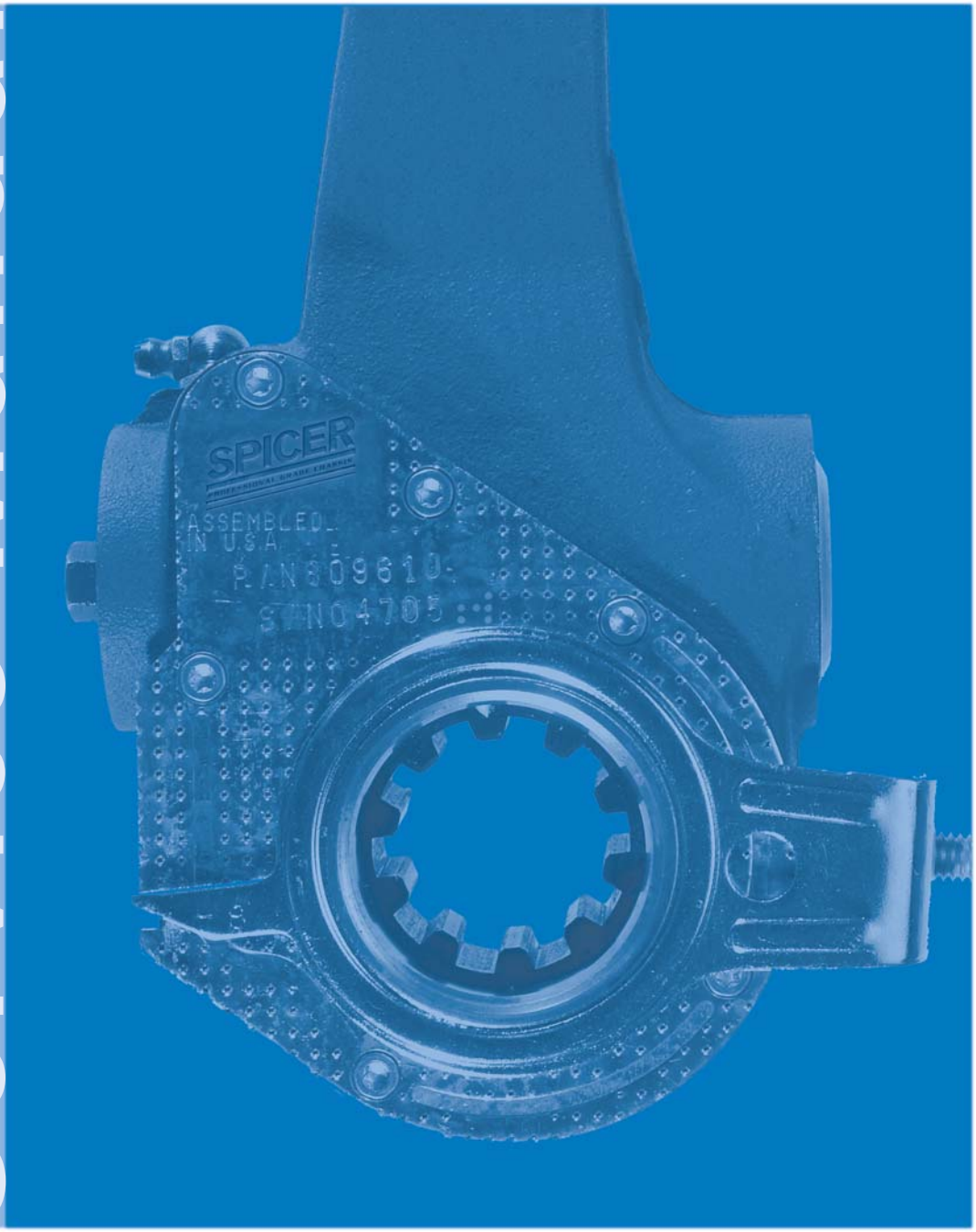
Bendix Spicer
Foundation Brake LLC
A Bendix Commercial Vehicle Systems and Dana Corporation Joint Venture

Premium wheel-end brake products

Spicer® Automatic Slack Adjuster

Service Manual



The description and specifications contained in this service publication are current at the time of printing.

Bendix Spicer Foundation Brake LLC reserves the right to discontinue or modify its models and/or procedures and to change specifications at any time without notice.

Any reference to brand name in this publication is made as an example of the types of tools and materials recommended for use and should not be considered an endorsement. Equivalents may be used.

IMPORTANT NOTICE

This symbol is used throughout this manual to call attention to procedures where carelessness or failure to follow specific instructions may result in personal injury and/or component damage.

Departure from the instructions, choice of tools, materials and recommended parts mentioned in this publication may jeopardize the personal safety of the service technician or vehicle operator.

NOTE: A properly working Automatic Slack Adjuster does not require manual adjustment while in service. The manual adjuster hex is intended for use during adjuster installation and brake overhaul.
WARNING: Automatic slack adjusters should not be repeatedly adjusted to correct excessive in service pushrod stroke, because this condition indicates that a problem exists with the automatic adjuster, with the installation of the adjuster or with related foundation brake components which manual adjustment will not correct.

WARNINGS: FAILURE TO FOLLOW INDICATED PROCEDURES CREATES A HIGH RISK OF PERSONAL INJURY TO THE SERVICING TECHNICIAN.

Caution: Failure to follow indicated procedures may cause component damage or malfunction.

Note: Additional service information not covered in the service procedures.

Tip: Helpful removal and installation procedures to aid in the service of this unit.

Always use genuine Spicer® replacement parts.

Contents

Manufactured By Haldex

Introduction/Operation

Introduction

Spicer® brand self adjusting brake adjusters compensate for wear in brake shoe linings caused by normal braking operation. Upon brake application, the brake adjuster assembly rotates, rotating the brake camshaft. The camshaft moves the shoes into contact with the drum.

During brake application and release, the adjuster mechanism rotates the camshaft slightly to maintain the correct shoe-to-drum clearance.

Operation

The Spicer® brand self adjusting brake adjuster is a clearance sensing brake adjuster that maintains a nominal distance or clearance between lining and drum. The clearance notch in the rack corresponds to this normal lining-to-drum clearance. (See Figure 1.)

When the brake applies:

- The rack moves upward and rotates the one-way clutch. The one-way clutch allows slippage in this direction.
- Brake application torque presses the wormshaft against the coil spring. Wormshaft movement releases the cone clutch.

When the brake releases:

- The coil spring presses against the wormshaft, engaging the cone clutch.
- The rack is pulled back to its original position in the clearance notch.
- Any lining wear causes the rack to turn the locked one-way clutch while rotating the wormshaft via the locked cone clutch.
- The wormshaft rotates the wormwheel and camshaft, adjusting the brakes.

NOTE: A properly working Automatic Slack Adjuster does not require manual adjustment while in service. The manual adjuster hex is intended for use during adjuster installation and brake overhaul.

<u>WARNING:</u> Automatic slack adjusters should not be repeatedly adjusted to correct excessive in service pushrod stroke, because this condition indicates that a problem exists with the automatic adjuster, with the installation of the adjuster or with related foundation brake components which manual adjustment will not correct.

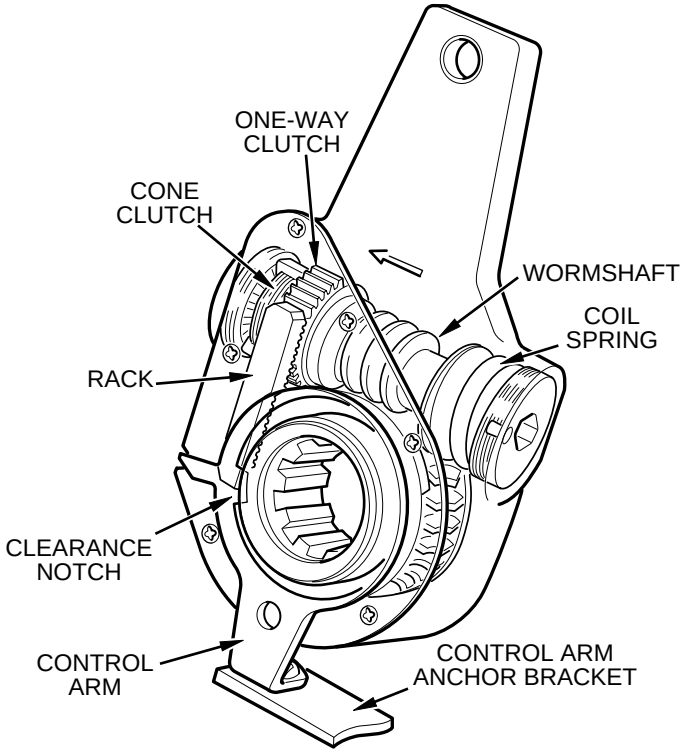
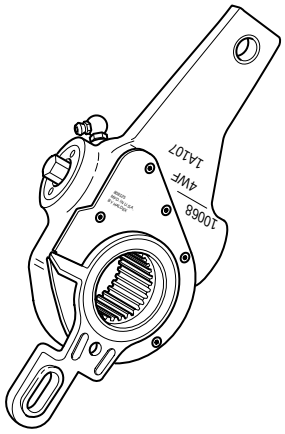
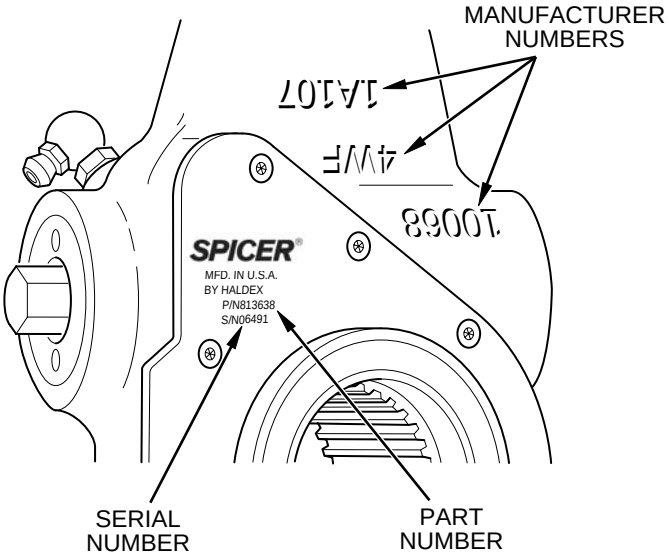


Figure 1 *Components of the Brake Adjuster*

Self Adjusting Brake Adjuster Identification

The serial and part numbers are stamped on the facing of the self adjusting brake adjuster. The serial number is used for control purposes. The part number describes the self adjusting brake adjuster specification.





Typical Applications

Steer Axle Installations

Figures 2, 3, 4 and 5 show typical brackets for self adjusting brake adjuster installations on steer axles:

- Straight brake adjuster using a clamp-type bracket (See Figure 2.)
- Offset brake adjuster using clamp-type bracket (See Figure 3.)
- Offset brake adjuster using bolt-on type bracket (See Figure 4.)
- Disc brake type installation (See Figure 5.)

Refer to pages 9, 10 and 11 for detailed installation procedures.

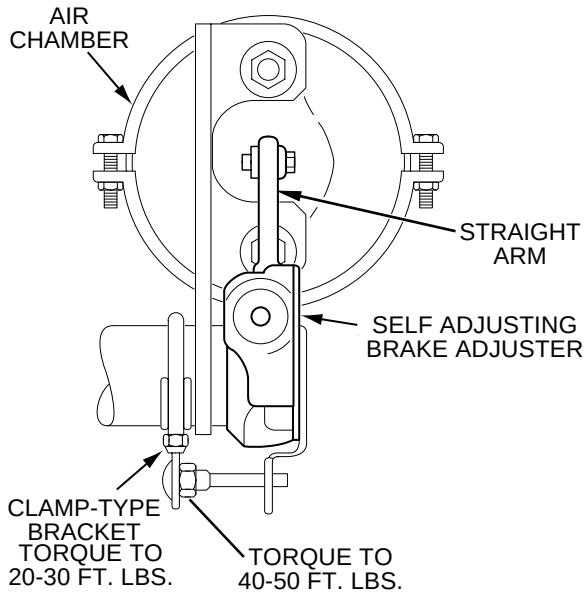


Figure 2 *Straight (Clamp-Type Bracket) Installation*

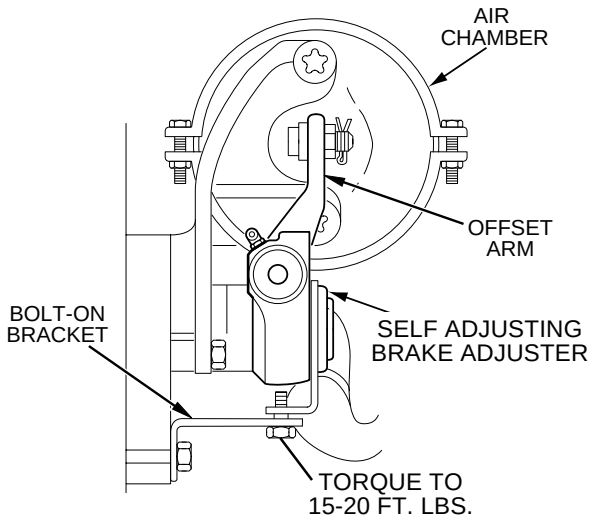


Figure 4 *Offset (Bolt-On Type Bracket) Installation*

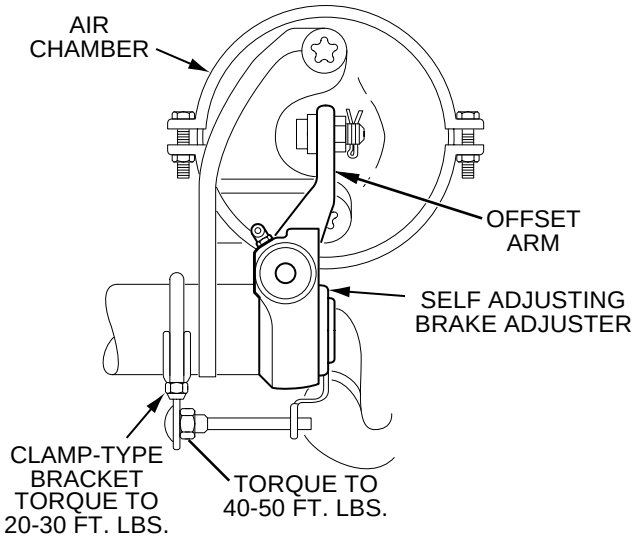


Figure 3 *Offset (Clamp-Type Bracket) Installation*

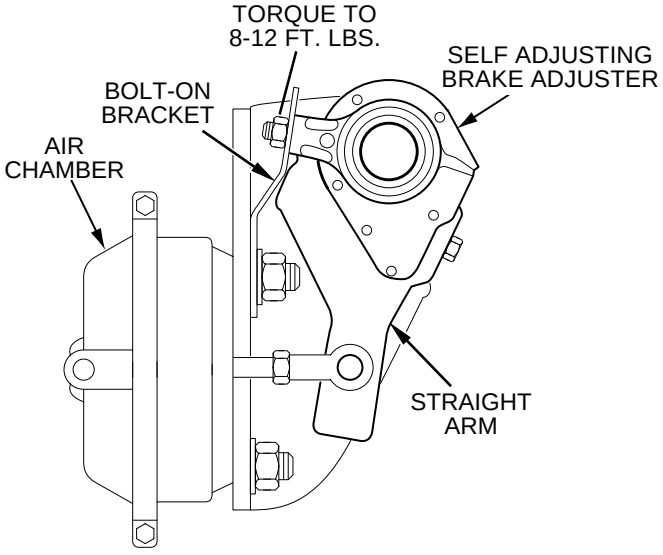


Figure 5 *Disc Brake Type Installation*

Drive Axle Installations

Figures 6, 7, 8 and 9 show typical brackets for self adjusting brake adjuster installations on drive axle brakes:

- Straight brake adjuster using a clamp-type bracket (See Figure 6.)
- Offset brake adjuster using bolt-on bracket (See Figure 7.)
- Straight brake adjuster using bolt-on type bracket (See Figure 8.)
- Disc brake application (See Figure 9.)

Refer to pages 9, 10 and 11 for detailed installation procedures.

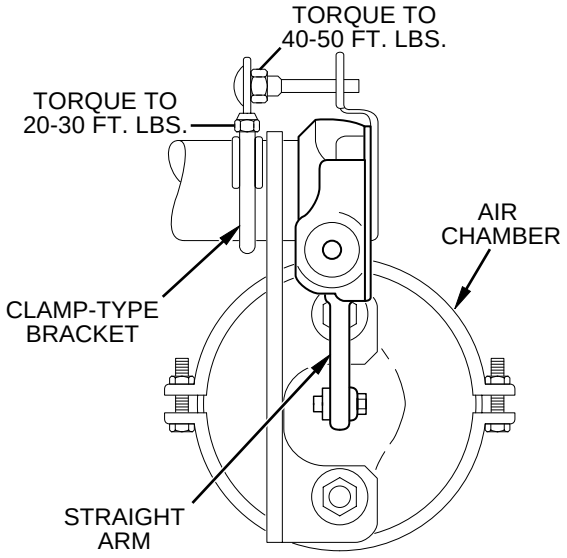


Figure 6 *Straight (Clamp-Type) Installation*

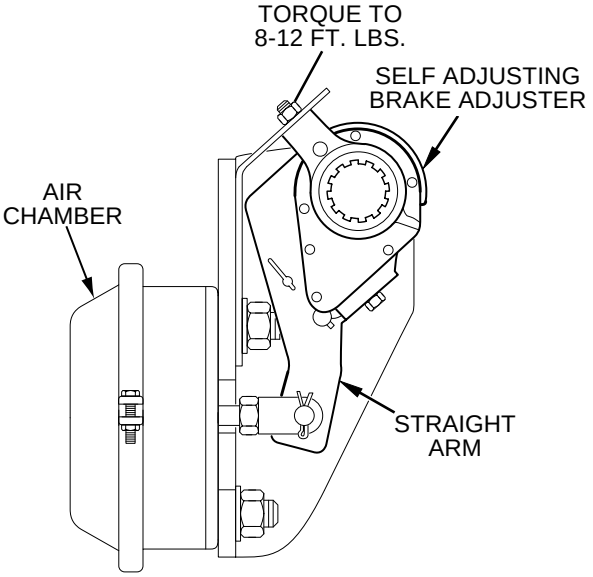


Figure 8 *Straight (Bolt-On Type Bracket) Installation*

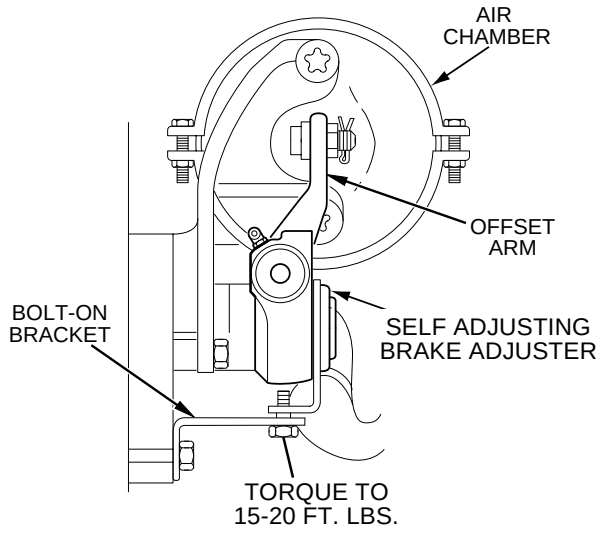


Figure 7 *Offset (Bolt-On Type Bracket) Installation*

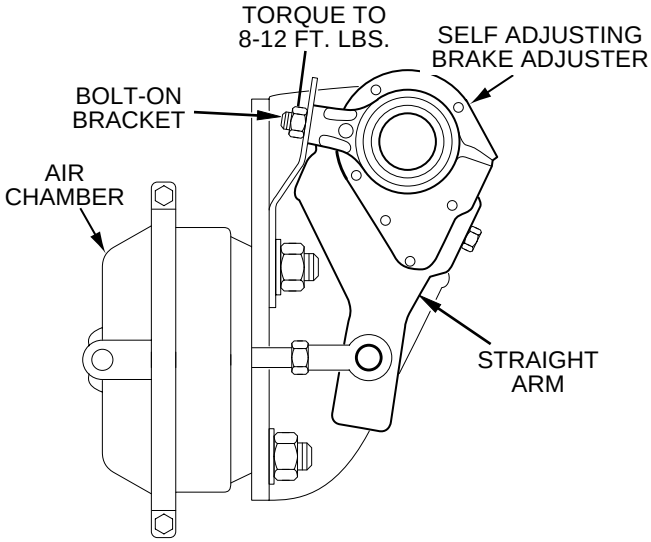


Figure 9 *Disc Brake Type Installation*

Typical Applications

Trailer Axle Installations

Figures 10 through 13 show typical and alternative brackets for self adjusting brake adjuster installations on trailer installations.

Universal Anchor Bracket

Tip: The universal anchor bracket mounts to the “S” cam bushing support bracket. Rockwell, Dana and Fruehauf brakes mount with two bolts. Position plate on adjuster side of the “S” cam support. Added bracket thickness requires the use of longer mounting bolts. **Eaton trailer axles manufactured after January 1993 have the anchor bracket as an integral part of the "S" Cam shaft bushing support.**

Refer to pages 9, 10 and 11 for detailed installation procedures.

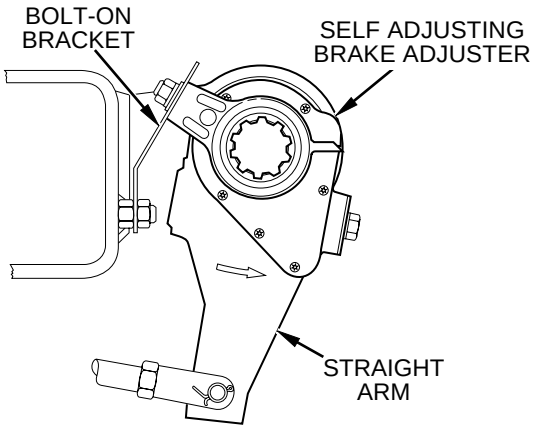


Figure 11 *Alternative Bracket Types*

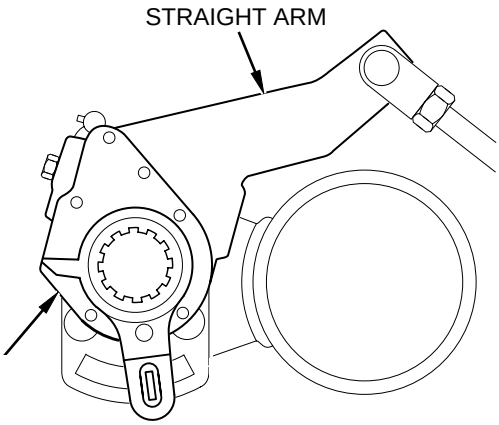


Figure 10 *12-1/4" Brake Application*

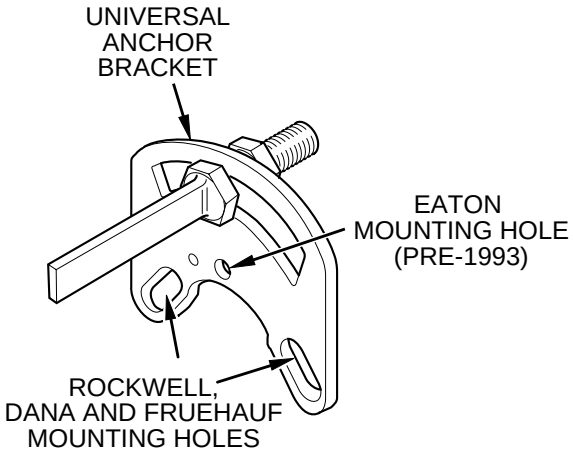


Figure 12 *Universal Anchor Bracket*

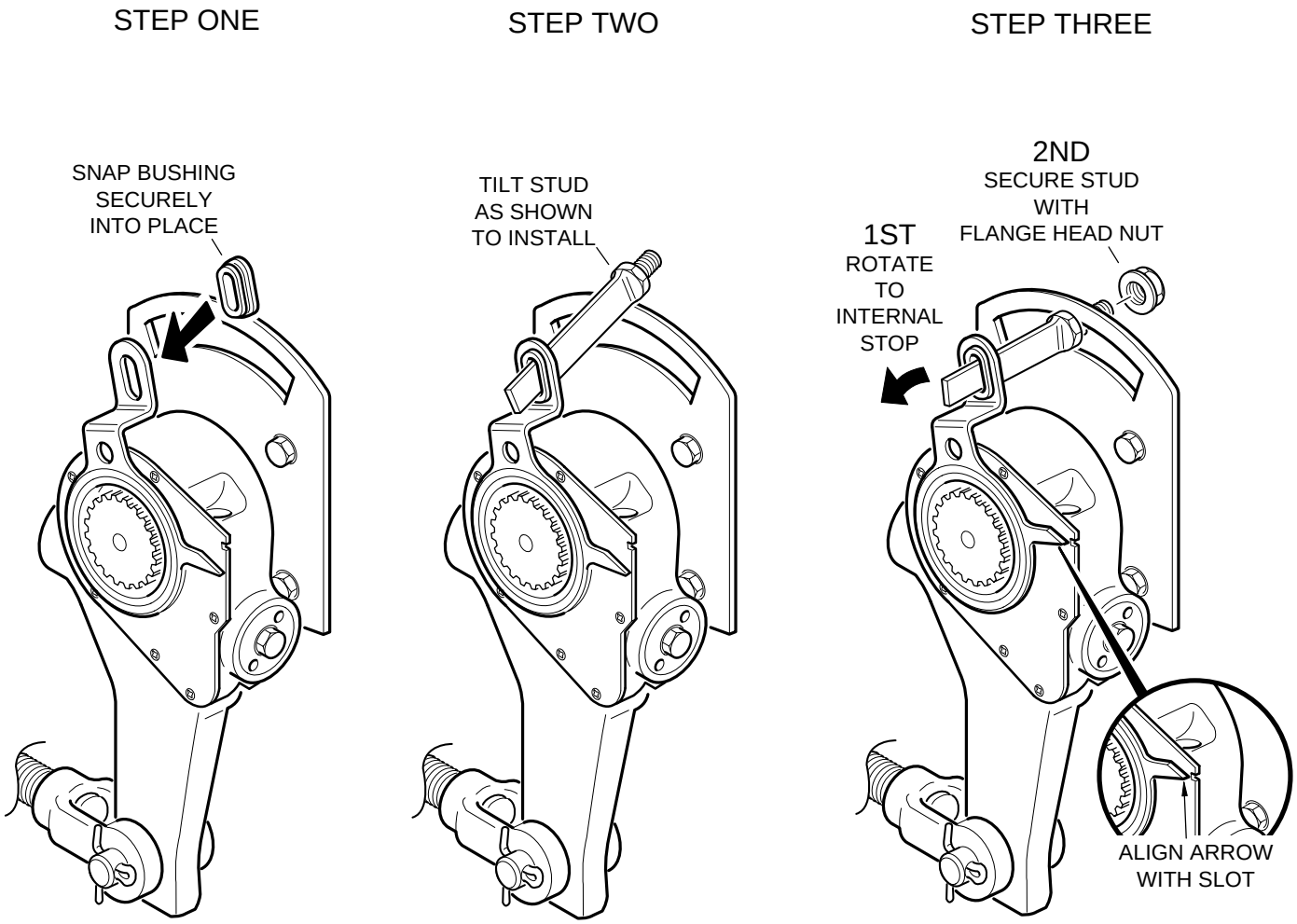


Figure 13 *Anchor Stud Installation*

Installation

Installation Procedure

Caution: The procedures shown in this section are applicable to vehicles originally equipped with Spicer® brand self adjusting brake adjusters only, and must not be used for aftermarket retrofit. Specific retrofit instructions are provided with retrofit kits.

Attach the Self Adjusting Brake Adjuster

WARNING: BLOCK WHEELS TO PREVENT VEHICLE FROM ROLLING. CAGE SPRING BRAKES IF INSTALLED.

NOTE: A properly working Automatic Slack Adjuster does not require manual adjustment while in service. The manual adjuster hex is intended for use during adjuster installation and brake overhaul.

WARNING: Automatic slack adjusters should not be repeatedly adjusted to correct excessive in service pushrod stroke, because this condition indicates that a problem exists with the automatic adjuster, with the installation of the adjuster or with related foundation brake components which manual adjustment will not correct.

1. Verify that the pushrod is fully retracted. Apply air to release spring brake. If air is not available, spring brake must be manually caged off.
2. Install anchor bracket loosely as shown. Do not tighten anchor bracket fasteners. (See Figure 14.)

Note: Configuration of anchor bracket will vary depending on axle. (See Axle Installations on pages 5, 6 and 7.)

3. Apply anti-seize type lubricant to the shaft splines. Install the brake adjuster onto the camshaft with the adjusting hex pointing away from the brake air chamber. Secure the brake adjuster on the camshaft. Follow procedures in the applicable Bendix Spicer Foundation Brake brake service manual for checking and adjusting camshaft end play.
4. Rotate the 7/16" adjusting hex nut **clockwise** until the brake adjuster arm hole lines up with the clevis hole. (See Figure 15.)
5. Install clevis pin. Do not install the clevis cotter pin at this time. It will be necessary to remove the clevis pin later to check installation.

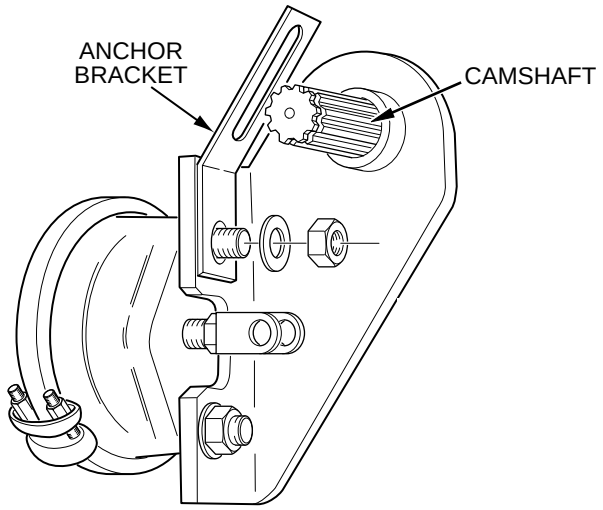


Figure 14 *Install the Anchor Bracket*

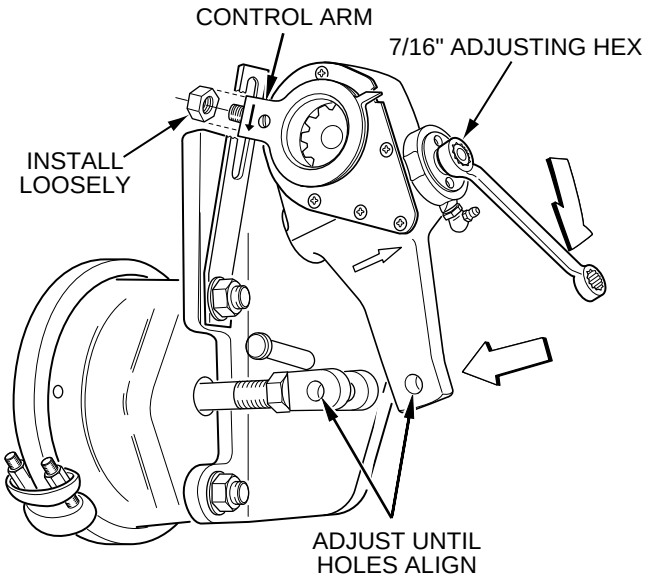


Figure 15 *Install Adjuster*

Position the Control Arm

6. Rotate the control arm counterclockwise away from adjustment hex towards the air chamber until it comes to a definite internal stop. (See Figure 16.) If necessary, use a plastic mallet to tap the control arm into position.

Caution: Excessive positioning force may damage the control arm. Most adjusters will be equipped with an Installation Indicator. Indicator must fall within the slot for proper installation. Incorrect control arm position can cause tight or dragging brakes.

7. Tighten all control arm anchor bracket fastener(s).

Note: Make sure the control arm does not move from its position while tightening the anchor bracket fasteners.

Note: Steer axle applications only–a gap of 1/16" should be maintained between the anchor bracket and the control arm. (See Figure 17.)

8. Adjust brakes by turning adjusting hex clockwise until the lining contacts the drum. Then rotate the adjusting hex counter clockwise 1/2 of a turn. A minimum of 13 ft. lbs. is necessary to overcome the clutch and a racheting sound will occur.

Final Inspection of the Self Adjusting Brake Adjuster

9. With full air pressure, release spring and service brake. Verify that the installation indicator is within the slot. Remove the clevis pin. The clevis hole and adjuster hole should remain in alignment. If the air chamber clevis pulls into the air chamber, repeat the installation procedure.

10. After final inspection, install the cotter pin into the clevis pin. **Verify that applied stroke is within the legal limits for the air chamber being used.**

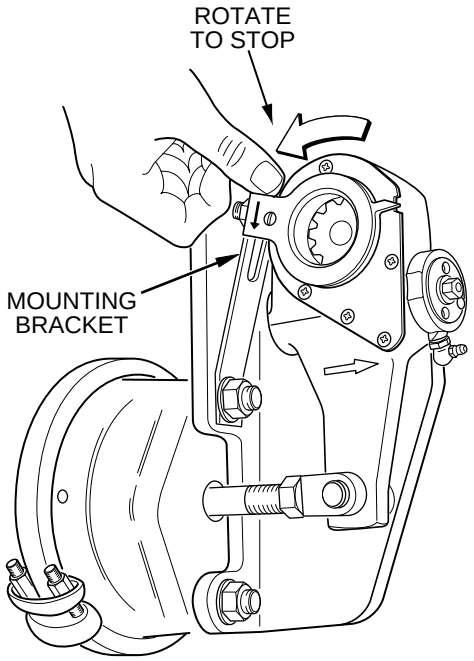


Figure 16 *Position Brake Adjuster*

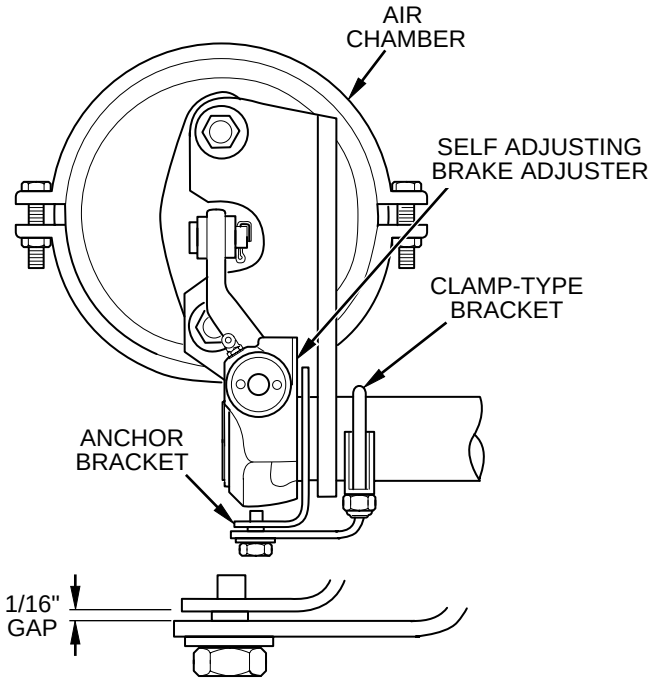


Figure 17 *Proper Anchor Bracket and Control Arm Gap*

Installation

Adjust the Self Adjusting Brake Adjuster

Free Stroke Adjustment

1. With air chamber fully retracted, measure distance from face of air chamber to centerline of clevis pin. Record exact measurement as **dimension A**.
2. Use a lever to move the brake adjuster until brake shoes contact the drum.
3. Measure the distance between face of air chamber and centerline of clevis pin. Record distance as **dimension B**.
4. Subtract **dimension A** from **dimension B**. The difference is free stroke. Allowable free stroke is a minimum of 3/8" stroke.
5. Remove lever and check that brakes are not dragging:
   - Spin wheel end assembly by hand
   - Tap drum lightly with a hammer, listening for a sharp ringing sound

If brake drag is noted, back off brake adjuster and recheck free stroke.

Note: A properly working self adjusting brake adjuster does not require manual adjustment while in service.

NOTE: A properly working Automatic Slack Adjuster does not require manual adjustment while in service. The manual adjuster hex is intended for use during adjuster installation and brake overhaul.

<u>WARNING:</u> Automatic slack adjusters should not be repeatedly adjusted to correct excessive in service pushrod stroke, because this condition indicates that a problem exists with the automatic adjuster, with the installation of the adjuster or with related foundation brake components which manual adjustment will not correct.

Applied Stroke Adjustment

1. Apply and hold an 80-90 psi brake application.
2. Measure distance between face of air chamber and clevis pin centerline. Record distance as **dimension C**.
3. Subtract **dimension A** from **dimension C**. The difference is applied stroke. Compare applied stroke to maximum value in table below.
4. If applied stroke equals or exceeds maximum applied stroke shown, adjust brakes. If less than the maximum, no adjustment is required.

80 - 90 PSI		
Air Chamber Size	**Maximum Applied Stroke**	**Desired Free Stroke**
Type 30" Long Stroke Type 30" Type 24" Type 24" (w/ 2-1/2" extended stroke) Type 24 (w/3" extended stroke)	2.5" 2" 1-3/4" 2" 2.5"	3/8" to 5/8" (Without Drag)
Type 20" and 16"	1-3/4"	3/8" to 1/2"
Type 12"	1-3/8"	3/8" to 1/2"

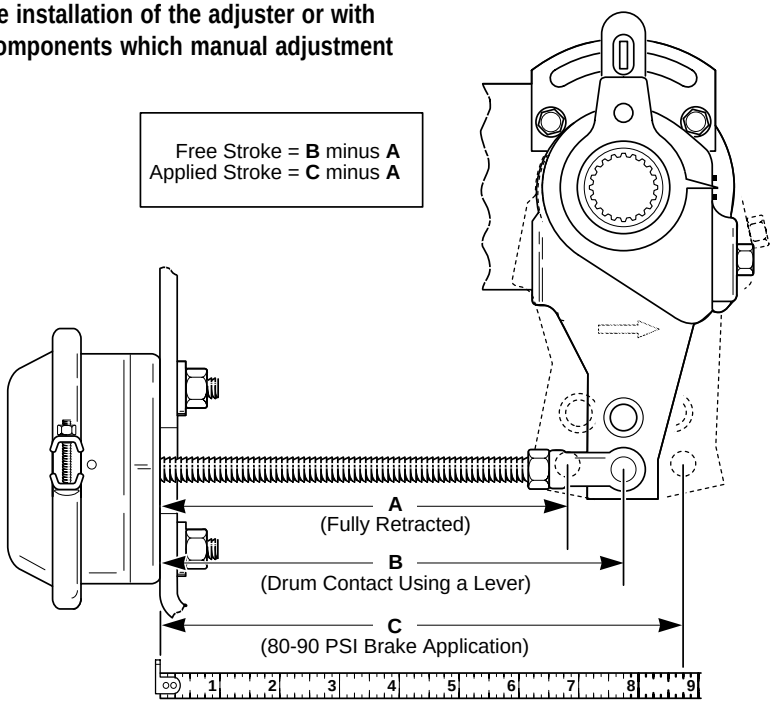


Figure 18 *Stroke Measurements*

Brake Adjuster Maintenance–General

Service Intervals

Component	Visual Inspection	Lubrication Interval	Type of Lubricant
Standard	During normal chassis lubrication or 3 months which ever occures first.	Adjusters manufactured prior to 6/1/96 – every 50,000 miles or every 3 months. Adjusters manufactured after 6/1/96 – once a year.	Standard Chassis Grease
Low Lube		Once a year	SHC 460 Synthetic
Lube Free		None	*Lubricated at Factory

*Lube free Spicer® brand self adjusting brake adjusters are manufactured without a grease fitting.

Lubrication

Caution: Do not use moly-disulfide loaded grease or oil because they may shorten brake adjuster service life. Do not use pressure-release grease fittings.

Important: In no case should the lubrication interval exceed the published intervals in table above.

Lube Free Spicer® brand self adjusting brake adjusters are lubricated at the factory with a proprietary grease and do not require lubrication at service intervals.

Note: Spicer® brand self adjusting brake adjusters manufactured after May 30, 1996 have incorporated an improved sealing and grease filling technique. This makes it possible to extend service intervals, thus reducing maintenance.

Inspection

Bendix Spicer Foundation Brake strongly recommends that routine visual/operational checks, including brackets and control arms, be performed at each Preventative Maintenance Service Interval.

Adjusters or anchor brackets that have visual damage, or which fail the operational checks, MUST be replaced immediately.

Inspect brake adjuster and anchor bracket for damage. Check that anchor bracket is tight and the control arm is in the full release position.

Note: If self adjusting brake adjuster is equipped with indicator arrow, make sure the indicator is within the slow when the brake is in the release position.

Automatic adjusters should not be operated as manual adjusters except as may be necessary to get the vehicle off the road for service.

Maintaining proper brake adjustment and brake balance cannot be accomplished by the brake adjuster alone. The condition of foundation brake components have a direct bearing on the effectiveness of brake adjustment. Inspect foundation brake components periodically.

Brake Air Chambers

Check that brake air chamber mounting bolts are tight and properly aligned to avoid interference between air chamber pushrod and air chamber housing.

Verify that brake chamber pushrod length is equal on both brake chambers of the same axle.

Camshaft Bushings

Worn “S” cam bushings will increase push rod travel. Replace bushing if worn and at each reline.

For detailed inspection procedure on foundation brake components refer to Bendix Spicer Foundation Brake service manual BW7258.

Wheel Bearing Adjustment

Accurate wheel bearing preload is necessary to maintain proper alignment between the brake drum and brake shoes.

Checking Release Torque

The following procedure verifies proper operation of the automatic brake adjuster.

Place a torque wrench on the 7/16" adjusting hex. (See Figure 19.) Turn the torque wrench counterclockwise. The clutch should not slip at a torque less than 13 lb. ft. (18 N•m). A racheting sound occurs when the clutch slips. If clutch slips at a lesser torque, replace the adjuster.

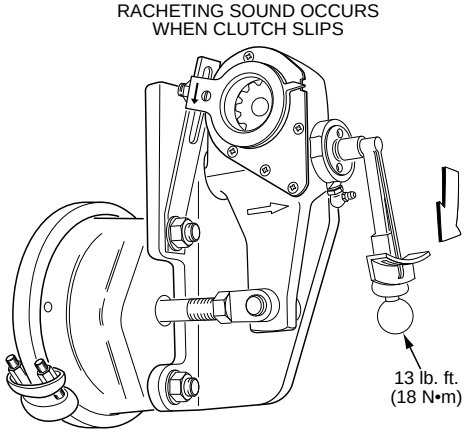


Figure 19 *Checking Release Torque*

Operational Check/Troubleshooting

Operational Check

1. Measure the pushrod length (distance from the face of air chamber to the centerline of the pushrod clevis pin) when fully retracted, **step 1**. (See Figure 20.)
2. Have an assistant make an 80 to 90 psi brake application. Measure pushrod length again, **step 2**.
3. Subtract the **step 1** dimension from **step 2**. The difference is the "applied stroke."
4. Verify that the applied stroke is less than the maximum specified below.

80-90 PSI Brake Application	
Air Chamber Type	**Maximum Applied Stroke**
Type 36"	2-1/4"
Type 30"	2"
Type 24"	1-3/4"
Type 24" (with 2-1/2" extended stroke)	2"
Type 20" and 16"	1-3/4"
Type 12"	1-3/8"

Verify the correct installation of the control arm. If the self adjusting brake adjuster does not maintain proper applied stroke, it must be replaced.

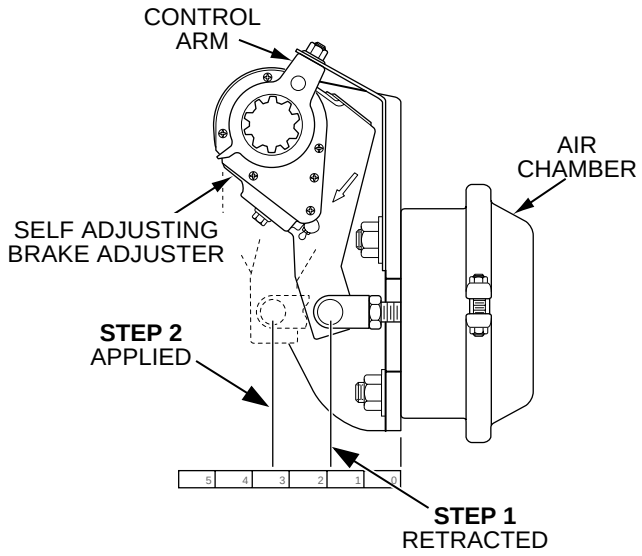


Figure 20 *Measuring Pushrod Length*

Troubleshooting

Tight or Dragging Brakes

Check foundation brake components for:

- Control arm anchor bracket not positioned properly (See brake adjuster installation procedures.)
- Brake chamber not fully releasing
  - – Spring brake not fully releasing
  - – Pushrod binding on chamber housing
  - – Air supply not exhausting completely
- Out-of-round brake drums
- Extreme differences in lining-to-drum clearances between shoes on same wheel
- Improper wheel bearing adjustment
- Broken shoe return spring
- Loose brake linings

Excessive Chamber Pushrod Travel

Check foundation brake components for:

- Loose, broken or bent control arm anchor bracket
- Worn camshaft bushings
- Loose air chamber mounting
- Binding camshaft
- Worn clutch assembly (See Checking Release Torque.)

Additional Service Information

Additional parts and service information on these and related Bendix Spicer Foundation Brake products may be found in the following publications:

Service Manuals

- **15" x 4" Steer Axle Brakes (Models ES-150 and EB-150) BW7258**
- **16.5" and 18" Axle Brakes (Models ES-165, EB-165 and EB-180) BW7258**
- **Trailer Axles BW7258**

Parts Books

- **Brake Models ES-150, EB-150, ES-165, EB-165 and EB-180 ..... BW7253**
- **Trailer Axles BW7253**

These publications may be ordered through the Bendix Spicer Foundation Brake publications online order system. Log on to www.bendix.com to access our online Literature Center.

For more information, talk to your Bendix or Roadranger representative, call 1-866-610-9709 or visit www.foundationbrakes.com.

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