

H TECHNICAL PROCEDURE

HENDRICKSON CHASSIS AXLE™ (HCA™)

SUBJECT: Original Equipment Installation
Procedure

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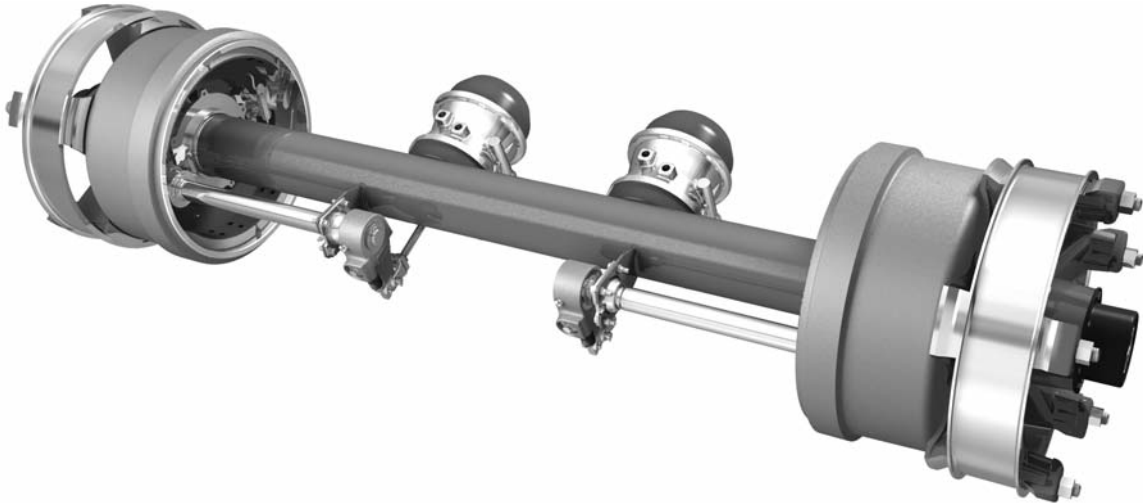


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SERVICE NOTES

This publication provides installation instructions and information for Hendrickson chassis or trailer axles. Before you begin:

- Read and understand all instructions and procedures before installing any component.
- Read and observe all Caution and Warning statements to help avoid personal injury or property damage.
- Follow your company's installation and diagnostic practices.

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Consult the Hendrickson website (www.hendrickson-intl.com) for the latest version of this manual.

IMPORTANT SAFETY NOTICE

Proper installation is important to the reliable operation of the chassis or trailer axle. The procedures recommended by Hendrickson and described in this publication are methods of performing such an installation.

The warnings and cautions should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper installation can cause damage to the vehicle and other property, personal injury, an unsafe operating condition or void the manufacturer's warranty.

Carefully read, understand and follow all safety related information within this publication.

EXPLANATION OF SIGNAL WORDS

Hazard signal words (such as Danger, Warning or Caution) appear in various locations throughout this publication. Information accented by one of these signal words must be observed at all times.

Additional notes are utilized to emphasize areas of procedural importance and provide suggestions for ease of installation. The following definitions indicate the use of these signal words as they appear throughout the publication.

DANGER Indicates immediate hazards which will result in severe personal injury or death.

WARNING Indicates hazards or unsafe practices which could result in severe personal injury or death.

CAUTION Indicates hazards or unsafe practices which could result in damage to machine or minor personal injury.

IMPORTANT An operating procedure, practice or condition that is essential to emphasize.

⚠ WARNING: Do not modify or rework parts. Do not use substitute parts of the axle components. Use of a modified part or replacement part not authorized by Hendrickson may not meet Hendrickson's specifications and can result in failure of the part, loss of vehicle control and possible personal injury or property damage. Use only Hendrickson authorized replacement parts. Do not modify parts without authorization from Hendrickson.

⚠ CAUTION: A mechanic using an installation procedure or tool which has not been recommended by Hendrickson must first satisfy himself that neither his safety nor the vehicle's safety will be jeopardized by the method or tool selected. Individuals deviating in any manner from the provided instructions assume all risks of consequential personal injury or damage to equipment.

⚠ WARNING: Always wear proper eye protection and other required personal protective equipment when performing an axle installation.



⚠ WARNING: Solvent cleaners can be flammable, poisonous and can cause burns. To help avoid serious personal injury, carefully follow the manufacturer's product instructions and guidelines and the following procedures:

- Wear proper 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.
- Hot solution tanks or alkaline solutions must be used correctly. Follow the manufacturer's recommended instructions and guidelines carefully to help prevent personal accident or injury.

⚠ WARNING A serious or fatal injury can occur if you...

- Lack proper training
- Fail to follow proper procedures
- Do not use proper tools and safety equipment
- Assemble axle components improperly
- Use incompatible axle components
- Use axles or axle components in a non-approved application

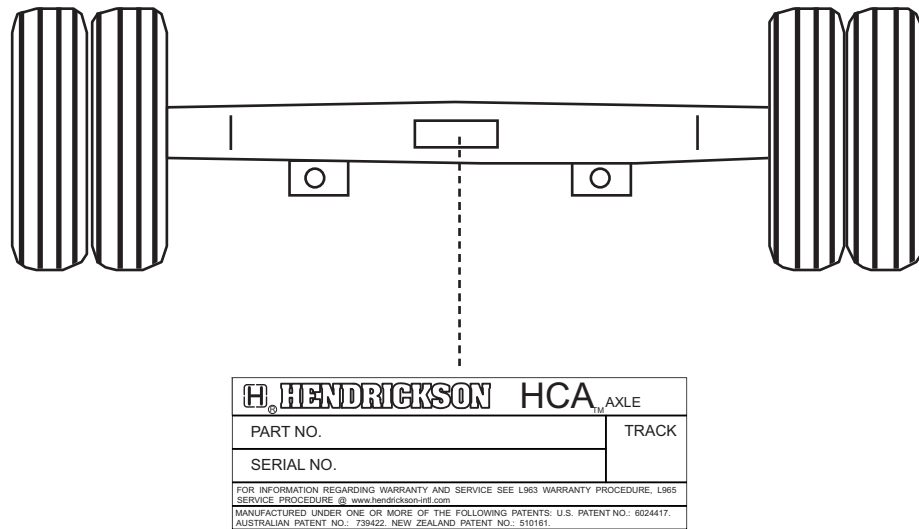
⚠ WARNING This manual contains detailed safety instructions. Read, understand and follow this manual.

- Get proper training
- Learn and follow safe operating procedures
- Use proper tools and safety equipment
- Use proper components that are in good condition



AXLE IDENTIFICATION

Refer to figure 1 for axle identification information.



Example HCA Part Number Nomenclature

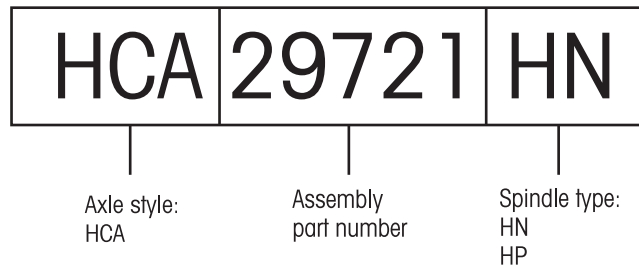


Figure 1. Axle identification



AXLE INSTALLATION

To assure safe operation and maximum durability on parts such as brake linings and tires, it is necessary to position and install the axle properly. It is recommended that the axle assembly be installed so the cams rotate in the same direction as the wheels (figure 1a).

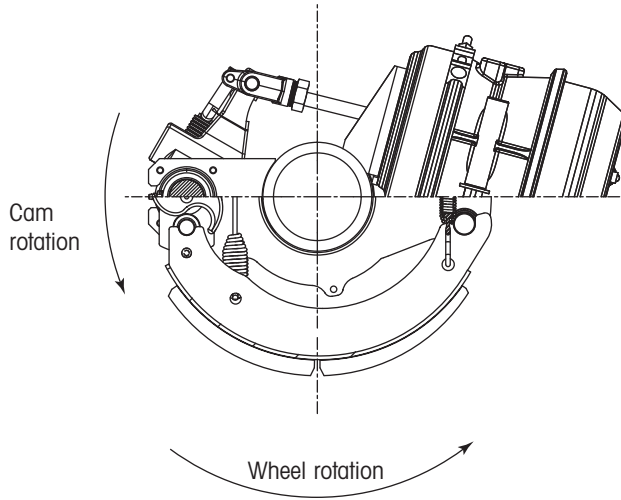


Figure 1a. Cam and wheels must rotate in the same direction

Installation in which the camshaft rotation is opposite that of wheel rotation could cause noisy brakes, chatter, and wheel "hop". With this in mind, the axle should be ordered with the placement of air chamber and slack adjuster assemblies that will ensure the correct directional rotation of the cams when the axle is installed.

Axle attachment to the suspension should be performed to the suspension manufacturers recommendation. For example, if the axle is to be bolted to the suspension, follow the recommended torque specifications. If the axle is to be welded to the suspension, follow the suspension manufacturers welding recommendation, but also adhere to the welding guidelines on page 6 of this manual.

AXLE REPAIR

⚠ WARNING Any axle found with shipping or handling damage should not be repaired, but replaced immediately. Repair welding can be detrimental to the structural integrity of the axle beam, where the benefit of the original tube heat treatment may be

nullified by the welding. An axle shaft weakened by welding could fail and cause an accident which could result in serious injury or death.

It is the responsibility of the axle installer to adjust the brakes properly. See the recommended adjustment procedure covered in this manual.

TRAILER AXLE ALIGNMENT

Proper preparation is a must for effective axle alignment. The vehicle, tools and equipment, and work site must all be appropriate for axle alignment. The process also requires a trained technician who knows the specifications. Refer to Hendrickson publication L579, *Alignment Procedure*, (available at www.hendrickson-intl.com) for complete preparation, alignment and safety details.

I. VEHICLE PREPARATION

TMC RP 708, *Trailer Axle Alignment*, addresses the steps needed to make the trailer ready for alignment.

To review these steps: 1) Inspect the suspension and the axles for any obvious damage; 2) Tighten or replace, as needed, any parts that do not meet suspension or axle manufacturer criteria for serviceability; 3) Check tires for proper inflation and matching diameters; 4) Park the trailer on a smooth and level surface with the parking brakes released. After backing the trailer in, pull it forward 10 feet (3m) to a gentle stop. This will allow suspension parts to settle in a "forward running" position. Use wheel chocks to prevent injury due to accidental movement of the trailer; 5) With the brakes still released, adjust the height control valve for the proper setting (if preparing an air ride suspension) and the kingpin to the designed height by raising or lowering the landing gear legs; 6) DO NOT proceed unless the wheel bearing end play is known to be in adjustment per TMC RP 618, the bearing manufacturer and / or this manual.

II. SPECIFICATIONS

Axle alignment specifications may be stated in inches, degrees, minutes of angle (MOA or 1/60th of a degree), or mm/M. Each format can produce equivalent results. Hendrickson chassis or trailer axles are built to less than ± 2.5 MOA run out at each spindle.



TOE-IN TOE-OUT: Installed axles should measure no more than 8 MOA toe in and 4 MOA toe out.

ALIGNMENT: Axles should be adjusted to an alignment of no more than 5 MOA scrub with the true center of the trailer frame if it is a single axle. If the trailer has multiple axles, each axle should be adjusted to not more than 2.5 MOA scrub relative to the front (or reference) axle (this adjustment was previously stated as a difference of not more than $\frac{1}{16}$ inch (1.6mm) between the right and left centers of adjacent axles).

CAMBER: Typical trailer axles exhibit 23 to 29 MOA of TOTAL camber change from an off-ground free state to a fully loaded condition.

A repeated difficulty in adjusting the axle to the desired reading is most often due to a loose wheel bearing, badly worn suspension component, or a combination thereof.

⚠ WARNING Never bend the axle, by any means, to correct an alignment condition. This could weaken the axle and cause axle failure, which could result in serious injury or death.

GENERAL WELDING GUIDELINES

In welding suspension component parts to the Hendrickson chassis or trailer axle, extreme care must be exercised to obtain their correct location and to ensure the spring-seated load bearing surfaces are parallel to each other. Any welding of additional attachments to the axle must be approved by Hendrickson to maintain warranty coverage.

It is necessary when welding to avoid the high stress areas on the tube top (compression zone) and tube bottom (tension zone). All welds should be made as close to the horizontal centerline as possible. When the axle tube is subjected to the heat from welding and then rapid cooling, the material adjacent to the weld loses its desirable ductile properties and becomes brittle. If this condition exists in the high stress areas under maximum load conditions, the life of the axle will be greatly reduced and premature fatigue failure can occur. Recommended locations for the welds are shown in figure 2.

The welding electrodes should conform to AWS (American Welding Society), grade E-7018 (Oven-

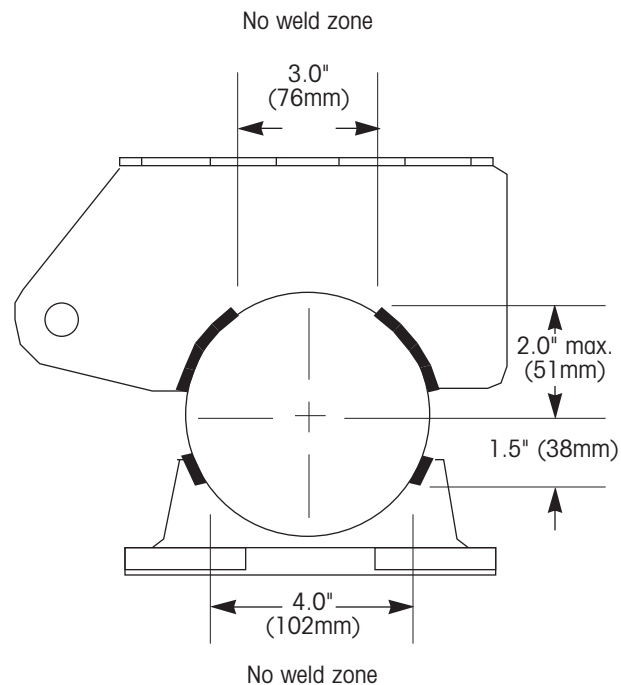


Figure 2. Weld placement recommendations for suspension bracketry

Dried) or comparable. Recommended rod size is $\frac{5}{32}$ inch at voltage and amperage recommended by the electrode manufacturer. For maximum strength, a three-pass weld should be used.

The arc should not be broken at the end of each pass and the corners should be wrapped. The electrode should be backed up to fill in the fillet crater at the end of each pass. Thoroughly clean the weld between each pass.

⚠ CAUTION Do not bring axles in from non-heated storage and weld while cold.

⚠ CAUTION To provide optimum suspension-to-tube welds, preheating is recommended. Preheating will minimize loss of the ductile properties in the weld area by slowing the rate of cooling, thus reducing the formation of an untempered martensitic grain structure adjacent to the weld. Martensite, a brittle grain structure, is formed by the rapid cooling of the metal surrounding the weld area. Preheat the suspension seat weld area to a minimum of 400 degrees



Fahrenheit (204 degrees Celsius) with a rosebud prior to welding. Preheat temperature should be verified with a temperature sensitive crayon or other appropriate means. If using multiple-pass welding, it is recommended to maintain a minimum preheat temperature of 200 degrees Fahrenheit (93 degrees Celsius) between passes.

CAUTION Do not "test the arc" on the axle beam.

HARDWARE FIT

Avoid excessive welding. Fit the seat / hardware as close as possible to the axle. The gap should not exceed 1/8 inch (3mm), see figure 3.

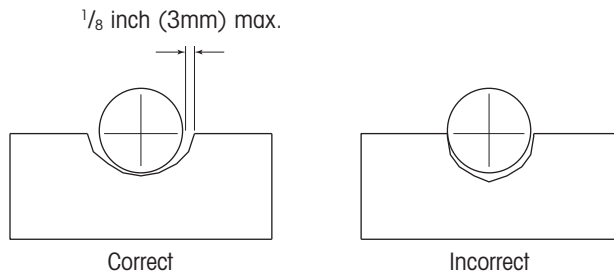


Figure 3. Hardware fit

WELDING METHODS

Table 1 lists four methods which may be used to weld hardware to Hendrickson axles. The weld tensile strength must be 70,000 psi minimum per AWS specifications.

WELDING HARDWARE TO AXLE

CAUTION The axle installer should obtain and read a copy of the suspension manufacturer's installation instructions.

Only use operators certified by AWS (the American Welding Society) or other internationally recognized welding society.

TABLE 1

Method for welding carbon and low alloy steels	AWS electrode classification	AWS spec
Shielded metal arc (stick electrodes)	E70XX	A5.1 A5.5
Gas metal arc (MIG, solid wire feed)	ER70S-X	A5.18
Gas Tungsten arc (TIG) has a non-consumable electrode, use stick electrodes	ER70-X	A5.18
Flux cored arc (self-shielded wire)	E70T-X	A5.20

The axle and its mating brackets must be at 60 degrees Fahrenheit (15 degrees Celsius) minimum and free of moisture, dirt, scale, paint and grease. Do not bring in axles from non-heated storage and weld while cold.

Prevent bearing damage. When grounding welding equipment to the axle, prevent current from passing through the wheel bearings. A connection that places a wheel bearing between the ground cable connection and the weld area can damage the bearing by electric arcing.

TACK WELDING BRACKET TO AXLE

NOTE: Do not place tack welds at what will be the ends of the final weld (figure 4).

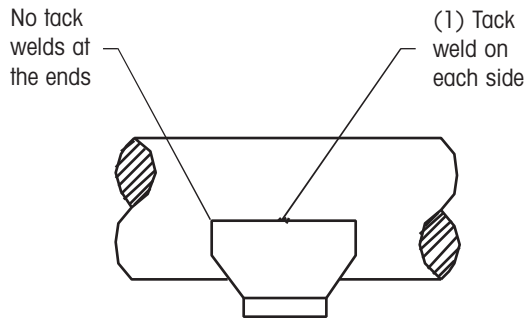


Figure 4. Tack welding bracket to axle

NOTE: Tack weld all brackets onto axle before fusing these tack welds into final welds (figure 4).

NOTE: Thoroughly clean the slag from the tack welds before applying the final welds.

NOTE: For maximum strength, a three-pass weld should be used. All final welds should be made in one continuous pass. The arc should not be broken at the end of each pass and the corners should be wrapped.

NOTE: To prevent axle distortion, alternate welds between the front and rear of the bracket and also between the roadside and curbside bracket.

This welding guideline pertains to all Hendrickson tubular axles. Unapproved variation from the procedures listed will void the axle warranty and could result in an unsafe weld. In the case of an uncertain circumstance, contact Hendrickson at 866-743-3247 in the United States or 800-668-5360 in Canada.

WHEEL BEARINGS

For wheel bearing removal and installation information, refer to the Conventional Hub Procedures section of Hendrickson publication L496, *Wheel-end Maintenance Procedures* (available at www.hendrickson-intl.com).

RECOMMENDED BRAKE ADJUSTMENT PROCEDURE

⚠ CAUTION Failure to properly adjust brakes could cause reduced braking performance.

1. Grease cam bracket, spider fittings and slack adjuster prior to brake shoe installation.

⚠ WARNING Care must be exercised to prevent grease from coming in contact with brake linings which could cause a reduction in braking performance. Reduced braking performance could cause an accident resulting in serious injury or death.

2. Manually adjust the brakes by rotating the manual adjusting nut (located on the slack adjuster) clockwise until the brake linings contact the brake drum. When contact occurs, back the slack adjuster off by rotating the manual adjusting nut counterclockwise one-half turn.

When turning the manual adjusting nut counterclockwise, use slow steady pressure to avoid damaging the internal clutch mechanism.

DO NOT use an impact wrench or internal adjusting mechanism damage will occur.

BRAKE ASSEMBLY

1. When air brake chambers are installed, the correct mounting holes must be used to correspond to the brake adjuster length (see figure 5).
2. Connect the slack adjuster to the brake chamber push rod.

NOTE: The following procedure describes and illustrates the steps necessary to install a Bendix automatic slack adjuster. If a slack adjuster other than Bendix is to be installed, refer to the appropriate slack adjuster manufacturer for complete installation details.

3. Install the slack adjuster onto camshaft splines so that the manual adjusting nut faces away from the brake chamber.

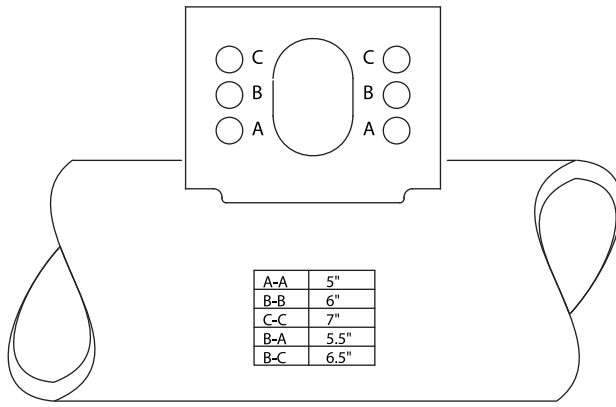


Figure 5. Brake adjuster mounting holes

4. Remove the quick-connect adapter bushing from the slack adjuster yoke by simultaneously squeezing the snap-ring legs and pulling the adapter bushing away from the slack adjuster (figure 6).
5. Position brake actuator push rod jam nut approximately one inch away from the end of the push rod (figure 7).
6. Thread the quick-connect adapter bushing onto the push rod until it is flush with the end of the push rod (figure 8).

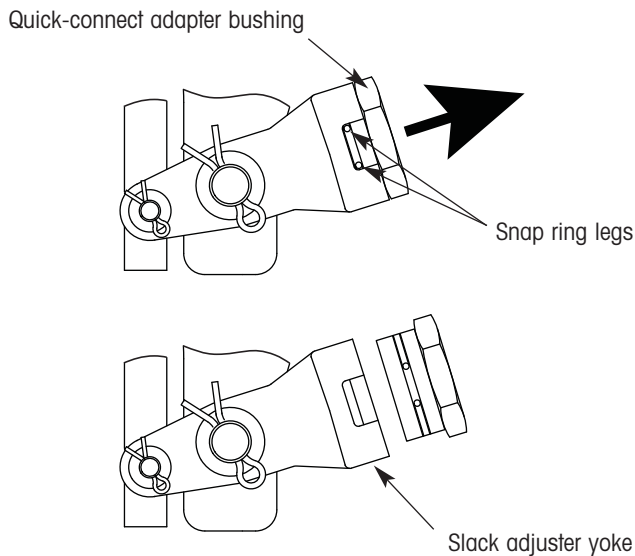


Figure 6. Quick-connect adapter bushing removal details

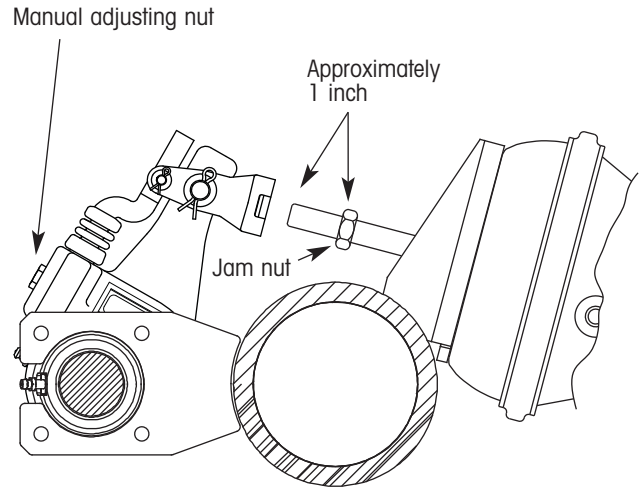


Figure 7. Installing the slack adjuster

7. Make sure the snap ring is in place on the adapter bushing (completely in the groove machined into the adapter bushing).
8. Turn the slack adjuster manual adjusting nut clockwise until the adapter bushing begins to enter the slack adjuster yoke.
9. Fully compress the snap ring legs and continue turning the manual adjusting nut until the adapter is completely inside the yoke.

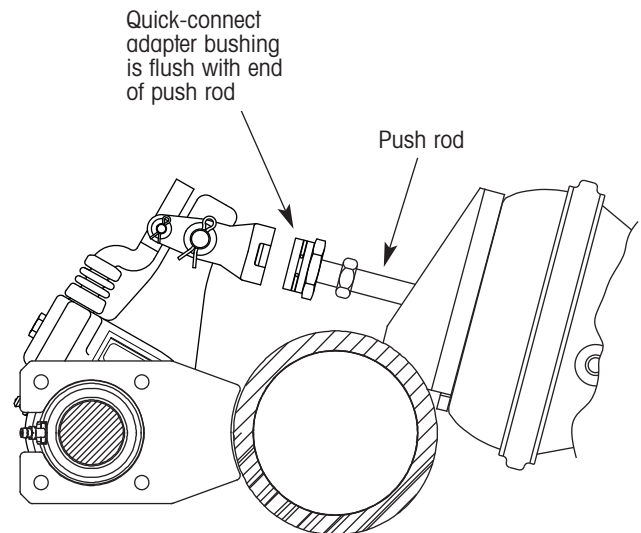


Figure 8. Threading adapter bushing onto push rod



10. Release the snap ring legs and allow it to expand into the corresponding groove in the yoke.
11. Make sure the snap ring is fully seated in both the yoke and adapter bushing grooves by manually pulling the slack adjuster arm.
12. Check the installation angle with the Bendix setup tool. For 5.5-inch slacks, the angle should be 98 to 111 degrees. For 6-inch slacks, the angle should be 90 to 109 degrees (figure 9).

A = 98 to 111 degrees for 5.5-inch slack
 A = 90 to 109 degrees for 6.0-inch slack

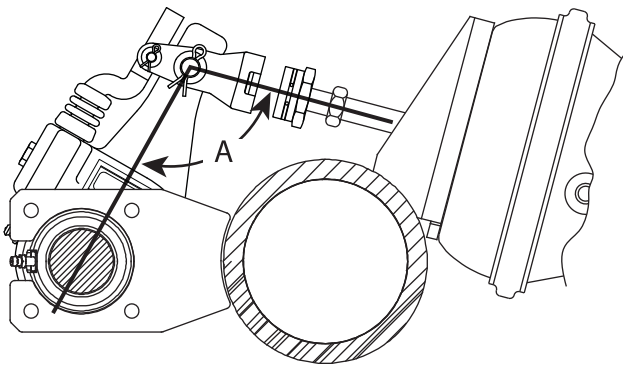


Figure 9. Proper slack installation angle

13. When the slack is properly aligned, tighten the push rod jam nut against the adapter bushing. Holding the adapter bushing with one wrench, tighten the push rod jam nut with a second wrench using 33 to 50 ft. lbs. (45 to 68 N•m) of torque.

Any questions or comments on the above procedure should be directed to Hendrickson.

TORQUE SPECIFICATIONS

FASTENER SPECIFICATIONS		
PART NAME	SIZE & THREAD	TORQUE
Cam brackets	8mm torque prevailing nut	18-26 ft. lbs. (24-25 N•m)
Air chamber mounting bolts	5/8 - 11 UNC	130-145 ft. lbs. (176-197 N•m)
Hub cap to hub	5/16 - 18 UNC	12-18 ft. lbs. (16-24 N•m)



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