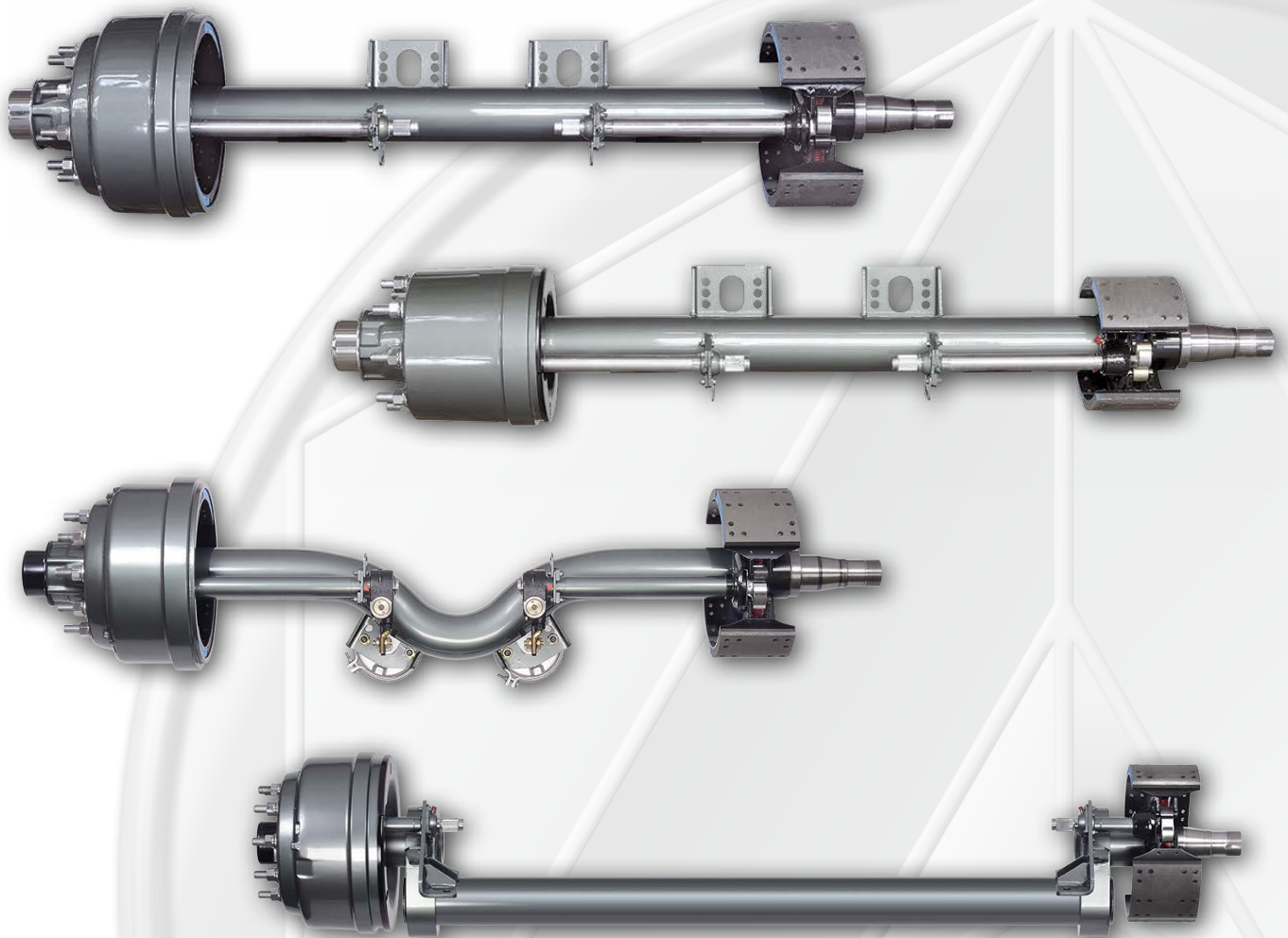




**AXN**  
HEAVY DUTY

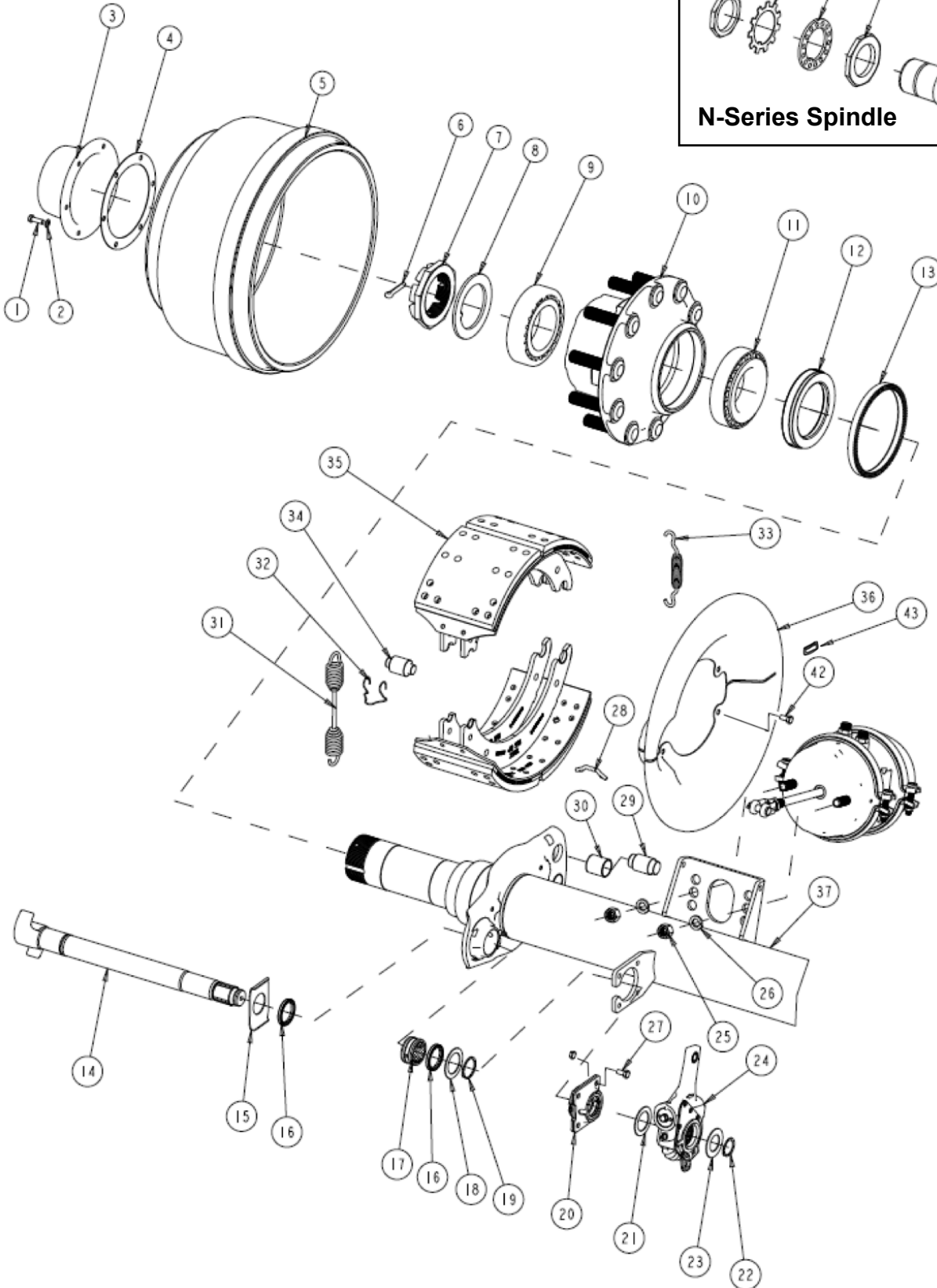
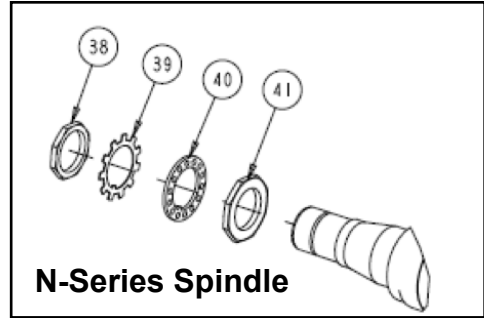
# Trailer Axle Maintenance Manual





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**Exploded View**
**P-Series Spindle Shown**


Item	Description
1	Capscrew - Hubcap
2	Lock Washer - Hubcap
3	Hubcap
4	Gasket
5	Brake Drum
6	Cotter Pin
7	Castellated Nut
8	Lock Washer - Spindle
9	Outer Wheel Bearing - Cup and Cone
10	Hub
11	Inner Wheel Bearing - Cup and Cone
12	Wheel Bearing Seal
13	ABS Sensor Ring
14	Camshaft
15	Washer - Spider End
16	Seal - Spider End
17	Bushing - Spider End
18	Washer - Spider End
19	Snap Ring - Spider End
20	Bushing Assembly
21	Washer - Slack Adjuster
22	Snap Ring - Slack Adjuster
23	Washer - Slack Adjuster
24	Automatic Slack Adjuster
25	Lock Nut - Air Chamber
26	Lock Washer - Air Chamber
27	Capscrew and Lock Nut
28	Brake Shoe Return Spring Pin
29	Anchor Pin

Item	Description
30	Anchor Pin Bushing
31	Brake Shoe Return Spring
32	Brake Shoe Roller Retainer
33	Brake Shoe Retaining Spring
34	Brake Shoe Roller
35	Brake Shoe and Lining Assembly
36	Dust Shield
37	Axle Beam
38	Outer Jam Nut
39	Lock Washer
40	Inner Jam Nut Washer
41	Inner Jam Nut
42	Cap Screw with Lock Washer
43	Inspection Plug, Dust Shield

## About this Manual

Maintenance and service procedures outlined in this manual apply to AXN Heavy Duty trailer axle.

Information contained in this manual is subject to change without notice.

## General Warnings

### Before You Begin

1. Read and understand all instructions and procedures before servicing components.
2. To prevent serious personal injury always wear eye protection and appropriate personal protection equipment when performing brake maintenance or service.
3. Use of special tools will aid in performing service and maintenance as well as help avoid serious personal injury and damage to components.
4. Follow all warning and caution messages in this publication to prevent personal injury and/or damage to components.
5. Follow your company's guidelines when performing diagnostic, maintenance, service or installation procedures.

### Vehicle Preparation

1. Park the vehicle on level surface. Set the parking brake and block the wheels to prevent the vehicle from moving.
2. Raise the trailer and support vehicle by placing safety stands under each axle spring seat. Do not work under a vehicle supported only by jacks.
3. For axles equipped with spring brake chambers, compress and lock the springs to prevent them from actuating.
4. Disengage brakes by using the manual adjusting nut on the slack adjusters until the linings clear the drums

### Automatic Slack Adjusters (ASAs)

Automatic slack adjuster installation, maintenance and service should be performed according to manufacturer's recommended procedures.

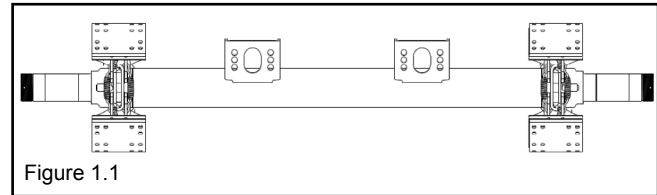
For additional information regarding slack adjusters refer to **TMC RP 609**.

## Description of Axle Models

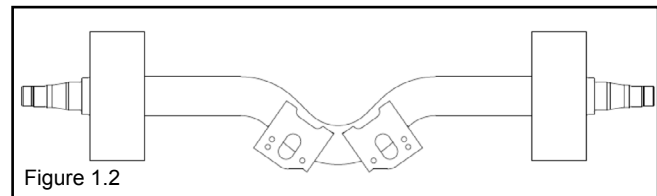
### Beam Design

AXN trailer axles are available in following beam designs variations.

- Straight beam - TA model (Figure 1.1)



- Drop Axle -TAD model (Figure 1.2)



### Spindle Design

- N series (tapered) or P series (parallel) spindle designs with standard retention hardware.

### Brakes

- Cam brakes

### Identification

#### Identification Tag

All the information needed to identify a specific AXN trailer axle can be found on the identification tag located at the center of the axle beam. ID tag is stamped with trailer axle part number, serial number, manufacture date and nominal beam rating (Figure 1.3).

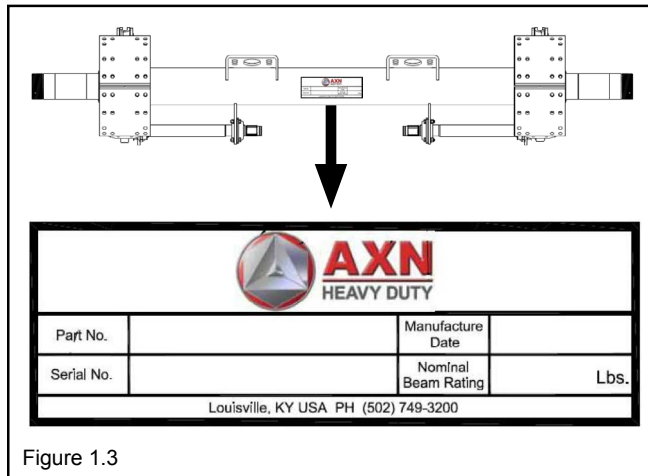


Figure 1.3

- Part number is composed of letters and numbers for example, TA225T67E7751001. It contains information regarding axle assembly.
- Serial number is composed of letters and numbers for example C10D00001. It is used to identify individual trailer axle.
- Manufacture date is indicated by MM/DD/YY.
- Nominal beam rating is specified in pounds.

#### Trailer Axle Model Nomenclature

Part number composed of letters and numbers found on the ID tag is used to identify an axle model. These letters and numbers correspond to information regarding beam design, nominal beam rating, spindle type, brake size and type, track and variant related to a trailer axle model.

AXN Trailer Nomenclature Chart						
Product	Nominal Beam Rating	Spindle Type	Brake Size (in.)	Brake Type	Track (in.)	Variant
<b>TA</b> Trailer Axle	<b>200</b> 20.0K lbs	<b>T</b> Tapered	<b>67</b> 16.5 x 7	<b>E</b> Extended Service	<b>715</b> 71.5"	<b>XXXX</b> 1001 through 9999 depending on specification details.
<b>TAC</b> Trailer Axle Crank	<b>225</b> 22.5K lbs	<b>P</b> Parallel	<b>27</b> 12.25 x 7.5	<b>S</b> Standard Service	<b>775</b> 77.5"	
<b>TAD</b> Trailer Axle Drop Center	<b>250</b> 25.0K lbs		<b>68</b> 16.5 x 8	<b>D</b> Disc	Custom Tracks also available.	
	<b>300</b> 30.0K lbs		<b>69</b> 16.5 x 8.625 <b>W2</b> Wabco Pan 22			

Sample Product Number – **TA 225 T 67 E 775 5019**

### Wheel End Installation, Adjustment and Maintenance Procedures

Please refer to Technology & Maintenance Council (TMC) Recommended Maintenance Practice Guidelines as Follows:

- Wheel Bearing Adjustment Procedures: Refer to TMC RP 618
- Wheel Seal and Bearing Removal, Installation and Maintenance: Refer to TMC RP 622
- Recommendations for Wheel End Lubrication: Refer to TMC RP 631

## Installation

Follow all warning and caution messages in this publication to prevent personal injury and/or damage to components.

### Warning!

**To prevent serious eye injury always wear eye protection when performing brake maintenance or service**

**Park the vehicle on level surface. Set the parking brake and block the wheels to prevent the vehicle from moving.**

**Support vehicle by placing safety stands under each axle spring seat. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over causing serious personal injury and damage axle components.**

### **Axle Installation Guideline**

1. Locate the top and front of axle (refer to procedures in Axle Positioning in this section).
2. Verify that the brackets fit the axle correctly, then weld the suspension bracket to the axle (refer to Welding Section)
3. Position the axle under the vehicle and tighten the suspension installation fasteners. Follow the recommended procedures to prevent over torquing of the fasteners. Final tightening must be performed using a calibrated torque wrench to the torque value specified by the manufacturer.
4. Inspect the assembly to ensure that:
  - a. Suspension springs are located correctly on their wear pads.
  - b. Sufficient clearance exists between the axle and vehicle components for both loaded and unloaded conditions.
  - c. All fasteners are tightened to correct torque values.
5. After an initial break-in period and during regular intervals, inspect all suspension fasteners to ensure that correct torque values are being maintained according to manufacturer's specifications.

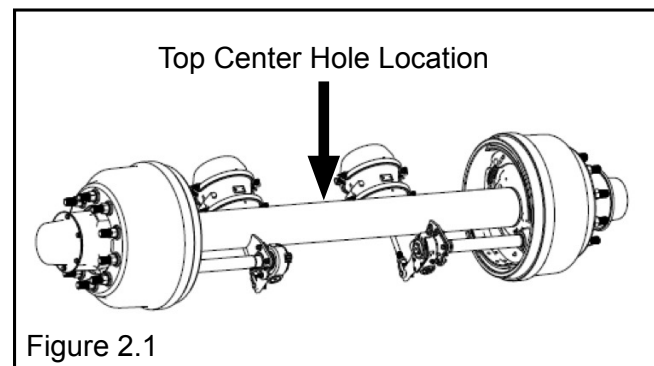
## Axle Positioning

### Caution!

Follow these instructions to correctly position an axle. Incorrectly positioned axle or brake components welds that are in unauthorized location can cause an axle to crack. Incorrectly positioned axle can cause incorrect axle camber or toe resulting in excessive tire wear. Damage to other components can also result.

### **Axle Top and Bottom**

1. On axles built **WITH** top center hole, the partially drilled 0.31" diameter hole identifies the top of the axle (Figure 2.1).



2. On axles built **WITHOUT** the top center hole, the axle can be rotated 180 degrees along the axial centerline. Axle top and bottom are interchangeable.

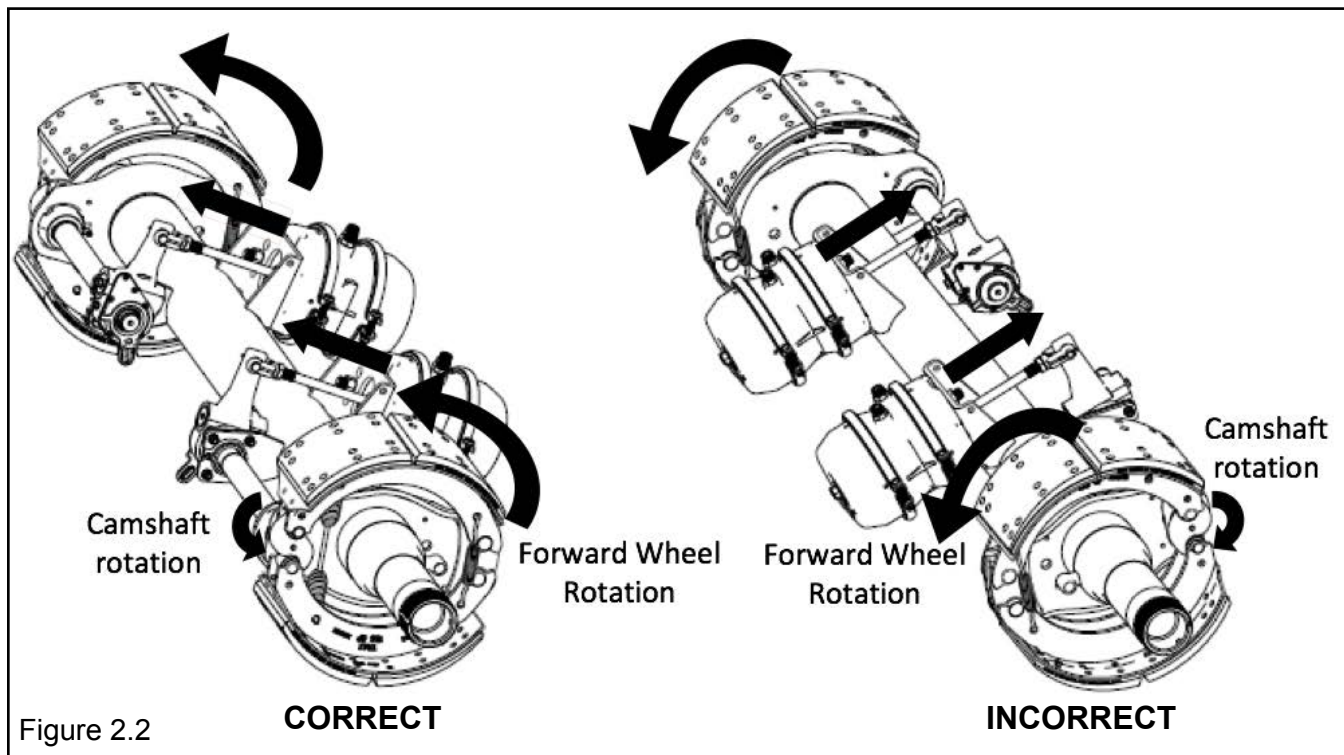


### Axle Front and Rear

1. On axles built with top center hole, the ID tag is located towards the rear of the axle.
2. On axles built without top center hole, axle can be rotated 180 degrees and axle front and rear are interchangeable. Refer to brake installation guideline regarding these models.

### Brake Orientation

Trailer axles should be installed so that the camshaft rotates in the same direction as the tires when the vehicle is moving forward (Figure 2.2).



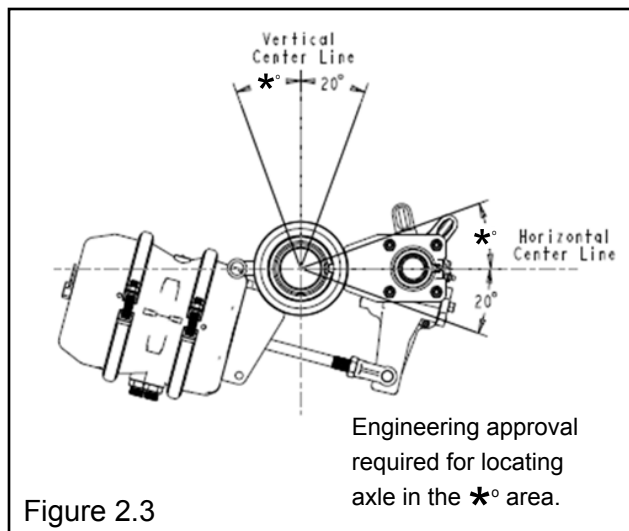
### Axle Rotation

#### Non Cambered Axles

3. On axles built with top center hole, locate the top center hole within 20 degrees from vertical centerline and locate the brake hardware within 20 degrees from horizontal centerline (Figure 2.3).
4. On axles built without top center hole, locate the brake hardware within 20 degrees of horizontal centerline.

#### Cambered Axles

All cambered axles are built with the top center hole. Cambered axles must be installed so that the top center hole located at the exact top position.



## Brake Chamber Mounting

Install the air chamber in the mounting holes in the chamber bracket according to the slack adjuster length required. (Figure 2.4)

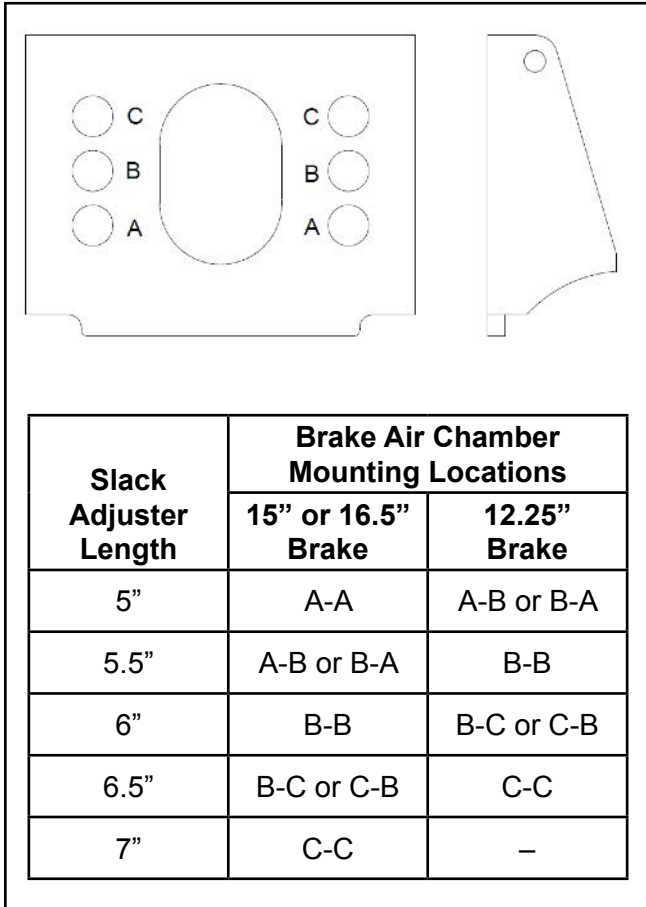


Figure 2.4

## Suspension

### **Caution!**

**U-bolts must be tightened to the manufacturer's specifications. Over tightened U-bolts can damage the axle at the point where the bolts contact the axle.**

Trailer axle suspension installation, maintenance and service should be performed according to suspension manufacturer's specification.

For additional information refer to **TMC RP 728**.

## Welding

### **Warning!**

**Incorrect welding methods and weld in unauthorized location can lead to reduction in fatigue life of the trailer axle. Serious personal injury can result.**

Refer to **TMC RP 728** for information regarding welding on the trailer axle.

## Axle Alignment

### **Caution!**

**Incorrectly positioned axle can cause incorrect axle camber or toe resulting in excessive tire wear. Damage to other components can also result.**

Refer to **TMC RP 708** regarding trailer axle alignment.

## Wheel End Installation

Wheel end components must be correctly installed and periodically inspected to ensure optimal performance of the trailer axle.

Refer to **TMC RP 618, 622, and 631** regarding installation, service and maintenance of wheel end components.

## P-series Castellated Spindle Nut Adjustment Procedure

The AXN P-series single nut model consists of a washer, castellated nut and cotter pin.

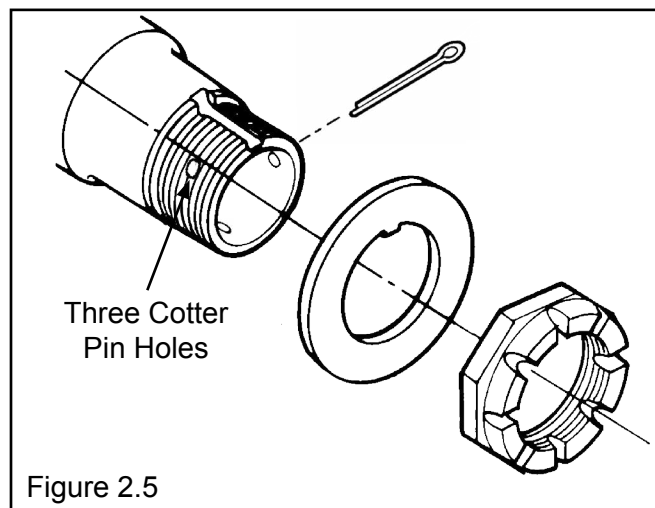


Figure 2.5

Use the following procedure to adjust the wheel bearings:

1. Install the washer and castellated nut. Tighten the nut to 200 lb-ft (271 N-m) while rotating the wheel end in both directions.
2. Completely loosen the nut, then tighten it to 50 lb-ft (68 N-m) while rotating the wheel end in both directions.
3. Loosen the nut 1/8 to 1/6 turn. Do not include socket backlash in the 1/8 to 1/6 turn.

### **Caution!**

**Always replace used cotter pins with new ones when servicing the axle spindle. Failure to do so can result in damage to components.**

4. Install a new cotter pin into the axle spindle hole, but do not bend.

### **Warning!**

**You must adjust wheel bearing end play to within 0.001-0.005-inch (0.025-0.127 mm). Loss of wheel-end components, serious personal injury and damage to components can result.**

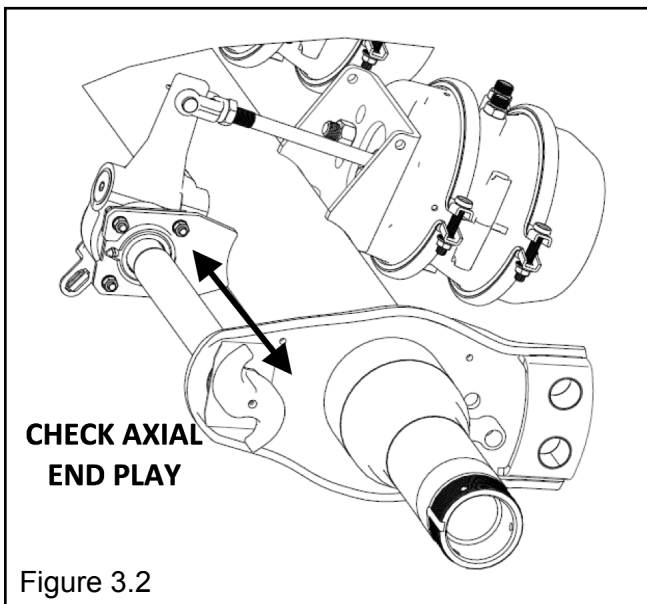
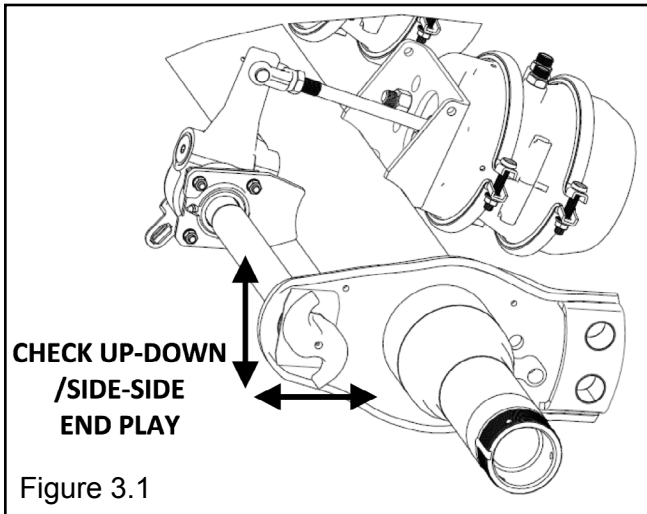
5. Check the end play using procedure detailed in the steps below. If end play falls within 0.001-0.005-inch (0.025-0.127 mm), go to Step 6.

If end play does not meet this requirement:

- a. Remove the cotter pin.
  - b. Tighten or loosen the castellated nut as required to achieve the correct end play.
  - c. Install the cotter pin.
  - d. Check end play.
  - e. Continue to adjust until the end play meets specifications. Then go to Step 6.
6. Bend one leg of the cotter pin 90 degrees. Do not bend both legs.

### **Caution!**

**When you install a new cotter pin into the axle spindle hole, only bend one leg of the pin 90 degrees. If you bend both cotter pin legs in the same direction, the cotter pin can fall out of the spindle, resulting in damage to components.**



## Brake Service Inspection

1. Inspect brake shoe anchor pins, rollers and bushings for wear and damage. Replace as required.
2. Inspect brake shoe "D" holes for wear and damage. Replace as required.
3. Inspect return and retaining springs for any relaxation in the coils and wear in the hooks. Replace as required.

Use of new return and retaining springs are highly recommended when servicing drum brakes.

4. Inspect brake linings for wear. If worn to wear indicator, replace as a set.
5. Check camshaft for up-down and side-side end play. If end play is more than 0.030" (0.76 mm) in either direction, replace the camshaft bushings or camshaft. (Figure 3.1)
6. Check camshaft for axial end play. If end play is more than 0.060" (1.52 mm), replace camshaft and/or bushings as required. (Figure 3.2)

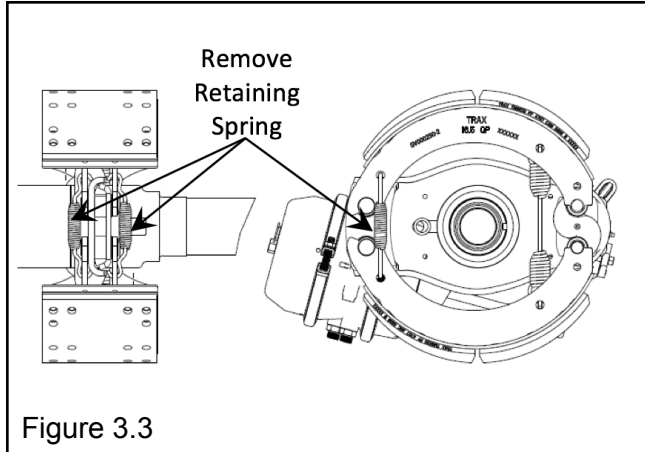


Figure 3.3

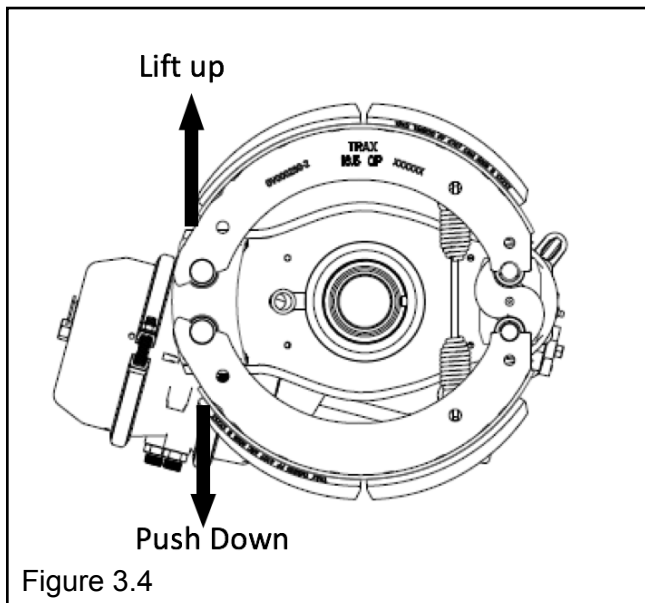


Figure 3.4

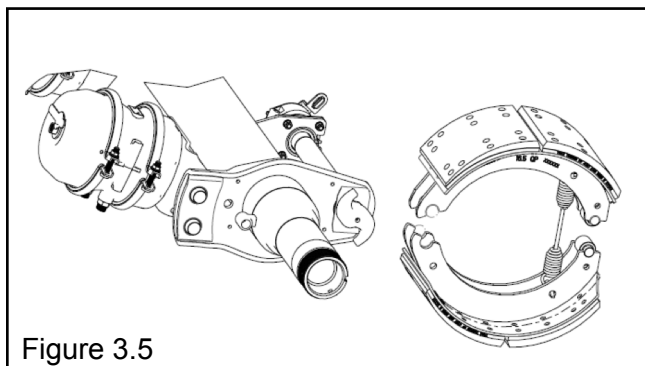


Figure 3.5

## Removal and Disassembly

### Brake Shoe Assembly Removal

AXN Brake Linings do not contain asbestos. However, always use caution when handling brake components as they could contain asbestos and non asbestos fibers.

1. Remove the two retaining springs. (Figure 3.3)
2. Push down on the bottom brake shoe and disengage it from the anchor pin. Move the bottom brake shoe to the outboard side of the brake spider (Figure 3.4).
3. Lift up the top brake shoe and disengage it from the anchor pin then remove brake shoe assembly (still connected by the return spring) from the brake spider (Figure 3.5).
4. Remove the return spring from the top and bottom brake shoe.
5. Remove brake shoe roller by carefully pulling on the retaining clip.
6. Remove the Anchor pin.

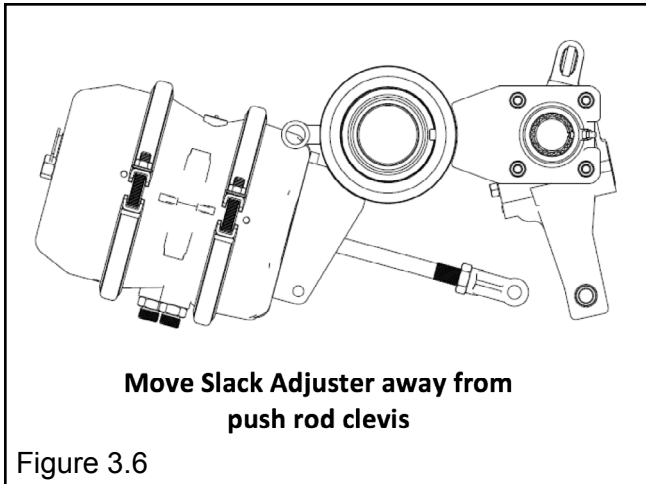


Figure 3.6

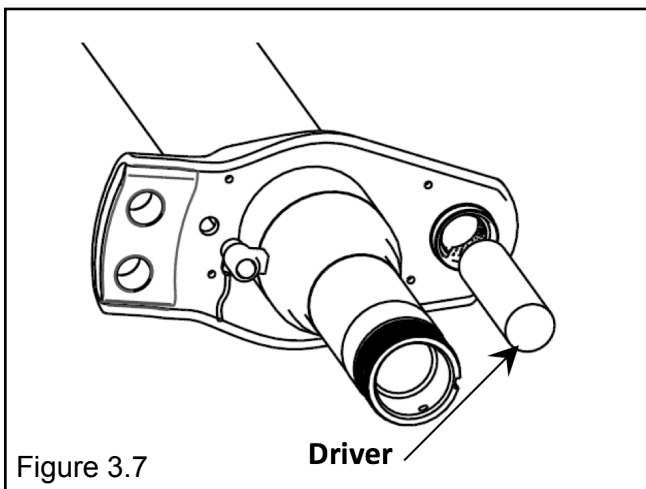


Figure 3.7

## Camshaft and Bushing Removal

1. Remove the clevis pin connecting the slack adjuster to the brake chamber push rod clevis.
2. Move the slack adjuster away from the clevis by rotating the adjusting nut (Figure 3.6).
3. Remove snap ring at the end of the camshaft spline and remove the slack adjuster from the camshaft spline.
4. Remove the snap ring at the spider end and remove camshaft from the brake spider.
5. Remove all the loose parts including seals and washers from the camshaft and retainer bore (figure 3.8).
6. Use a correct size driver to drive the bushings out of the retainer bore. Use care to prevent damage to the retainer bore (Figure 3.7).
7. Remove the bushing assembly at the slack adjuster end by removing the four cap screws.

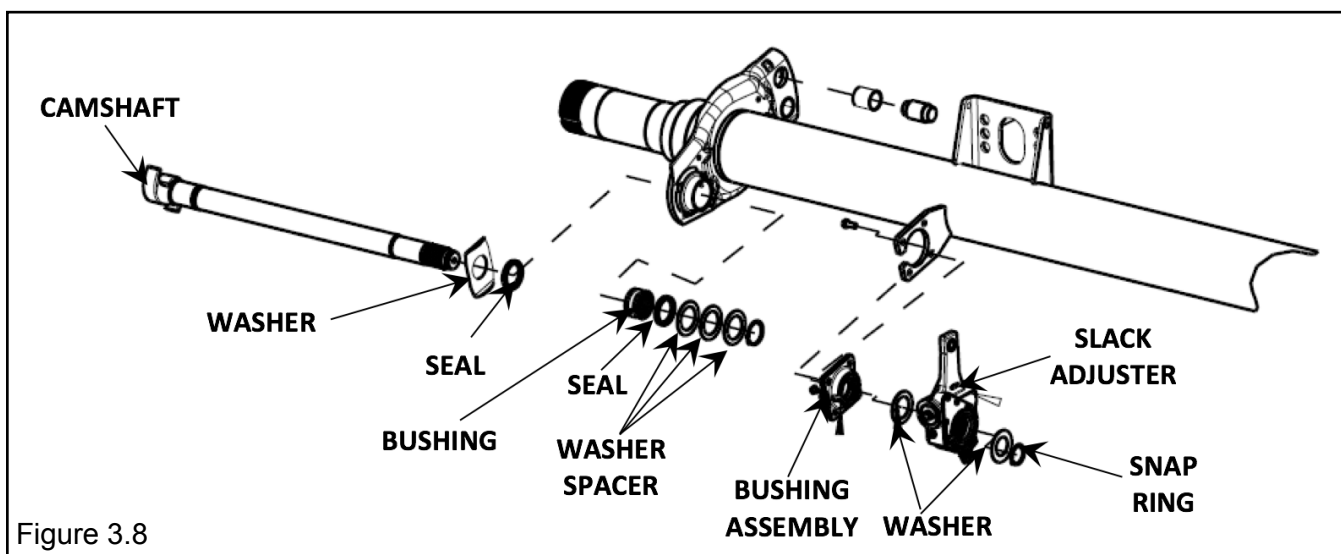
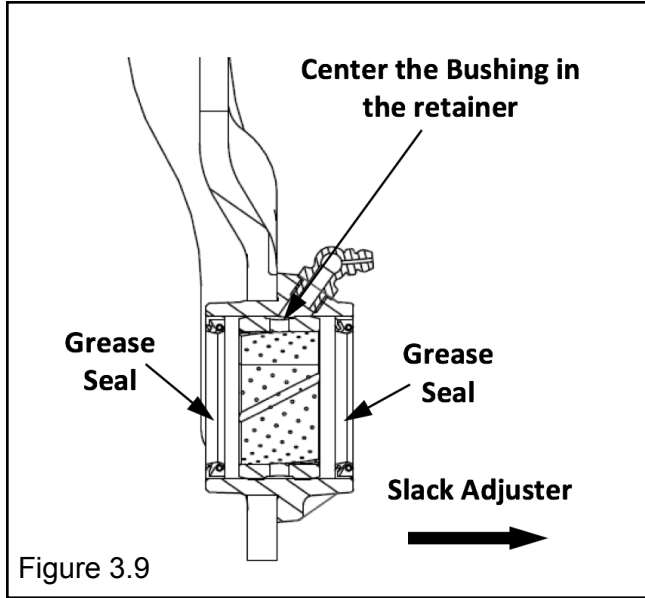


Figure 3.8



## Install and Assembly

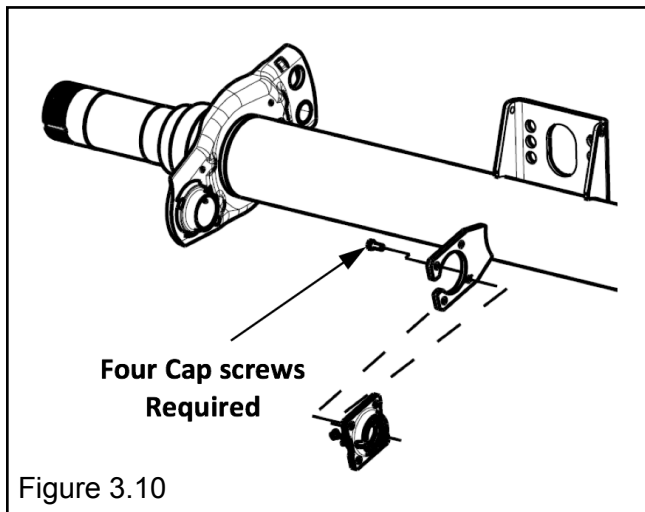
### Bushing and Seal install at the Spider End.

1. Drive the metal bushing into the retainer bore until the bushing is centered in the retainer (Figure 3.9).
2. Install the grease seal on each side of the bushing with the seal lips facing toward the slack adjuster.

### Bushing install at the Slack Adjuster End

Install the bushing assembly by tightening four cap screws to 25-35 lb-ft (34-48 N•m)

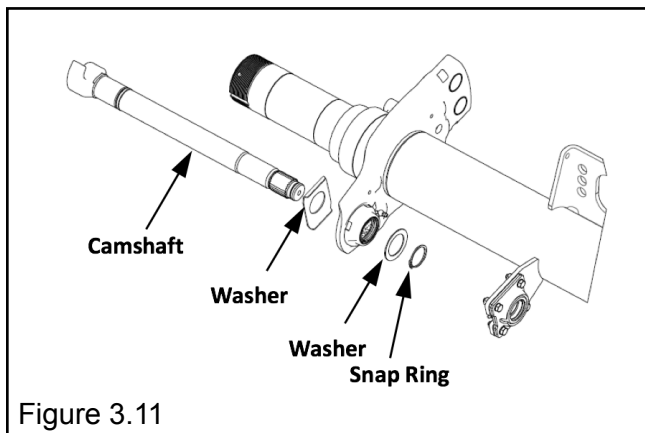
(Figure 3.10).

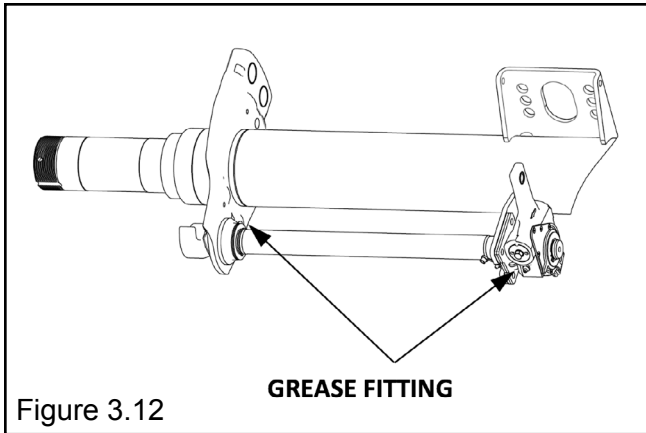


### Camshaft install

1. Clean the entire camshaft, this prevents the bushing from being contaminated when the camshaft is pushed through the bushing.
2. Apply light grease to the camshaft bushing and journals.
3. Install a large rectangular washer onto the camshaft.
4. Install the camshaft by pushing through the bushing at the spider end. Do not push through the bushing at the slack adjuster end.
5. Install a washer as needed onto the camshaft.
6. Install the camshaft by pushing through the bushing assembly at the slack adjuster end.
7. Install the snap ring onto the camshaft at the spider end.

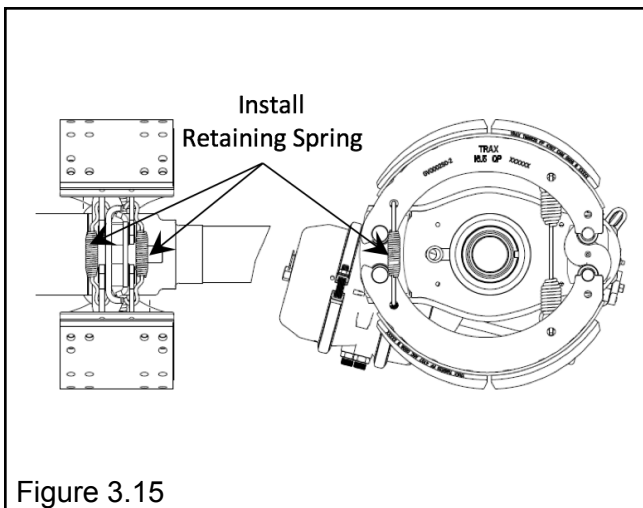
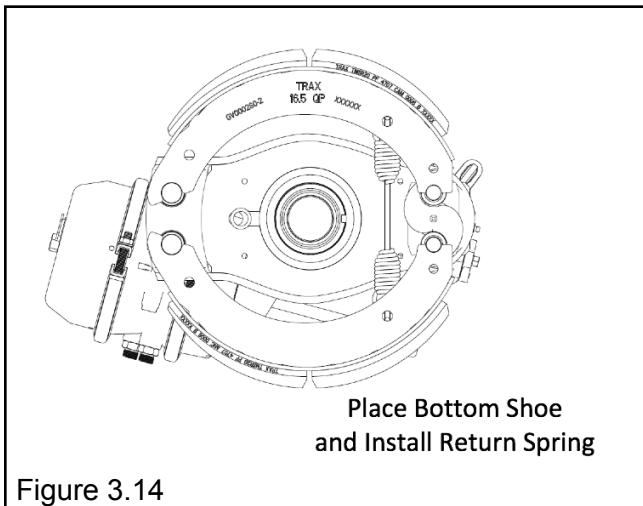
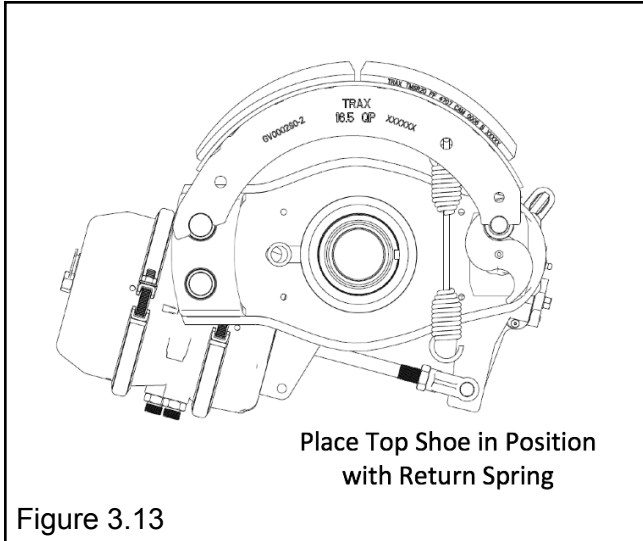
Turn the camshaft by hand to ensure that it is installed correctly. (Figure 3.11)





8. Apply anti-seize compound to the camshaft spline and slack adjuster spline.
9. Install the slack adjuster by installing one washer on each side of the slack adjuster and install the snap ring.
10. Using the slack adjuster manual adjusting nut align the hole in the slack adjuster with the hole in the push rod clevis on the brake chamber.
11. Apply anti-seize compound to the clevis and install through the hole in the push rod clevis and slack. Secure using a cotter pin.
12. Apply grease to the grease fitting at the spider and bushing assembly until new grease purges from all the seals (Figure 3.12).





### Brake Shoe Assembly and Install

1. Lubricate inside the anchor pin bushings and install anchor pin.
2. Lubricate the anchor pin and brake shoe rollers where they touch the brake shoe.
3. Install brake shoe roller on both top and bottom brake shoes by pressing the ear of the retainer clip and fitting the retainer between brake shoe webs. Push the retaining clip into the brake shoes until the ears lock in holes in the brake shoe webs.
4. Place the top brake shoe in position on the top anchor pin and camshaft head and attach the return spring to the brake shoe return spring pin (Figure 3.13).
5. Hold the bottom brake shoe in position on the bottom anchor pin and install brake shoe retaining springs (Figure 3.14).
6. Install retaining spring to the top and bottom brake shoes (Figure 3.15).

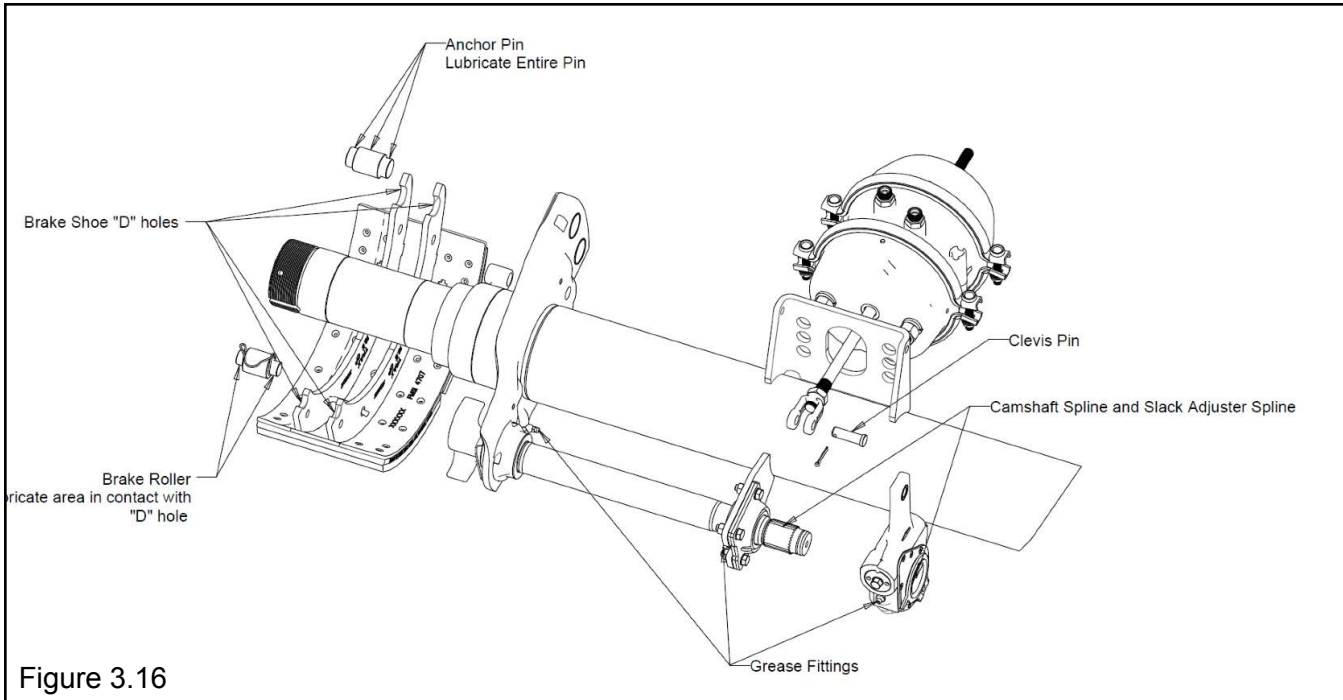


Figure 3.16

### Lubrication Schedule

To ensure optimum brake performance and maintain life of brake components use one of following schedules that provide most frequent interval. (Figure 3.16)

#### Note:

Following recommended schedules are for on-highway application under standard driving conditions. More frequent lubrication schedule are required for on-highway heavy duty, off-highway driving conditions or combination of both.

- Vehicle manufacturer's schedule.
- Company fleet lubrication schedule.
- Every 6 months.
- Four times during the life of brake lining.

In addition to lubrication schedule, lubricate brake components as needed or when they are disassembled.

### Caution:

Do not allow grease or any other lubricants to come in contact with the brake surface or brake lining. Clean brake drums or rotors and replace contaminated linings if grease or any other lubricants are found on these components.

### Lubrication

**Camshaft Bushings** - Apply specified grease at the grease fitting on the spider bushing and on the slack adjuster bushing.

**Slack Adjuster** - Apply specified grease at the grease fitting.

**Camshaft Spline** - Apply specified lubricant to the entire area in contact with the spline on the slack adjuster.

**Anchor Pin** - Apply specified grease to the entire pin.

**Brake Shoe Roller** - Apply specified grease to the part of roller in contact with the brake shoe "D" hole. Do not grease the area in contact with the camshaft head.

**Clevis Pin** - Apply specified lubricant to entire pin.

## Lubrication Schedule

Component		NLGI Grade	Type	Operating Temperature
Camshaft bushings Anchor Pin	Recommend	2	Calcium Sulfonate Complex	Down to -30°F (-34.4°C)
		1	Clay Base	Down to -40°F (-40°C)
Brake Shoe Roller	Optional	2*	Synthetic Oil, Clay Base*	Down to -65°F (-54°C)
		1 and 2	Lithium Base	Refer to Manufacturer's Specification
Automatic Slack Adjusters -at grease fitting	Recommend	2	Calcium Sulfonate Complex	Down to -30°F (-34.4°C)
		1	Clay Base	Down to -40°F (-40°C)
	Optional	2*	Synthetic Oil, Clay Base*	Down to -65°F (-54°C)
		1 and 2	Lithium Base	Refer to Manufacturer's Specification
Camshaft Spline		Any of Above	Refer to above	Refer to above
Clevis Pin		-	Anti-Seize	Not Applicable

\*Do not mix synthetic,clay base grease with any other grease in this table. Purge and wipe off all previously intalled grease prior to using synthetic,clay base grease to prevent cross contamination

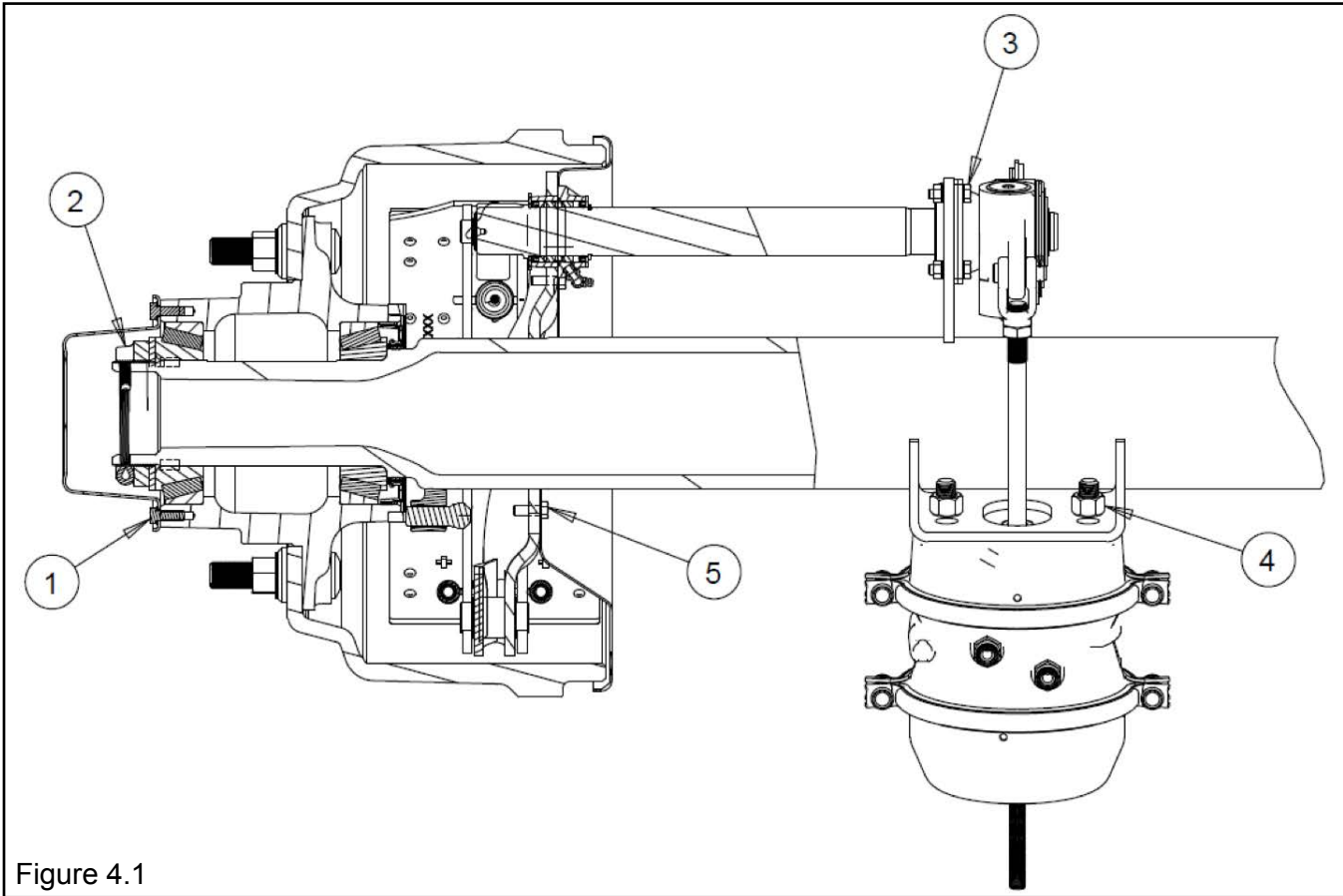
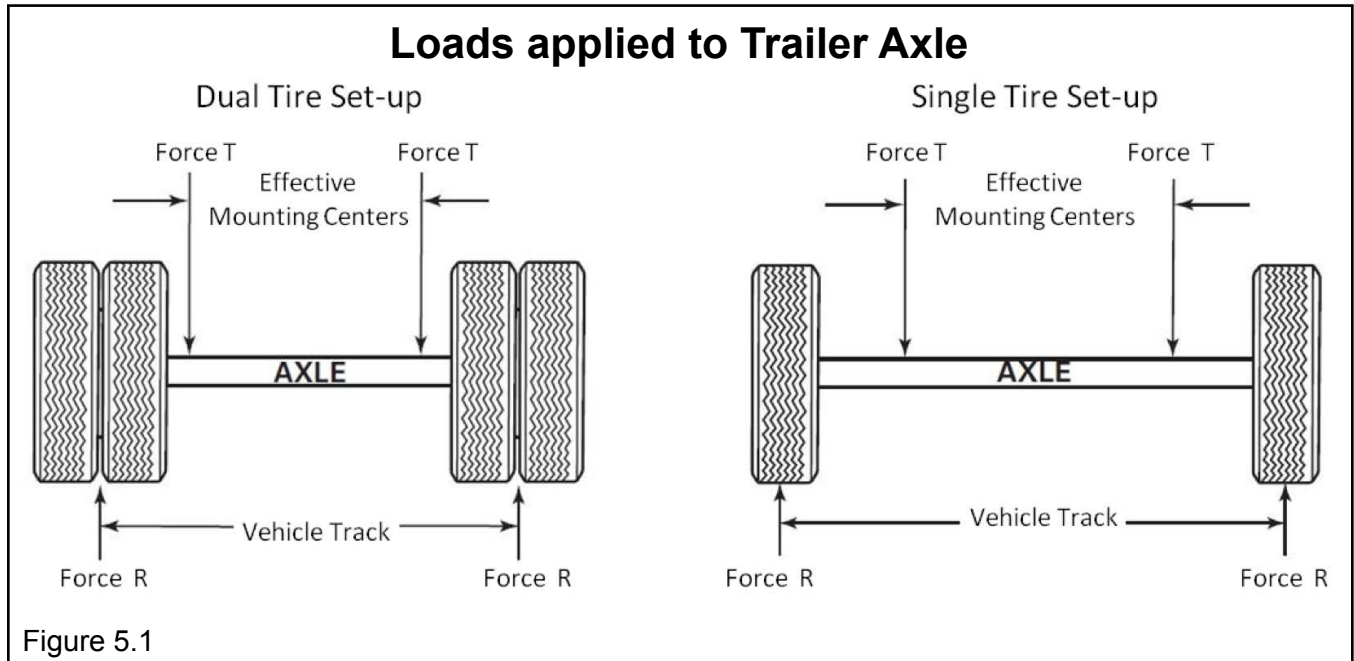


Figure 4.1

Item	Description	Torque Range	
		Lb-Ft	N•m
1	Hubcap bolts	12-16	17-22
2	Spindle Nuts	Refer to TMC RP 618	
3	Cam Bushing Housing Bolt/Nut	14-18	20-25
4	Air Chamber Nut	80-125	109-170
5	Dust Shield Bolt	12-16	20-25



**Force T = Downward load from vehicle and freight applied at effective mounting centers**

- Trailers equipped with mechanical spring suspensions the effective mounting centers are equal to the spring centers.
- Trailers equipped with air suspensions, effective mounting centers are determined by suspension geometry and calculated using formula as shown in “Axle Ratings for Air Suspensions installed on 5 inch OD Axle Beams”

**Force R = Reaction load applied at vehicle track**

- Trailers equipped with dual wheels or single wheel with zero offset, the vehicle track is equal to the axle track
- Trailers equipped with single tire using outset wheel, the vehicle track is equal to the distance between the centerline of the two single tires.

**Note: Outset single-wheel applications require P-series spindles**

**To determine the AXN axle load rating**

1. Determine effective mounting centers
2. Determine Vehicle Track
3. Calculate Overhang
4. Use the calculated overhang distance to get axle beam rating from the respective chart based on axle type

**Axle Ratings for Mechanical Suspension  
Installed on 5 inch OD Axle Beams**

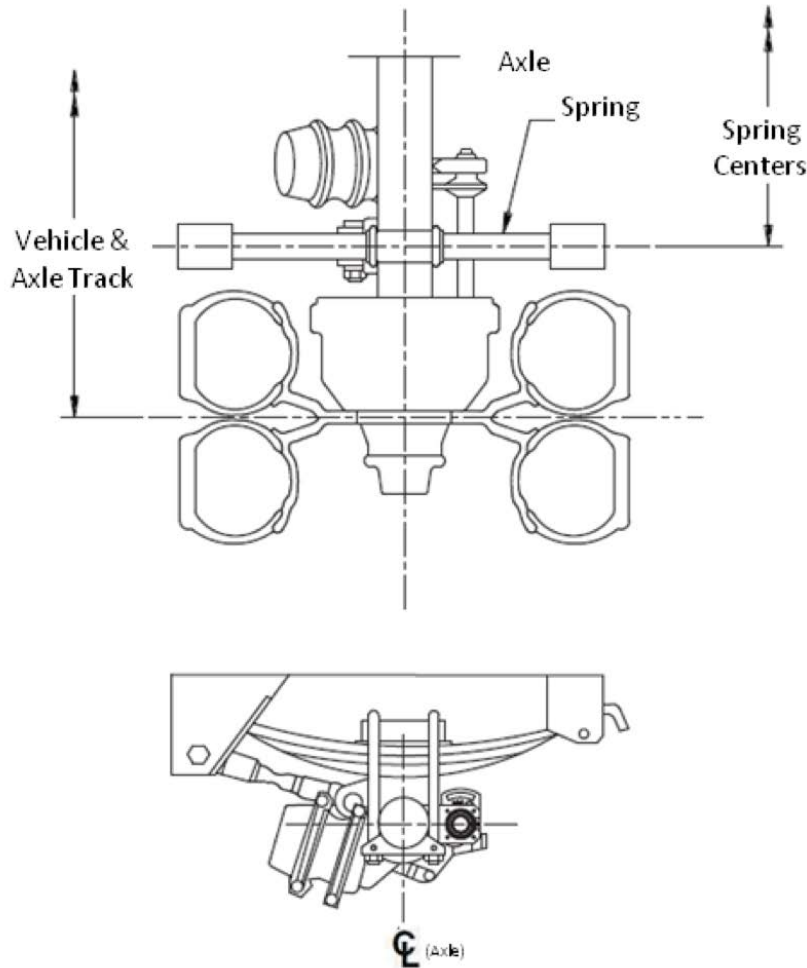


Figure 5.2

**Effective Mounting Centers = *Spring Centers***

If vehicle is equipped with dual wheel or single wheel with zero offset.

Vehicle Track = Axle track

$$\text{Overhang} = \frac{(\text{Vehicle Track} - \text{Effective Mounting Centers})}{2}$$

Use this Overhang distance to get axle beam rating from the respective chart based on axle type

**Axle Ratings for Air Suspension  
Installed on 5 inch OD Axle Beams**

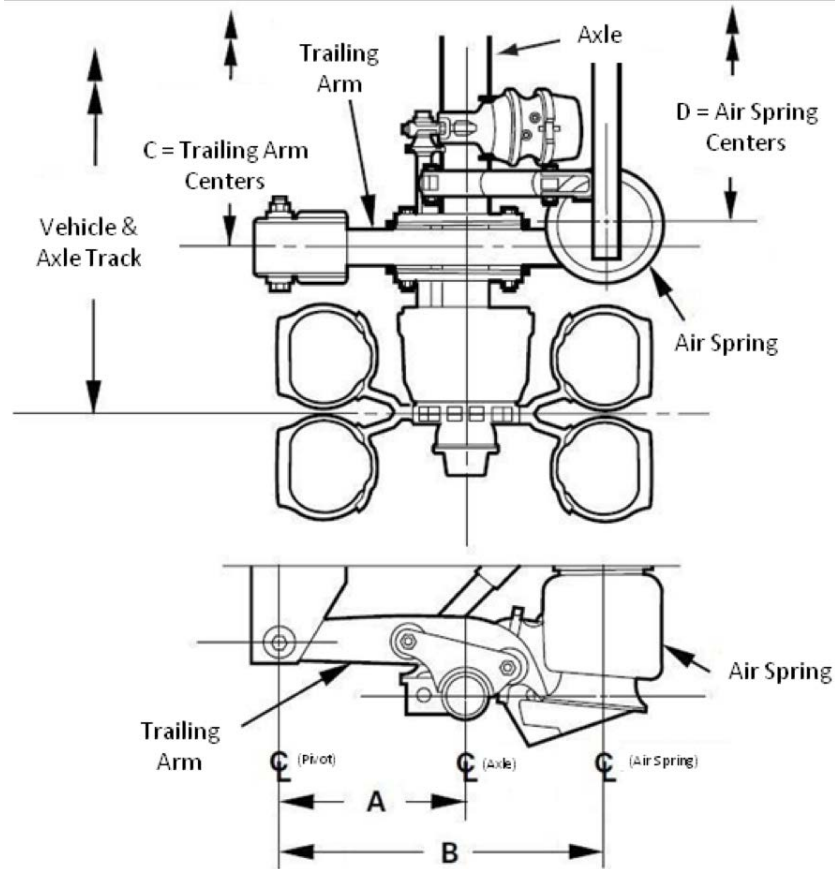


Figure 5.3

A = Distance from centerline of pivot to centerline of axle.

B = Distance from centerline of pivot to centerline of air spring.

C = Trailing arm center distance

D = Air spring center distance

$$\text{Effective Mounting Centers} = \left( \left( \frac{B}{A+B} \right) * C \right) + \left( \left( \frac{A}{A+B} \right) * D \right)$$

If vehicle is equipped with dual wheel or single wheel with zero offset.

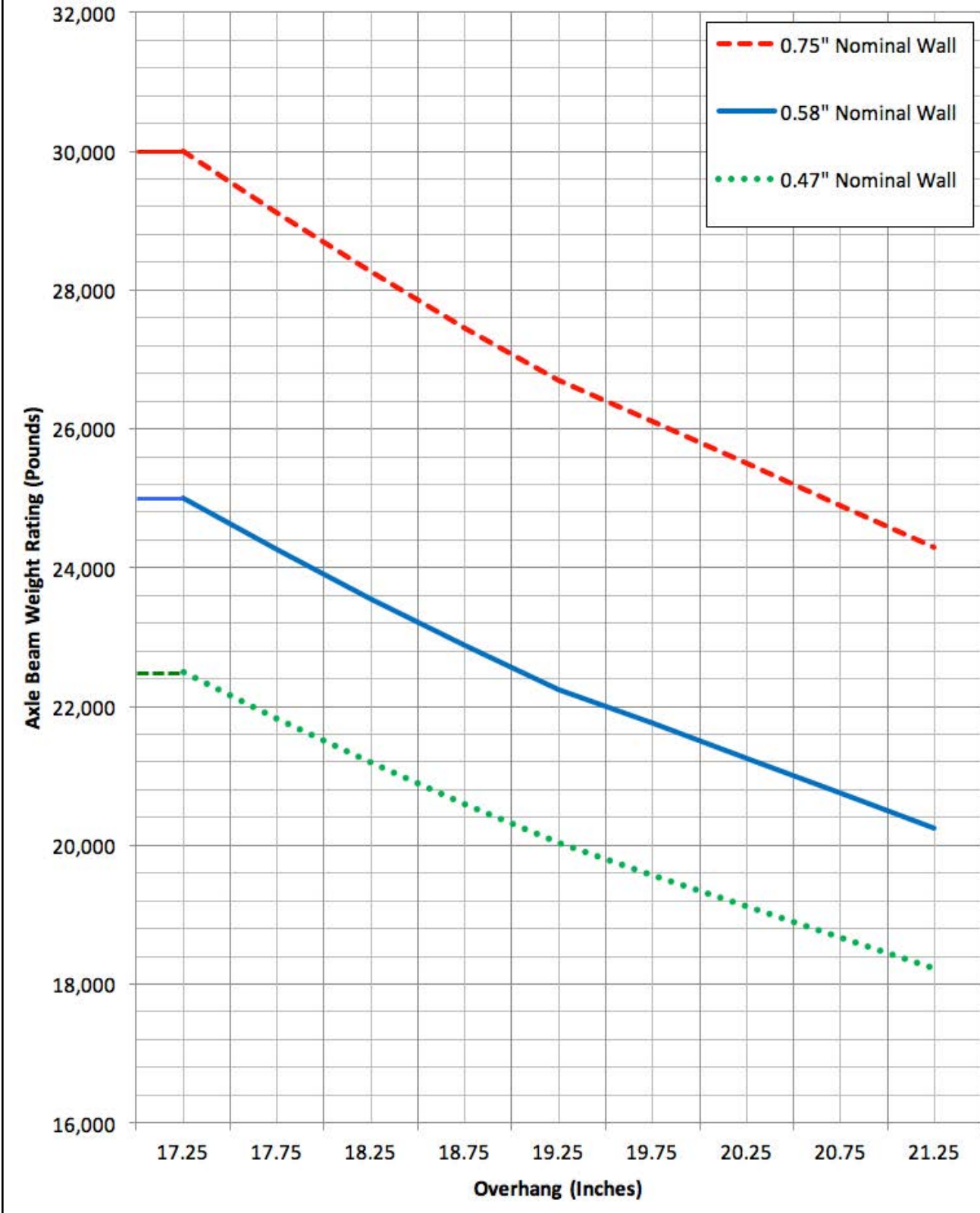
Vehicle Track = Axle track

$$\text{Overhang} = \frac{(\text{Vehicle Track} - \text{Effective Mounting Centers})}{2}$$

Use this Overhang distance to get axle beam rating from the respective chart based on axle type.

### Straight Trailer Axles (5" OD)

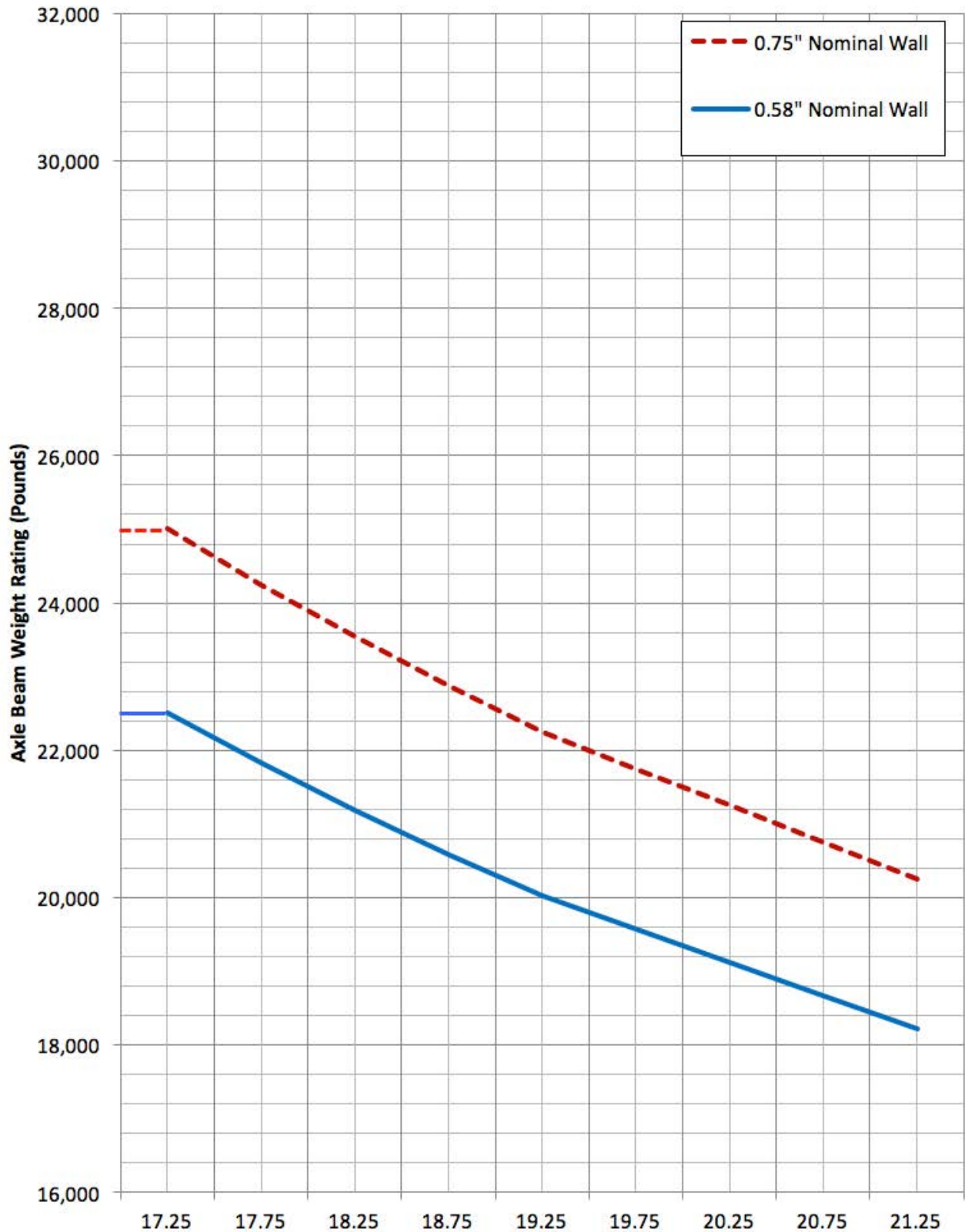
Note: Outset single-wheel applications require P-series spindles





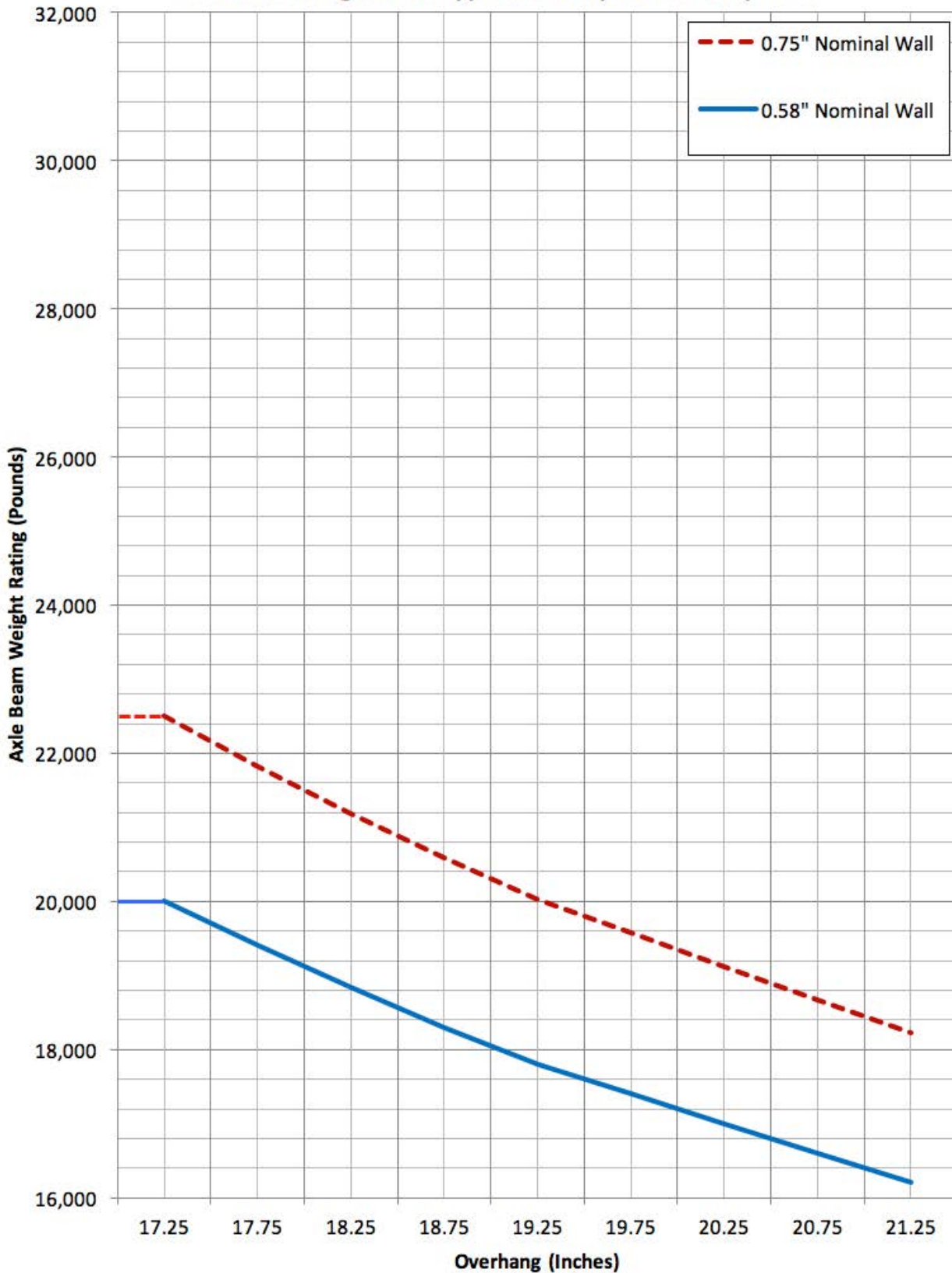
### 6.25" Drop Center Axle (5" OD)

Note: Outset single-wheel applications require P-series spindles



### 8" and 9" Drop Center Axles (5" OD)

Note: Outset single-wheel applications require P-series spindles







## **Trailer Axle Maintenance Manual**

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**For more information, please contact:**

**AXN Heavy Duty**

5534 National Turnpike, Louisville, KY 40214 • USA

502.749.3200 • [www.axnheavyduty.com](http://www.axnheavyduty.com)