Slack Adjuster

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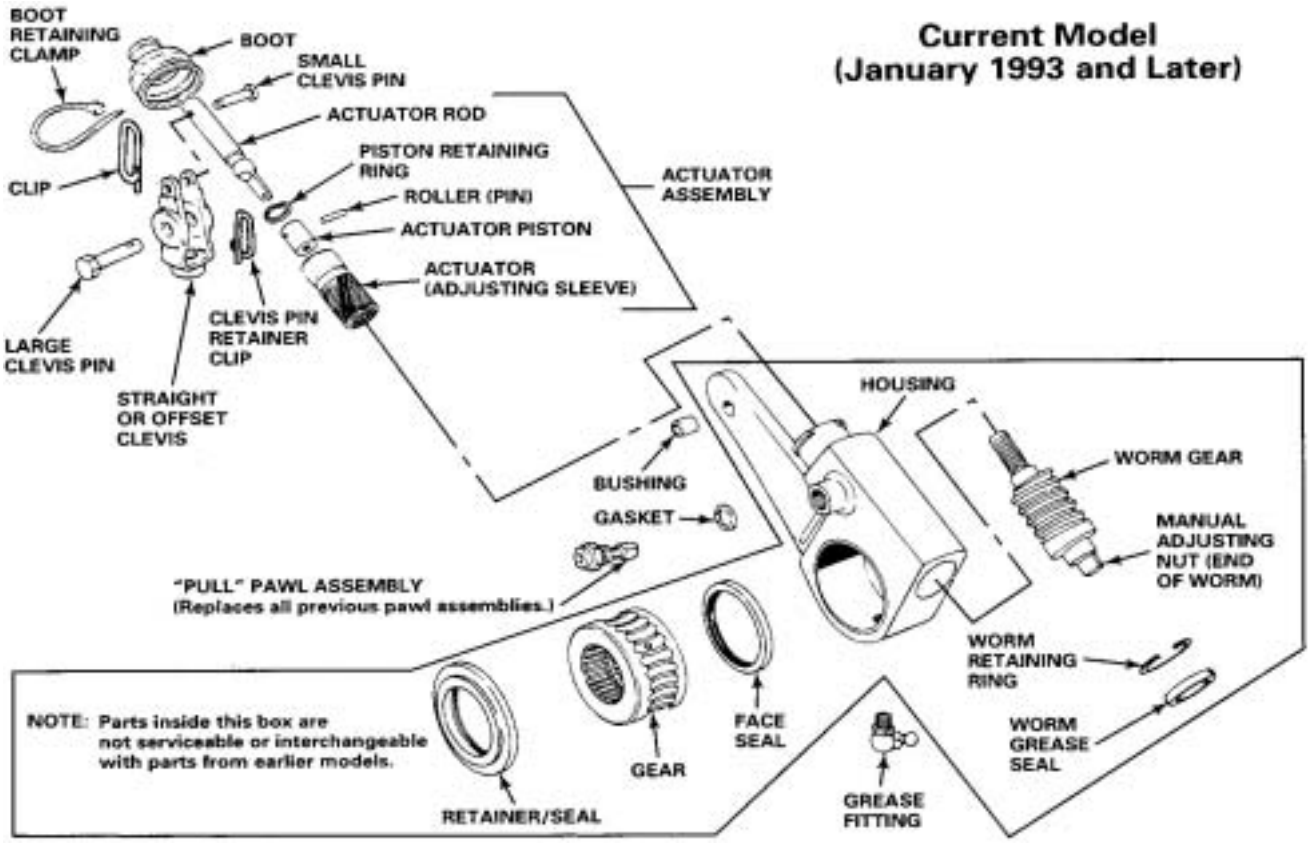

Figure 1 – Automatic Slack Adjuster Exploded View

Automatic Slack Adjuster

Safety

The purpose of this safety summary is twofold. First, it is to help ensure the safety and health of individuals performing service and maintenance on, or operation of, this Blue Bird product. Second, it is to help ensure protection of equipment. Before performing any service, maintenance or operating procedure on this product, individuals should read and adhere to the applicable warnings, cautions and notes located throughout this Blue Bird Service Manual.

Warnings

Warnings apply to a procedure or practice that, if not correctly adhered to, could result in injury or death. Particular attention should be paid to sections of this manual where warnings appear.

Cautions

Cautions apply to a procedure or practice that, if not correctly adhered to, could result in damage to or destruction of equipment.

Notes

Notes are used to explain, clarify, or otherwise give additional insight for a given subject, product or procedure. Please note that on occasion, notes too may advise of potential safety issues.

Meritor's Automatic Slack Adjuster Service

Meritor's PayMaster® Automatic Slack Adjuster

Note

As of January 1993, some parts of Meritor's automatic slack adjuster are no longer serviceable and are not interchangeable with parts from earlier models. Refer to ***Figure 1*** *exploded view for more information.*

How the Automatic Slack Adjuster Works

Meritor's PayMaster® automatic slack adjuster automatically adjusts the clearance between the brake lining and the brake drum (rotor). When linings wear, this clearance increases and causes the chamber push rod to move a greater distance to apply the brakes.

When you install an automatic slack adjuster (**Figure 3**), you set the brake chamber stroke measurement, which is the correct clearance between the linings and drum (rotor).

During operation, if the chamber stroke exceeds the design limit, the automatic slack adjuster will automatically adjust the push rod's return stroke to control clearance between the lining and drum (rotor) and reset the stroke to the correct length.

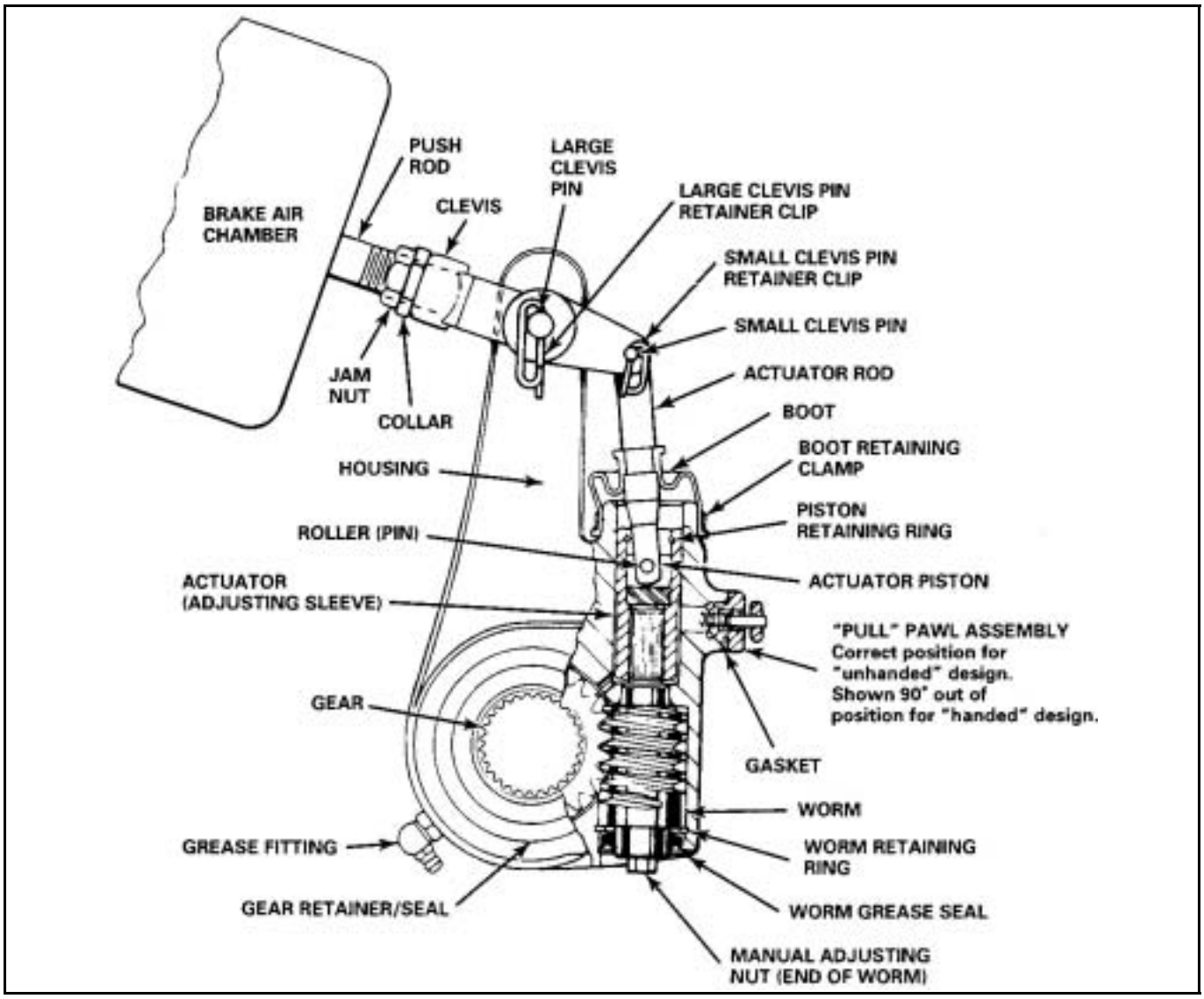

Figure 2 – Automatic Slack Adjuster Cutaway

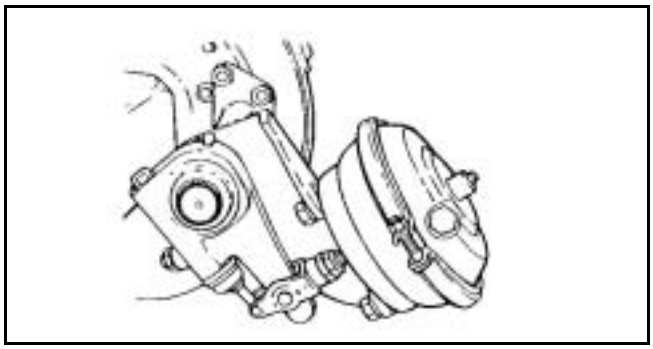

Figure 3 – Automatic Slack

Pressed-In, Sealed Actuator Boot on Meritor Automatic Slack Adjusters Manufactured From July 1998

A pressed-in, sealed actuator boot is standard equipment on Meritor automatic slack adjusters manufactured from July 1998.

The boot features a metal retaining ring with additional material that extends beyond the base of the retainer and forms a seal once the boot is pressed into the slack adjuster body.

- Meritor part numbers will not change.

- All application information is printed on the slack adjuster's identification tag.
- A counterbore is machined into the slack body for easier installation of the press-in boot.

Handed and Unhanded Automatic Slack Adjusters

There are two automatic slack adjuster designs: **HANDED** and **UNHANDED.** For most applications, install a handed automatic slack adjuster so that the pawl faces **INBOARD** on the vehicle.

The pawl can be on either side or on the front of the slack adjuster housing. **Figure 4.**

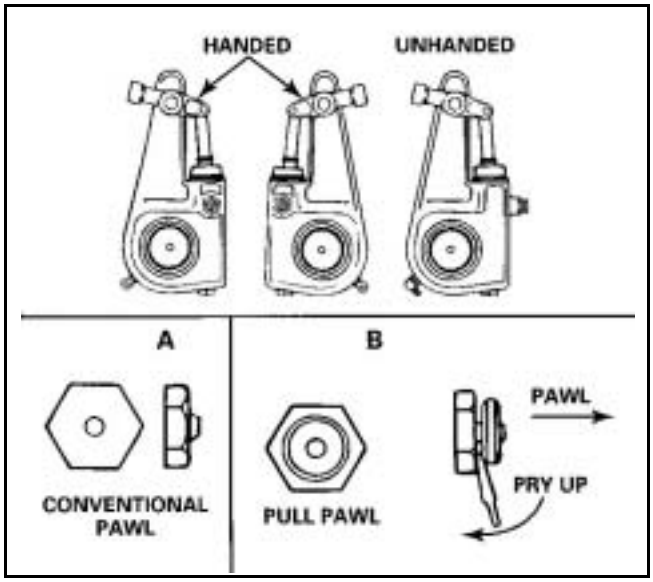

Figure 4 – Automatic Slack

Pull Pawls

Pull pawls are spring loaded. Pry the pull pawl at least 1/32-inch to disengage the teeth. **Figure 4B**. When you remove the pry bar, the pull pawl will re-engage automatically.

Replace Conventional Pawls with Pull Pawls

When you service an automatic slack adjuster, replace a conventional pawl with a pull pawl. **Figure 4A** and **Figure 4B.** Install the slack adjuster so that you can remove the conventional pawl or disengage the pull pawl when you adjust the brake.

Clevis Types and Thread Sizes

Note

Meritor's automatic slack adjusters and clevises are designed to be used as a system. Always replace original components with genuine Meritor replacement parts. Although parts from other manufacturers can look the same, significant differences can exist that can affect brake system performance.

"Quick Connect" Clevis

Some models of Meritor's automatic slack adjuster have a "Quick Connect" clevis. **Figure 5.**

- A "Quick Connect" clevis is a three-piece assembly that cannot be separated after it is assembled.
- The collar has a threaded hole for the push rod.
- A "Quick Connect" clevis can be straight or offset. Use an offset clevis when more clearance is necessary between the air chamber and the tire on the front axle.

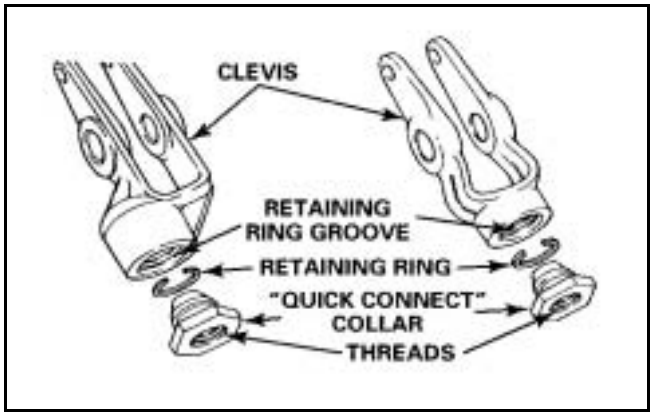

Figure 5 – Quick Connect Clevis

One-Piece Threaded Clevis

Most of Meritor's automatic slack adjusters, including the factory-installed slack adjusters on the new Q plus ™ LX500 and MX500 cam brakes, have a one-piece threaded clevis.

- The clevis has a threaded hole for the push rod. **Figure 6.**
- The one-piece threaded clevis can be straight or offset.
- All service replacement automatic slack adjusters have one-piece threaded clevises.

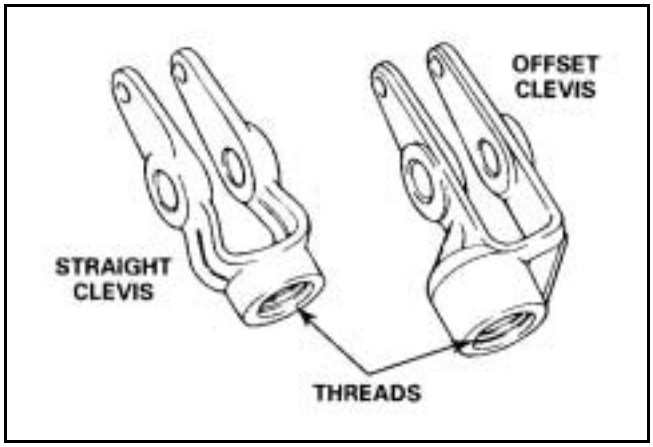

Figure 6 – One-Piece Threaded Clevis

Thread Sizes

Straight and offset clevises are available in two thread sizes (including metric threads) to match push rod threads.

Chambers	Thread Sizes
9, 12, 16	1/2" – 20 UNF
20, 24, 30, 36	5/8" – 18 UNF

Table A – Thread Sizes

Removal of Slack Adjuster

Warning

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

When you work on a spring chamber, carefully follow the service instructions of the chamber manufacturer. Sudden release of a compressed spring can cause serious personal injury.

Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury can result.

1. If the brake has a spring brake, compress and lock the spring, so that the brake is released completely. Check that no air pressure remains in the service half of the air chamber.
2. If it is necessary to raise the vehicle, use a jack and support the vehicle with safety stands.

Warning

When you remove a clevis pin that has a spring, hold the spring with pliers. The spring can disengage from the clevis with enough force to cause serious personal injury.

3. Remove both clevis pins.
4. Remove a conventional pawl. Disengage a pull pawl: Use a screwdriver or equivalent tool to lift the button of a pull pawl assembly at least 1/32-inch from the actuator.

Caution

You must disengage a pull pawl or remove a conventional pawl before rotating the manual adjusting nut, or you will damage the pawl teeth. A damaged pawl will not allow the slack adjuster to automatically adjust brake clearance. Replace damaged pawls before putting the vehicle in service.

5. Use a wrench to turn the manual adjusting nut in the direction shown in **Figure 7.** Move the slack adjuster away from the clevis.

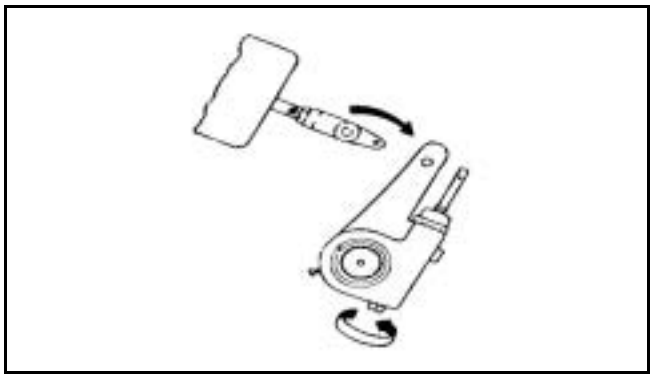

Figure 7 – Adjusting Nut Rotation

6. Remove the snap ring and washers from the camshaft. Remove the slack adjuster from the camshaft.
7. Remove the clevis from the push rod if the gap between the clevis and the collar of a "Quick Connect" clevis exceeds 0.060-inch (1.52 mm). You do not have to remove the clevis if it is in good condition.

Disassembly of Slack Adjuster

Warning

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

1. Cut the clamp and remove it from the boot. Use a new clamp and boot when you assemble the slack adjuster.
2. Remove the boot from the housing. Pull the actuator assembly from the housing. **Figure 8.**

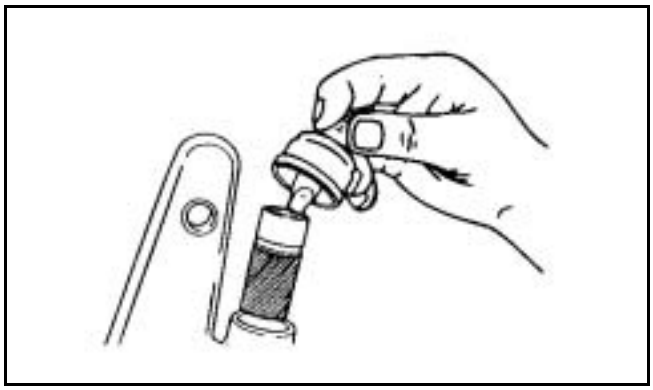

Figure 8 – Boot and Actuator Assembly

3. Use a small screwdriver to push down on one side of the piston retaining ring to force the ring out of the groove. **Figure 9.**
4. Extend the coils of the ring.
5. Use pliers to unwind the ring and pull it out of the groove. **Figure 9.**

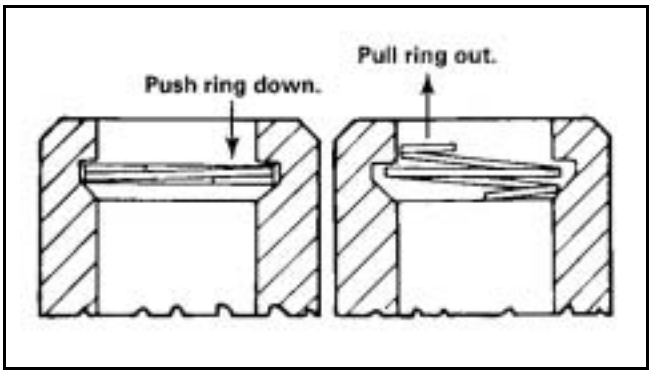

Figure 9 – Piston Retaining Ring

6. Use a new ring when you assemble the slack adjuster.
7. Pull the actuator rod, piston and pin from the actuator.
8. Remove the pin from the rod and piston, if necessary. **Figure 10.**

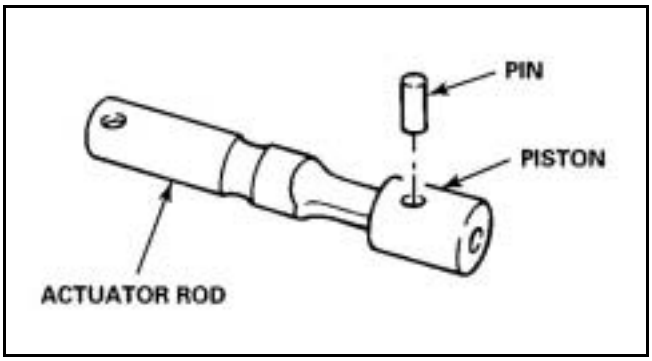

Figure 10 – Rod and Piston

Note

You do not have to remove the slack adjuster arm bushing unless it is worn or "egg-shaped".

9. Inspect the condition and fit of the slack adjuster arm bushing.

10. If necessary, install a new bushing onto the clevis pin. Use the clevis pin and mallet to drive out the old bushing while you drive in the new bushing.

Note

Steps 11 through 21 apply only to automatic slack adjusters manufactured before January 1993. The gear set and seals are not serviceable on automatic slack adjusters manufactured after January 1993.

*Refer to **Figures 1 & 2** exploded for more information.*

11. Use a small screwdriver to remove the grease seal from around the worm bore. **Figure 11.** Discard the seal. Use a new seal when you assemble the slack adjuster.

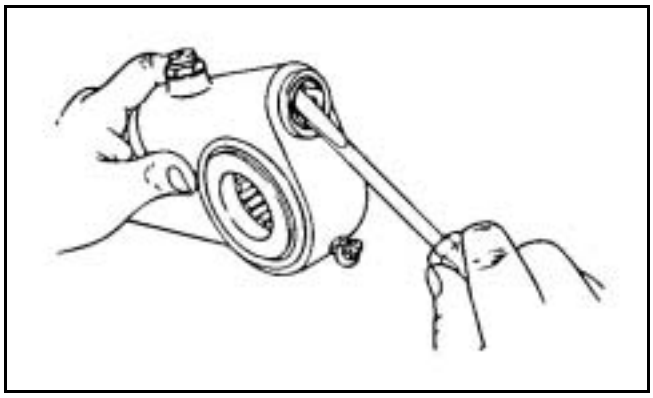

Figure 11 – Grease Seal Removal

12. Use snap ring pliers to remove the retaining ring from the worm bore. **Figure 12.**

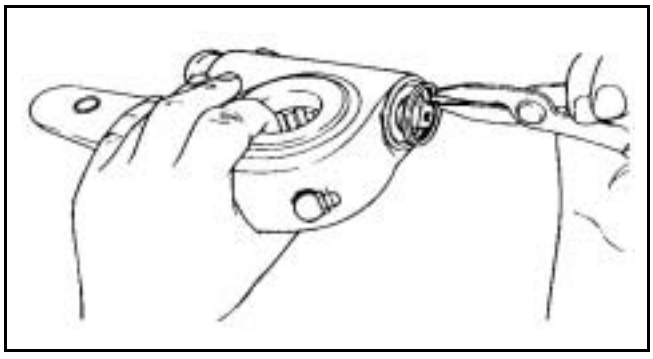

Figure 12 – Retaining Ring

13. Use a wrench to turn the manual adjusting nut and wind the worm out of the bore. **Figure 13.**

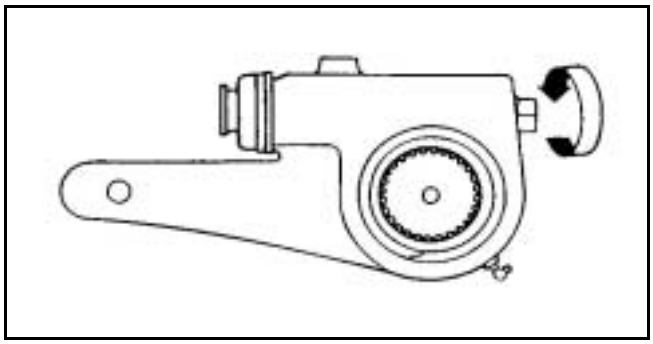

Figure 13 – Manual Adjusting Nut

14. Remove the retaining rings and thrust washers from both sides of the gear.

15. Fit a small screwdriver into the notch at the end of the retaining ring.

16. Remove the end of the retaining ring from the groove.

17. Unwind the ring by hand and pull it out of the groove. **Figure 14.**

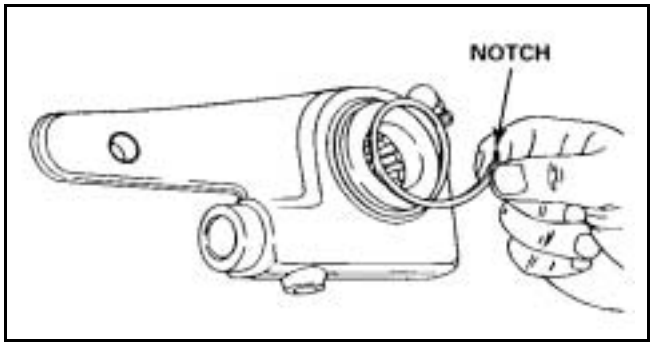

Figure 14 – Large Retaining Ring

18. Remove the thrust washer.

Caution

Push one seal out of one side of the slack adjuster housing and the other seal out of the other side of the housing to avoid damaging the seals.

19. Push the gear out of the housing only far enough to enable you to remove on gear seal.

20. Push the gear out of the opposite side of the housing and remove the other seal.

21. Inspect the seals. Discard damaged seals.

Prepare Parts for Assembly

Warning

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Solvent cleaners can be flammable, poisonous or cause burns. Examples of solvent cleaners are carbon tetrachloride, emulsion-type cleaners and petroleum-base cleaners. To avoid serious personal injury when you use solvent cleaners, you must carefully follow the manufacturer's product instructions and these procedures:

- *Wear safe eye protection.*
- *Wear clothing that protects your skin.*
- *Work in a well-ventilated area.*
- *Do not use gasoline, or solvents that contain gasoline. Gasoline can explode.*
- *You must use hot solution tanks or alkaline solutions correctly. Follow the manufacturer's instructions carefully.*

Caution

Do not use hot solution tanks or water and alkaline solutions to clean ground or polished parts. Damage to parts will result.

Only use solvent cleaners on metal parts. Damage to parts will result.

Clean Parts

1. Use solvent cleaners to clean all automatic slack adjuster parts that have ground or polished surfaces; for example, the gear, the worm and the inner bores of the housing.
2. Use soap and water to clean non-metal parts.
3. Use soft paper or cloth that is free from dirt, oil or abrasives to dry the parts completely.

Dry Parts After Cleaning

Dry the parts immediately after cleaning. Dry parts with clean paper or rages, or compressed air.

Inspect Parts

1. You must carefully inspect all slack adjuster parts, including pawl teeth, for wear and damage before you assemble the slack adjuster.
2. Replace any part that is worn or damaged.

Corrosion Protection

Note

Parts must be clean and dry before you lubricate them.

1. **If you assemble parts immediately after you clean them:** Lubricate parts with grease to prevent corrosion. Parts must be clean and dry before you lubricate them.
2. **If you store parts after you clean them:** Apply a corrosion-preventive material. Store parts in a special paper or other material that prevents corrosion.

Automatic Slack Adjusters

Caution

Always replace used clevis pin retainer clips with new ones when servicing the automatic slack adjuster or chamber. Do not reuse clevis pin retainer clips after removing them. Discard used clips. When removed for maintenance or service, clevis pin retainer clips can be bent or "gapped apart" and lose retention. Damage to components can result.

Check the clevis pins and the bushing in the arm of the slack adjuster. Replace the pins if they are worn. Replace the bushing if its diameter exceeds 0.531-inch (13.5 mm).

Assembly

Warning

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Note

Steps 3 through 11 apply only to automatic slack adjusters manufactured before January 1993. The gear set and seals are not serviceable on automatic slack adjusters manufactured after January 1993. If you are working on a current model, skip to Step 10.

*Refer to **Figures 1 & 2** for more information.*

1. Remove any corrosion-preventive material that may have been applied to the parts you will assemble.
2. Use grease to lubricate the gear bore in the housing.

Caution

Follow Steps 3, 4 and 5 exactly when you install the seals so that the sharp edges of the worm bore will not damage the seals.

3. Install the gear straight into the bore in the housing without the seals, keeping one seal groove outside of the housing.
4. Install a seal into the groove. **Figure 15.**

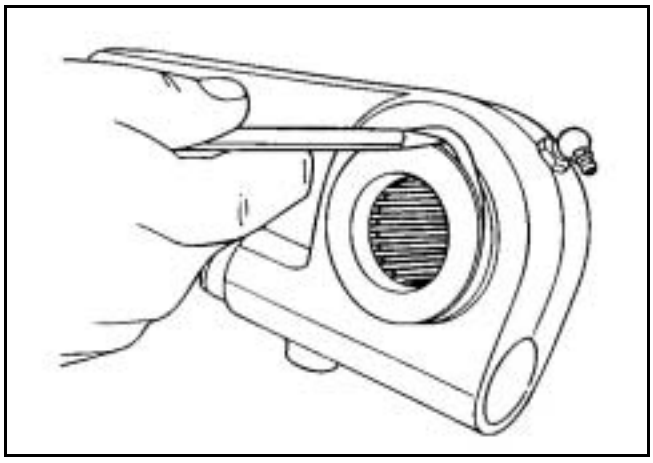

Figure 15 – Seal

5. Lubricate the seal with grease that meets Meritor's specifications. Compress the seal in its groove. Push the gear into the housing.
6. Push the gear out of the opposite side of the housing only until the other seal groove is visible. Repeat Steps 4 and 5 to install the second seal.
7. Lubricate a thrust washer with grease that meets Meritor's specifications. Refer to **"Lubrication and Maintenance"** section. Install the washer around the gear.
8. Expand the retaining ring coil. Install one end of the coil into the groove in the outer diameter of the gear. Work around the gear and press the coil into the groove. **Figure 16.**

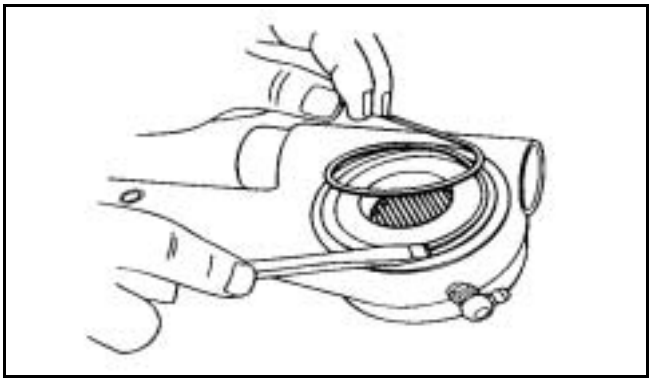

Figure 16 – Retaining Ring Coil

9. Repeat Steps 7 and 8 for the opposite side of the gear.
10. Install the worm into the bore. Turn the adjusting nut to wind the worm completely into the bore. **Figure 17.**

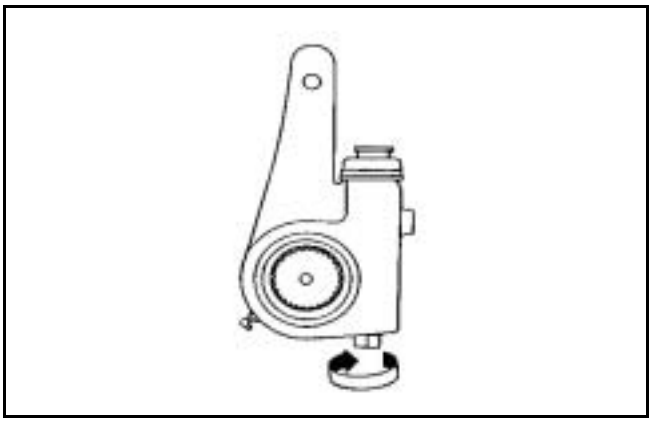

Figure 17 – Adjusting Nut

11. Use snap ring pliers to install the retaining ring into the worm bore.

Caution

Install the seal with the lips outside of the bore and the metal retainer inside of the bore to prevent contamination from entering the slack adjust housing. Damage to components can result. ***Figure 18.***

Do not his the seal after it reaches the bottom of the bore. Damage to seal will result.

12. Place the seal directly over the worm bore. Use a hammer and 1-3/16-inch (30.2 mm) diameter seal driver to install the seal strai9ght into the bore. **Figure 19.**

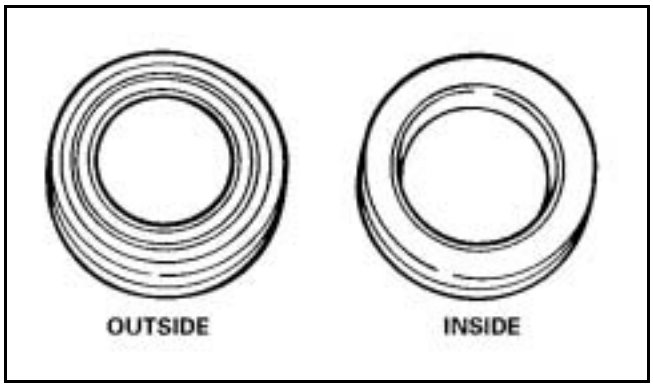

Figure 18 – Seals

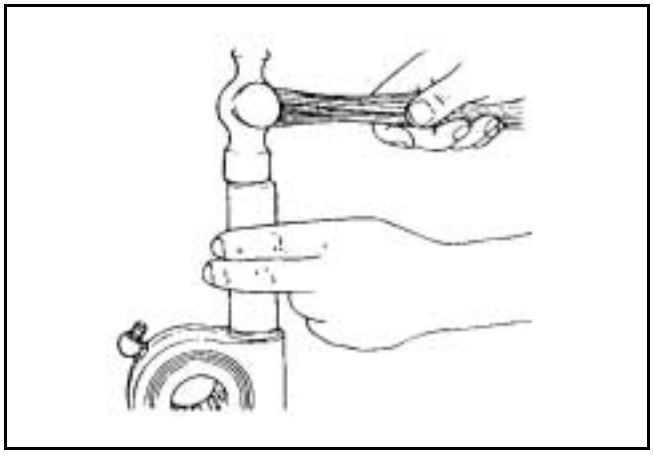

Figure 19 – Seal Installation

13. If you removed the pin, install it into the rod and piston. **Figure 20.**

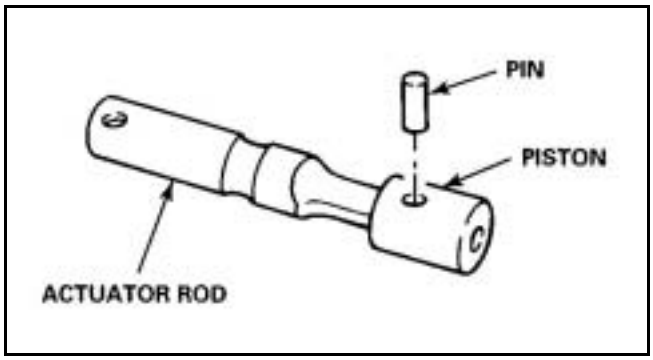

Figure 20 – Rod and Piston

14. Install the actuator rod and piston assembly into the actuator (adjusting sleeve).

15. Slide the piston retaining ring over the rod.

16. Extend the coils of the ring.

17. Use a small screwdriver to press one end of the ring into the groove. **Figure 21.**

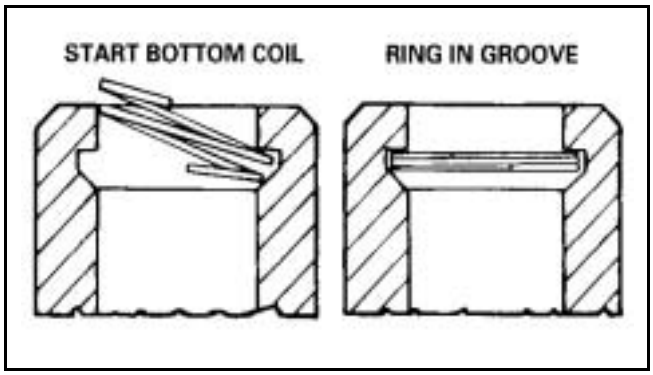

Figure 21 – Piston Retaining Ring Installation

18. Keep the coil extended. Press on the ring and work around the groove until the ring is in the groove completely.

Note

If the actuator rod has a groove, you must install the piston retaining ring correctly into the groove, so that you will be able to remove the piston from the actuator.

19. Check to ensure that the ring is installed correctly in the groove. You cannot pull the piston out of the actuator if the retaining ring is installed correctly.

20. Install the actuator assembly into the housing so that the actuator slides along the worm splines.

21. Slip the boot over the actuator rod.

Note
Do not seal the boot to the tapered part of the actuator rod.

- **If the rod has a groove:** The top of the boot must fit into the groove.
- **If the rod does not have a groove:** Use silicon sealant to seal the top of the boot to the round part of the rod.

22. Fasten the bottom of the boot to the housing with a retaining clamp.

23. **Conventional Pawl:** Install the pawl assembly into the housing. Tighten the capscrew to a torque of 15-20 lb-ft (20-27 N•m).

24. **Pull Pawl:** Remove the screwdriver or equivalent tool. The pull pawl will re-engage automatically.

25. Use a grease gun to lubricate the slack adjuster through the grease fitting. If necessary, install a camshaft into the slack adjuster gear to minimize grease flow through the gear holes.

26. Apply lubrication that meets Meritor's specifications until new grease purges from around the camshaft splines and from the pawl assembly. Refer to **"Lubrication and Maintenance"** section.

Caution
*In Step 28, turn the adjusting nut only in the direction shown in **Figure 22**. If you turn the adjusting nut in the opposite direction while the pawl is installed, you will damage pawl teeth. Damaged teeth prevent automatic adjustment. Replace damaged pawls before putting the vehicle in service.*

27. Use a torque wrench that measures lb-in.

28. As you turn the adjusting nut in the direction shown in **Figure 22**, read the torque scale and rotate the gear 360 degrees (22 turns of the wrench).

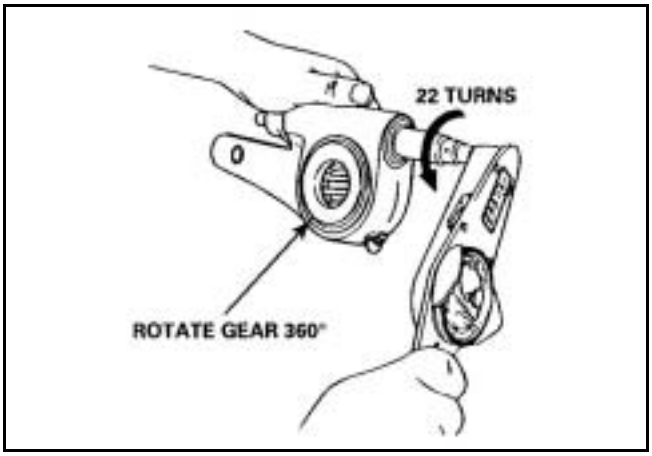

Figure 22 – Adjusting Nut Torque

29. The torque value must remain less than 25 lb-in (2.83 N•m) during the complete 360-degree rotation of the gear.

30. **If the torque value remains less than 25 lb-in (2.8 N•m):** The slack adjuster is working correctly.

31. **If the torque value exceeds 25 lb-in (2.8 N•m):** The slack adjuster is not working correctly. Disassemble the slack adjuster.
    - Check that the slack adjuster is assembled correctly.
    - Check that parts are aligned correctly.

Installing the Slack Adjuster Onto the Camshaft

Warning
To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Warning
Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks.

Jacks can slip and fall over. Serious personal injury can result.

1. Check the camshaft, bushings, and seals for wear and corrosion.
2. Turn the camshaft by hand to check for smooth operation.
3. Repair or replace parts as required.
4. Apply the service brake and spring brake several times. Check that the chamber return spring retracts the push rod quickly and completely. If necessary, replace the return spring or the air chamber.
5. The new automatic slack adjuster must be the same length as the one you are replacing. **Table B** shows the length of slack adjuster that is used with each brake chamber size.
6. Place blocks in front of and behind the vehicle's wheels to prevent it from moving.

Length of Slack Adjuster (Inches)	Size of Chamber (Square Inches)
5	9*, 12*, 16, 20, 24, 30,
5-1/2	9*, 12*, 16, 20, 24, 30, 36
6	24, 30, 36
6-1/2	30, 36

* Use an auxiliary spring on slack adjusters used with these size chambers. A size 9 or 12 chamber return spring cannot supply enough spring tension to completely retract the slack adjuster

Table B: Chamber and Automatic Slack Adjuster Sizes

Warning

When you work on a spring chamber, carefully follow the service instructions of the chamber manufacturer. Sudden release of a compressed spring can cause serious personal injury.

7. If the brake has a spring brake, compress and lock the spring to completely release the brake. No air pressure must remain in the service half of the air chamber.

Caution

Most Meritor automatic slack adjusters manufactured after January 1990 have lubrication holes in the gear splines. Do not operate the actuator before you install the slack adjuster. Lubricant can pump through the holes and onto the splines. Damage to components can result.

8. If the automatic slack adjuster gear has a 10-tooth spline, apply anti-seize compound to the slack adjuster and cam splines. Use Meritor specified 0-637, Southwest SA 8249496 or equivalent lubricants.

Note

Install the slack adjuster so that you can remove a conventional pawl or disengage a pull pawl when you adjust the brake.

9. Install the slack adjuster onto the camshaft. Position the slack adjuster so that you can remove the pawl when you adjust the brake.
10. If necessary, install spacing washers and the snap ring at a maximum clearance of 0.062-inch (1.57 mm).
11. Install the clevis onto the push rod. Do not tighten the jam nut against the clevis.

Caution

You must disengage a pull pawl before rotating the manual adjusting nut, or you will damage the pawl teeth. A damaged pawl will not allow the slack adjuster to automatically adjust the brake clearance. Replace damaged pawls before returning the vehicle to service.

12. Disengage the pawl. Turn the manual adjusting nut to align the holes in the slack adjuster arm and the clevis. **Figure 23.**

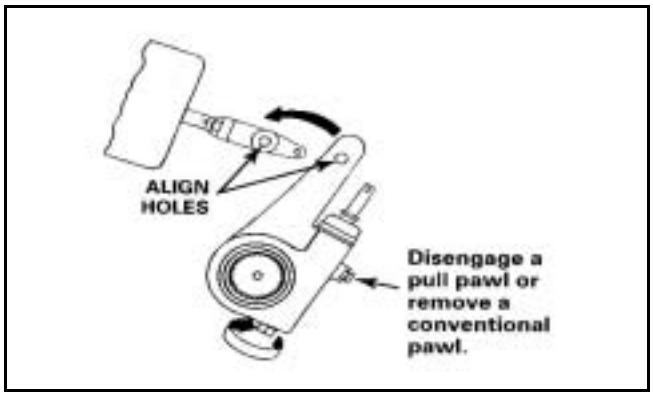

Figure 23 – Slack Adjuster Installation

A Slack Adjuster with a Welded Clevis

13. Apply anti-seize compound to the two clevis pins. Install the clevis pins through the clevis and the slack adjuster.

Caution

Always replace used clevis pin retainer clips with new ones when servicing the automatic slack adjuster or chamber. Do not reuse clevis pin retainer clips after removing them. Discard used clips. When removed for maintenance or service, clevis pin retainer clips can be bent or "gapped apart" and can lose retention. Damage to components can result.

14. Install new cotter pins or clevis pin retainer clips to hold the clevis pins in place. **Figure 24.**

A Slack Adjuster with a Threaded Clevis

- Refer to **"Install a Threaded Clevis"** section in this manual.

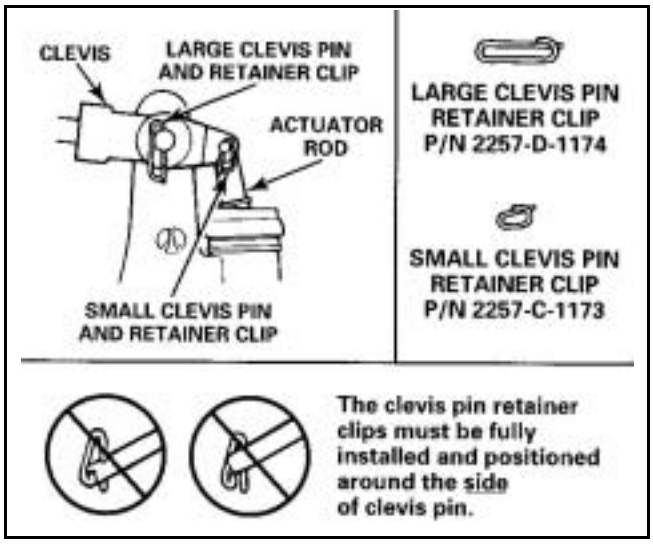

Figure 24 – Retainer Clips and Clevis Pins

Adjusting the Brakes

Check Brake Chamber Push Rod Stroke and Adjust Clevis Position

Warning

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Note

You cannot adjust the clevis position on a chamber push rod that is equipped with a welded clevis.

There are two methods you can use to adjust the clevis position on a chamber push rod that is equipped with a **threaded clevis:**

- The Brake Slack Adjuster (BSAP) method for standard and long stroke chambers.
- Meritor's automatic slack adjuster template method **for standard stroke chambers only.**

Brake Slack Adjuster Position (BSAP) Method

When installing the automatic slack adjuster, verify that the BSAP dimension of the chamber matches the table in **Figure 25.**

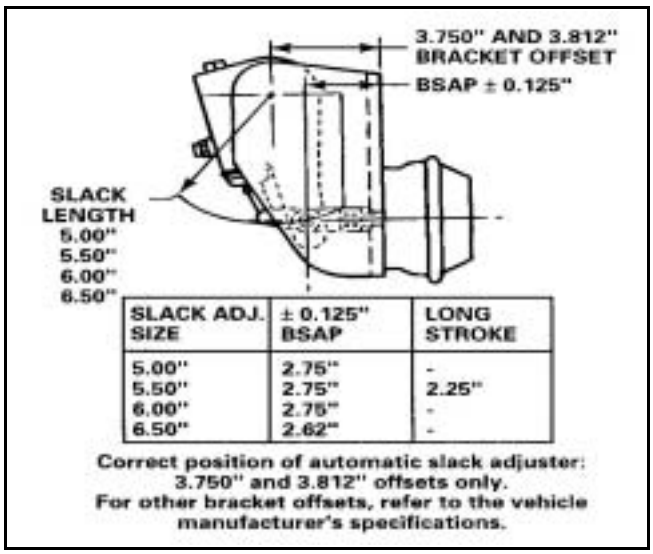

Figure 25 – BSAP Dimension

Automatic Slack Adjuster Templates

Order the correct slack adjuster template from Meritor's Customer Service Center at 800-535-5560.

Caution

*There are five different installation templates for Meritor automatic slack adjusters (**Figure 26**). The templates are NOT interchangeable. You MUST use the correct template and you MUST adjust the clevis position as described below. If you use the wrong template and install the clevis in the wrong position, the slack adjuster will not adjust the brakes correctly. If the slack adjuster under-adjusts, the stopping distances are increased. If the slack adjuster over-adjusts, then the linings may drag and damage the brake.*

Measure the Slack Adjuster

Note

For long-stroke chambers, use the Brake Slack Adjuster Position method to measure the automatic slack adjuster.

Use the correct Meritor automatic slack adjuster template to measure the length of the slack adjuster. The marks by the holes in the small end of the template indicate the length of the slack adjuster. **Figure 26.**

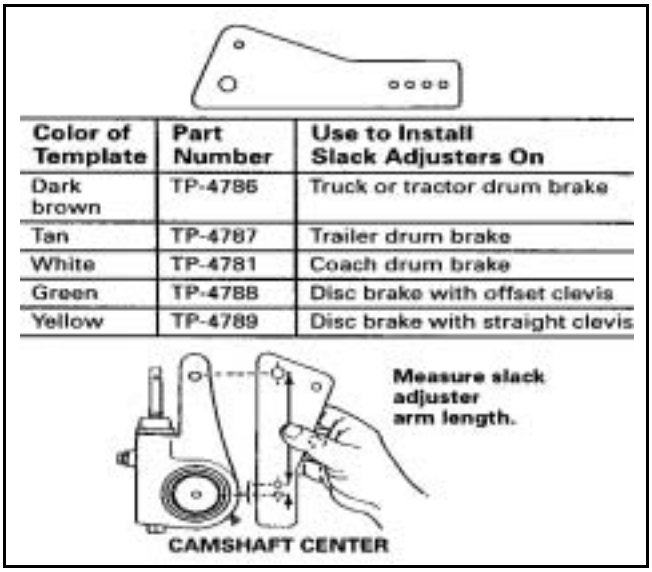

Figure 26 – Slack Adjuster Templates

Install a Threaded Clevis

1. Install the large clevis pin through the large holes in the template and the clevis.
2. Select the hole in the template that matches the length of the slack adjuster. Hold that hole on the center of the camshaft.
3. Look through the slot in the template. If necessary, adjust the position of the clevis until the small hole in the clevis is completely visible through the template slot. **Figure 27.**

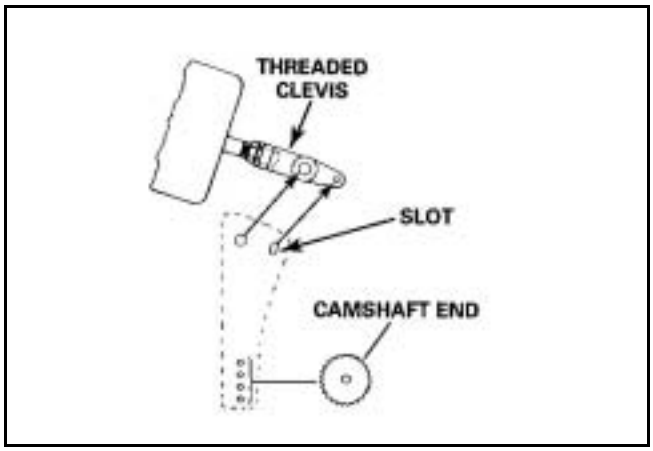

Figure 27 – Adjusting Nut Torque

4. Check for these specifications:

- Thread engagement between the clevis and the push rod must be at least 1/2-inch (12.7 mm). **Figure 28.**
- The push rod must not extend through the clevis more than 1/8-inch (3.18 mm). If necessary, cut the push rod, or install a new push rod with a new air chamber.

5. Tighten the jam nut against the clevis to torque specifications in **Table C.**

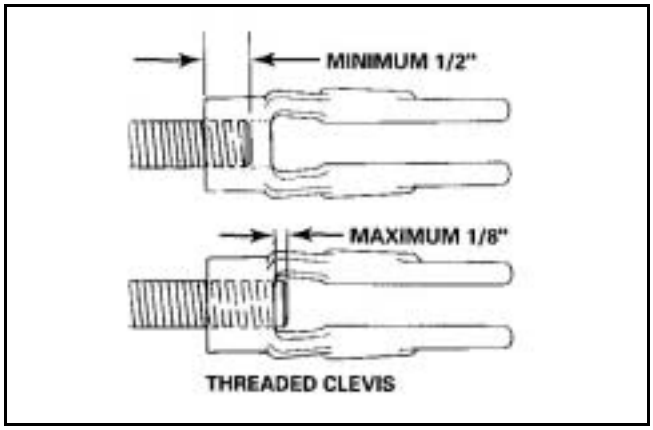

Figure 28 – Threaded Clevis

Threads	Torque
1/2 - 20	20-30 lb-ft (27-41 N•m)
5/8 - 18	35-50 lb-ft (48-68 N•m)

Table C: Jam Nut Torque Specifications

Free Stroke Measurement

Caution

You must disengage a pull pawl or remove a conventional pawl before rotating the manual adjusting nut, or you will damage the pawl teeth. A damaged pawl will not allow the slack adjuster to automatically adjust brake clearance. Replace damaged pawls before putting the vehicle in service.

Note

During preventive maintenance on an in-service brake, check both the free stroke as described below and the adjusted chamber stroke as described in "Alternate Method for Determining Push Rod Travel (Adjusted Chamber Stroke)"section.

On some applications, you may find the in-service free stroke to be slightly longer than specified in Step 5. However, this is not necessarily a concern, as long as the adjusted chamber stroke is within the limits shown in the **"Commercial Vehicle Safety Alliance (CVSA) Reference Charts**

1. Disengage a pull pawl or remove a conventional pawl.
2. Turn the adjusting nut in the direction shown in **Figure 29** until the linings touch the drum, and then turn the adjusting nut in the opposite direction:
   - 1/2 turn for drum brakes.
   - 3/4 turn for drum brakes.

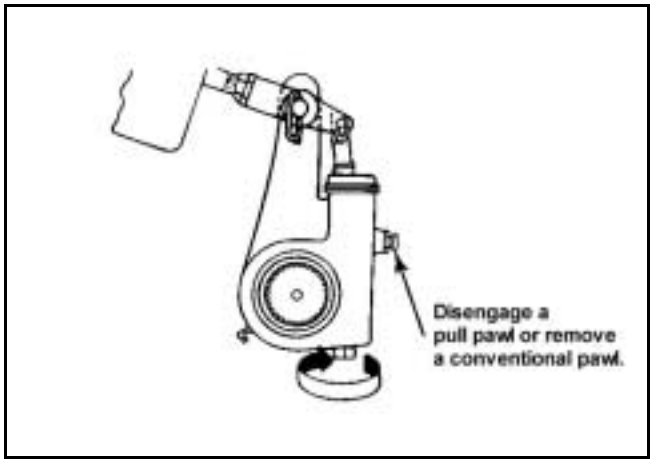

Figure 29 – Brake Adjustment

3. Measure the distance from the center of the large clevis pin to the bottom of the air chamber while the brake is released. Refer to "X" in **Figure 30.**

4. Use a pry bar to move the slack adjuster so that the linings are against the drum (applying the brakes). Measure the same distance again while the brakes are applied. Refer to "Y" in **Figure 30.**

Caution

Do not set FREE STROKE shorter than specifications. If FREE STROKE is too short, linings can drag and damage the brake.

5. The difference between measurement "X" and measurement "V" is the **FREE STROKE**, which sets the clearance between the linings and drum. **FREE STROKE** must be within the following specifications. **Figure 30.**

   - **DRUM BRAKES** 1/2-inch - 5/8-inch (12.7-15.9 mm)
   - **DISC BRAKES** 3/4-inch - 7/8-inch (19.1-22.2 mm)

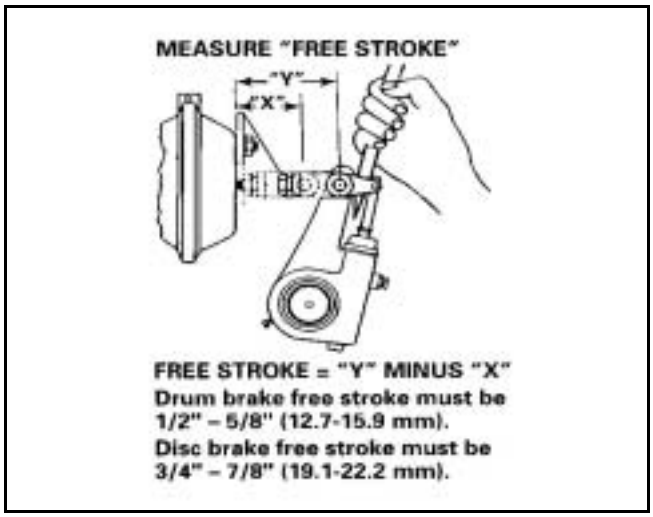

Figure 30 – Free Stroke

6. If it is necessary to adjust the stroke, turn the adjusting nut 1/8 turn in the direction shown in **Figure 31** and check the stroke again. Continue to measure and adjust the stroke until it is adjusted correctly.

7. Release a pull pawl or install a conventional pawl.

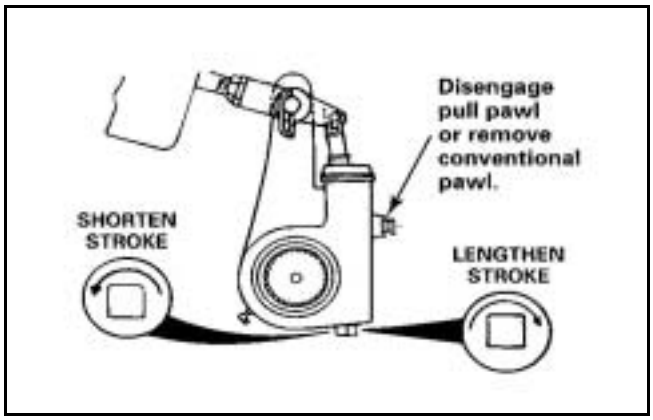

Figure 31 – Stroke Adjustment

Warning

When you work on a spring chamber, carefully follow the service instructions of the chamber manufacturer. Sudden release of a compressed spring can cause serious personal injury.

8. If the brake has spring chambers, carefully release the spring.

9. Test the vehicle to ensure that the brake system is operating correctly before you return the vehicle to service.

Diagnostics

Symptoms	Possible Causes	Corrective Actions
Adjusted Stroke is too long **No adjustment**	Incorrect slack adjuster parts number	Check with WD or OEM
	Clevis installed at wrong angle	Use correct template or BSAP setting to install clevis correctly
	Excessive wear between clevis and collar (more than 0.060 inch (1.52 mm)	Replace with threaded clevis
	Loose jam nut at clevis	Tighten to specification
	Worn clevis pin bushing in slack arm (ID larger than 0.53 inch (13.46 mm))	Replace bushing
	Wear or broken return spring in air chamber (Spring force must be at least 32 lb (142.4 N) at first push rod movement)	Replace return spring or air chamber
	Spring brake does not retract fully	Repair or replace spring brake
	Worn or stripped teeth on pawl or actuator	Replace pawl or actuator
	High torque is required to rotate worm when slack is removed from vehicle In service slack, maximum worm torque: 45 lb-in (5.09 N•m) New or rebuilt slack, maximum worm torque: 25 lb-in (2.83 N•m)	Rebuild or replace slack adjuster
	Excessive looseness between splines of camshaft and ASA gear	Replace powershaft, gear or automatic slack adjuster as needed
	Worn components (cam bushing, for example) in foundation brake	Replace components
Adjusted stroke is too short **Linings drag**	None-Original Equipment Manufacturer replacement linings with excessive swell and/or growth	Use Meritor approved linings
	Incorrect slack adjuster part number	Check with WD or OEM
	Clevis installed at wrong angle	Use correct template to install clevis correctly
	Loose jam nut at clevis	Tighten to specification
	Spring brake does not retract fully	Repair or replace spring brake
	Wrong manual adjustment	Adjust brake. Refer to appropriate section.
	Poor contact between linings and drum, or drum is out-of-bound	Repair or replace drums or linings
	Brake temperature imbalance	Correct brake balance

Table D – Brake Diagnostics

Inspection

Commercial Vehicle Safety Alliance (CVSA) Guidelines to Measure Push Rod Travel (Adjusted Chamber Stroke)

Use the following procedures to check in-service push rod travel (adjusted chamber stroke) on truck or tractor air brakes with automatic slack adjusters.

Hold the ruler parallel to the push rod and measure as carefully as possible. An error in measurement can affect CVSA re-adjustment limits, which state, "Any brake 1/4-inch or more past the re-adjustment limit, or any two brakes less than 1/4-inch beyond the re-adjustment limit will be cause for rejection".

Warning

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

When you work on a spring chamber, carefully follow the service instructions of the chamber manufacturer. Sudden release of a compressed spring can cause serious personal injury.

1. The engine must be OFF. If the brake has spring chambers, carefully release the spring.
2. Check the gauges in the cab to ensure that air pressure in the tanks is 100 psi (689 kPa).
3. Determine the size and type of brake chamber you are inspecting.
4. With the brakes released, mark the push rod where it exits the chamber. **Figure 32.** Measure and record the distance.
5. Have another person apply and hold the brakes one full application.
6. Measure push rod travel distance (adjusted chamber stroke) from where the push rod exits the brake chamber to your mark on the push rod. Measure and record the distance. (Refer to the NOTE after step 3.)
7. **TO DETERMINE PUSH ROD TRAVEL (ADJUSTED CHAMBER STROKE):** Subtract the measurement you obtained in Step 4 from the measurement you obtained in Step 6. The difference is the push rod travel (adjusted chamber stroke).
   a. Push rod travel (adjusted chamber stroke) must not be greater than the stroke length shown in the **CVSA REFERENCE CHARTS** for the size and type of air chamber you are inspecting.
   b. If push rod travel (adjusted chamber stroke) is greater than the maximum stroke shown in the **CVSA REFERENCE CHARTS**, inspect the slack adjuster and replace if necessary.

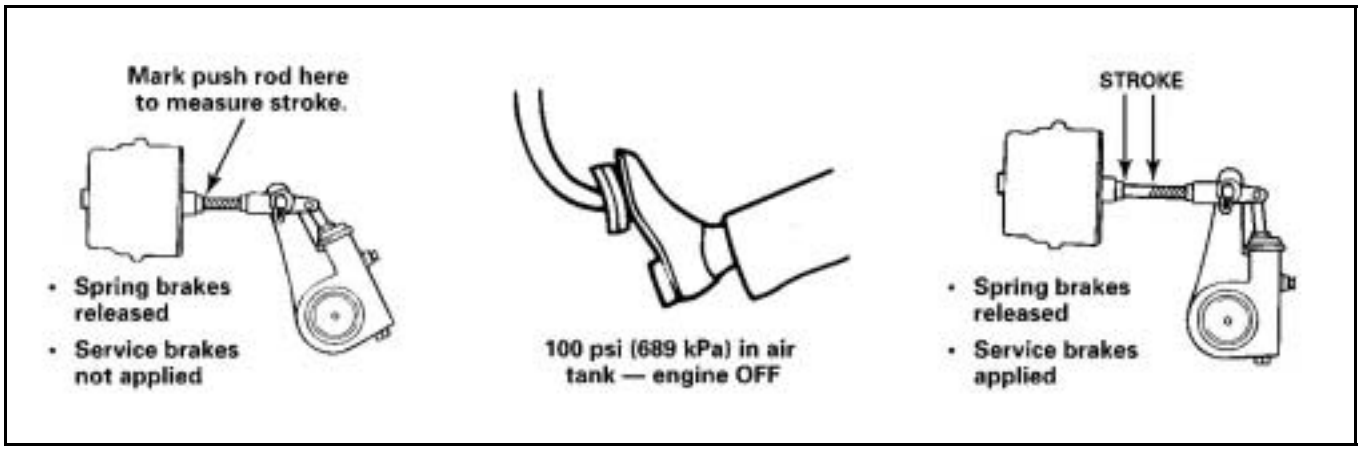

Figure 32 – Brake Adjustment Guidelines (CVSA)

Alternate Method for Determining Push Rod Travel (Adjusted Chamber Stroke)

Use the above procedure, except in Step 4 and Step 6, measure the distance from the bottom of the air chamber to the center of the large clevis pin on each of the brakes.

Commercial Vehicle Safety Alliance (CVSA) North American Out-of-Service Criteria Reference Charts

'Standard Stroke' Clamp Type Brake Chamber Data

Type	Outside Diameter (inches)	Brake Adjustment Limit (inches)
6	4 1/2	1 1/4
9	5 1/4	1 3/8
12	5 4/16	1 3/8
16	6 3/8	1 3/4
20	6 25/32	1 3/4
24	7 7/32	1 3/4
30	8 3/32	2
36	9	2 1/4

Table E – Standard Stroke

Note

A brake found at the adjustment limit is not a violation.

'Long Stroke' Clamp Type Brake Chamber Data

Type	Outside Diameter (inches)	Brake Adjustment Limit (inches)
16	6 3/8	2.0
20	6 25/32	2.0
24	7 7/32	2.0
24*	7 7/32	2.5
30	8 3/32	2.5

Table F – Long Stroke

Lubricants

Component	Meritor Specification	NLGI Grade	Grease Description	Outside Temperature
Automatic Slack Adjuster	0-616-A	1	Clay Base	Down to -40°F (-40°C)
	0-692	1 and 2	Lithium Base	Down t0 -40°F (-40°C)
	0-645	2	Synthetic Oil, Clay Base	Down to -65°F (--54°C)
Clevis Pins	Any of above	See Above	See Above	See Above
	0-637	1 - 1/2	Calcium Base	Refer to the grease manufacturer's specifications for temperature service limits
	0-641	---	Anti-Seize	

Table D - Conventional Automatic Slack Adjuster Grease Specifications

Anti-Seize Compound

Meritor lubricant specification 0-637 (part number 2297-U-4571) is a corrosion control grease. **Do not mix this grease with other greases.** This compound is also available from the Southwest Petro-Chemical Division of Witco Chemical Corporation, 1400 South Harrison, Olathe, KS 66061, as "Corrosion Control," part number SA 8249496.

- Use anti-seize compound on the clevis pins of all slack adjusters.
- Also, use anti-seize compound on the automatic slack adjuster and cam splines if the slack adjuster gear has no grease groove and holes around its inner diameter.

Maintenance

Inspections and Lubrication

Inspect and lubricate the slack adjuster according to one of the following schedules. Use the schedule that gives the most frequent inspection and lubrication. Also, inspect and lubricate the slack adjuster whenever you reline the brakes.

- The schedule of chassis lubrication used by your fleet.
- The schedule of chassis lubrication recommended by the chassis manufacturer.
- Every six months.
- A minimum of four times during the life of the linings.

At Brake Reline

1. Before you perform brake maintenance, check the free stroke and the adjusted chamber stroke as described in **"Adjusting the Brakes"** section.
2. If the free stroke is not correct, refer to the **Diagnostics Table D** to correct the stroke before you adjust the chamber stroke.
3. Inspect the boot for cuts or other damage. If the boot is cut or damaged, remove the pawl and inspect the grease.
4. If the grease is in good condition, replace the damaged boot with a new boot.
5. Use a grease gun to lubricate the slack adjuster through the grease fitting. If necessary, install

a camshaft into the slack adjuster gear to minimize grease flow through the gear holes.

6. Lubricate until new grease purges from around the inboard camshaft splines and from the pawl assembly.

7. Measure the gap between the clevis and the collar on a "Quick Connect" clevis. Replace the clevis if the gap exceeds 0.060 inch (1.52 mm). **Figure 33.**

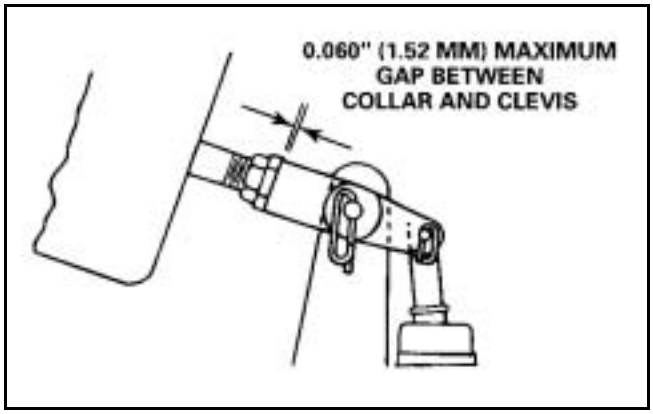

Figure 33 – Clevis and Collar Gap

Note

Information contained in this Service Manual was obtained, either whole or in part, from the following ArvinMeritor publications.

- *Manual 1, Lubrication – Revised 02-01*
- *Manual 4, Cam Brakes – Revised 10-98*
- *Manual 4B, Automatic Slack Adjuster – Revised 03-98*
- *Manual 5A, Single Reduction Rear Differential Carriers – Revised 09-00*
- *Manual 8 – Drive Axle Housings – Revised 08-00*
- *Manual 23 – Bus and Coach Front Axles – Issued 07-98*
- *Manual 23A – Bus and Coach Rear Axles – Revised 09-97*
- *Manual 23B – Bus and Coach Brakes – Revised 11-96*
- *Manual 39 – Hydraulic ABS for Medium-Duty Trucks, Buses and Motor Home Chassis – Rev 09-00*
- *Manual MM-2075, Four Piston Quadraulic Disc Brake Caliper – Issued 01-01*
- *Manual 2 – Parts 1 & 2, Front Non-Drive Steering Axles – Rev 05-01 (supersedes MM-99120)*
- *Manual TP-9955, Failure Analysis for Drive Axle Components – Issued 08-00*

Note

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