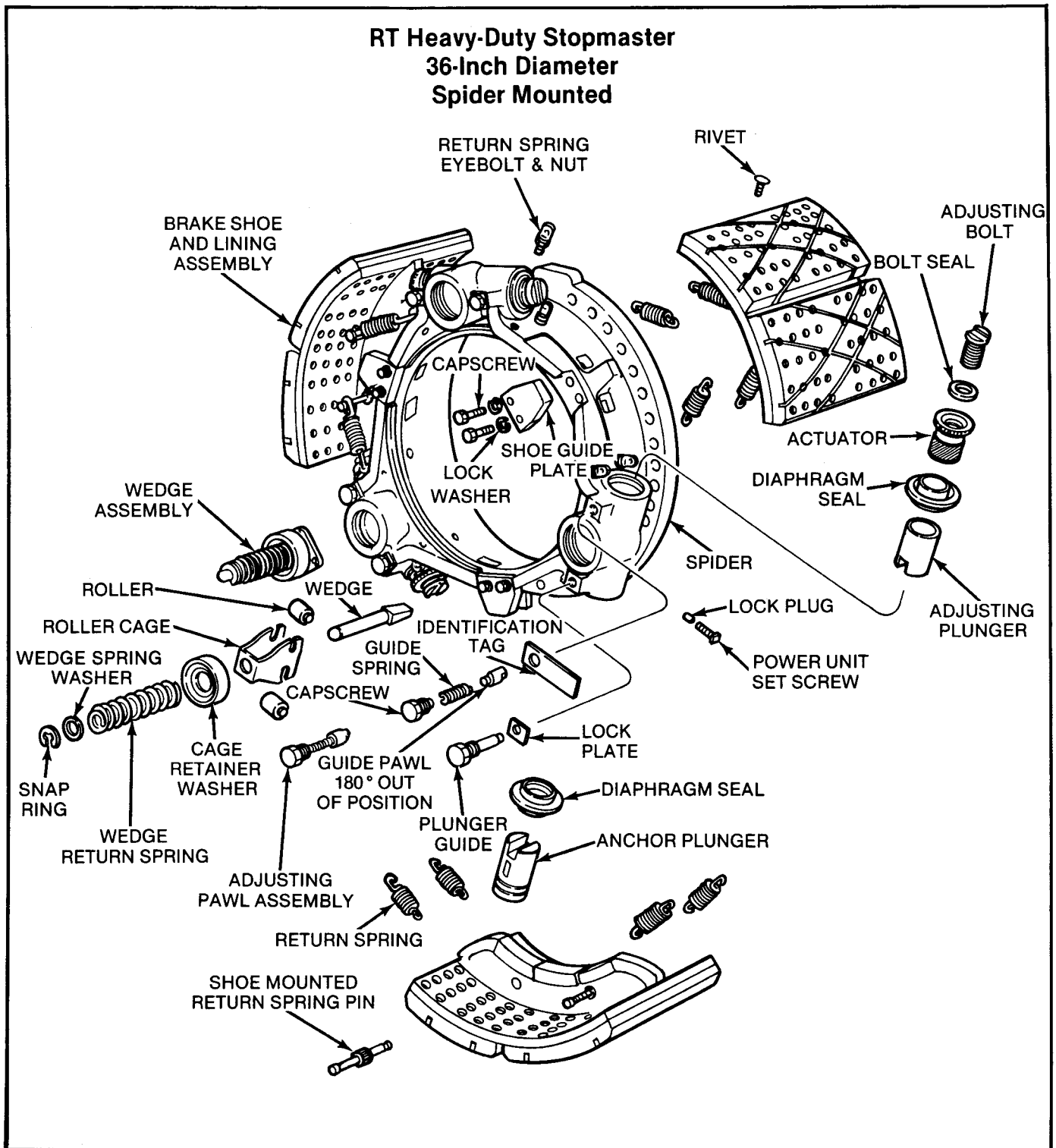
This brake is double actuated (RD). It has a cast, one-piece spider with built-in plunger housings. The spider is mounted to the axle housing flange with bolts. The power units are hydraulic cylinders. The brake shoes can be adjusted automatically or manually. The illustration shows automatic adjust-

ment. The brake shoes are held in position with eight return springs and guide plates that are attached to the spider with bolts. The guide plates can be removed, so the brake shoes can be removed, while the drum is installed. The linings used on this brake are available with or without grooves.



This brake is double actuated (RD). It has a cast, one-piece spider with built-in plunger housings. The spider is mounted to the axle housing flange with bolts. The power units are hydraulic cylinders. The brake shoes can be adjusted automatically or manually. The illustration shows automatic adjust-

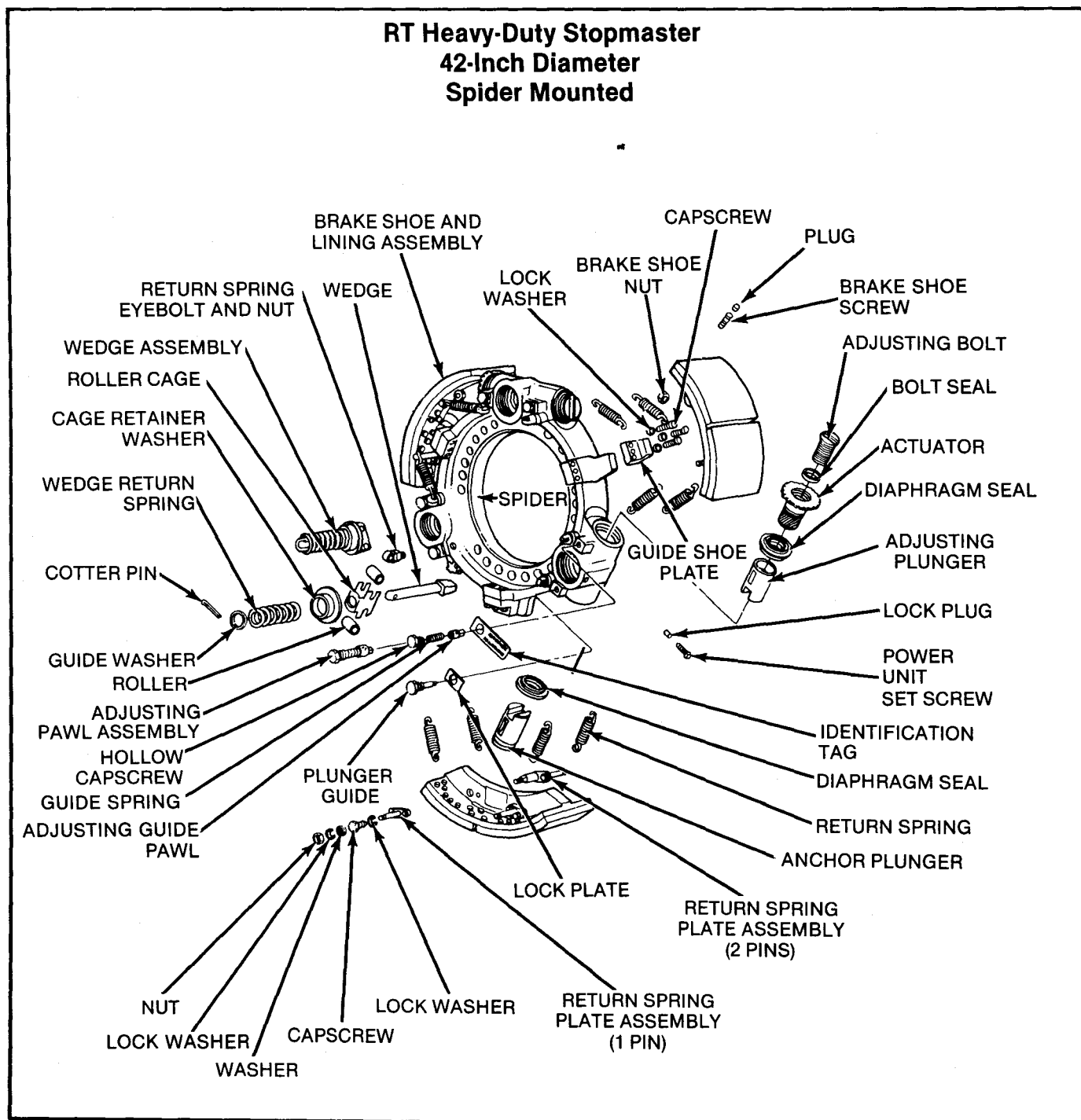
ment. The brake shoes are held in position with eight return springs and guide plates that are attached to the spider with bolts. The guide plates can be removed, so the brake shoes can be removed, while the drum is installed. The linings used on this brake are available with or without grooves.



This brake is triple actuated (RT). It has a cast, one-piece spider with built-in plunger housings. The spider is mounted to the axle housing flange with bolts. The power units are hydraulic cylinders. The brake shoes can be adjusted automatically or manually. The illustration shows automatic adjust-

ment. The brake shoes are held in position with 12 return springs and guide plates that are attached to the spider with bolts. The guide plates can be removed, so the brake shoes can be removed, while the drum is installed. The linings used on this brake are available with or without grooves.

# section **2** Exploded Views



This brake is triple actuated (RT). It has a cast, one-piece spider with built-in plunger housings. The spider is mounted to the axle housing flange with bolts. The power units are hydraulic cylinders. The brake shoes can be adjusted automatically or manually. The illustration shows automatic adjust-

ment. The brake shoes are held in position with 12 return springs and guide plates that are attached to the spider with bolts. The guide plates can be removed, so the brake shoes can be removed, while the drum is installed. The linings used on this brake are available with or without grooves.



# Lubrication, Fluids and Preventive Maintenance

## section 3

### Grease

The grease used in Rockwell heavy-duty Stop-master brakes must be NLGI Grade Number 1 or equivalent. The grease must keep its lubrication qualities under high temperatures. The grease must be smooth and contain no fillers or abrasives. The grease must have a resistance to water or corrosion. The grease must remain soft under normal parking storage conditions so that the brakes can be applied and released.

The following chart shows greases approved by Rockwell. Use these greases or their equivalent.

Chart 2

OPERATING TEMPERATURE	
DOWN TO – 40°F (– 40°C)	BELOW – 40°F (– 40°C)
<ul style="list-style-type: none"><li>• Rockwell 0-616-A (Rockwell Part No. A-1779-W-283)</li><li>• Texaco Thermotex EP No. 1</li><li>• Shell Darina No. 1</li><li>• Aral Aralub 3837</li></ul>	<ul style="list-style-type: none"><li>• Rockwell 0-645 (Rockwell Part No. 2297-X-4574)</li><li>• Mobilgrease 28</li><li>• Mobilgrease 32</li></ul>

### Areas To Be Lubricated

Lubricate the following areas of the brake. **Figure 15.**

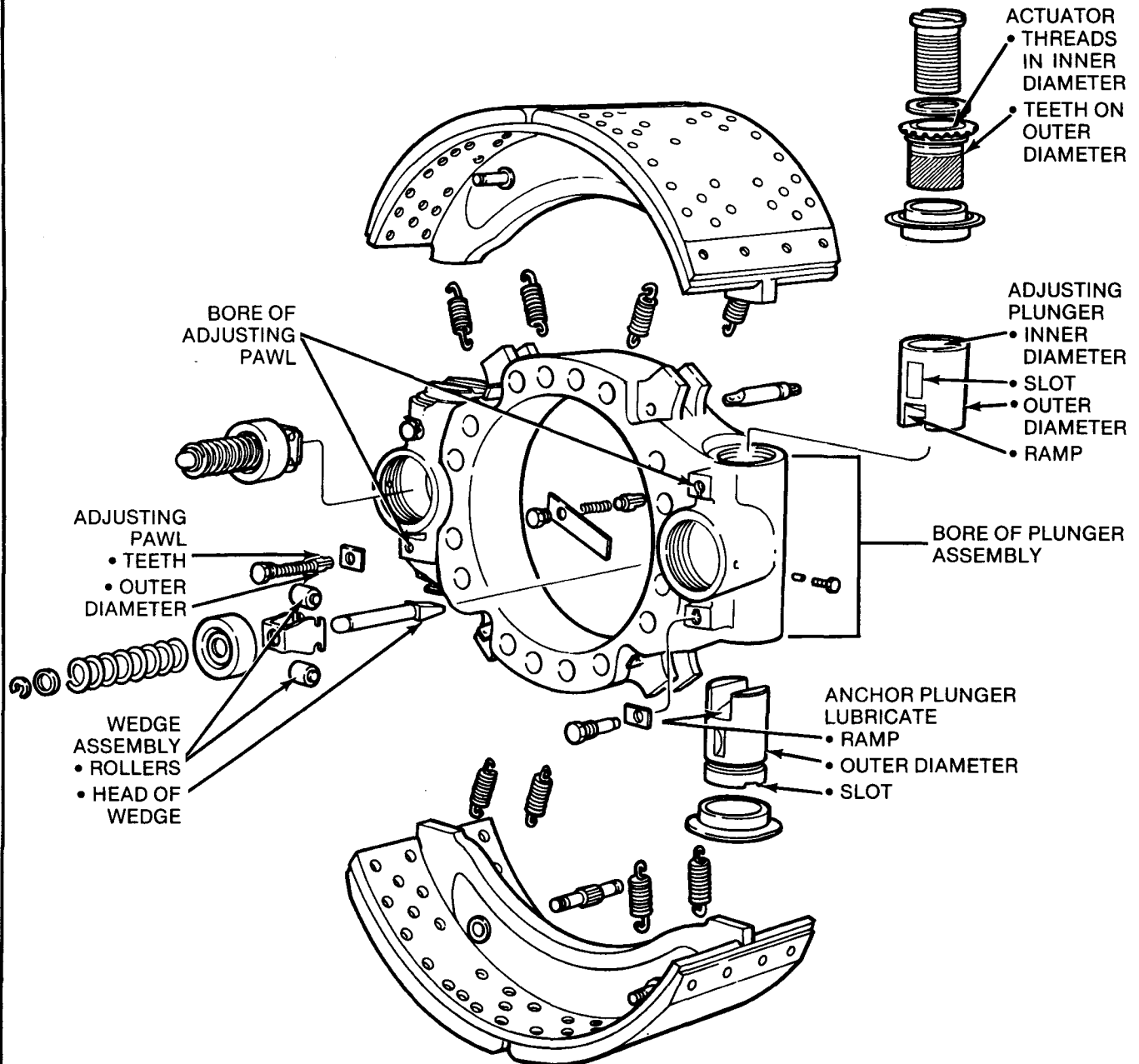
- The outer diameter, the ramp and the slot of anchor plungers.
- The outer diameter, inner diameter, the ramp and the slot of adjusting plungers.
- The teeth on the outer diameter and the threads on the inner diameter of actuators.
- The teeth and outer diameter of adjusting pawls.
- The rollers and the head of wedge assemblies.
- The plunger bores and the bore for the pawl in the plunger housing.

### Brake Fluid

Some systems use mineral oil and some use hydraulic brake fluid. You must use the correct type of brake fluid for the system. Mineral oil is a petroleum based fluid. Hydraulic brake fluid is a non-petroleum based fluid that matches specifications SAE-J1703 (formerly J-70) and SAE J-1702f (arctic). The wrong brake fluid will damage the seals in the system and cause leaks. Do not mix different types of brake fluid. If you are not sure which type of fluid to use, read the Vehicle Operator's Manual or check with the manufacturer of the vehicle.

Figure 15

## Areas of Lubrication — Typical RD-Series Shown



## Preventive Maintenance

### NOTE:

*The lubrication and maintenance schedules in this manual are for normal operating conditions. The lubrication and maintenance schedules can be shorter under severe operating conditions. For severe conditions, base your inspections on lining wear and inspect when the linings have worn 25%, 50%, and 75%. For a new vehicle, inspect the lubricant and the internal components more frequently during the first year to help you set a schedule.*

### NOTE:

*When the brakes are relined, the lubrication and maintenance schedule must be changed to begin at the time the linings are replaced. Each brake must be inspected according to the "Every Twelve Months" information.*

### Every Two Months

1. Check the condition and the thickness of the linings to determine if you must reline the brakes. Be sure the lining is thick enough to last until your next inspection.
2. Check the clearance between the linings and the drum. Check the clearance at the CENTER of the linings, NOT at the ends of the linings.

### Brakes With Automatic Adjustment

If the clearance is less than the amount below, the adjusters are operating correctly. If the clearance is more than the amount below, inspect the operation of the adjusters. Correct the cause of the problem and adjust the brake. See Section 9, ADJUSTING THE BRAKES.

Size of Brake	Maximum Clearance
28-42 inches	0.100 inch (2.54 mm)
17-26 inches	0.080 inch (2.03 mm)
17-1/4 inches mounted to backing plate	0.060 inch (1.52 mm)

### Brakes With Manual Adjustment

If the clearance is more than 0.040 inch (1.0 mm), adjust the brake. See Section 9, ADJUSTING THE BRAKES. If the clearance is more than the amount below, you **MUST** measure and adjust the clearance more frequently.

Size of Brake	Clearance
28-42 inches	0.100 inch (2.54 mm)
17-26 inches	0.080 inch (2.03 mm)
17-1/4 inches mounted to backing plate	0.060 inch (1.52 mm)

3. Inspect for any leaks and correct the cause of the leak. If the lubricant is leaking, disassemble the brake assembly and correct the cause of the leak. Remove the grease from all components and use new grease during assembly. See "Grease" and "Areas to be Lubricated" in this section.
4. Check the operation of the service brake system, the secondary (emergency) brake system and the parking brake system. Be sure that all of the brake systems operate correctly.

### Every 12 Months



### WARNING:

**Carefully follow the service instructions supplied by the manufacturer of the spring brake when you work on this component in Step 1. The spring brake can activate and cause injury.**

1. If the brake has a spring brake, compress and lock the spring so that the brake is released and the spring cannot activate. See page 29 for instructions on how to compress and lock Rockwell spring brakes. For other spring brakes, see the procedure recommended by the manufacturer of the spring brakes to compress and lock the springs.

# section 3 Lubrication, Fluids, and Preventive Maintenance



## **WARNING:**

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

2. Raise the vehicle with jacks and support the vehicle with safety stands. Remove the jacks.
3. Remove the brake shoes as described in Section 7, **SERVICING THE BRAKE SHOES**.

## **NOTE:**

***Some large diameter brakes have shoe guide plates that can be removed. You can remove the guide plates and brake shoes and inspect the seals without removing the wheels and drums.***

4. Remove the plunger assemblies from the housing. See Section 8, **SERVICING THE PLUNGERS AND HOUSINGS**. Inspect the seals, the housing and the plunger assemblies for damage. Inspect the grease. If the grease is hard or contaminated, the complete brake assembly must be disassembled. Remove all of the grease and inspect all of the parts. Be sure that you inspect the O-rings and seals for cuts and damage. Assemble the brake assembly and use new grease to lubricate the parts. See "Grease" and "Areas to be Lubricated" in this section.
5. Remove and inspect the wedge assemblies as described in Section 6, **SERVICING THE WEDGE ASSEMBLIES**. Inspect the grease. If the grease is hard or contaminated, the complete brake assembly must be disassembled. Remove all of the grease and inspect all of the parts. Assemble the wedge assembly and use new grease to lubricate the parts. See "Grease" and "Areas to be Lubricated" in this section.
6. Assemble and install all the components of the brake. See the correct sections of this manual.
7. Adjust the brakes. See Section 9, **ADJUSTING THE BRAKES**.
8. Check the operation of the service brake system, the secondary (emergency) brake system and the parking brake system. Be sure that all of the brake systems operate correctly.

## **When the Brakes Are Relined**

1. If the brakes are relined after more than one year, disassemble and inspect all of the components of the brake. See the correct sections in this manual.
2. If the brakes are relined after less than one year, disassemble and inspect the following components of the brake.

## **NOTE:**

***If any components of the brake system are damaged or if the grease is hard or contaminated, all of the components of the brake must be disassembled and inspected. See the correct sections in this manual.***

- A. Disassemble and inspect the plungers and the housings. See Section 8, **SERVICING THE PLUNGERS AND HOUSINGS**.
- B. Disassemble and inspect the wedge assemblies and the housings. See Section 6, **SERVICING THE WEDGE ASSEMBLIES**.
- C. Assemble and install the components of the brake. See the correct sections in this manual.
- D. Adjust the brakes. See Section 9, **ADJUSTING THE BRAKES**.
- E. Check the operation of the service brake system, the secondary (emergency) brake system, and the parking brake system. Be sure all of the brake systems operate correctly.

# Troubleshooting

## section 4

CONDITION	CAUSE	CORRECTION
Brakes do not apply or not enough braking force.	<ul style="list-style-type: none"> <li>• Wedge assembly installed wrong.</li> <li>• Power unit installed wrong.</li> <li>• Leak or restriction in brake lines or valves.</li> <li>• Hydraulic cylinder seal or air chamber diaphragm damaged.</li> <li>• Air in hydraulic system.</li> <li>• Brakes not adjusted correctly.</li> <li>• Grease or other contamination on brake linings.</li> <li>• Linings worn, damaged or missing.</li> <li>• Low fluid level in master cylinder or reservoir.</li> <li>• Low operating pressure at hydraulic cylinder.</li> </ul>	<ul style="list-style-type: none"> <li>• Install correctly.</li> <li>• Install correctly.</li> <li>• Repair brake lines or valves.</li> <li>• Repair or replace hydraulic cylinder or air chamber.</li> <li>• Remove air from hydraulic system.</li> <li>• Adjust brakes.</li> <li>• Clean or replace brake linings.</li> <li>• Repair or replace linings.</li> <li>• Fill to correct level.</li> <li>• Inspect hydraulic system and correct cause of low pressure.</li> </ul>

CONDITION	CAUSE	CORRECTION
Braking force not equal or lining wear not even.	<ul style="list-style-type: none"> <li>• Hydraulic cylinder seal or air chamber diaphragm damaged.</li> <li>• Wedge rod pulled out of wedge guide on push rod of air chamber or pulled out of piston in hydraulic cylinder.</li> <li>• Wedge rollers and cage pulled out of slots in plungers.</li> <li>• Plungers corroded or cannot move freely.</li> <li>• Brakes not adjusted correctly.</li> <li>• Grease or other contamination on brake linings.</li> <li>• Brake shoes installed backward.</li> <li>• Brake linings installed in wrong positions on shoes.</li> <li>• Drum has runout of more than 0.010 inch (0.25 mm).</li> <li>• Wheel bearings not adjusted correctly.</li> <li>• Linings that are not the specified kind are installed.</li> </ul>	<ul style="list-style-type: none"> <li>• Repair or replace hydraulic cylinder or air chamber.</li> <li>• Install wedge rod correctly.</li> <li>• Install wedge correctly.</li> <li>• Repair or replace plungers.</li> <li>• Adjust brakes.</li> <li>• Clean or replace brake linings.</li> <li>• Install brake shoes correctly.</li> <li>• Install linings in correct positions.</li> <li>• Repair or replace drum.</li> <li>• Adjust wheel bearings.</li> <li>• Replace with specified linings.</li> </ul>

# **section 4 Troubleshooting**

CONDITION	CAUSE	CORRECTION
Automatic adjusters not working.	<ul style="list-style-type: none"> <li>• Adjusting pawl installed backward.</li> <li>• Pawl cannot move freely in its bore.</li> <li>• Worn pawl or actuator teeth.</li> <li>• Pawl spring weak or broken.</li> <li>• Adjusting bolt cannot move freely in actuator.</li> <li>• Detent or clip on shoe retainer are damaged and let adjusting bolt rotate with actuator.</li> <li>• Adjusting plunger not installed at leading end of shoe</li> <li>• Plunger seal damaged or installed wrong.</li> <li>• Shoe return springs are weak, damaged, missing or stretched.</li> <li>• Adjusting bolt wound back too far.</li> </ul>	<ul style="list-style-type: none"> <li>• Install pawl correctly.</li> <li>• Repair or replace pawl or plunger housing.</li> <li>• Replace pawl or actuator and lubricate.</li> <li>• Replace pawl spring.</li> <li>• Repair or replace bolt or actuator and lubricate.</li> <li>• Repair or replace detent or clip.</li> <li>• Install adjusting plunger at leading end of shoe.</li> <li>• Replace seal. Install correctly.</li> <li>• Replace shoe return springs.</li> <li>• Check that bolt rotates freely in actuator. Adjust brakes.</li> </ul>

CONDITION	CAUSE	CORRECTION
Spring brake not holding.	<ul style="list-style-type: none"> <li>• Power spring(s) not fully released (spring is caged).</li> <li>• Air or hydraulic pressure that holds spring(s) in compressed position is not fully released.</li> <li>• Brakes not adjusted correctly.</li> <li>• Power spring(s) weak or broken.</li> <li>• Grease or other contamination on brake linings.</li> </ul>	<ul style="list-style-type: none"> <li>• Release (uncage) power spring(s).</li> <li>• Repair air or hydraulic system.</li> <li>• Adjust brakes correctly.</li> <li>• Replace spring(s).</li> <li>• Clean or replace brake linings.</li> </ul>

CONDITION	CAUSE	CORRECTION
Brakes dragging.	<ul style="list-style-type: none"> <li>• Not enough air or hydraulic pressure to hold spring brake in compressed (off) position.</li> <li>• Brake lines connected to wrong ports.</li> <li>• Leaks in brake lines or seals of spring brake.</li> <li>• Wheel bearings not adjusted correctly.</li> <li>• Drum has runout of more than 0.010 inch (0.25 mm).</li> <li>• Shoe return springs are weak, damaged or missing.</li> <li>• Restriction in brake line or valve does not permit complete release of system pressure when brake pedal is released.</li> <li>• Plungers corroded or cannot retract completely.</li> <li>• Plunger seal damaged or installed wrong.</li> <li>• Air in hydraulic system.</li> <li>• Residual system pressure.</li> </ul>	<ul style="list-style-type: none"> <li>• Repair air or hydraulic system.</li> <li>• Connect lines to correct ports.</li> <li>• Repair or replace brake lines or seals.</li> <li>• Adjust wheel bearings.</li> <li>• Repair or replace drum.</li> <li>• Replace shoe return springs.</li> <li>• Repair or replace brake lines or valves.</li> <li>• Repair or replace plungers.</li> <li>• Replace seal. Install correctly.</li> <li>• Remove air from hydraulic system.</li> <li>• Reduce or remove residual pressure.</li> </ul>

# section 5 Servicing the Power Units

## Description of Power Units

Three kinds of power units are used with Stop-master brakes.

- Air Chambers
- Hydraulic Cylinders
- Spring and Hydraulic Cylinders

Air chambers are used on air actuated braking systems. Hydraulic cylinders and spring and hydraulic cylinders are used on hydraulically actuated braking systems and on air over hydraulic braking systems.

The power units are threaded into the plunger housing of the brake. There are two types of power units: "adjusting" power units and "bottoming" power units. **Figure 16.**

"Adjusting" power units have threads that extend to the end of the cylinder. Adjusting power units must be adjusted when they are installed in order to get the correct amount of wedge travel. The depth that the cylinder is threaded into the plunger housing controls the amount of wedge travel. Adjusting power units are no longer available from Rockwell.

"Bottoming" power units do not have threads near the end of the cylinder. When you install the cylinder to the bottom of its bore in the plunger housing, you automatically get the correct amount of wedge travel. Bottoming units can be used to replace adjusting units as long as the correct wedge assembly is used.

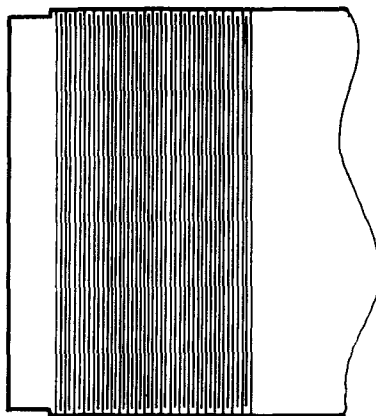
## Spring and Cylinder Unit

The Rockwell heavy-duty spring and cylinder unit is a hydraulic cylinder and a spring brake in one unit. The primary use of the unit is on 36- and 42-inch brakes. The hydraulic cylinder is threaded into the plunger housing of the brake and functions as the service power unit for the brake. The spring brake is threaded on to the opposite end of the hydraulic cylinder and functions as an emergency and parking brake.

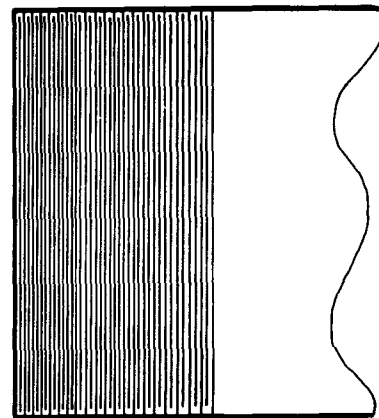
There are two fluid ports on the unit, a service port and a spring brake port. Both ports are located next to each other on the housing. During normal vehicle operation, the service port supplies fluid for application of the brake. At the same time, fluid pressure of 550 psi (3792kPa) through the spring brake port pushes against the piston plunger to hold the power springs in the compressed position. **Figure 17.**

**Figure 16**

"BOTTOMING" POWER UNIT



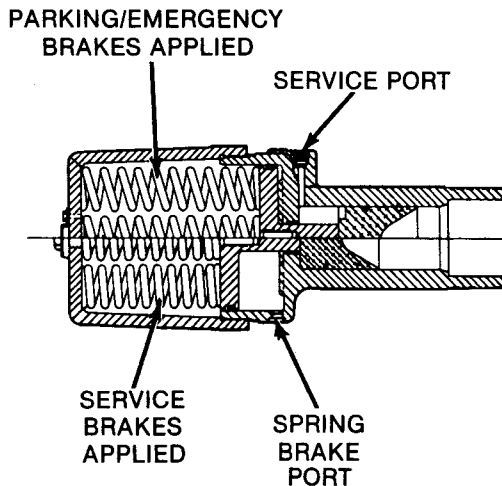
"ADJUSTING" POWER UNIT





In an emergency, or when the vehicle is parked, the fluid pressure in the emergency line is released and the power springs expand. The springs push the piston plunger which pushes the piston in the hydraulic cylinder which pushes the wedge to apply the brakes. **Figure 17.**

**Figure 17**



## **! WARNING:**

*Compress and lock the spring brake before you remove the wheel drum or any brake components. The spring brake can activate and cause injury. Use the following procedure to compress and lock the Rockwell spring brake. If you are working on other spring brakes, carefully follow the service instructions supplied by the manufacturer of that spring brake.*

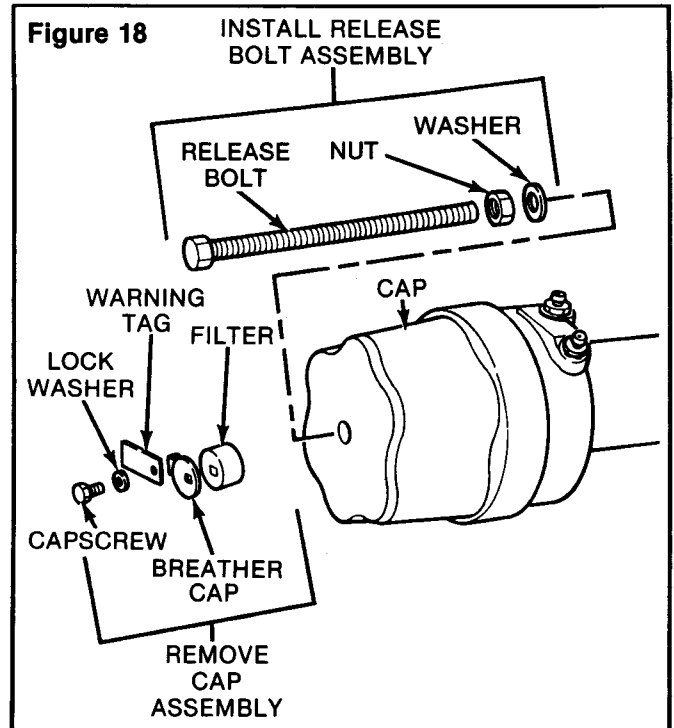
## Compressing and Locking the Rockwell Spring Brake

1. Put blocks under the wheels to prevent the vehicle from moving.
2. If the hydraulic system is operating correctly, apply the parking and emergency brake system to compress the spring. Lock the spring as described in Steps 3-8.

If the hydraulic system is damaged, the spring is manually compressed and locked as described in Steps 3-8.

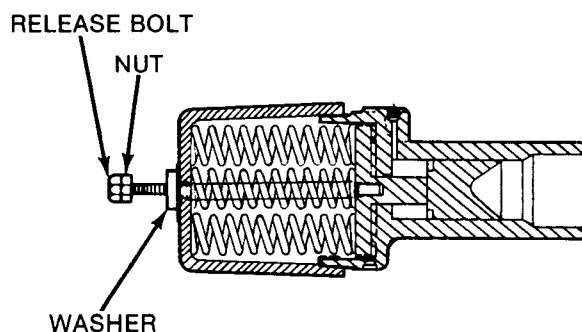
3. Remove the capscrew, lock washer, warning tag, breather cap and filter from the end of the cap on the spring brake. **Figure 18.**
4. Put the nut on the release (caging) bolt and turn the nut until it is against the head of the bolt. **Figure 18.**

**Figure 18**

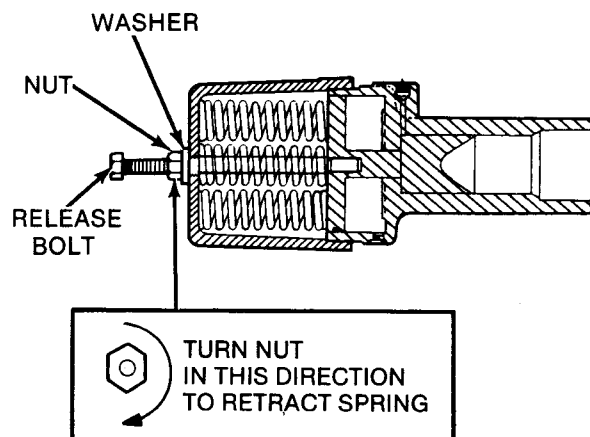


5. Install the bolt as follows: **Figure 19**
  - A. Put the washer on the bolt and put the bolt through the hole in the end of the cap.
  - B. Push the bolt in until you feel it touch the piston plunger.
  - C. Turn the bolt and thread it completely into the hole in the piston plunger (approximately 18–22 turns).
6. Tighten the nut against the washer and the end of the cap. **Figure 20.**
7. Turn the nut in the direction shown in **Figure 20** to retract the bolt. When the bolt is retracted, the plunger of the piston compresses the spring.
8. If necessary, release the parking and emergency brakes.

**Figure 19**



**Figure 20**



## Removing the Power Unit

### NOTE:

*On Rockwell spring and cylinder units, if only the spring and cap assembly need to be serviced, see **REMOVING THE CAP AND SPRING ASSEMBLY** on Page 31.*

### ! WARNING:

*Carefully follow the service instructions supplied by the manufacturer of the spring brake when you work on this component as described in Step 1. The spring brake can activate and cause injury.*

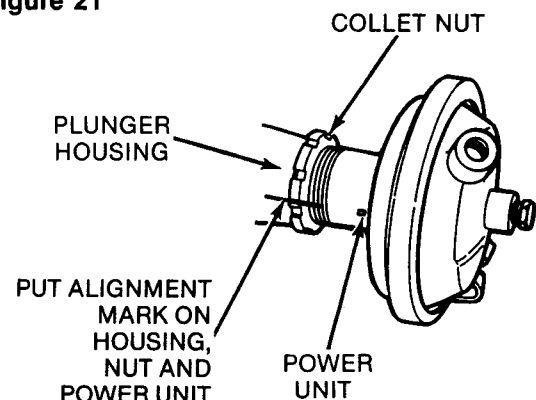
1. If the brake has a spring brake, compress and lock the spring so that it cannot activate during disassembly. See Page 29 for instructions on how to compress and lock Rockwell spring brakes. For other spring brakes, see the procedure recommended by the manufacturer of the spring brakes to cage and lock the springs.
2. Disconnect the brake lines from the power unit and put plugs in the lines. Put tags on the lines and ports so that you can know how to connect them when you install the power unit.

### NOTE:

*If you do not know if the power unit is an “adjusting” or “bottoming” unit, use the procedure for removing and adjusting power unit. See Step 3 of this procedure.*

3. On adjusting power units, put alignment marks on the plunger housing, the collet nut (if used) and the first thread outside the plunger housing or collet nut. The alignment marks help you to be sure the power unit is installed in the correction position during installation. **Figure 21.**

**Figure 21**



4. Remove the set screw that holds the power unit in the plunger housing.

**NOTE:**

*If a collet nut is used on the threads of the power unit, use a hammer and brass drift to loosen the collet nut.*

5. Remove the power unit from the plunger housing. If necessary, use a strap wrench.

**NOTE:**

*There is a nylon lock plug under the set screw to prevent damage to the threads of the power unit. If the plug falls from the hole, keep the plug for use during assembly.*

**NOTE:**

*If the brake has automatic adjustment and an identification ring is installed on the unit, keep the ring and install it with the unit.*

## Removing the Cap and Spring Assembly

**NOTE:**

*To remove the cap and spring assembly, and leave the hydraulic cylinder installed in the plunger housing, use the following procedures. To remove the spring brake and hydraulic cylinder as a unit, follow the procedures under REMOVING THE POWER UNIT.*

1. Compress and lock the spring brake as described under COMPRESSING AND LOCKING THE ROCKWELL SPRING BRAKE.
2. Put a container under the assembly to catch any brake fluid.
3. Disconnect the brake lines from the assembly and put plugs in the lines. Put tags on the lines and ports so that you know how to connect them when you install the assembly.
4. Use two strap wrenches. Put one wrench on the hydraulic cylinder and hold the cylinder to keep it from turning. Use the other wrench to turn the cap and remove the spring brake assembly.

## Disassembling the Rockwell Spring and Cylinder Unit

See Figure 22.



**WARNING:**

*Make sure the spring brake is compressed and locked before you separate the unit in Step 1. The spring brake can activate and cause injury.*

1. If necessary, use two strap wrenches to separate the hydraulic cylinder and the spring brake. Put one wrench on the hydraulic cylinder and hold the cylinder to keep it from turning. Use the other wrench to turn the cap and remove the spring brake assembly.



**WARNING:**

*Wear eye protection when you do Step 2. Do not put your hand near the piston when you force out the piston. Injury can occur.*

2. Put a rag over the end of the cylinder. Carefully apply air pressure through the fluid inlet to force the piston and rings from the cylinder.
3. Remove the O-ring and backup ring from the piston.
4. Use a tool without a sharp point to remove the two O-rings and four backup rings from inside the hydraulic cylinder.
5. Put the cap and spring assembly in a press so that the piston plunger is on top. Install a sleeve on the press that will fit over the shaft of the piston plunger so that you will not damage the piston plunger.
6. Apply just enough press load to compress the springs and release the spring pressure on the release (caging) bolt.
7. Remove the bolt from the piston plunger and cap.
8. Slowly release the press load on the piston plunger and springs.
9. Lift the piston plunger and springs from the cap.
10. Remove the springs from their pins and remove the pins from the piston plunger.

# Servicing the Power Units

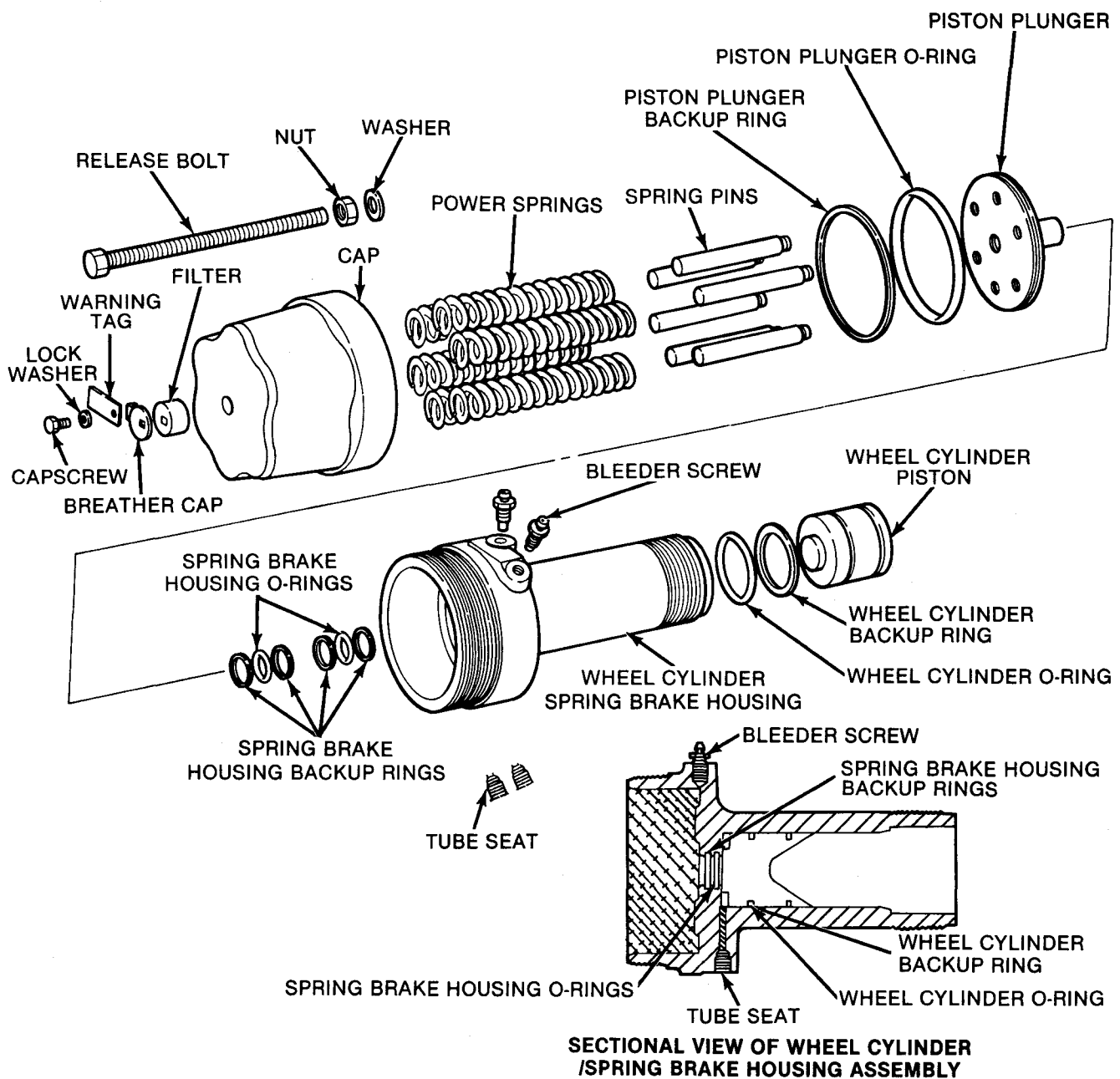
11. Remove the O-ring and backup ring from the piston plunger.
12. Inspect all parts of the cap and spring assembly before assembly. Inspect all parts for any signs of wear or damage. Replace any part that shows signs of wear or damage.

Inspect the O-rings and the backup rings for any cuts, tears, or other damage that can keep them from sealing. If necessary, replace the O-rings and the backup rings.

13. Clean all parts of the spring and cylinder unit. See Section 10, CLEANING AND CORROSION PROTECTION.

Figure 22

## ROCKWELL SPRING AND CYLINDER UNIT—EXPLODED VIEW



## Assembling the Rockwell Spring and Cylinder Unit

See Figure 22.



### CAUTION:

*Be sure you use the correct seals for the type of fluid used in the system. Some seals can only be used in systems that use mineral oil. Some seals can only be used in systems that use hydraulic brake fluid. If you use the wrong seals, the fluid will damage the seals and cause them to leak.*

1. Install the O-ring and backup ring on the piston plunger.
2. Install the pins into the piston plunger and put the springs on the pins.
3. Put the cap in a press with the open end on top. Put the piston plunger and spring assembly in the cap. Install a sleeve on the press that will fit over the shaft of the piston plunger so that you will not damage the piston plunger.
4. Carefully apply just enough load pressure to compress the springs. Install the release (caging) bolt to lock the spring brake in the released position.
5. Release the load pressure and remove the assembly from the press.
6. Lubricate the cylinder bore with clean fluid of the same type used in the system.
7. Install the two O-rings and four backup rings inside the hydraulic cylinder.
8. Install the O-ring and backup ring on the piston.
9. Install the piston in the cylinder and push the piston to the bottom of the bore.
10. Use two strap wrenches to assemble the hydraulic cylinder and the spring brake.
11. If necessary, install the spring cylinder unit according to the instructions given in INSTALLING AND ADJUSTING THE POWER UNITS.

## Disassembling Hydraulic Cylinders

1. Remove the bleeder screw(s) from the cylinder. Drain all hydraulic brake fluid or mineral oil from the unit.



### CAUTION:

*Wear eye protection when you do Step 2. Do not put your hand near the piston when you force out the piston. Injury can occur.*

2. Put a rag over the end of the cylinder. Carefully apply air pressure through the fluid inlet to force the piston and seals from the cylinder.

# Servicing the Power Units

## NOTE:

Some cylinders have a piston with an O-ring or U-packer, a cup seal, a spring, and a spacer. Some cylinders have a piston with two O-rings or U-packers. Figures 23 and 24.

3. Remove the O-rings or U-packers from the piston.
4. Inspect all parts of the hydraulic cylinder before assembly. Inspect all parts for any signs of wear or damage. Replace any part that shows signs of wear or damage.

Polish the piston and bore of a hydraulic cylinder with crocus cloth. If the piston or bore has nicks, scratches or corrosion, replace the components.

Inspect the bleeder screws for any damage that can keep them from sealing.

Inspect the seals and the O-rings or the U-packers for any cuts, tears or other damage that could keep them from sealing.

5. Clean all the parts with the same fluid that is used in the brake system. For additional information, see Section 10, CLEANING AND CORROSION PROTECTION.

Figure 23

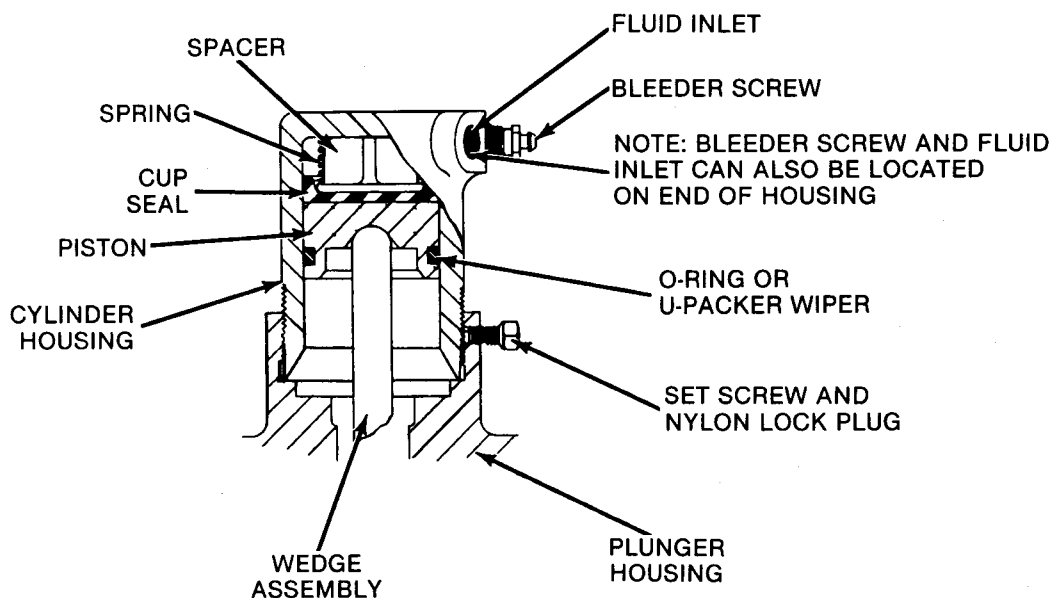
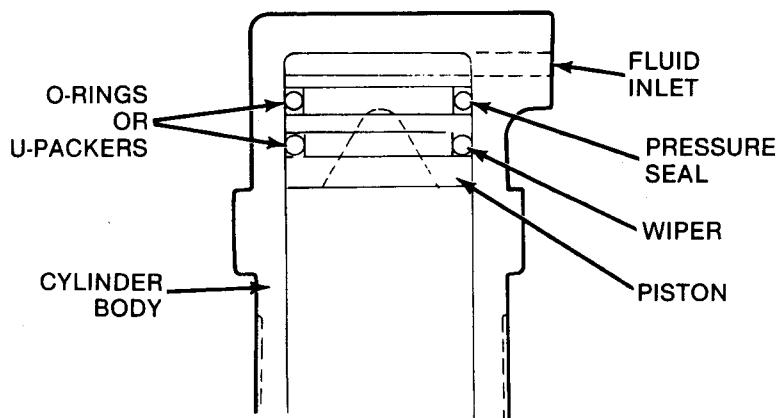


Figure 24



## Assembling Hydraulic Cylinders



### CAUTION:

***Be sure you use the correct seals for the type of fluid used in the system. Some seals can only be used in systems that use mineral oil. Some seals can only be used in systems that use hydraulic brake fluid. If you use the the wrong seals, the fluid will damage the seals and cause them to leak.***

1. Lubricate the cylinder bore with clean fluid of the same type used in the system.
2. If a spring and spacer are used, install them into the bottom of the cylinder.
3. If a cup seal is used, install it into the cylinder so that the flat face of the cup is toward the piston.
4. Install the piston and seal assembly, flat end first, into the cylinder. Push the piston and cup seal to the bottom of the cylinder.
5. Install the bleeder screw(s).
6. Install and adjust the power unit according to the instructions given in INSTALLING AND ADJUSTING THE POWER UNITS.

## Disassembling The Air Chambers

See Figures 25 and 26.

### NOTE:

***You can disassemble the air chamber while it is installed in the plunger housing. If you do, you must not disengage the wedge rollers from the plungers. If you disengage the rollers, you must remove the air chamber from the plunger housing to install the wedge correctly.***



### WARNING:

***Carefully follow the service instructions of the manufacturer of the spring brake when you work on this component. The spring brake can activate and cause injury.***

1. If a spring brake is mounted to the air chamber, compress and lock the spring brake before you disassemble the air chamber. See Page 29 for instructions on how to compress and lock Rockwell spring brakes. For other spring brakes, see the procedure recommended by the manufacturer of the spring brakes to cage and lock the springs.
2. Remove the nut and bolt, warning tag and bottoming tag (if used) from the clamp ring on the service chamber.



### WARNING:

***Do not remove the clamp from the spring chamber. If the clamp is removed, the spring will expand with dangerous force. If the spring chamber must be serviced, see procedure that is recommended by the manufacturer of the chamber.***

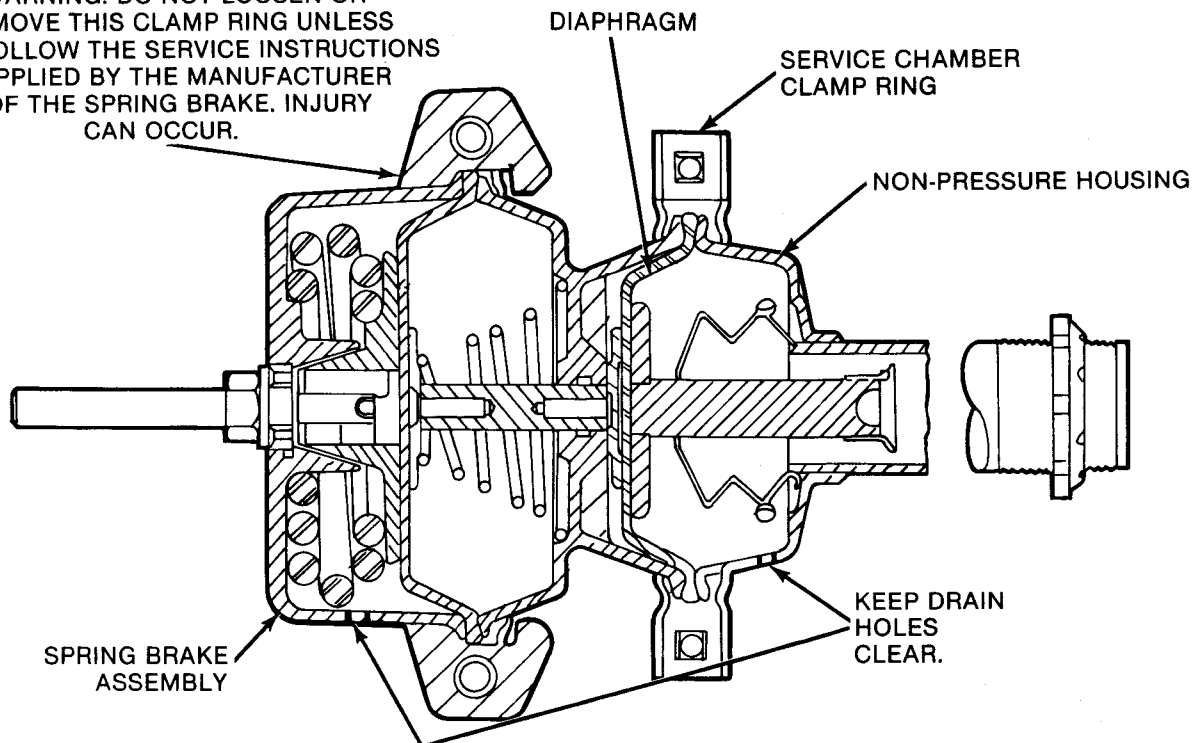
3. Open the clamp ring on the service chamber and hold the diaphragm in place on the non-pressure housing. Remove the pressure housing and the spring brake if one is installed.
4. Hold the diaphragm plate so the wedge does not disengage from the plungers and remove the diaphragm.
5. Inspect the diaphragm for cuts or other damage. Replace the diaphragm if necessary.
6. Make sure the drain holes in the service chamber are free from obstructions. If the holes are plugged, moisture will stay in the chamber and damage the assembly.
7. Inspect the boot.
  - If the boot is damaged or separated from the housing, remove the diaphragm plate and push rod assembly from the boot retainer. See Step 8.
  - If the boot is in good condition, assemble the air chamber. Go to Step 5 of ASSEMBLING THE AIR CHAMBER in this section.

# Servicing the Power Units

8. Use a drill to remove the diaphragm plate and push rod assembly from the boot retainer. Remove the assembly of the diaphragm plate, boot retainer, boot and wedge guide.
9. Remove the wedge guide and boot from the push rod. Inspect the wedge guide for wear and replace the wedge guide, if necessary.

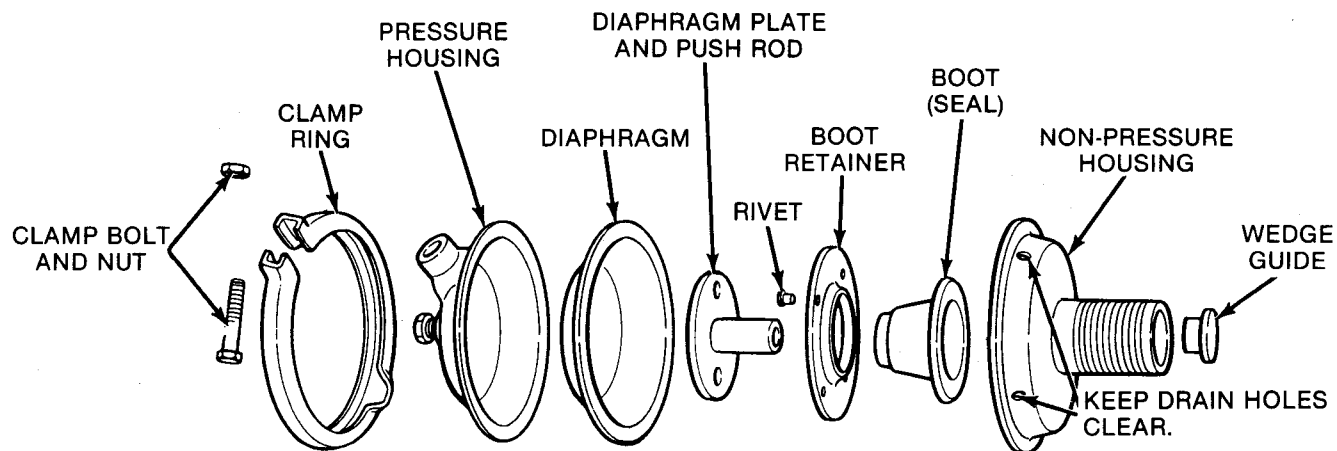
**Figure 25 COMBINATION SERVICE AND SPRING BRAKE CHAMBERS—CUTAWAY VIEW**

**WARNING: DO NOT LOOSEN OR REMOVE THIS CLAMP RING UNLESS YOU FOLLOW THE SERVICE INSTRUCTIONS SUPPLIED BY THE MANUFACTURER OF THE SPRING BRAKE. INJURY CAN OCCUR.**



**Figure 26**

**SERVICE CHAMBER—EXPLODED VIEW**





## Assembling the Air Chambers

See Figures 25 and 26.

1. Put the lip of a new boot retainer over a new boot.

### NOTE:

*If rivets are not used, do Step 2 then go to Step 4.  
If rivets are used, go to Step 3.*

2. Assemble and install the boot and retainer as follows.
  - A. Clean the inside of the non-pressure housing with cement thinner or similar material.
  - B. Install the push rod of the diaphragm plate through the boot and push the wedge guide completely onto the end of the push rod.
  - C. Apply a bead of cement inside the non-pressure housing around the hole where the push rod fits.
  - D. If the chamber is installed in the plunger housing, carefully engage the wedge guide with the wedge rod.
  - E. Press the boot onto the cement to hold the boot in place.

### NOTE:

*To do Step 3, the chamber must be removed from the plunger housing. You must install the wedge guide from the inboard end of the air chamber tube.*

3. Assemble and install the boot and retainer as follows.
  - A. Align and rivet holes in the retainer and non-pressure housing.
  - B. Fasten the retainer to the housing with nuts and bolts through two holes that are 180° apart.
  - C. Use a hammer and flat head drift to install rivets in the other two holes. Install the rivets from the outside of the housing. Use the correct rivet set to finish the rivet heads.
  - D. Remove the nuts and bolts and repeat Step C for those holes.

- E. Install the push rod of the diaphragm plate through the boot and push the wedge guide completely on to the end of the push rod.

4. Install the diaphragm on the non-pressure housing over the diaphragm plate.
5. Install the pressure housing and spring brake if one is used. Install the clamp ring, tags, bolt and nut and tighten the nut to hold the assembly together.
6. Apply air pressure to the chamber and use soap and water solution to test for leaks.
7. If necessary, install and adjust the air chamber according to the instructions given in INSTALLING AND ADJUSTING THE POWER UNITS.

## Installing and Adjusting the Power Units

Before the power unit is installed onto the plunger housing, remove and inspect the wedge assembly. If necessary, service the wedge assembly. Lubricate the wedge assembly before installing it into the housing. See Section 3, LUBRICATION, FLUIDS AND PREVENTIVE MAINTENANCE.

The power unit must be installed so that when the piston or the diaphragm moves, the wedge immediately moves and lifts the plungers. This arrangement gives the least amount of lost movement and makes the maximum use of the stroke of the power unit. To install the power unit correctly, do the following.



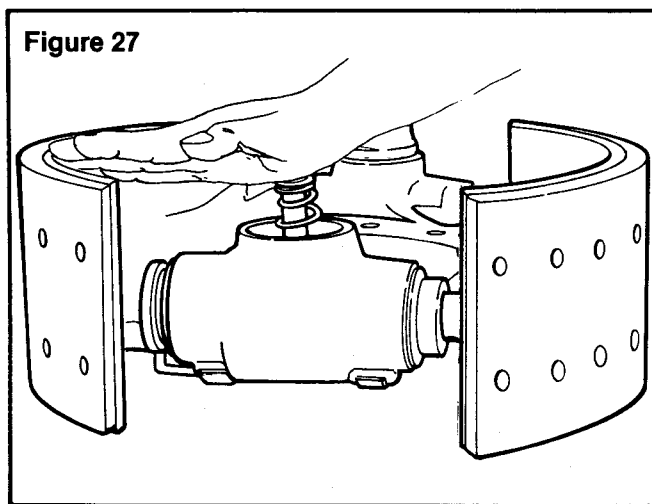
### WARNING:

*Carefully follow the service instructions supplied by the manufacturer of the spring brake when you work on this component in Step 1. The spring brake can activate and cause injury.*

1. If the power unit has a spring brake, be sure the spring is compressed and locked. See Page 29 for instructions on how to compress and lock Rockwell spring brakes.

# Servicing the Power Units

2. Make sure the rollers of the wedge assembly are engaged with the slots in the plungers. Push the end of the wedge rod to be sure the wedge lifts the plungers and brake shoes. If the plungers and shoes do not move, remove the wedge assembly and install it correctly. **Figure 27.**

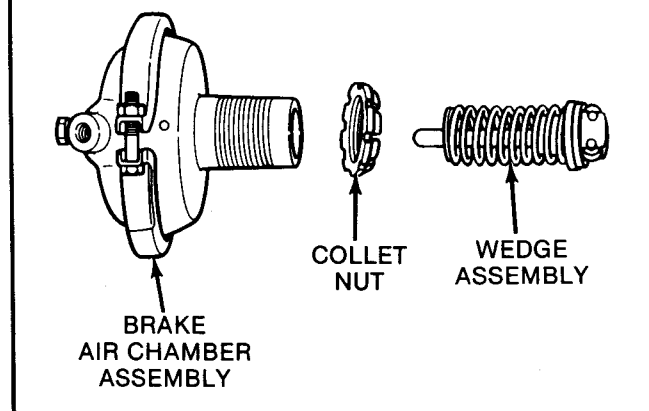


## NOTE:

*If an identification ring for automatic adjustment is used, install it on the unit.*

3. Install the power unit into the plunger housing according to the following procedure.
  - A. If used, install the collet nut on the power unit so that the tapered side of the nut is toward the plunger housing. If alignment marks were made during disassembly, install the nut so that the marks on the nut and on the threads of the power unit are aligned. If alignment marks were not made during disassembly, install the nut to the end of the threads toward the chamber or cylinder. **Figure 28.**
  - B. Apply a sealant that will not get hard to the first three threads on the shaft of the power unit. Use a sealant such as Rockwell part number A-2297-F-4114 or equivalent.
  - C. Install the power unit into the plunger housing according to the following procedure. If necessary use a strap wrench to tighten the unit in the housing.

**Figure 28**



## NOTE:

*On hydraulic actuated power units, be sure that the unit is installed so that the bleeder screw is toward the highest possible position.*

- **Bottoming Type Power Units.** Tighten the unit until the bottom of the power unit touches the bottom of the bore in the plunger housing. When correctly installed, the power unit will not rotate in the direction that it is tightened.
- **Adjusting Type Power Units with Alignment Marks.** Tighten the unit until the alignment marks on the unit, the collet nut (if used), and the plunger housing are aligned together. If a collet nut is used, the collet nut must also be against the plunger housing.
- **Adjusting Type Units Without Alignment Marks.**
  - A. Tighten the unit until the bottom of the power unit touches the bottom of the bore in the plunger housing.
  - B. Back out the unit one complete turn.
  - C. Push on one shoe or plunger while you look at the opposite shoe or plunger.
  - D. If the opposite shoe or plunger moves, back out the unit another complete turn. Be sure the rollers on the wedge assembly do not touch the plungers in the "off" position. Repeat Steps B and C until the opposite shoe or plunger does not move.



## CAUTION:

*If you back out a hydraulic cylinder in Step 4, do not back out the unit more than one complete turn. If you back out the unit too much, there will be too much lost movement when the brake is applied.*

## NOTE:




*If you are installing an air chamber, loosen the clamp ring on the service chamber and rotate the pressure housing to align the ports and brake lines in Step 4. Tighten the clamp ring when you are done.*

4. Connect the brake lines to the correct ports. If necessary, back out the units no more than one complete turn to align the ports and the brake lines. Make sure the bleeder screws are at the top of the unit so that you can completely bleed air from the hydraulic system later.



## CAUTION:

*In Step 5, do not overtighten the set screw or you will damage the power unit.*

5. If removed, install a new nylon lock plug and a set screw to hold the power unit in the plunger housing. Tighten the set screw according to the following sequence.
  - A. Tighten the set screw to 175–200 lb-in (19–22 N·m). 
  - B. Loosen the set screw until all torque is removed.
  - C. Tighten the set screw to 50 lb-in (6 N·m). 
6. If a collet nut is used, do the following.
  - A. Install the brake drum if it is not installed.
  - B. Another person must apply the brakes using full system pressure.
  - C. While the brakes are applied, tighten the collet nut as tight as possible by hand. Then, use a hammer and brass drift to tighten the collet nut 1/4 turn (125 lb-ft of torque). **Figure 29.** 
  - D. Release the brakes.

7. Check for leaks at all connections. Use a soap and water solution to check for air leaks.

8. If the brake is a hydraulic brake, remove the air from the brake system. Use the procedure recommended by the manufacturer of the vehicle. For more information, see Section 11, REMOVING THE AIR FROM THE BRAKE SYSTEM.

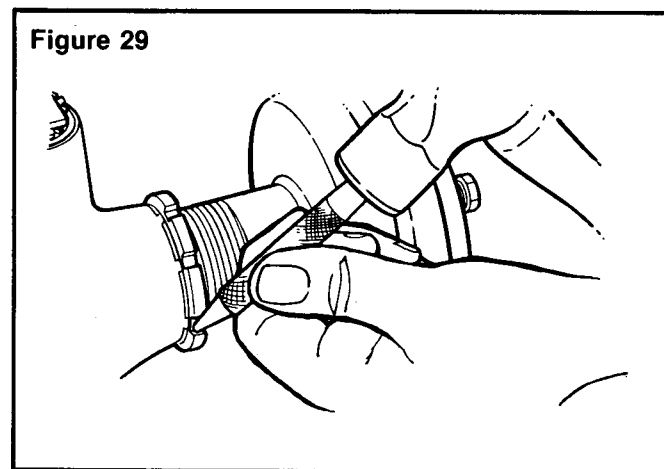


## WARNING:

*Carefully follow the service instructions supplied by the manufacturer of the spring brake when you work on this component in Step 9. The spring brake can activate and cause injury.*

9. If the brake has a spring brake, release the springs. See Page 29 for directions on how to release Rockwell spring brakes. For other spring brakes, see the procedure recommended by manufacturer of the spring brakes to cage and lock the springs.
10. On air actuated braking systems, be sure that the drain hole in the air chamber is not blocked. The chamber must also be installed so that the drain hole is in the lowest possible position.

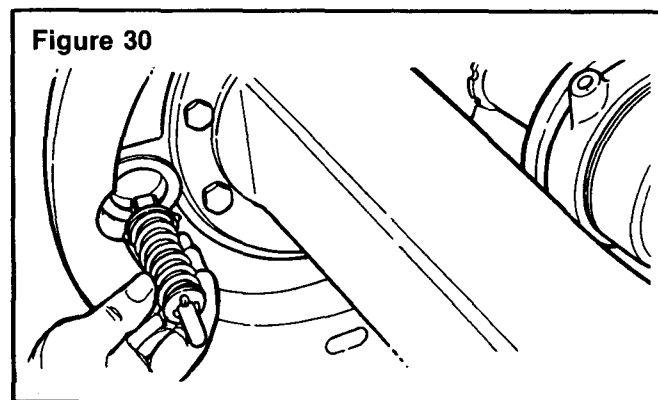
**Figure 29**



# section 6 Servicing the Wedge Assemblies

## Removing the Wedge Assemblies

1. Remove the power unit. See REMOVAL OF POWER UNITS in Section 5, SERVICING THE POWER UNITS.
2. Pull the wedge assembly straight out from its bore in the plunger housing. **Figure 30.**



## Disassembling the Wedge Assemblies

See Figures 31 and 32.

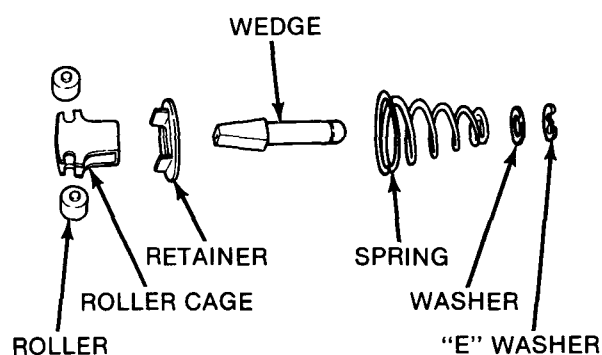


### **WARNING:**

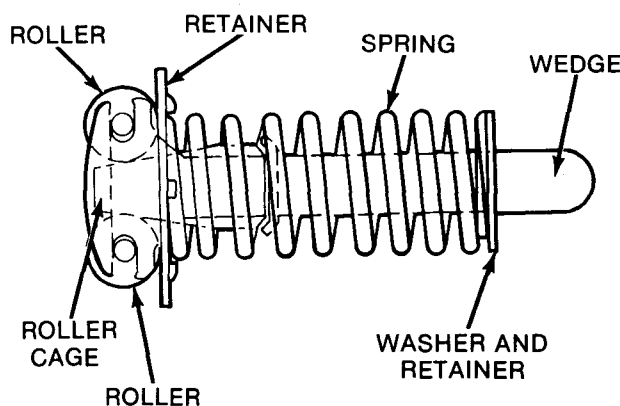
*The wedge return spring is under pressure. Quick release of the spring pressure can cause injury.*

1. Compress and hold the return spring while you remove the cotter pin or the "E" washer from the wedge shaft. Carefully release the spring and remove the washer, guide washer (if used), spring and retainer from the wedge.

**Figure 31** SHORT-STROKE WEDGE ASSEMBLY



**Figure 32** LONG-STROKE WEDGE ASSEMBLY



### **NOTE:**

*Use a vise to compress and hold the spring on a large wedge assembly. Use soft metal covers on the jaws of the vise to protect the spring.*

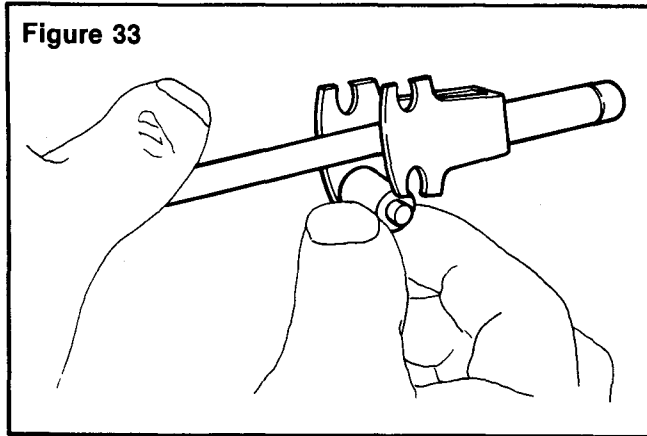


## CAUTION:

*In Step 2, do not force open the roller cage more than is needed to remove the rollers. Do not force the rollers through the slots in the cage. Do not force the wedge through the rollers. Damage to the cage will occur.*

2. Put a thin screwdriver between the wedge and the roller cage and force open the cage just enough to remove the rollers. **Figure 33.**

**Figure 33**



3. Slide the roller cage off the shaft of the wedge.
4. Inspect all parts of the wedge assembly before assembly. Inspect all parts for any signs of wear or damage. Replace any part that shows signs of wear or damage.

Make sure the wedge, rollers, and slots in the plungers are free of nicks, pits, scratches or corrosion. If these parts are damaged, replace them.

Make sure all springs extend and retract quickly and completely. Be sure the springs are free of any damage.

Make sure the groove in the wedge shaft for the snap ring or "E" washer is clean and sharp.

Make sure the roller cage holds the rollers in correct alignment.

5. Clean all parts of the wedge assembly. See Section 10, CLEANING AND CORROSION PROTECTION.

## Assembling the Wedge Assemblies

See Figures 31 and 32.



## CAUTION:

*Do not mix components of different wedge assemblies. The wedge will not work correctly if components are mixed.*

1. Slide the wedge into the roller cage so that the angled faces of the wedge are visible.



## CAUTION:

*In Step 2, do not force open the roller cage more than is needed to install the rollers. Do not force the rollers through the slots in the cage. Do not force the wedge through the rollers. Damage to the cage will occur.*

# section 6 Servicing the Wedge Assemblies

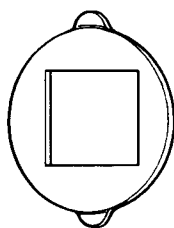
Chart 3

TYPE OF RETAINER	PART NUMBER	INSTALL
Flat	1729-C-315	Against the roller cage.
Flat with four tabs	1729-L-428	On the roller cage with the tabs toward the spring and away from the roller cage.
Flat with two tabs	1229-U-3167	On the roller cage with the tabs toward the roller cage and away from the spring.
Cup	1729-Q-407	With the cup over the roller cage.

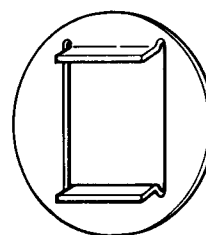
Figure 34

## Wedge Retainers

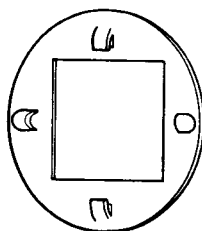
FLAT RETAINER  
1729-C-315



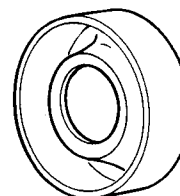
FLAT RETAINER  
WITH TWO TABS  
1229-U-3167



FLAT RETAINER  
WITH FOUR TABS  
1729-L-428



CUP RETAINER  
1729-Q-407



- Put a thin screwdriver between the wedge and the roller cage and force open the cage just enough to install the rollers. **Figure 33.**
- There are four different types of retainers for the four different types of wedge assemblies. **Figure 34.** Install the retainers according to the information in Chart 3.
- Install the spring on the shaft of the wedge. If the spring is larger at one end than the other, the large end of the spring goes against the retainer. **Figure 31.**

## **WARNING:**

*The wedge return spring is under pressure. Quick release of the spring pressure can cause injury.*

- Install the guide washer (if used) and the spring washer. Compress and hold the spring and install the cotter pin or the "E" washer.

## **NOTE:**

*Use a vise to compress and hold the spring on a large wedge assembly. Use soft metal covers on the jaws of the vise to protect the spring.*

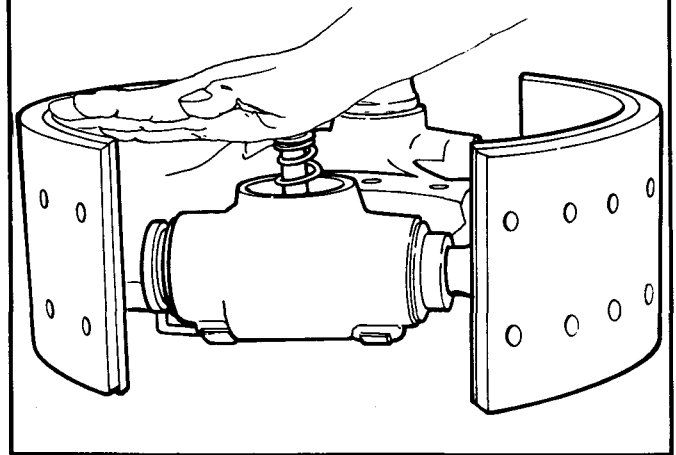
- Apply grease to the wedge assembly. Use Rockwell lubricant 0-616-A (part number 1779-W-283) or equivalent.

## Installing the Wedge Assemblies

1. Make sure that the wedge assembly and the plungers are lubricated. See LUBRICATION in Section 3, LUBRICATION, FLUIDS AND PREVENTIVE MAINTENANCE.
2. Install the wedge straight into its bore in the plunger housing.
3. Make sure the rollers of the wedge assembly are engaged with the slots in the plungers. Push the end of the wedge rod to be sure the wedge lifts the plungers and brake shoes. If the plungers and shoes do not move, remove the wedge assembly and install it correctly.

**Figure 35.**

**Figure 35**



4. Install the power unit. See INSTALLING AND ADJUSTING THE POWER UNITS in Section 5, SERVICING THE POWER UNITS.

# section 7 Servicing the Brake Shoes

## Removing the Brake Shoes

### CAUTION:

Use only the brake lining materials recommended by the manufacturer of the vehicle. Reline both brakes on an axle at the same time. If you use the wrong material or only reline one brake, poor brake performance can occur.

1. Put blocks in front of and behind the wheels of the vehicle. This prevents the vehicle from rolling when the parking/emergency brakes are released.

### WARNING:

Carefully follow the service instructions supplied by the manufacturer of the spring brake when you work on this component in Step 2. The spring brake can activate and cause injury.

2. If the brake has a spring brake, compress and lock the spring so that the brake is completely released. Be sure there is no air pressure in the service half of the air chamber.

### WARNING:

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

3. If necessary, raise the vehicle to get room to work. Support the vehicle with safety stands.

### CAUTION:

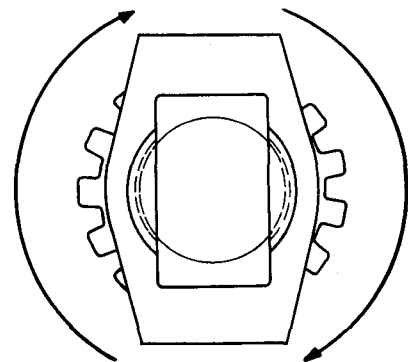
Do not use a power wrench to remove pawl assemblies. A power wrench can damage the spring of the pawl.

4. Retract the brake shoes so that there is a clearance between the linings and the shoes according to the following procedure.

**17-26-Inch Brakes.** Turn the star wheel of the adjusting bolt assembly in the direction shown in Figure 36 to move the linings away from the drum.

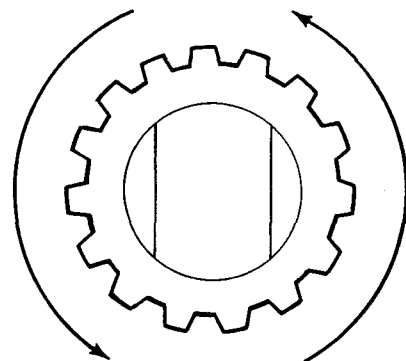
**28-42-Inch Brakes.** Loosen the hollow capscrew of the pawl assembly. Back off or remove the pawl assembly to release pressure on the spring. Turn the star wheel of the adjusting bolt assembly in the direction shown in Figure 37 to move the linings away from the drum.

**Figure 36** 17-26-INCH BRAKES—  
TURN STAR WHEEL IN THIS  
DIRECTION TO MOVE LININGS  
AWAY FROM DRUM



TOP VIEW OF STAR WHEEL

**Figure 37** 28-42-INCH BRAKES—  
TURN STAR WHEEL IN THIS  
DIRECTION TO MOVE LININGS  
AWAY FROM DRUM



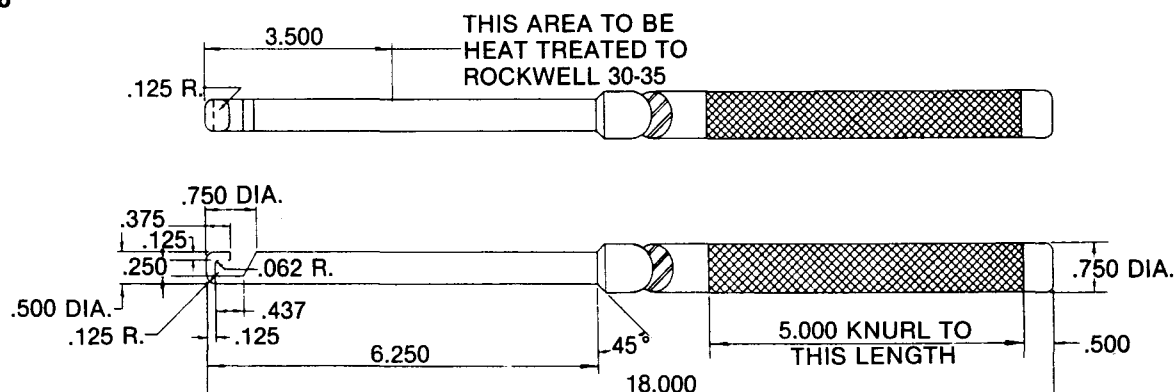
TOP VIEW OF STAR WHEEL



# Servicing the Brake Shoes

section 7

Figure 38



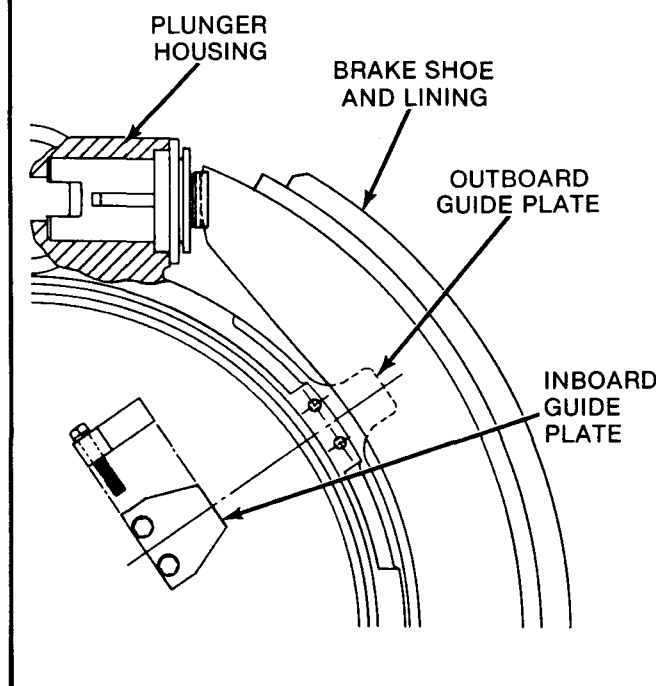
5. If the brake does not have guide plates that you can remove, remove the wheel, hub and drum using standard procedures.
6. Remove the return springs from the brake shoes. On some 36-inch brakes you must use a special tool to remove the return springs. **Figure 38.**

## NOTE:

*Some 17-inch brakes have shoe hold-down clips. Remove the clips to remove the shoes. Some 17-inch brakes have anchor pins. Remove the "C" washers and the strap from the anchor pins to remove the shoes.*

7. On brakes with guide plates, remove the capscrews and washers that fasten the guide plates to the brake assembly. Remove the guide plates. **Figure 39.**
8. Remove the brake shoes from the spider or backing plate.
9. Inspect the brake shoe and lining assemblies for broken linings, broken welds, worn contact areas between the brake shoe and the adjusting bolt, cracks, contamination and an out-of-alignment condition. Replace damaged or contaminated shoe and lining assemblies.

Figure 39



## Installing the Brake Shoes

### NOTE:

*If you install linings with grooves, be sure the grooves are clear of dirt, dust or other contamination. If necessary, use a screwdriver or other tool to clean the grooves.*

### NOTE:

*Some linings are fastened to the shoes with rivets. Some linings are fastened to the shoes with bolts and prevailing torque nuts. If you fasten linings with bolts, tighten the bolts according to Chart 4.*



Chart 4

Bolt Size	Torque
1/4-28 steel (150°)	9-10 lb-ft (12.2-13.6 N·m)
3/8-16 steel (150°)	25-30 lb-ft (33.9-40.7 N·m)

1. Install the adjusting pawl assembly in the plunger housing. Be sure that the teeth of the pawl engage the teeth of the actuator. Tighten the hollow capscrews that hold the pawl assembly in the housing to 15-25 lb-ft (20-34 N·m). See Section 8, SERVICING THE PLUNGERS AND THE HOUSINGS.



### NOTE:

*For the specified grease, see Section 3, LUBRICATION, FLUIDS AND PREVENTIVE MAINTENANCE.*

2. Apply grease to the following areas:

- The tops of the plungers
  - The inside of the guide plates
  - The base of the shoe where it contacts the plungers and the guide plates.
3. Install the shoes on the spider or backing plate.

### NOTE:

*If used, install the hold-down clips, or the strap and "C" washers on the anchor pins.*

4. If the brake has guide plates that you can remove, install the guide plates with the washers and capscrews. **Figure 39.**

### NOTE:

*Rockwell recommends that return springs be replaced when they are removed. If the springs are not replaced, be sure that the coils, body or ends of the spring are not damaged. Compare the spring with a new spring to be sure that the spring is not stretched or damaged. Replace damaged springs.*

5. Install the return springs on the brake shoes. On some 36-inch brakes you must use a special tool to install the return springs. **Figure 38.**
6. If necessary, install the hubs, drums and wheels using standard procedures.

# Servicing the Plungers and Housings

## section 8

### Removal and Disassembly of the Plungers

1. Remove the hub, drum, wheel and brake shoes. See REMOVING THE BRAKE SHOES in Section 7.
2. Remove the lockplates and plunger guides from the anchor (solid) plungers.
3. Carefully pry the seals out of the plunger housing and then remove the adjusting pawl assemblies, plungers, actuators and adjusting bolts from the housing.
4. Disassemble the plunger assemblies.
5. Inspect all of the parts of the plungers and housing before assembly. Inspect all parts for any signs of wear or damage. Replace any part that shows signs of wear or damage.

Inspect the seals for cuts and wear. Replace any damaged seals.

Inspect the threads in the plunger or actuator and on the adjusting bolt for wear and damage. The bolt must move freely in and out of the plunger or actuator. Clean the threads or replace the parts, if necessary.

Inspect the teeth on the pawl and the actuator. Replace the parts that are worn or damaged.

Inspect the slot in the plunger that touches the wedge assembly. Be sure the area is free of nicks, pits, scratches or corrosion. If damaged, replace the plunger.

Polish the bore of the plunger housing with crocus cloth. If the bore has nicks, scratches or corrosion, replace the plunger housing.

6. Clean the parts as described in Section 10, CLEANING AND CORROSION PROTECTION.

### Assembling the Plungers

#### CAUTION:

*First, install the seals on the plungers, then, install the plungers in the plunger housings. If you install the seals in the plunger housings first, the seals will be damaged when you try to install the plungers.*

#### Anchor (Solid) Plungers

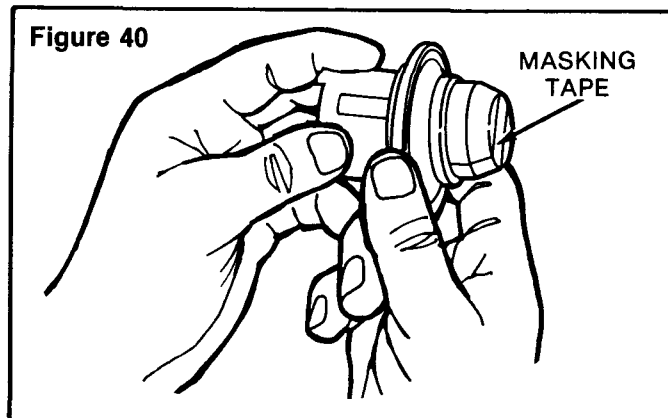
1. Apply a thin layer of grease to the inside surface of the seal.
2. To protect the seal, put masking tape over the slots for the web of the brake shoe. **Figure 40.**

#### NOTE:

*Some seals have two inner lips and some have one.*

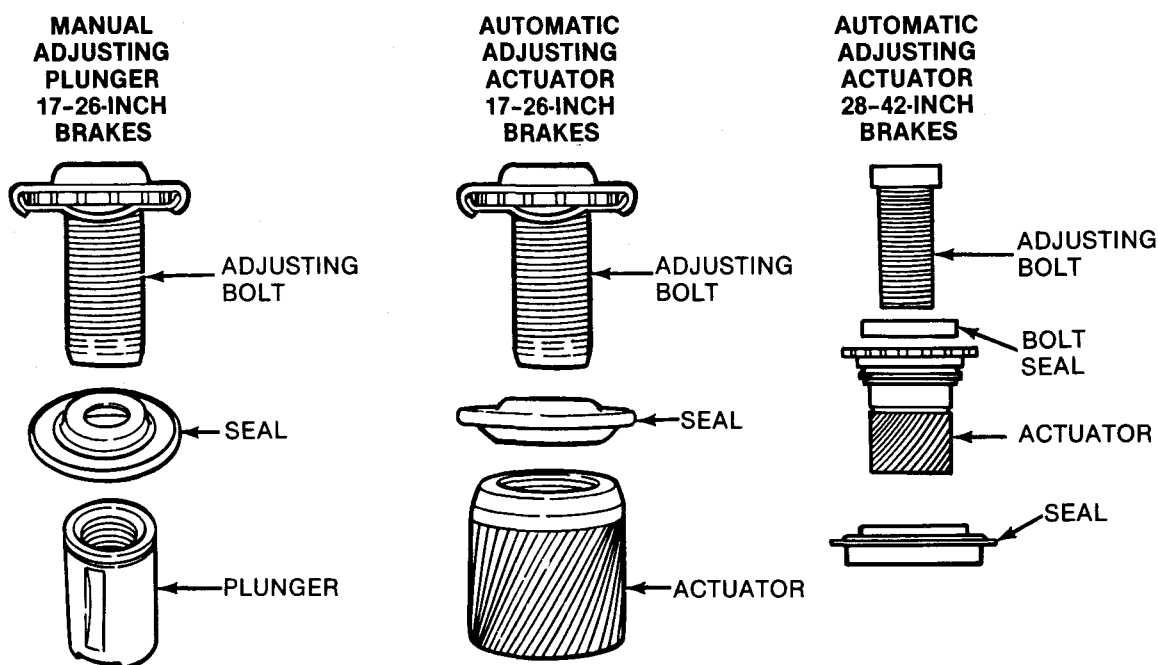
3. Carefully slide the seal over the nose of the plunger and push the inner lip(s) completely into the groove(s).
4. Remove the masking tape.

**Figure 40**



# section **8** **Servicing the Plungers and Housings**

**Figure 41**



## **Manual and Automatic Adjusting Plungers**

See Figure 41.

1. Apply a thin layer of grease to the following areas:

- Inside surface of the seal
- Threads inside the plunger or the actuator
- Threads on the adjusting bolt

2. Install the seal(s) as follows:

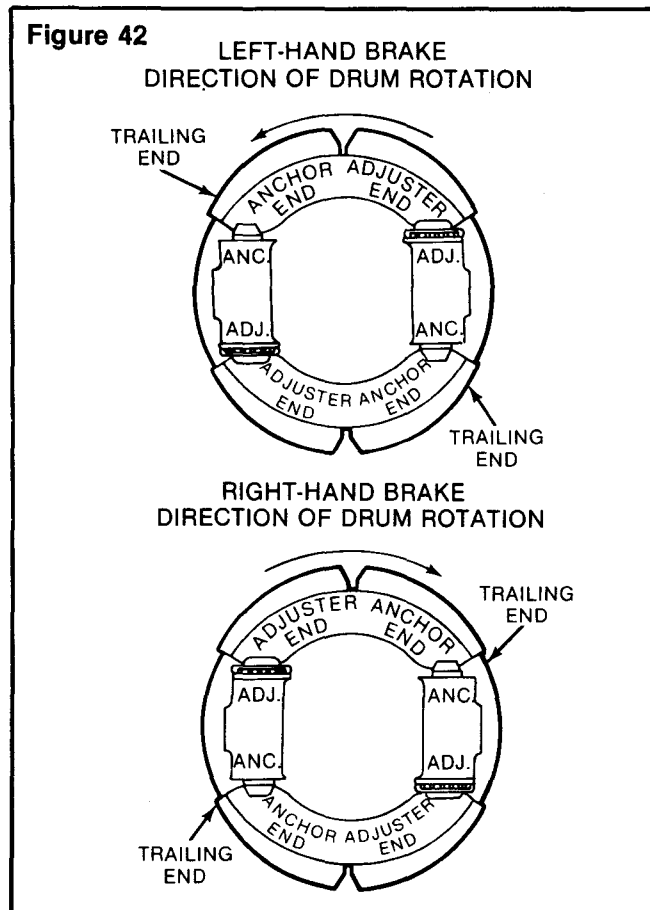
- Manual Plungers on 17-26-Inch Brakes: Carefully slide the seal over the open end of the plunger and push the inner lip completely into the groove.
- Automatic Plungers on 17-26-Inch Brakes: Carefully slide the seal over the threads of the adjusting bolt and into the groove in the bore. Be sure that the threads do not damage the seal.

- All Plungers on 28-42-Inch Brakes: Install the seal on the actuator from the end opposite the star wheel. Do not let the teeth on the actuator damage the seal. Push the inner lips of the seal completely into the grooves. Install the bolt seal in the groove in the inner diameter of the actuator.
3. Carefully put the bolt through the seal and turn the bolt into the plunger or actuator. Do not let the threads of the bolt damage the seal. Stop turning the bolt just before the head of the bolt touches the seal. **DO NOT** tighten the bolt against the seal or you will damage the seal. Be sure that the bolt turns freely in the plunger or actuator.

## Installing the Plungers

### ! CAUTION:

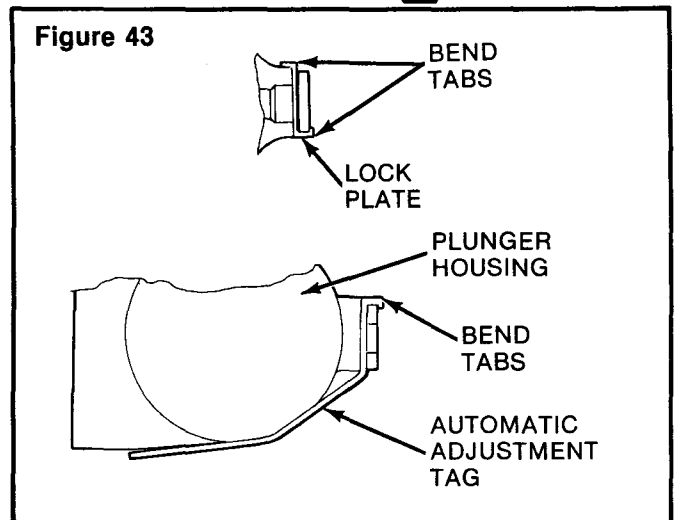
On double (RD) and triple (RT) brakes, the anchor (solid) plungers must be installed at the trailing end of each shoe. The trailing end of the shoe depends on the direction of drum rotation when the vehicle is traveling FORWARD. Figure 42. If you put the plungers in the wrong position, poor brake performance will occur.



### CAUTION:

Use a torque wrench to tighten the plunger guide. Do not use a power tool to tighten the plunger guide or the guide will be damaged.

3. Install the lockplate on the plunger guide and install the plunger guide in the housing. Tighten the plunger guide to a torque of 15–25 lb-ft (20–34 N·m). Bend the tabs of the lockplate to lock it in place. Figure 43. **T**



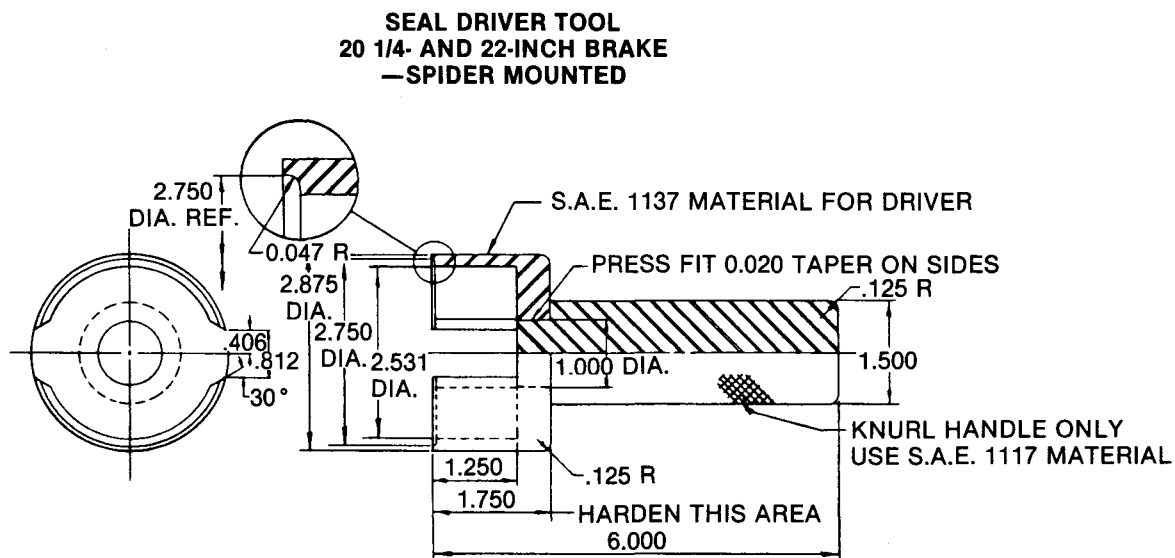
## All Anchor (Solid) Plungers and Manual Adjusting Plungers on 17-26-Inch Brakes

1. Apply a thin layer of grease to the plunger and its bore in the plunger housing. Fill the cavity between the seal and the plunger with grease. Fill the ramp in the plunger that touches the wedge assembly with grease. See AREAS TO BE LUBRICATED in Section 3.
2. Put the plunger assembly into the housing so that the slot in the plunger is aligned with the hole for the guide screw in the housing. Push the plunger to the bottom of its bore.

# section **8** **Servicing the Plungers and Housings**

4. Use the correct size driver to install the seal into the housing. See **Figures 44, 45 and 46** for dimensions on making seal driver tools. **Figure 47** shows a typical seal that is correctly installed.
5. Install other plungers as necessary. Install the brake shoes, hub, drum, and wheel. Adjust the brake. See Section 9, **ADJUSTING THE BRAKES**.

**Figure 44**



**Figure 45**

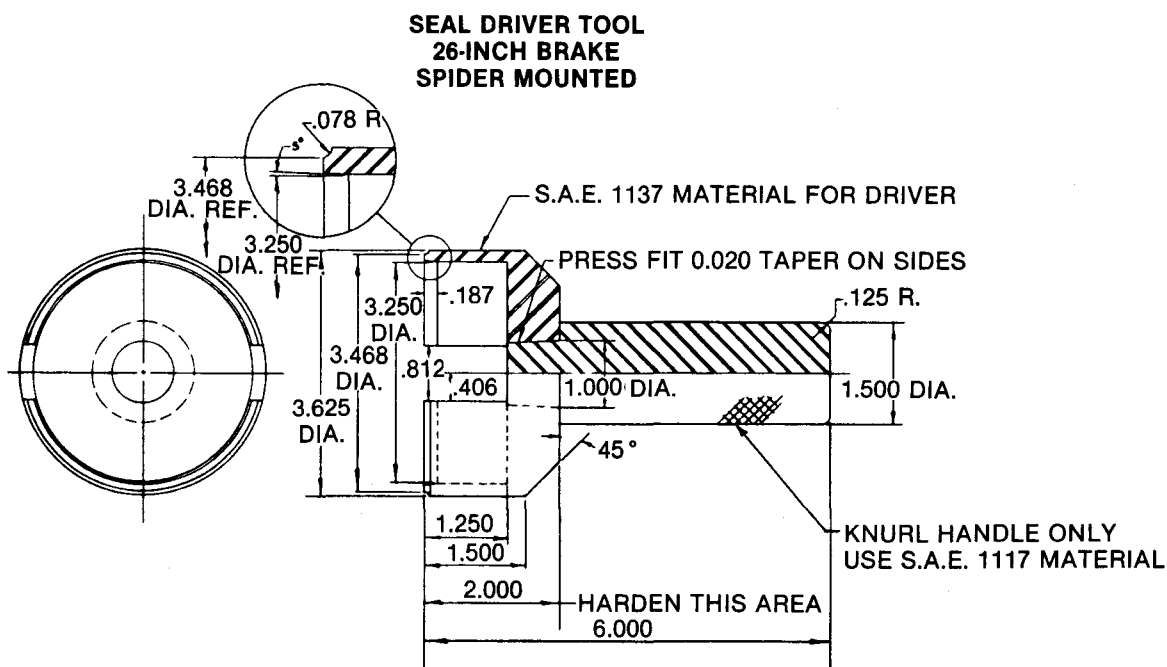


Figure 46

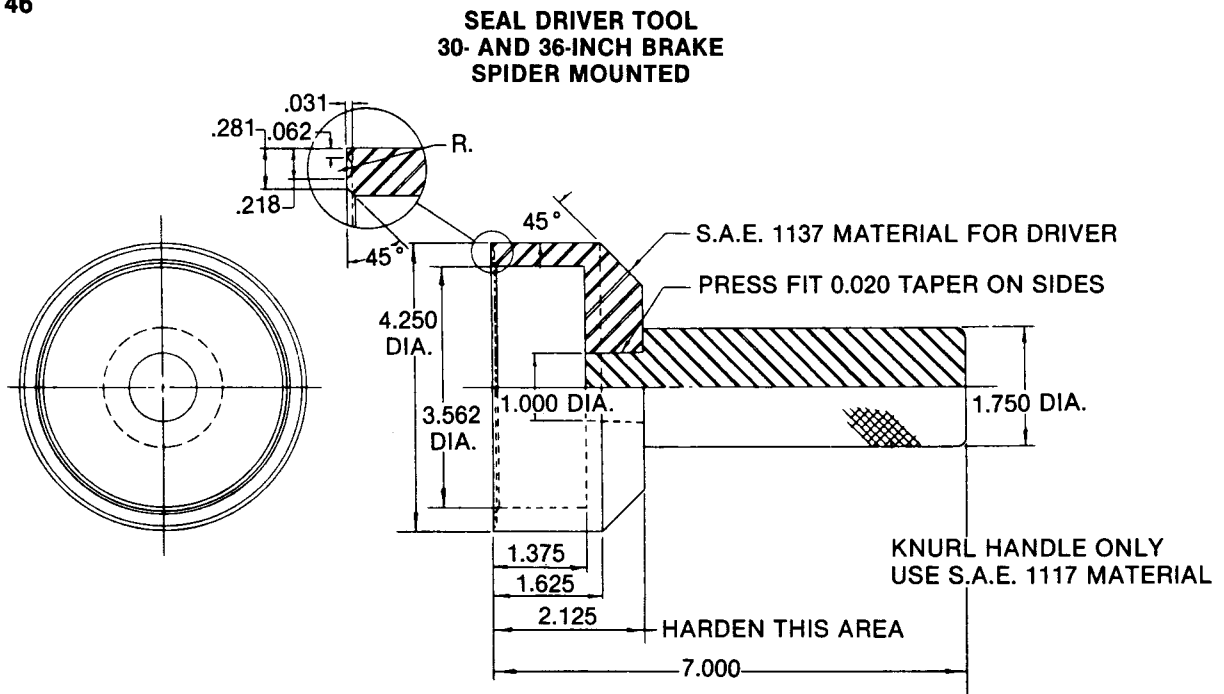
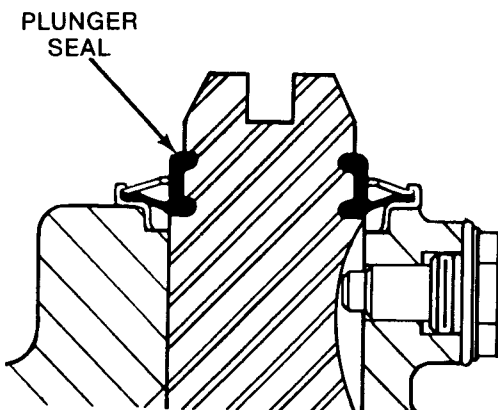


Figure 47



## Automatic Adjusting Plungers on 17-26-Inch Brakes and All Plungers on 28-42-Inch Brakes

1. Apply a thin layer of grease to the following areas:
  - Inside and outside of the plunger and on the ramp of the plunger
  - Inside of the plunger housing
  - The teeth of the actuator (adjusting sleeve)
  - The pawl and the bore for the pawl in the plunger housing

See AREAS TO BE LUBRICATED in Section 3.

2. Put the plunger into the housing so that the slot in the plunger is aligned with the hole for the adjusting pawl in the housing. Push the plunger to the bottom of its bore.
3. Assemble the adjusting pawl, spring, gasket, capscrew and automatic adjustment tag or lockplate (for manual adjustment).

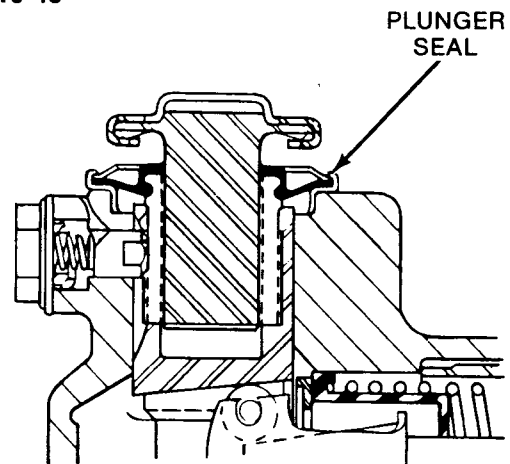


### CAUTION:

*The pawl must be installed correctly, so that its teeth engage the teeth on the actuator, or the automatic adjuster will not work correctly. Pawls with a 45° chamfer must be installed with the chamfer toward the head of the adjusting bolt. Pawls with a built-in key can only be installed in plunger housings that have holes with matching slots for the keys. Pawls with vertical teeth for manual adjusters must be installed with the teeth in the correct direction.*

4. Install the pawl assembly and tighten the capscrew by hand. Put your finger inside the plunger to be sure the pawl fits freely through the slot in the side of the plunger. Make sure the plunger can freely move up and down while the pawl extends through the slot. Then, loosen the capscrew until the teeth of the pawl are level with the inside diameter of the plunger and there is room to install the actuator.
5. Install the actuator, bolt and seal assembly into the plunger. Push the assembly to the bottom of the plunger.
6. Tighten the pawl capscrew to a torque of 15-25 lb-ft (20-34 N·m). Bend the tabs of the lockplate or identification tag to lock it in place. **T** **Figure 43.**
7. Use the correct size driver to install the seal into the housing. See **Figures 44, 45 and 46** for the dimensions for making seal driver tools. **Figure 48** shows a typical seal that is correctly installed.
8. Install other plungers as necessary. Install the brake shoes, hub, drum, and wheel. Adjust the brake. See Section 9, ADJUSTING THE BRAKES.

**Figure 48**





# Adjusting the Brakes

## section

# 9

You must adjust any brake, including brakes with automatic adjustment, after you do any of the following:

- Reline the brake
- Service a plunger assembly
- Retract the plungers to remove the drum, or for any other reason

There are two types of adjustment systems, manual and automatic. There are four different designs of adjustment systems used on the different brake models, but all the designs do the same function. The difference between the designs is in the adjusting bolt and detent. Each design can be automatic or manual, but different components are used in the automatic and manual systems of the same design.

An automatic adjustment system will adjust the brake automatically after you set the clearance for the first time. A brake with manual adjustment must be checked and adjusted regularly.



### CAUTION:

***A brake with automatic adjustment may not adjust correctly and stop the vehicle safely unless you first set the clearance to the correct amount. Never put a vehicle into service unless you have adjusted the brakes.***

To correctly adjust the brakes you must set the clearance between linings and the drum. Use the following procedures to check and adjust brakes with either manual or automatic adjustment.

1. Put blocks in front of and behind the wheels of the vehicle. This prevents the vehicle from rolling when the parking/emergency brakes are released.



### WARNING:

***Carefully follow the service instructions supplied by the manufacturer of the spring brake when you work on this component in Step 2. The spring brake can activate and cause injury.***

2. If the brake has a spring brake, compress and lock the spring so that the brake is completely released. Be sure there is no air pressure in the service half of the air chamber. Be sure there is no air pressure in the service half of the air chamber. See Page 29 for instructions on how to compress and lock Rockwell spring brakes. For other spring brakes, see the procedure recommended by the manufacturer of the spring brakes to compress and lock the spring brakes.



### WARNING:

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

3. If possible, raise the wheel off the ground. Support the vehicle with safety stands.
4. Use a feeler gauge to check the clearance between the CENTER of the linings and the drum. The clearance must be 0.020–0.040 inch (0.5–1.0 mm). DO NOT check the clearance at the ends of the linings.
5. Remove the covers from the adjusting slots in the dust shield (if used) or remove the complete dust shield.

# Adjusting the Brakes

## CAUTION:

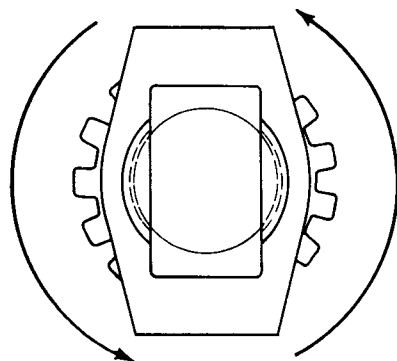
Do not damage the seals when you adjust the brake. If you damage the seals, replace the damaged seal with a new one.

6. Work on one brake shoe at a time. Use an adjusting spoon or a screwdriver to turn the star wheel on the adjuster in the direction shown in **Figures 49 and 50** to move the linings against the drum. Turn the adjuster until you feel a heavy drag on the drum when you rotate the wheel.

## NOTE:

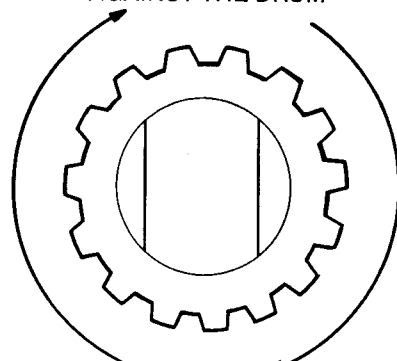
If you cannot raise the wheel from the ground, or cannot turn the wheel, turn the adjuster until the linings are against the drum. **DO NOT** force the adjuster after the linings touch the drums.

**Figure 49** 17-26-INCH BRAKES —  
TURN STAR WHEEL IN THIS  
DIRECTION TO MOVE LININGS  
AGAINST THE DRUM



TOP VIEW OF STAR WHEEL

**Figure 50** 28-42-INCH BRAKES —  
TURN STAR WHEEL IN THIS  
DIRECTION TO MOVE LININGS  
AGAINST THE DRUM



TOP VIEW OF STAR WHEEL

## CAUTION:

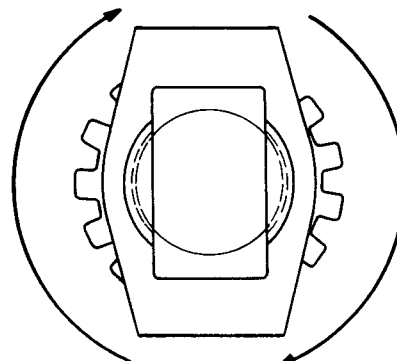
If you are working on a 28-42-inch brake, remove the pawl before you do Step 7. If you do not remove the pawl, you will damage the teeth when you turn the star wheel.

7. Turn the star wheel in the direction shown in **Figures 51 and 52** until you feel a very light drag on the drum when you turn the wheel. Turning the star wheel in this direction moves the linings away from the drum.

## NOTE:

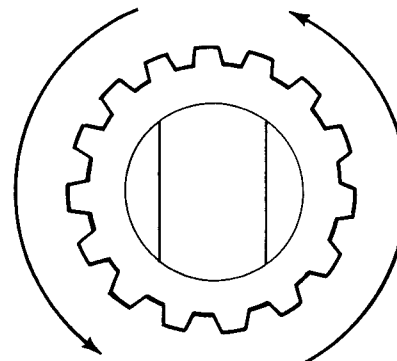
If you cannot turn the wheel, turn the star wheel eight notches in the opposite direction or eight clicks of the detent.

**Figure 51** 17-26-INCH BRAKES —  
TURN STAR WHEEL IN THIS  
DIRECTION TO MOVE LININGS  
AWAY FROM DRUM



TOP VIEW OF STAR WHEEL


**Figure 52** 28-42-INCH BRAKES —  
TURN STAR WHEEL IN THIS  
DIRECTION TO MOVE LININGS  
AWAY FROM DRUM



TOP VIEW OF STAR WHEEL

# Adjusting the Brakes

## section 9

8. Use a feeler gauge to check the clearance between the CENTER of the lining and the drum. The clearance must be 0.020–0.040 inch (0.5–1.0 mm). Continue to adjust the clearance until correct.
9. When the clearance is correct, install the pawl assembly. Tighten the capscrew to a torque of 15–25 lb-ft (20–34 N·m). Be sure that the teeth of the pawl engage the teeth of the actuator. 
10. Repeat the above procedures for each brake shoe on the brake.
11. Install the dust shield or install the covers for the adjustment slots in the dust shield.

# Cleaning and Corrosion Protection

## Cleaning

Clean all parts of the brake after disassembly. Follow the procedures below.



### **WARNING:**

*Solvent cleaners can be flammable, poisonous, and cause burns. Examples of solvent cleaners are emulsion cleaners, carbon tetrachloride, or petroleum cleaners.*

- *Wear eye protection.*
- *Wear clothing that protects your skin.*
- *Be sure there is enough ventilation.*
- *Do not use gasoline or solvents that contain gasoline.*
- *Follow the instructions of the manufacturer for safe use of the solvent.*



### **WARNING:**

*Be careful when using hot solution tanks and alkaline solutions. To prevent injury, follow the instructions supplied by the manufacturer.*

## Metal Parts With Polished Surfaces



### **CAUTION:**

*Do not clean ground or polished parts in a hot solution tank. Do not use water and alkaline solutions. Hot solution tanks, water, and alkaline solutions will damage ground or polished surfaces.*

Use solvent cleaners to clean all metal parts that have ground or polished surfaces. Examples of parts that have ground or polished surfaces are the rollers, the wedge, and the inner bores of the plunger housings.

## Metal Parts With Rough Surfaces

Metal parts with rough surfaces can be cleaned with solvent cleaners or with alkaline solutions.

## Parts Not Made of Metal



### **CAUTION:**

*Do not use solvent cleaners on parts that are not made of metal. Solvent cleaners will damage parts that are not made of metal.*

Use soap and water to clean parts that are not made of metal.

Use the specified hydraulic fluid that is used in the system to clean the O-rings and the seals. If you use the wrong fluid, the rubber parts will be damaged.

Completely dry all parts immediately after you clean them. Use soft, clean paper or cloth to dry the parts. Make sure the paper or cloth does not contain any dirt, grease, oil, or abrasives.

## Corrosion Protection

If you assemble parts immediately after you clean them, lubricate the parts with grease to prevent corrosion. Make sure you clean, dry, and inspect all parts before you lubricate them.

If you store any parts after you clean them, apply a material that prevents corrosion to the parts. Store the parts in special paper or other material that prevents corrosion.

# Removing the Air from the Brake System

## section 11

After any component in the hydraulic brake system is serviced, the air must be removed from the brake system (bleeding the brakes). Follow the procedure recommended by the manufacturer of the vehicle.

The air must first be removed from the hydrovac, master cylinder, or power cluster. Then remove air from the brake that is the greatest distance from the hydrovac, master cylinder, or power cluster. Continue removing air from the brake system in a sequence so that the brake that is closest to the hydrovac, master cylinder, or power cluster is the last brake from which air is removed.

The following information must be used when air is removed from a hydraulic brake system.

- Use only the specified fluid recommended by the manufacturer of the vehicle. The use of the wrong fluid damages components in the brake system.
- Do not use fluid that has been removed from the brake system.
- Make sure the bleeder screws are at the highest possible position. If the bleeder screws are below the level of the fluid, air cannot be removed from the brake system.
- If pressure equipment is used to remove air from air over hydraulic brake systems, do not apply more than 20 psi (137 kPa) to the system.