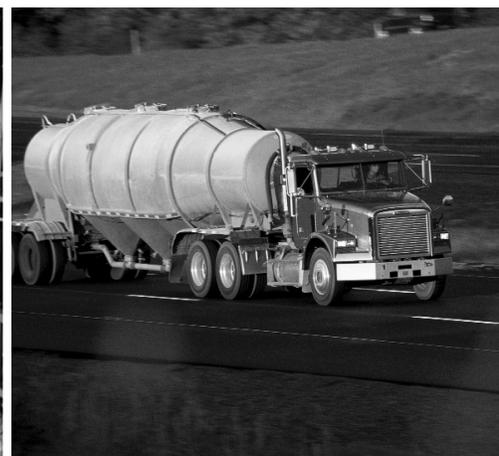


Service Manual Truck and Trailer Applications

L30033

8/10



Automatic Brake Adjusters

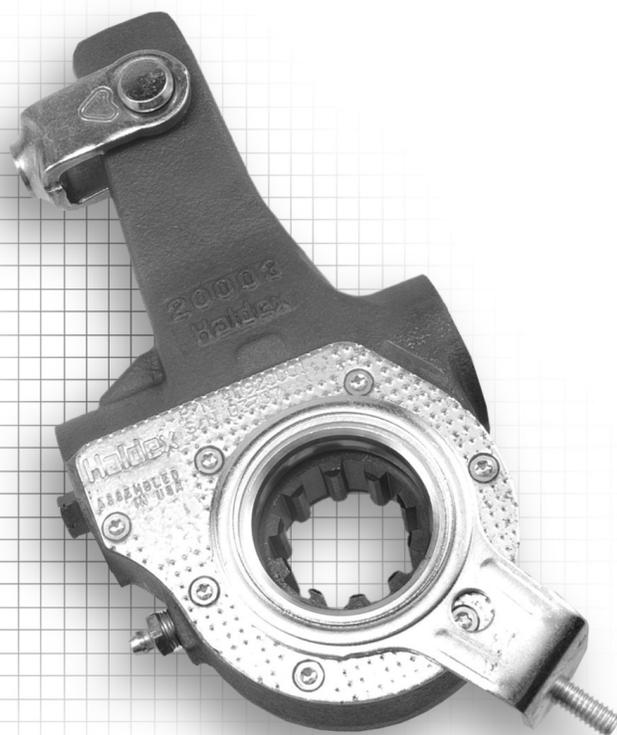


Table of Contents



Warning: Haldex strongly recommends routine visual checks be performed at EACH maintenance service interval. Foundation brake operational checks utilizing CVSA level 1 applied stroke criteria should always be utilized. Manual adjustment of automatic adjusters can disguise hidden problems within the foundation brake. Brake components such as S-cams, bushings, return springs, actuators, drums and adjuster installation MUST be within manufacturer's specifications. Adjuster control arms, wear bushings or attaching hardware that demonstrate visual damage, or which fail the operational checks, MUST be replaced immediately. Automatic Adjusters should NEVER be operated as manual adjusters except as may be necessary to get the vehicle off the road for service.

| | |
|---|----|
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| Brake Adjuster Part Number and Build Date..... | 1 |
| Steer Axle Applications..... | 2 |
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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.

The descriptions and specifications contained in this service publication are current at the time of printing. Haldex Brake Products Corp. reserves the right to discontinue or modify its models and/or procedures and to change specifications at any time without notice.

Operation

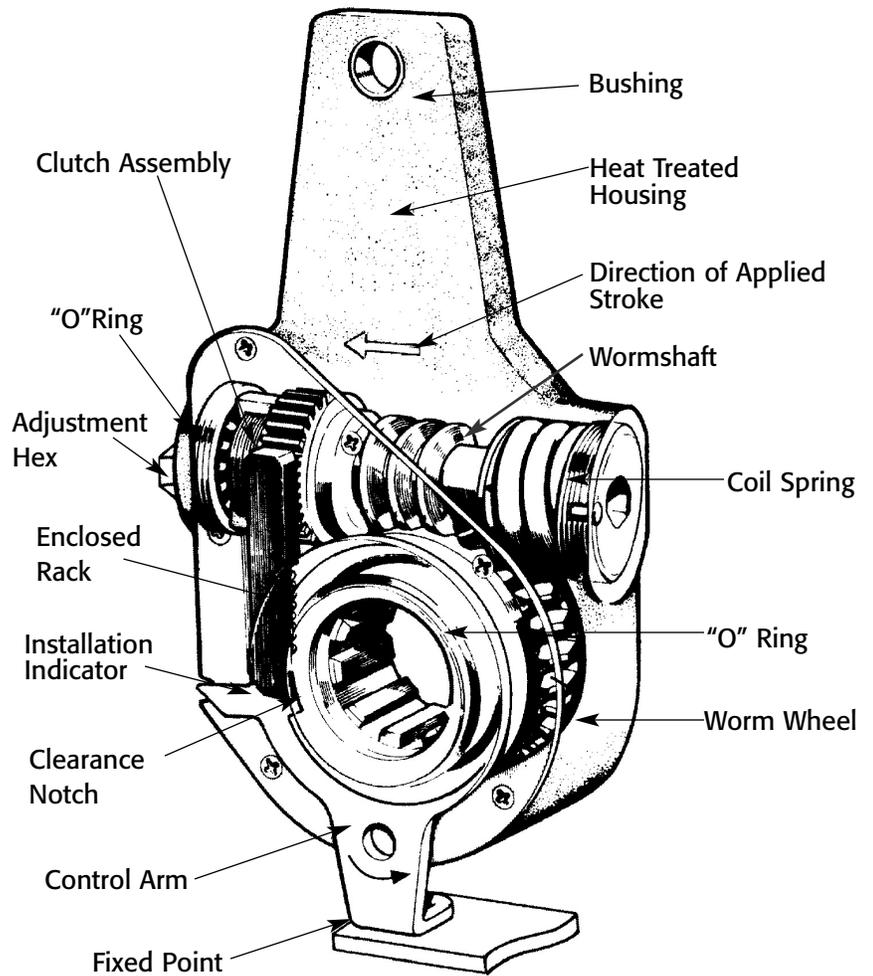
The Haldex automatic brake adjuster is a clearance sensing brake adjuster that maintains

When the Brake Applies:

Upon brake application, the brake adjuster rotates and moves the shoes into contact with the drum. The clearance notch corresponds to the normal lining-to-drum clearance. As the brake application continues, the rack moves upward and rotates the one-way clutch which slips in this direction. As the brake torque increases, the coil spring load is overcome and the wormshaft is displaced axially, releasing the cone clutch.

When the Brake Releases:

When the brake begins its return stroke, the coil spring load returns to normal and the cone clutch is again engaged. The rack is pulled back to its original position in the notch, and any additional travel brought about by lining wear causes the rack to turn the locked one-way clutch and rotates the wormshaft through the locked cone clutch. The wormshaft then rotates the worm wheel and camshaft, adjusting the brakes.



Brake Adjuster Identification

Part Number:

409 prefix = Reduced maintenance adjuster

429 prefix = No-Lube™ adjuster

Serial Number:

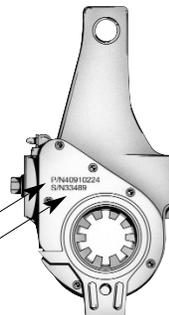
First 3 digits = Day of year built

Last 2 digits = Year of build

After Sept. 1989

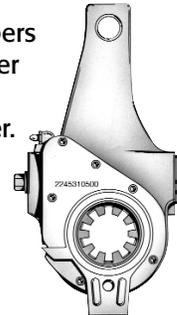
The Part No. P/N40910224 would be our adjuster part number 409-10224.

Part Number
P/N40910224
Serial Number
S/N33489



Prior to Sept. 1989

The first three numbers stamped on the cover plate is the brake adjuster part number. For example: 224 would be our adjuster part number 409-10224.



Typical Applications

Steer Axle

Figures 1–4 show typical brackets for automatic brake adjuster applications on steer axle brake assemblies. Refer to pages 4 and 5 for detailed installation procedures.

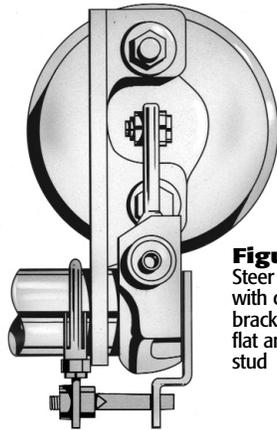


Figure 1
Steer axle with clamp bracket and flat anchor stud

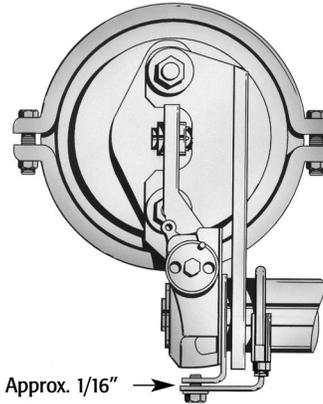


Figure 2
Steer axle with clamp bracket and round anchor stud

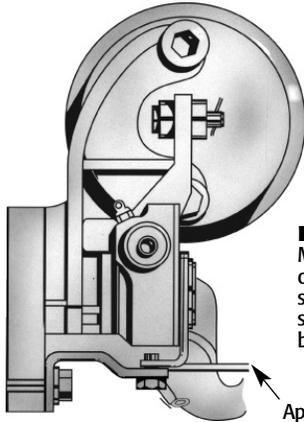


Figure 3
Mack 16,000# or higher rated steer axles with spider mounted bracket

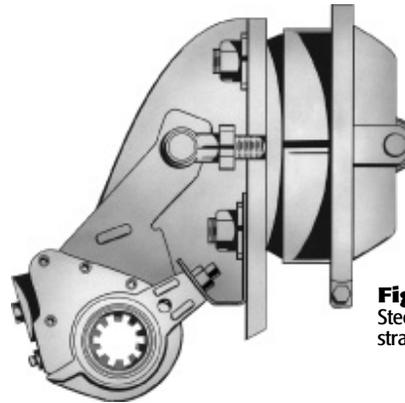


Figure 4
Steer axle with strap bracket

Drive Axle

Figures 5–8 show typical brackets for automatic brake adjuster applications on drive axle brake assemblies. Refer to pages 4 and 5 for detailed installation procedures.

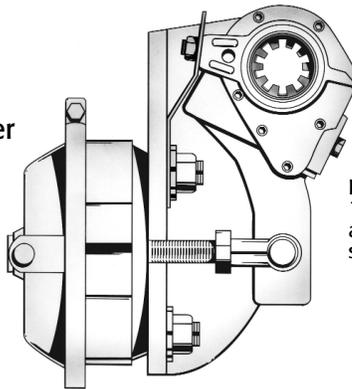


Figure 5
16° drive axle with strap bracket

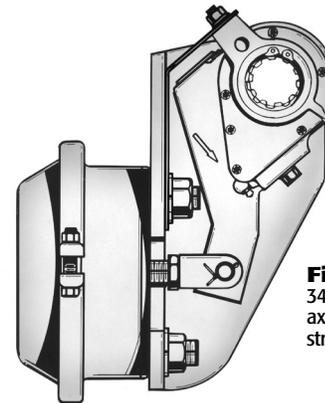


Figure 6
34° drive axle with strap bracket

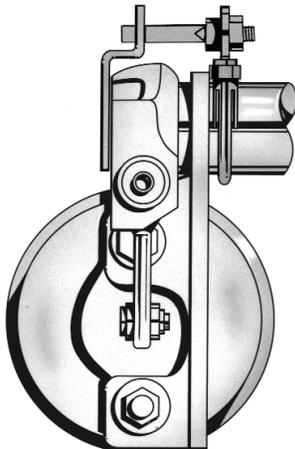


Figure 7
Mack drive axle with clamp bracket and flat anchor stud

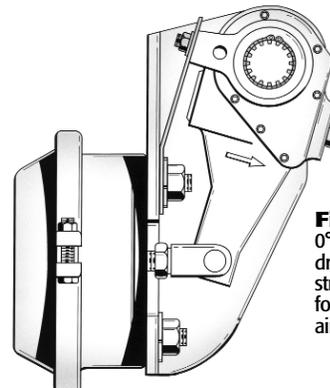


Figure 8
0° Kenworth drive axle with strap bracket, for 8 bag air ride

Note: Refer to fundamental parts identification and location on page 10.

Typical Applications

Trailer Axle

Figures 9–12 show typical brackets for automatic brake adjuster applications on trailer axle brake assemblies. Refer to pages 4 and 5 for detailed installation procedures.

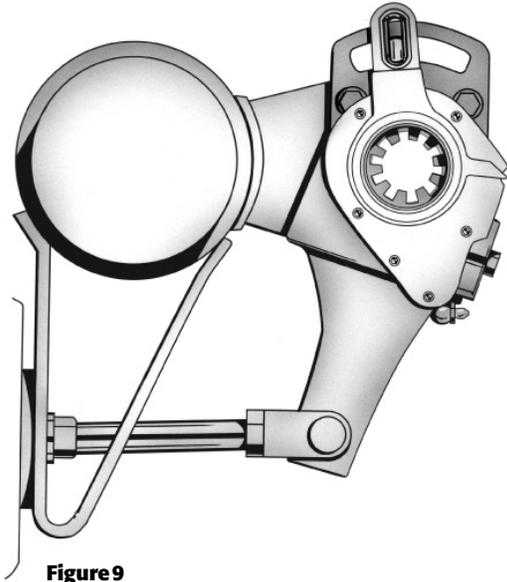


Figure 9
For 16-1/2" Brake Assemblies

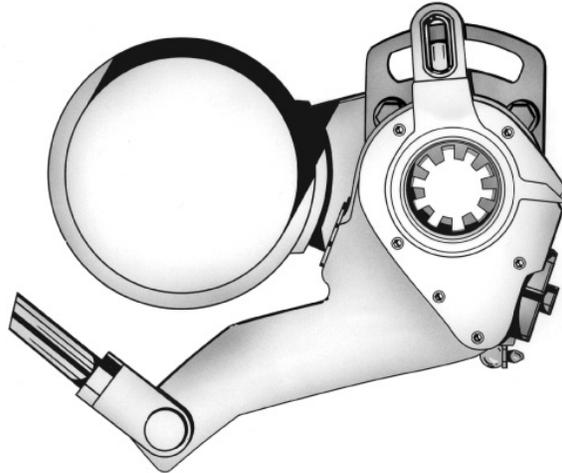


Figure 10
For 12-1/4" Brake Assemblies

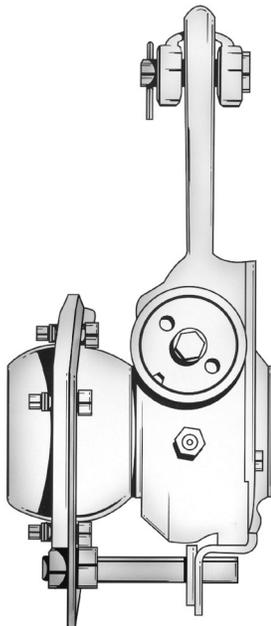


Figure 11
Integral cam support anchor
bracket for 12-1/4" and 16-1/2"
brakes

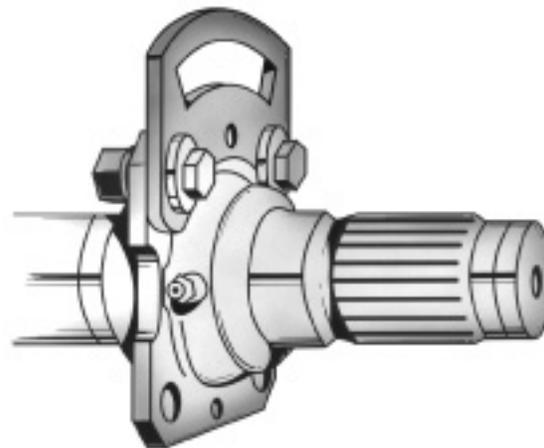


Figure 12
Bolt-on cam support anchor
bracket for 12-1/4" and 16-1/2"
brakes

Note: Refer to fundamental parts identification and location on page 10.

Installation Procedures

Note: Configuration of anchor bracket and brake adjuster housing may vary, depending upon axle. Refer to typical applications on Page 2 and 3.



Step 1

Note: Block wheels to prevent vehicle from rolling. Ensure system tank pressure is above 100 PSI.

- Check that the push rod is fully retracted: apply air to release spring brake. If air is not available, spring brake must be manually caged back.
- Install anchor bracket loosely as illustrated (fig. 13).
- Some strap brackets have two mounting holes. Proper mounting location is determined by the length of adjuster arm. 5" and 5-1/2" adjuster arm lengths utilize the shorter hole location while 6" and 6-1/2" length adjusters utilize the longer hole locations.
- Do not tighten anchor bracket fasteners at this time.
- Apply "Anti-Seize" type lubricant to camshaft splines.

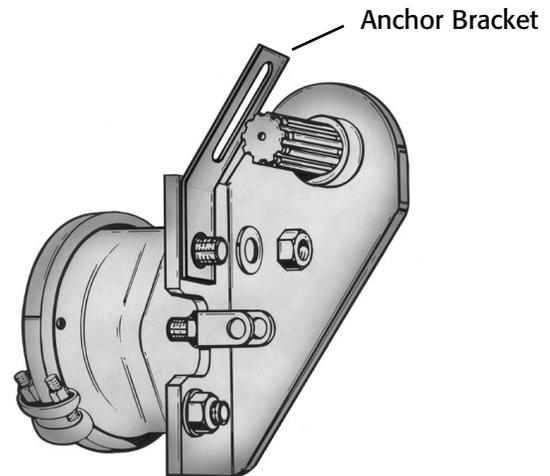


Figure 13

Step 2

- Install the brake adjuster onto the camshaft with the adjusting hex pointing away from the brake chamber (fig. 14).
- Secure the brake adjuster on the camshaft. Use at least one inner washer and enough outer washers to allow no more than .060 movement of adjuster on camshaft. (Per TMC recommended practice RP609-A.)

Note: Do NOT pull push rod out to meet the brake adjuster.

- Rotate the 7/16" adjusting hex nut CLOCKWISE until the clevis hole lines up with the brake adjuster arm hole.
- Apply anti-seize to clevis pin, install and secure with cotter pin.

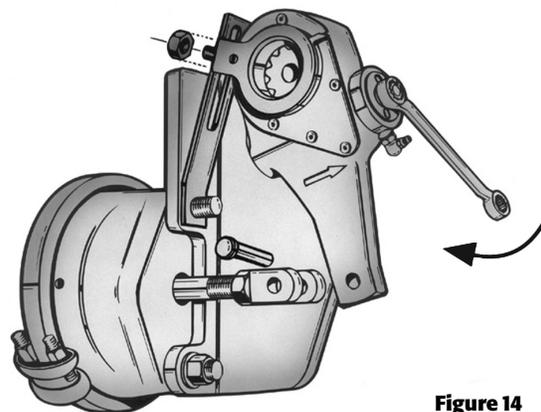


Figure 14

Installation Procedures

Step 3

- Rotate the control arm away from the adjusting hex toward the air chamber, until it comes to a definite internal stop (fig. 15).
- Most adjusters will be equipped with an "Installation Indicator." Indicator must fall within the slot for proper installation with brakes fully released (fig. 16).
- **If the control arm position is wrong, tight brakes will occur (fig. 17).**
- Tighten all anchor bracket fasteners (make sure the control arm does not move from its position while tightening fasteners).

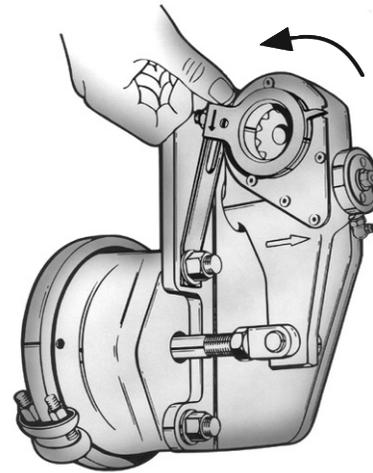


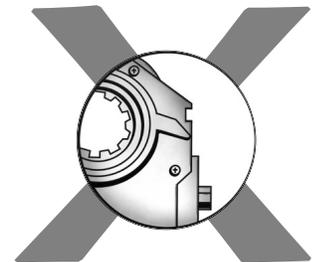
Figure 15

Step 4

- The adjuster must be manually adjusted at this time.
- Rotate the adjusting hex clockwise until the lining lightly contacts the drum.
- Then back-off the adjuster by turning the adjusting hex counter-clockwise 1/2 of a turn (fig. 18).
- A minimum of 13 ft. lbs. is necessary to overcome the internal clutch. A ratcheting sound will be present.
- **Do NOT use an impact wrench or internal damage will occur!**
- **FINAL INSPECTION.** With full system air pressure, assure that spring brakes are released and check that the "Installation Indicator" is within the slotted area. **IF NOT, REPEAT Step 3.**



Correct
(Brakes released)
Figure 16



INCORRECT
(Brakes released)
Figure 17

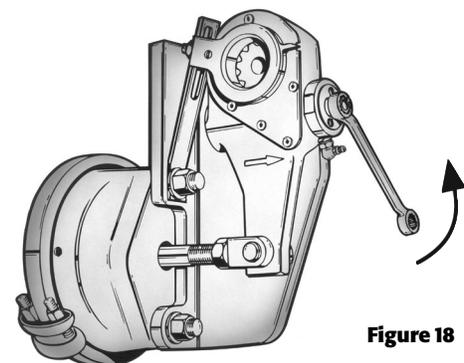


Figure 18

Note: To ensure proper fit and function, always replace both adjuster and mounting bracket.

Routine Visual/Operational Checks

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

Service and Lubrication Intervals

| Adjuster Type | Manufacture Date | Lubrication Interval | Type of Lubricant | Visual Check Interval |
|--|------------------|--------------------------------|-------------------------|--|
| Standard Adjuster 409-10... | Prior to 6/1/96 | 50,000 miles or every 3 months | Standard Chassis Grease | Each Preventative Maintenance Service Interval |
| Reduced Maintenance Adjuster 409-10... | After 6/1/96 | Once a year | Standard Chassis Grease | Each Preventative Maintenance Service Interval |
| No-Lube™ Adjuster 429-10... | After 6/1/96 | None | Sealed Unit | Each Preventative Maintenance Service Interval |



Notes:

No-Lube™ automatic brake adjusters are manufactured without a grease fitting and are identified by a 429 prefix.

Moly-disulfide grease should not be used because it may affect the function of the internal friction clutches and reduce the reliability of the automatic adjustment.

In no case should the lubrication interval exceed the published intervals shown above.

Foundation Brake Operational Check and Troubleshooting



- Note:**
- Block wheels to prevent vehicle from rolling.
 - Ensure system tank pressure is at 90-100 psi.
 - Check that push rod is fully retracted; apply air to release spring brake.

North American Commercial Vehicle Safety Alliance (CVSA) Uniform Vehicle Inspection Criteria

The applied stroke of the brake should be checked per CVSA guidelines at 90-100 PSI reservoir pressure. **Applied stroke** should be at or less than the specified adjustment limits as follows:

| Standard Clamp Type Brake Chamber | | | |
|-----------------------------------|------------------|------|------------------|
| Type | Adjustment Limit | Type | Adjustment Limit |
| 9 | 1-3/8" | 24 | 1-3/4" |
| 12 | 1-3/8" | 30 | 2" |
| 16 | 1-3/4" | 36 | 2-1/4" |
| 20 | 1-3/4" | | |

| Long Stroke Type Brake Chamber | | | |
|--------------------------------|------------------|------|------------------|
| Type | Adjustment Limit | Type | Adjustment Limit |
| 16L | 2" | 24LS | 2-1/2" |
| 20L | 2" | 30LS | 2-1/2" |
| 24L | 2" | | |

NOTE: Long stroke chambers are identified with square air ports or port bosses and special trapezoid ID tags.

Free Stroke

Measuring the Free Stroke

Free stroke is the amount of movement of the adjuster arm required to move the brake shoes against the drum. With brakes released, measure from the face of the chamber to the center of the clevis pin "A" (fig. 19). Use a lever to move the brake adjuster until the brake shoes contact the drum "B" (fig. 19). The difference between the fully retracted and drum contact measurement "B" – "A" (fig. 19), is the free stroke. The free stroke range should fall between 3/8"–3/4".

Free Stroke Within Range

If the free stroke is good, but the applied stroke is too long, there is probably a problem with the foundation brake. Check the following and reference CVSA out-of-service criteria:

| Component | Cause | Action |
|---------------------|------------------------------|--|
| Brake drums | Cracked or out of round | Replace or check drum run out |
| Brake shoes | Shoe span out of spec | Refer to OEM specs and replace if necessary |
| Brake shoes | Uneven lining wear | Check spider concentricity |
| Brake shoes | Shoe pad missing | Remove & replace shoes |
| Brake shoes | Cracked shoes | Remove & replace shoes |
| Cam bushings | Excessive movement | Remove & replace cam bushings per OEM specs |
| Camshaft | Flat spots on cam head | Replace camshaft |
| Camshaft | Cracked/broken splines | Replace camshaft |
| Camshaft | Worn bearing journals | Replace camshaft |
| Chamber bracket | Broken/bent | Replace bracket |
| Clevis yoke and pin | Worn | Remove & replace |
| Return springs | Broken/stretched or missing | Remove & replace springs |
| Rollers | Flat spots, grooved pin/worn | Remove & replace roller and pin |
| Rollers | Wrong size | Remove & replace with correct parts |
| Spider anchor pins | Grooved or scored/worn | Replace spider or pins, as appropriate for OEM |

Free Stroke Above the Range

If the free stroke is above the range and the applied stroke is too long, there is a problem with the foundation brake or the adjuster. Check the following:

| Component | Cause | Action |
|----------------------------|----------------------------|--|
| Camshaft | Binding | Remove, replace, lubricate camshaft |
| Camshaft bushings | Excessive movement | Remove and replace cam bushings per OEM specs |
| Camshaft bushings | Binding shaft | Lubricate camshaft bushings or replace |
| Air chamber return springs | Broken, weak, missing | Replace chamber |
| Air chamber push rod | Binding on chamber housing | Check adjuster for proper shimming and air chamber position for proper adjuster arm length |
| Air system | Not exhausting completely | Check for cause of air problem and repair |
| Shoe return springs | Broken, weak, missing | Replace springs |
| Automatic brake adjuster | Unknown | Check automatic brake adjuster for proper installation. Refer to Installation Instructions on pages 4 & 5. |
| Automatic brake adjuster | Unknown | Refer to Automatic Brake Adjuster Checking Procedures and Operational Check on pages 9 & 10. |

Free Stroke Below the Range

If the free stroke is less than 3/8", a dragging brake can occur. Check the following:

| Component | Cause | Action |
|--------------------------|-------------------|--|
| Wheel bearing | Out of adjustment | Readjust per OEM specs |
| Automatic brake adjuster | Unknown | Check automatic brake adjuster for proper control arm position. Refer to Installation Instructions on pages 4 & 5. |
| Automatic brake adjuster | Unknown | Refer to Automatic Brake Adjuster Checking Procedures and Operational Check on pages 9 & 10. |

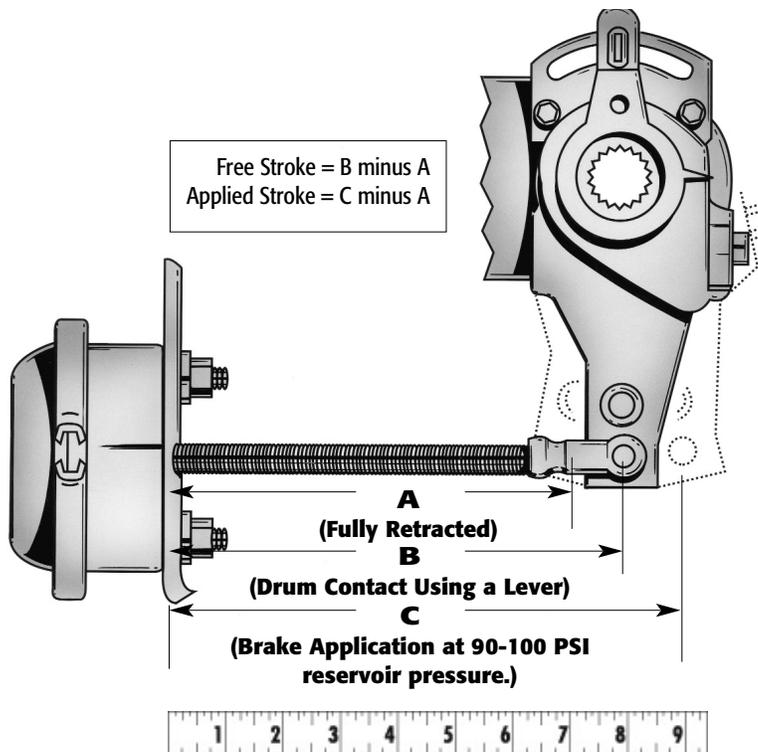


Figure 19
Stroke Measurements
(taken from face of air chamber to center of clevis pin)

Automatic Brake Adjuster Checking Procedures

If the brake adjuster is not maintaining the proper applied stroke, before removing the brake adjuster, check the condition of the foundation brake (see pages 7 & 8). **If after inspecting the foundation brake** no apparent problems are found, inspect the automatic brake adjuster to determine if it is operating properly. The inspection can be performed on or off the vehicle using the following procedures.



- Note:**
- Block wheels to prevent vehicle from rolling.
 - Ensure system tank pressure is at 90-100 PSI.
 - Check that push rod is fully retracted; apply air to release spring brake.
 - If air is not available, spring brake must be manually caged back.
 - Do not use air tools on brake adjuster!

On Vehicle Inspection

| Component | Cause | Action |
|-----------------------------------|---|---|
| Tight or dragging brakes | Control arm mispositioned | Realign control arm and anchor bracket. Check installation procedures on pages 4 & 5. |
| Excessive chamber push rod travel | Improper anchor bracket connection to control arm | If anchor bracket to control arm connection is worn, loose, bent or broken, it must be re-secured or replaced. |
| | Low clutch torque | Rotate the 7/16" adjustment hex one full turn counterclockwise. Replace brake adjuster if the torque is <u>less than 13 ft. lbs.</u> or no ratcheting sound occurs. |
| | Unknown | Perform automatic brake adjuster operational check (see below). |

Automatic Brake Adjuster Operational Check

Functional operation of the brake adjuster can be performed on the vehicle by using the following procedure:



- Block wheels to prevent vehicle from rolling.
- Ensure tank pressure is at 90-100 psi.
- Check that the push rod is fully retracted; apply air to release spring brake. If air is not available, spring brake must be manually caged back.

Manually de-adjust brakes (turn adjustment hex counterclockwise one full turn) to create an excessive drum to lining clearance condition. (A ratcheting sound should occur.)

Make a full service brake application. On release, allow sufficient time for brake to fully retract.

During the brake release, observe rotation of the adjustment hex (attaching a wrench on the hex or scribing the hex will make this rotation easier to see).

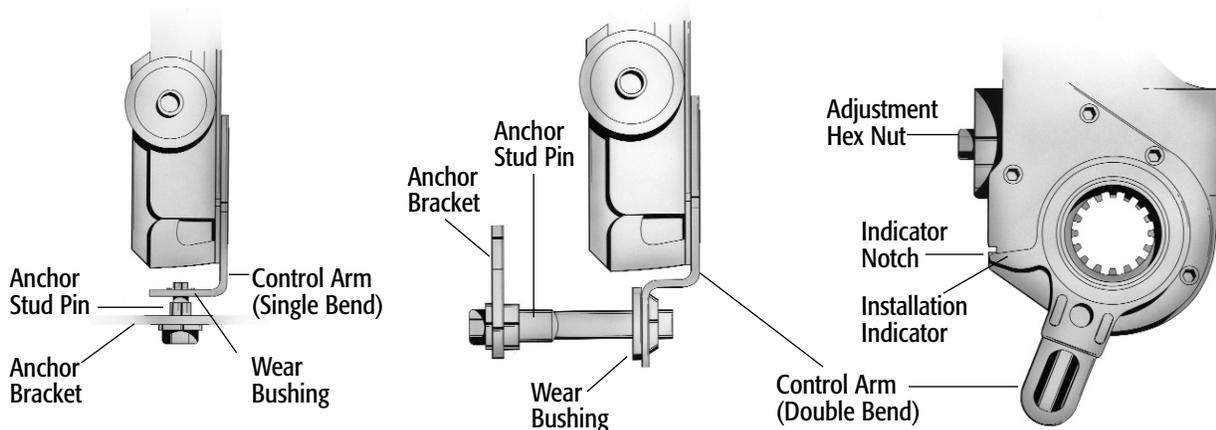
This rotation indicates that an excessive clearance condition has been determined by the brake adjuster, and it is making an adjustment to compensate. On each subsequent brake release, the amount of adjustment and push rod travel will be reduced until the desired clearance is achieved.

If rotation of the adjustment hex is not observed, refer to Foundation Brake Operational Check and Troubleshooting Procedures on pages 7 and 8. If foundation brake assembly checks out okay and hex still does not turn, check control arm and mounting bracket for possible worn, bent or broken components. If the control arm and mounting bracket check out okay, replace the adjuster and hardware per procedures on pages 4 & 5.

Off Vehicle Inspection

| Component | Cause | Action |
|-----------------------------------|--|--|
| Adjuster not functioning properly | Low clutch torque | Place adjuster arm in vise. Rotate the 7/16" adjustment hex counterclockwise one full turn to check de-adjustment torque. After control arm stops rotating, a minimum of 13 ft. lbs. will be required and a ratcheting sound will occur. Replace brake adjuster if the torque is <u>less than 13 ft. lbs.</u> or no de-adjustment ratcheting sound is present. |
| | Control Arm slippage | Place adjuster arm in vise. Rotate the control arm counterclockwise until the control arm rotates to an INTERNAL STOP. If the installation indicator goes past the indicator notch or does not stop rotating (arm slips freely), replace the brake adjuster. |
| | Unknown | If torque is above 13 ft. lbs., scribe a line on the adjustment hex. Manually pull the brake adjuster control arm clockwise then push back counterclockwise until the installation indicator stops in the indicator notch. The hex will move in a clockwise direction when the control arm of the brake adjuster is pushed back counterclockwise. Replace adjuster if hex does not move. |
| | Worn/missing control arm wear bushing, and anchor stud pin, if applicable. | Remove and replace pin and bushings. If adjuster has passed the above checks, re-install adjuster on vehicle, with new hardware. |

Typical Parts Identification and Location

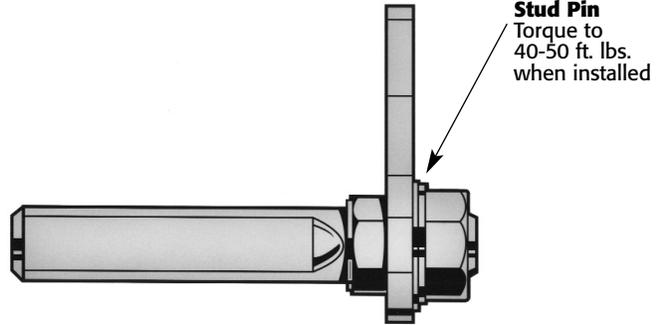


Torque Specifications

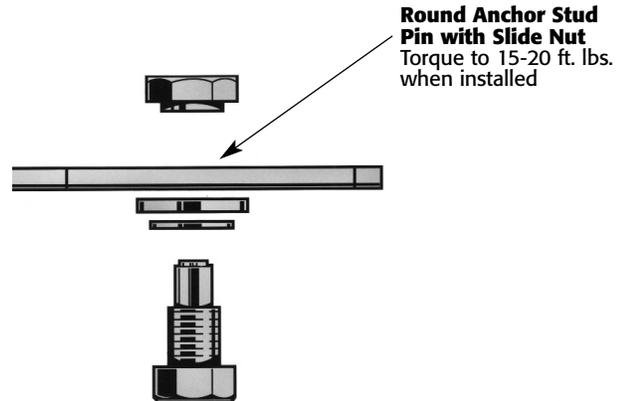
Note: Tighten all fasteners to manufacturer's recommendations unless otherwise specified below.



Round Anchor Stud Pin with Fabricated Ring Clamp
Torque to 15-20 ft. lbs. when installed

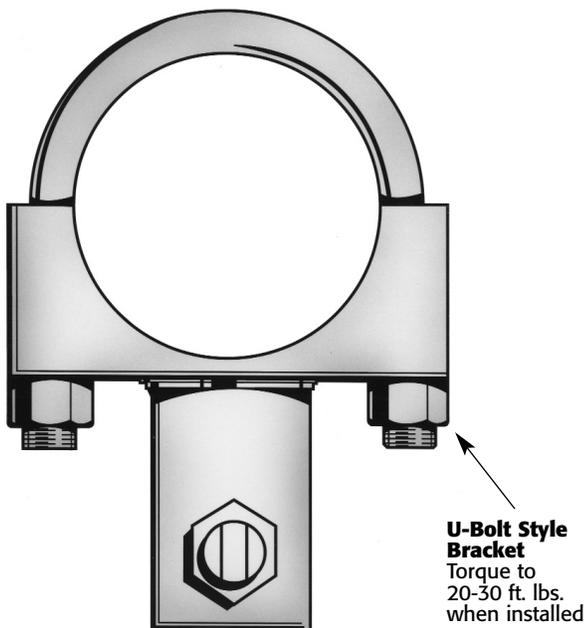


Flat Anchor Stud Pin
Torque to 40-50 ft. lbs. when installed

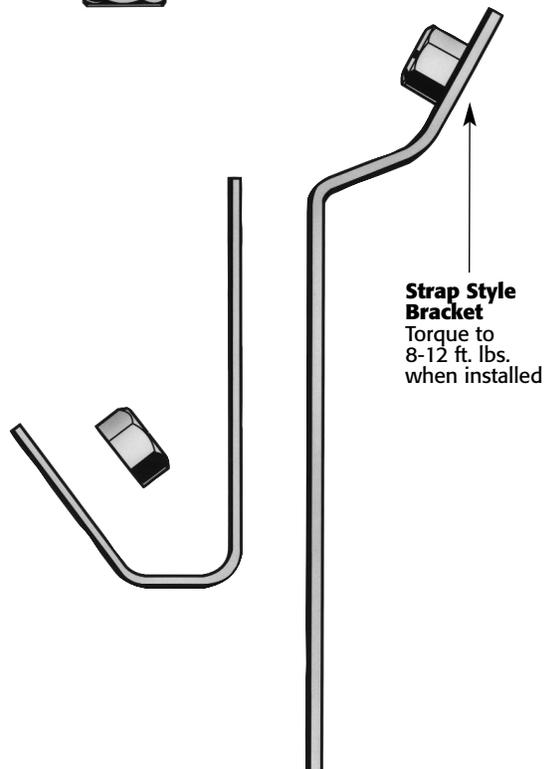


Round Anchor Stud Pin with Slide Nut
Torque to 15-20 ft. lbs. when installed

3/8"-16 Nut and Bolt
Torque to 15-20 ft. lbs. when installed



U-Bolt Style Bracket
Torque to 20-30 ft. lbs. when installed



Strap Style Bracket
Torque to 8-12 ft. lbs. when installed

Frequently Asked Questions

- 1. Will the side of the brake adjuster with the installation indicator always face in?**

No. Haldex adjusters are normally unhandled. Always install with the adjusting hex pointing away from the air chamber.
- 2. My adjuster doesn't have an installation indicator; should I be concerned?**

No. A few applications aren't manufactured with installation indicators. However, the set-up and function are the same regardless. Refer to pages 4 & 5 for proper installation procedures.
- 3. Why is there resistance when backing off the adjuster?**

It takes approximately 20-25 lb. ft. of torque to back off the adjustment hex. (A ratcheting sound should occur.)
- 4. How far do I back off the automatic brake adjuster at a brake reline?**

1/2 turn. (NOTE: for the first 1/8 turn you may not hear the ratcheting; this is normal.)
- 5. How do I know if I need an offset, angled or straight-armed adjuster?**

Haldex manufactures the right adjuster arm for your specific application. Haldex adjusters are unhandled (no lefts or rights) in the majority of applications. Please refer to the Haldex Parts and Cross Reference Guide for your specific application (L00090).
- 6. Why does my replacement ABA look different from the original I took off?**

The Haldex ABA replacement adjuster has been designed to fit a number of applications. It is the same original equipment quality and design of the adjuster you removed; however, it may look different on the outside. If you use all the parts included in the kit, the results will be the same as the original equipment adjuster.
- 7. Why is the applied stroke pressure range 90-100 psi at the reservoir?**

This is the pressure recommended by the CVSA (Commercial Vehicle Safety Alliance). Anything beyond 100 psi measures deflection within the foundation brake and not true push rod stroke.
- 8. Some brake chambers have round port openings and some square; what is the difference?**

Standard brake chambers are identified by round ports. Long stroke chambers are identified by square ports and trapezoid ID tags.
- 9. Can I vary the amount of lining-to-drum clearance by moving the control arm?**

No, that clearance is set at the factory. If long or short stroke continues, please refer to the foundation brake checking procedures on pages 7 & 8 of this manual.
- 10. Can I use an air ratchet on the adjuster?**

No. It will damage the internal mechanism of the adjuster and render it inoperative.
- 11. Can I access the adjuster through the rear cover?**

No, do not tamper with the rear cover—it will release the factory set pressure on the spring and destroy the adjuster and its ability to properly function.
- 12. How much control arm bushing and anchor stud pin wear is acceptable before replacement is required?**

No more than 1/16."
- 13. What is the acceptable amount of camshaft bushing wear?**

Automatic adjusters cannot compensate for worn foundation brake parts. Please refer to the foundation brake manufacturer's recommendations for maximum bushing and camshaft wear limits.
- 14. Can wheel bearing adjustment affect the brake adjuster?**

Yes. Improper wheel bearing adjustment could result in improper brake adjustment. It is necessary to refer to the axle manufacturer's wheel bearing adjustment recommendations. A loose bearing preload could cause a tight brake.

(continued on page 13)

Frequently Asked Questions (continued)

15. Are all Haldex automatic brake adjusters pre-lubed?

Yes. All Haldex brake adjusters are lubricated at the factory. Please consult the Service and Lubrication Section on Page 6 for proper lubrication guidelines.

16. Can I use moly lube with the Haldex automatic brake adjuster?

No. A high concentration of moly-disulfide can lower the friction capabilities in the adjusting clutch parts and decrease automatic adjustment reliability.

17. Can I purchase anchor bracket wear items separately (i.e., anchor stud pins, wear bushings)?

Yes. Normal wear items like anchor stud pins and wear bushings are available. Refer to the Haldex Parts and Cross Reference Guide, L00090. Otherwise, contact Haldex Technical Assistance for the appropriate bracket kit at 1-800-643-2374.

18. Does the control arm need to be properly set and secured?

Yes. Without proper placement and attachment, the adjuster will not function properly. Make sure the control arm, anchor bracket and wear items are in good working order to assure the adjuster will operate as designed.

19. If automatic adjustment stops, can I operate as a manual brake adjuster?

No. Completely check out foundation brake and adjuster to determine cause of problem. Repair or replace as needed to restore automatic adjustment.

Additional Information Available

Additional parts and service information on Haldex Automatic Brake Adjusters may be found in the following materials:

Service Information

| | |
|--|--------|
| Installation and Maintenance Wall Chart | L60047 |
| Service Manual (Truck/Trailer) | L30033 |
| Installation Tips – Automatic Brake Adjuster (Pocket Size) | L20397 |
| Installation Instructions – AA1 and S-ABA Models | L31195 |

Parts Information

| | |
|---|--------|
| Parts and Cross Reference Guide (Truck/Trailer) | L00090 |
| Supplemental Automatic Brake Adjuster Kits | L20447 |

These materials are readily available on the Haldex website www.haldex.com, or you may order copies by contacting your Customer Service Representative at 1-800-643-2374.

Haldex (www.haldex.com), headquartered in Stockholm, Sweden, is a provider of proprietary and innovative solutions to the global vehicle industry, with focus on products in vehicles that enhance safety, environment and vehicle dynamics.

Haldex is listed on the Stockholm Stock Exchange. Haldex has a yearly turnover of close to 5.6 billion SEK and employs 4,300 people.

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