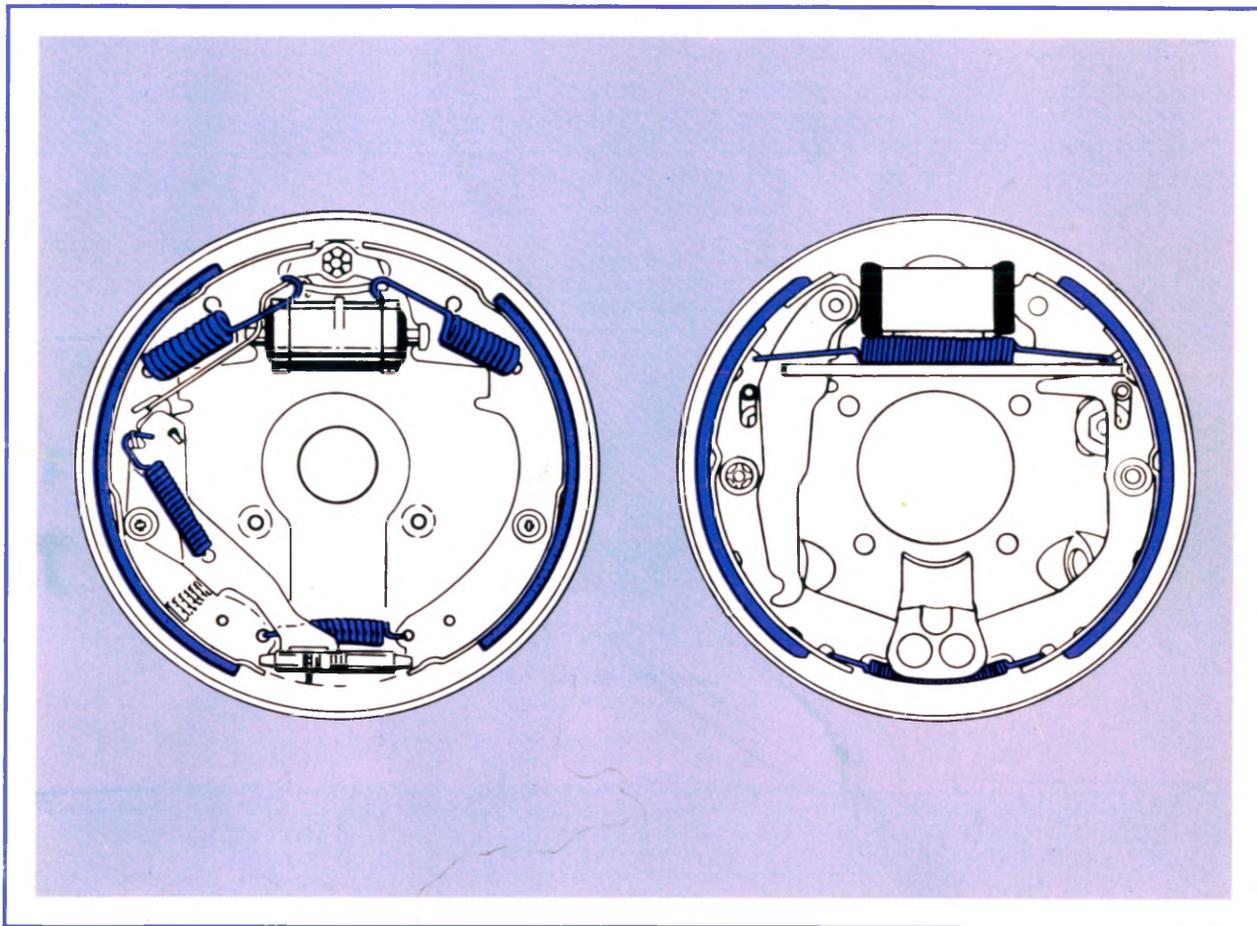


# JERRY CHAMBLESS

## DRUM BRAKES



Product  
Service  
Training

15001.00-2

# Drum Brakes

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## Foreword

This booklet is supplied by GM Product Service Training to GM dealer service personnel upon their completion of the subject course conducted at GM Training Centers.

While this booklet will serve as an excellent review of the extensive program presented in the training center session, it is not intended to substitute for the various service manuals normally used on the job. The range of specifications and variation in procedures between carlines and models requires that the division service publications be referred to, as necessary, when performing these operations.

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*Ferry R. Chamberlain 10-23-91*

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# SECTION I

## INTRODUCTION AND DESCRIPTION

### 1-1. INTRODUCTION

1-2. This manual provides descriptive information and service procedures for drum brake assemblies used on GM passenger cars and light trucks. It covers applications from 1969 up through the publication date of the manual.

1-3. The manual is divided into 7 sections. This section (Section I) contains descriptive information which will be helpful in classifying drum brakes and interpreting the troubleshooting data presented in Section II. Sections III and IV provide on-vehicle service instructions for the two basic types of drum brakes. Section III covers on-vehicle service for the Duo-Servo Drum Brake. Section IV provides on-vehicle service information for the Leading-Trailing Shoe Drum Brake. Section V covers unit repair, which is basically wheel cylinder overhaul. Completing the manual, Section VI covers Bleeding and Section VII gives information on servicing brake drums.

### 1-4. DESCRIPTION AND OPERATION

1-5. **DUO-SERVO DRUM BRAKE.** The most commonly used hydraulically operated internal shoe brakes are self-energized. The force which the wheel cylinder applies to the shoes is supplemented by the tendency of the shoes to wrap into the drum during braking. The name of the duo-servo brake is derived from the fact that the self-energizing force is transferred from one shoe to the other with the wheel rotating in either direction. Both the primary (front) and secondary (rear) brake shoes are actuated by a double piston wheel cylinder (see figure 1-1). The upper end of each shoe is held against a single anchor by a coil return spring. An adjusting screw assembly and spring connect the lower ends of the shoes.

1-6. The wheel cylinder is mounted on the backing plate at the top of the brake. When the brakes are applied, hydraulic pressure behind the wheel cylinder cups forces both pistons outward causing the brakes to be applied. Some wheel cylinders have extensions on the pistons that contact the brake shoes, while others have separate links (see figure 1-2).

1-7. When both brake shoes are moved out by the wheel cylinder to contact the rotating drum, in either direction of rotation, the frictional forces between the linings and drum tend to drag the shoes along and turn them outward around their pivot points (see figure 1-3). In the forward direction, the primary shoe

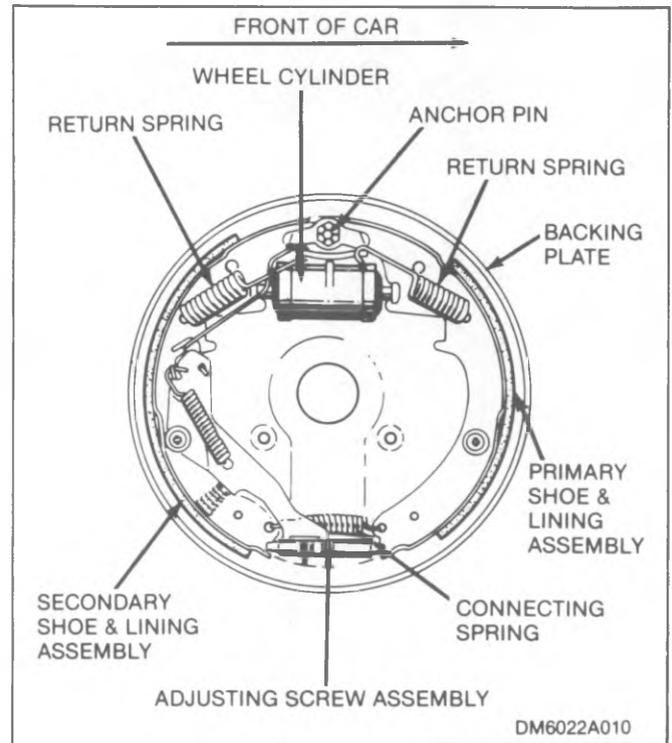


Figure 1-1. Duo-Servo Brake

pivots around the adjusting screw. The drum prevents the outward movement and the shoe is wedged into the drum with a force greater than that supplied by the wheel cylinder. The forces from the primary shoe are transferred through the adjusting screw to the secondary shoe. The frictional forces between the drum and secondary shoe quickly overcome the wheel cylinder forces and return the secondary shoe to the anchor pin. The drum again prevents outward movement and wedges the secondary shoe similar to the primary shoe. It cannot transfer any forces and therefore does most of the braking in the forward direction. The secondary brake lining is usually thicker and has more surface area than the primary brake lining.

1-8. **DUO-SERVO SELF-ADJUSTING BRAKES.** All duo-servo brakes covered in this manual are self-adjusting. Delco Moraine duo-servo self-adjusting brakes use a system of links and levers to actuate the adjusting screw assembly automatically to compensate for lining wear. There are two basic types of Delco Moraine adjusters. Both operate when the brakes are used with the vehicle traveling in reverse. One operates when the brakes are applied; the other when the brakes are released. Operation for each type is as follows:

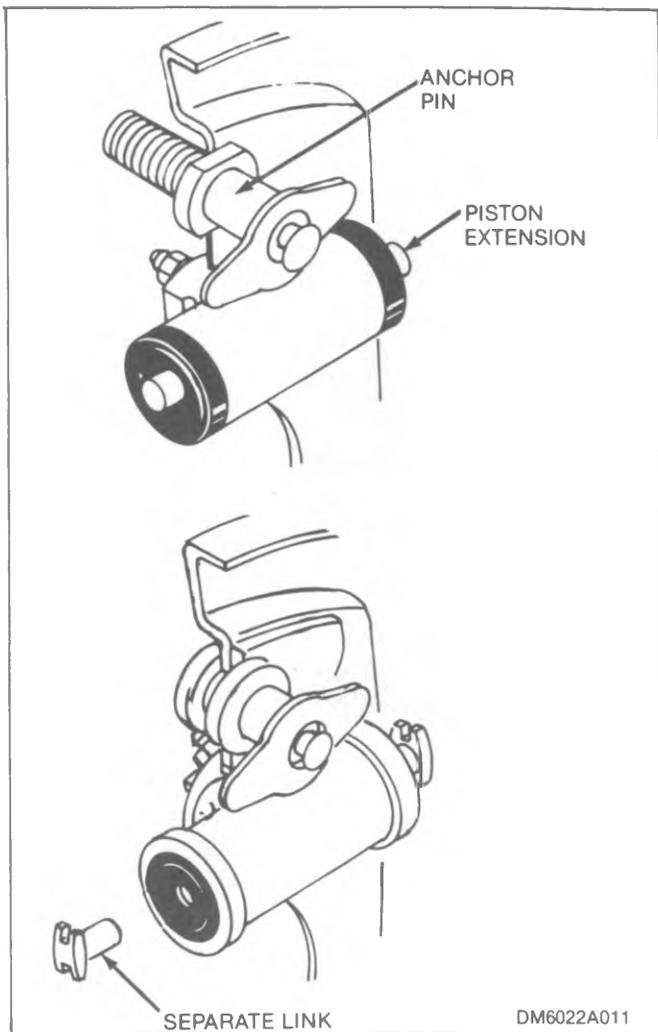


Figure 1-2. Wheel Cylinders

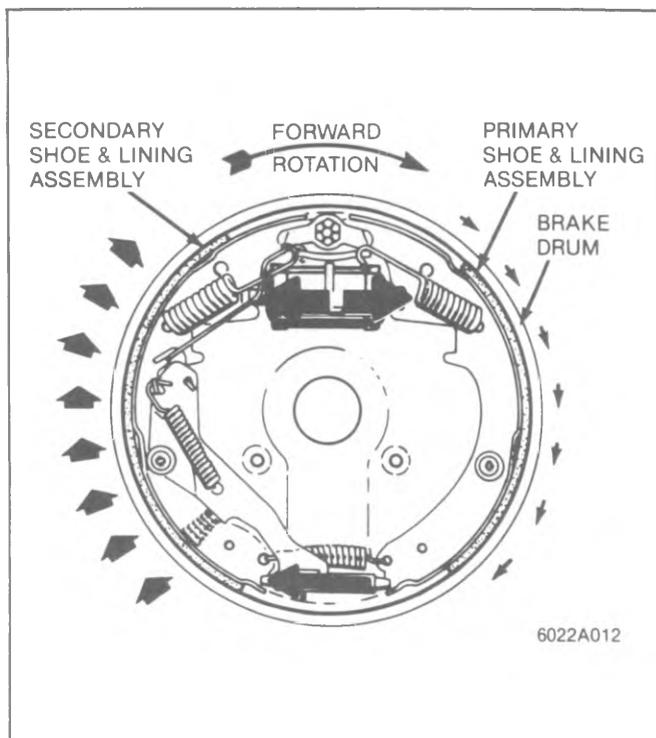


Figure 1-3. Duo-Servo Brake Forces

1-9. Apply Actuated Adjuster. Sequence of operation for this type of adjuster is shown in figure 1-4. When the brakes are applied with the vehicle traveling in reverse, the secondary shoe is forced away from the anchor. If the brakes require adjustment this movement will be great enough to cause the actuator lever and pawl to pivot downward at the bottom and turn the star wheel on the adjusting screw. When the brakes are released, the lever and pawl return to their original positions and re-cock by dropping into the next notch in the star wheel. Note that the pawl operates above the adjusting screw centerline. The pawl is pivoted on the lever under spring load to prevent overloading during hard braking.

1-10. Release Actuated Adjuster. Figure 1-5 shows the sequence of operation for this type adjuster. Note that the actuator lever operates below the adjusting screw centerline. When the brakes are applied with the vehicle traveling in reverse, the secondary shoe moves away from the anchor. If the brakes require adjustment, this movement will be great enough to cause the actuator lever to pivot downward at the bottom and cock by dropping into the next notch in the adjusting screw star wheel. When the brakes are released, the lever return spring forces the lever back to its original position, at the same time turning the star wheel and adjusting the brakes. Since actuation occurs by spring action a separate overload mechanism is not required.

1-11. LEADING-TRAILING SHOE DRUM BRAKE. The leading-trailing shoe drum brakes covered in this manual are identified in the application listing (see paragraph 1-23).

1-12. With the leading-trailing shoe brake, both shoes are held against a fixed anchor at the bottom by a shoe retaining spring (see figures 1-6, 1-8, 1-9, 1-11, 1-12 or 1-13 as applicable).

1-13. During forward brake application, the forward (leading) shoe friction forces are developed by the wheel cylinder forcing the lining into contact with the rotating brake drum. The shoe friction forces work against the anchor abutment at the bottom of the shoe. The rear (trailing) shoe is also actuated by the wheel cylinder, but can only support a friction force equal to the wheel cylinder piston force. No friction force is transmitted to the shoe anchor from the trailing shoe. The leading shoe in this example is energized and does most of the braking in comparison to the non-energized trailing shoe. During reverse braking, the function of the leading and trailing brake shoes is switched.

1-14. On the 1976-79 Chevette type (figure 1-6), brake adjustment is automatic. Adjustment occurs, if needed, whenever the brakes are applied, whether during a forward or reverse stop or while motionless. Upon any brake application, the shoes move outward to contact the drum. As the shoes move outward, the automatic adjuster pins, which are inserted in a slot

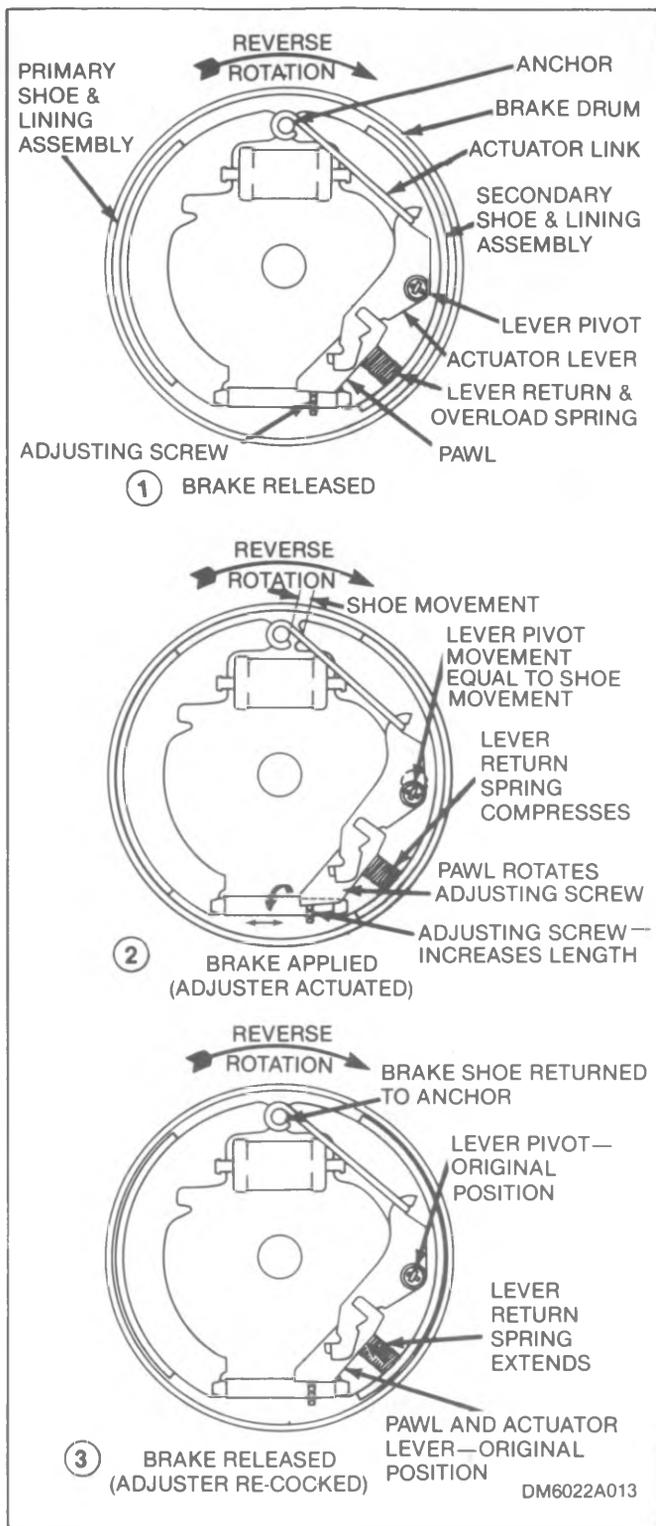


Figure 1-4. Apply Actuated Adjuster Sequence

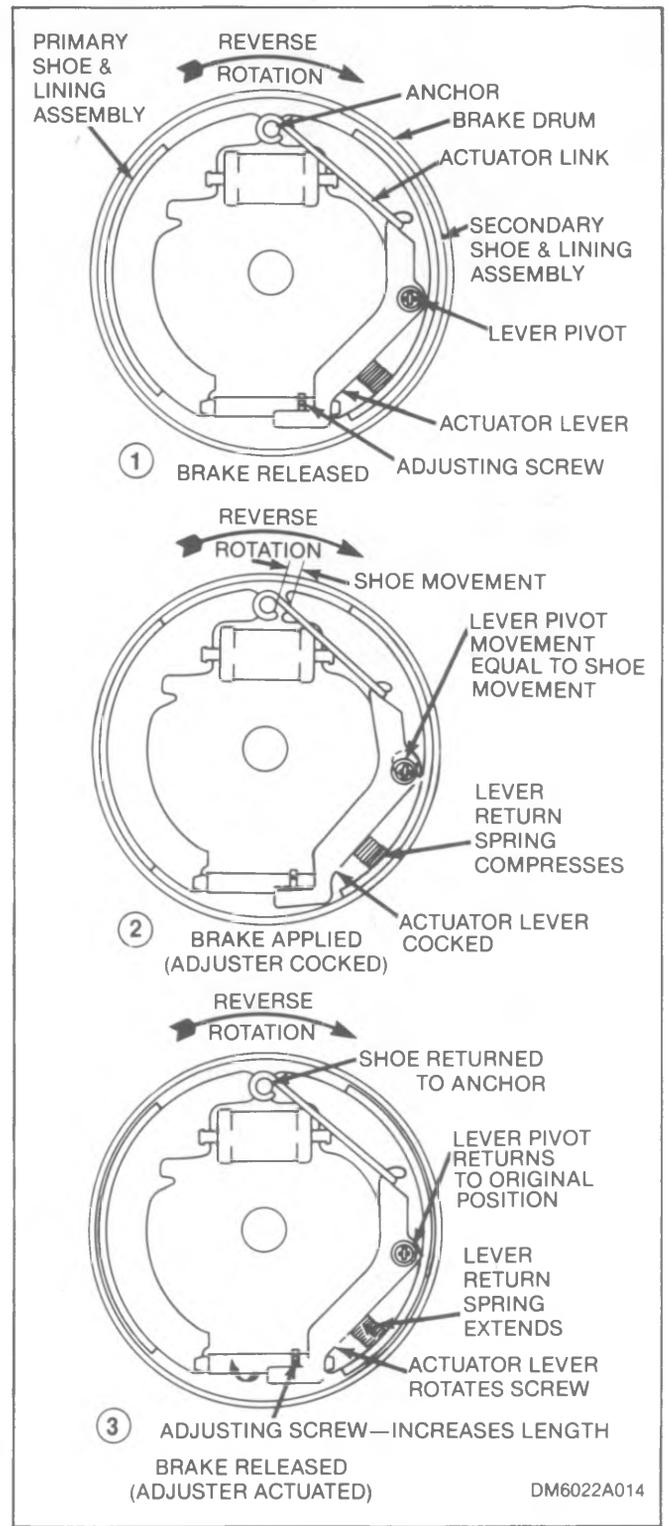


Figure 1-5. Release Actuation Adjuster Sequence

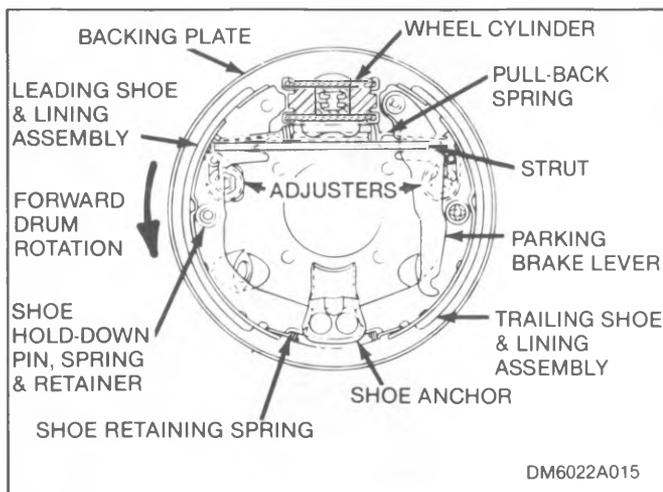


Figure 1-6. 1976-79 Chevette Type Leading-Trailing Shoe Drum Brake

in each shoe, follow the shoe movement (see figure 1-7). The automatic adjuster pin is smaller than the slot in the brake shoe; therefore, when the brakes are released, the shoes are allowed to return slightly, providing brake shoe to drum running clearance. The automatic adjuster pins rotate to adjust by overcoming friction at the adjuster pivot.

1-15. The 1975 and prior Vega, Monza, Astre, Sunbird, Skyhawk and Starfire type (figure 1-8) has a special parking brake rod and strut assembly that provides for brake adjustment only when the parking brake is applied. The strut portion of the assembly fits between the parking brake lever and the front shoe web. The rod engages a hole in the rear shoe web. When the parking brake is applied, the strut is pressed against the leading shoe and the rod is pulled against the trailing shoe. As the shoes spread, a spring lock in the rod and strut assembly allows the assembly to lengthen. Since the diameter of the end of the rod that fits in the trailing shoe is smaller than the diameter of the hole in the shoe web, running clearance is provided when the parking brake is released.

1-16. The 1985-86 Sprint type leading-trailing shoe drum brake (figure 1-9) uses the parking brake strut assembly to provide automatic adjustment of the brake shoes. The strut assembly consists of the strut and an adjuster lever with mating ratcheted surfaces held in contact by the adjuster spring (see figure 1-10). The adjuster lever fits through a slot in the leading shoe web. When the brakes are applied the leading shoe moves out to contact the brake drum. If lining wear is such that the shoe travel exceeds the gap between the shoe web slot and the adjuster lever, the lever will be forced to advance one ratchet notch. When the brakes are released the brake shoe can retract only the distance permitted by the gap between the shoe web slot and the adjuster lever.

1-17. On the 1985-86 Spectrum type leading trailing shoe drum brake (figure 1-11) the parking brake strut also serves as an adjusting screw, and thus is termed

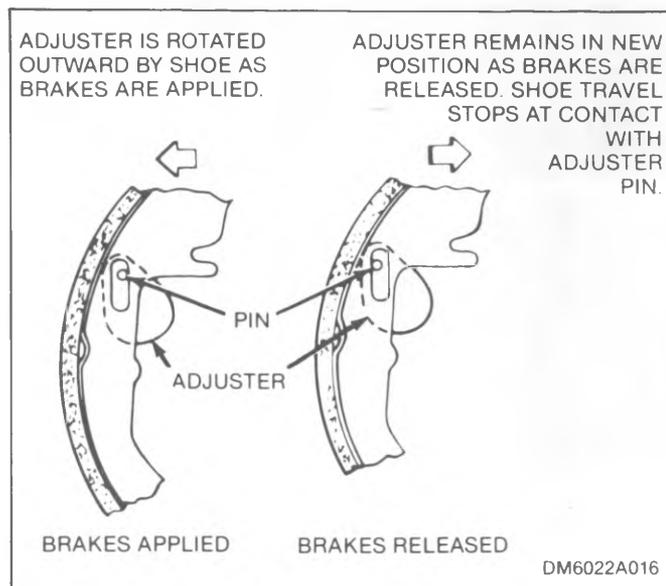


Figure 1-7. 1976-79 Chevette Adjustment

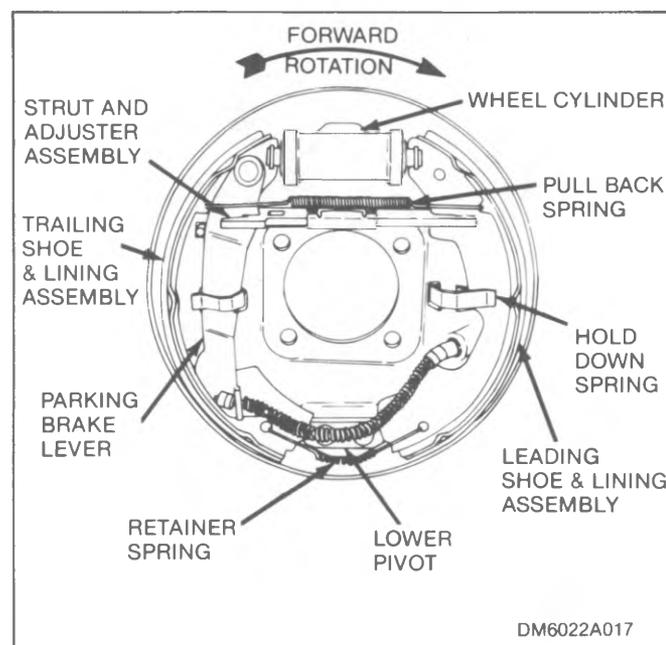


Figure 1-8. 1975 and Prior Vega, Monza, Astre, Sunbird, Skyhawk and Starfire Type Leading-Trailing Shoe Drum Brake

the auto adjuster. The auto adjuster lever is installed on the trailing shoe and retained by the auto adjuster spring, which also serves as the upper return spring. When the brakes are applied the trailing shoe moves out to contact the brake drum. If lining wear is such that the shoe travel is great enough, the auto adjuster lever will turn the star wheel on the auto adjuster, lengthening the auto adjuster.

1-18. On the 1985-86 Nova type leading-trailing shoe drum brake (see figure 1-12) the parking brake strut serves as an adjusting screw. The adjusting lever is behind and installed on the same pivot with the parking brake lever. When the parking brake is applied the parking brake lever pulls the bottom arm of the

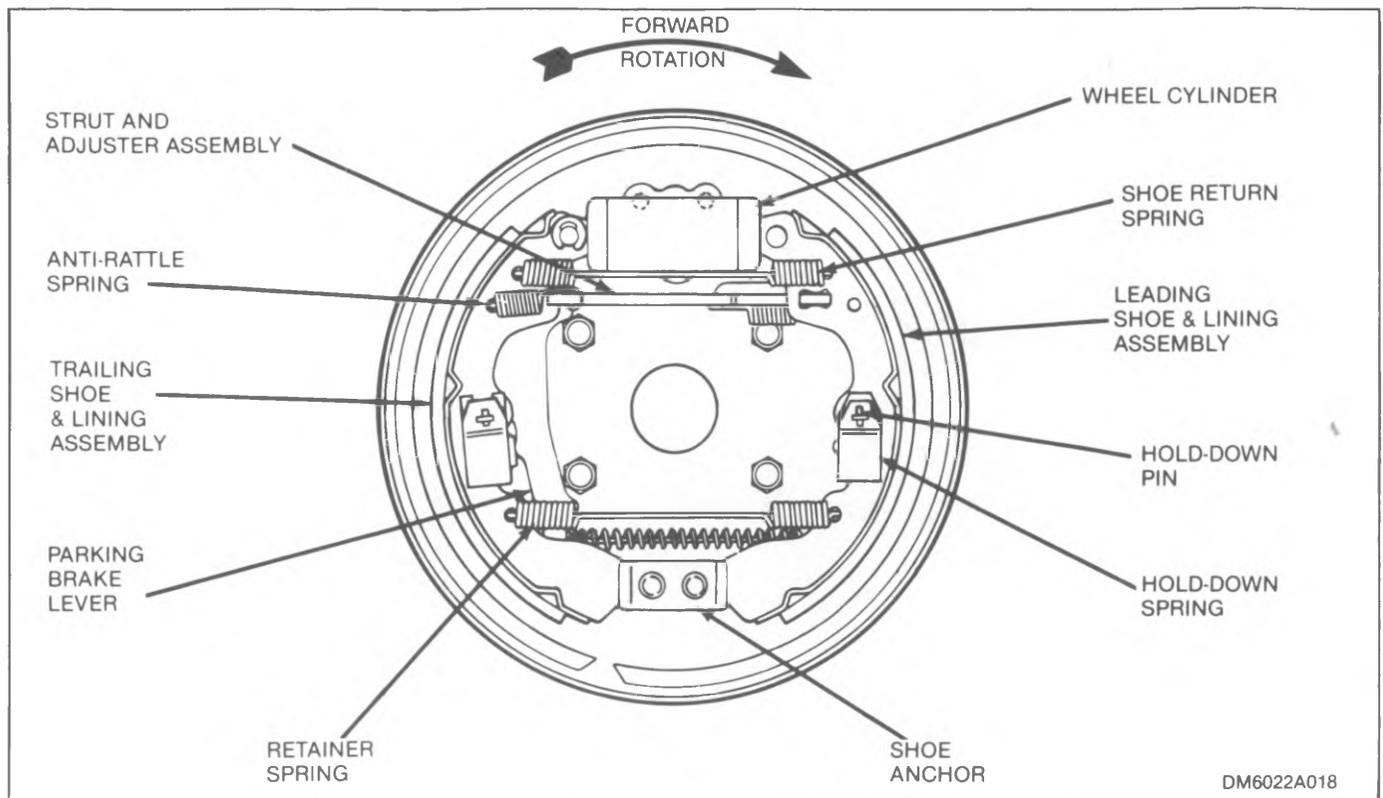


Figure 1-9. 1985-86 Sprint Type Leading-Trailing Shoe Drum Brake

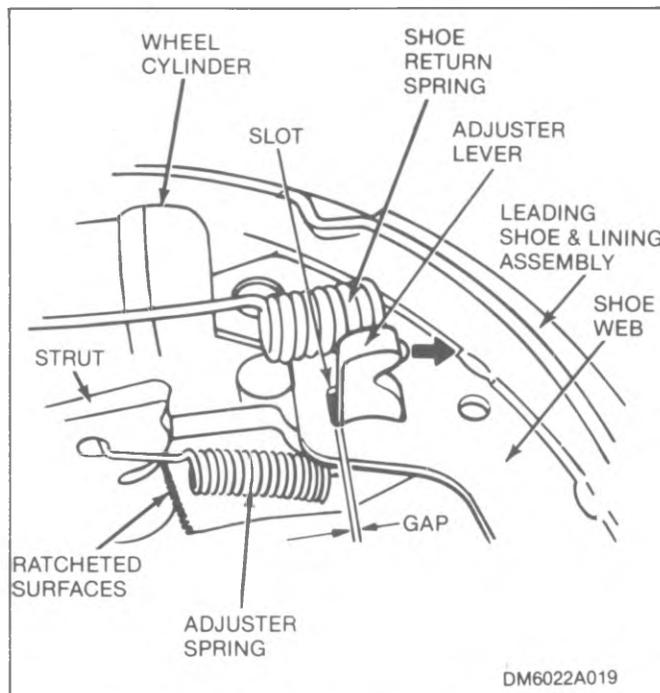


Figure 1-10. 1985-86 Sprint Type Adjuster

adjusting lever in toward the center of the brake and raises the top arm of the adjusting lever. If the travel is great enough, the upper arm of the adjusting lever will drop into the next tooth of the star wheel on the strut. When the parking brake is released, the adjusting lever spring pulls the bottom arm of the ad-

justing lever outward and the top arm downward, turning the star wheel on the strut, expanding the strut.

1-19. 1986 LeSabre, Delta 88 and Bonneville type leading-trailing shoe drum brake (see figure 1-13) uses an automatic adjusting screw assembly instead of a one-piece strut. The adjusting screw assembly is made up of an adjuster socket, screw, nut and a spring clip. When the brakes are applied, the shoe and linings move outward. This also moves the pivot point of the adjuster actuator. Since the top of the adjuster actuator rests on a notch of the adjuster nut, outward shoe movement allows the actuator spring to pull the adjuster actuator downward, turning the adjusting nut and lengthening the adjusting screw assembly. When the brakes are released this process is reversed and, if shoe travel has been sufficient to warrant adjustment, the adjuster actuator will drop into the next tooth on the adjuster nut.

1-20. The function of the spring clip is to prevent the brake from over adjusting during hot braking conditions. During repeated hard brake applies, the high temperatures will tend to expand the brake drums. This condition may result in greater travel of the shoe and lining assemblies which could cause over-adjustment by the self-adjusting mechanism. To prevent this condition, the spring clip expands when heated, taking up the additional travel and preventing the adjusting screw from over adjusting. When the brakes cool, the spring clip contracts bringing the brakes back into proper adjustment.

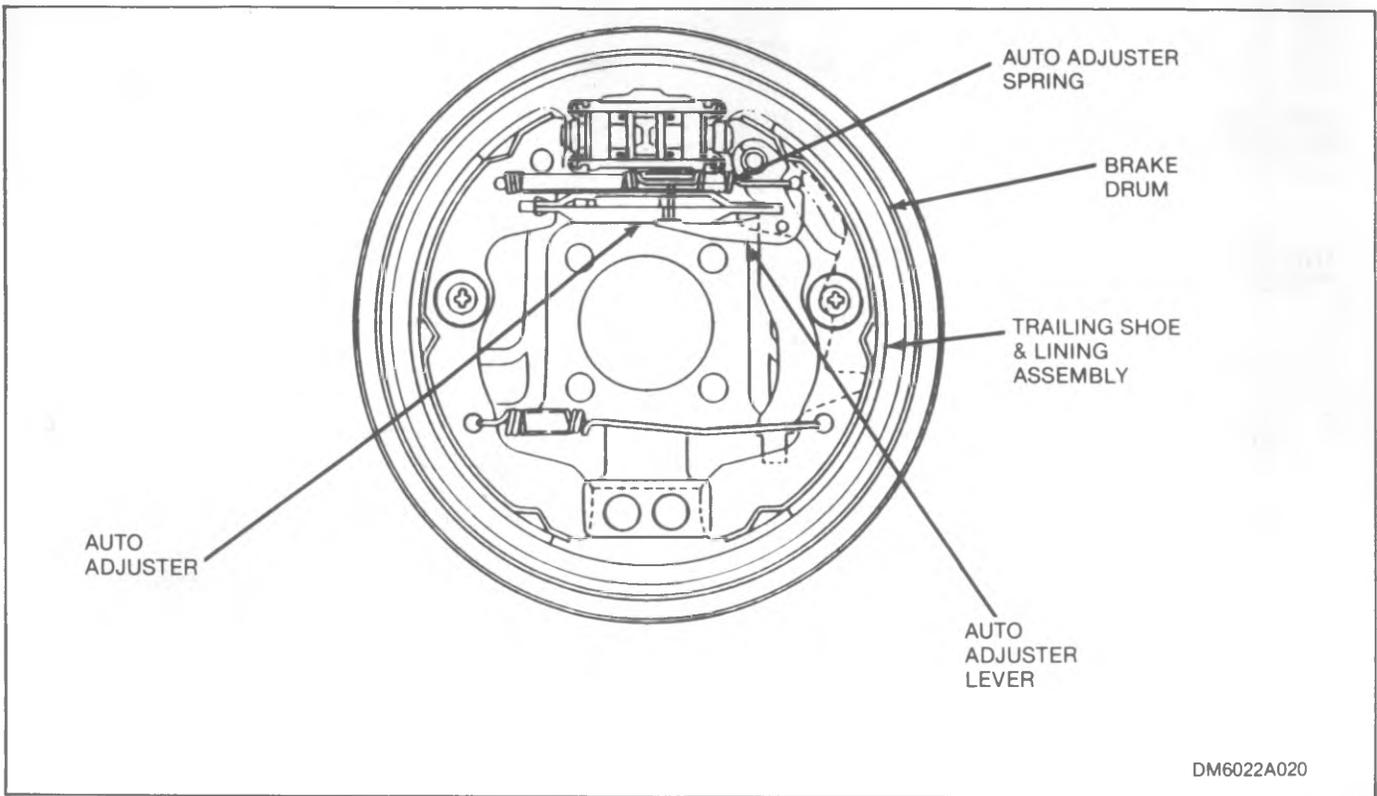


Figure 1-11. 1985-86 Spectrum Type Drum Brake

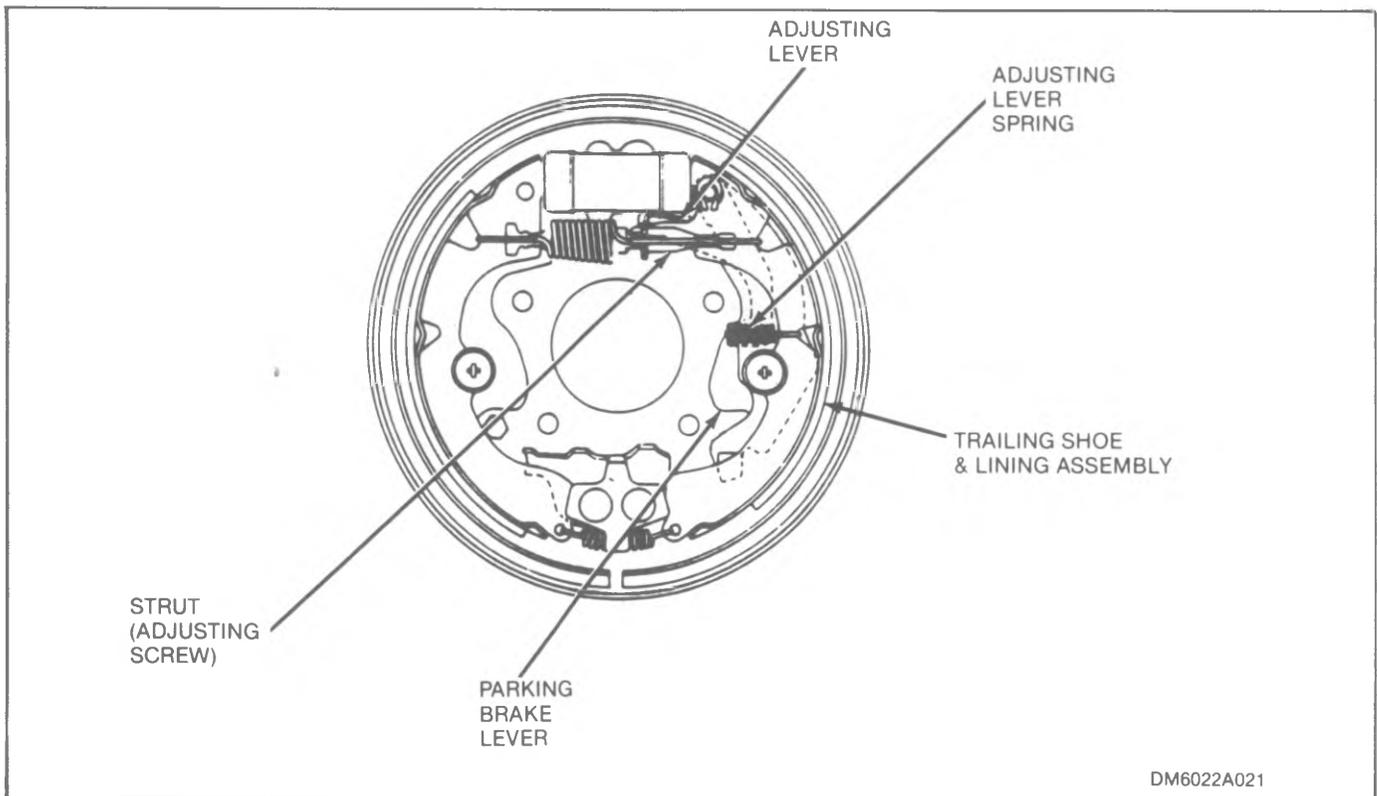


Figure 1-12. 1985-86 Nova Type Drum Brake

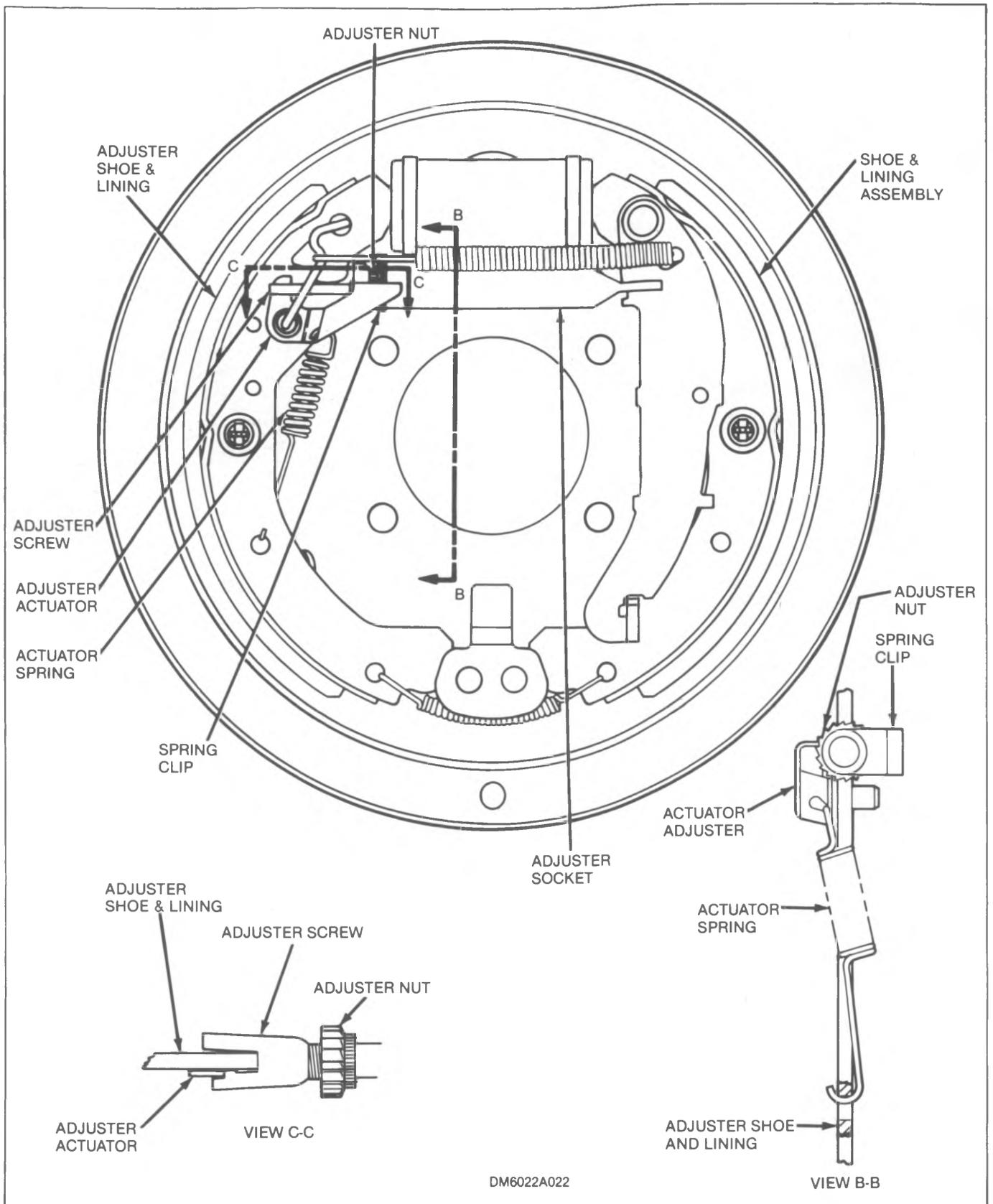


Figure 1-13. 1986 LeSabre, Delta 88 and Bonneville Drum Brake

1-21. REAR PARKING BRAKES. The rear drum brake (on vehicles so equipped) also serves as the parking brake. The parking brake cable is connected to the bottom of the parking brake lever. The lever operates between one brake shoe and the parking brake strut, which engages the other shoe, so that when the parking brake is applied both shoes are forced outward against the drum. On all vehicles with duo-servo brakes, except certain 1977 and later models, the parking brake lever is attached to the secondary brake shoe (see figure 1-14). Because the parking brake cable enters the right-rear drum brake

from the rear on some 1977 and later vehicles with duo-servo brakes, the parking brake lever is attached to the primary brake shoe (see figure 1-15).

1-22. On most of the leading-trailing shoe drum brake models in this manual, the parking brake lever is attached to the trailing shoe. The exceptions are the 1986 LeSabre, Delta 88 and Bonneville at the right-rear wheel only. Here, the rear entry parking brake cable is used and the parking brake lever is attached to the leading shoe.

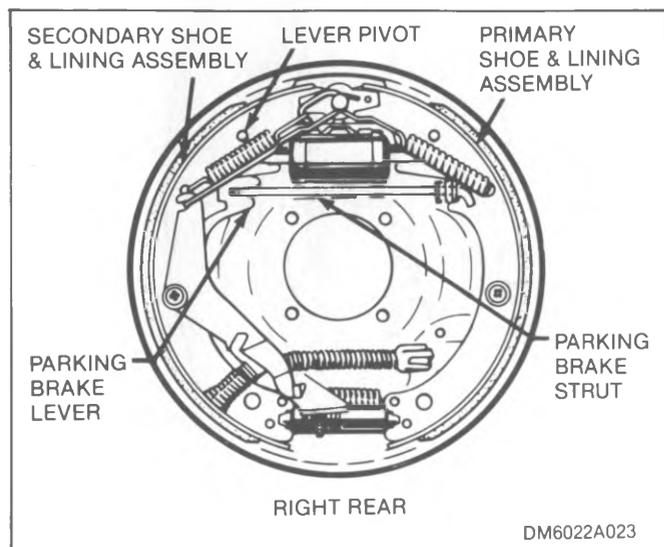


Figure 1-14. Typical Parking Brake Components

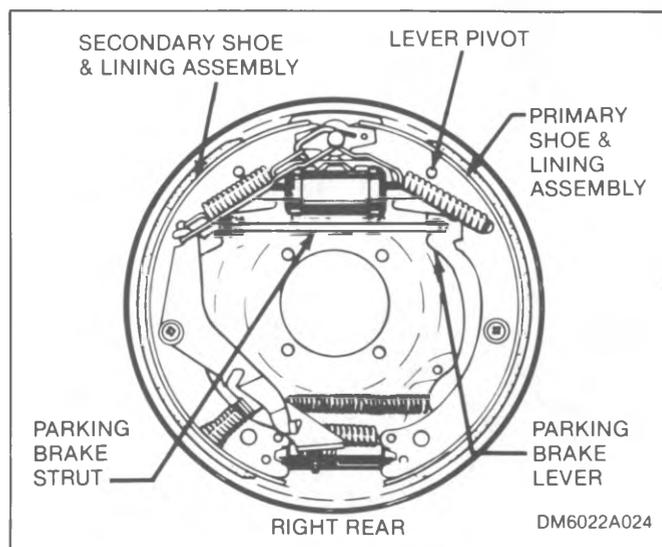


Figure 1-15. Parking Brake Components With Rear Entry Parking Brake Cable

1-23. APPLICATION LISTING-GENERAL MOTORS VEHICLES

VEHICLE	MODEL YEAR	TYPE OF DRUM BRAKES	NOTES	ON-VEHICLE SERVICE SECTION
Cadillac	1960-86	Delco Duo-Servo	1, 2	III
Chevrolet (except Vega, Monza, Chevette)	1969-86	Delco Duo-Servo	1, 2	III
Vega	1971-75	Leading-Trailing Shoe	2	IV
Vega	1976-77	Delco Duo-Servo	2	III
Monza	1975	Leading-Trailing Shoe	2	IV
Monza	1976-80	Delco Duo-Servo	2	III
Chevette	1976-79	Leading-Trailing Shoe	2	IV
Chevette	1980-86	Delco Duo-Servo	2	III
Sprint	1985-86	Leading-Trailing Shoe	2	IV
Spectrum	1985-86	Leading-Trailing Shoe	2	
Nova	1985-86	Leading-Trailing Shoe	2	
Buick (except 1975 Skyhawk and 1986 LeSabre)	1969-85	Delco Duo-Servo	1, 2	III
Skyhawk	1975	Leading-Trailing Shoe	2	IV
LeSabre	1986	Leading-Trailing Shoe	2	
Oldsmobile (except 1975 Starfire and 1986 Delta 88)	1969-85	Delco Duo-Servo	1, 2	III
Starfire	1975	Leading-Trailing Shoe	2	IV
Delta 88	1986	Leading-Trailing Shoe	2	
Pontiac (except Astre, 1975 Sunbird and 1986 Bonneville)	1969-85	Delco Duo-Servo	1, 2	III
Astre	1969-75	Leading-Trailing Shoe	2	IV
Astre	1976-77	Delco Duo-Servo	2	III
Sunbird	1975	Leading-Trailing Shoe	2	IV
Bonneville	1986	Leading-Trailing Shoe	2	IV
Chevrolet GMC Light Duty Trucks (1/2, 3/4, & 1 ton)	1969-86	Chevrolet & Delco Duo-Servo	2	III

1. Four wheel disc brakes on some models.
2. Front disc brakes standard.

# SECTION II

## DRUM BRAKE TROUBLESHOOTING GUIDE

### 2-1. LOW PEDAL OR PEDAL GOES TO TOE BOARD

CAUSES	CORRECTIONS
Excessive clearance between linings and drum.	Adjust brakes, repair automatic adjusters.
Automatic adjusters not working.	Make forward and reverse stops; if pedal stays low, repair faulty adjusters.
Leaking wheel cylinder.	Clean and repair or replace cylinder. Replace shoe and linings in axle sets, if contaminated.
Air in system.	Bleed brakes.

### 2-2. SPRINGY, SPONGY PEDAL

CAUSES	CORRECTIONS
Drums worn below specifications.	Replace drums.
Air in system.	Bleed brakes.

### 2-3. EXCESSIVE PEDAL PRESSURE REQUIRED TO STOP CAR

CAUSES	CORRECTIONS
Grease of fluid soaked linings.	Repair grease seal or wheel cylinder. Install new shoe and linings in axle sets.
Frozen wheel cylinder pistons.	Repair or replace cylinder.
Linings installed on wrong shoes.	Install primary and secondary linings correctly.

### 2-4. LIGHT PEDAL PRESSURE—BRAKES TOO SENSITIVE

CAUSES	CORRECTIONS
Brake adjustment not correct.	Adjust the brakes or repair self-adjusters.
Loose backing plate.	Torque backing plate bolts to specifications.
Lining loose on shoe.	Replace shoe and linings in axle sets.
Excessive dust and dirt in drums.	Clean with water-dampened cloth.
Scored, bell-mouthed or barrel-shaped drum.	Refinish drums in pairs to specifications or replace.
Improper lining contact pattern.	Replace with proper GM shoe and linings.

### 2-5. BRAKE PEDAL TRAVEL DECREASING

CAUSES	CORRECTIONS
Weak shoe retracting springs.	Check springs—replace bent, open-coiled or cracked springs.
Wheel cylinder pistons sticking.	Clean and repair or replace cylinder.

## 2-6. PULSATING BRAKE PEDAL (PARKING BRAKE APPLY PULSATES ALSO)

CAUSES	CORRECTIONS
Drums out-of-round.	Refinish drums in pairs to specifications or replace.

## 2-7. BRAKES FADE\*

CAUSES	CORRECTIONS
Poor lining contact.	Check drums wear. Replace or refinish drum. Bur-nish brakes if not fully seated.
Drums worn below discard dimension.	Replace drums.
Charred or glazed linings.	Replace shoe and linings in axle sets.

\*Fade is temporary reduction of brake effectiveness resulting from heat.

## 2-8. SHOE CLICK

CAUSES	CORRECTIONS
Shoes lift off backing plate and snap back.	Change drums side to side or refinish in pairs to specifications.
Hold down springs weak.	Replace springs.
Shoe bent.	Replace shoe and linings in axle sets.
Grooves in backing plate pads.	Replace backing plate.

## 2-9. SNAPPING NOISE IN FRONT END

CAUSES	CORRECTIONS
Grooved backing plate pads.	Replace backing plate.
Loose backing plates.	Torque backing plate bolts to specifications.

## 2-10. THUMPING NOISE WHEN BRAKES ARE APPLIED

CAUSES	CORRECTIONS
Cracked drum; hard spots in drum.	Replace drum.
Retractor springs unequal—weak.	Replace springs.

## 2-11. GRINDING NOISE

CAUSES	CORRECTIONS
Shoe hits drum.	Refinish drum to specifications or replace.
Bent shoe web.	Replace shoe and linings in axle sets.
Brake improperly assembled.	Assemble and adjust to specifications.

## 2-12. ONE WHEEL DRAGS

CAUSES	CORRECTIONS
Weak or broken shoe retracting springs.	Check springs—replace bent, open-coiled or cracked springs.
Brake shoe to drum clearance too tight—the brake shoes not adjusted properly.	Adjust and/or repair automatic adjusters.
Brake improperly assembled.	Assemble and adjust to specifications.
Wheel cylinder piston cups swollen and distorted.	Flush system, replace all rubber parts in the brake system, and refill with proper fluid.
Pistons sticking in wheel cylinder.	Clean and repair or replace cylinder.
Drum out-of-round.	Refinish drums in pairs to specifications or replace.
Loose anchor pin/plate.	Adjust and tighten lock nut or replace backing plate.
Parking brake cable not free.	Lubricate or replace cable.
Parking brake not adjusted properly.	Adjust to specifications.

## 2-13. VEHICLE PULLS TO ONE SIDE

CAUSES	CORRECTIONS
Brake adjustment not correct.	Adjust—check automatic adjuster mechanism (both sides).
Loose backing plate.	Torque backing plate bolts to specifications.
Linings not of specified kind, primary and secondary shoes reversed or not replaced in pairs.	Install specified linings in proper position.
Water, mud, etc., in brakes.	Remove any foreign material from all of the brake parts and the inside of the drums. Lubricate the pads and the rear brake cable ramps.
Wheel cylinder sticking.	Repair or replace wheel cylinder.
Weak or broken shoe retracting springs.	Check springs—replace bent, open-coiled or cracked springs.
Drums out-of-round.	Refinish drums in pairs to specifications or replace.
Wheel cylinder size different on opposite sides.	Replace with correct cylinders.
Scored drum.	Refinish drums in pairs to specifications or replace.

## 2-14. WET WEATHER: BRAKES GRAB OR WON'T HOLD

CAUSES	CORRECTIONS
Bent backing plate flange.	Straighten or replace backing plate.
Incorrect or abused shoe and linings.	Replace with correct GM part number, or equivalent, in axle sets.

## 2-15. BRAKES SQUEAK

CAUSES	CORRECTIONS
Backing plate bent or shoes twisted.	Straighten or replace damaged parts.
Shoes scraping on backing plate pads.	Apply brake lube, GM 5450032 or equivalent, to pads. Replace with new shoe and linings, if distorted.
Weak or broken hold-down springs.	Replace defective hold-down springs
Loose backing plate, anchor or wheel cylinder.	Torque to specifications.
Glazed linings.	Replace shoe and linings in axle sets.
Dry shoe pads and hold-down pin surfaces.	Lubricate with GM 5450032 or equivalent.

## 2-16. BRAKES CHATTER

CAUSES	CORRECTIONS
Incorrect lining to drum clearance.	Readjust to recommended clearance. Repair or replace automatic adjuster parts as required.
Loose backing plate.	Torque backing plate bolts to specifications.
Weak or broken retractor spring.	Check springs—replace bent, open-coiled or cracked springs.
Drums out-of-round.	Refinish drums in pairs to specifications or replace.
Tapered or barrel-shaped drums.	Refinish drums in pairs to specifications or replace.
Improper lining contact pattern.	Replace shoe and linings with correct GM part number or equivalent.

# SECTION III

## DUO-SERVO BRAKE ON-VEHICLE SERVICE

### 3-1. GENERAL INFORMATION

*CAUTION: When brake lube or lubrication is specified for drum brake service, use GM 5450032 brake lube, or equivalent. Do not use ordinary grease. It will not hold up under the high temperatures generated by brake operation. Use care not to get brake lube on the linings or the inside surface of the drum since this will make the linings unfit for proper braking.*

3-2. DUO-SERVO BRAKE DESIGNATIONS. To group the many duo-servo design variations for the purpose of organizing service instructions, the following types have been established:

NOTE: Any of the following three types may be equipped with either apply actuated adjusters or release actuated adjusters (refer to paragraphs 1-8 thru 1-10).

3-3. CONVENTIONAL DUO-SERVO DRUM BRAKE (See figure 3-1). This type brake is characterized by the use of an anchor pin (32) attached to a heavy backing plate (29). The wheel cylinder (30) is bolted to the backing plate. Refer to paragraph 3-19

for removal and replacement of shoe and linings and brake hardware.

3-4. DIRECT TORQUE DUO-SERVO DRUM BRAKE (See figure 3-2). This type brake uses an anchor pin (29), which goes through the backing plate and attaches directly to the axle tube flange. The wheel cylinder (30) is attached to the backing plate by a retainer (21). Refer to paragraph 3-20 for removal and replacement of shoe and linings and brake hardware.

3-5. ANCHOR PLATE DUO-SERVO DRUM BRAKE (See figure 3-3). This type brake has an anchor plate (32) attached to the backing plate (29). The anchor plate may have hooks (37) or a pin (36) attaching the return springs (1 and 2). The wheel cylinder (30) is attached to the backing plate with a retainer. Refer to paragraph 3-21 for removal and replacement of shoe and lining and brake hardware.

3-6. BRAKE HYDRAULIC SYSTEM. To maintain the hydraulic system in serviceable condition, note the following when performing on-vehicle service:

1. Do not disconnect any brake line fitting, pipe or hose unless specified for the on-vehicle service being performed.

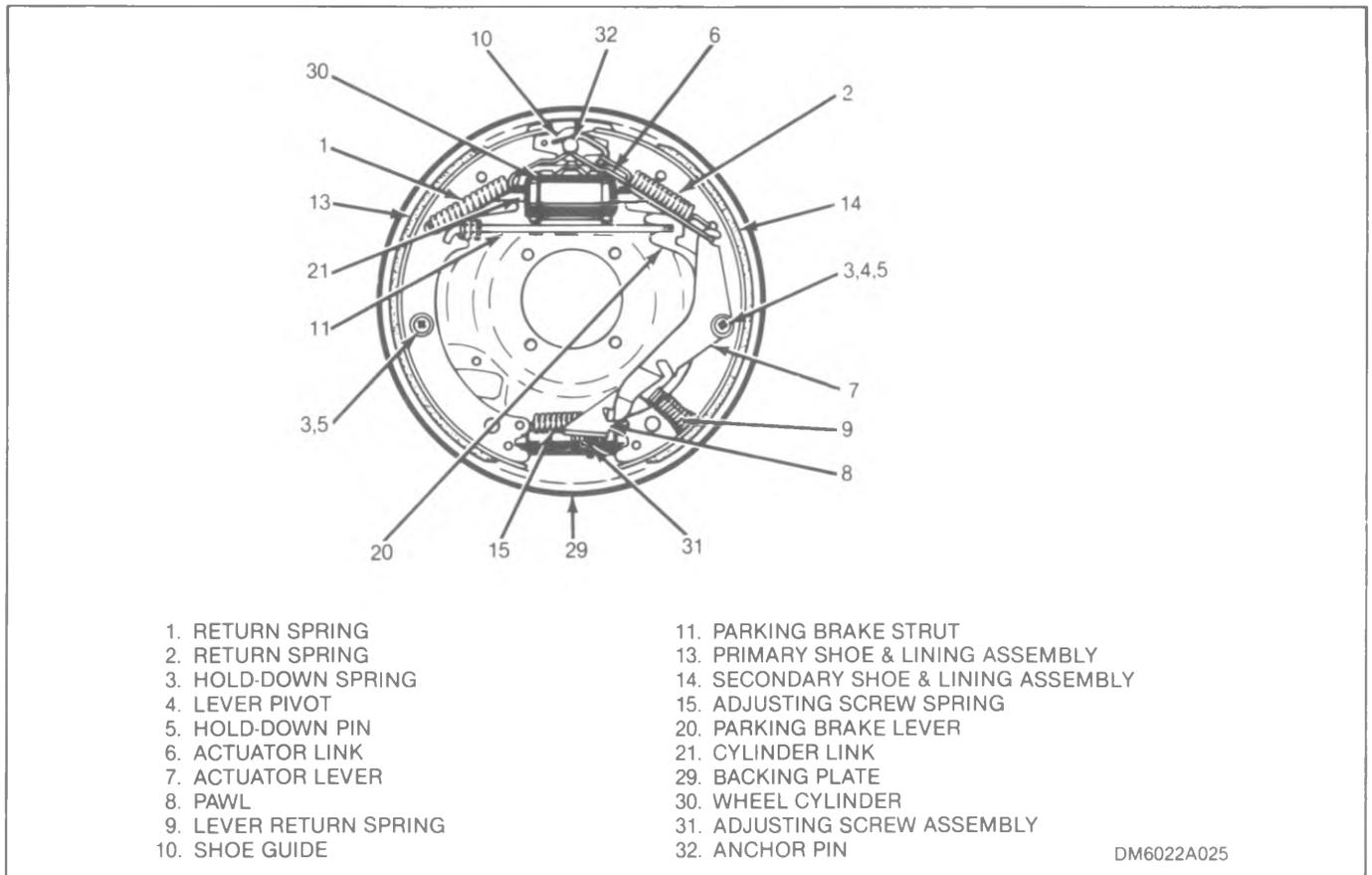


Figure 3-1. Conventional Duo-Servo Drum Brake

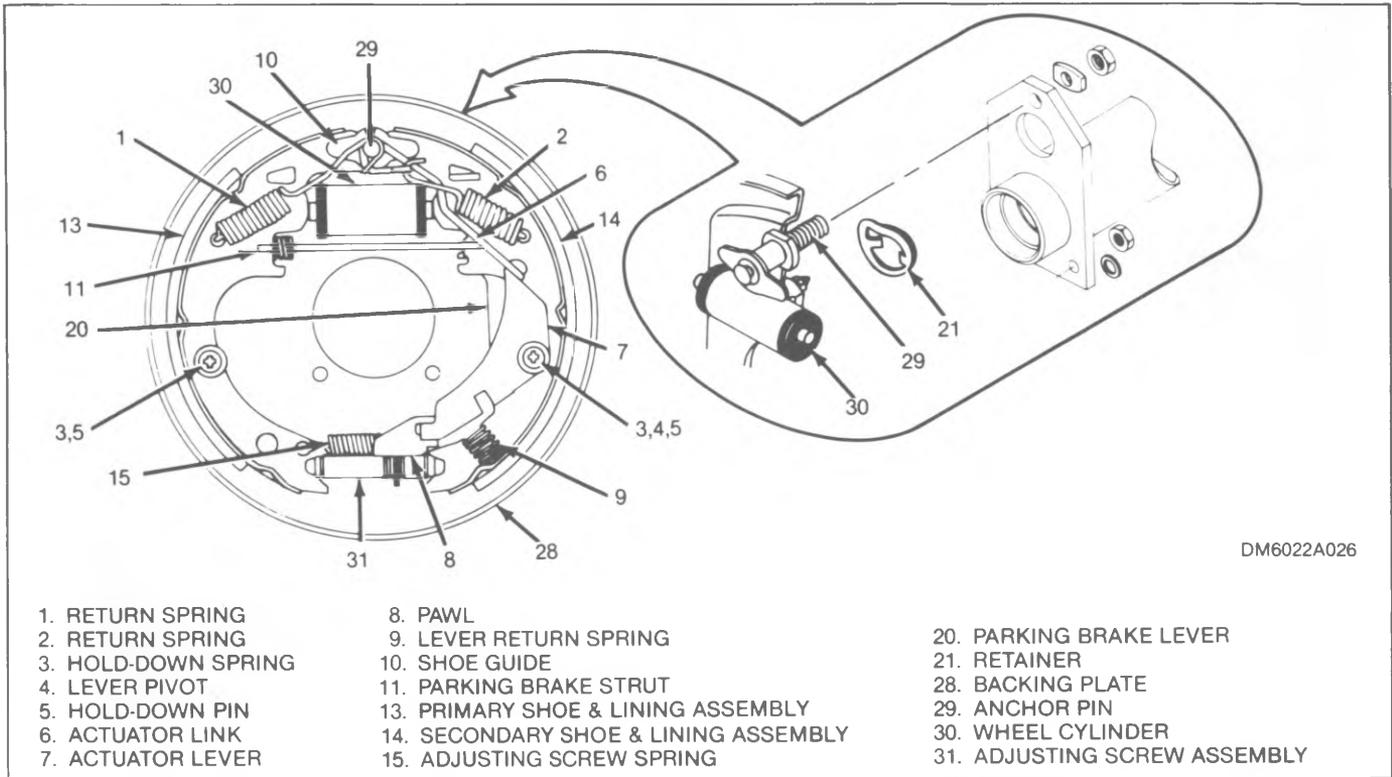


Figure 3-2. Direct Torque Duo-Servo Drum Brake

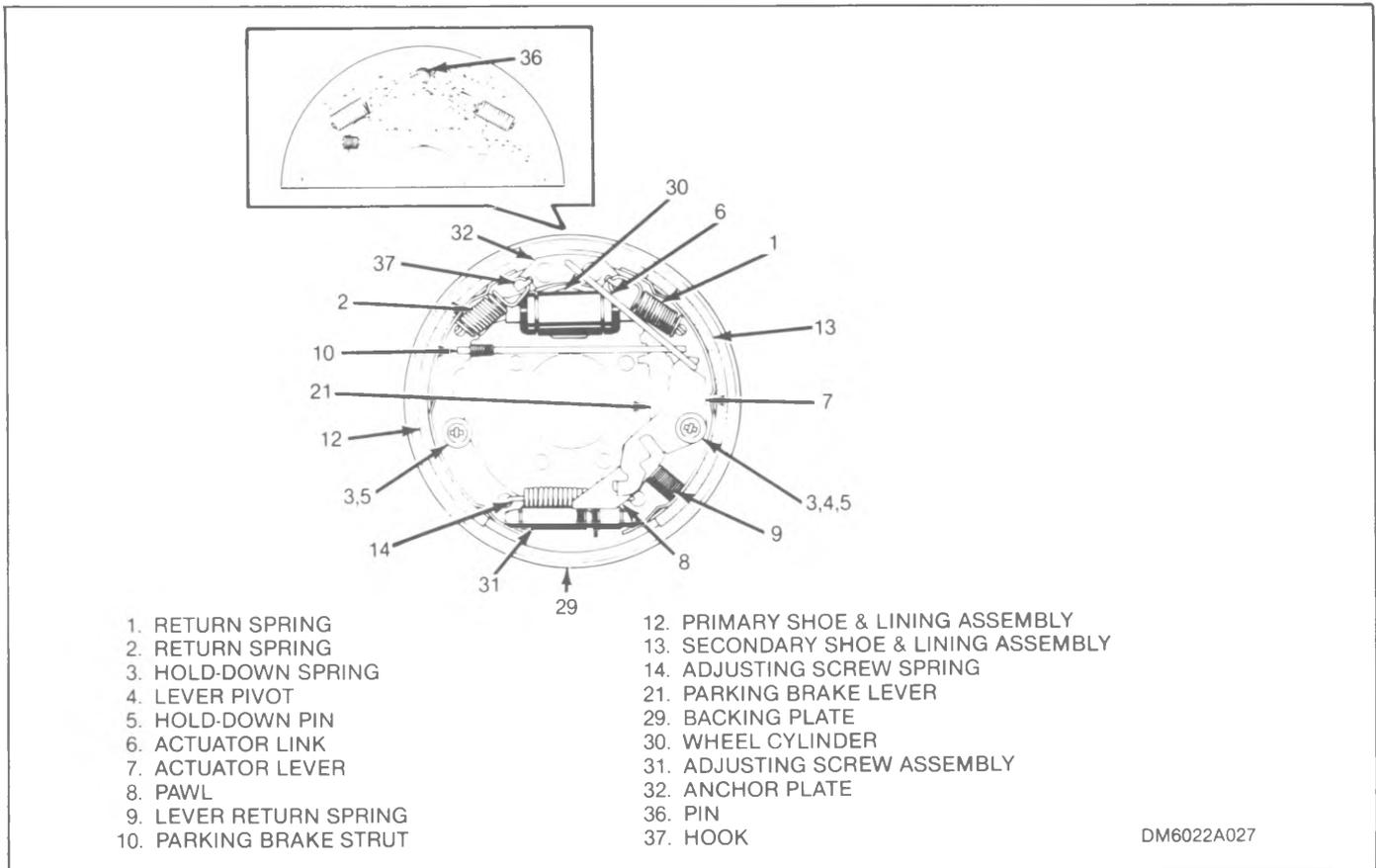


Figure 3-3. Anchor Plate Duo-Servo Drum Brake

2. Whenever the brake hydraulic system is opened, plug opening in line to prevent fluid loss and contamination.

3. Torque all hydraulic fittings to specifications.

4. Always bleed the brake hydraulic system whenever any lines or fittings are disconnected.

5. Never reuse brake fluid that is drained, removed, or bled from the hydraulic system or brake components.

6. Check that the master cylinder is filled to the proper level after any on-vehicle service.

7. Test for proper braking before operating vehicle.

### 3-7. SERVICE BRAKE ADJUSTMENT

3-8. GENERAL INFORMATION. The duo-servo self-adjusting drum brakes covered by this manual do not require manual adjustment when the automatic adjusters are functioning properly.

1. If excessive pedal travel or other symptoms of improper adjustment are noted, remove the brake drums (refer to paragraph 3-15).

2. Inspect the automatic adjuster mechanisms, replacing defective parts as required (refer to applicable paragraph 3-19, 3-20 or 3-21).

3. Clean, lubricate and/or replace damaged adjuster parts.

4. A manual adjustment of self-adjusting brakes is required when the shoe and linings are replaced or when the adjustment is manually changed for other service operation.

5. In some cases, it may be necessary to back off or release the brake adjustment to remove the brake drums.

6. All duo-servo brakes can be manually adjusted by turning the star wheel on the adjusting screw assembly.

3-9. MANUAL ADJUSTMENT WITH DRUMS REMOVED. If the drums have been removed and the tool is available, manual adjustment can be made by using a brake shoe adjusting gage.

1. Set the adjusting gage to the inside diameter of the drum (see figure 3-4A) and tighten the gage lock screw securely.

2. Turn the gage over and fit it over the brake shoes (see figure 3-4B). Expand the brake shoes by manually turning the star wheel until the gage just slides over the linings. Rotate gage around the lining surface to insure proper clearance.

NOTE: If the brake shoes must be retracted, it will be necessary to pull the adjusting pawl or lever out to disengage from the star wheel teeth.

3-10. MANUAL ADJUSTMENT WITH DRUMS INSTALLED. Duo-servo brakes have an adjustment hole, or a lanced knock-out, in either the backing plate or the drum for manual adjustment. The type of adjuster (apply actuated or release actuated, refer to paragraph 1-8) will determine direction of rotation of the star wheel for adjustment. Proceed as follows:

1. Remove the rubber plug from the adjustment hole or knock out the lanced area using a suitable punch.

CAUTION: If lanced area is knocked out, the drum must be removed and the metal knock out removed from the brake. Install a plug in the lanced hole after adjustment to prevent entry of dirt and water.

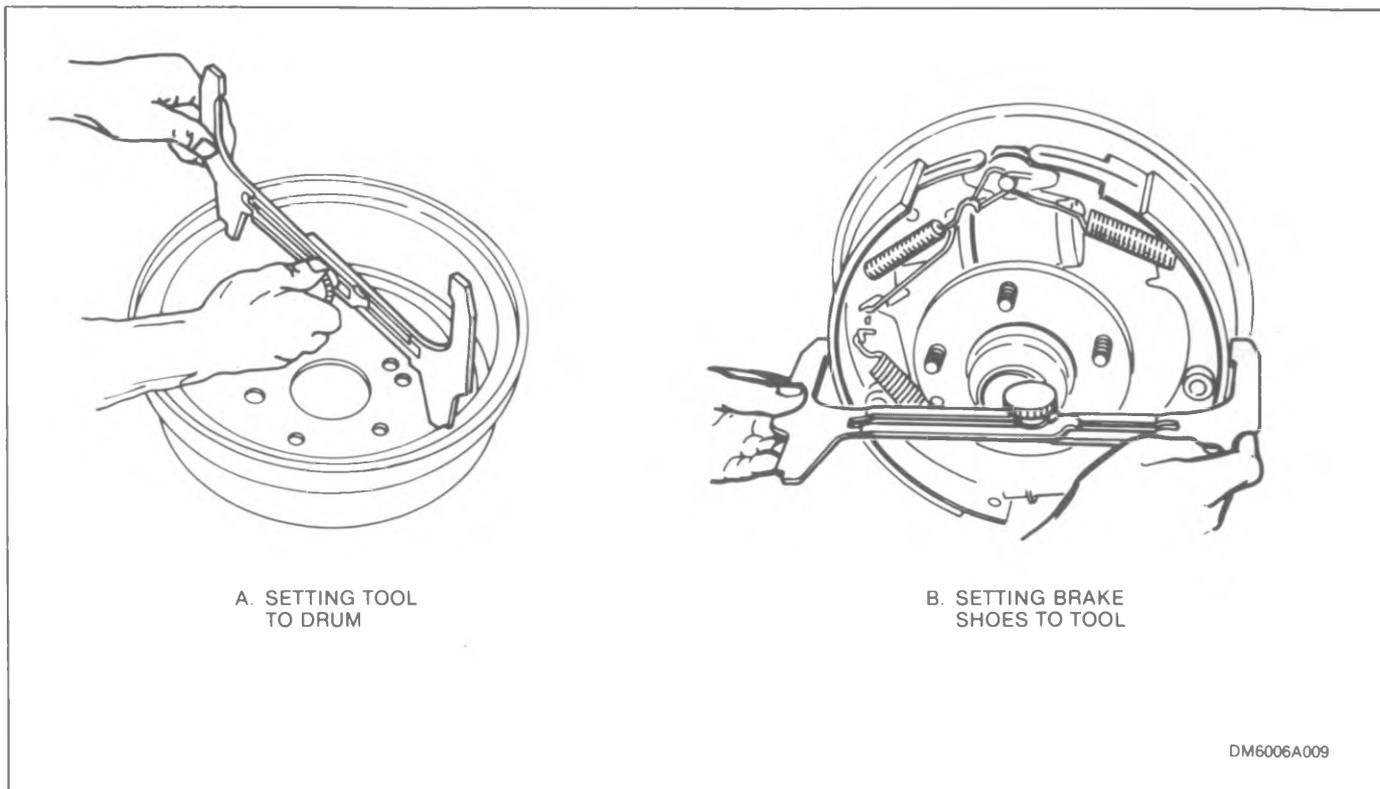


Figure 3-4. Brake Shoe Adjusting Gage

2. **ADJUSTMENT THROUGH BACKING PLATE.** To expand the brake shoes, use a brake adjusting tool to turn the star wheel in the direction shown in figure 3-5 (apply actuated adjuster) or figure 3-6 (release actuated adjuster). Expand the shoes to produce heavy drag on the wheel. To retract the brake shoes, use a screwdriver to move pawl or actuator lever away from star wheel (see figure 3-5 or 3-6), back off the star wheel approximately 30 notches.

3. **ADJUSTMENT THROUGH BRAKE DRUM.** To expand the brake shoes, use a screwdriver to turn the star wheel in the direction shown in figure 3-7 (apply actuated adjuster) or figure 3-8 (release actuated adjuster). Expand the shoes to produce a heavy drag on the wheel. To retract the brake shoes, use a wire hook to move the pawl or actuator lever away from star wheel (see figure 3-7 or 3-8), back off star wheel approximately 30 notches.

*CAUTION: After making preliminary adjustment, apply firm pressure to brake pedal. Make sure there is adequate pedal reserve before moving the vehicle.*

4. Complete preliminary adjustments by making several alternate reverse and forward stops.

**NOTE:** If making alternate reverse and forward stops fails to bring pedal travel to specifications (refer to vehicle service manual), the automatic adjusters are not functioning properly. Pull the drums and check the adjusting mechanisms.

5. With pedal travel to specifications, check and adjust the parking brake if necessary (refer to paragraph 3-11).

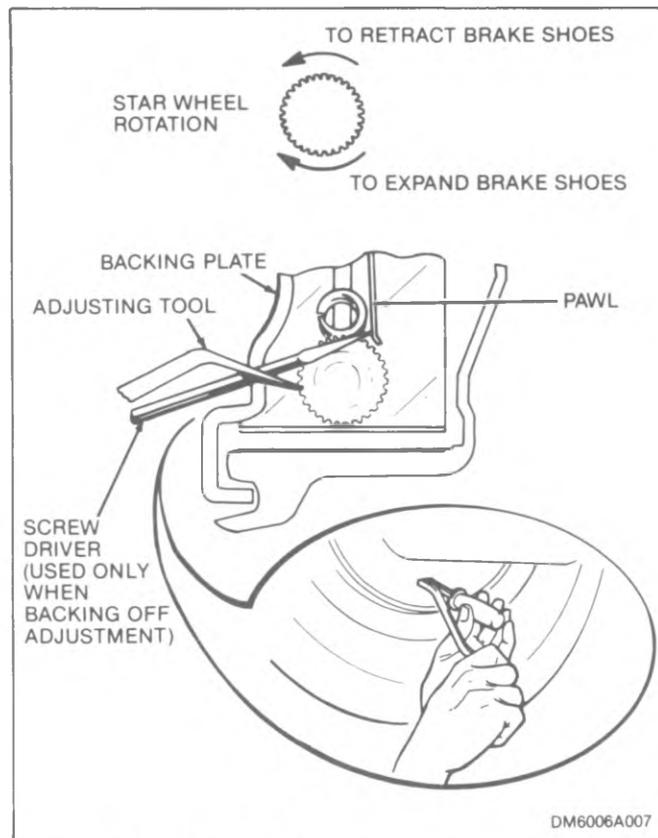


Figure 3-5. Manual Adjustment Through Backing Plate—Apply Actuated Adjuster

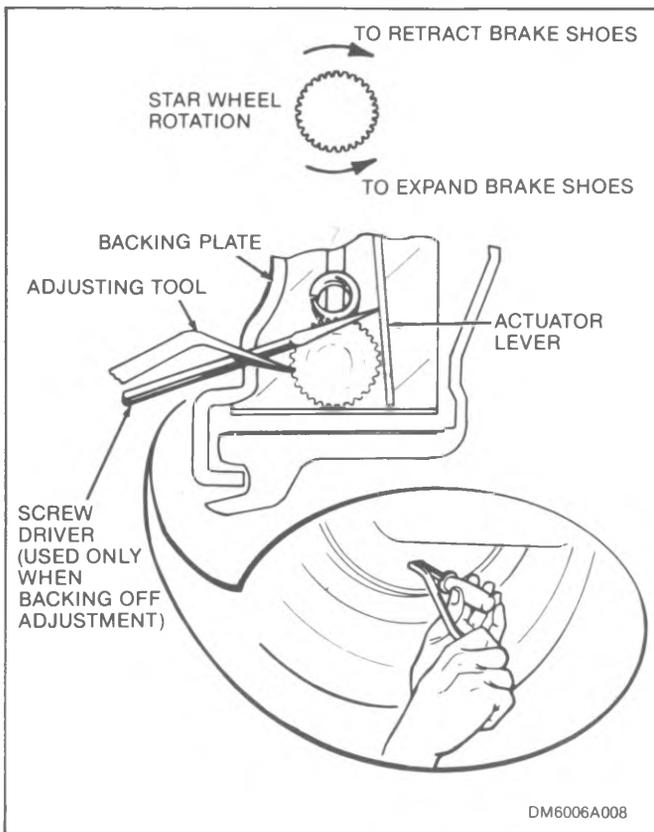


Figure 3-6. Manual Adjustment Through Backing Plate—Release Actuated Adjuster

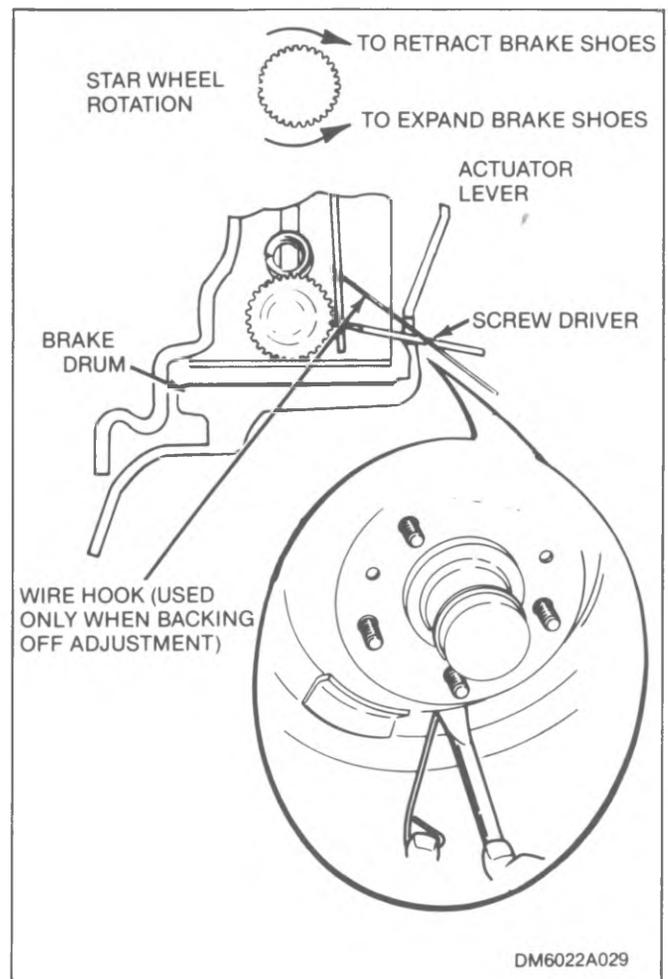


Figure 3-8. Manual Adjustment Through Brake Drum—Release Actuated Adjuster

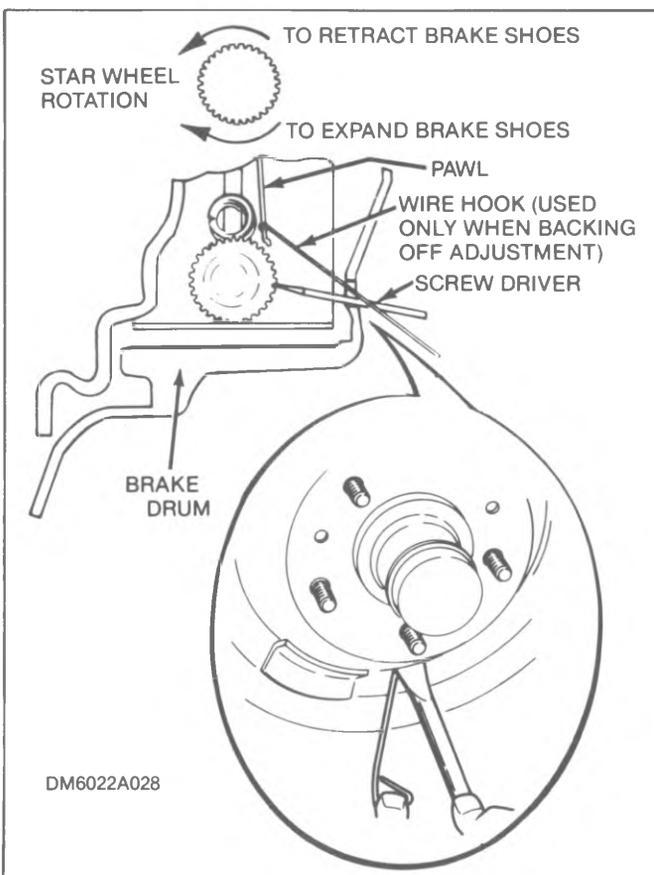


Figure 3-7. Manual Adjustment Through Brake Drum—Apply Actuated Adjuster

### 3-11. PARKING BRAKE ADJUSTMENT

NOTE: Parking brake adjustment is necessary whenever the rear brakes have been serviced or the need is indicated by parking brake check.

3-12. Proper adjustment of the parking brake is an essential part of any brake service job. It is important that the service brakes be properly adjusted first. The same shoe and linings are used for both service and parking brakes at the rear wheels and adjustment of the star wheel will affect both. Parking brakes should be adjusted to the manufacturer's specifications. If this data is not available, adjust so that:

1. Brakes are fully set when the parking brake lever is moved through approximately 1/3 of its total travel.
2. When the parking brake is released, rear wheels will turn freely, with no drag.

3-13. Adjustment procedures are as follows:

1. Release the parking brake and hoist the vehicle.

2. On most vehicles, the parking brake pedal or lever is connected to the front cable, which in turn is connected to the equalizer (see figure 3-9). On some, the front cable may extend back to the vicinity of the rear wheels where the equalizer is located. On others, as shown in figure 3-9, a short front cable is used with the equalizer located nearer the front of the vehicle and individual cables running back along each side of the frame to the rear wheels.

3. Another arrangement will be found on some 1977 and later vehicles (see figure 3-10). On these models, the front cable goes from the parking brake pedal assembly, along the left side of the vehicle, through the equalizer to which it is attached. This same cable continues on as the LH rear cable and enters the front of the left rear brake assembly. The cable for the right rear brake is connected to the equalizer and routed around the rear axle to enter the brake assembly from the rear.

4. Adjustment of all types is basically the same. By tightening or loosening the equalizer nut, or alternately loosening and tightening the check nuts on either side of the equalizer, it can be moved forward or back to produce the proper tension on the brake cables. It may be necessary to hold the front cable to prevent it from turning (see figure 3-11). For vehicles with the system shown in figure 3-10, adjustment is made by turning the adjusting nut at the equalizer.

5. After making adjustment, make sure that the jam nut or nuts are tight against the equalizer. Apply and release the parking brake several times to check operation. With the brake released, make sure that there is no drag on the rear wheels.

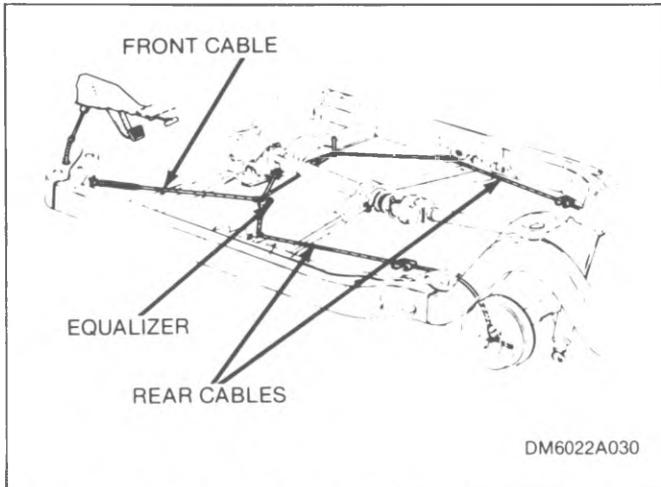


Figure 3-9. Typical Parking Brake Cable System

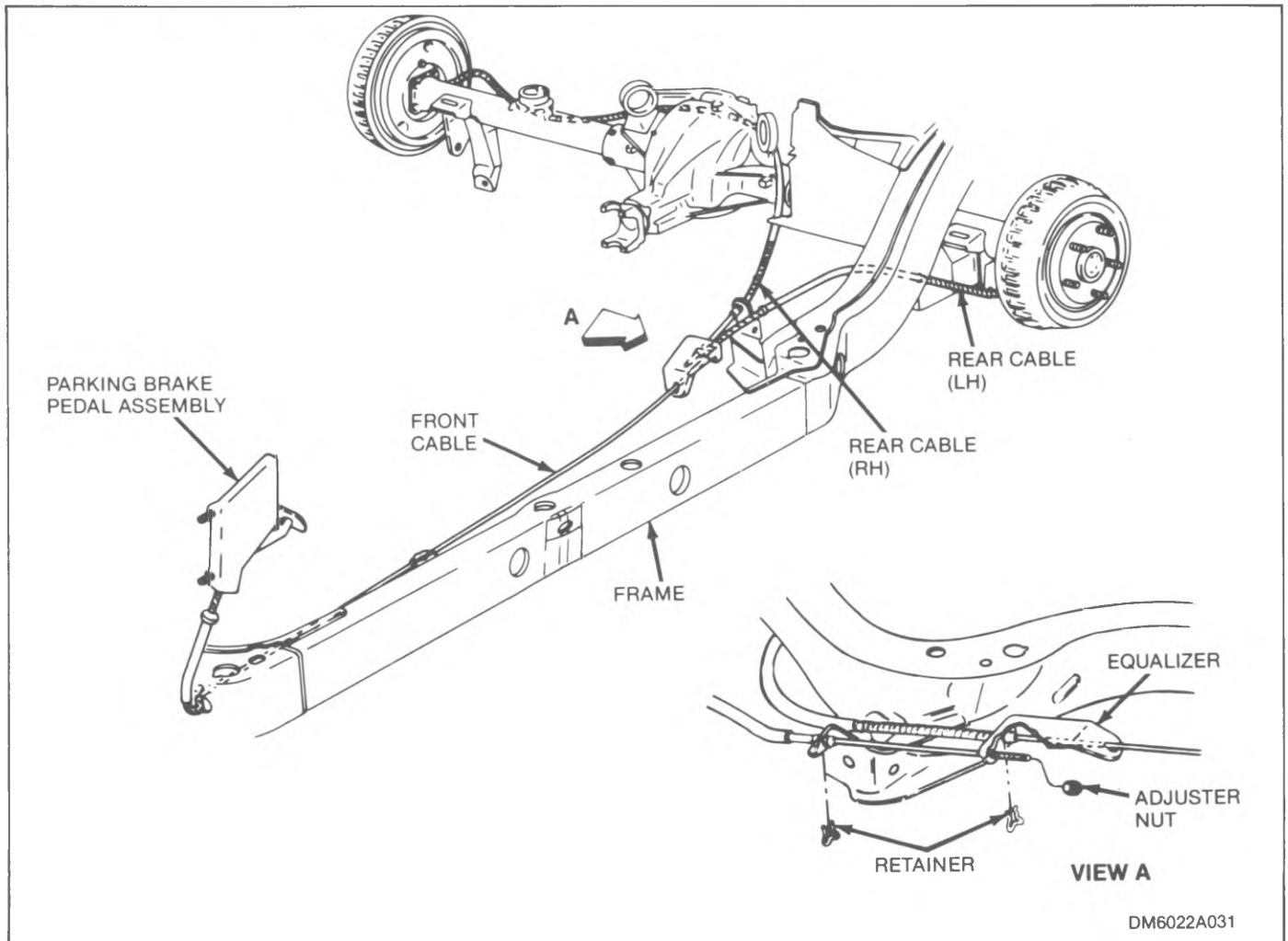


Figure 3-10. Typical Parking Brake System With Right Rear Cable Entry

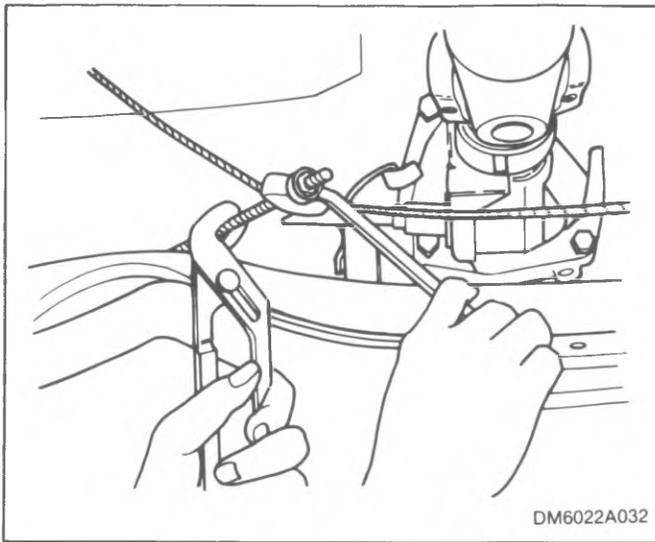


Figure 3-11. Typical Parking Brake Adjustment

### 3-14. REMOVE AND INSTALL BRAKE DRUMS

3-15. To remove brake drums for servicing or to gain access to other brake components, proceed as follows:

1. Release parking brake and hoist vehicle.
2. Loosen parking brake adjustment (refer to paragraph 3-11).
3. Mark relationship of wheel to axle.
4. Remove wheel and tire.
5. Mark relationship of drum to axle.

NOTE: In some cases, before the drum can be removed, it may be necessary to back off brake adjustment (refer to paragraph 3-10).

6. Remove brake drum.
7. Refer to Section VII for brake drum service instructions (inspection, refinishing and replacement).
8. Preadjust brakes if required (refer to paragraph 3-9).
9. Install brake drums in same position as removed.
10. Adjust brakes if required (refer to paragraph 3-10).
11. Install wheel in same position as removed. Torque wheel nuts to specifications.
12. Adjust parking brakes (refer to paragraph 3-11).

### 3-16. LINING INSPECTION

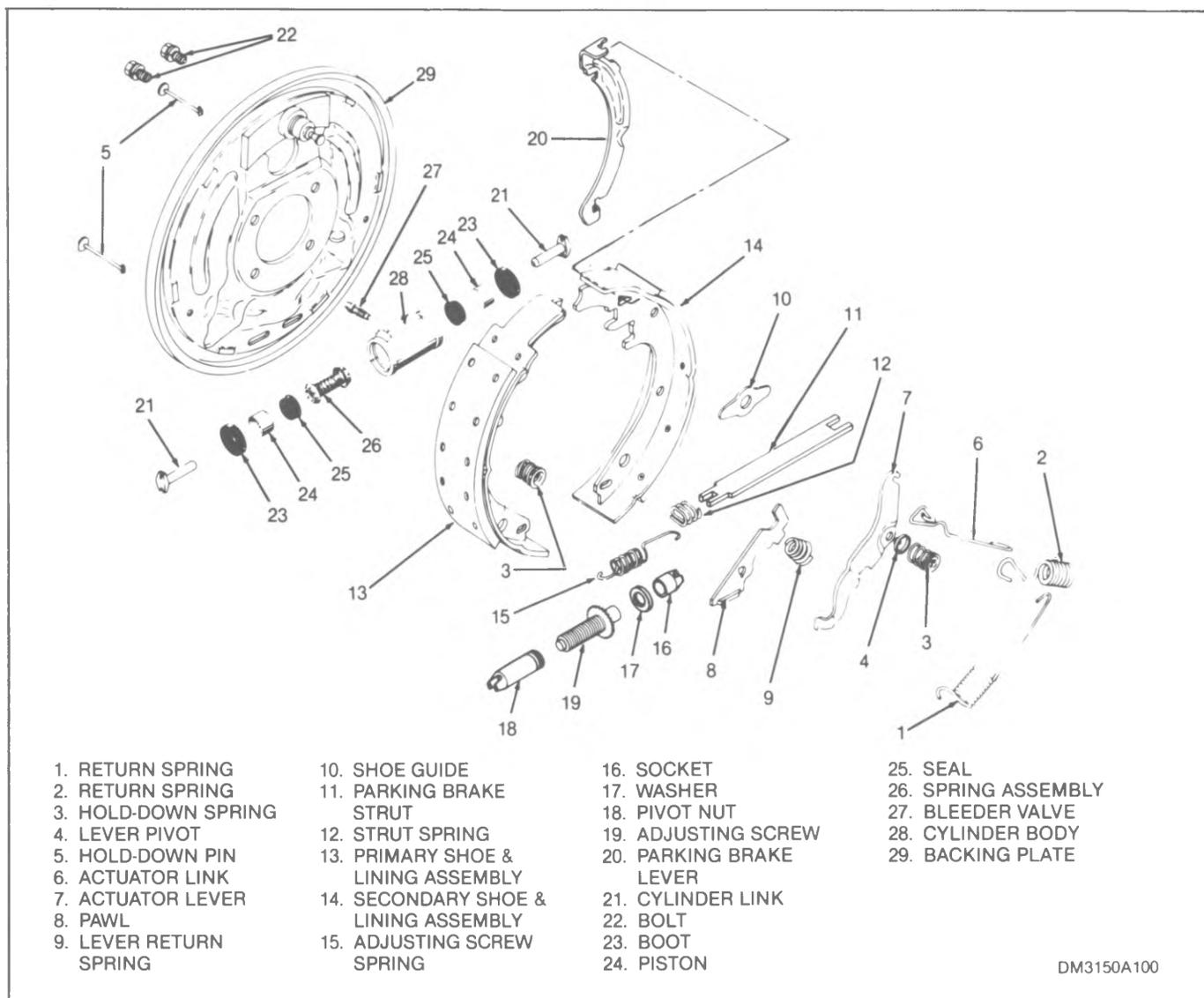
3-17. With wheels and drums removed (refer to paragraph 3-14), inspect drum brake linings as follows:

1. Check for even lining wear. If side to side wear is uneven, replace shoe and linings. Check brake drums and refinish or replace as required in axle sets.
2. If less than 1/32 inch of usable lining remains (above riveted heads on riveted type), replace the shoe and linings in axle sets.
3. If linings are oil-soaked, or not firmly attached to shoes, or have foreign material imbedded in them, replace shoe and linings in axle sets.

### 3-18. REMOVE AND INSTALL SHOE AND LININGS AND BRAKE HARDWARE

3-19. CONVENTIONAL DUO-SERVO DRUM BRAKE. Refer to figures 3-12, and 3-13 for identification of parts for the conventional drum brakes. The automatic adjuster actuator lever variations shown are described in paragraphs 1-8 thru 1-10. After removing brake drums (refer to paragraph 3-14), proceed as follows to remove and replace brake shoes and hardware (see figure 3-14):

1. Remove return springs (1 and 2) using suitable brake spring pliers.
2. Remove hold-down springs (3) using suitable pliers. Remove lever pivot (4).
3. Remove hold-down pins (5).
4. Lift up actuator lever (7) and remove actuator link (6).
5. Remove actuator lever (7), pawl (8) (on apply actuated adjuster models only) and lever return spring (9).
6. Remove shoe guide (10).
7. Remove parking brake strut (11) and strut spring (12) by spreading shoes (13 and 14) apart.
8. Spread brake shoes (13 and 14) to clear axle flange. Disconnect parking brake cable and remove shoes, connected by adjusting screw spring (15), from the vehicle.
9. Remove adjusting screw assembly (31) and adjusting screw spring (15). Note position of adjusting screw spring. Do not interchange adjusting screw assemblies or springs from RH and LH brake assemblies.



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Figure 3-12. Conventional Drum Brake With Apply Actuated Adjuster

10. Remove parking brake lever (20) by unhooking lever tab from slot in secondary shoe (14).

**NOTE:** On some models, with rear entry parking brake cable, the right rear brake has the parking brake lever (20) installed on the primary shoe (13).

**CAUTION:** When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.

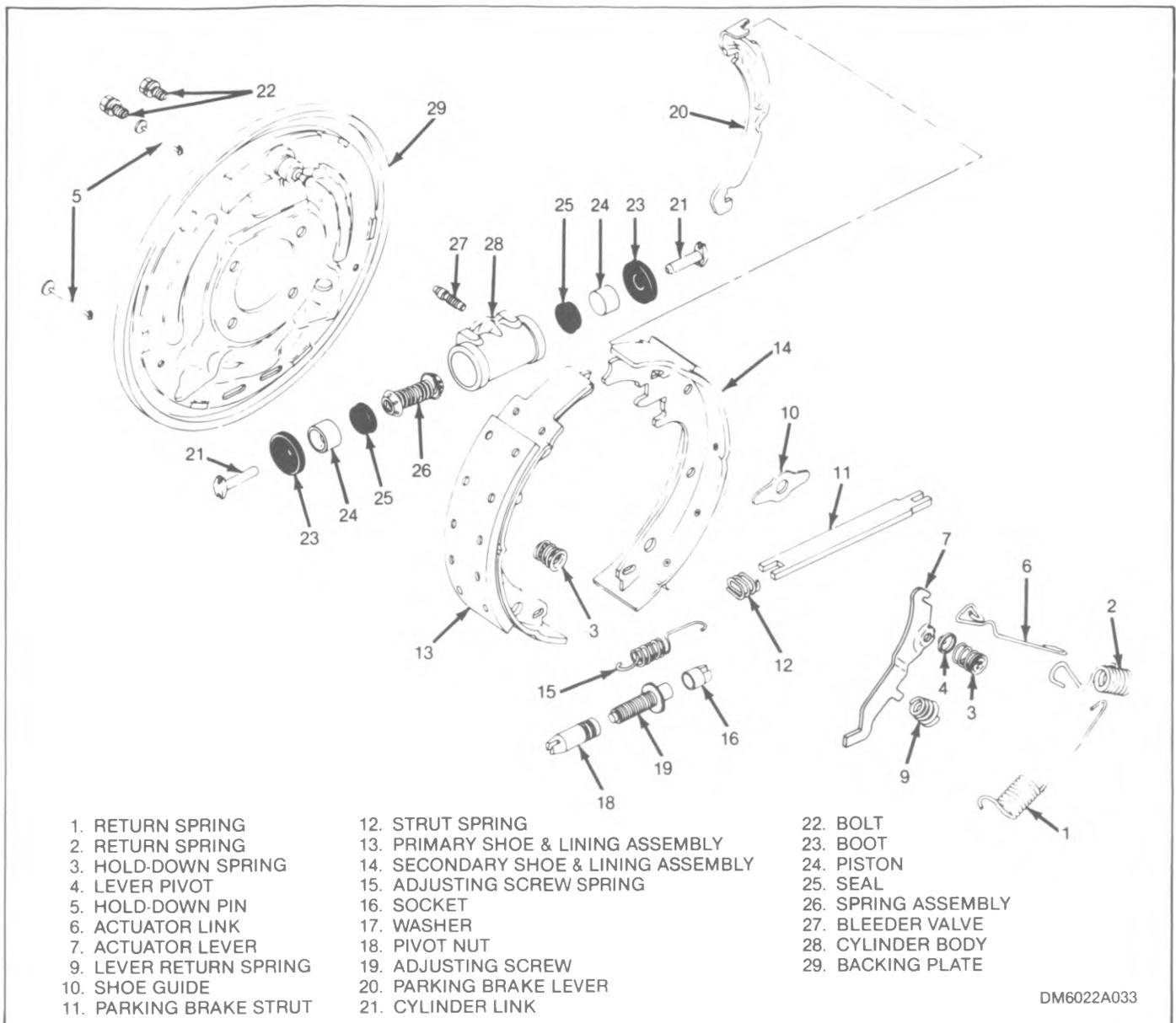
11. Clean the backing plates, struts, levers and other metal parts which are to be reused with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

12. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

13. Look for evidence of oil or grease leakage past the axle bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

14. Check that the backing plates are not cracked, bent or corroded at wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts and bolted-on anchor pins are torqued to specifications.

15. If the wheel cylinders need repair, it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be repaired or replaced.



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Figure 3-13. Conventional Drum Brake With Release Actuated Adjuster

NOTE: A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

NOTE: When disassembling adjusting screw assembly in the following step, note if a washer (17) is used between the adjusting screw (19) and socket (16). The washer is not used on all applications.

16. Disassemble the adjusting screw assembly (see figure 3-15) and clean parts in clean denatured alcohol. Make sure that the adjusting screw threads into the pivot nut over its complete length without sticking or binding. Check that none of the adjusting screw teeth are damaged.

17. Apply brake lube to adjusting screw (19) threads, inside diameter of socket (16) and socket face. Adequate lubrication is achieved when a continuous bead of lubricant is produced at open end of pivot nut (18) and socket after parts are assembled and threads fully engaged. Install washer (17) if found on unit at disassembly.

18. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads.

19. Install parking brake lever (20, figure 3-14) by hooking lever tab into slot in secondary shoe (14).

NOTE: On some models, with rear entry parking brake cable, the right rear brake has the parking brake lever (20) installed on the primary shoe (13).

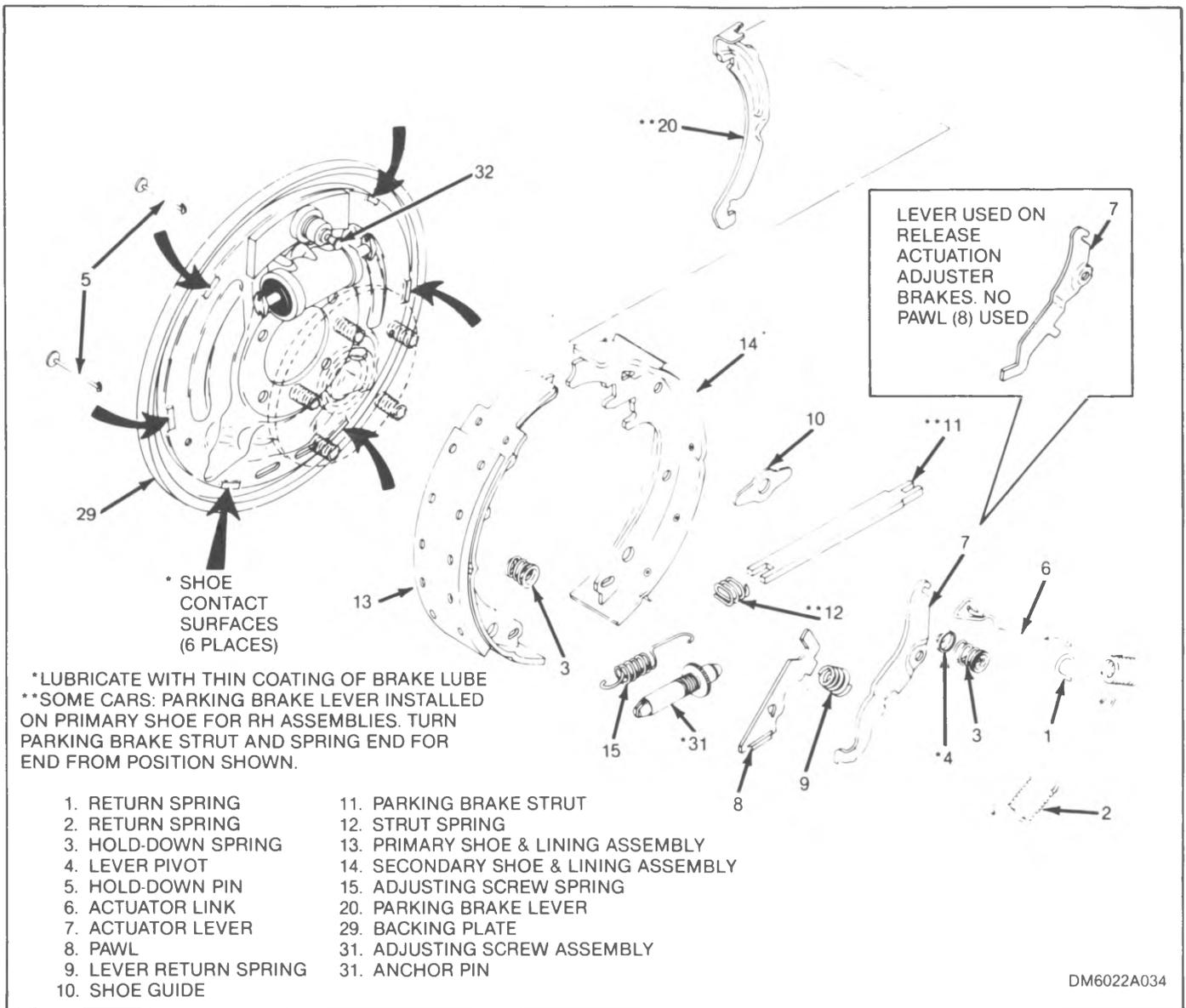


Figure 3-14. Brake Components

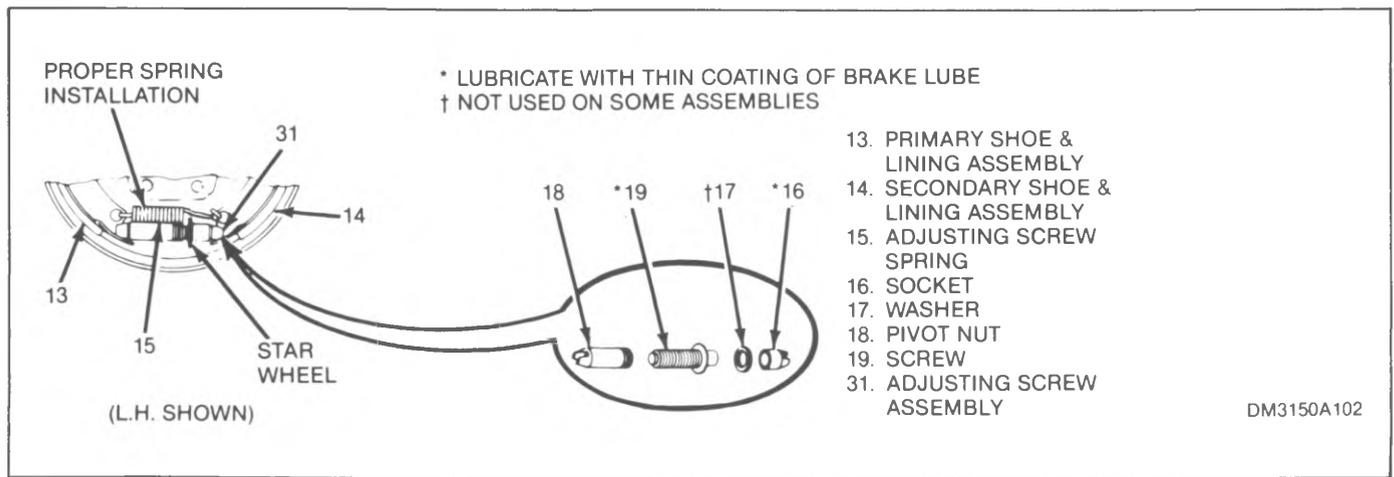


Figure 3-15. Adjusting Screw and Spring

20. Install adjusting screw assembly (31) and spring (15) between shoes (13 and 14) as shown in figure 3-15. Coils of spring must not be over star wheel. Left and right hand springs are different. Do not interchange.

21. Spread brake shoes (13 and 14) to clear axle flange, connect parking brake cable to lever (20), and install parts on backing plate (29).

22. Install parking brake strut (11) and strut spring (12) by spreading shoes (13 and 14) apart.

NOTE: For right rear brakes with rear entry parking brake cable and parking brake lever (20) installed on primary shoe (13), turn strut (11) and spring (12) end for end from that shown in figure 3-14.

23. Make sure strut (11) is properly installed. End without spring (12) engages parking brake lever (20). End with spring engages opposite brake shoe.

24. Install shoe guide (10).

25. Install actuator lever (7), pawl (8) (where used) and lever return spring (9).

26. Lubricate lever pivot (4). Install hold-down pins (5), lever pivot and hold-down springs (3).

27. Install actuator link (6) on anchor pin (32).

28. Lift up actuator lever (7) and hook link (6) into lever.

29. Install shoe return springs (1 and 2) using brake spring pliers.

30. Adjust brake as specified in paragraph 3-9.

3-20. DIRECT TORQUE DUO-SERVO DRUM BRAKE. Refer to figures 3-16 and 3-17 for identification of parts for the direct torque drum brakes. The actuator lever variations shown are described in par-

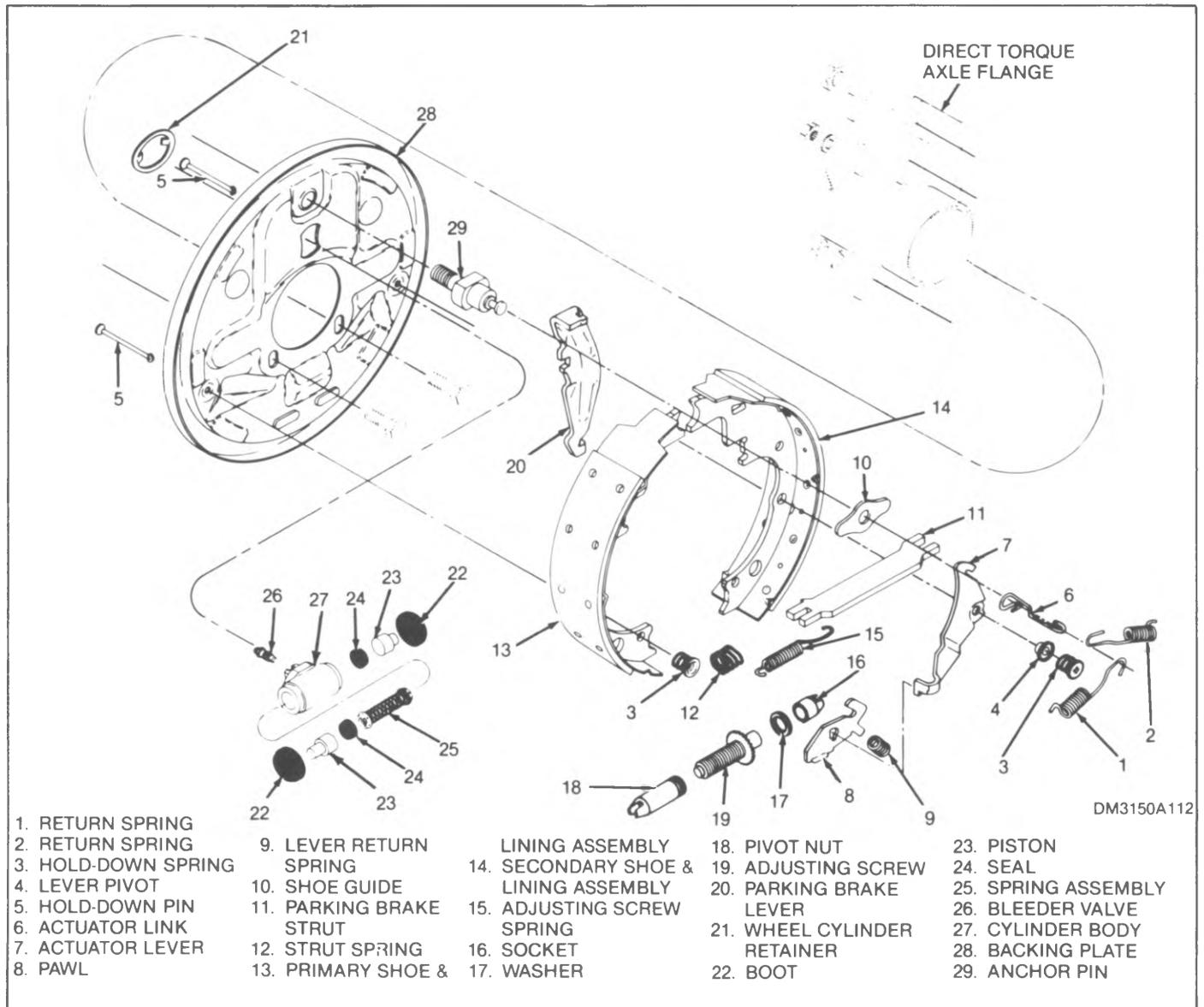


Figure 3-16. Direct Torque Drum Brake With Apply Actuated Adjuster

agraph 1-8 thru 1-10. After removing brake drums (refer to paragraph 3-14), proceed as follows to remove and replace brake shoes and hardware (see figure 3-18):

1. Remove return springs (1 and 2) using suitable brake spring pliers.
2. Remove hold-down springs (3) using suitable pliers. Remove lever pivot (4).
3. Remove hold-down pins (5).

4. Lift up actuator lever (7) and remove actuator link (6).
5. Remove actuator lever (7), pawl (8) (where used) and lever return spring (9).
6. Remove shoe guide (10).
7. Remove parking brake strut (11) and strut spring (12) by spreading shoes (13 and 14) apart.

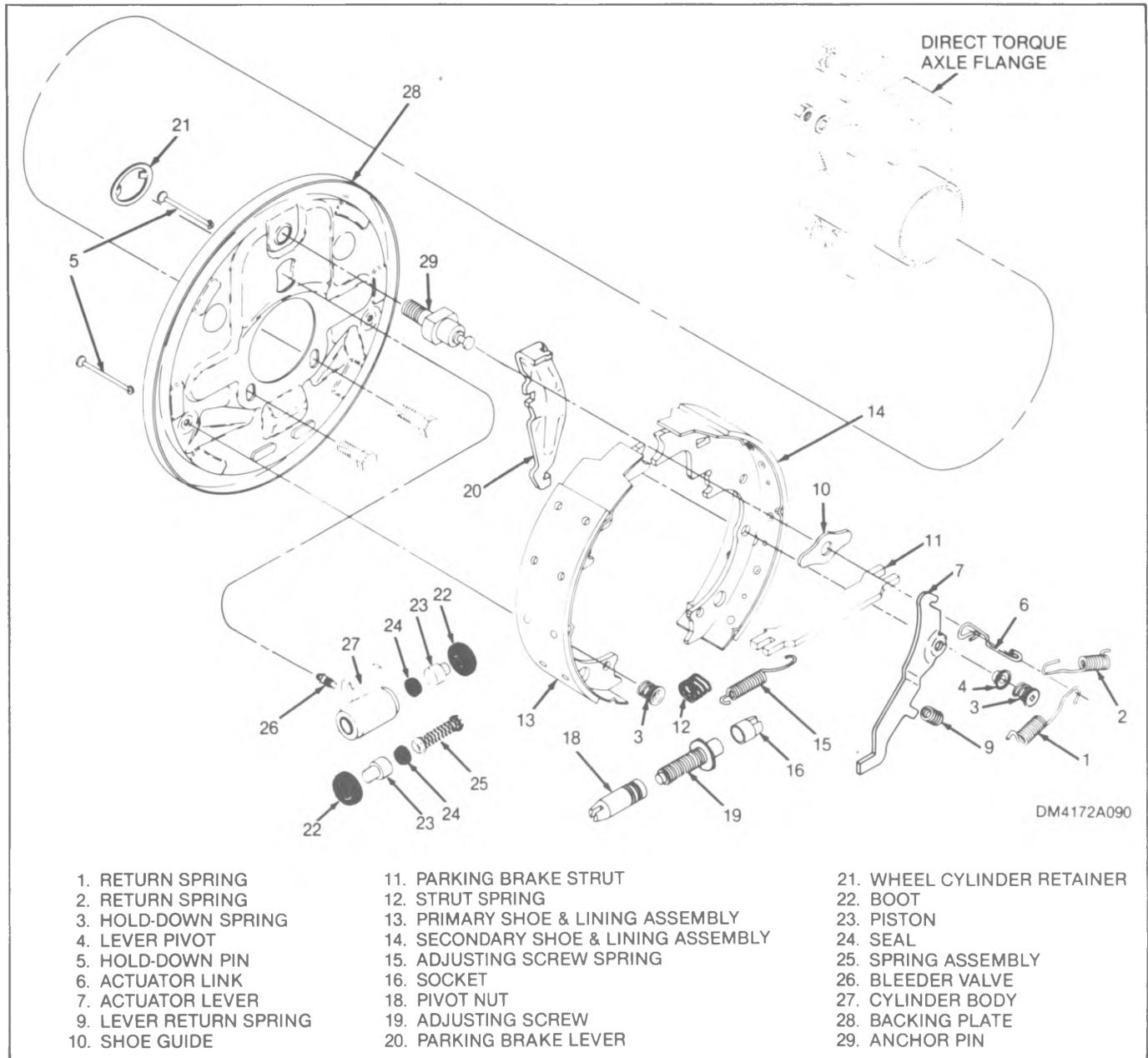


Figure 3-17. Direct Torque Drum Brake With Release Actuated Adjuster

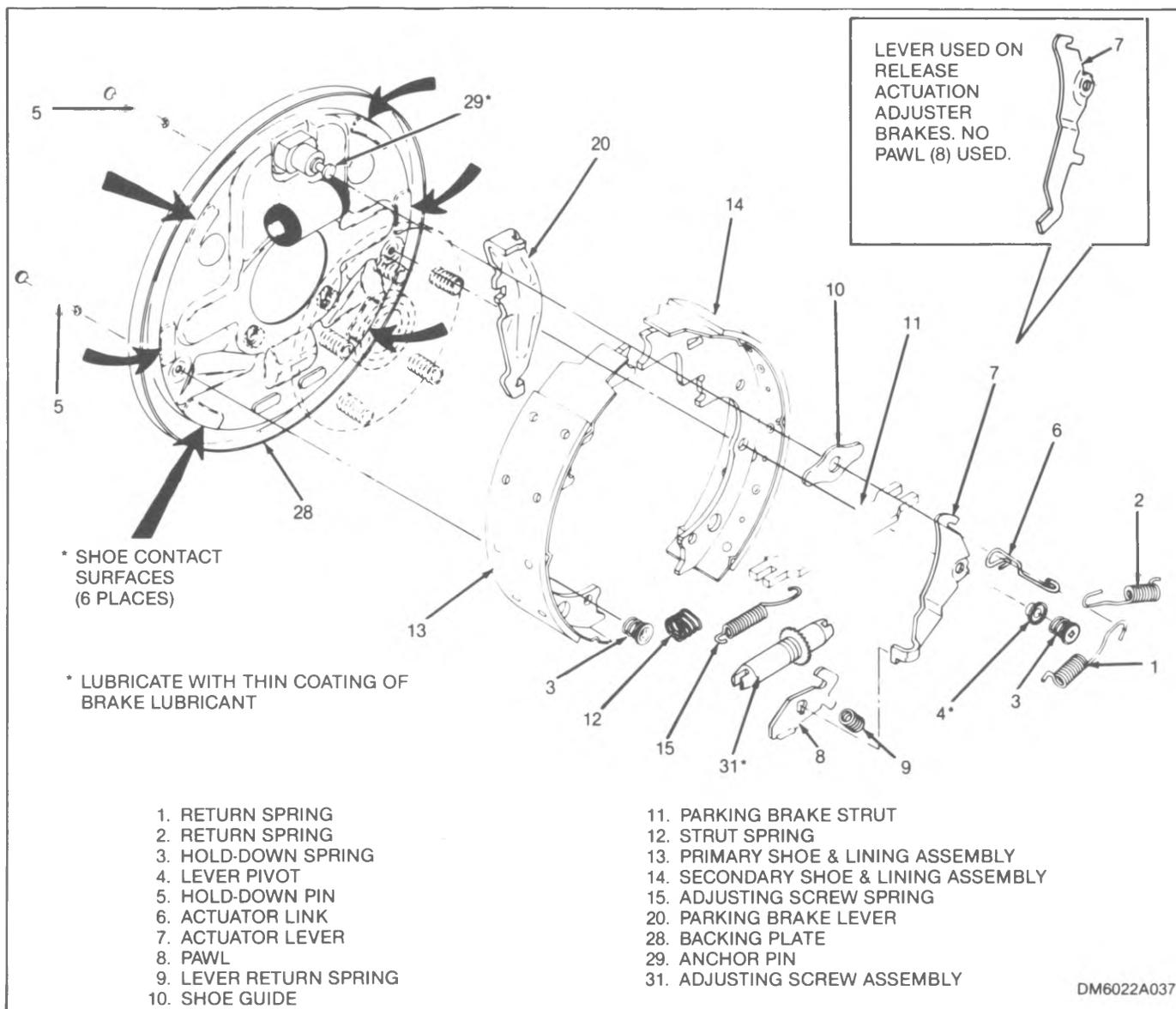


Figure 3-18. Brake Components

8. Spread brake shoes (13 and 14) to clear axle flange. Disconnect parking brake cable and remove shoes, connected by adjusting screw spring (15), from the vehicle.

9. Remove adjusting screw assembly (31) and adjusting screw spring (15). Note position of adjusting screw spring. Do not interchange adjusting screw assemblies or springs from RH and LH brake assemblies.

10. Remove parking brake lever (20) by unhooking lever tab from slot in secondary shoe (14).

*CAUTION: When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.*

11. Clean the backing plates, struts, levers and other metal parts which are to be reused with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

12. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

13. Look for evidence of oil or grease leakage past the axle bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

14. Check that the backing plates are not cracked, bent or corroded at wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts and bolted-on anchor pins are torqued to specifications.

15. If the wheel cylinders need repair it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be repaired or replaced.

NOTE: A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

NOTE: When disassembling adjusting screw assembly in the following step, note if a washer (17) is used between the adjusting screw (19) and socket (16). The washer is not used on all applications.

16. Disassemble the adjusting screw assembly (see figure 3-19) and clean parts in clean denatured alcohol. Make sure that the adjusting screw threads into the pivot nut over its complete length without sticking or binding. Check that none of the adjusting screw teeth are damaged.

17. Apply brake lube to adjusting screw (19) threads, inside diameter of socket (16) and socket face. Adequate lubrication is achieved when a continuous bead of lubricant is produced at open end of pivot nut (18) and socket after parts are assembled and threads fully engaged. Install washer (17) if found on unit at disassembly.

18. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads.

19. Install parking brake lever (20) by hooking lever tab into slot in secondary shoe (14).

20. Install adjusting screw assembly (31) and spring (15) between shoes (13 and 14) as shown in figure 3-19. Coils of spring must not be over star wheel. Left and right hand springs are different. Do not interchange.

21. Spread brake shoes (13 and 14, figure 3-18) to clear axle flange, connect parking brake cable to lever (20), and install parts on backing plate (28).

22. Install parking brake strut (11) and strut spring (12) by spreading shoes (13 and 14) apart.

23. Make sure strut (11) is properly installed. End without spring (12) engages parking brake lever (20). End with spring engages opposite brake shoe.

24. Install shoe guide (10).

25. Install actuator lever (7), pawl (8) (where used) and lever return spring (9).

26. Lubricate lever pivot (4). Install hold-down pins (5), lever pivot and hold-down springs (3).

27. Install actuator link (6) on anchor pin (29).

28. Lift up actuator lever (7) and hook link (6) into lever.

29. Install shoe return springs (1 and 2) using brake spring pliers.

30. Adjust brake as specified in paragraph 3-9.

3-21. ANCHOR PLATE DUO-SERVO DRUM BRAKE. Refer to figures 3-20 and 3-21 for identification of parts for the anchor plate drum brakes. The actuator lever variations shown are described in paragraphs 1-8 thru 1-10. After removing brake drums (refer to paragraph 3-14), proceed as follows to remove and replace brake shoes and hardware components (see figure 3-22):

1. Remove return springs (1 and 2) using suitable brake spring pliers.

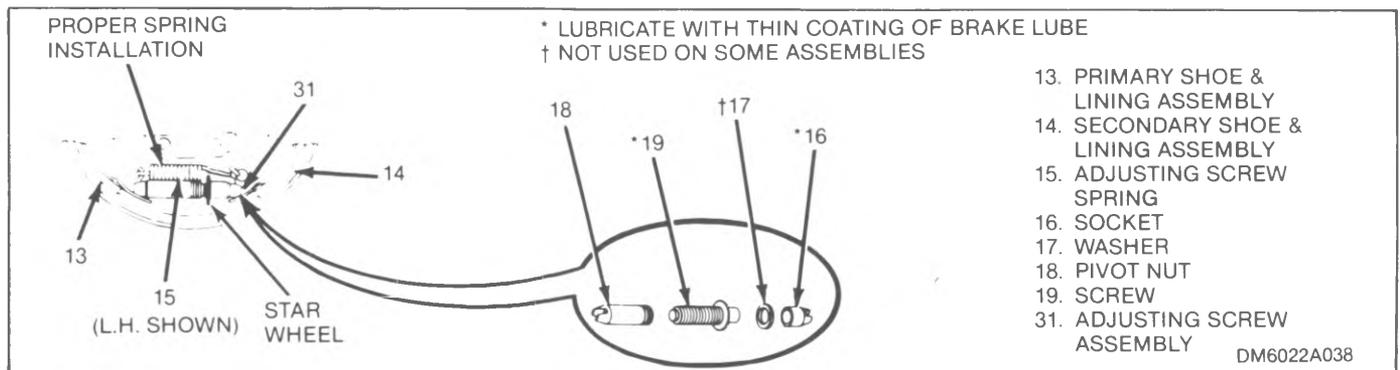


Figure 3-19. Adjusting Screw and Spring

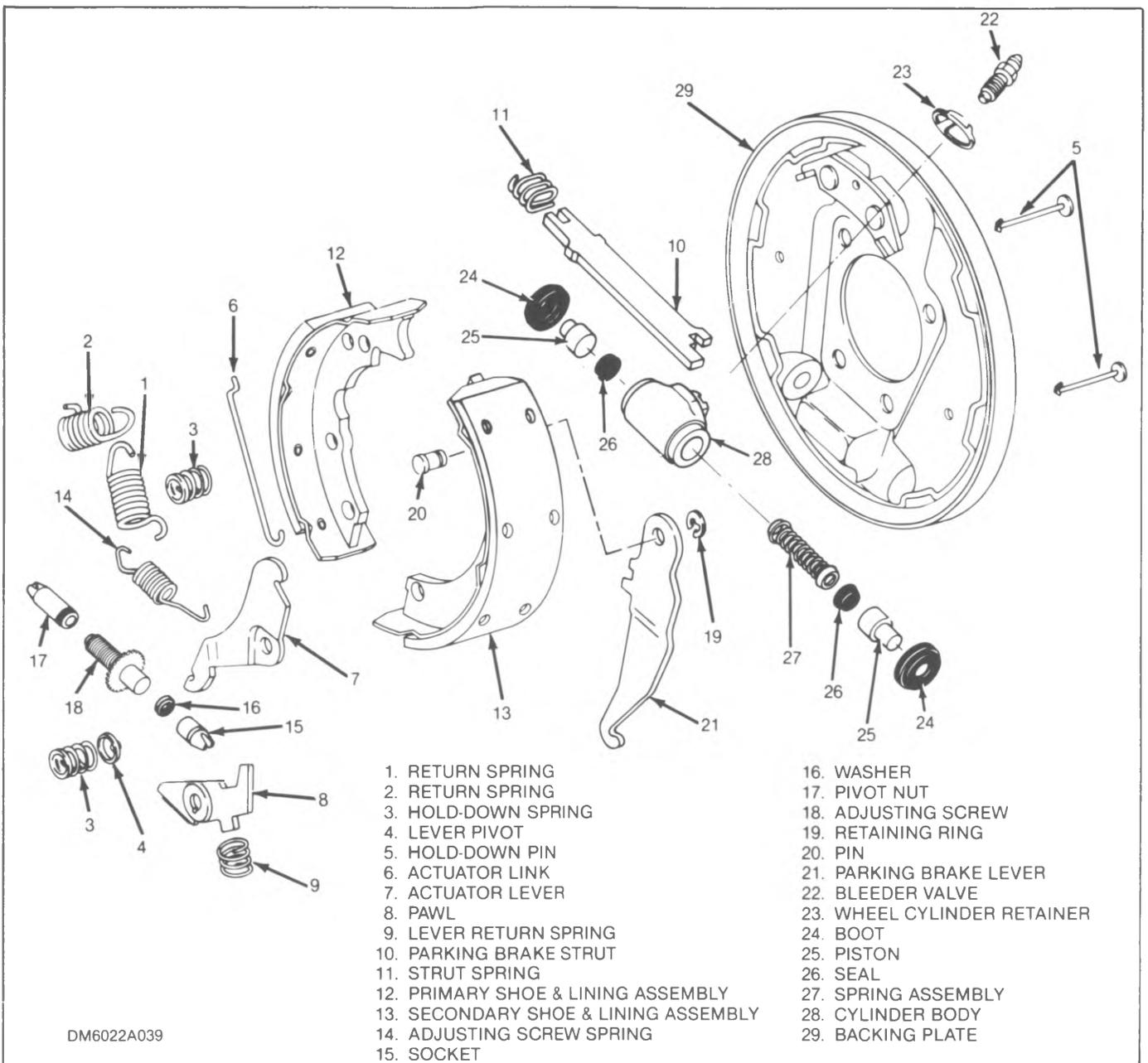


Figure 3-20. Anchor Plate Drum Brake With Apply Actuated Adjuster

2. Remove hold-down springs (3) using suitable pliers. Remove lever pivot (4).

3. Remove hold-down pins (5).

4. Lift up actuator lever (7) and remove actuator link (6).

5. Remove actuator lever (7), pawl (8) (where used) and lever return spring (9).

6. Remove parking brake strut (10) and strut spring (11) by spreading shoes (12 and 13) apart.

7. Spread brake shoes (12 and 13) to clear axle flange. Disconnect parking brake cable and remove shoes, connected by adjusting screw spring (14), from the vehicle.

8. Remove adjusting screw assembly (31) and adjusting screw spring (14). Note position of adjusting screw spring. Do not interchange adjusting screw assemblies or springs from RH and LH brake assemblies.

9. Remove parking brake lever (21) by removing retaining ring (19) and pin (20).

**CAUTION:** When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.

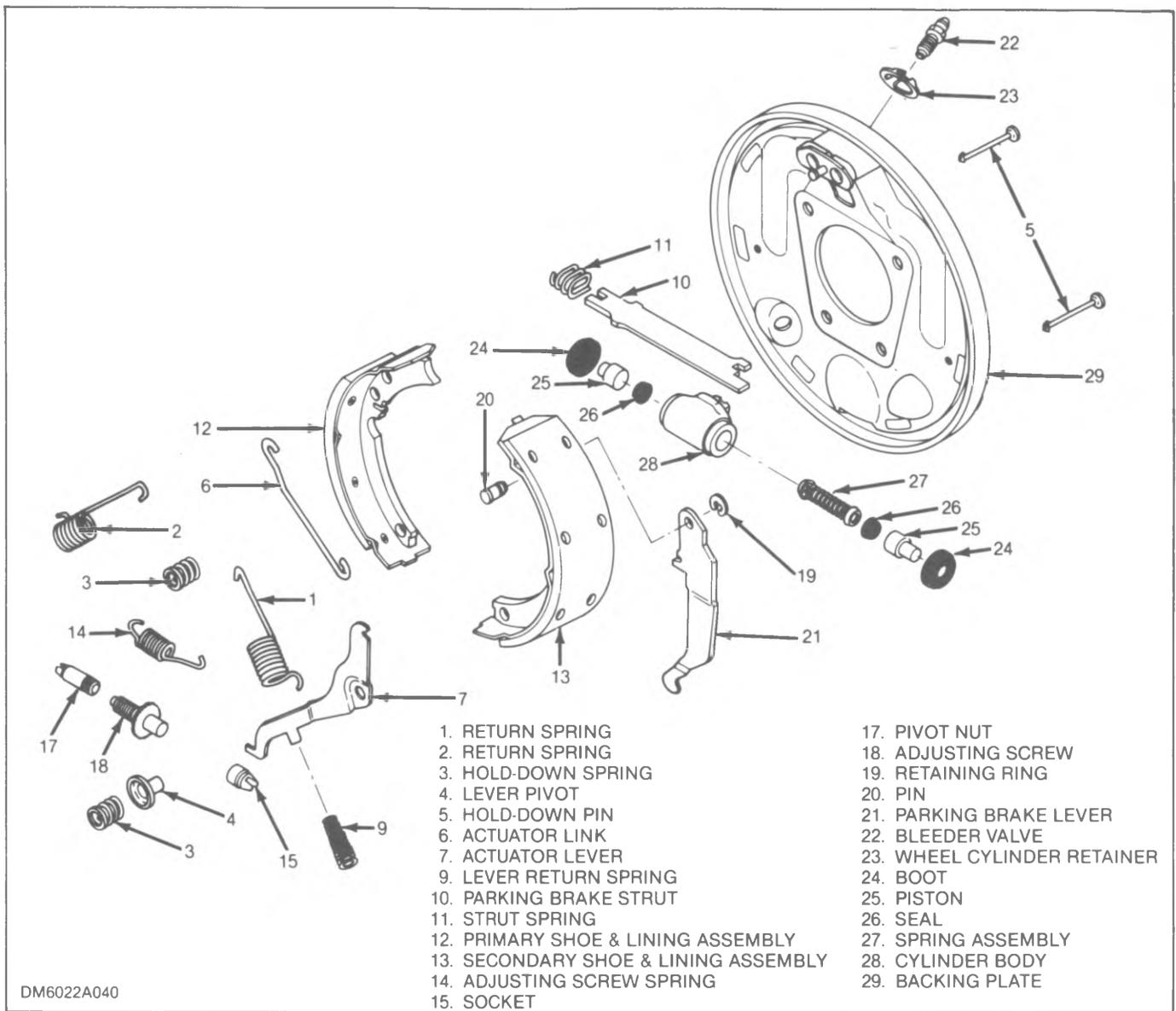


Figure 3-21. Anchor Plate Drum Brake With Release Actuated Adjuster

10. Clean the backing plates, struts, levers and other metal parts which are to be reused with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

11. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

12. Look for evidence of oil or grease leakage past the axle bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

13. Check that the backing plates are not cracked, bent or corroded at wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts and bolted-on anchor pins are torqued to specifications.

14. If the wheel cylinders need repair, it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be repaired or replaced.

NOTE: A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

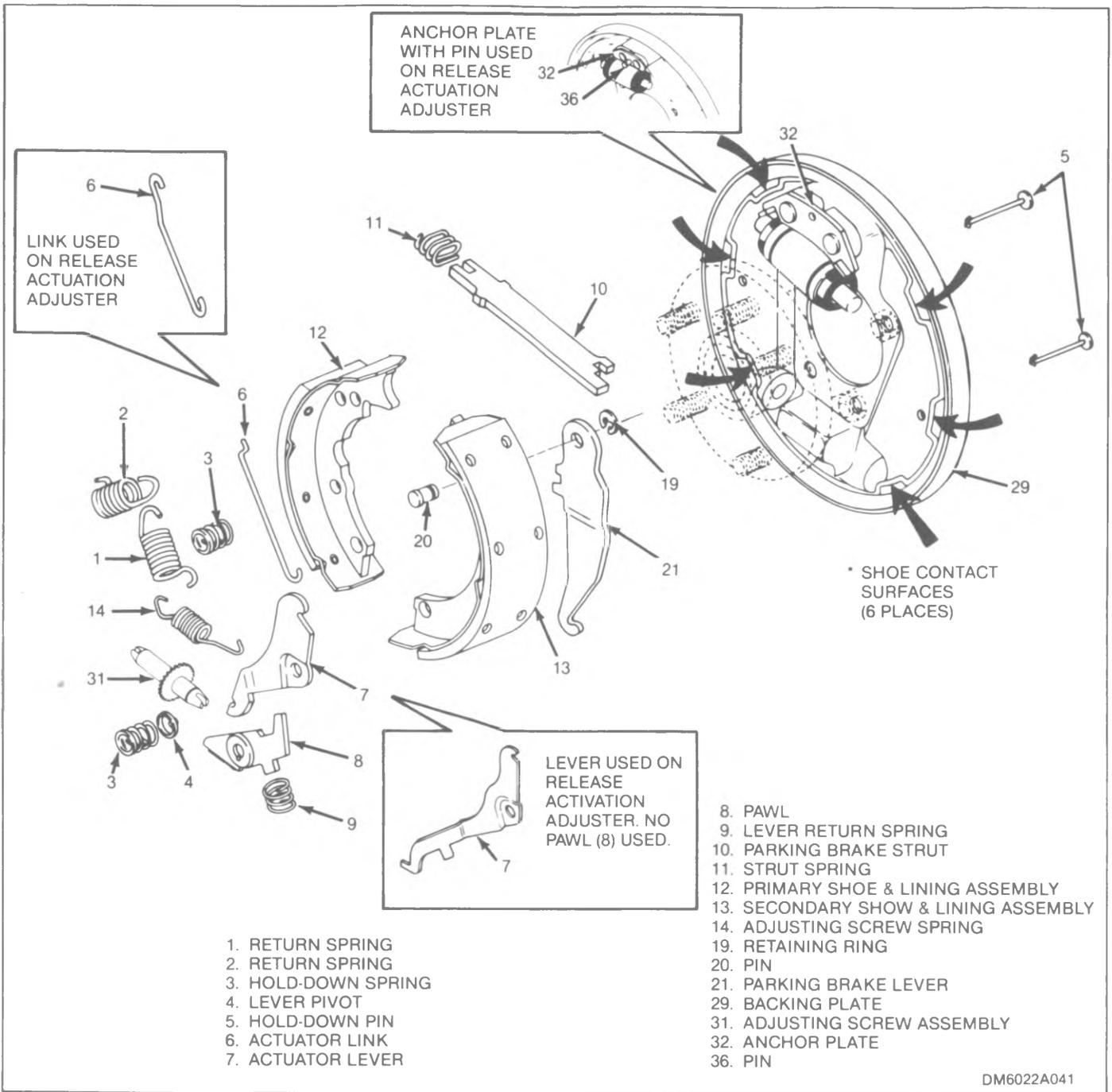


Figure 3-22. Brake Components

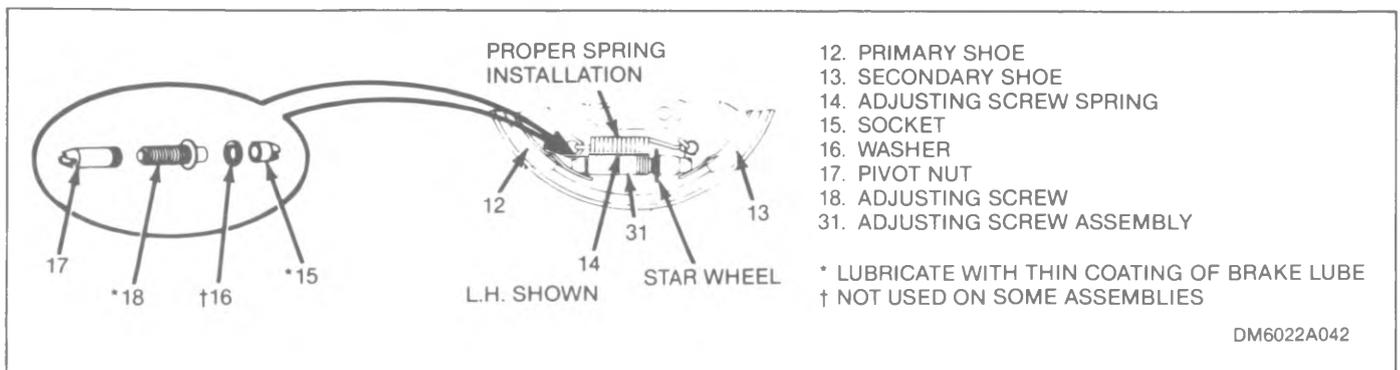


Figure 3-23. Adjusting Screw and Spring

NOTE: When disassembling adjusting screw assembly in the following step, note if a washer (16) is used between the adjusting screw (18) and socket (15). The washer is not used on all applications.

15. Disassemble adjusting screw assembly (see figure 3-23) and clean parts in clean denatured alcohol. Make sure that the adjusting screw threads into the pivot nut over its complete length without sticking or binding. Check that none of the adjusting screw teeth are damaged.

16. Apply brake lube to adjusting screw (18) threads, inside diameter of socket (15) and socket face. Adequate lubrication is achieved when a continuous bead of lubricant is produced at open end of pivot nut (17) and socket after parts are assembled and threads fully engaged. Install washer (16) if found on unit at disassembly.

17. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads.

18. Install parking brake lever (21, figure 3-22) to secondary shoe (13) using pin (20) and retaining ring (19).

19. Install adjusting screw assembly (31) and spring (14) between shoes (12 and 13) as shown in figure 3-23. Coils of spring must not be over star wheel. Left and right hand springs are different. Do not interchange.

20. Spread brake shoes (12 and 13) to clear axle flange, connect parking brake cable to lever (21), and install parts on backing plate (29).

21. Install parking brake strut (10) and strut spring (11) by spreading shoes (12 and 13) apart.

22. Make sure strut (10) is properly installed. End without spring (11) engages parking brake lever (21). End with spring engages opposite brake shoe.

23. Install actuator lever (7), pawl (8) (where used) and lever return spring (9).

24. Lubricate lever pivot (4). Install hold-down pins (5), lever pivot and hold-down springs (3).

25. Install actuator link (6) in anchor plate (32) (apply actuation adjuster) or hook onto anchor plate pin (36) (release actuation adjuster).

26. Lift up actuator lever (7) and hook link (6) into lever.

27. Install shoe return springs (1 and 2) using brake spring pliers.

28. Adjust brake as specified in paragraph 3-9.

### 3-22. REMOVE AND INSTALL WHEEL CYLINDER

3-23. Wheel cylinders are either bolted to the backing plate (see figure 3-24) or attached with a retainer (see figure 3-25). Proceed as follows for the type being serviced:

3-24. WHEEL CYLINDER BOLTED ON (see figure 3-24).

1. Remove dirt and foreign material around wheel cylinder (3) inlet and pilot.

2. Remove links (1).

3. Disconnect inlet tube line.

4. Remove bolts (2) and lift off wheel cylinder.

5. For wheel cylinder repair, refer to Section V.

6. Position wheel cylinder (3) and attach with bolts (2). Torque bolts to 11-25 N-m (8-19 lb-ft.).

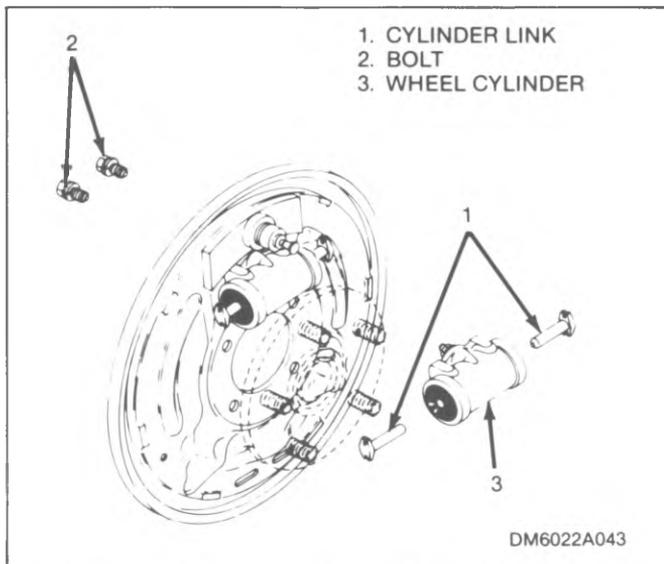


Figure 3-24. Remove and Replace Wheel Cylinder

7. Install and torque inlet tube nut to 13-20 N-m (10-15 lb-ft.).

8. Install links (1).

3-25. WHEEL CYLINDER ATTACHED WITH RETAINER. Proceed as follows (see figure 3-26):

1. Remove dirt and foreign material around wheel cylinder (2) inlet and pilot.

2. Disconnect inlet tube line.

3. Remove wheel cylinder retainer (1) using two awls or pins (1/8 inch diameter or less), or use J29839 Retainer Remover as shown in figure 3-28.

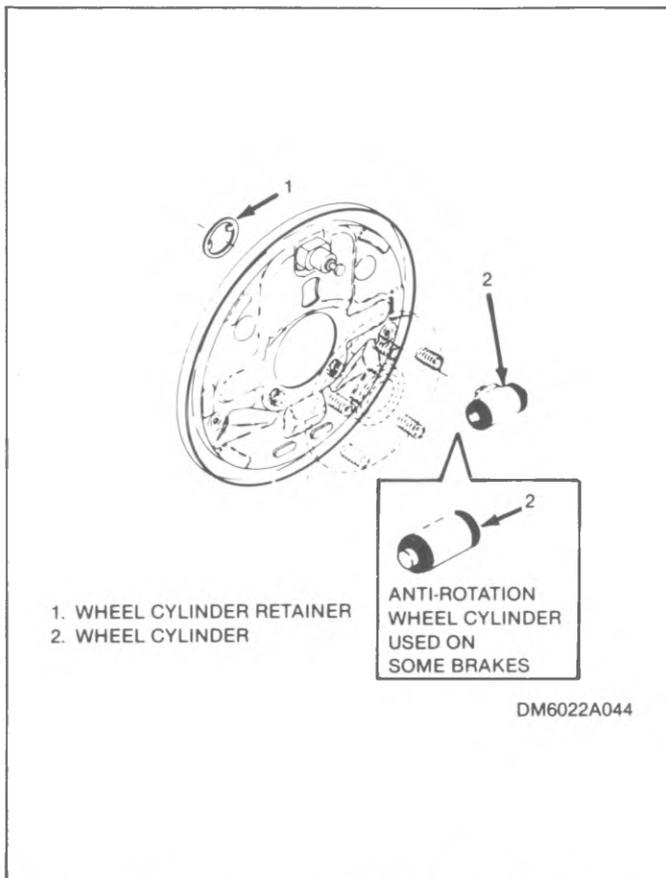


Figure 3-25. Remove and Replace Wheel Cylinder

4. As shown in figure 3-26, insert awls (3) or pins into access slots between wheel cylinder pilot and retainer (1) locking tabs.

5. Bend both tabs away simultaneously to remove retainer (1) and wheel cylinder (2).

6. For wheel cylinder repair, refer to Section V.

7. Position wheel cylinder (2) and hold in place with wooden block between cylinder and axle flange.

8. As shown in figure 3-27, install new retainer (1) over wheel cylinder (2) abutment using a 1-1/8 inch, 12 point socket (5) and socket extension (4).

9. Torque inlet tube nut to 13-20 N-m (10-15 lb-ft.).

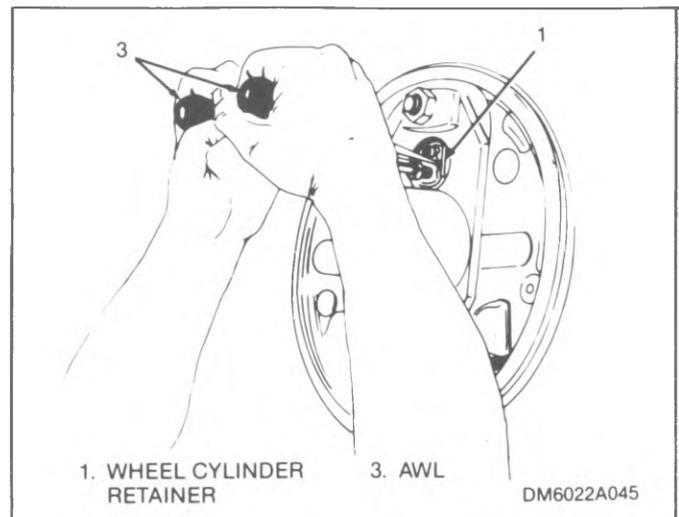


Figure 3-26. Removing Retainer

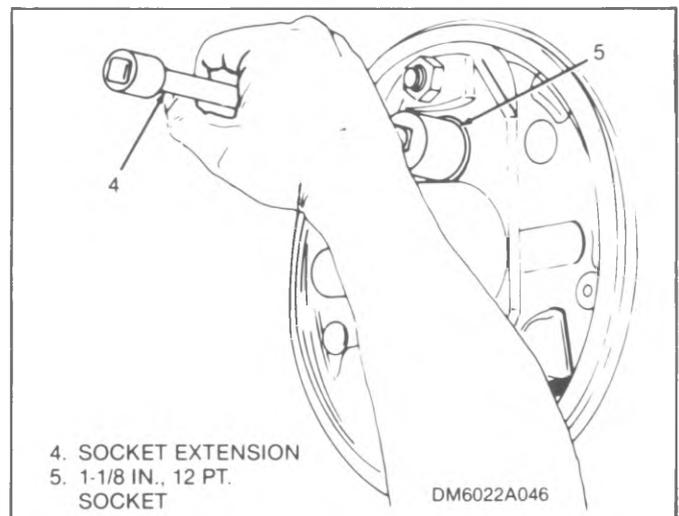
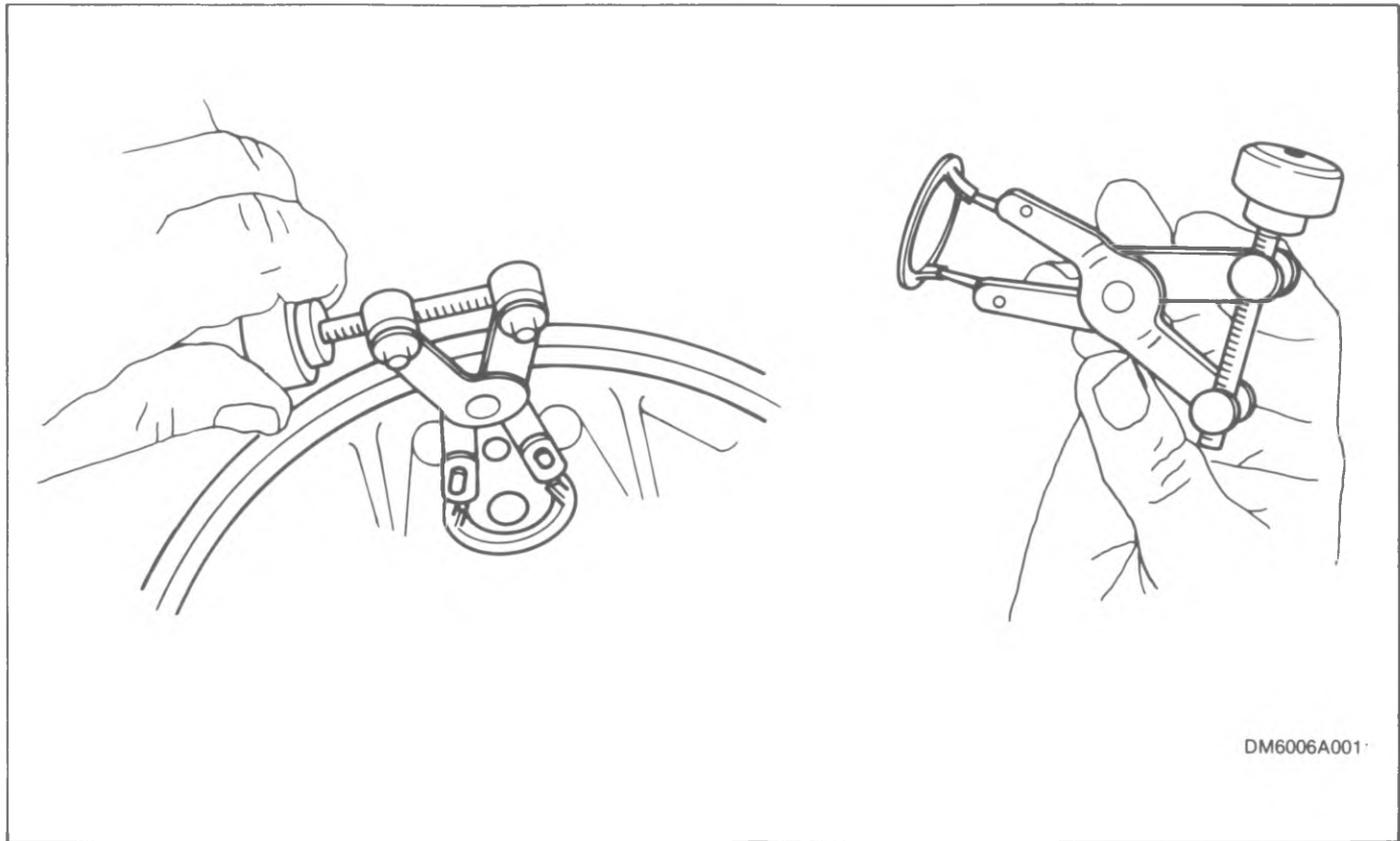


Figure 3-27. Installing Retainer



DM6006A001

Figure 3-28. Removing/Installing Retainer with J29839 Retainer Remover

# SECTION IV

## LEADING-TRAILING BRAKE ON-VEHICLE SERVICE

### 4-1. GENERAL INFORMATION

*CAUTION: When brake lube or lubrication is specified from drum brake service use GM 5450032 brake lube, or equivalent. Do not use ordinary grease. It will not hold up under the high temperatures generated by brake operation. Use care not to get brake lube on the linings or the inside surface of the drum since this will make the linings unfit for proper braking.*

**4-2. LEADING-TRAILING BRAKE DESIGNATIONS.** Several types of leading-trailing shoe drum brake mechanisms are covered in this section. The differences are primarily in the automatic adjusters. Descriptions for these are provided in Section I as follows:

1. 1976-79 Chevette type, described in paragraph 1-14. (Refer to paragraph 4-24 for shoe and lining and brake hardware replacement.)
2. 1975 and prior Vega, Monza, Astre, Sunbird, Skyhawk and Starfire type, 1 described in paragraph 1-15. (Refer to paragraph 4-25 for shoe and lining and brake hardware replacement.)
3. 1985-86 Sprint type, described in paragraph 1-16. (Refer to paragraph 4-26 for shoe and lining and brake hardware replacement.)
4. 1985-86 Spectrum type, described in paragraph 1-17. (Refer to paragraph 4-27 for shoe and lining and brake hardware replacement.)
5. 1985-86 Nova type, described in paragraph 1-18. (Refer to paragraph 4-28 for shoe and lining and brake hardware replacement.)
6. 1986 LeSabre, Delta 88 and Bonneville type, described in paragraph 1-19. (Refer to paragraph 4-29 for shoe and lining and brake hardware replacement.)

**4-3. BRAKE HYDRAULIC SYSTEM.** To maintain the hydraulic system in a serviceable condition, note the following when performing on-vehicle service:

1. Do not disconnect any brake line fitting, pipe or hose unless specified for the on-vehicle service being performed.
2. Whenever the brake hydraulic system is opened, plug opening in line to prevent fluid loss and contamination.
3. Torque all hydraulic fittings to specifications.

4. Always bleed the brake hydraulic system whenever any line or fitting is disconnected (refer to Section VI).

5. Never reuse brake fluid that is drained, removed, or bled from the hydraulic system or brake components.

6. Check that the master cylinder is filled to the proper level after any on-vehicle service.

7. Test for proper braking before operating vehicle.

### 4-4. SERVICE BRAKE ADJUSTMENT

**4-5. GENERAL INFORMATION.** The leading-trailing self-adjusting drum brakes covered by this manual do not require manual adjustment when the automatic adjusters are functioning properly.

1. If excessive pedal travel or other symptoms of improper adjustment are noted, remove the brake drums (refer to applicable paragraph 4-21 or 4-22).
2. Inspect the automatic adjuster mechanisms, replacing defective parts as required (refer to applicable paragraph 4-24 thru 4-29).
3. Clean, lubricate and/or replace damaged adjuster parts.
4. A manual adjustment of the self-adjusting brakes is required when the shoe and linings are replaced. This is a part of the procedure for removing and replacing the shoe and linings and is described in the applicable paragraph 4-24 thru 4-29.
5. In some cases, it may be necessary to back off or release the brake adjustment to remove the brake drums.

**4-6. 1976-79 CHEVETTE BRAKE ADJUSTMENT.** Adjust this type of brake with drums installed by applying and releasing the brake pedal 3-5 times, using approximately 30 lbs. (66N) of force, with the vehicle motionless. Repeat this procedure until a firm pedal is obtained. Check that pedal travel is to specifications (refer to vehicle service manual). If it is necessary to release the brake adjustment to remove the brake drum, proceed as follows:

1. Locate the adjuster bolts, on the inside of the backing plate.
2. Turn the adjuster bolts in direction shown in figure 4-1, to retract the brake shoes.

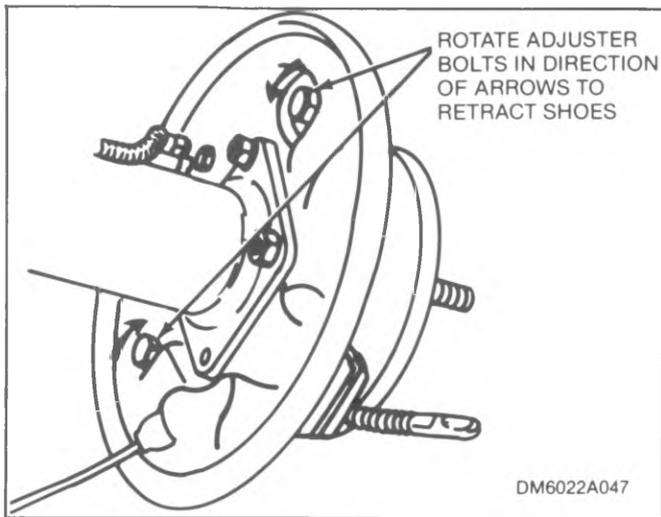


Figure 4-1. Retracting Brake Shoes  
1976-79 Chevette Type  
Leading-Trailing Shoe Drum Brake

NOTE: The parking brake cable must be properly adjusted (refer to paragraph 4-12) in order to make the brake adjustment described in the following paragraph.

4-7. VEGA, MONZA, ASTRE, SUNBIRD, SKY-HAWK AND STARFIRE, THRU 1975, BRAKE ADJUSTMENT. Adjust this type of brake with drums installed by applying and releasing the parking brake several times with the vehicle motionless. This will adjust the service brakes and can be checked by pressing the brake pedal. If it is necessary to release the brake adjustment to remove the brake drum, proceed as follows:

1. Knock out the lanced area in the web of the brake drum using a chisel or similar tool (see figure 4-2).

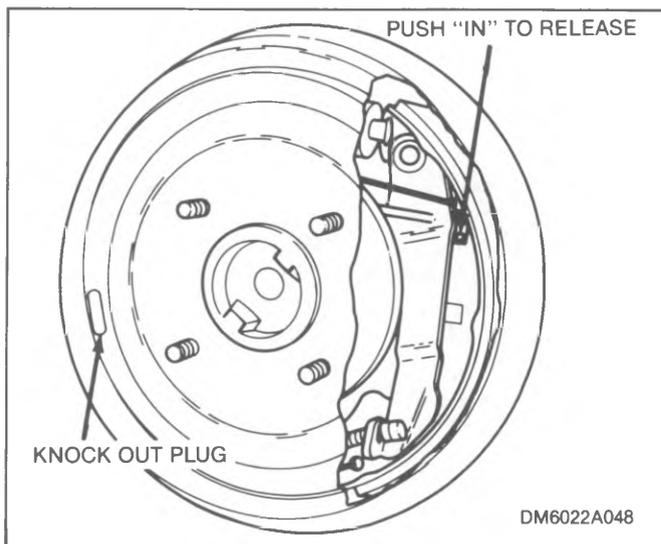


Figure 4-2. Retracting Brake Shoes 1975 and Prior  
Vega, Monza, Astre, Sunbird, Skyhawk and Starfire  
Type Leading-Trailing Shoe Drum Brake

2. Release the rod assembly from the trailing shoe by pushing in on the rod until it is clear of the shoe (see figure 4-2). The pull back spring will then pull the shoes toward each other and the drum may be removed.

*CAUTION: After the lanced area of the drum is knocked out, the drum must be removed and the metal "knock-out" or any small pieces of metal removed from the brake. Install a plug in the lanced hole when the drum is reinstalled to prevent entry of dirt and water into the brake.*

4-8. 1985-86 SPRINT BRAKE ADJUSTMENT. Adjust this type of brake with the drums installed, by applying and releasing the brake pedal 3 to 5 times using approximately 66 lb (30 kg) of force, with vehicle motionless. Repeat this procedure until a firm pedal is obtained. Check that pedal travel is to specifications (refer to vehicle service manual). If it is necessary to release the brake adjustment to remove the brake drum, proceed as follows:

1. Remove the plug from the backing plate.
2. Insert a screwdriver through the exposed access hole.
3. Position tip of screwdriver on the shoe hold-down spring and push (see figure 4-3). This will allow the parking brake lever to spring outward and release the brake adjustment.

4-9. 1985-86 SPECTRUM BRAKE ADJUSTMENT. Adjust this type of brake, with drums installed, by applying and releasing the brake pedal several times using approximately 66 lb (30 kg) force, with the vehicle motionless. Repeat this procedure until a firm pedal is obtained. Check that pedal travel is to specifications (refer to vehicle service manual). If it is necessary to release the brake adjustment to remove the brake drum, proceed as follows:

1. Remove the plug from the backing plate.
2. Insert a screwdriver through the exposed access hole.
3. Position tip of screwdriver on the auto adjuster lever and push it off the star wheel on the auto adjuster. Using a second screwdriver, back off the auto adjuster star wheel.

4-10. 1985-86 NOVA BRAKE ADJUSTMENT. Adjust this type of brake, with drums installed, by applying and releasing the parking brake several times with the vehicle motionless. This will adjust the service brakes and can be checked by pressing the brake pedal. If it is necessary to release the brake adjustment to remove the drum, proceed as follows:

1. Remove the plug from the backing plate.

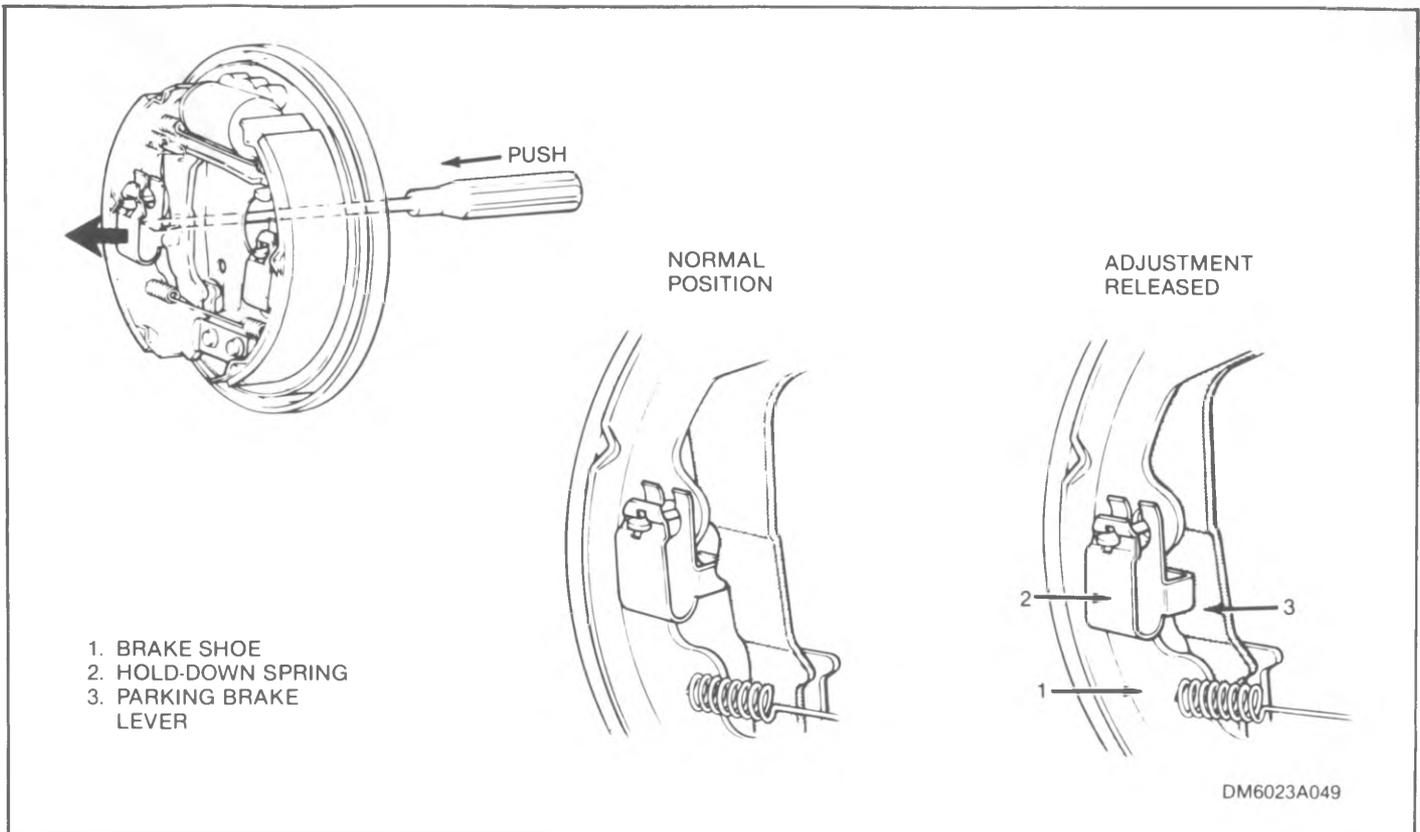


Figure 4-3. Releasing Brake Adjustment 1985-86 Sprint Leading-Trailing Shoe Drum Brake

2. Insert a screwdriver through the exposed access hole.

3. Position tip of screwdriver into the slot in the adjusting lever. Lift the adjusting lever away from the adjuster star wheel. Use a second screwdriver, back off the auto adjuster star wheel (see figure 4-4).

4-11. 1986 LESABRE, DELTA 88 AND BONNEVILLE. Adjust this type of brake with the drums installed, by applying and releasing the service brake pedal 30-35 times using approximately 30 lb (66 N) force, with the vehicle motionless. Pause about one second between pedal applies. A clicking noise will be heard from the drum brake adjusters as adjustment takes place. Continue until a firm pedal is obtained. Check that pedal travel is to specifications (refer to vehicle service manual). If it is necessary to release the brake adjustment to remove the brake drum, proceed as follows:

1. Remove the plug from the backing plate.
2. Insert a screwdriver through the exposed access hole.

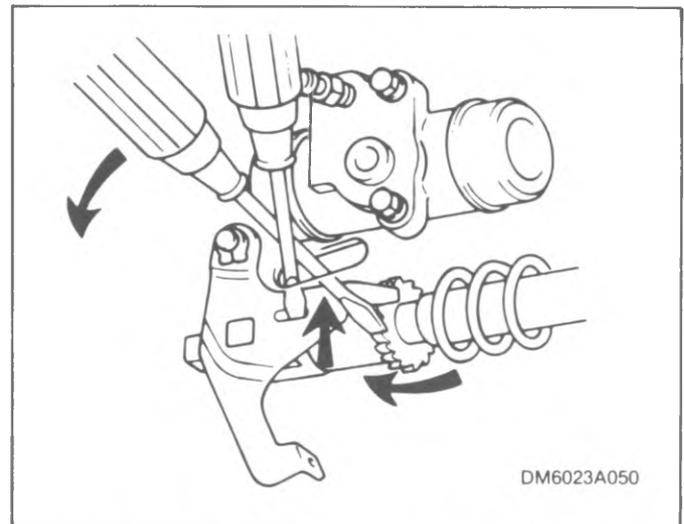


Figure 4-4. Backing Off 1985-86 Nova Adjuster

3. Position tip of screwdriver on the parking brake lever and push it off its stop (see figure 4-5). This will allow the shoe and linings to retract slightly.

## 4-12. PARKING BRAKE ADJUSTMENT

4-13. Parking brake adjustment is necessary whenever the rear drum brakes have been serviced or the need is indicated by parking brake check. Make sure service brakes are adjusted properly before making parking brake adjustment.

4-14. 1976-79 CHEVETTE CAR PARKING BRAKE ADJUSTMENT. Adjust as follows:

1. Hoist vehicle.
2. Apply parking brake 1 notch from fully released position.
3. Tighten equalizer adjusting nut (under the vehicle, see figure 3-11) until a light drag is felt when the rear wheels are rotated forward.
4. Fully release the parking brake and rotate the rear wheels. No drag should be present. If drag is felt, back off equalizer adjusting nut until drag is gone.

4-15. VEGA, MONZA, ASTRE, SUNBIRD, SKY-HAWK AND STARFIRE, THRU 1975, PARKING BRAKE ADJUSTMENT. Adjust as follows:

1. Hoist vehicle.
2. Apply parking brake 1 notch from fully released position.
3. Loosen equalizer check nut and tighten equalizer adjusting nut (under the vehicle, see figure 3-11) until a light drag is felt when the rear wheels are rotated forward.
4. Tighten check nut securely.
5. Fully release the parking brake and rotate the rear wheels. No drag should be present. If a drag is felt, loosen check nut and back off adjusting nut until drag is gone. Retighten check nut.

4-16. 1985-86 SPRINT PARKING BRAKE ADJUSTMENT. Set parking brake using a force of 44 lb (20 kg) on the lever. Parking brake lever travel shall be 3-8 notches (clicks). Fully release the parking brake and rotate the rear wheels. No drag should be present. If drag is felt, adjust as follows:

NOTE: To gain access to parking brake adjustment, it will be necessary to lift carpet from around parking brake lever.

1. Release parking brake.
2. To tighten parking brake cable, loosen adjusting nuts (3) equally and tighten adjusting nuts (4) (see figure 4-6).

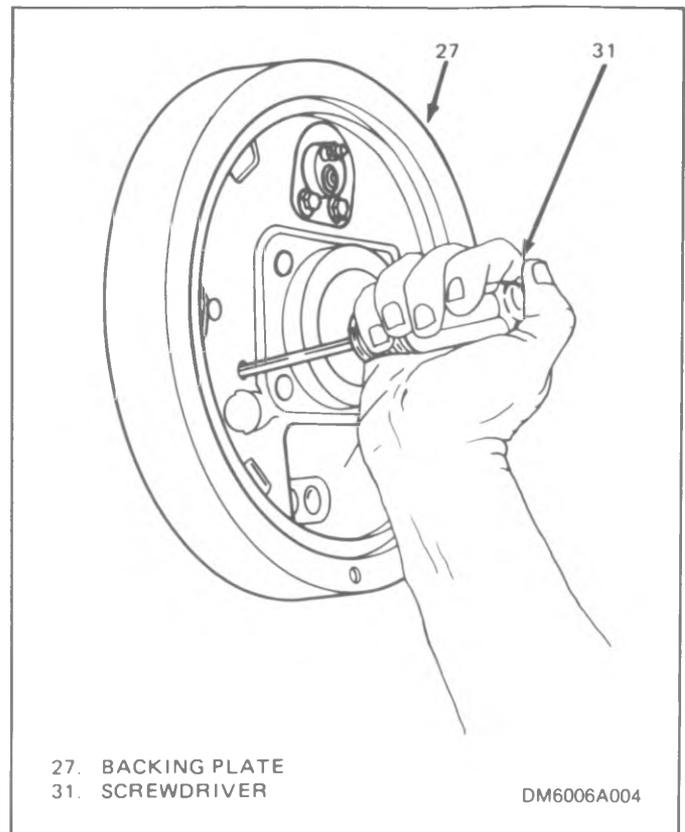


Figure 4-5. Retracting 1986 LeSabre, Delta 88 and Bonneville Brake Shoes

3. To loosen parking brake cable, loosen adjusting nuts (4) equally and tighten adjusting nuts (3) (see figure 4-6).
4. Recheck parking brake application and release.

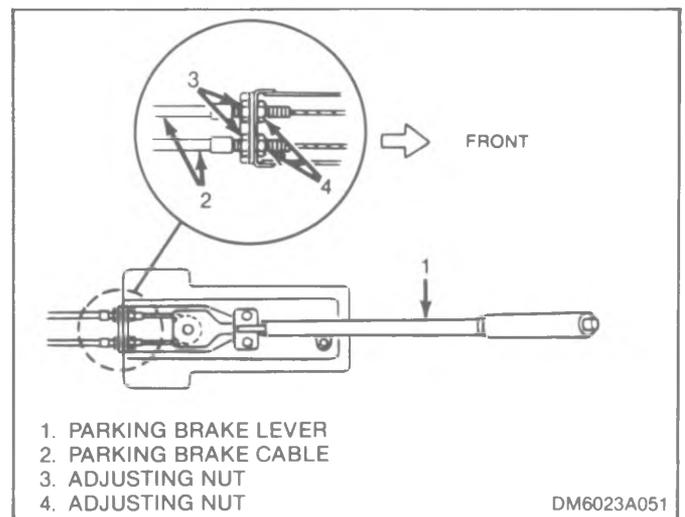


Figure 4-6. 1985-86 Sprint Parking Brake Adjustment

4-17. 1985-86 SPECTRUM PARKING BRAKE ADJUSTMENT. Set parking brake using a force of 66 lb (30 kg) on the lever. Parking brake lever travel should be 7-9 notches. Fully release the parking brake and rotate the rear wheels. No drag should be present. If a drag is felt, adjust parking brake cable at the turnbuckle.

4-18. 1985-86 NOVA PARKING BRAKE ADJUSTMENT. Set the parking brake using a force of 44 lb (20 kg) on the lever. Parking brake lever travel shall be 4-7 notches (clicks). Fully release the parking brake and rotate the rear wheels. No drag should be present. If a drag is felt, adjust as follows:

NOTE: To gain access to parking brake adjustment it will be necessary to remove the console box at the lever.

1. Loosen the locknut and turn the adjusting nut until lever travel is correct (see figure 4-7).
2. Tighten locknut.
3. Re-install console box.

4-19. 1986 LESABRE, DELTA 88 AND BONNEVILLE PARKING BRAKE ADJUSTMENT. Apply and release parking brake 6 times to 10 clicks. Release park brake pedal.

1. Remove access hole plug from inboard side of backing plate.

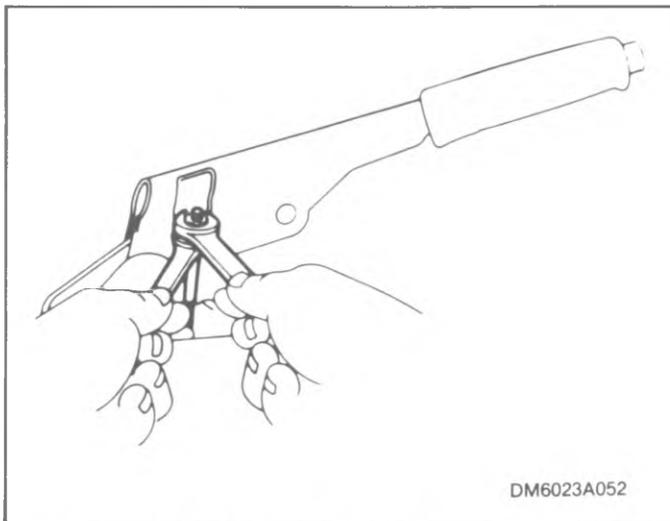


Figure 4-7. Adjusting Nova Parking Brake

2. Adjust park brake cable until a 1/8 inch (3.17 mm) drill (34) can just be inserted through the access hole into the space between the shoe web and park brake lever as shown in figure 4-8. Satisfactory parking brake cable adjustment is achieved when a 1/8 inch (3.17 mm) drill will fit into the space but a 1/4 inch (6.35 mm) drill will not.

3. Release park brake and check for free wheel rotation.

4. Replace access hole plug.

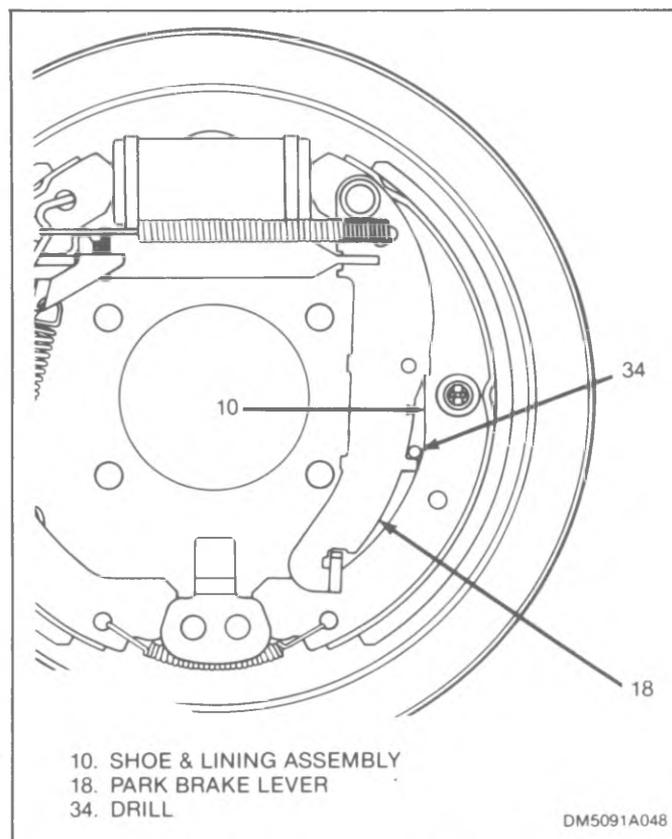


Figure 4-8. 1986 LeSabre, Delta 88 and Bonneville Parking Brake Adjustment

#### 4-20. REMOVE AND INSTALL BRAKE DRUMS

4-21. ALL LEADING-TRAILING DRUM BRAKE MODELS EXCEPT SPRINT. Remove and replace brake drums for servicing or to gain access to other brake components as follows:

1. Release parking brake and hoist vehicle.
2. Loosen parking brake adjustment (refer to applicable paragraph 4-14, 4-15, 4-17, 4-18 or 4-19).
3. Mark relationship of wheel to axle.
4. Remove wheel and tire.
5. Mark relationship of drum to axle.

NOTE: In some cases, before the drum can be removed, it may be necessary to back off brake adjustment (refer to applicable paragraph 4-6 thru 4-11).

6. Remove brake drum.

7. Refer to Section VII for brake drum service instructions (inspection, refinishing and/or replacement).

8. Install brake drums in same position as removed.

9. Adjust brakes if required (refer to applicable paragraph 4-6 thru 4-11).

10. Install wheel in same position as removed. Torque wheel nuts to specifications.

11. Adjust parking brake (refer to applicable paragraph 4-14 thru 4-19).

4-22. 1985-86 SPRINT. To remove brake drums for servicing or to gain access to other brake components, proceed as follows (see figure 4-9):

1. Release parking brake, hoist car and remove wheel.

2. Remove spindle cap (1) by tapping a suitable chisel around cap circumference as shown in figure 4-10. Use care not to dent or deform cap.

3. Remove the cotter pin (2), nut (3) and washer (4).

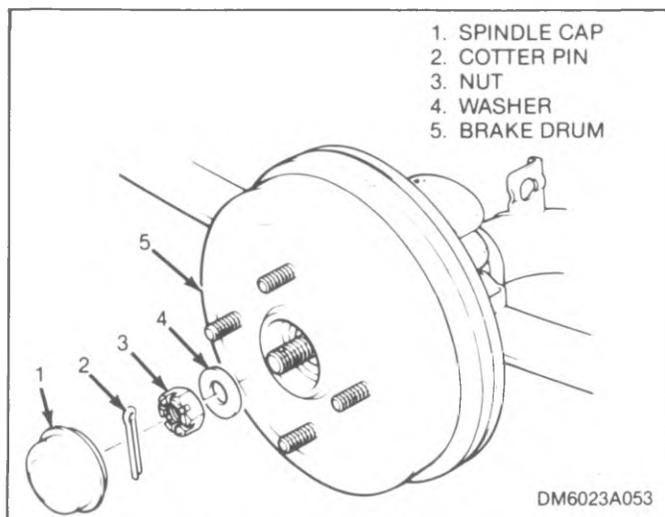


Figure 4-9. Remove and Install 1985-86 Sprint Brake Drum

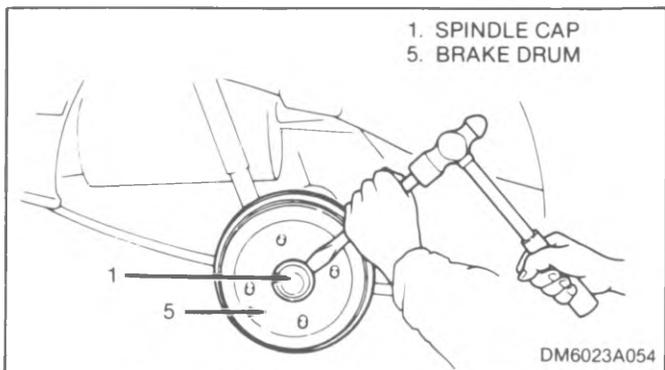


Figure 4-10. Removing Spindle Cap

4. Remove tension on parking brake cable by loosening adjusting nuts (refer to paragraph 4-16).

5. Release brake adjustment (refer to paragraph 4-8).

6. Remove brake drum (5). Special tools as shown in figure 4-11, or equivalent, may be required.

7. Refer to Section VII for brake drum service instructions (inspection, refinishing and replacement).

*CAUTION: In the following step, use care not to damage boot on wheel cylinder.*

8. Retract the brake shoes (6) (see figure 4-12). To do this, press the strut ratchet (7) inward while simultaneously pushing forward on brake shoe.

9. Return parking brake lever to its normal position. Move parking brake lever in direction shown in figure 4-13. The shoe hold-down spring will snap inward so that when the lever (9) is released it will come to rest against the spring.

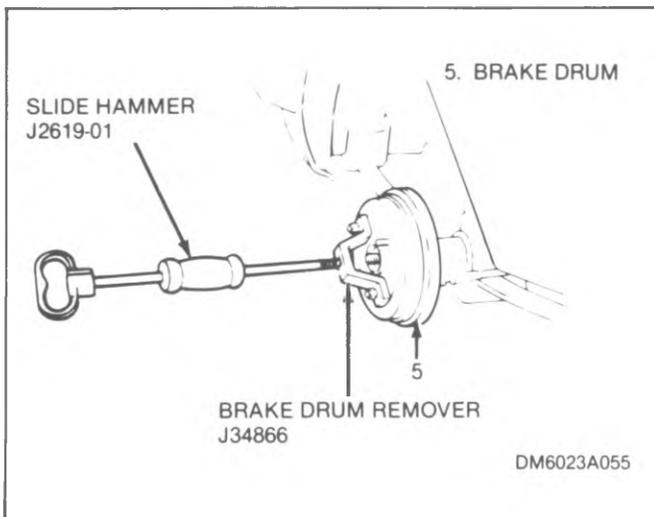


Figure 4-11. Removing Sprint Brake Drum Using Special Tools

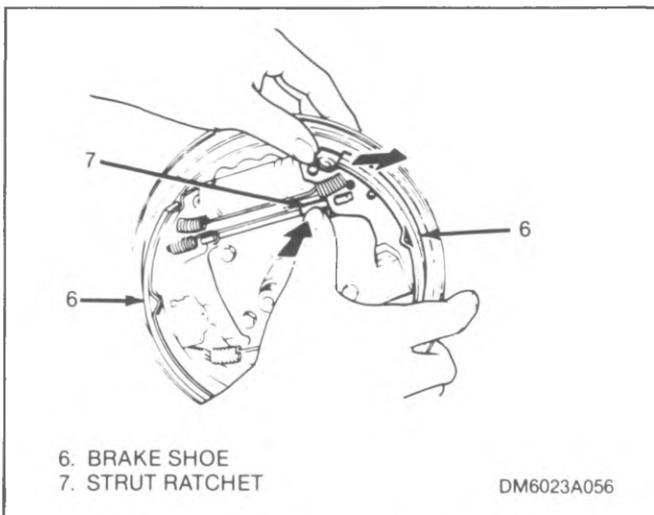


Figure 4-12. Retracting Brake Shoes

10. Install brake drum (5) (see figure 4-9), washer (4) and nut (3). Torque nut to 80-120 N-m (58-86 lb-ft).

11. Install and bend cotter pin (2) as shown in figure 4-14.

14. Adjust parking brake (refer to paragraph 4-16).

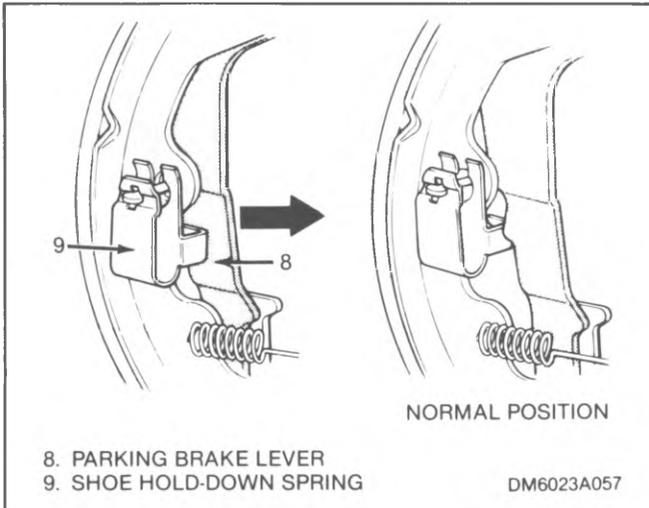


Figure 4-13. Returning Parking Brake Lever to Normal Position

12. Install spindle cap (1) by tapping lightly around cap collar with a mallet. Replace spindle cap if damaged or distorted so that it cannot be installed properly.

13. Adjust brakes by depressing brake pedal as specified in paragraph 4-8.

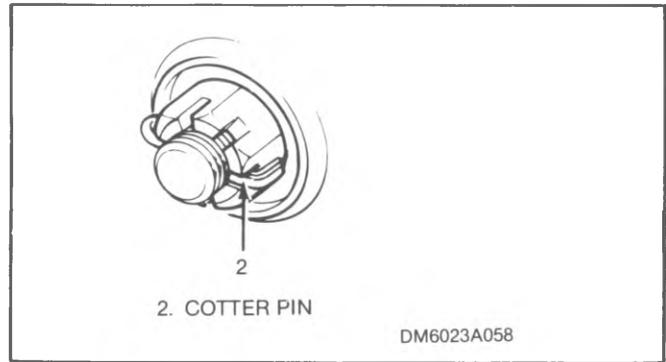


Figure 4-14. Cotter Pin Installation

#### 4-23. REMOVE AND INSTALL SHOE AND LININGS AND BRAKE HARDWARE

4-24. 1976-79 CHEVETTE LEADING-TRAILING BRAKE. Refer to figure 4-15 for identification of parts for this type brake. After removing brake drums (refer to paragraph 4-21), proceed as follows to remove and replace brake shoes and hardware:

1. Disconnect parking brake cable from parking brake lever (8).

2. Remove pull-back spring (1) using suitable brake spring pliers as shown in figure 4-16.

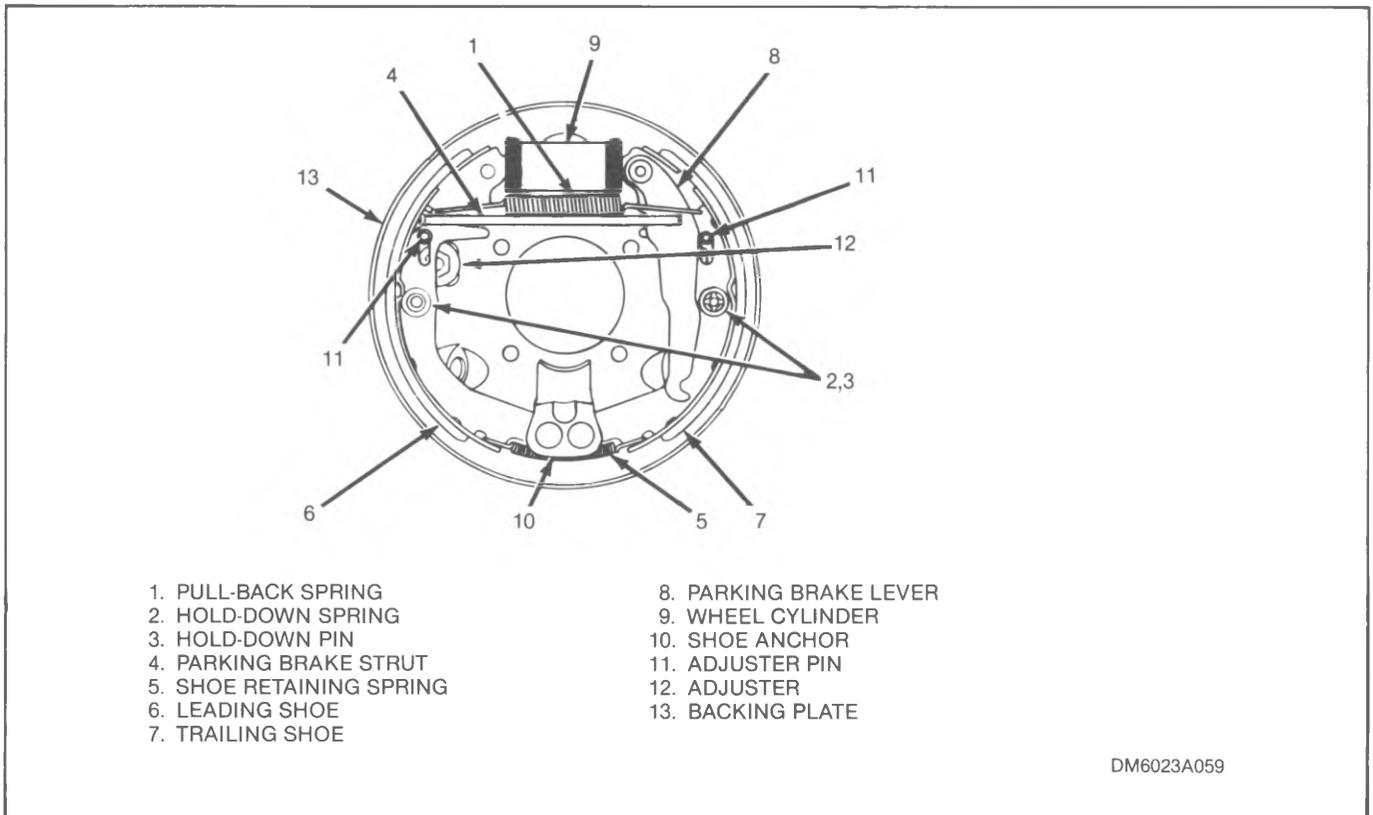


Figure 4-15. 1976-79 Chevette Leading-Trailing Shoe Brake Parts

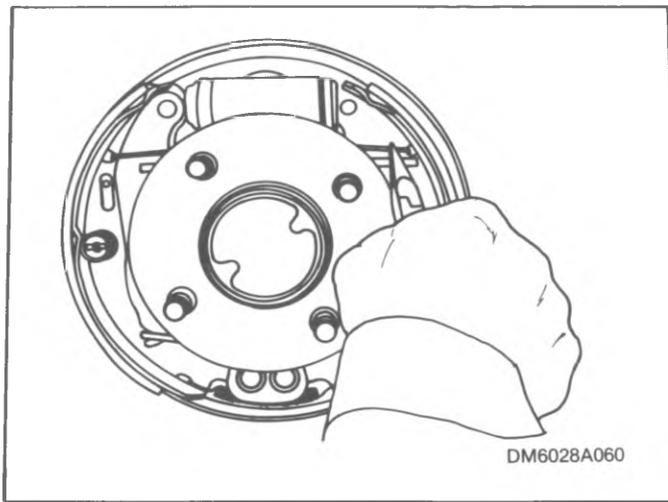


Figure 4-16. Removing Pull-Back Spring

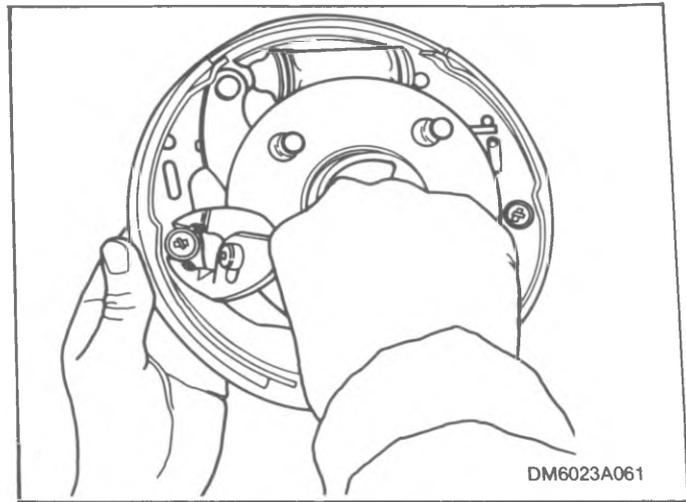


Figure 4-17. Removing Hold-Down Springs

3. Remove hold-down springs (2) using brake spring pliers as shown in figure 4-17.

4. Remove hold-down pins (3).

5. Remove brake shoes (6 and 7), with parking brake strut (4), shoe retaining spring (5) and parking brake lever (8), as a unit (see figure 4-18).

6. Remove parking brake strut (4), shoe retaining spring (5) and parking brake lever (8) from brake shoes (6 and 7).

**NOTE:** Mark shoe positions if they are to be reused.

**CAUTION:** When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See **CAUTION** inside front cover.

7. Clean the backing plate, strut, lever and other metal parts which are to be reused with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

8. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

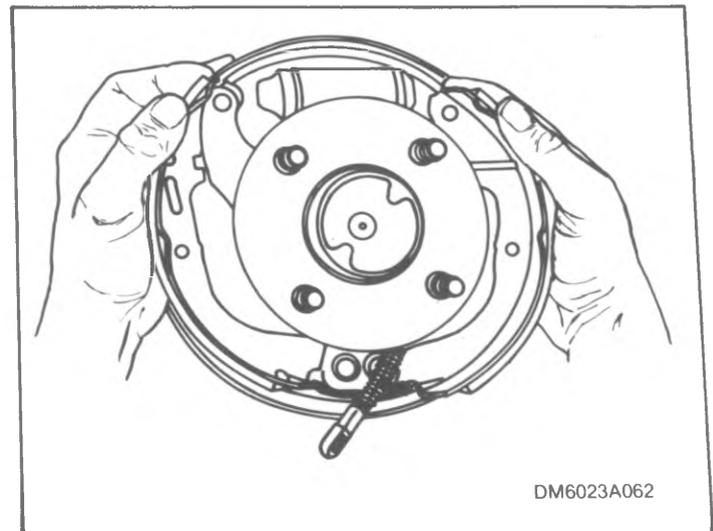


Figure 4-18. Removing Brake Shoes and Attached Parts

9. Look for evidence of oil or grease leakage past the axle bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

10. Check that the backing plates are not cracked, bent or corroded at the wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts are torqued to specifications.

11. If the wheel cylinders need repair, it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be repaired or replaced.

NOTE: A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

12. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads.

13. Install parking brake lever (8) (see figure 4-15) to the trailing shoe (7). Check that lever moves freely.

14. Connect leading and trailing shoes (6 and 7) together with retaining spring (5).

NOTE: When installing brake shoes (6 and 7), make sure that adjuster pin (11) engages slotted holes in shoe webs.

15. Position connected shoes (6 and 7) on backing plate (13). Secure the leading shoe (6) with hold-down pin (3) and spring (2).

16. Insert the parking brake strut (4) between the shoes (6 and 7), engaging notches in parking brake lever (8) and leading shoe (6).

17. Secure trailing shoe (7) with hold-down pin (3) and spring (2).

18. Make sure that upper ends of webs on shoes (6 and 7) are resting on pistons of wheel cylinder (9). Install pull back spring (1).

19. Connect the parking brake cable to the lower end of the parking brake lever.

20. Adjust brake as specified in paragraph 4-6.

4-25. 1975 AND PRIOR VEGA, MONZA, ASTRE, SUNBIRD, SKYHAWK AND STARFIRE LEADING-TRAILING BRAKE. Refer to figure 4-19 for identification of parts for leading-trailing drum brake. After removing brake drums (refer to paragraph 4-21), proceed as follows to remove and replace brake shoes and hardware:

1. Disconnect parking brake cable from parking brake lever (7). Do not allow lever to swing forward since this would "adjust" the brakes.

2. Remove pull-back spring (1) using suitable brake spring pliers as shown in figure 4-20.

NOTE: Do not remove hold-down springs (2) unless they require replacement.

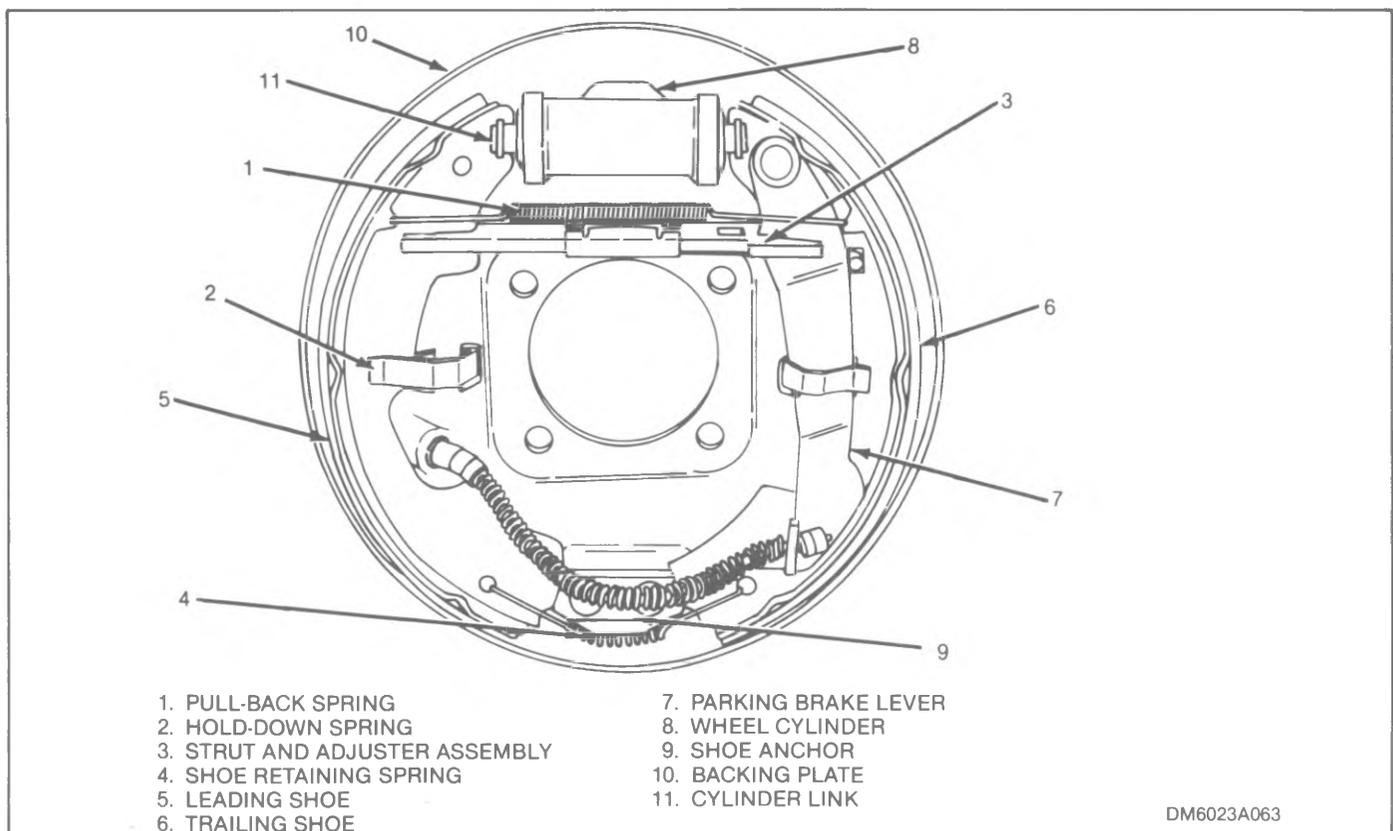


Figure 4-19. 1975 and Prior Vega, Monza, Astre, Sunbird, Skyhawk and Starfire Leading-Trailing Drum Brake Parts

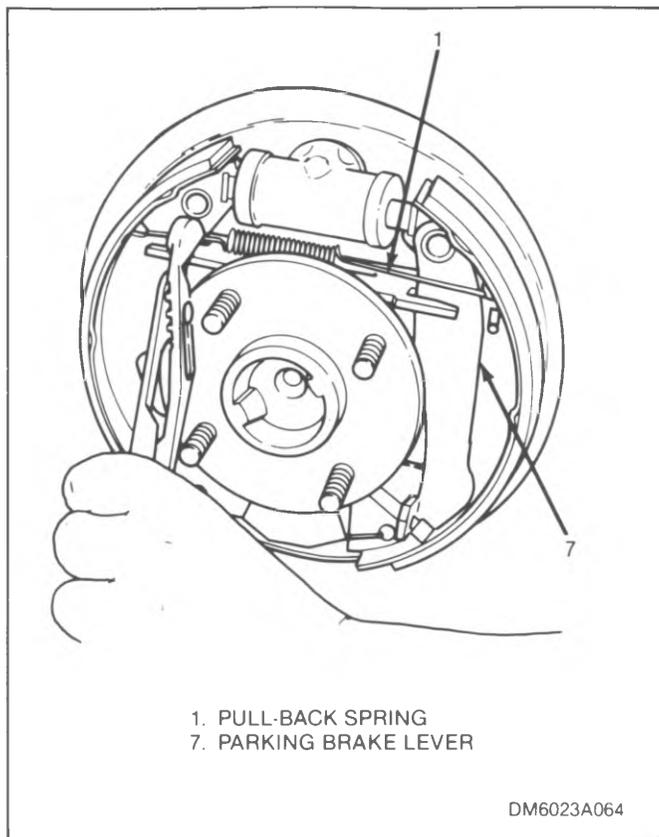


Figure 4-20. Removing Pull-Back Spring

3. Pull brake shoes (5 and 6) from under hold-down springs (2) and remove strut and adjuster assembly (3), parking brake lever (7) with shoe retaining spring (4) attached.

4. Remove shoe retaining spring (4), separate shoes (5 and 6) and remove strut and adjuster assembly (3).

5. Remove parking brake lever (7) from trailing shoe (6).

6. Position tool J23730 (12) on strut and adjuster assembly (see figure 4-21) and press down on adjuster locks.

7. Work rod assembly (14) free of adjuster locks on strut (13).

8. When both adjuster tangs are clear of the rod assembly (14), slide the rod off the lever.

NOTE: Mark shoe positions if they are to be reused.

**CAUTION:** When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.

9. Clean the backing plate, strut, lever, adjuster and other metal parts which are to be reused with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

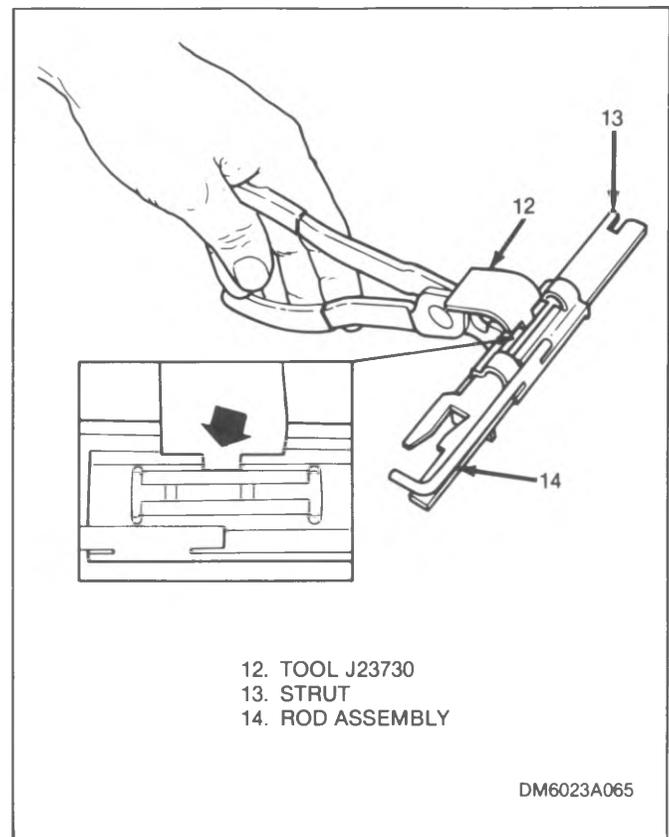


Figure 4-21. Unlocking Adjuster Assembly

10. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

11. Look for evidence of oil or grease leakage past the axle bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

12. Check that the backing plates are not cracked, bent or corroded at the wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts are torqued to specifications.

13. If the wheel cylinders need repair, it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be overhauled or replaced.

NOTE: A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

14. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads.

15. Assemble rod assembly to the strut. Make sure index hole is lined up and seated (see figure 4-22).

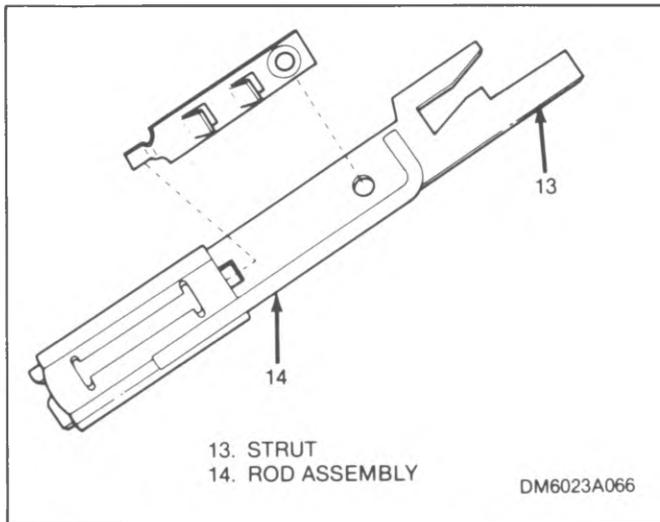


Figure 4-22. Positioning Adjuster Assembly

16. Slide rod assembly (14) over adjuster locks (see figure 4-23) until both locks are positioned as shown in figure 4-24. Note that adjuster lock index hole is approximately one-half covered by rod assembly.

17. Attach parking brake lever (7) (see figure 4-19) to trailing shoe (6). Check that lever moves freely.

18. Install strut and adjuster assembly (3) to trailing shoe (6).

19. Connect leading shoe (5) and trailing shoe (6) together with retaining spring (4).

20. Install both shoes (5 and 6), with attached parts, on backing plate so that:

a. Retaining spring (4) goes under shoe anchor (9).

b. End of rod assembly (14) engages hole in web of trailing shoe (6).

c. Strut (13) engages parking brake lever (7) and leading shoe (5).

d. Webs of both shoes (5 and 6) are under hold-down springs (2).

e. Both shoes (5 and 6) engage links in wheel cylinder (8).

21. Install pull-back spring (1) using suitable brake spring pliers (see figure 4-20). Make sure pull-back spring goes over parking brake lever (7).

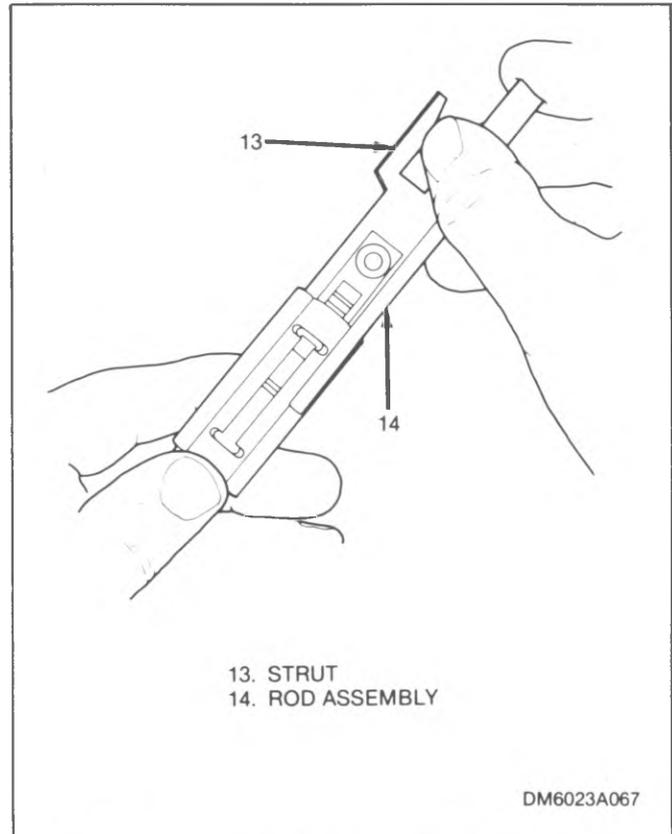


Figure 4-23. Starting Adjuster Into Position

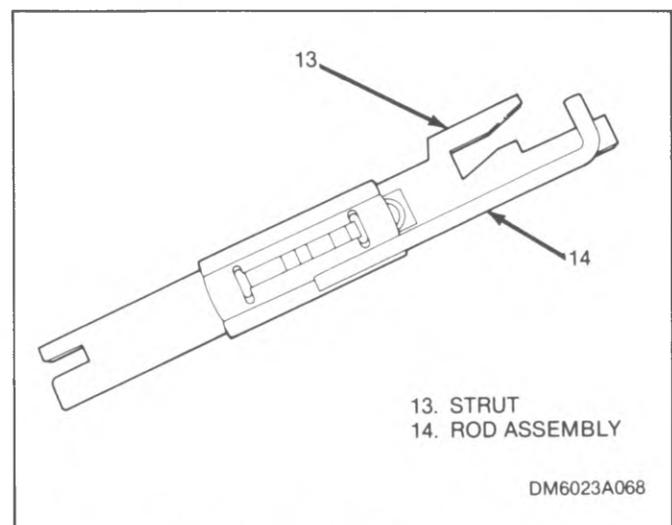


Figure 4-24. Strut and Adjuster in Position

22. Connect parking brake cable to parking brake lever (7), using care not to "adjust" the brakes.

23. Adjust brake as specified in paragraph 4-7.

4-26. 1985-86 SPRINT LEADING-TRAILING BRAKE. Refer to figure 4-25 for identification of parts for the leading-trailing drum brake. After removing brake drums (refer to paragraph 4-22), proceed as follows to remove and replace brake shoes and hardware:

1. Compress hold-down spring (1) and turn hold-down pin (2) to remove pins and springs.

2. Disconnect parking brake cable (13) from parking brake lever (8) as shown in figure 4-26.

3. Remove both brake shoes (9 and 10) and assembled parts (3 thru 8) (see figure 4-27) as a unit.

4. Move bottom ends of shoes (9 and 10) together to remove lower shoe return spring (3). Then remove anti-rattle spring (5), strut and adjuster assembly (4) and upper shoe return spring (3).

NOTE: Do not remove quadrant spring (6) from strut and adjuster assembly (4) unless replacement is required.

5. Remove lever retainer (7) to separate parking brake lever (8) from trailing shoe (10).

NOTE: Mark shoe positions if they are to be reused.

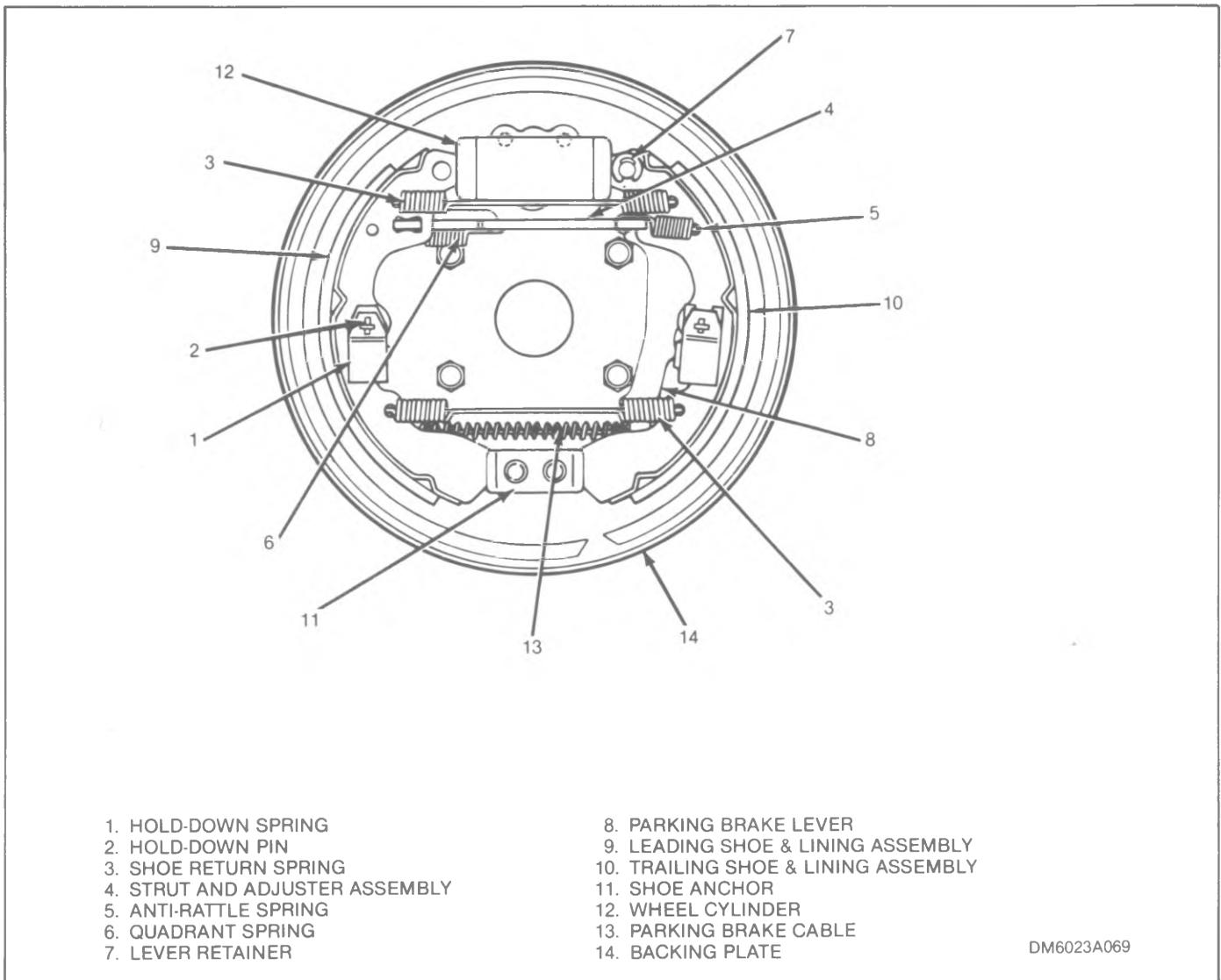
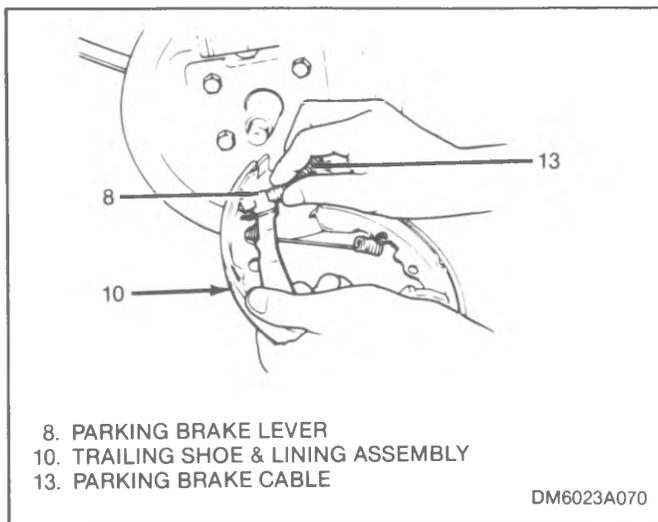


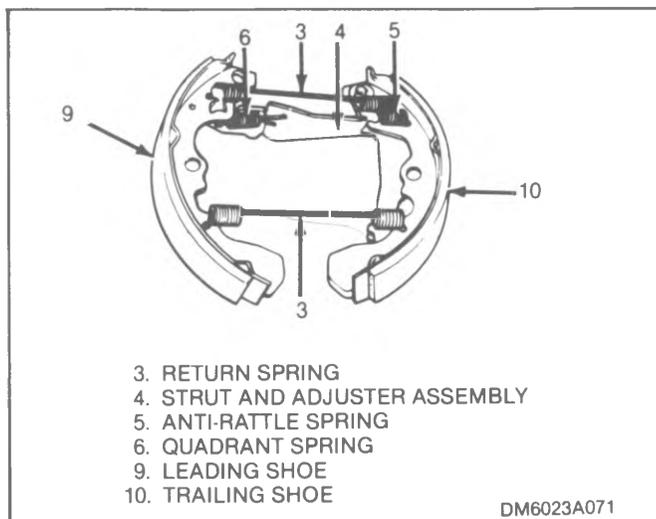
Figure 4-25. 1985-86 Sprint Leading-Trailing Shoe Brake Parts



- 8. PARKING BRAKE LEVER
- 10. TRAILING SHOE & LINING ASSEMBLY
- 13. PARKING BRAKE CABLE

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Figure 4-26. Disconnecting/Connecting Parking Brake Cable



- 3. RETURN SPRING
- 4. STRUT AND ADJUSTER ASSEMBLY
- 5. ANTI-RATTLE SPRING
- 6. QUADRANT SPRING
- 9. LEADING SHOE
- 10. TRAILING SHOE

DM6023A071

Figure 4-27. Shoe, Spring and Lever Group

**CAUTION:** When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.

6. Clean the backing plate, strut, lever and other metal parts which are to be reused with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

7. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

8. Look for evidence of oil or grease leakage past the wheel bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

9. Check that the backing plates are not cracked, bent or corroded at the wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts are torqued to specifications.

10. If the wheel cylinders need repair, it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be overhauled or replaced.

**NOTE:** A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

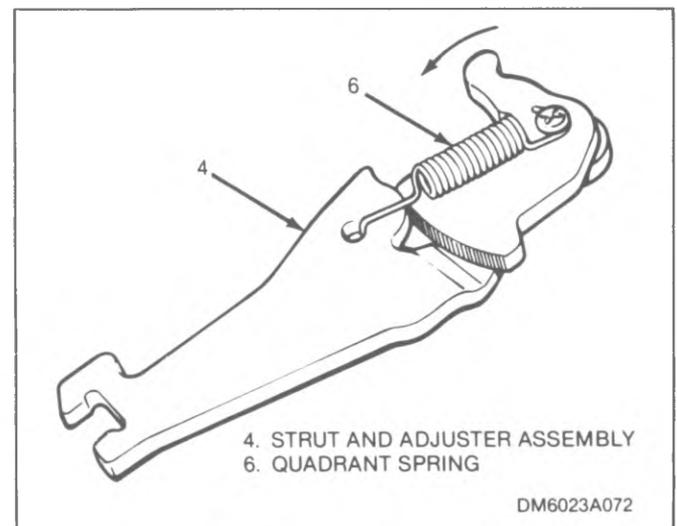
11. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads.

12. Attach parking brake lever (8) to trailing shoe (10) with retainer (7).

13. If new shoes are being installed, pivot adjuster on strut and adjuster assembly (4) as far as it will go in the direction shown in figure 4-28.

14. Preassemble both shoes (9 and 10), strut and adjuster assembly (4), return springs (3) and anti-rattle spring (5) as shown in figure 4-27.

15. Move brake shoes (9 and 10) and assembled parts (3 thru 8) on backing plate and attach parking brake cable (13) to parking brake lever (8).



- 4. STRUT AND ADJUSTER ASSEMBLY
- 6. QUADRANT SPRING

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Figure 4-28. Setting Adjuster For New Shoes

16. Position brake shoes (9 and 10) and assembled parts (3 thru 8) on backing plate (14). Attach with hold-down springs (1) and pins (2).

17. Adjust brake as specified in paragraph 4-8.

4-27. 1985-86 SPECTRUM LEADING-TRAILING BRAKE. Refer to figure 4-29 for identification of parts for the leading-trailing drum brake. After removing the brake drums (refer to paragraph 4-21), proceed as follows to remove and replace brake shoes and hardware:

1. Remove return spring (14), auto adjuster spring (15) and auto adjuster lever (13).

2. Remove seat (20), spring (19) and pin (18) attaching leading shoe (11). Remove leading shoe and auto adjuster (16).

3. Remove seat (20), spring (14) and pin (18) attaching trailing shoe (12). Disconnect parking brake cable from lever (10) and remove trailing shoe.

4. Remove retainer (8), washer (9) and parking brake lever (10).

NOTE: Mark shoe positions if they are to be reused.

CAUTION: When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.

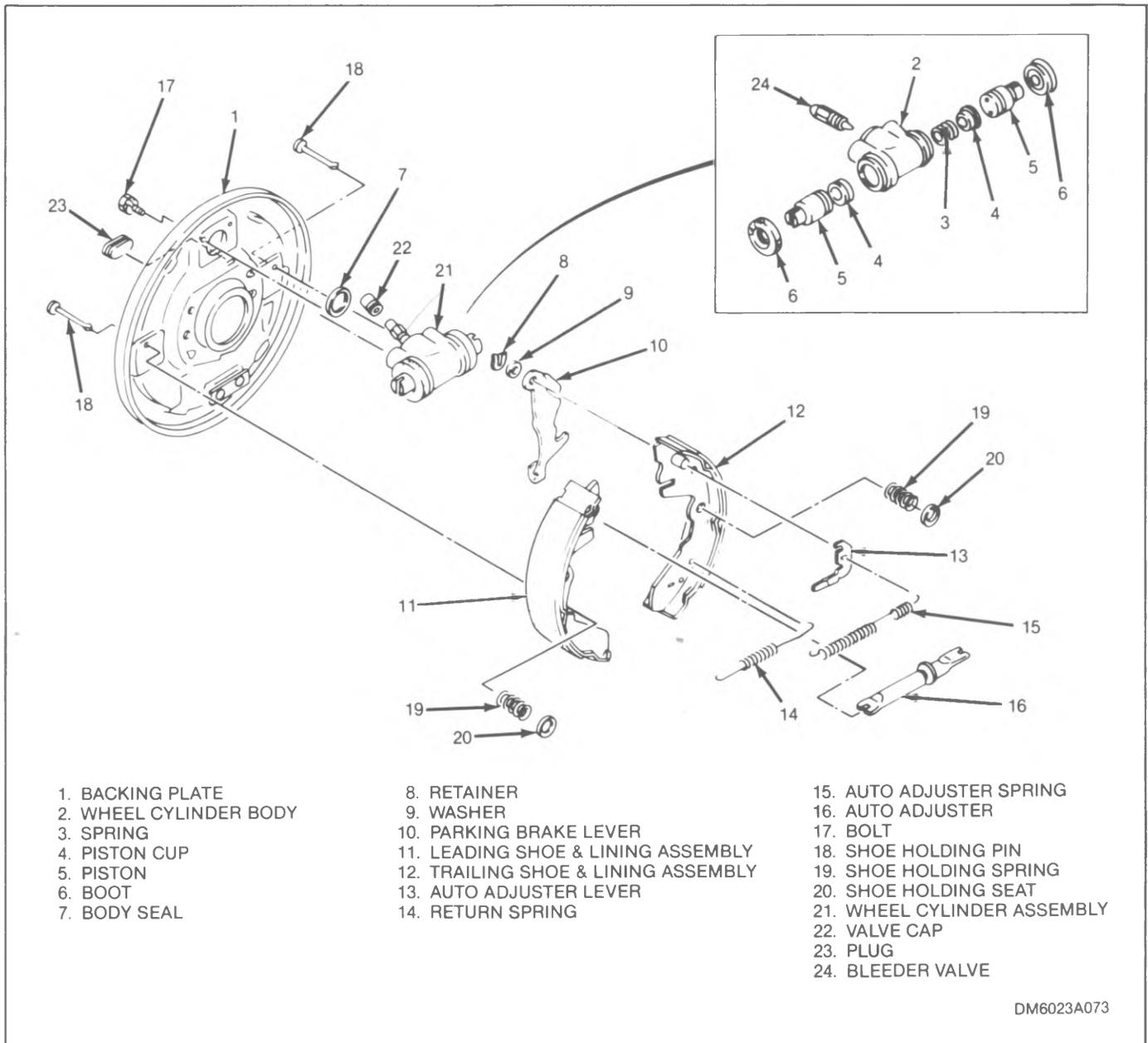


Figure 4-29. 1985-86 Spectrum Leading-Trailing Shoe Brake Parts

5. Clean the backing plate, lever and other metal parts which are to be reused using a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

6. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

7. Look for evidence of oil or grease leakage past the wheel bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

8. Check that the backing plates are not cracked, bent or corroded at the wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts are torqued to specifications.

9. If repair of the wheel cylinders is needed, it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be overhauled or replaced.

NOTE: A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

10. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads. Lubricate the parking brake lever and auto adjuster lever pivot points. Lubricate the anchor plate and shoe contact points. Lubricate the piston and shoe contact points.

11. Attach park brake lever (10), (see figure 4-29) to trailing shoe (12) with washer (9) and retainer (8). Connect parking brake cable to lever.

12. Install trailing shoe (12) and attach with pin (18), spring (19) and seat (20).

13. If new shoe and linings are being installed, turn star wheel on auto adjuster (16) to produce minimum adjuster length.

14. Install auto adjuster (16) and leading shoe (11). Attach leading shoe with pin (18), spring (19) and seat (20).

NOTE: In the following step, make sure auto adjuster spring (15) is installed with open space at star wheel on auto adjuster (16).

15. Install auto adjuster lever (13) and auto adjuster spring (15).

16. Install return spring (14) using suitable brake spring pliers.

17. Adjust brake as specified in paragraph 4-9.

4-28. 1985-86 NOVA LEADING-TRAILING DRUM BRAKE. Refer to figure 4-30 for identification of parts for the leading-trailing drum brake. After removing brake drums (refer to paragraph 4-21), proceed as follows to remove and replace brake shoes and hardware:

1. Remove return spring (8) and anchor spring (12) using suitable brake spring pliers.

2. Remove forward hold-down spring (15), retainers (14) and pin (1).

3. Remove leading shoe & lining (9).

4. Remove rear hold down spring (15), retainers (14) and pin (1).

5. Use screwdriver to disconnect parking brake cable (7) from backing plate (4). Using pliers, disconnect parking brake cable from parking brake lever (18).

6. Remove trailing shoe and lining (10) with attached parts (16 thru 19) and strut (11).

7. Remove adjusting lever spring (13) and strut (11) from trailing shoe & lining (10).

8. Using screwdriver, pry out C-washers (16). Remove shim (19) adjusting lever (17) and parking brake lever (18) from trailing shoe & lining (10).

NOTE: Mark shoe positions if they are to be reused.

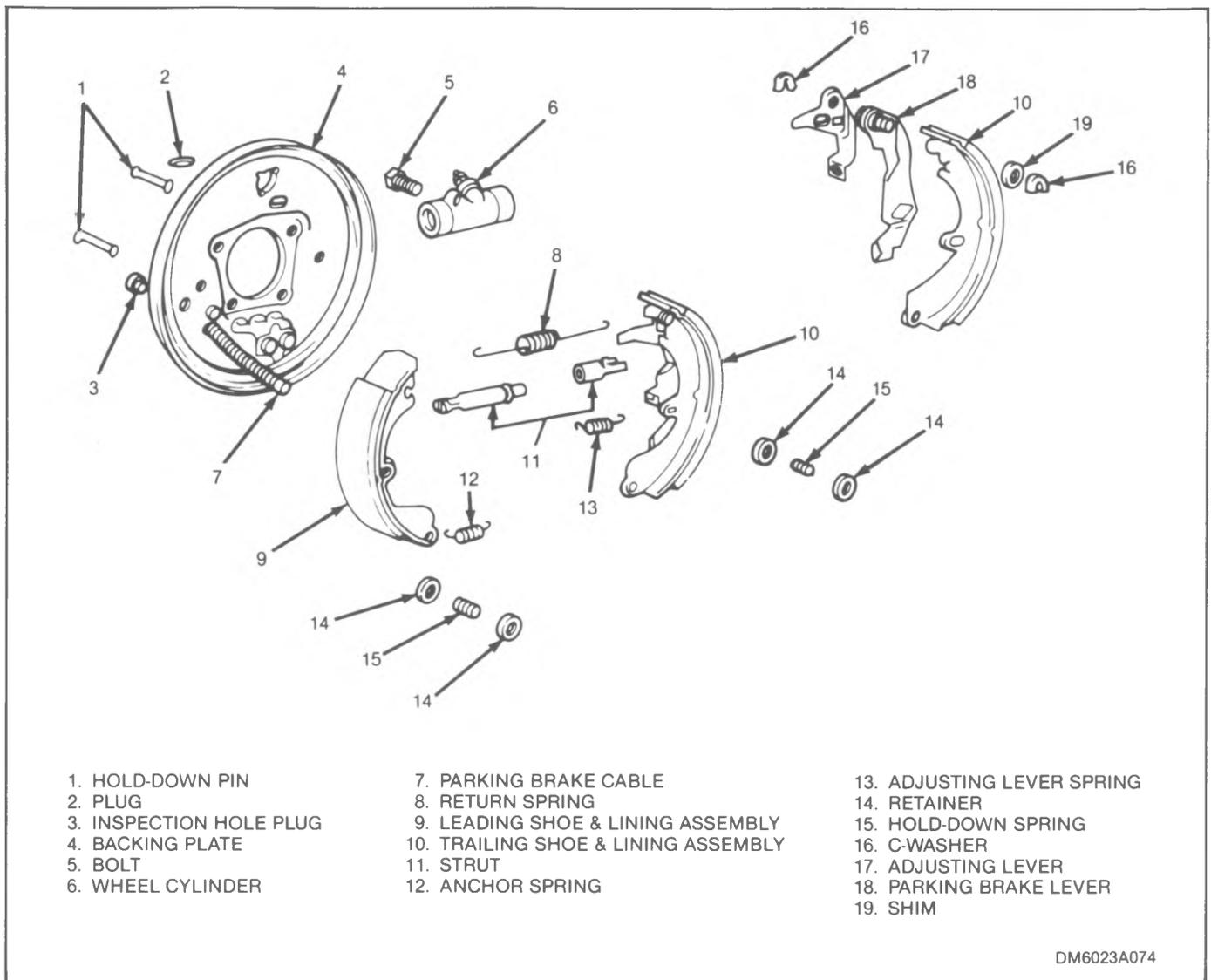


Figure 4-30. 1985-86 Nova Leading-Trailing Drum Brake Parts

**CAUTION:** When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.

9. Clean the backing plate, strut, levers and other metal parts which are to be reused with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

10. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

11. Look for evidence of oil or grease leakage past the axle bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

12. Check that the backing plates are not cracked, bent or corroded at the wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts are torqued to specifications.

13. If the wheel cylinders need repair, it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be overhauled or replaced.

**NOTE:** A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

14. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads. Lubricate the parking brake lever pivot and bottom anchor plate and shoe contact points.

15. Disassemble, clean and lubricate strut (11) at points shown in figure 4-31. Reassemble strut.

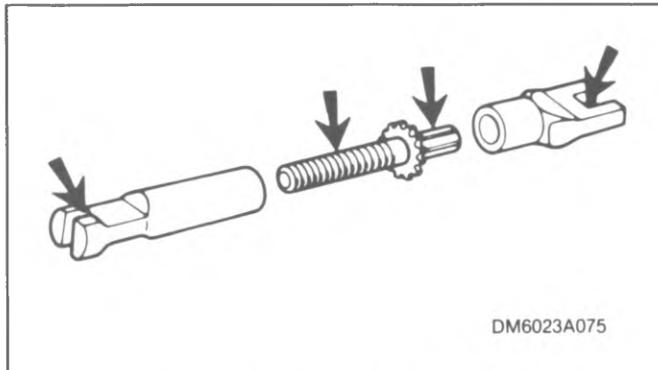


Figure 4-31. Strut Lube Points

16. Note the difference between RH and LH assemblies shown in figure 4-32.

17. Assemble adjusting lever (17) parking brake lever (18), and shim (19) to trailing shoe & lining (10) and temporarily attach with C-washers (16).

18. Check clearance between trailing shoe and lining (10) and parking brake lever (18) with feeler gage (see figure 4-33). Clearance shall be 0-0.35 mm (0.0138 in.) If clearance is outside limits, use shim (19) (figure 4-33).

19. After proper parking brake lever (18) to trailing shoe (10) clearance is obtained, bend in ends of C-washers (16) using pliers (figure 4-34) to secure.

20. Engage strut (11) in notch in trailing shoe (10) and hook end of return spring (8) into place in shoe. Install adjusting lever spring (13).

21. Moving trailing shoe and lining (10) and attached parts into position, connect parking brake cable (7) to parking brake lever (18). Pass cable through notch in backing plate (4).

22. Position trailing shoe & lining (10) engaging wheel cylinder (6) at top and anchor at bottom. Attach shoe with pin (1), hold-down spring (15) and retainers (14) using suitable brake spring pliers.

23. Hook anchor spring into shoe and linings (9 and 10), then move leading shoe and lining into position on backing plate (4), engaging wheel cylinder (6) at the top and anchor at the bottom.

24. Secure leading shoe (9) in place with hold-down pin (1), hold-down spring (15) and retainers (14).

25. Connect free end of return spring (8) to leading shoe and lining (9).

26. Move parking brake lever (18) back and forth and check that adjusting lever (17) turns star wheel on strut (11). If not recheck brake assembly (see figures 4-30 and 4-32).

27. If adjusting operation is OK, hold adjusting lever away from star wheel on strut (11) and turn to compress strut to its shortest length.

28. Install drum and pull parking brake lever all the way up until clicking sound is no longer heard. Remove drum and check drum to shoe clearance to be 0.6 mm (0.024 in.) as shown in figure 4-35. If incorrect, check parking brake system.

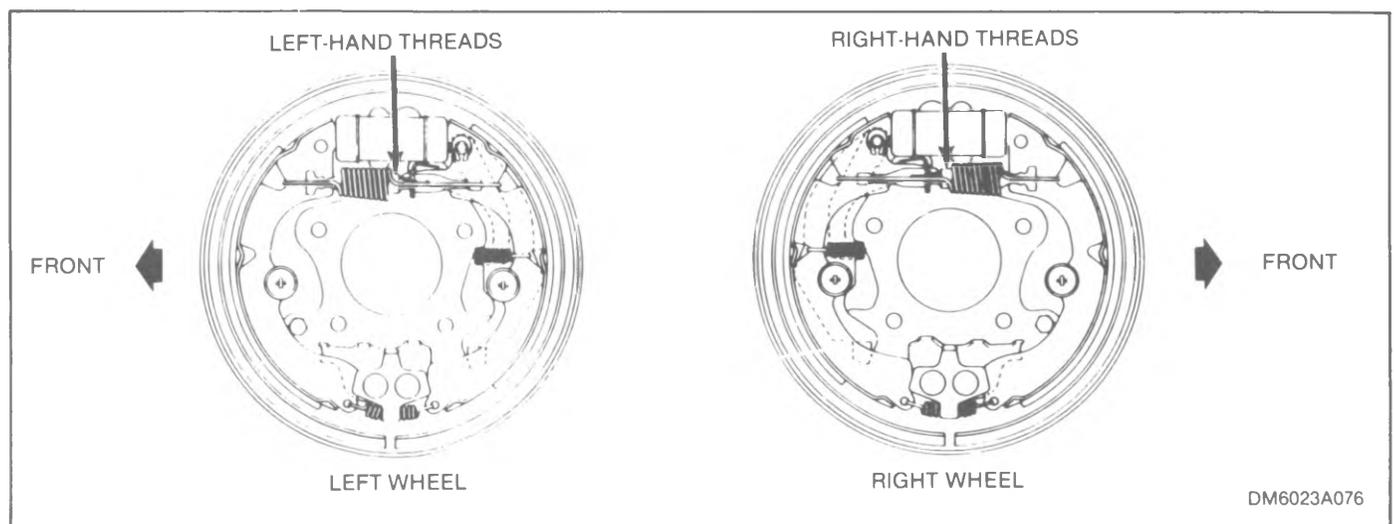


Figure 4-32. Left Hand and Right Hand Brake Assemblies

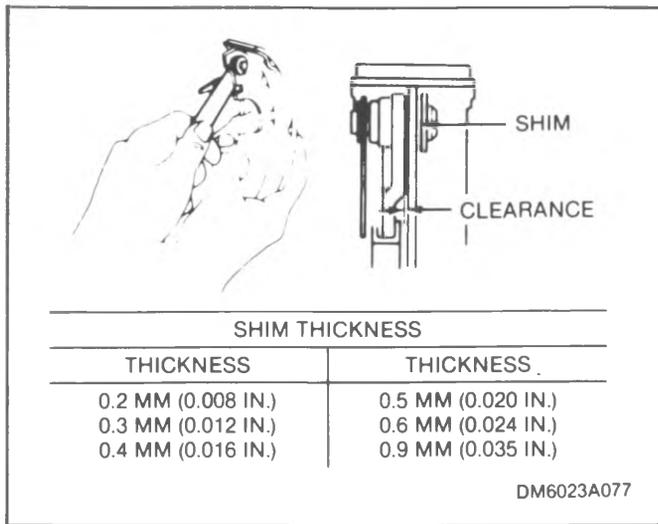


Figure 4-33. Lever to Shoe Clearance and Shims

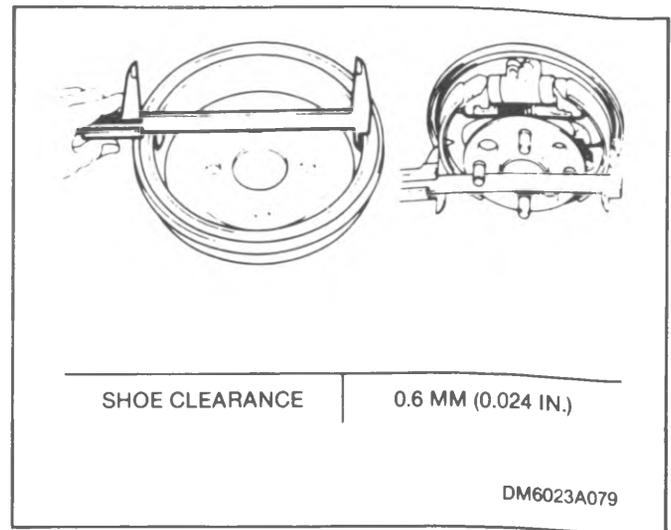


Figure 4-35. Shoe Clearance

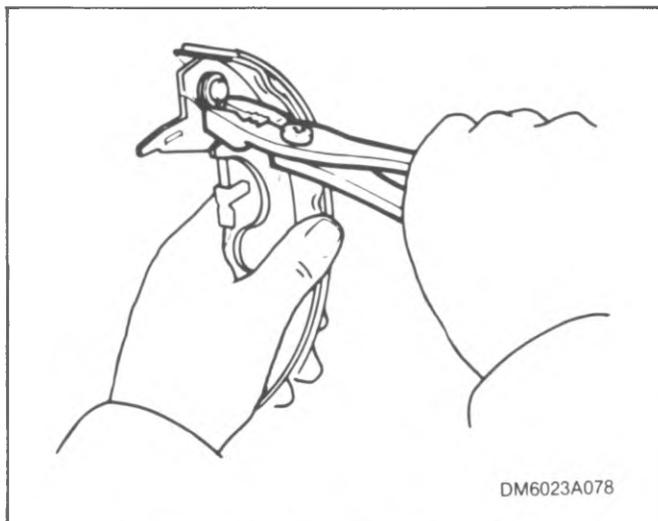


Figure 4-34. Securing C-Washers

4-29. 1986 LESABRE, DELTA 88 AND BONNEVILLE LEADING-TRAILING BRAKE. Refer to figure 4-36 for identification of parts for the leading-trailing drum brake. After removing brake drums (refer to paragraph 4-21), proceed as follows (see figure 4-37) to remove and replace brake shoes and hardware:

1. Remove actuator spring (1) and upper return spring (2) with brake spring pliers.
2. Remove spring connecting link (3), adjuster actuator (4) and spring washer (5).
3. Remove hold-down springs (7) using brake spring pliers.
4. Remove hold down pins (8).
5. Disconnect parking brake cable from parking brake lever (18).

6. Remove brake shoes (9 and 10) and adjusting screw assembly (28).

7. Remove lower return spring (6).

8. Remove retaining ring (15), pin (16), spring washer (17) and parking brake lever (18) from brake shoe (10).

NOTE: Mark shoe positions if they are to be reused.

**CAUTION:** When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.

9. Clean the backing plate, strut, lever and other metal parts which are to be reused with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne.

10. Examine the raised shoe pads on the backing plate to make sure that they are free of burrs, corrosion or other surface defects which might prevent the shoes from sliding freely. Use fine emery cloth to remove surface defects if necessary, then clean thoroughly.

11. Look for evidence of oil or grease leakage past the axle bearing seals. Such leakage could cause brake failure and indicates the need for additional service work.

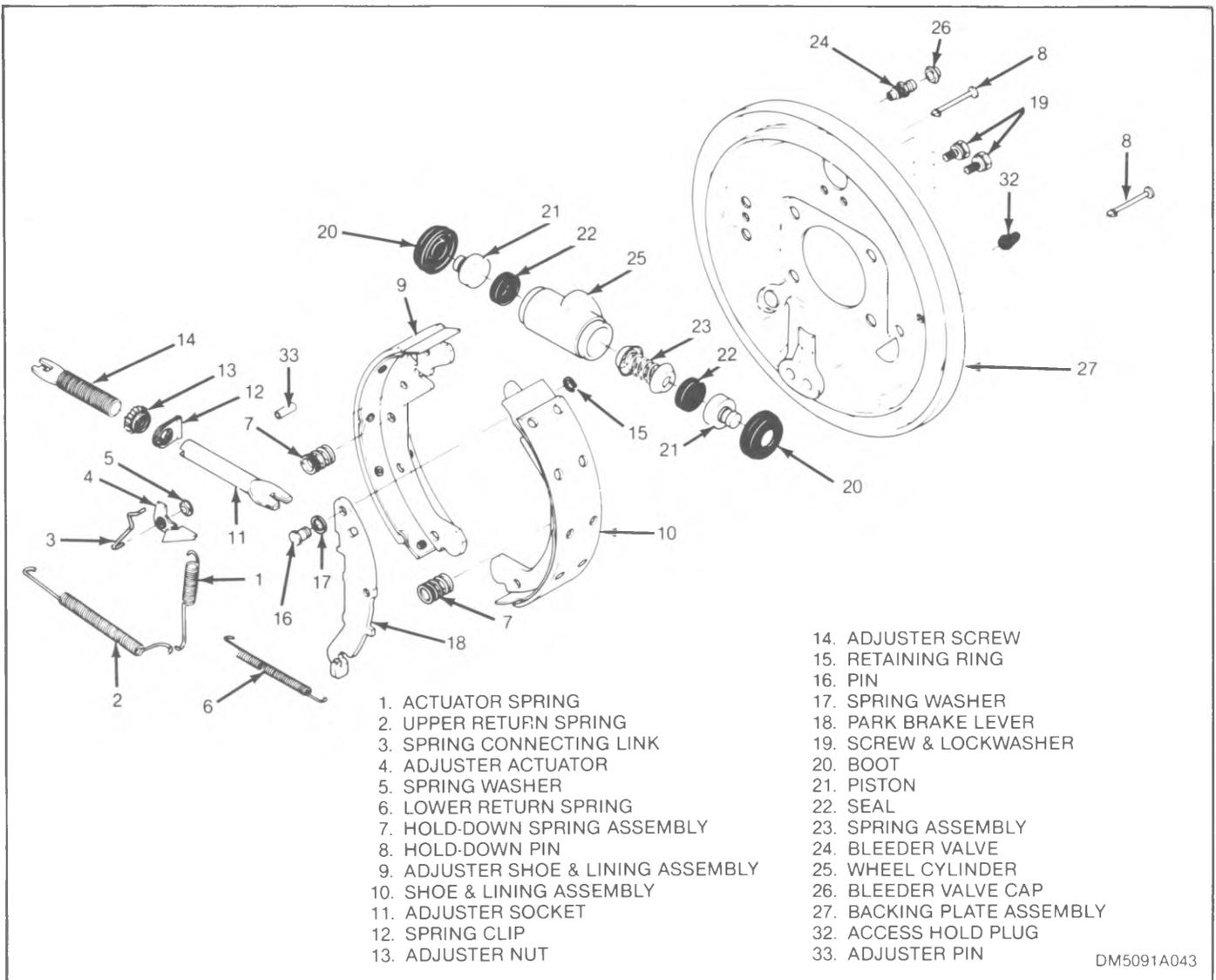


Figure 4-36. 1986 LeSabre, Delta 88 and Bonneville Drum Brake

12. Check that the backing plates are not cracked, bent or corroded at the wheel cylinder pilot. If so, they must be replaced. Make sure that backing plate bolts are torqued to specifications.

13. If the wheel cylinders need repair, it should be done at this time (refer to Section V). To determine wheel cylinder condition, carefully inspect the boots. If they are cut, torn, heat-cracked or show evidence of excessive leakage, the wheel cylinders should be overhauled or replaced.

NOTE: A slight amount of fluid behind the boot is normal. This serves to lubricate the pistons. However, if enough fluid is present to run or spill out, excessive leakage is indicated.

14. Disassemble adjusting screw assembly (see figure 4-38) and clean parts in denatured alcohol. Check threads of adjuster screw (14) and nut (13) for smooth rotation over entire length. Apply brake lube

to adjuster screw threads, and ID of adjuster socket (11). Reassemble with spring clip (12) in position shown in figure 4-38.

15. Apply a thin film of brake lube to the raised shoe pads on the backing plate. If brake shoes are replaced, check that there are no burrs on the edges of shoes where they will contact the pads. Lubricate the parking brake lever pivot point.

16. If shoe and lining assemblies were replaced, press adjuster pin (33) into shoe and lining (9) so that pin projects 7.0-7.2 mm (0.275-0.283 in.) from side of shoe web where adjuster actuator (4) is installed.

17. Install parking brake lever (18) on shoe and lining (10) with spring washer (17), pin (16) and retaining ring (15). Make sure concave side of spring washer is against parking brake lever.

18. Install lower return spring (6) between shoe and linings (9 and 10).

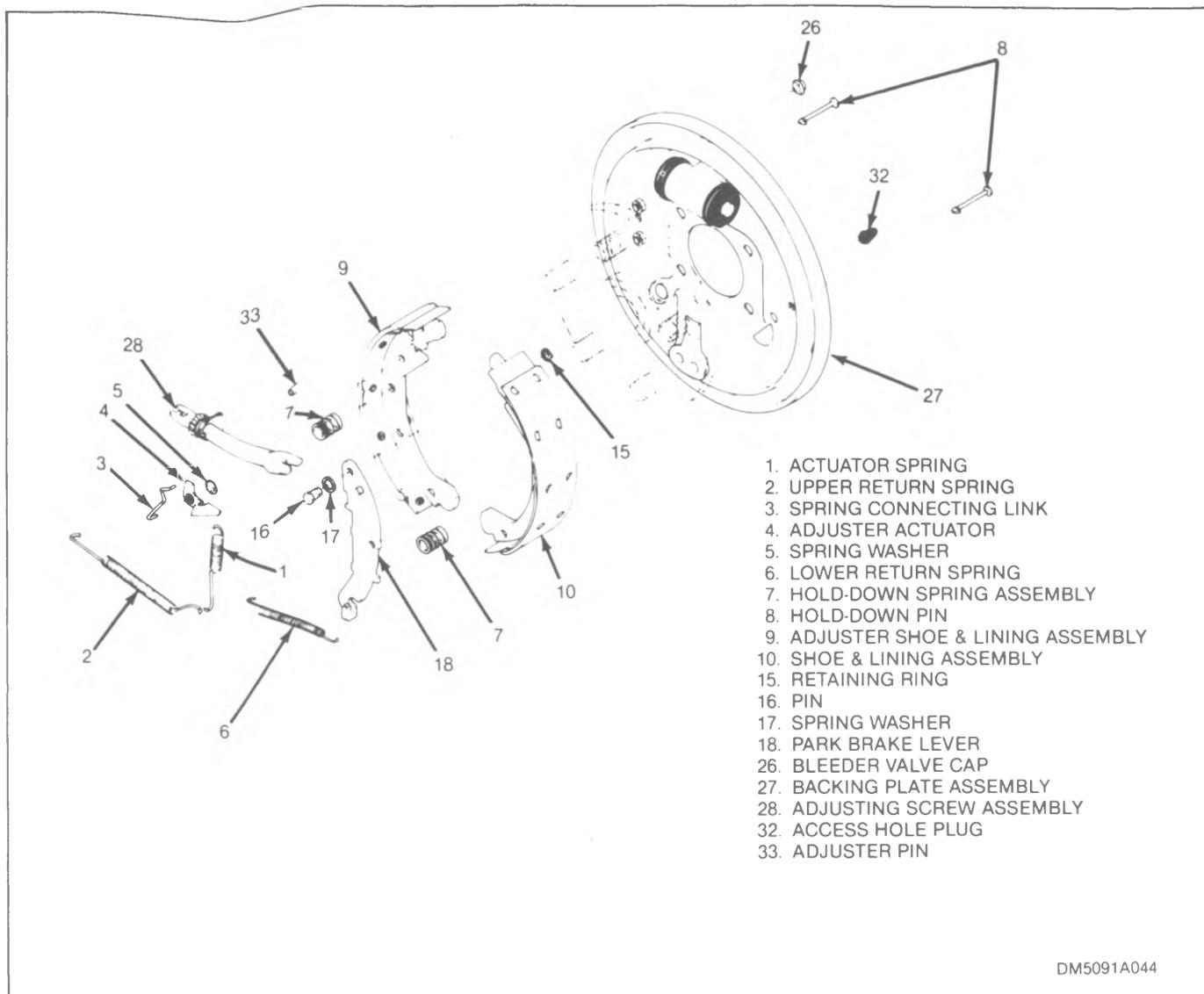


Figure 4-37. Brake Components

**CAUTION:** Do not over-stretch lower return spring (6) in following step. Spring will be damaged if extended length exceeds 98.6 mm (3.88 in).

19. Install adjuster shoe and lining (9) and shoe and lining (10) (after connecting parking brake cable) with hold down pins (8) and springs (7). Lower return spring (6) should be positioned under the anchor plate.

a. Adjuster shoe and lining (9) is the one in which pin (33) was installed.

b. Adjuster shoe and lining (9) is to front of car on LH brake assembly or to rear of car on RH brake assembly.

20. Install adjusting screw assembly (28) between adjuster shoe and lining (9) and shoe and lining (10). Position as follows (see figure 4-39).

a. Adjusting screw assembly (28) with adjuster screw (14) engaging notch in adjuster shoe and lining (9), and spring clip (12) pointing towards the backing plate (see figure 4-38).

21. Install spring washer (5) over pin (33) with concave side against web of adjuster shoe and lining (9).

22. Install adjuster actuator (4) so that its top leg engages notch in adjuster screw (14) as shown in figure 4-39, view C-C.

23. Install spring connecting link (3) and hold in place.

**CAUTION:** Do not over-stretch upper return spring in following step. Spring will be damaged if extended length exceeds 139.5 mm (5.49 in.).

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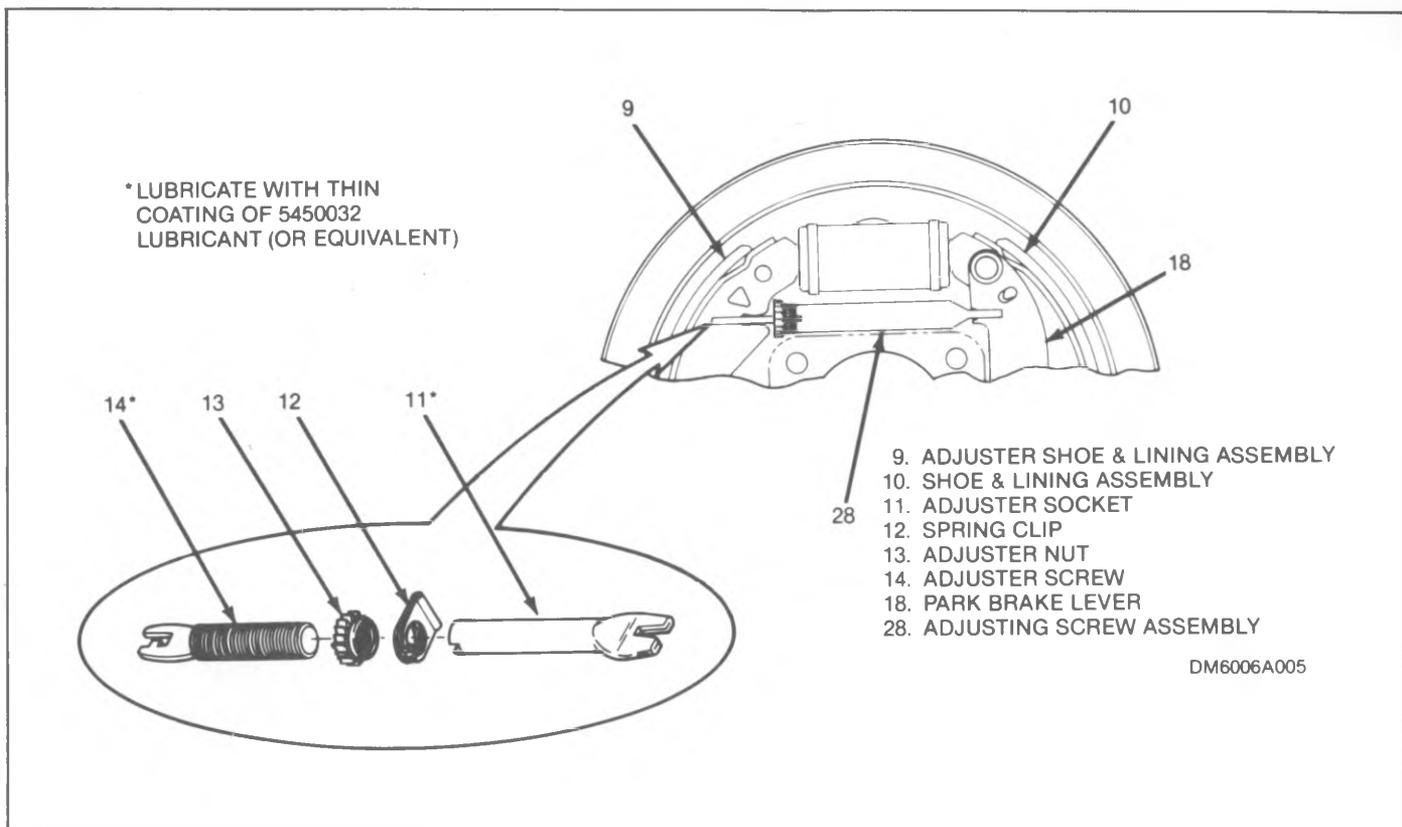


Figure 4-38. Adjusting Screw Assembly

24. Install upper return spring (2) as follows:

a. Insert angled hook end of spring (2) through parking brake lever (18) and shoe and lining (10) as shown in figure 4-39, view A-A.

b. Grasp long straight section of spring (2) with pliers. Pull spring straight across and then down to hook into crook in connecting link (3).

*CAUTION: Do not over-stretch actuator spring (1) in following step. Spring will be damaged if extended length exceeds 83.0 mm (3.27 in.).*

25. Install actuator spring (1) with brake spring pliers as shown in figure 4-39, view B-B.

#### 4-30. REMOVE AND INSTALL WHEEL CYLINDER

4-31. Wheel cylinders used on the leading-trailing shoe drum brakes covered by this manual are bolted to the backing plate. Proceed as follows to remove and replace (see figure 4-40):

1. Remove dirt and foreign material around wheel cylinder (2) inlet and pilot.
2. Disconnect inlet tube line.
3. Remove bolts (1) and lift off wheel cylinder (2).

4. On Sprint and Spectrum wheel cylinders only, remove and discard packing (seal) (3).

5. For wheel cylinder repair, refer to Section V.

6. For Sprint and Spectrum cars only, install new packing (seal) (3) on wheel cylinder (2).

7. Position wheel cylinder (2) and attach with bolts (1). Torque bolts as follows:

1976-79 Chevette; 1975 and prior Vega, Monza, Astre, Sunbird, Skyhawk and Starfire: 12-13 N-m (9-10 lb-ft)

1985-86 Sprint: 10-13 N-m (8-9 lb-ft)

1985-86 Spectrum and Nova: 9-10 N-m (7-8 lb-ft)

1986 LeSabre, Delta 88 and Bonneville: 12 N-m (9 lb-ft)

8. Install and torque inlet tube nut as follows:

1976-79 Chevette; 1975 and prior Vega, Monza, Astre, Sunbird, Skyhawk and Starfire: 13-20 N-m (10-15 lb-ft)

1985-86 Sprint, Spectrum and Nova: 14-18 N-m (10-13 lb-ft)

1986 LeSabre, Delta 88 and Bonneville: 17 N-m (13 lb-ft)

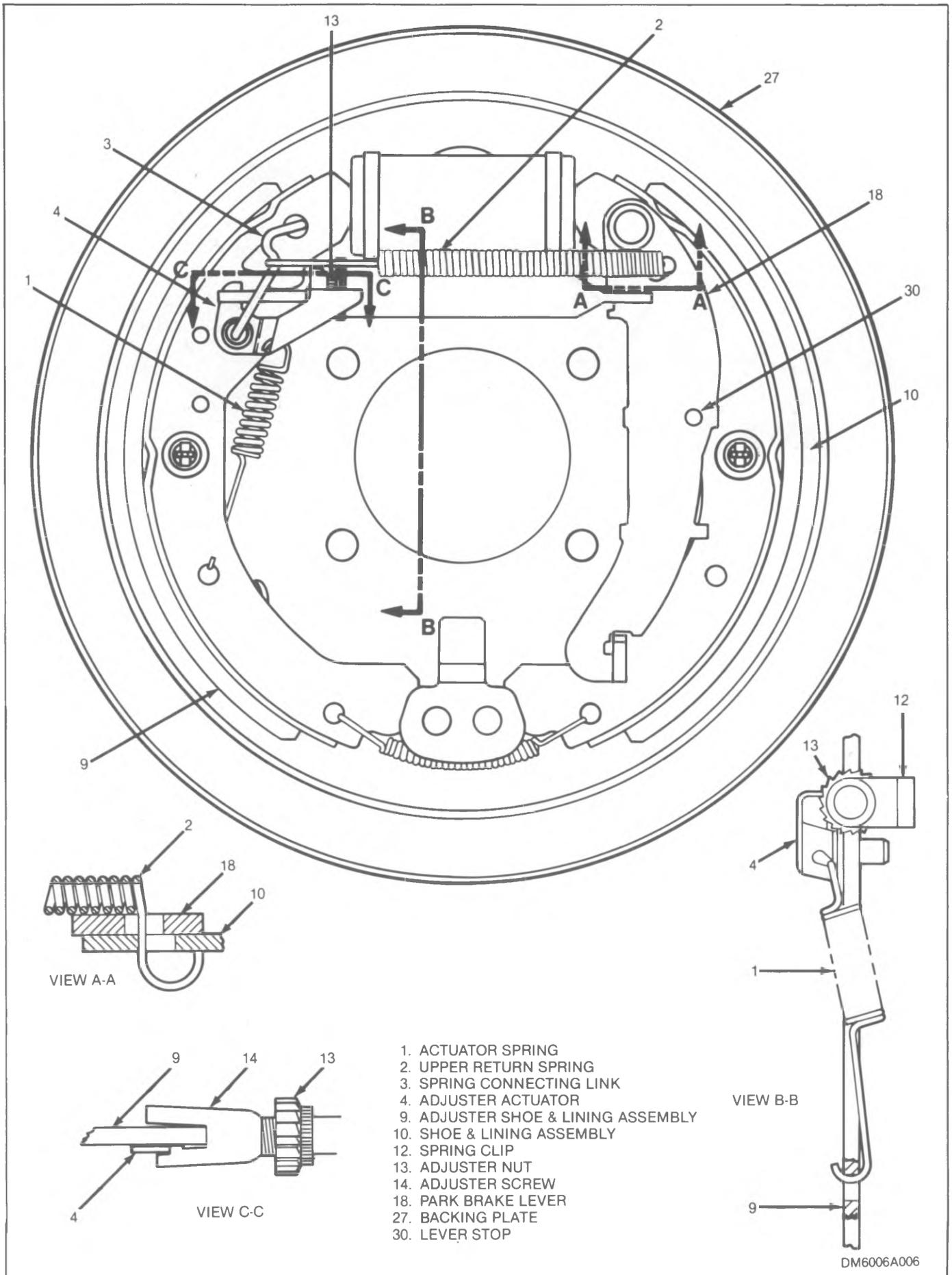


Figure 4-39. Brake Assembly Details

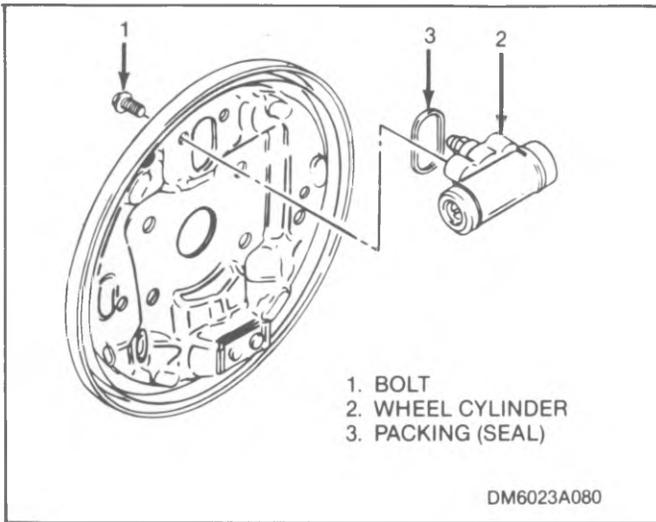


Figure 4-40. Remove/Install Wheel Cylinder

# SECTION V

## UNIT REPAIR—WHEEL CYLINDER

### 5-1. GENERAL INFORMATION

5-2. Unit repair (overhaul) procedures for all wheel cylinders covered in this manual are basically the same. Minor differences, when they occur, are called out by the use of notes in the text and illustrations. Illustrations used in this section are typical. While the shapes of some parts may vary slightly from those shown, procedures, unless otherwise noted, are the same.

### 5-3. PRELIMINARY PROCEDURES

5-4. REMOVAL. Disconnect and remove wheel cylinder as specified in applicable paragraph 3-22 (duoservo brakes) or paragraph 4-30 (leading-trailing brakes).

5-5. EXTERIOR CLEANING. Wipe the exterior of the wheel cylinder with a damp cloth, removing any corrosion or road dirt. After wiping thoroughly, cylinder may be washed in denatured alcohol before moving to a clean work bench for disassembly.

*CAUTION: Contamination of the brake hydraulic system with dirt particles or fluids other than clean brake fluid can result in system failure. Repair wheel cylinders on a clean bench away from grinders, sanders and other particle generating equipment. Do not use petroleum based oil, grease, or cleaning compounds at the cylinder repair station. Do not repair cylinders with oily or greasy hands. Use only clean brake fluid to clean cylinder parts. Use only clean brake fluid to lubricate parts at assembly.*

### 5-6. DISASSEMBLY

5-7. Refer to figure 5-1 and proceed as follows:

1. Remove links (1), if used.
2. If the cylinder has external boots (2) (outside of boot fits over cylinder body), pull off boots.
3. If cylinder has internal boots (2) (outside of boot fits in cylinder body), insert a wood or plastic implement through the boot hole and pry up. Take care not to damage the cylinder bore or boot.
4. By hand, or using a suitable non-metallic tool, press out the pistons (3), seals (4) and spring assembly (5).

NOTE: The Sprint, Spectrum and Nova springs (5) do not use expanders on the ends.

5. On Sprint, Spectrum and Nova cylinders only, remove the seals (4) from the grooves in the pistons (3). Use a plastic implement so as not to damage the pistons.

6. Remove the bleeder valve (6) from the cylinder body (7) to permit thorough cleaning.

### 5-8. CLEANING AND INSPECTION

5-9. Clean metal wheel cylinder parts in clean denatured alcohol. Use unlubricated compressed air to blow out passages in bleeder valve (6) and cylinder body (7), and remove excess fluid from all parts. Lay out parts on a clean surface and inspect as follows:

1. Inspect pistons (3) for scoring, nicks, corrosion or deposits that cannot be removed by cleaning. Replace—do not attempt to refinish—damaged pistons.
2. Check bleeder valve (6) and bleeder valve inlet in cylinder body (7) for damaged seating surfaces or threads. Replace damaged parts.
3. Check spring or spring assembly (5) for distortion or cracks. If spring has expanders, make sure these are secure on spring ends.
4. Using a light source, inspect the bore of the cylinder body (7). Check for scoring, nicks, corrosion, stains, deposits or evidence of structural damage such as cracks.

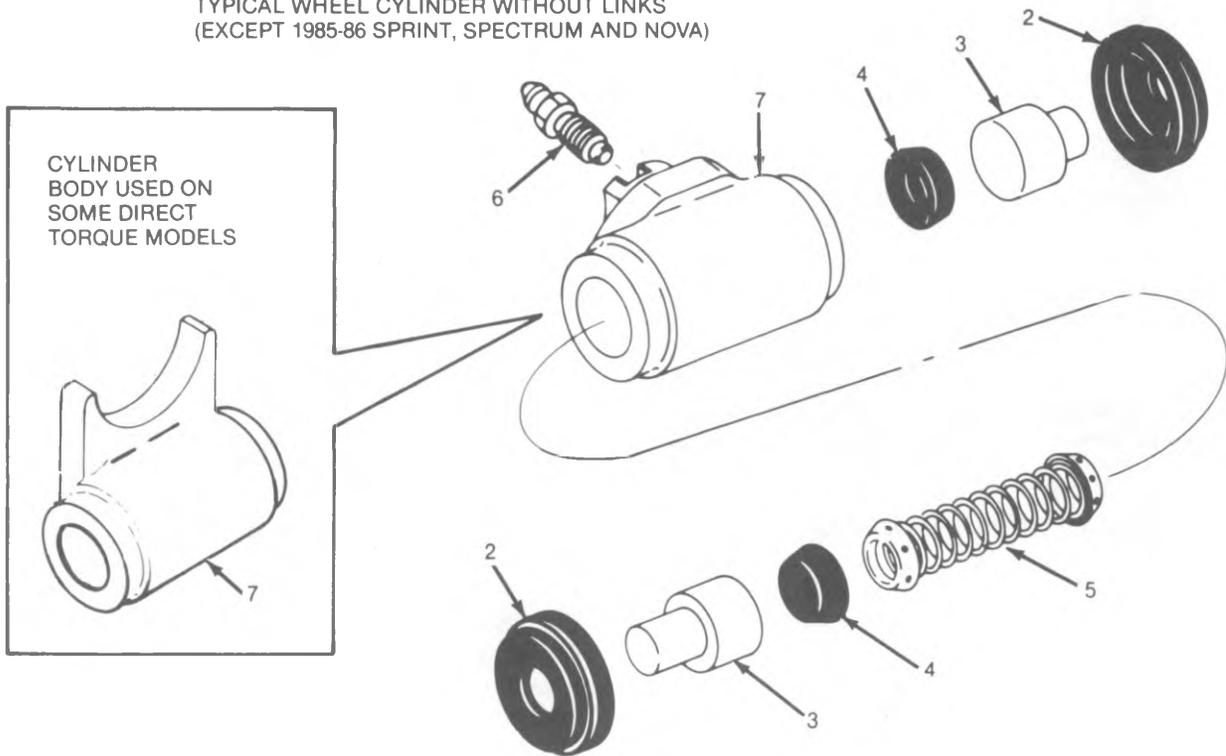
a. Cylinders that are scored, corroded or structurally damaged must be replaced.

NOTE: Do not confuse staining with corrosion. Corrosion will show up in the form of pits or roughness.

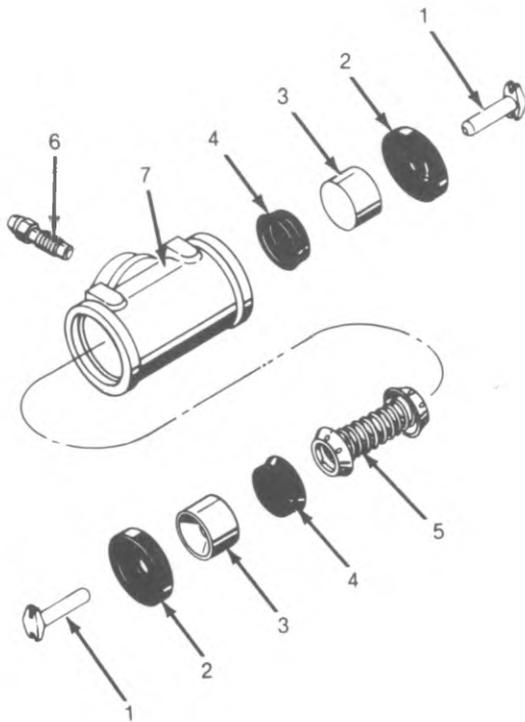
b. Clean up stains or deposits by polishing the cylinder bore with crocus cloth. Revolve the cylinder against the cloth supported by a finger. Do not use emery cloth or sandpaper. Do not slide the cloth in a lengthwise manner under pressure.

c. Cylinders that cannot be cleaned up by polishing with crocus cloth are to be replaced. Do not hone or use any machining operations on the wheel cylinders.

TYPICAL WHEEL CYLINDER WITHOUT LINKS  
(EXCEPT 1985-86 SPRINT, SPECTRUM AND NOVA)

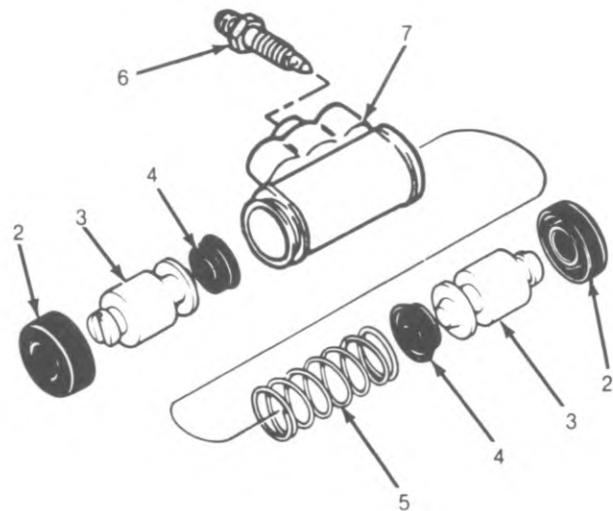


TYPICAL WHEEL CYLINDER WITH LINKS



- 1. LINK\*
- 2. BOOT
- 3. PISTON
- 4. SEAL

TYPICAL WHEEL CYLINDER FOR  
1985-86 SPRINT, SPECTRUM AND NOVA



- 5. SPRING ASSEMBLY (OR SPRING)
- 6. BLEEDER VALVE
- 7. CYLINDER BODY

\*NOT USED ON SOME WHEEL CYLINDERS

DM6023A081

Figure 5-1. Typical Wheel Cylinders

5. When repairing wheel cylinders, replace all components included in the repair kit. Lubricate kit parts in clean brake fluid prior to assembly.

## 5-10. ASSEMBLY

5-11. Make sure that the work area, all parts and your hands are clean and free from all mineral oil or grease. Assemble as follows:

1. Lubricate bleeder valve (6) threads with clean brake fluid. Install in cylinder body (7) and torque to 3-8 N-m (2-6 lb-ft).

2. On Sprint, Spectrum and Nova cylinders only, lubricate seals (4) with clean brake fluid and install in grooves in pistons (3). Make sure seal lips

will face to the inside when pistons are installed in cylinder body (7).

3. Lubricate seals (4) and pistons (3) with clean brake fluid and install with spring assembly or spring (5) in cylinder body (7). Use care not to scratch cylinder bore with spring or damage seal lips on edges of cylinder bore.

4. If the cylinder has internal boots (2), press them in by hand to seat firmly in the cylinder (7) counterbores. If the cylinder has external boots, install them over each end of the cylinder, making sure that they fit snugly in the grooves on the cylinder OD.

5. Install the links (1), if used, through the boot openings.

# SECTION VI

## BLEEDING

### 6-1. GENERAL INFORMATION

6-2. If a wheel cylinder was removed for repair, or if a brake hose or pipe was disconnected for any reason, it will be necessary to bleed all air from the hydraulic system.

6-3. Prior to bleeding the system it is important to check the master cylinder reservoir. Use Delco Supreme 11 Brake Fluid, or equivalent, to bring the fluid up to the proper level.

6-4. Brakes can be bled either manually or with pressure bleeding equipment.

**NOTICE: Discard—never reuse—drained brake fluid.**

### 6-5. MANUAL BLEEDING

6-6. Manual bleeding requires two people—one to operate the brake pedal and another to operate the component being bled. If the car is equipped with power brakes, deplete the vacuum reserve by applying the brakes several times.

**NOTE:** Rapid pumping of the brake pedal may push the secondary piston down the bore of the master cylinder in a manner that makes it difficult to bleed the system.

1. Fill the master cylinder reservoirs with clean brake fluid and keep at least one-half full of fluid during the bleeding operation.

2. If the master cylinder is known or suspected to have air in the bore, then it must be bled before any wheel cylinder or caliper in the following manner:

a. Disconnect the brake pipe at the upper front (blind) end of the master cylinder bore.

**NOTE:** It is not necessary to disconnect the proportioner valve brake pipe connections on diagonal split master cylinders.

b. Allow the brake fluid to fill the master cylinder bore until it begins to flow from the upper connector port.

c. Connect the brake pipe to the master cylinder and tighten.

d. Depress the brake pedal slowly and hold. Loosen the front brake pipe connection at the master cylinder to purge the air. Tighten the connection and then release the brake pedal slowly. Wait 15 seconds. Repeat the sequence, including the 15 second wait, until all air is removed from the bore. Care must be taken to prevent brake fluid from contacting any painted surface.

e. After all air has been removed at the front connection, bleed the master cylinder at the upper rear connection in the same manner as the front connection starting with step 2b above.

3. Individual wheel cylinders and calipers are bled only after all air is removed from the master cylinder.

a. Place a proper size box end wrench over the bleeder valve. Attach a transparent tube over valve and allow tube to hang submerged in brake fluid in a transparent container. Depress the brake pedal slowly and hold. Loosen the bleeder valve to purge the air from the wheel cylinder. Tighten bleeder screw and slowly release pedal. Wait 15 seconds. Repeat the sequence, including the 15 second wait, if any air is removed. It may be necessary to repeat the sequence 10 or more times to remove all the air.

4. If it is necessary to bleed all of the wheel cylinders and calipers, the following sequence should be used:

a. Front-Rear Split:

- (1) Right-rear wheel cylinder
- (2) Left-rear wheel cylinder
- (3) Right-front caliper
- (4) Left-front caliper

b. Diagonal Split:

- (1) Right-rear wheel cylinder
- (2) Left-front caliper
- (3) Left-rear wheel cylinder
- (4) Right-front caliper

5. Torque all caliper bleeder valves to 9-16 N-m (6.5-11.5 lb-ft). Torque wheel cylinder bleeder valves to 3-8 N-m (2-6 lb-ft).

6-7. After bleeding, check the brake pedal for "sponginess" and the brake warning light for indication of unbalanced pressure. Repeat entire bleeding procedure to correct either of these conditions.

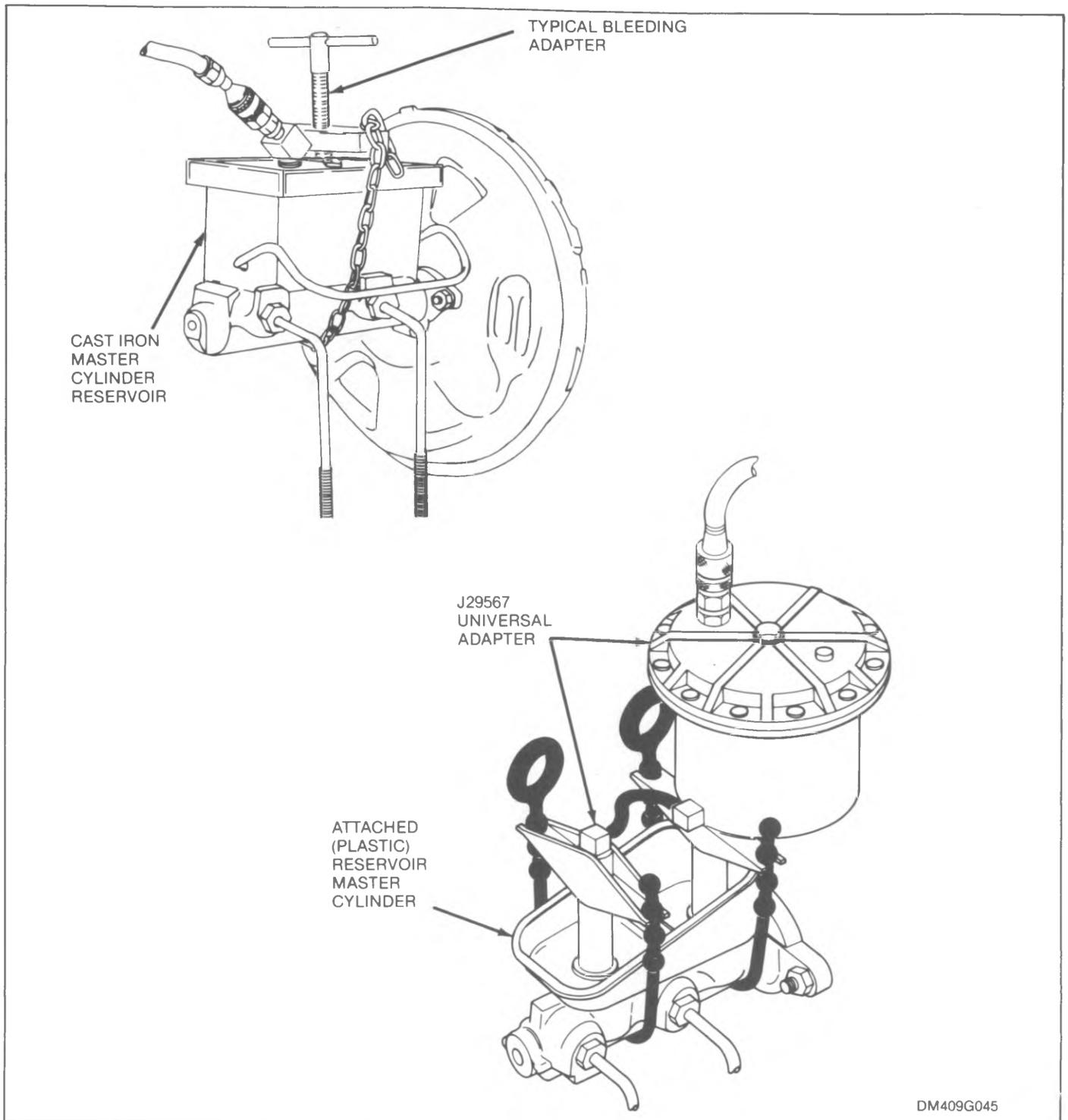


Figure 6-1. Bleeding Adapters

## 6-8. PRESSURE BLEEDING

6-9. If the equipment is available, the pressure method of bleeding is better and faster, since a constant flow of fluid will remove air pockets more efficiently. Also, the master cylinder does not have to be refilled several times. Pressure bleeding equipment should be of the diaphragm type. That is, it should have a rubber diaphragm between the air supply and the brake fluid to prevent air, moisture, oil and other contaminants from entering the hydraulic system. A

bleeding adapter or fixture that fits on the master cylinder is also required. The adapter transmits fluid from the pressure tank to the vehicle's hydraulic system through the master cylinder. Adapters are available in several sizes and shapes to fit different master cylinders. The J29567 universal adapter (see figure 6-1) can be used on attached (plastic) reservoir units. Proceed as follows:

1. Install the special bleeding adapter or fixture on the master cylinder (see figure 6-1).

**NOTE:** In the following step, using excessive air pressure will cause air to mix with the brake fluid. This will make further bleeding necessary after the air settles out.

2. Make sure that the pressure tank is at least 1/3 full of fluid. Position the tank so that its hose will easily reach the adapter or fixture on the master cylinder of the vehicle being serviced, then make the air pressure connection to the tank at 20-25 psi.

3. Open the tank valve to bleed all air out of the hose before connecting it to the adapter or fixture. After making this connection, open the valve when ready to begin bleeding.

4. Bleed master cylinder (if necessary), calipers and wheel cylinders as specified in paragraph 6-6, steps 2 thru 5, disregarding instructions to press and release brake pedal.

*CAUTION: Do not lift, move or shake the tank after air pressure is applied. This may cause air to become trapped in the fluid.*

## **6-10. BLEEDING BRAKE SYSTEMS WITH COMBINATION VALVE**

6-11. The hydraulic pressure generated by manual bleeding is sufficient to open the metering valve in the combination valve and allow fluid to flow to the front calipers. When pressure bleeding, it may be necessary to hold the valve stem open manually.

6-12. To hold the combination valve open, push the valve stem in on Delco Moraine units; pull the valve stem out on Kelsey-Hayes units. Do not use more than 25 pounds force on the valve stem. On Delco Moraine units tool No. J23770 may be used to hold the valve stem open, since it is specifically designed for this purpose. Do not use a screw clamp, wedges or blocks that may put excessive force on the valve stem.

# SECTION VII

## SERVICING BRAKE DRUMS

### 7-1. REMOVAL AND INSTALLATION

7-2. For removal and installation instructions, refer to the applicable on-vehicle service paragraph:

1. Duo-Servo Brakes—paragraph 3-14.
2. Leading-Trailing Shoe Brakes.
  - a. Early Chevette, Vega, Monza, Astre, Sunbird, Skyhawk and Starfire—paragraph 4-15.

- b. Sprint—paragraph 4-16.

7-3. BRAKE LINING INSPECTION. After removing the drums, visually inspect the brake shoe and linings, as installed on the car. Their conditions can, many times, reveal defects in the drums. If the linings on one wheel are worn more than others, it may indicate a rough drum. Uneven wear from side to side on any one set of shoe and linings may be caused by a tapered drum. If some linings are worn badly at the toe or heel, it may indicate an out-of-round drum.

### 7-4. CLEANING

*CAUTION: When servicing wheel brake parts, do not create dust by cleaning with a dry brush or with compressed air. Asbestos fibers can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. See CAUTION inside front cover.*

7-5. Clean drums with a water-dampened cloth or a water based solution. Equipment is commercially available to perform washing functions of brake parts. Wet cleaning methods must be used to prevent asbestos fibers from becoming airborne. If the drums have been exposed to leaking oil or grease, thoroughly clean with a non-oil base solvent after washing to remove dust and dirt.

NOTE: Determine the source of the oil or grease leak if noted, and take corrective action before reinstalling drums.

### 7-6. INSPECTION

7-7. VISUAL INSPECTION. Visually inspect the drums for cracks or any defects in the friction surfaces. The most common surface defects, their causes and effects are shown in figure 7-1. On composite drums, check that the cast iron liner has not separated from the drum.

*CAUTION: Cracked or separated drums must be replaced. Do not attempt to weld or otherwise repair such drums.*

7-8. DIMENSIONAL INSPECTION. Check the drums for wear, taper or an out-of-round condition. Use a brake drum micrometer or any inside micrometer fitted with suitable extension rods. Take measurements at the open and closed edges of the friction surface, at several points (4 or more) around the drum circumference.

7-9. Drums with taper or out-of-roundness exceeding 0.006 inch are unfit for service and must be turned or replaced.

7-10. If the maximum diameter reading equals or exceeds the discard dimension marked on the drum, the drum must be replaced, even if the drums are smooth and true. If the drum is under the discard dimension but require refinishing that would leave no allowance for wear, the drum should also be replaced (refer to paragraph 7-15).

7-11. If the drums are true, very light scoring or other surface defects may be removed by hand sanding with fine emery cloth. Deeper scoring must be removed by turning on a drum lathe.

### 7-12. DRUM REFINISHING

7-13. Best brake performance is obtained by turning drums with a very fine feed. Drum refinishing should be done by qualified personnel using reliable equipment.

7-14. Only enough metal should be removed to obtain a true, smooth friction surface. The exception is that when one drum must be machined, the other drum on the same axle set must also be machined to the same diameter and in the same manner. Otherwise, unequal braking may result.

7-15. The discard dimension marked on the drum is the maximum allowable wear dimension and not the allowable machining dimension. There should be at least 0.030 inch left for wear after turning a drum.

### 7-16. REPLACEMENT DRUMS

7-17. Replacement drums are normally fully finished and do not require additional machining unless it is necessary to match the diameter of an old drum on the same axle set. If the old drum is approaching the discard dimension, it may be more desirable in the long run to replace both.

7-18. Some replacement drums are protected with a rust proofing coating which must be cleaned off the friction surface if no machining is anticipated. A volatile, non-oil base solvent such as carburetor cleaner or lacquer thinner should be used to remove the coating as well as any traces of oil or grease.

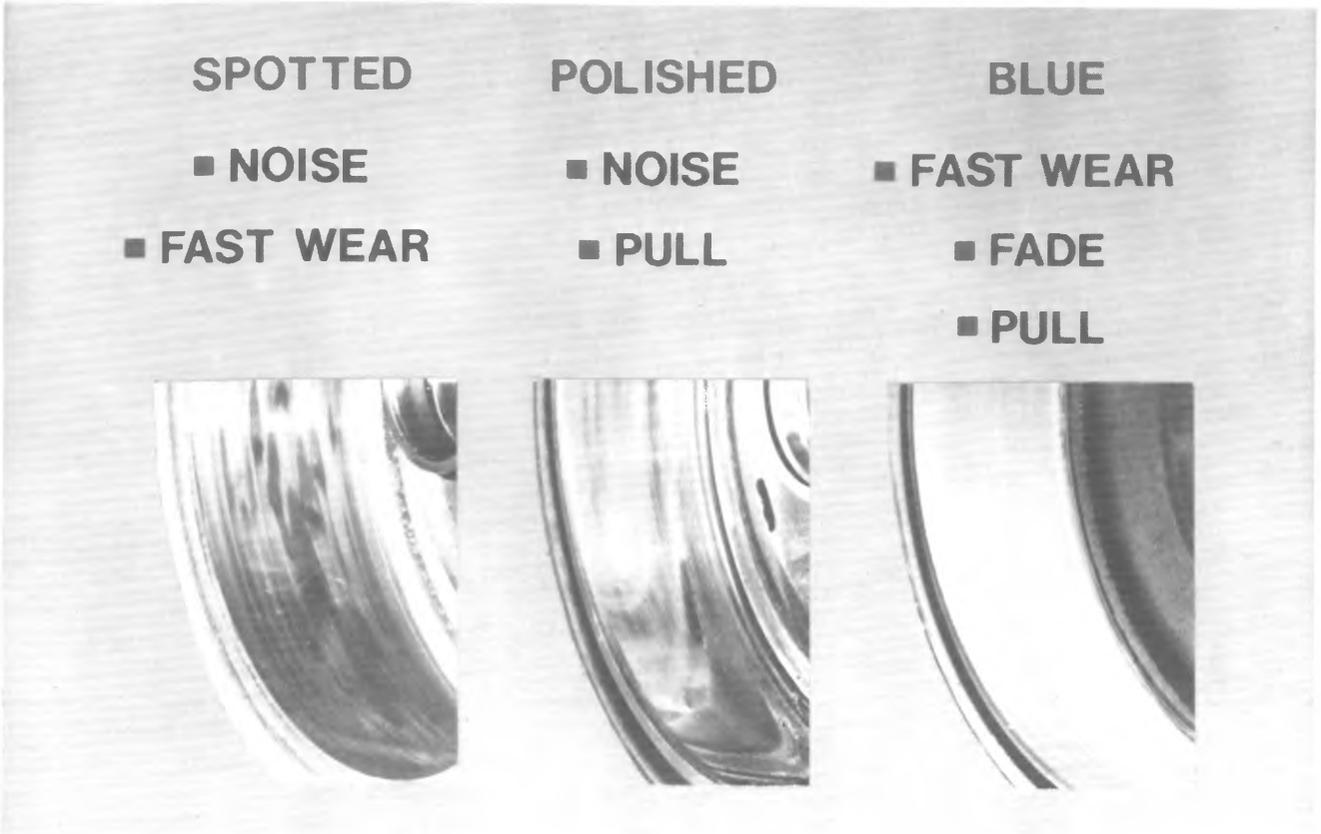
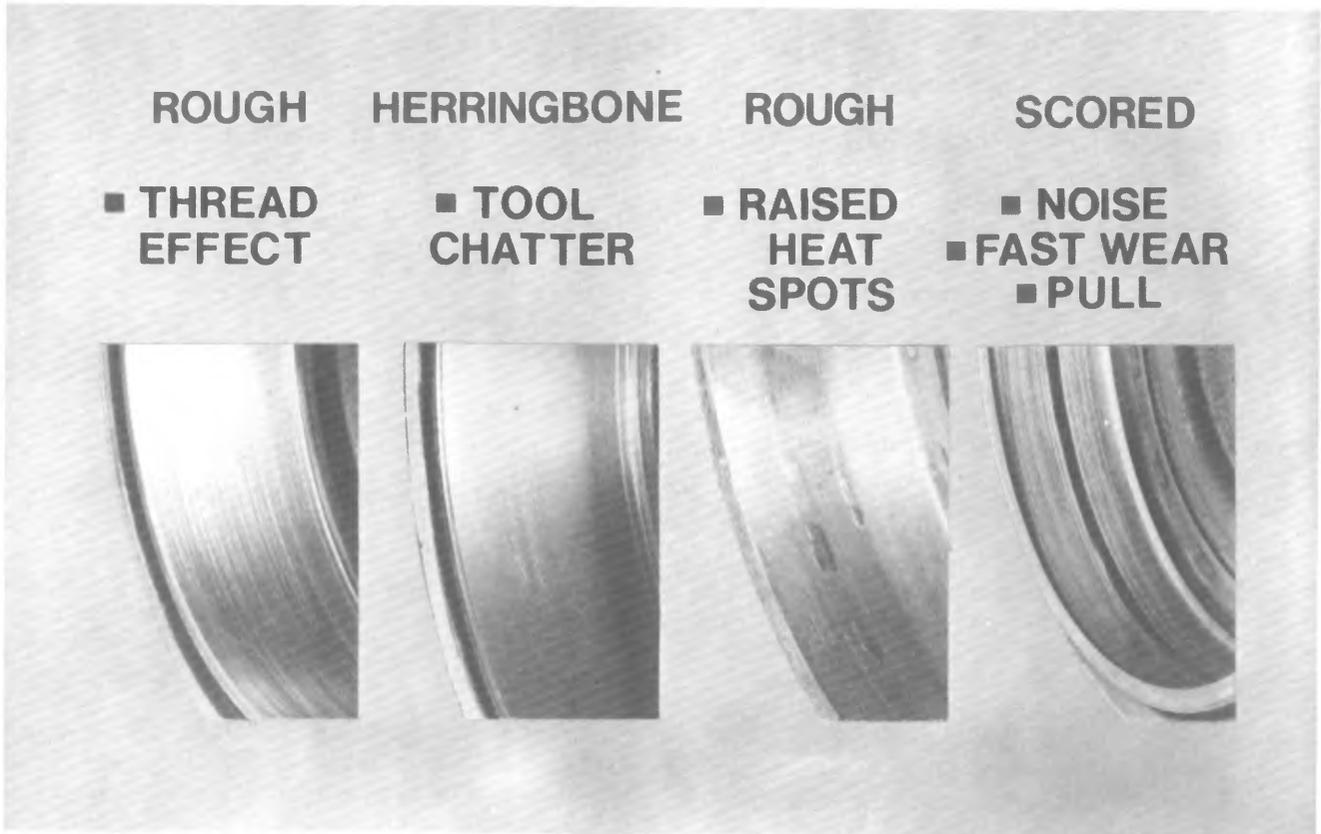


Figure 7-1. Drum Surface Defects



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