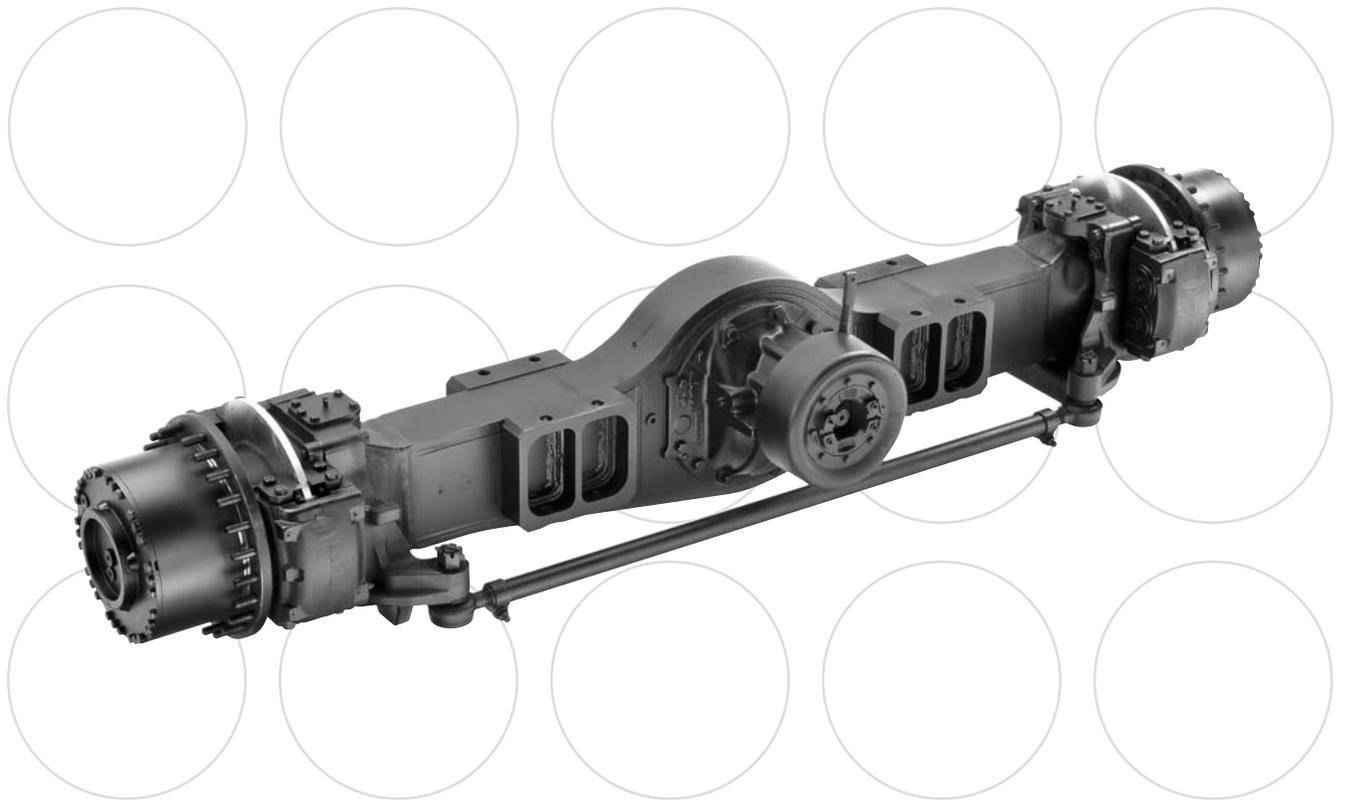


Maintenance Manual MM-10101

# Heavy-Duty Planetary Wheel End Drive Steer Axles

## MOX-H2, MOX-N5 and MOX-P8

Issued 03-11



# Service Notes

## About This Manual

This manual provides service and repair procedures for Meritor heavy-duty planetary wheel-end drive steer axles.

## Before You Begin

1. Read and understand all instructions and procedures before you begin to service components.
2. Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.
3. Follow your company's maintenance and service, installation, and diagnostics guidelines.
4. Use special tools when required to help avoid serious personal injury and damage to components.

## Hazard Alert Messages and Torque Symbols

### WARNING

A Warning alerts you to an instruction or procedure that you must follow exactly to avoid serious personal injury and damage to components.

### CAUTION

A Caution alerts you to an instruction or procedure that you must follow exactly to avoid damage to components.

 This symbol alerts you to tighten fasteners to a specified torque value.

## How to Obtain Additional Maintenance and Service Information

### On the Web

Visit Literature on Demand at [arvinmeritor.com](http://arvinmeritor.com) to access and order product, service, aftermarket, and warranty literature for ArvinMeritor's truck, trailer and specialty vehicle components.

## Literature on Demand DVD (LODonDVD)

The LODonDVD contains product, service and warranty information for ArvinMeritor components. To order the DVD, visit Literature on Demand at [arvinmeritor.com](http://arvinmeritor.com) and specify TP-0742.

## How to Obtain Tools and Supplies Specified in This Manual

Call ArvinMeritor's Commercial Vehicle Aftermarket at 888-725-9355 to obtain Meritor tools and supplies.

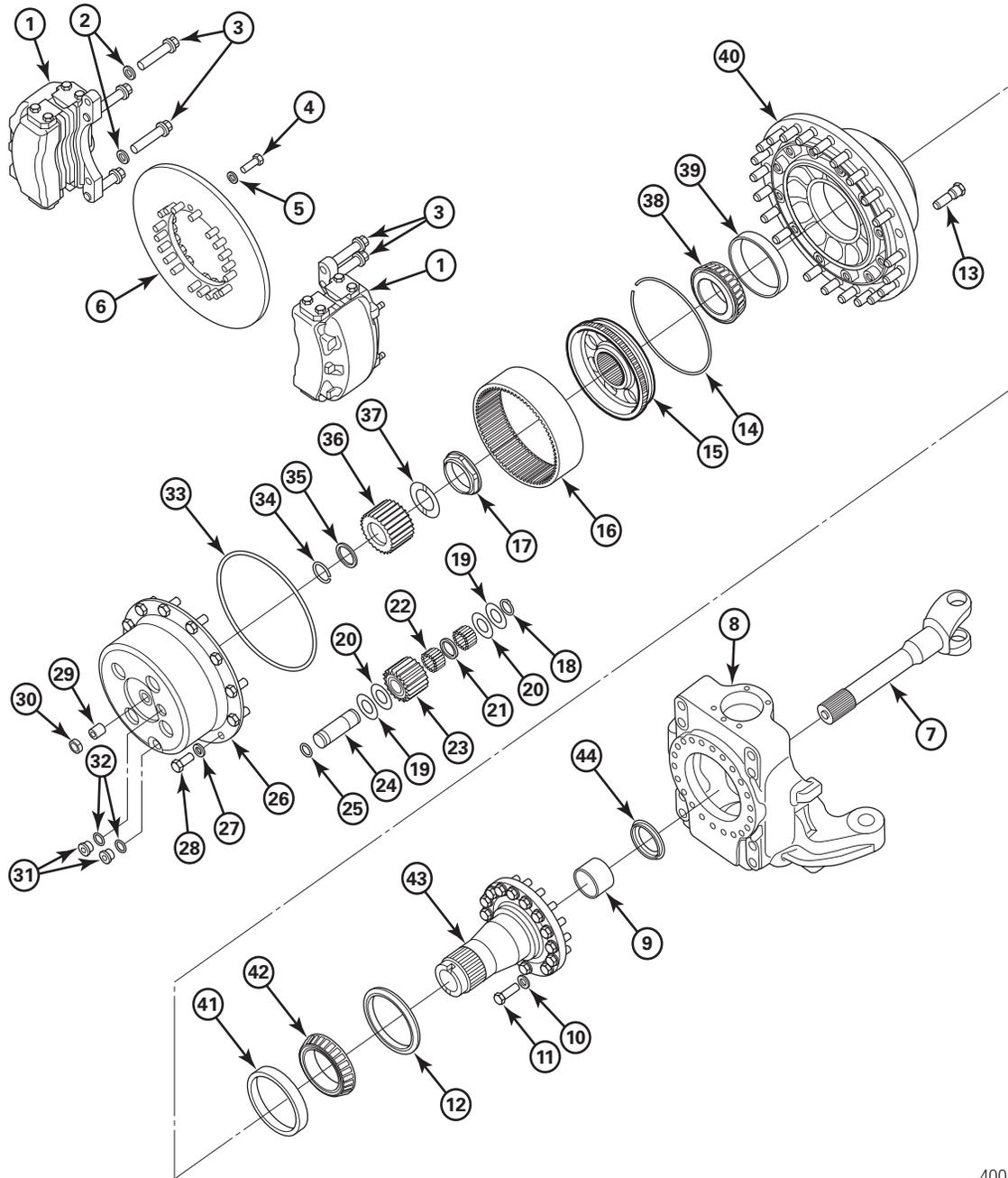
Information contained in this publication was in effect at the time the publication was approved for printing and is subject to change without notice or liability. Meritor Heavy Vehicle Systems, LLC, reserves the right to revise the information presented or to discontinue the production of parts described at any time.

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MOX-H2 Planetary Wheel End



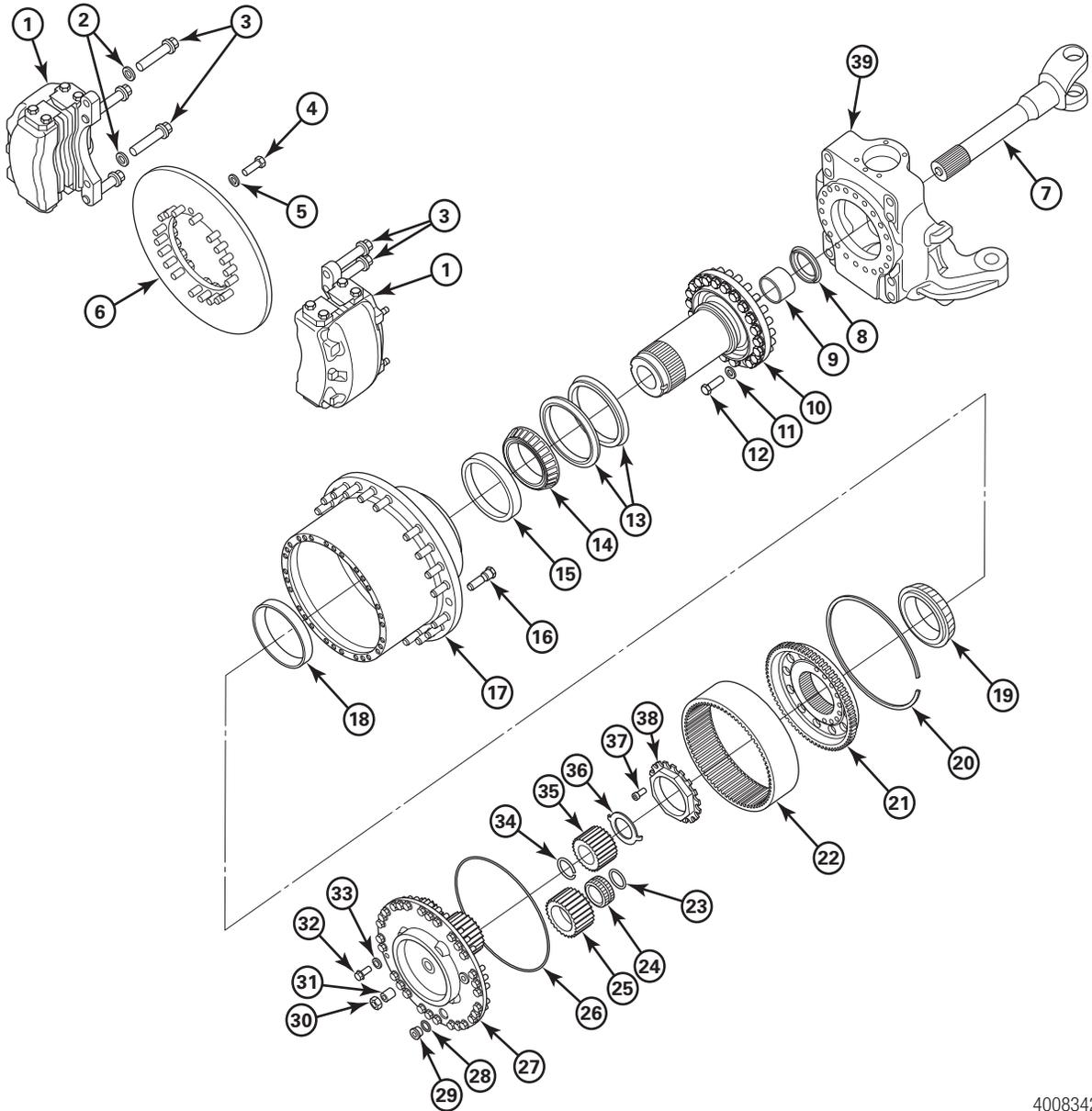
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# 1 Exploded Views

<b>Item</b>	<b>Description</b>
1	Brake Caliper Assembly
2	Washer
3	Brake Caliper Bolt
4	Brake Rotor Bolt
5	Washer
6	Brake Rotor
7	Axle Shaft Assembly
8	Knuckle
9	Axle Shaft Bushing
10	Washer
11	Spindle Bolt
12	Oil Seal
13	Wheel Stud
14	Ring Gear Snap Ring
15	Ring Gear Hub
16	Ring Gear
17	Wheel Bearing Nut
18	Snap Ring
19	Thrust Washer, Brass
20	Thrust Washer, Steel
21	Roller Spacer
22	Roller Bearings
23	Planetary Gear
24	Pinion Shaft
25	O-ring
26	Planetary Carrier
27	Washer
28	Planetary Carrier Bolt
29	Thrust Screw
30	Thrust Screw Jam Nut
31	Drain/Fill Plug
32	Seal Ring
33	O-ring
34	Snap Ring
35	Retaining Washer

<b>Item</b>	<b>Description</b>
36	Sun Gear
37	Thrust Washer
38	Outer Bearing Cone
39	Outer Bearing Cup
40	Wheel Hub
41	Inner Bearing Cup
42	Inner Bearing Cone
43	Spindle
44	Radial Seal

MOX-N5 Planetary Wheel End



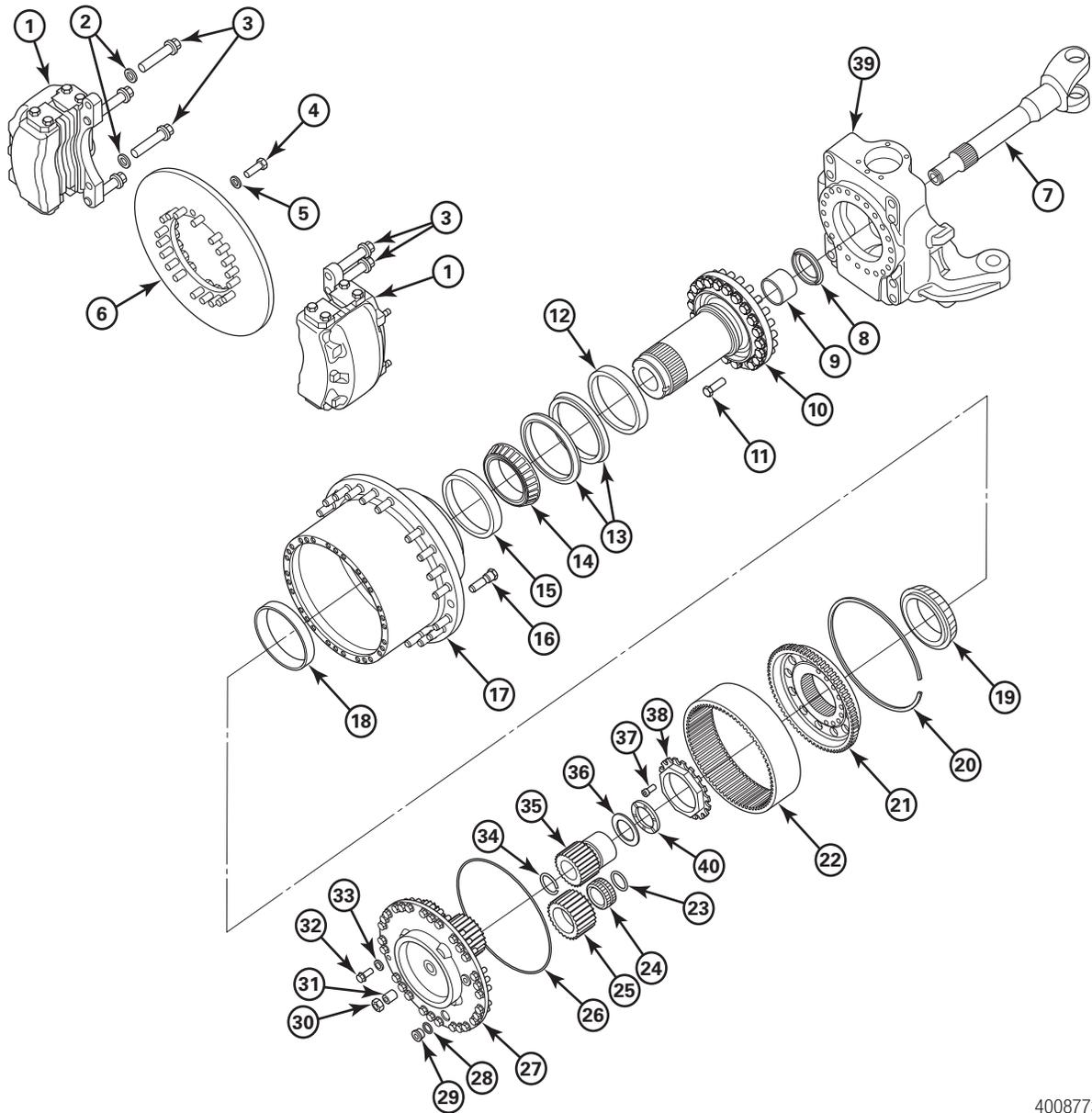
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# 1 Exploded Views

<b>Item</b>	<b>Description</b>
1	Brake Caliper Assembly
2	Washer
3	Brake Caliper Bolt
4	Brake Rotor Bolt
5	Washer
6	Brake Rotor
7	Axle Shaft Assembly
8	Radial Seal
9	Axle Shaft Bushing
10	Spindle
11	Washer
12	Spindle Bolt
13	Metal Face Seal
14	Inner Bearing Cone
15	Inner Bearing Cup
16	Wheel Stud
17	Wheel Hub
18	Outer Bearing Cup
19	Outer Bearing Cone
20	Ring Gear Snap Ring
21	Ring Gear Hub
22	Ring Gear
23	Snap Ring
24	Roller Bearings
25	Planetary Gear
26	O-ring
27	Planetary Carrier
28	Seal Ring
29	Fill/Drain Plug
30	Thrust Screw Jam Nut
31	Thrust Screw
32	Planetary Carrier Bolt
33	Washer
34	Snap Ring
35	Sun Gear

<b>Item</b>	<b>Description</b>
36	Thrust Washer
37	Lock Bolt
38	Wheel Bearing Nut
39	Knuckle

## MOX-P8 Planetary Wheel End



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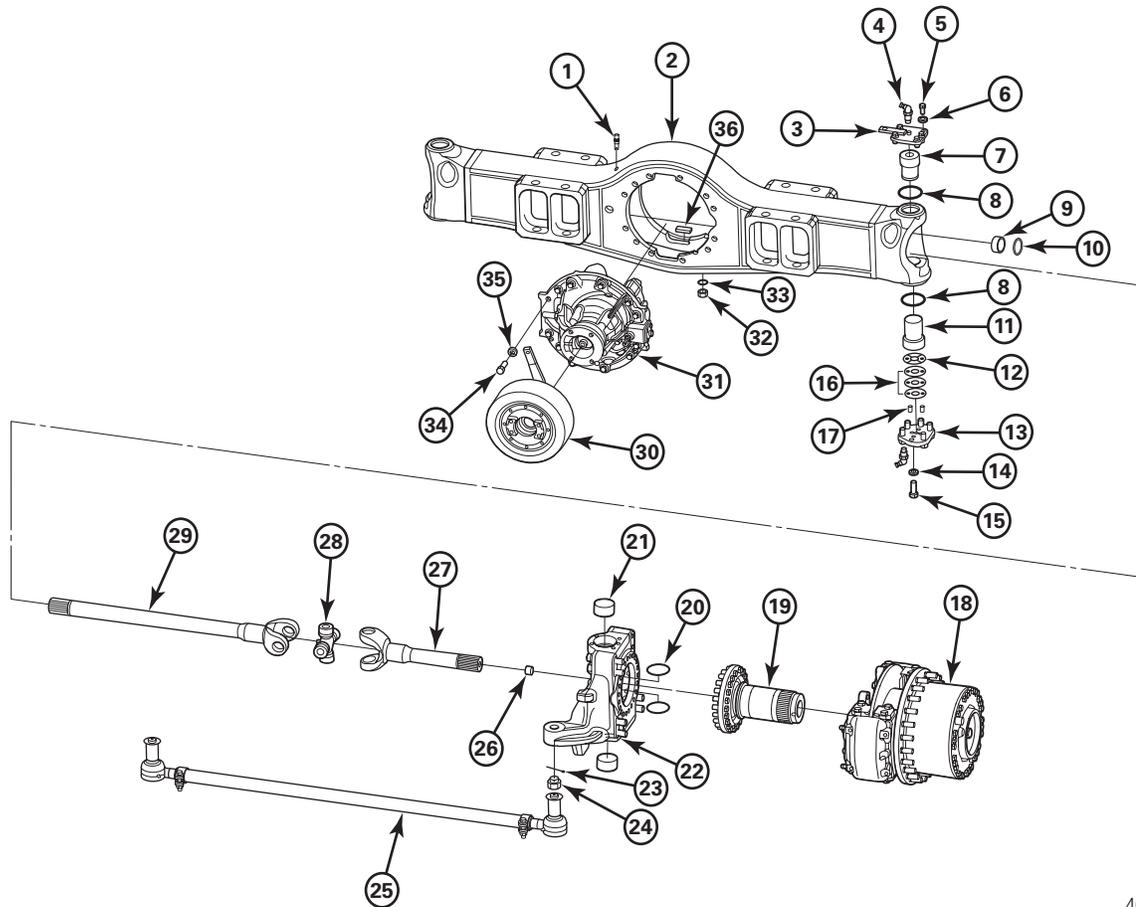
Item	Description
1	Brake Caliper Assembly
2	Washer
3	Brake Caliper Bolt
4	Brake Rotor Bolt
5	Washer
6	Brake Rotor

Item	Description
7	Axle Shaft Assembly
8	Radial Seal
9	Axle Shaft Bushing
10	Spindle
11	Spindle Bolt
12	Oil Seal Sleeve

# 1 Exploded Views

<b>Item</b>	<b>Description</b>
13	Metal Face Seal
14	Inner Bearing Cone
15	Inner Bearing Cup
16	Wheel Stud
17	Wheel Hub
18	Outer Bearing Cup
19	Outer Bearing Cone
20	Ring Gear Snap Ring
21	Ring Gear Hub
22	Ring Gear
23	Snap Ring
24	Roller Bearings
25	Planetary Gear
26	O-ring
27	Planetary Carrier
28	Seal Ring
29	Fill/Drain Plug
30	Thrust Screw Jam Nut
31	Thrust Screw
32	Planetary Carrier Bolt
33	Washer
34	Snap Ring
35	Sun Gear
36	Thrust Washer
37	Lock Bolt
38	Wheel Bearing Nut
39	Knuckle
40	Thrust Washer

## Axle Assembly



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Item	Description	Item	Description
1	Breather	13	Lower King Pin Cap
2	Axle Housing	14	Washer
3	Upper King Pin Cap	15	King Pin Cap Bolt
4	Grease Fitting	16	Thrust Washer Shims
5	King Pin Cap Bolt	17	Roll Pin
6	Washer	18	Wheel End Assembly
7	Upper King Pin	19	Spindle
8	O-ring	20	King Pin Seals
9	Axle Shaft Bushing	21	King Pin Bushing
10	Inner Universal Joint Radial Seal	22	Knuckle
11	Lower King Pin	23	Cotter Pin
12	King Pin Thrust Washer	24	Castle Nut

# 1 Exploded Views

<b>Item</b>	<b>Description</b>
25	Tie Rod Assembly
26	Thrust Button
27	Axle Shaft, Wheel End
28	Universal Joint
29	Axle Shaft, Carrier End
30	Parking Brake Assembly
31	Carrier Assembly
32	Magnetic Oil Plug
33	Seal Ring
34	Carrier Bolt
35	Washer
36	Housing Magnet

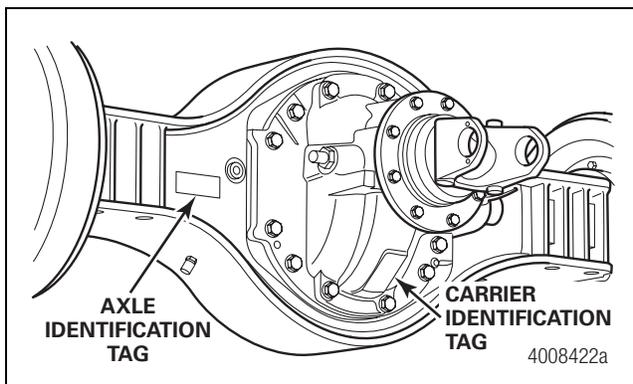
## Description

Meritor MOX-H2, MOX-N5 and MOX-P8 heavy-duty drive steer axles are equipped with planetary wheel ends. The planetary wheel end consists of a cylindrical planetary assembly in each hub. The assembly is made up of a sun gear which is splined to the axle shaft, and several planetary gears which rotate around the sun gear within a ring gear.

## Identification

### Model Number

An identification tag is riveted on the axle housing or on the differential carrier. Figure 2.1. Use the model number and the ratio number marked on the identification tag and the number on the carrier to obtain replacement parts.



**Figure 2.1**

Refer to Figure 2.2 and Figure 2.3 for an explanation of the model number.

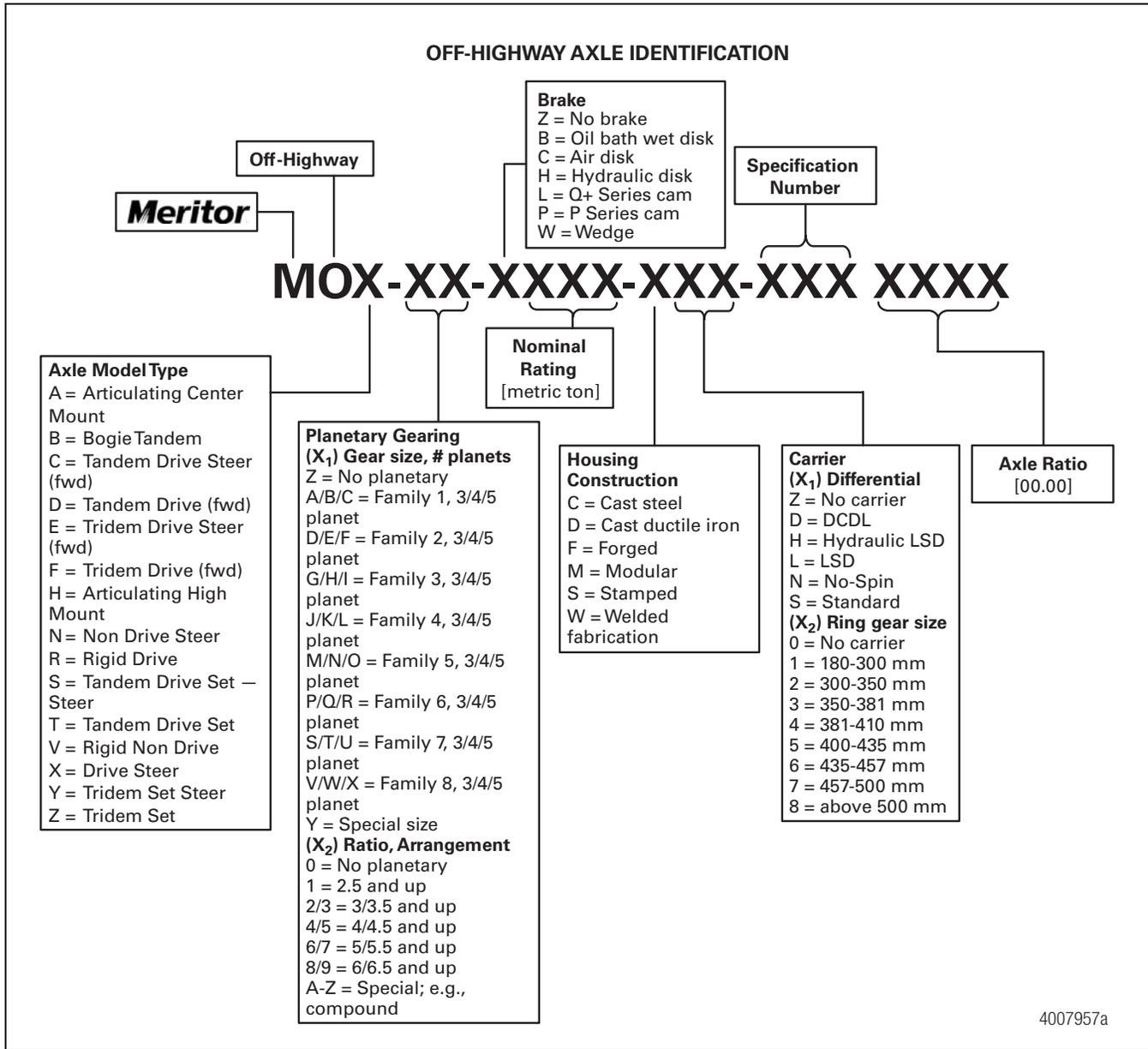


Figure 2.2

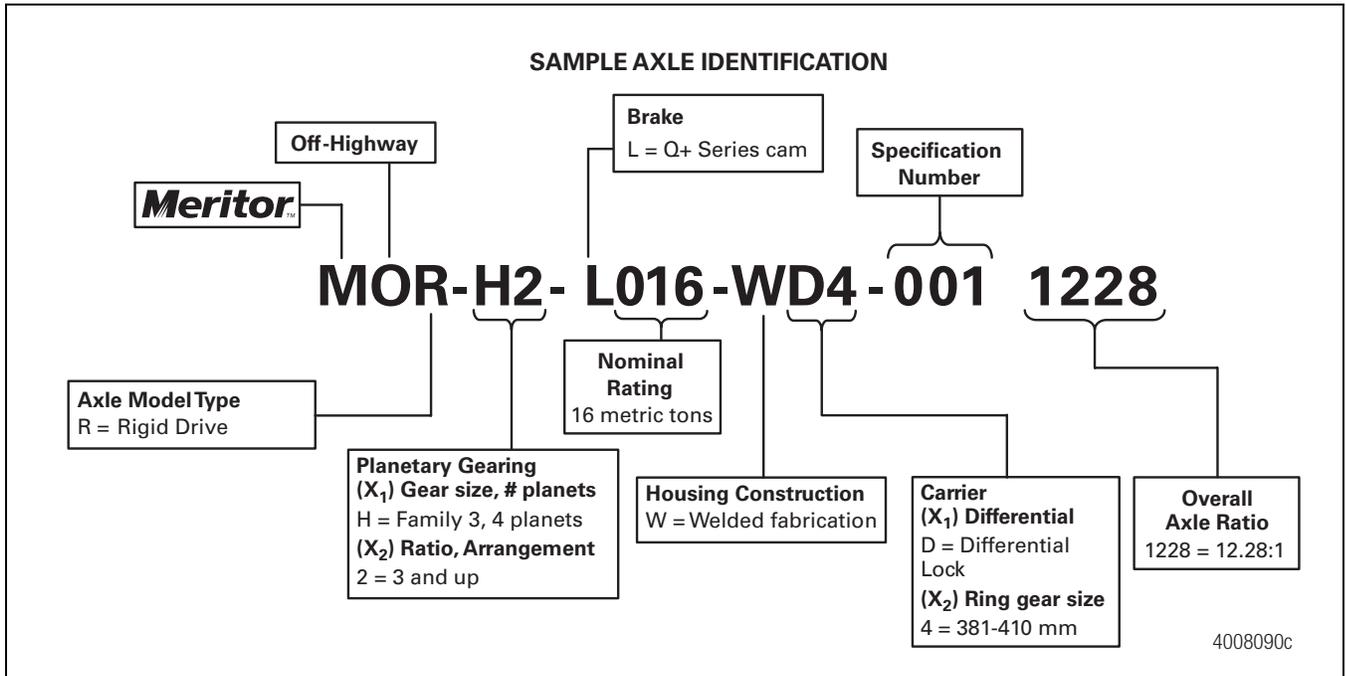


Figure 2.3

## 3 MOX-H2 Axle Removal and Disassembly

### Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

#### **⚠ WARNING**

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

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

Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

Observe all warnings and cautions provided by the press manufacturer to avoid damage to components and serious personal injury.

To avoid serious personal injury and damage to components, take care when using lifting devices during service and maintenance procedures. Inspect a lifting strap to ensure that it is not damaged. Do not subject the lifting straps to shocks or drop-loading.

### Prior to Disassembly

#### Drain the Oil

1. Wear safe eye protection.
2. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
3. Raise the vehicle so the wheels to be serviced are off the ground. Support the axle to be serviced with safety stands.
4. Remove the wheel and tire assemblies from the wheel ends.
5. Place a drain pan under the hub drain plug. Rotate the wheel end so the drain plug is at its lowest position. Remove the drain plug and allow the hub oil to drain completely from the wheel end. Figure 3.1.

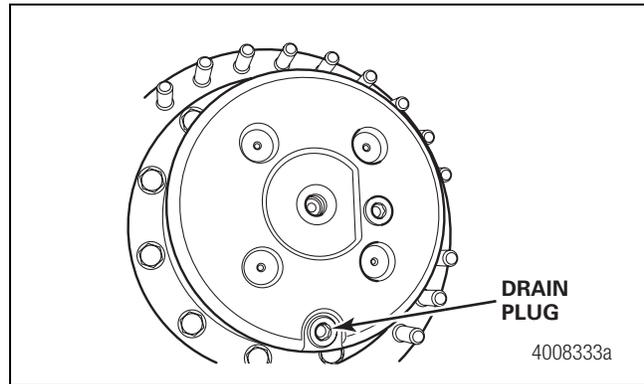


Figure 3.1

6. Place a drain pan under the housing drain plug. Remove the drain plug and allow the oil to drain completely from the axle housing.

### Removal

#### Brake Caliper

1. Use a suitable lifting device to support the brake caliper. Remove the caliper mounting bolts.
2. Remove the caliper from the wheel end and set aside.

#### Planetary Carrier Assembly

1. Use a suitable lifting device to support the planetary assembly. Remove the mounting bolts. Remove the planetary assembly from the hub. Figure 3.2.

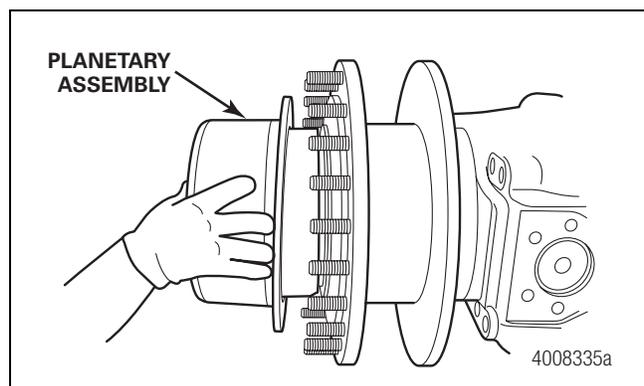


Figure 3.2

2. If necessary, remove the thrust screw from the planetary assembly. Figure 3.3.

### 3 MOX-H2 Axle Removal and Disassembly

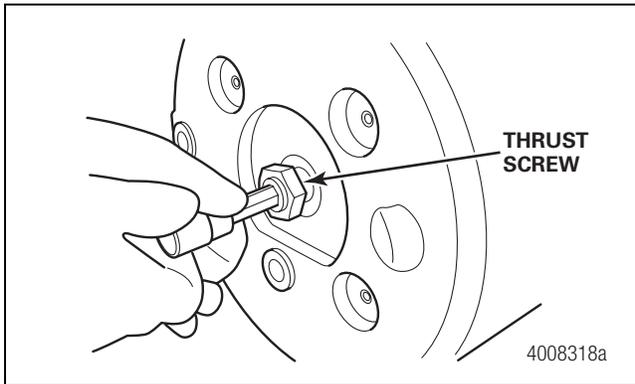


Figure 3.3

#### Disassembly

#### Planetary Assembly

1. Remove the snap rings from the end of the planetary pinion shaft. Figure 3.4.

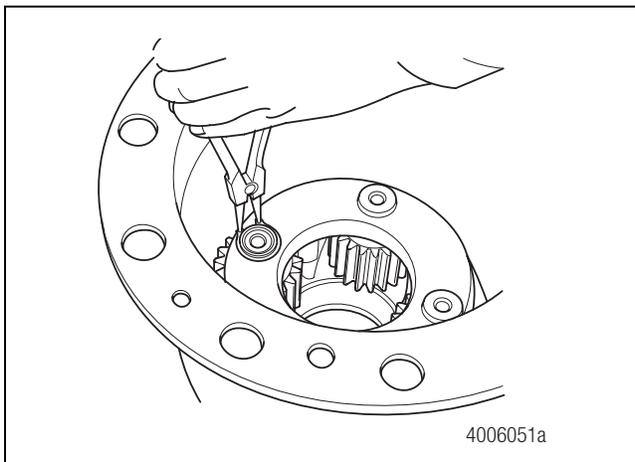


Figure 3.4

2. Use a hammer and drift to drive out the planetary pinion shaft from the planetary carrier.
3. Remove the O-rings from the planetary pinion shaft. Figure 3.5.

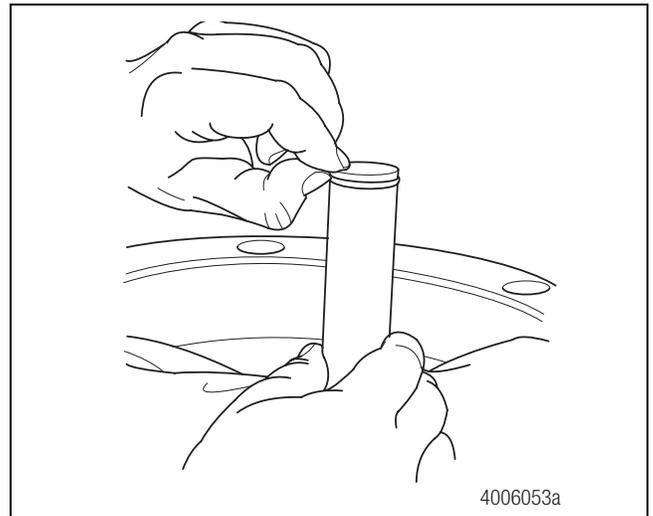


Figure 3.5

4. Remove the planetary gears and thrust washers from the planetary carrier.

#### ⚠ CAUTION

Bearing needles that are dislodged or lost during operation can cause damage to components.

5. Remove the bearing needles from the planetary gears. If necessary, install a dowel of an appropriate size into the planetary gears to help removal and keep the bearing needles together.

#### Removal

#### Wheel End

1. Remove the sun gear retaining snap ring from the end of the axle shaft. Figure 3.6.

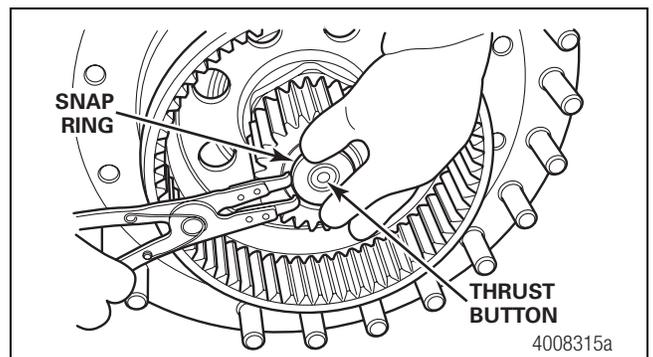


Figure 3.6

### 3 MOX-H2 Axle Removal and Disassembly

2. Remove the sun gear and thrust washer from the axle shaft. Figure 3.7.

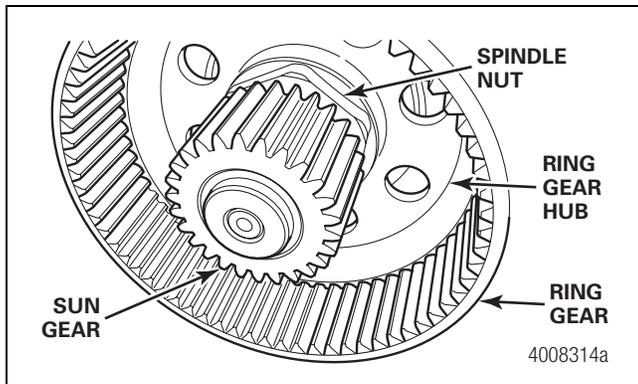


Figure 3.7

#### ⚠ WARNING

The hub unit is heavy. Use a strap and lifting device to support the hub during removal to prevent serious personal injury and damage to components.

When you remove a spindle nut, always replace the nut with a new one. Do not reuse a spindle nut. Ensure that you correctly stake a spindle nut. A reused or incorrectly staked spindle nut will not tighten correctly and can cause the wheels to loosen and separate from the vehicle during operation. Serious personal injury and damage to components can result.

3. Remove the spindle nut. Use a drift to remove the staking points before removing the nut.
4. Remove the ring gear assembly from the spindle. Figure 3.8.
5. If necessary, remove the snap ring to separate the ring gear from the ring gear hub.

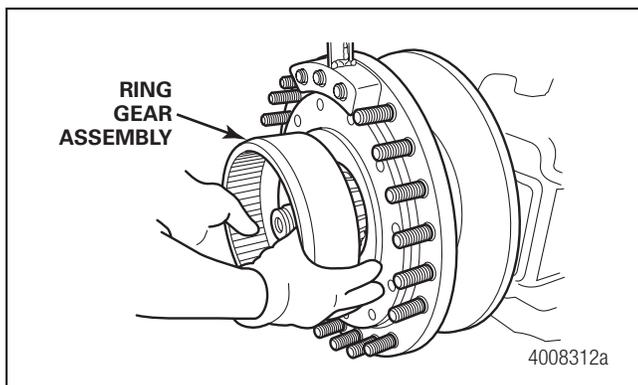


Figure 3.8

6. Remove the outer bearing cone from the spindle. Figure 3.9.

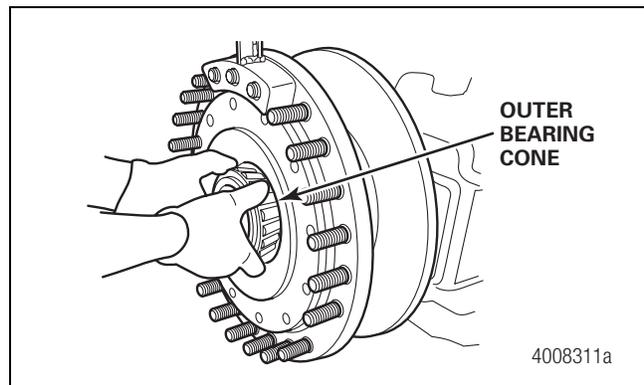


Figure 3.9

7. Use a suitable lifting device to remove the hub from the spindle.

## Disassembly

### Wheel End

1. Remove the rotor mounting bolts and remove the rotor from the hub. Figure 3.10.

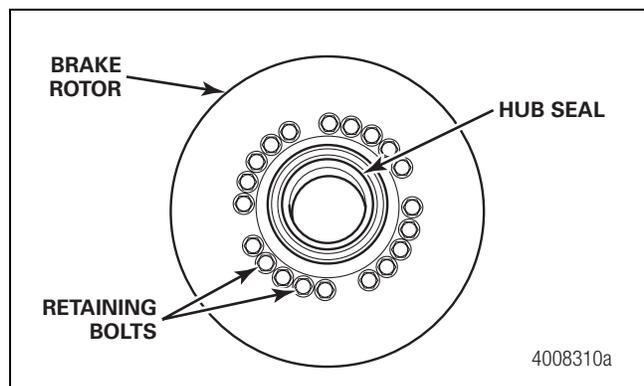


Figure 3.10

2. Remove the hub seal and inner bearing cone from the hub.
3. Remove the inner and outer bearing cups from the hub.

### 3 MOX-H2 Axle Removal and Disassembly

## Removal

### Tie Rod

1. Remove and discard the cotter pins from the tie rod end castle nuts. Figure 3.11.

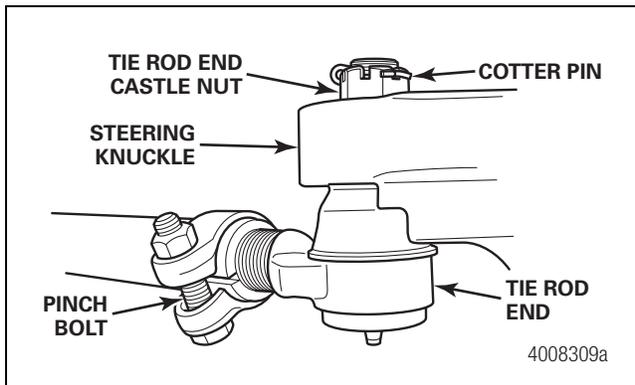


Figure 3.11

2. Remove the tie rod end castle nuts. Disconnect and remove the tie rod assembly.

### Knuckle

1. Remove the mounting bolts from the spindle. Remove the spindle from the knuckle. Figure 3.12.

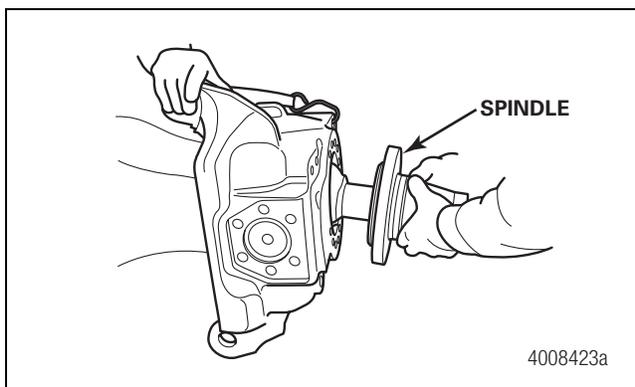


Figure 3.12

2. Remove and discard the axle shaft seal from the inner face of the spindle.
3. Inspect the axle shaft bushing inside the spindle. Replace if worn or damaged.

4. If necessary, remove the axle shaft assembly from the housing. Use a suitable lifting device as necessary to support the weight of the axle shaft assembly.
5. Remove the bolts and washers from the lower king pin cap. Remove the lower king pin cap and thrust washers from the knuckle.
6. Remove the bolts and washers from the upper king pin cap. Remove the upper king pin cap from the knuckle.
7. Use a suitable lifting device to support the knuckle. Use a suitable puller to remove the upper and lower king pins.
8. Use a lifting device to remove the knuckle from axle housing. Figure 3.13.

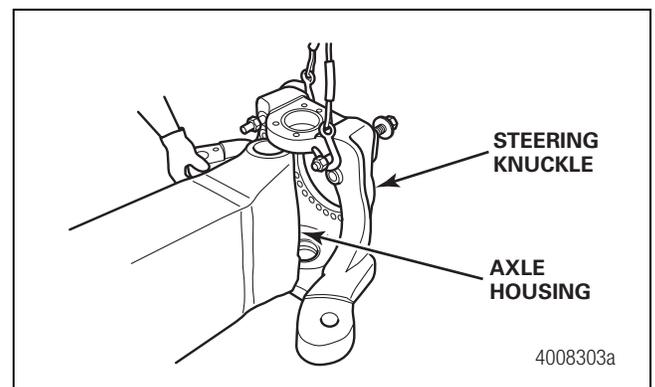


Figure 3.13

9. Remove and discard the king pin seals. Figure 3.14.

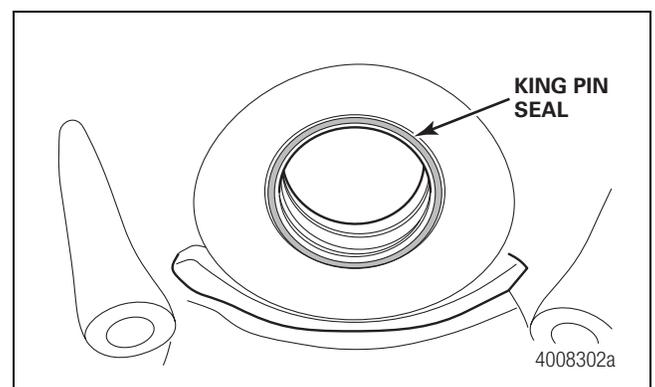
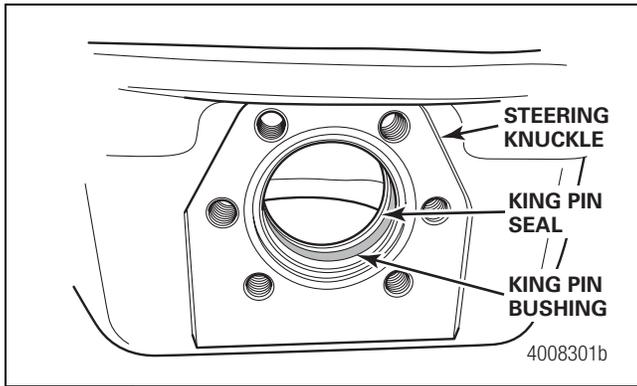


Figure 3.14

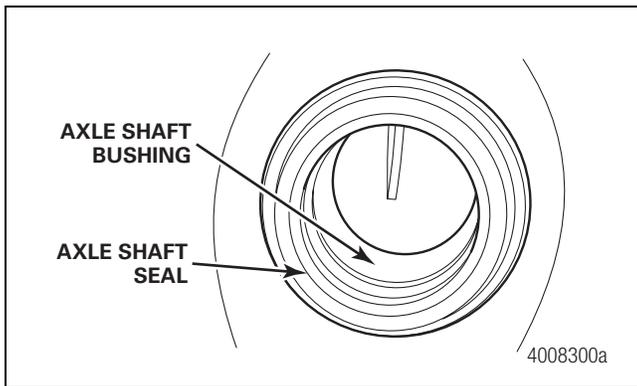
10. If worn or damaged, use a hammer and suitable driver to remove the king pin bushings from the knuckle. Figure 3.15.

### 3 MOX-H2 Axle Removal and Disassembly



**Figure 3.15**

11. Remove the axle shaft seals from the housing. Figure 3.16.



**Figure 3.16**

12. If worn or damaged, remove the axle shaft bushings from the axle housing.

## 4 MOX-N5/MOX-P8 Axle Removal and Disassembly

### Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

#### **⚠ WARNING**

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Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

Observe all warnings and cautions provided by the press manufacturer to avoid damage to components and serious personal injury.

To avoid serious personal injury and damage to components, take care when using lifting devices during service and maintenance procedures. Inspect a lifting strap to ensure that it is not damaged. Do not subject the lifting straps to shocks or drop-loading.

### Prior to Disassembly

#### Drain the Oil

1. Wear safe eye protection.
2. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
3. Raise the vehicle so the wheels to be serviced are off the ground. Support the axle to be serviced with safety stands.
4. Remove the wheel and tire assemblies from the wheel ends.
5. Place a drain pan under the hub drain plug. Rotate the wheel end so the drain plug is at its lowest position. Remove the drain plug and allow the hub oil to drain completely from the wheel end. Figure 4.1.

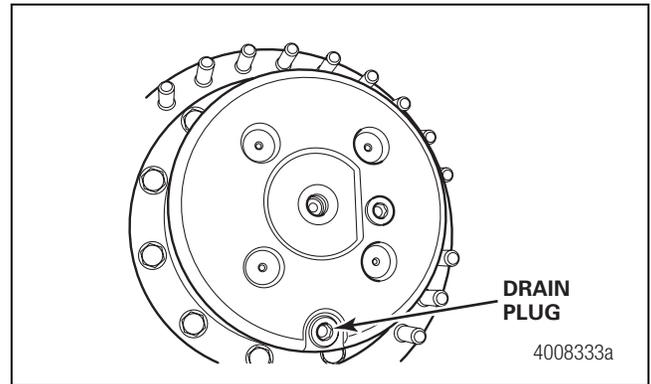


Figure 4.1

6. Place a drain pan under the housing drain plug. Remove the drain plug and allow the oil to drain completely from the axle housing.

### Removal

#### Brake Caliper

1. Use a suitable lifting device to support the brake caliper. Remove the caliper mounting bolts.
2. Remove the caliper from the wheel end and set aside.

#### Planetary Carrier Assembly

1. Remove the thrust screw from the planetary assembly.
2. Use a suitable lifting device to support the planetary assembly. Remove the mounting bolts. Remove the planetary assembly from the hub. Figure 4.2.

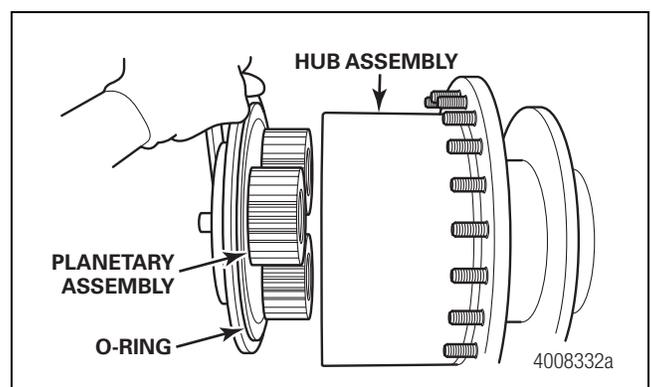


Figure 4.2

## 4 MOX-N5/MOX-P8 Axle Removal and Disassembly

### Disassembly

#### Planetary Assembly

1. Remove the snap rings from the end of the carrier stems.
2. Press the planetary gears and bearing assemblies from the carrier stems.

#### **CAUTION**

Worn or damaged gear and bearing assemblies are non-serviceable. You must replace them as an entire assembly to prevent damage to components.

### Removal

#### Wheel End

1. Remove the sun gear snap ring from the end of the axle shaft. Figure 4.3.

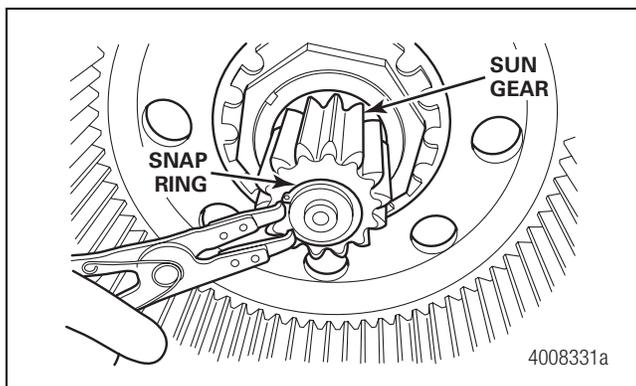


Figure 4.3

2. Remove the sun gear and thrust washer from the end of the axle shaft.
3. Remove the spindle nut lock bolt.
4. Remove the spindle retaining nut.
5. Remove the ring gear assembly from the spindle. Figure 4.4.

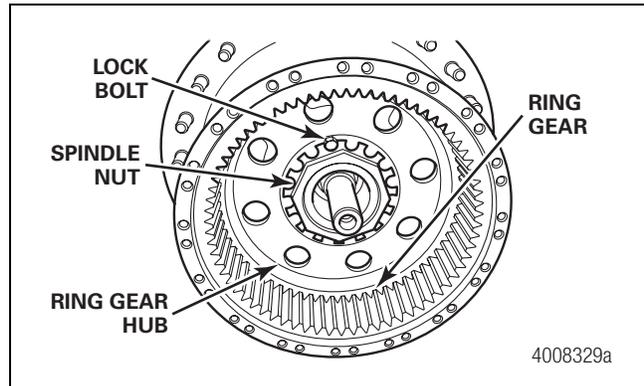


Figure 4.4

6. Remove the outer bearing cone from the spindle.

#### **WARNING**

The hub unit is heavy. Use a strap and lifting device to support the hub during removal to prevent serious personal injury and damage to components.

7. Use a suitable lifting device to remove the hub assembly from the spindle. Figure 4.5.

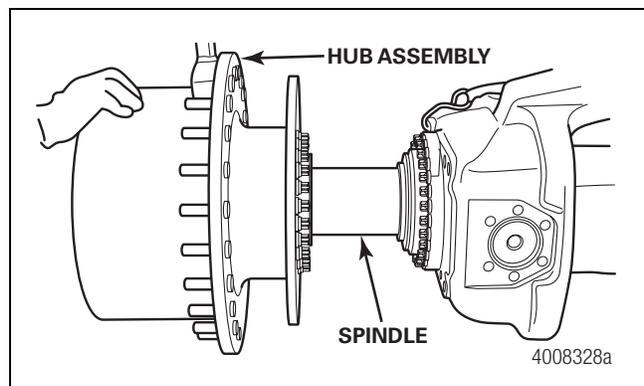


Figure 4.5

### Disassembly

#### Wheel End

1. Remove the rotor mounting bolts and remove the rotor from the hub. Figure 4.6.

## 4 MOX-N5/MOX-P8 Axle Removal and Disassembly

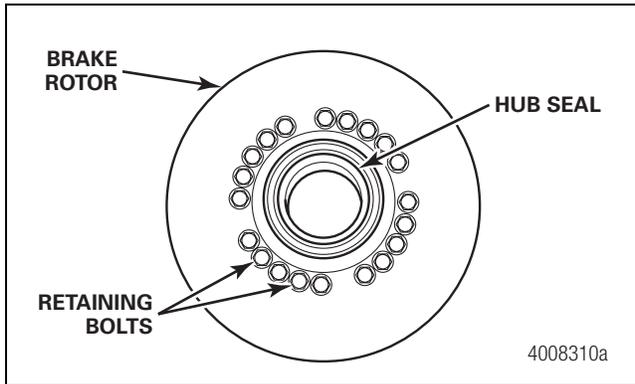


Figure 4.6

2. Remove the hub seal, sleeve (if equipped) and inner hub bearing cone from the hub.
3. Remove the inner and outer bearing cups from the hub.

### Removal

#### Tie Rod

1. Remove the cotter pins from the tie rod end castle nuts. Figure 4.7.

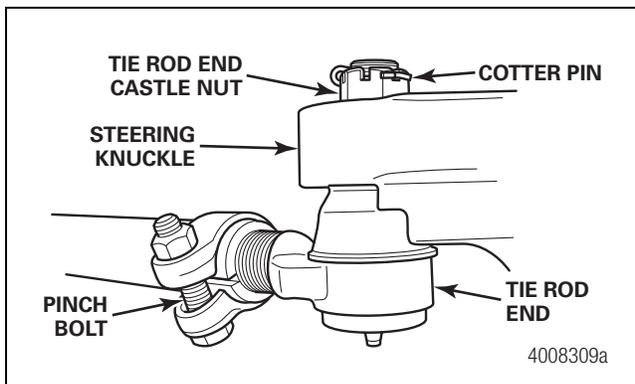


Figure 4.7

2. Remove the tie rod end castle nuts. Disconnect and remove the tie rod assembly.

#### Knuckle

1. Remove the mounting bolts from the spindle. Remove the spindle from the knuckle. Figure 4.8.

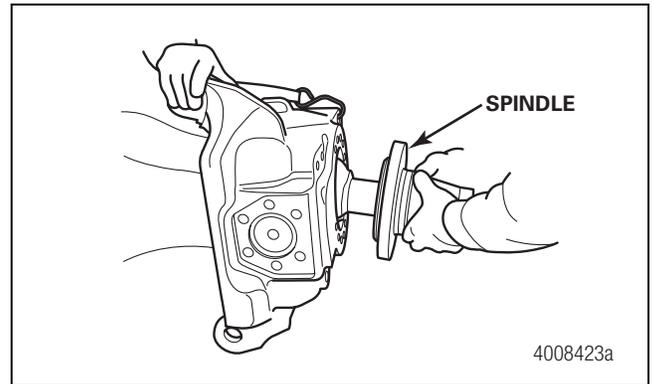


Figure 4.8

2. Remove the axle shaft seal from the inner face of the spindle.
3. Inspect the axle shaft bushing inside the spindle. Replace if worn or damaged.
4. If necessary, remove the axle shaft assembly from the housing. Use a suitable lifting device as necessary to support the weight of the axle shaft assembly.
5. Remove the bolts and washers from the lower king pin cap. Remove the lower king pin cap and thrust washers from the knuckle.
6. Remove the bolts and washers from the upper king pin cap. Remove the upper king pin cap from the knuckle.
7. Use a suitable lifting device to support the knuckle. Use a suitable puller to remove the upper and lower king pins.
8. Use a lifting device to remove the knuckle from axle housing. Figure 4.9.

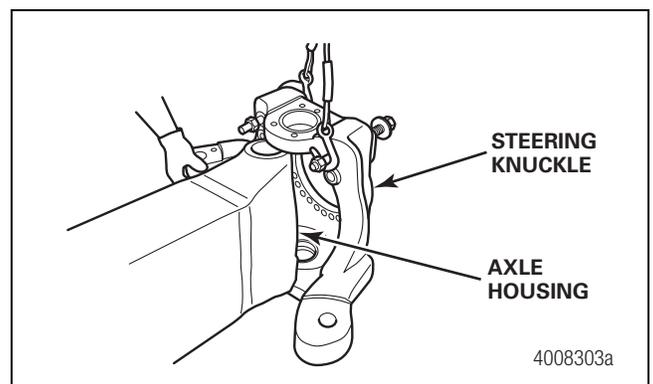
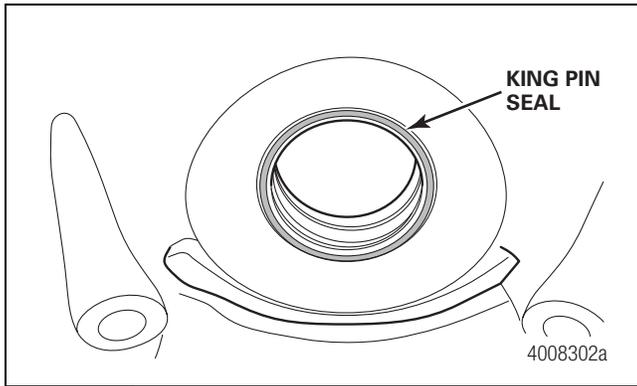


Figure 4.9

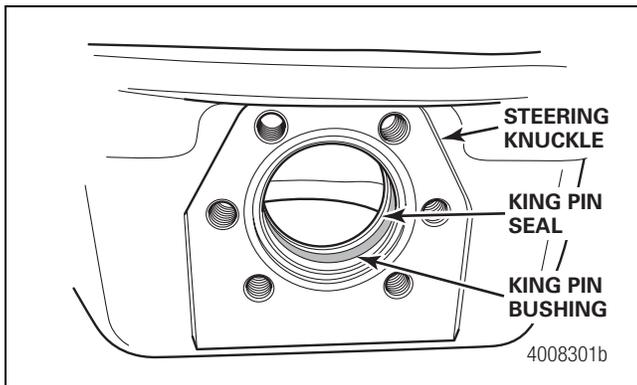
9. Remove and discard the king pin seals. Figure 4.10.

## 4 MOX-N5/MOX-P8 Axle Removal and Disassembly



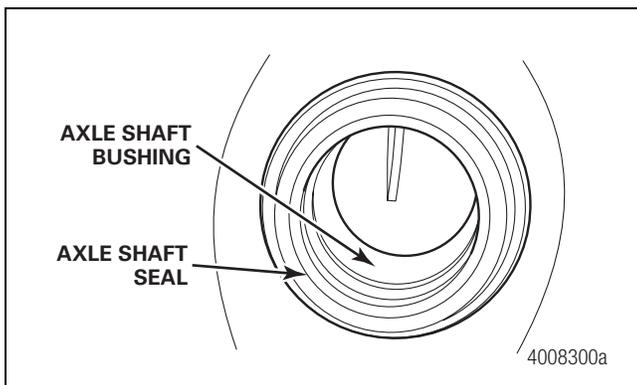
**Figure 4.10**

10. If worn or damaged, use a hammer and suitable driver to remove the king pin bushings from the knuckle. Figure 4.11.



**Figure 4.11**

11. Remove the axle shaft seals from the housing. Figure 4.12.



**Figure 4.12**

12. If worn or damaged, remove the axle shaft bushings from the axle housing.

### Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

#### **⚠ WARNING**

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

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

Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

To avoid serious personal injury and damage to components, take care when using lifting devices during service and maintenance procedures. Inspect a lifting strap to ensure that it is not damaged. Do not subject the lifting straps to shocks or drop-loading.

### Removal

#### Differential Carrier

1. Disconnect the driveline universal joint from the pinion yoke or flange on the carrier.
2. Install a hydraulic rolling jack or suitable lifting device to the carrier.
3. Remove the carrier mounting fasteners. Use the lifting device or rolling jack to remove the carrier assembly from the axle housing. Figure 5.1.

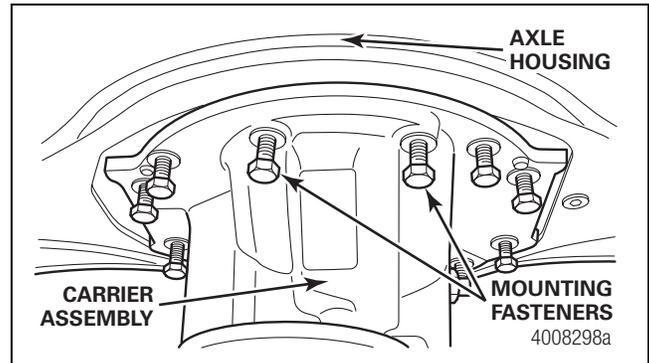


Figure 5.1

## 6 Prepare Parts for Assembly

### Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

#### WARNING

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

Solvent cleaners can be flammable, poisonous and cause burns. Examples of solvent cleaners are carbon tetrachloride, and emulsion-type and petroleum-base cleaners. Read the manufacturer's instructions before using a solvent cleaner, then carefully follow the instructions. Also follow the procedures below.

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

Take care when you use Loctite® adhesive to avoid serious personal injury. Read the manufacturer's instructions before using this product. Follow the instructions carefully to prevent irritation to the eyes and skin. If Loctite® adhesive material gets into your eyes, follow the manufacturer's emergency procedures. Have your eyes checked by a physician as soon as possible.

When you apply some silicone gasket materials, a small amount of acid vapor is present. To prevent serious personal injury, ensure that the work area is well-ventilated. Read the manufacturer's instructions before using a silicone gasket material, then carefully follow the instructions. If a silicone gasket material gets into your eyes, follow the manufacturer's emergency procedures. Have your eyes checked by a physician as soon as possible.

### Clean, Dry and Inspect Parts

#### Clean and Inspect the Companion Flange

##### CAUTION

Do not install a press-on shaft excluder or POSE™ seal after you install a unitized pinion seal. The use of a POSE™ seal will prevent correct seating of the unitized pinion seal onto the companion flange and will result in lubricant leakage at the seal. POSE™ seal installation is recommended only for triple-lip and other previous design seals.

Do not use thin metal wear sleeves to refresh the companion flange surface. Wear sleeves pressed onto the companion flange will prevent correct seating of the pinion seal and will damage the pinion seal assembly. Wear sleeve usage will cause the seal to leak.

1. Clean the ground and polished surface of the companion flange journal using a clean shop towel and a safe cleaning solvent. Do not use abrasive cleaners, towels or scrubbers to clean the companion flange or flange surface. Do not use gasoline.
2. Inspect the companion flange seal surface for grooves. The unitized seal features a rubber inner sleeve that is designed to seal and rotate with the companion flange. This feature allows you to reuse a companion flange with minor grooves.
  - **If you find grooves on companion flange hubs used with single or triple-lip seals:** Replace the companion flanges.
  - **If you find grooves on the companion flange:** Use calipers to measure the groove diameters. If any groove diameter measures less than the correct specification, replace the companion flange.

#### Clean Ground and Polished Parts

1. Use a cleaning solvent, kerosene or diesel fuel to clean ground or polished parts or surfaces. Do not use gasoline.
2. Use a tool with a flat blade if required, to remove sealant material from parts. Be careful not to damage the polished or smooth surfaces.

### **⚠ CAUTION**

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

3. Do not clean ground or polished parts with water or steam. Do not immerse ground or polished parts in a hot solution tank or use strong alkaline solutions for cleaning, or the smooth sealing surface may be damaged.

### **Clean Rough Parts**

1. Clean rough parts with the same method as cleaning ground and polished parts.
2. Rough parts can be cleaned in hot solution tanks with a weak or diluted alkaline solution.
3. Parts must remain in hot solution tanks until heated and completely cleaned.
4. Parts must be washed with water until all traces of the alkaline solution are removed.

### **Clean Axle Assemblies**

1. A complete axle assembly can be steam cleaned on the outside to remove dirt.
2. Before the axle is steam cleaned, close or place a cover over all openings in the axle assembly. Examples of openings are breathers or vents in air chambers.

### **Drying Parts Immediately After Cleaning**

#### **All Parts Except Bearings**

Use soft, clean paper, cloth rags or compressed air to dry parts immediately after cleaning.

#### **Bearings**

### **⚠ CAUTION**

**Use soft, clean paper or cloth rags to dry bearings immediately after cleaning. Do not use compressed air, which can damage the bearings when they are rotated and dried.**

Use soft, clean paper or cloth rags to dry bearings immediately after cleaning. Do not use compressed air.

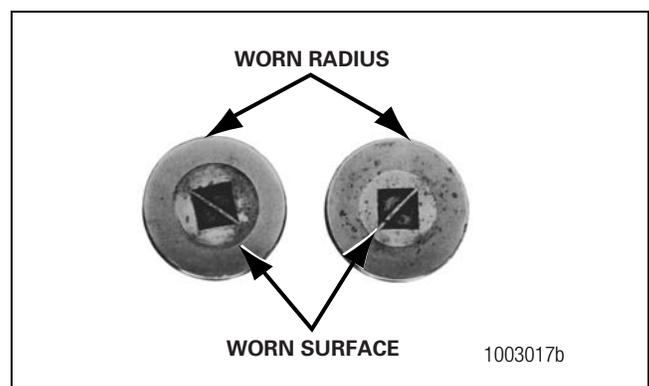
### **Prevent Corrosion on Cleaned Parts**

1. Apply axle lubricant to cleaned and dried parts that are not damaged and are to be assembled.
2. To store parts, apply a special material that prevents corrosion to all surfaces. Wrap cleaned parts in a special paper that will protect the parts from moisture and prevent corrosion.

### **Inspect Parts**

It is very important to inspect all parts carefully and completely before the axle is assembled. Check all parts for wear and replace damaged parts.

1. Inspect the cup, cone, rollers and cage of all tapered roller bearings in the assembly. If any of the following conditions exist, replace the bearing.
  - The center of the large-diameter end of the rollers is worn level with or below the outer surface. Figure 6.1.
  - The radius at the large-diameter end of the rollers is worn to a sharp edge. Figure 6.1.
  - There is a visible roller groove in the cup or cone inner race surfaces. The groove can be seen at the small- or large-diameter end of both parts. Figure 6.2.
  - There are deep cracks or breaks in the cup, cone inner race or roller surfaces. Figure 6.2.
  - There are bright wear marks on the outer surface of the roller cage. Figure 6.3.
  - There is damage on the rollers and on the surfaces of the cup and cone inner race that touch the rollers. Figure 6.4.
  - There is damage on the cup and cone inner race surfaces that touch the rollers. Figure 6.5.



**Figure 6.1**

## 6 Prepare Parts for Assembly

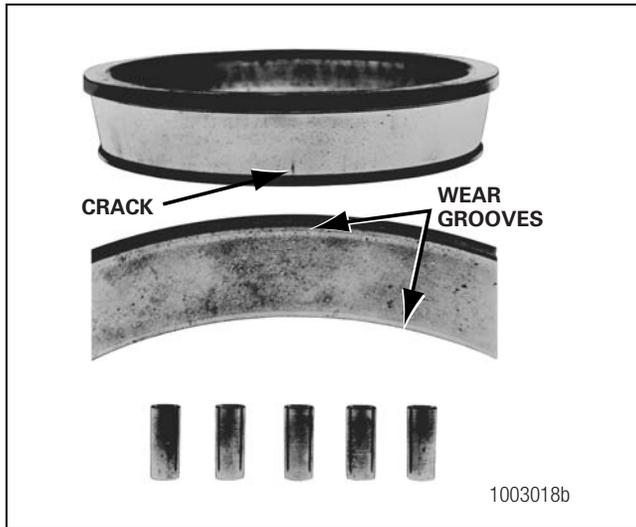


Figure 6.2

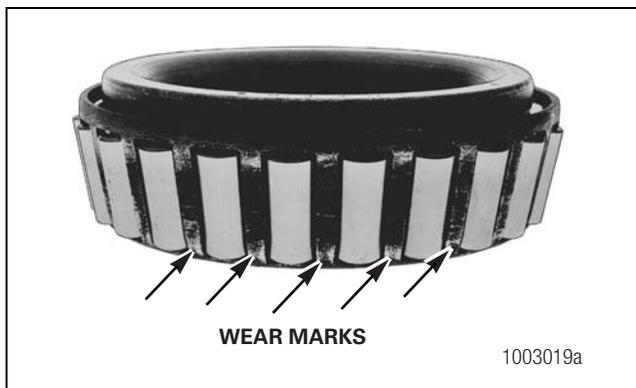


Figure 6.3

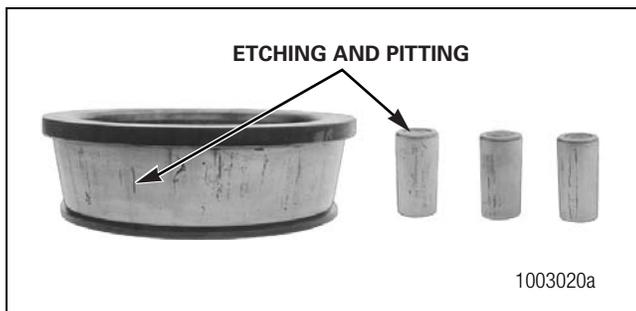


Figure 6.4

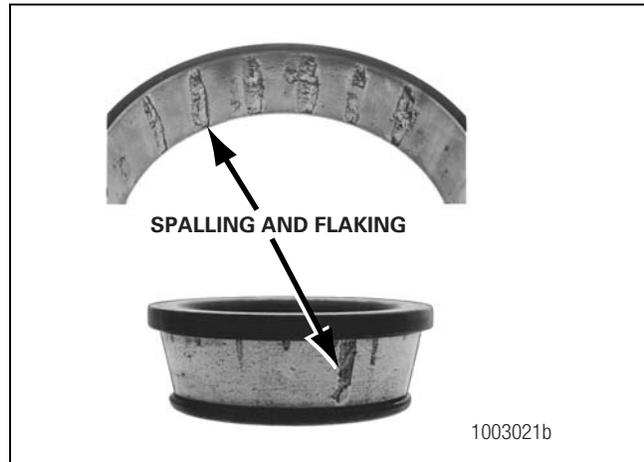


Figure 6.5

2. Inspect the axle shafts for wear and cracks at the flange, shaft and splines. Replace the axle shafts, if required.
3. Inspect the breather.
  - A. Remove the breather from the axle housing.
  - B. Clean the breather.
    - **If the breather remains dirty after cleaning:** Replace the breather.
  - C. Apply compressed air to the breather.
    - **If compressed air does not pass through the breather:** Replace the breather.
  - D. Install the breather into the axle housing.

### Repair or Replace Parts

Threads must be without damage and clean so that accurate adjustments and correct torque values can be applied to fasteners and parts.

1. Replace any fastener if the corners of the head are worn.
2. Replace the washers if damaged.
3. Replace the gaskets, oil seals or grease seals at the time of axle repair.
4. Clean the parts and apply new silicone gasket material where required when the axle is assembled. Figure 6.6.

## 6 Prepare Parts for Assembly

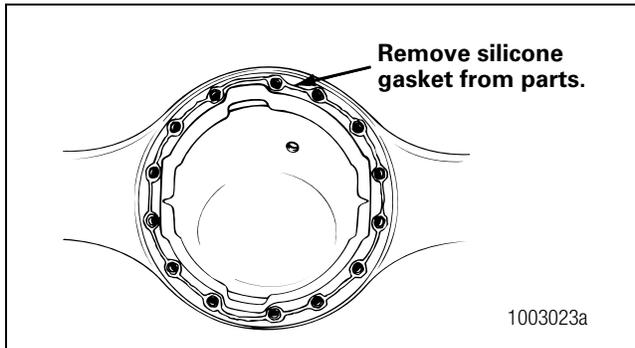


Figure 6.6

5. Remove nicks, mars and burrs from parts with machined or ground surfaces. Use a fine file, India stone, emery cloth or crocus cloth.
6. Clean and repair the threads of fasteners and holes. Use a die or tap of the correct size or a fine file.

### Do Not Bend or Straighten a Damaged Drive Axle Housing

#### **⚠ WARNING**

Replace damaged or out-of-specification axle components. Do not bend, repair or recondition axle components by welding or heat-treating. A bent axle beam reduces axle strength, affects vehicle operation and voids Meritor's warranty. Serious personal injury and damage to components can result.

Always replace a damaged drive axle housing. Do not bend or straighten a damaged housing, which can misalign or weaken it, and void Meritor's warranty.

### Do Not Repair Weld the Axle Housings

#### **⚠ WARNING**

Do not repair weld the axle housings, which can reduce axle beam fatigue life and void the warranty. Serious personal injury and damage to components can result.

Meritor does not permit repair welding on the axle housings, which can reduce axle beam fatigue life and void the warranty.

### Removing Fasteners Secured with Adhesive

If it is difficult to remove fasteners secured with Dri-Loc<sup>®</sup>, Meritor adhesive or Loctite<sup>®</sup> 277 adhesive, use the following procedure.

When you remove fasteners secured with adhesive, slowly heat the fastener to 350°F (177°C). Do not exceed this temperature or heat fasteners quickly. Damage to components can result.

1. Heat the fastener for three to five seconds. Try to loosen the fastener with a wrench. Do not use an impact wrench or hit the fastener with a hammer.
2. Repeat Step 1 until you can remove the fastener.

### New Fasteners with Pre-Applied Adhesive

1. Use a wire brush to clean the oil and dirt from threaded holes.
2. Install new fasteners with pre-applied adhesive to assemble parts. Do not apply adhesives or sealants to fasteners with pre-applied adhesive, or to fastener holes.
3. Tighten the fasteners to the required torque value for that size fastener. No drying time is required for fasteners with pre-applied adhesive.

### Original or Used Fasteners

1. Use a wire brush to clean the oil, dirt and old adhesive from all threads and threaded holes.
2. Apply four or five drops of Meritor liquid adhesive 2297-C-7049, Loctite<sup>®</sup> 638 or 680 liquid adhesive or equivalent inside each threaded hole or bore. Do not apply adhesive directly to the fastener threads. Figure 6.7.

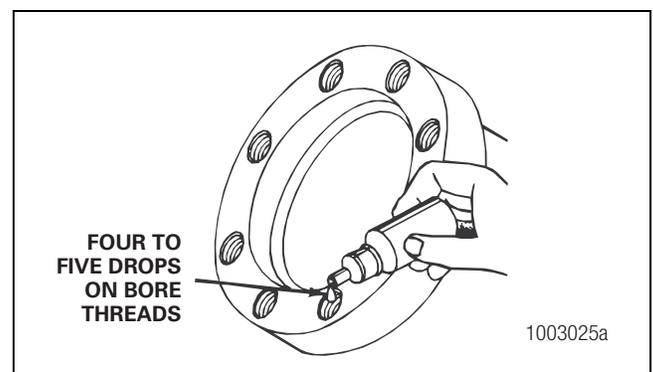


Figure 6.7

3. Tighten the fasteners to the required torque value for that size fastener. There is no drying time required for Meritor liquid adhesive 2297-C-7049, Loctite<sup>®</sup> 638 or 680 liquid adhesive or equivalent.

## 6 Prepare Parts for Assembly

### Carrier-to-Housing Joint Sealing Procedure

1. Remove the carrier from the housing.
2. Remove all debris from inside the housing.
3. Use a rotary tool with a scour pad to clean all silicone residue from the housing and carrier faces. Figure 6.8. Surfaces must be clean, dry and free of foreign matter. The surfaces must not be oily to the touch.



Figure 6.8

4. Remove metal filings from the magnets inside the housing.
5. Use solvent to clean the inside of the housing.
6. Use Loctite® ODC Free cleaner or brake cleaner to clean the housing and carrier faces.
7. Dry the housing and carrier faces.

#### CAUTION

New capscrew kits have blue Dri-Loc® STS threadlocker, an equivalent to Loctite® 242 threadlocker, applied to the capscrews. Do not remove the blue Dri-Loc® STS threadlocker from the capscrews. Damage to components can result.

8. If you reuse the carrier-to-housing capscrews, use a rotary wire brush to remove any threadlocker material and clean the capscrew threads. Use a clean cloth to wipe the threads.
9. Use a tap to clean the internal threads in the housing.

#### CAUTION

Apply silicone gasket material in a continuous 0.25-inch (6 mm) bead. If you use more than this amount, gasket material can break off and plug lubrication passages. Damage to components can result.

10. Apply a 0.25-inch (6 mm) bead of Loctite® 5699 silicone gasket material to the housing face. Do not use ThreeBond 1216E silicone products. Figure 6.9.

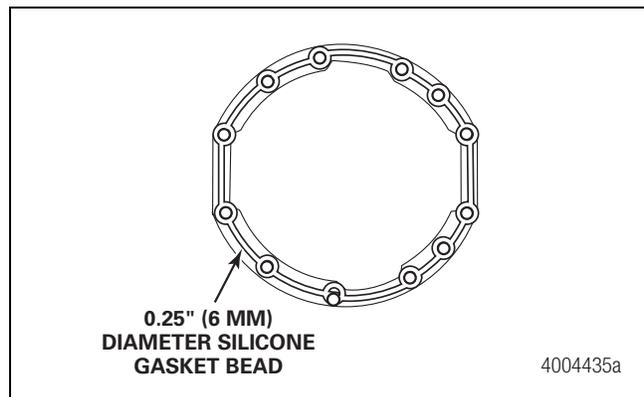


Figure 6.9

11. Install two long studs in the carrier to guide the carrier into the housing.
12. Immediately install the carrier into the housing to permit the silicone gasket material to compress evenly between the faces. If using a new capscrew kit with blue Dri-Loc® STS pre-applied threadlocker, skip the next step.
13. Apply a 0.125-inch (3 mm) bead of Loctite® 242 threadlocker around the capscrew threads approximately 0.25-inch (6 mm) from the end. Apply a 0.125-inch (3 mm) bead of Loctite® 242 threadlocker across the length of the threads. Figure 6.10.

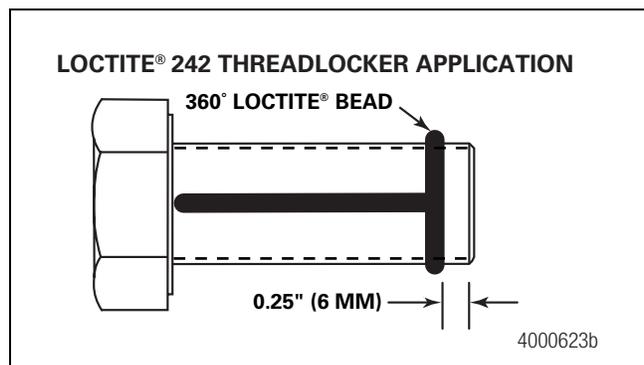


Figure 6.10

14. Install the capscrews. Use a crossing pattern to tighten the capscrews evenly. The capscrews must be tightened within 10 minutes of initial application of Loctite® 242 threadlocker.
15. Wait a minimum of 60 minutes before filling the assembly with lubricant.

### Hub Reduction Wheel Ends

Thoroughly clean all hub parts. Check all of the parts for wear, deformities or damage.

Check the needle roller bearing assemblies, gears and all bearing surfaces. If a planetary gear is damaged, all of the planetary gear journals and rollers must be replaced at the same time. Also, check the contact surface to ensure correct sealing with the wear ring and drive shaft. Replace any damaged parts.

### Wheel Studs

Replace all wheel studs that have damaged or distorted threads. Replace broken or bent studs, and studs that are badly corroded. Also replace the stud on each side of the damaged stud. If two or more studs in the hub are damaged, replace all the studs in the hub. Broken studs are usually an indication of either excessive or inadequate wheel nut torque.

#### WARNING

**Take care that you do not damage stud threads. Studs with damaged threads can strip or cross-thread, which will reduce clamp load, loosen studs and cause a wheel to separate from the vehicle. Serious personal injury and damage to components can result.**

**Replace bent, loose, broken or stripped studs. When you replace a stripped stud, always replace the stud on each side of the stripped stud as well. Even if the adjoining studs are not cracked, they have sustained fatigue damage, which can cause the wheels to loosen and separate from the vehicle. Serious personal injury and damage to components can result.**

**You must correctly support the hub when you remove or install a stud. If you do not support the hub correctly, serious personal injury and damage to components can result.**

**Do not use a hammer to remove or install studs while the hub is on bearings. A hammer can cause impact damage to the bearing raceway, which will reduce bearing life. Serious personal injury and damage to components can result.**

**Ensure that you do not damage stud threads during installation procedures. Damaged threads will not allow the stud to provide the required clamp to support the wheel retention system. The wheels can loosen and separate from the vehicle. Serious personal injury and damage to components can result.**

### Stud Removal

1. Wear safe eye protection.
2. Place the clean hub in a shop press.
3. Support the inboard side of the flange adjacent to the stud head and perpendicular to the press cylinder.
4. Use a press on the threaded end of the stud to force the stud out of the flange.

### Stud Installation

1. Wear safe eye protection.
2. Support the outboard side of the flange close to the stud hole and perpendicular to the press cylinder.

#### CAUTION

**Always replace the studs with the same part number as those removed. Damage to components can result.**

3. Always replace the studs with the same part number as those removed. Damage to components can result. Press the new stud all the way into the hub. Verify that the stud is fully seated and that the stud head is not embedded into the hub.
  - **If the stud head is embedded into the hub:** Replace the hub.
4. Examine the hub flange to verify the studs are not damaged, and make sure the flange was not damaged during the stud installation process.
  - **If the flange is damaged:** Replace the hub.

## 7 Differential Carrier Installation

### Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

#### **⚠ WARNING**

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

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

Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

To avoid serious personal injury and damage to components, take care when using lifting devices during service and maintenance procedures. Inspect a lifting strap to ensure that it is not damaged. Do not subject the lifting straps to shocks or drop-loading.

### Installation

#### Differential Carrier into the Axle Housing

#### **⚠ WARNING**

When you apply some silicone gasket materials, a small amount of acid vapor is present. To prevent serious personal injury, ensure that the work area is well-ventilated. Read the manufacturer's instructions before using a silicone gasket material, then carefully follow the instructions. If a silicone gasket material gets into your eyes, follow the manufacturer's emergency procedures. Have your eyes checked by a physician as soon as possible.

Solvent cleaners can be flammable, poisonous and cause burns. Examples of solvent cleaners are carbon tetrachloride, and emulsion-type and petroleum-base cleaners. Read the manufacturer's instructions before using a solvent cleaner, then carefully follow the instructions. Also follow the procedures below.

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

1. Use a cleaning solvent and rags to clean the inside of the axle housing and the carrier mounting surface.
2. Inspect the axle housing for damage. Repair or replace the axle housing.
3. Check for loose studs, if equipped, in the mounting surface of the housing where the carrier fastens. Remove and clean the studs that are loose.
4. Apply liquid adhesive to the threaded holes. Install the studs into the axle housing. Tighten the studs to the correct torque value.
5. Check the magnets inside of the axle housing to ensure they are clean and securely fastened. Use Loctite® 5699 gasket material to secure the magnets if necessary. Figure 7.1.

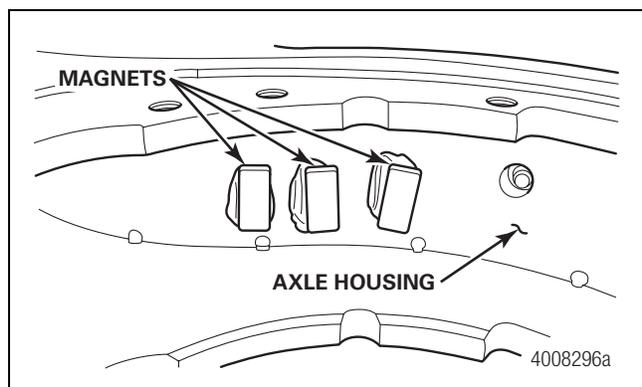


Figure 7.1

## 7 Differential Carrier Installation

### ⚠ CAUTION

Apply silicone gasket material in a continuous 0.25-inch (6 mm) bead. If you use more than this amount, gasket material can break off and plug lubrication passages. Damage to components can result.

6. Apply a 0.25-inch (6 mm) continuous bead of Loctite® 5699 gasket material to the carrier mounting surface on the axle housing. Figure 7.2.

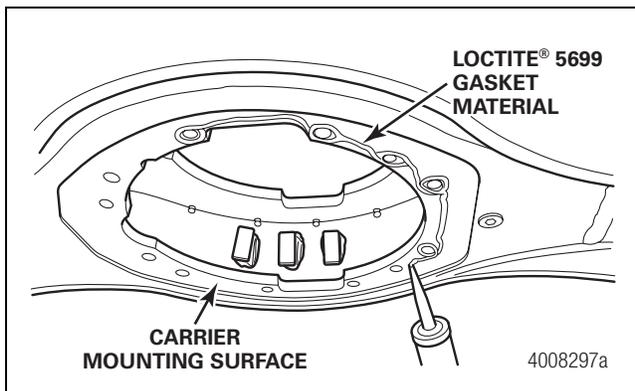


Figure 7.2

### ⚠ CAUTION

Use a hydraulic jack or lifting tool to install the carrier into the axle housing. Do not use a hammer or mallet, which will damage the mounting flange and cause oil leaks. Damage to components can result.

7. Use a hydraulic jack or lifting tool to install the carrier into the axle housing. Do not use a hammer or mallet, which will damage the mounting flange and cause oil leaks.
8. Install nuts and washers or capscrews and washers, if equipped, into the four corner locations around the carrier and axle housing. Hand-tighten the fasteners. Figure 7.3.

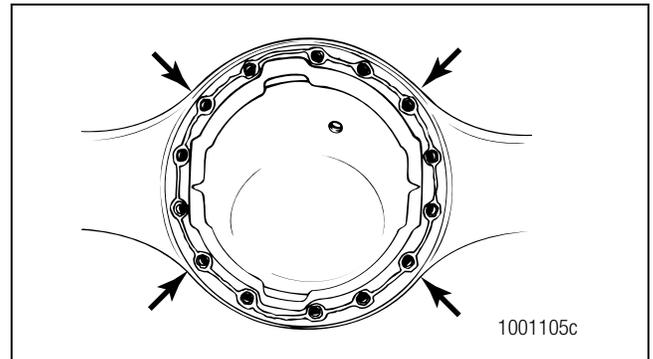


Figure 7.3

9. Carefully push the carrier into position. Tighten the four fasteners two or three turns each in a pattern opposite each other. Figure 7.4.

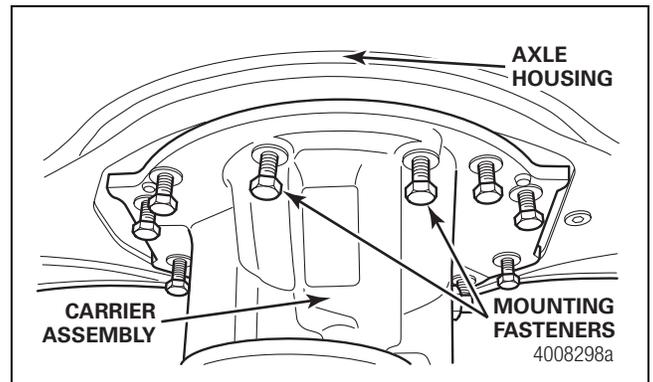


Figure 7.4

10. Repeat the previous step until the four fasteners are tightened to the torque specified in Section 11.
11. Install the other fasteners and washers that hold the carrier in the axle housing. Tighten fasteners to the torque specified in Section 11.
12. Connect the driveline universal joint to the pinion input yoke or flange on the carrier.

## 8 MOX-H2 Axle Assembly and Installation

### Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

#### **⚠ WARNING**

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

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

Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

Observe all warnings and cautions provided by the press manufacturer to avoid damage to components and serious personal injury.

To avoid serious personal injury and damage to components, take care when using lifting devices during service and maintenance procedures. Inspect a lifting strap to ensure that it is not damaged. Do not subject the lifting straps to shocks or drop-loading.

### Installation

#### Knuckle

1. If removed, use a driver and hammer to install the axle shaft bushing into the housing. Figure 8.1.

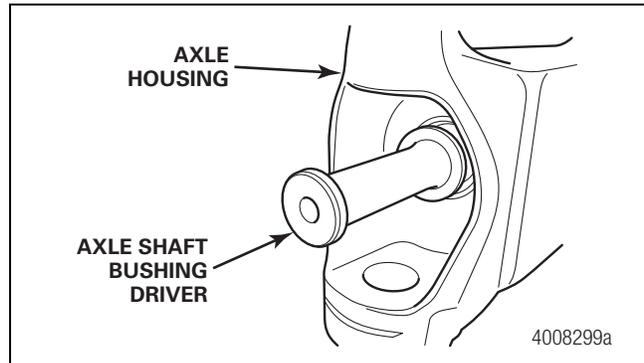


Figure 8.1

2. Use a seal driver and hammer to install the retaining seal into the housing. Figure 8.2.

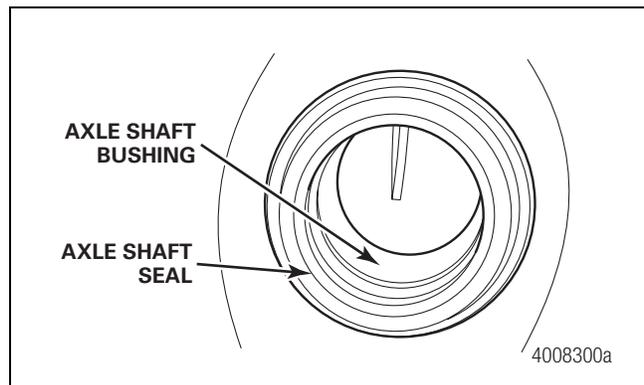


Figure 8.2

3. Apply grease to the upper and lower knuckle bores.
4. If removed, use a suitable driver and a hammer to install the upper and lower king pin bushings into the knuckle bores. The upper and lower bushings must be pressed in flush to the bore. Figure 8.3.

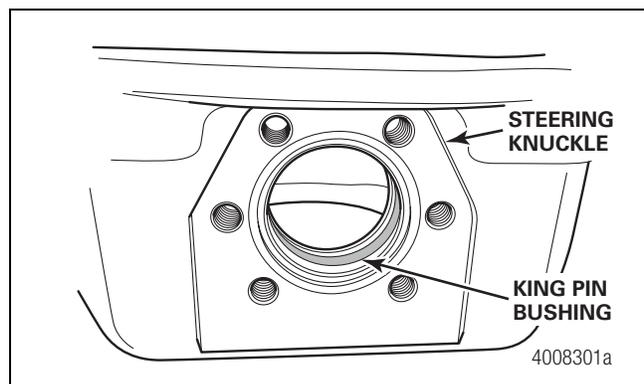


Figure 8.3

## 8 MOX-H2 Axle Assembly and Installation

5. Install the upper and lower king pin seals on the inner side of both bushings. Install the seals with the flat edge facing in and the seal lip facing out. Figure 8.4.

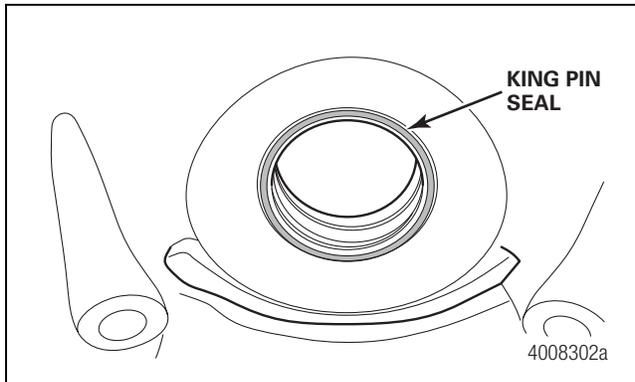


Figure 8.4

6. Apply grease to the bushings, seals and king pins.
7. Use a lifting device to support the knuckle assembly. Guide the knuckle assembly into position and install it onto the axle. Figure 8.5.

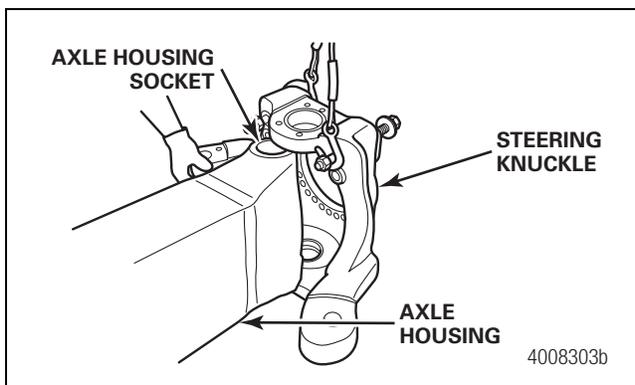


Figure 8.5

### **CAUTION**

Align parts carefully to prevent the king pin from damaging the bushing or moving the bushing out of position.

8. Use a press and suitable driver to press the king pins through the knuckle and into the housing sockets. The pin is fully seated once it has bottomed out against the housing socket face. Figure 8.6.

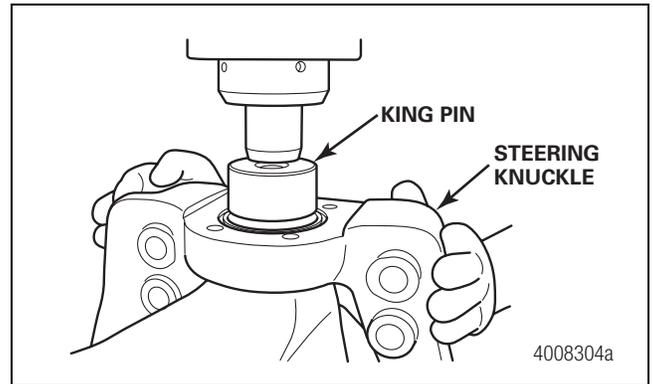


Figure 8.6

9. Grease the axle shaft journals and install the axle shaft into the housing. Use care to avoid damaging the housing seal during shaft installation.
10. If removed, use an appropriate driver to install a new axle shaft bushing and seal into the spindle.
11. Use steel rods or studs to help align the spindle to the knuckle. Figure 8.7.

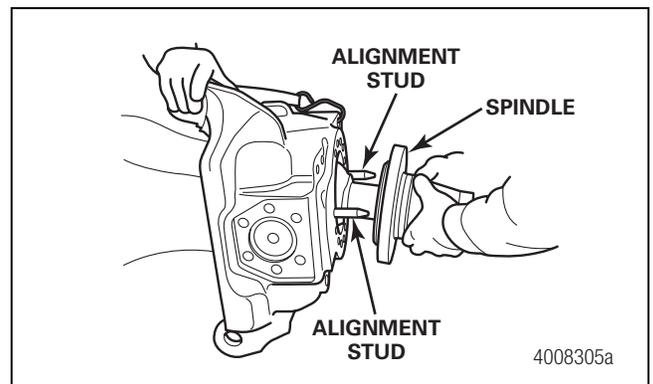


Figure 8.7

12. Install the spindle mounting bolts and tighten to the torque specified in Section 11. Figure 8.8.

## 8 MOX-H2 Axle Assembly and Installation

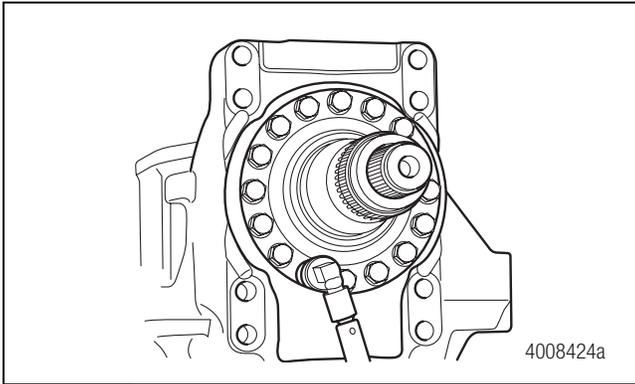


Figure 8.8

### Adjust the King Pin End Play

#### ⚠ CAUTION

The axle shaft and planetary carrier must be installed prior to shimming the king pins to ensure accurate measurements. Incorrect shim selection may result in hard steering, premature wear or component damage.

1. Position the axle as it would sit in the vehicle with the axle raised to remove any vehicle weight from the wheel ends.
2. Install the O-ring, upper king pin cap, washer and bolts. Tighten the bolts to the torque specified in Section 11.
3. Temporarily hold the thrust washer against the lower king pin. The thrust washer will sit below the lower king pin boss.
4. Use a depth gauge to measure from the king pin boss to the thrust washer face. Figure 8.9.

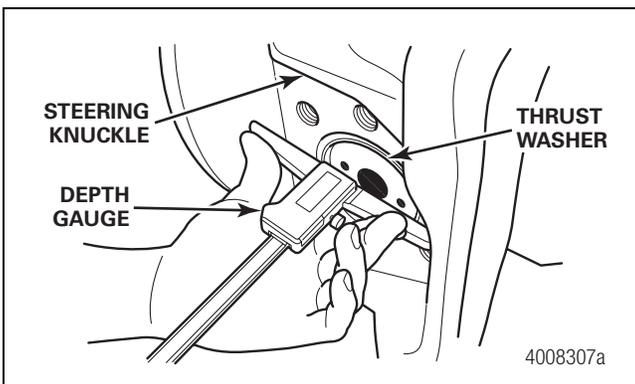


Figure 8.9

5. Choose shims to create a shim pack that is 0.001-0.010-inch (0.025-0.250 mm) less than the measurement taken in the previous step.
6. If removed, install new roll pins. The roll pins must not stand out above the shim pack and thrust washer. Figure 8.10.

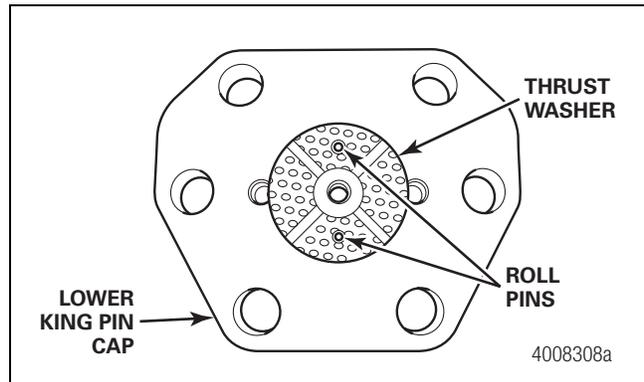


Figure 8.10

7. Install the shims and thrust washer onto the king pin cap.
8. Install the king pin cap assembly onto the axle with all of the bolts and washers. Tighten the bolts to the torque specified in Section 11.
9. Install a dial indicator to the axle housing so that the tip is located on the upper king pin cap. Figure 8.11.

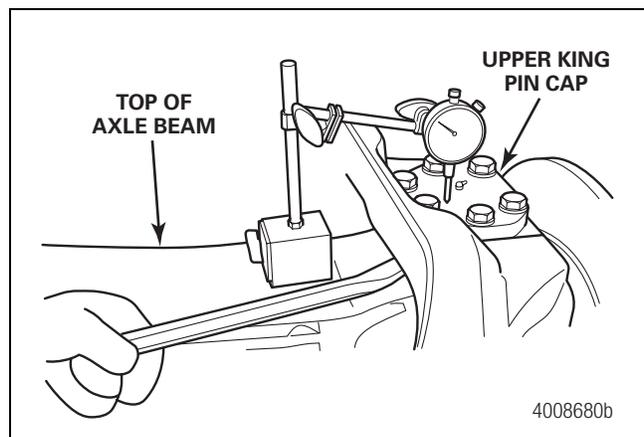


Figure 8.11

10. Wedge a pry bar between the axle housing and the king pin boss of the knuckle to measure the vertical movement of the knuckle. Use only enough force to lift the knuckle from the king pin boss.

## 8 MOX-H2 Axle Assembly and Installation

11. If final end play is not within 0.001-0.010-inch (0.0250-0.250 mm), adjust the shim pack as necessary.

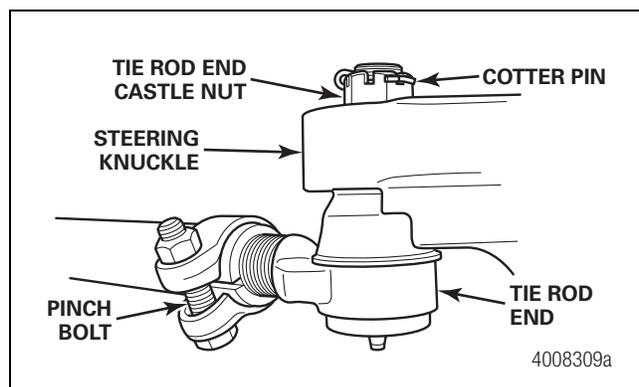
### **⚠ CAUTION**

Verify king pin end play to ensure the shim selection is correct. Incorrect shim selection can result in hard steering, premature wear or component damage.

12. Verify steering resistance. Incorrect shim selection can result in hard steering, component damage or premature wear.
13. If removed, install the grease fittings into the king pin caps. Tighten the fittings to the torque specified in Section 11, and then additionally rotate them until the fittings point towards the center of the cap.

### Tie Rod

1. Install the tie rod end into the steering arm.
2. Check the toe setting to ensure it is within specification. Refer to Section 10.
3. Tighten the tie rod pinch bolts to the torque specified in Section 11.
4. Install the tie rod end castle nuts and tighten them to the torque specified in Section 11. Continue to advance the nut until it allows for the cotter pin to be installed without exceeding the maximum torque specified in Section 11.
5. Install the cotter pin through the nut. Bend the end of the cotter pin over to lock it in place. Figure 8.12.



**Figure 8.12**

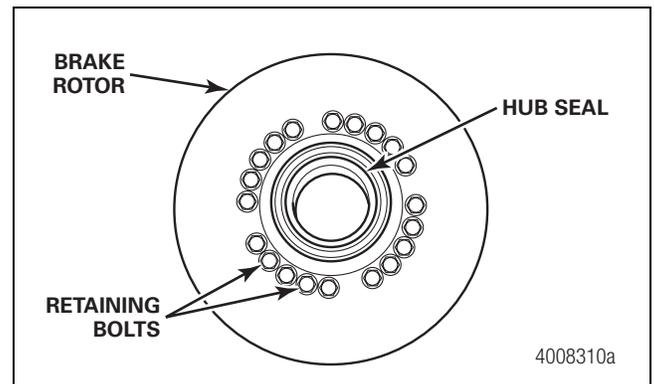
## Assembly

### Wheel End

### **⚠ CAUTION**

Do not apply grease to the bearings during installation, which can prevent correct oil flow. Damage to components can result.

1. If removed, lubricate the hub bores and use a press and driver to install the inner and outer bearing cups into the hub assembly.
2. Install the inner bearing cone into the hub assembly.
3. Use a suitable seal driver and hammer to install the seal into the hub assembly.
4. Install the rotor onto the hub. Install the rotor mounting bolts and tighten them to the torque specified in Section 11. Figure 8.13.



**Figure 8.13**

## Installation

### Wheel End

1. Use a lifting device to guide the hub assembly onto the spindle until seated. Use care to avoid damaging the hub seal during installation.
2. Install the outer bearing cone into the hub assembly. Figure 8.14.
3. If disassembled, set the ring gear hub into the ring gear and secure the assembly with the snap ring.

## 8 MOX-H2 Axle Assembly and Installation

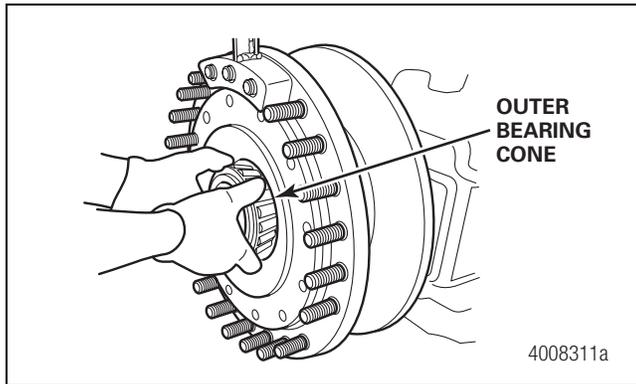


Figure 8.14

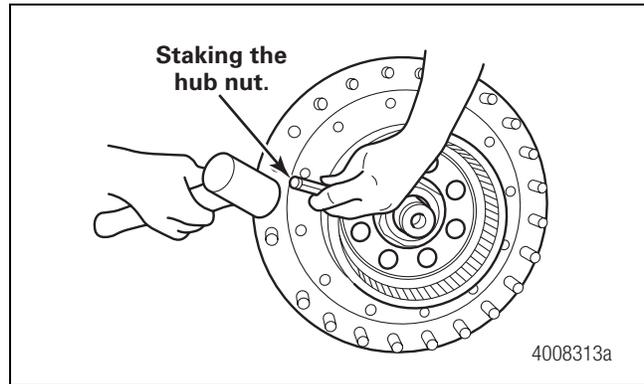


Figure 8.16

4. Install the ring gear assembly onto the spindle. Figure 8.15.

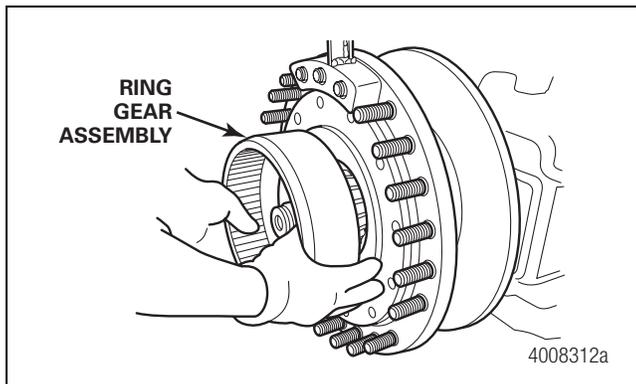


Figure 8.15

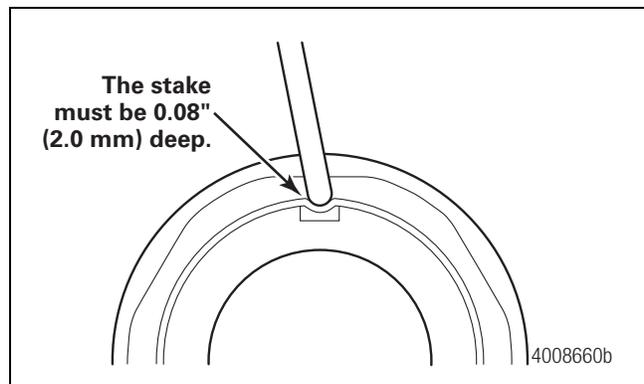


Figure 8.17

5. Lightly coat the spindle nut threads with oil.
6. While rotating the hub by hand, tighten the nut to the torque specified in Section 11.
7. Further rotate the hub three times in alternating directions, then mark the location of the nut.
8. Retighten the nut. If it moves, repeat the previous steps until the required torque is maintained.

### **⚠ WARNING**

When you remove a spindle nut, always replace the nut with a new one. Do not reuse a spindle nut. Ensure that you correctly stake a spindle nut. A reused or incorrectly staked spindle nut will not tighten correctly and can cause the wheels to loosen and separate from the vehicle during operation. Serious personal injury and damage to components can result.

9. Use a hammer and drift to stake the nut into the spindle slots in two places. Figure 8.16 and Figure 8.17.

10. Install the sun gear thrust washer against the spindle with the tabs facing inward. Install the sun gear onto the axle shaft. Figure 8.18.

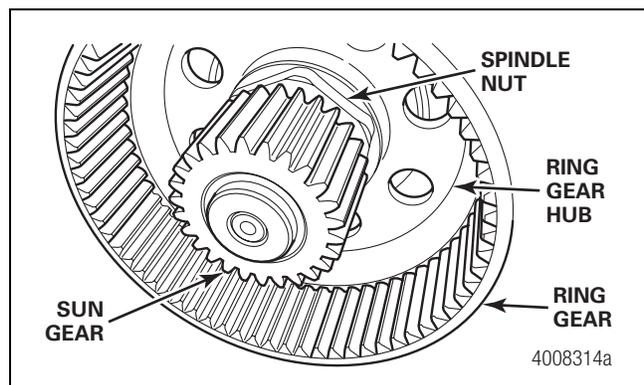


Figure 8.18

11. Install the retaining snap ring on the end of the axle shaft. Figure 8.19.

## 8 MOX-H2 Axle Assembly and Installation

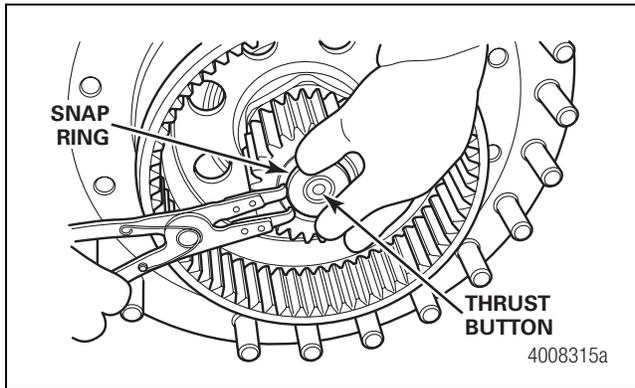


Figure 8.19

12. Install the outer O-ring seal onto the hub face. Figure 8.20.

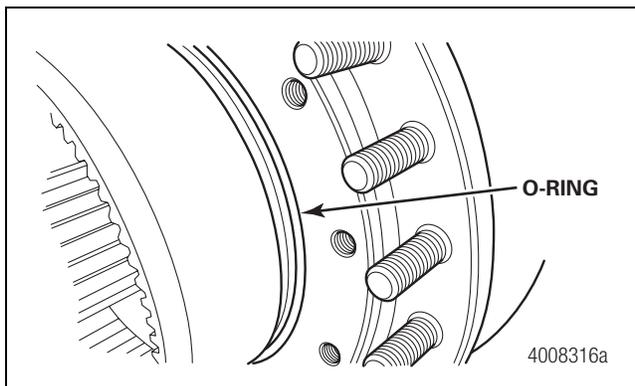


Figure 8.20

13. Install the thrust button into the end of the axle shaft.

### Assembly

#### Planetary Assembly

1. Grease the bearing needles and the planetary gears. Install the bearing needles and spacer sleeves into the planetary gears. Wedge a pointed tool between two needles and check that the gap opened will not fit an additional needle.

#### **CAUTION**

When you install the planetary gears and thrust washers into the planetary carrier, install the steel washer against the planetary gears and the brass washer against the planetary carrier. Otherwise, damage to the roller bearing and gears can occur during operation.

2. Install the planetary gears and thrust washers into the planetary carrier. Align the gears with the planetary pinion shaft bores and verify that the washers are positioned correctly against the planetary carrier.
3. Grease the new O-rings with Meritor-approved white lithium grease and install them onto the planetary pinion shaft.
4. Clock the planetary carrier pinion shaft so that the cross lube hole points to the carrier center. Use a drift to press the new planetary pinion shaft into the planetary carrier. The shafts should be seated with enough room to fit the snap rings.
5. Install the snap rings onto the inner ends of the pinion shafts.

### Installation

#### Planetary Assembly

1. Install the planetary assembly onto the hub. Install the retaining bolts and tighten them to the torque specified in Section 11. Figure 8.21.

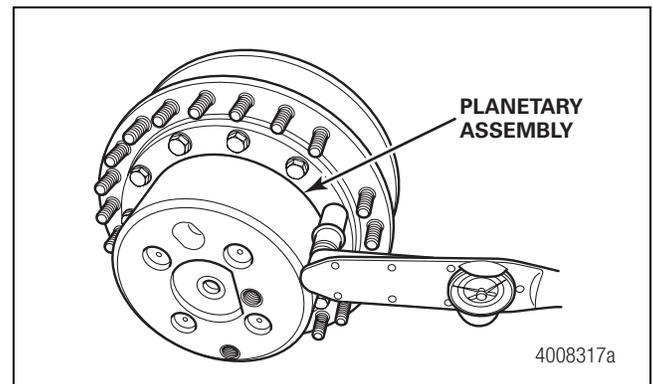


Figure 8.21

2. Apply Loctite® 30557 threadlocker to the threads of the thrust screw assembly.
3. Install the thrust screw assembly and tighten it to the torque specified in Section 11, then back it off 90 degrees (1/4 turn). Figure 8.22.

## 8 MOX-H2 Axle Assembly and Installation

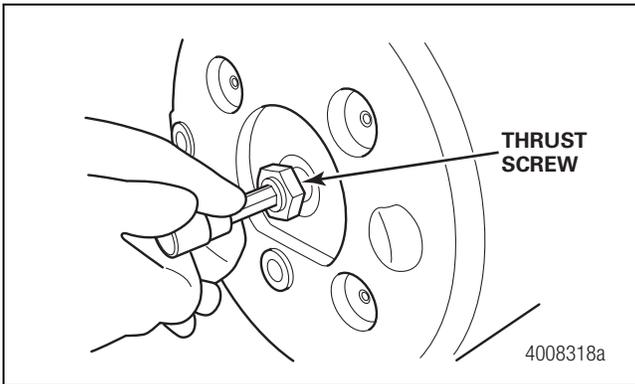


Figure 8.22

4. Tighten the thrust screw jam nut to the torque specified in Section 11 while holding the position of the thrust screw.

### Brake Caliper

1. Use a lifting device to install the brake caliper onto the knuckle.

#### **⚠ WARNING**

You must install the longer bolts in the upper mounting holes and the shorter bolts in the lower mounting holes. Do not install the bolts in the wrong positions. Serious personal injury and damage to components can result.

2. Install washers on the caliper mounting bolts. Install the two longer caliper mounting bolts into the upper holes and the two shorter caliper mounting bolts into the lower holes. Tighten the mounting bolts to the torque specified in Section 11. Figure 8.23 and Figure 8.24.

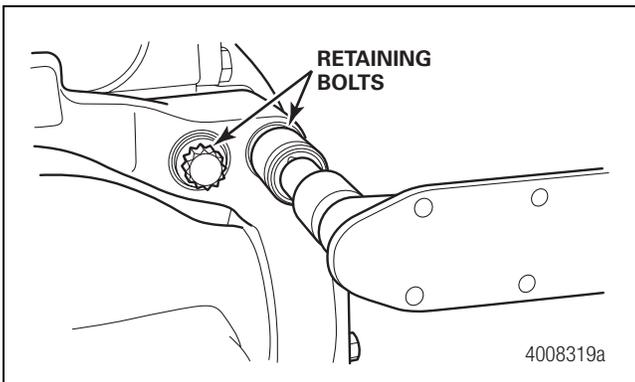


Figure 8.23

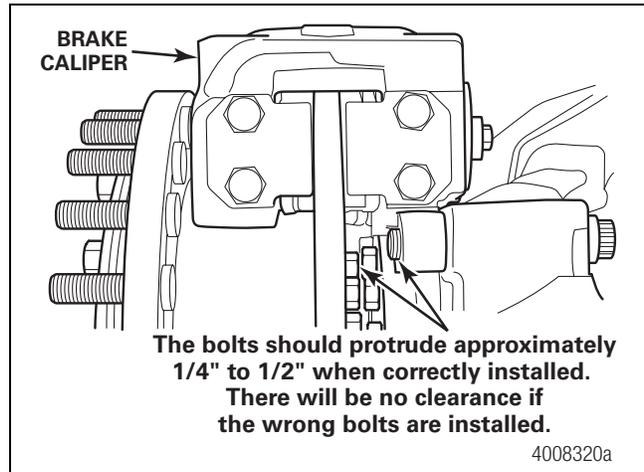


Figure 8.24

3. If removed, install the brake pads into the caliper.
4. Install the brake pad retainer plates onto the caliper. Install the retainer plate bolts and tighten them to the torque specified in Section 11.

### Fill the Axle with Oil

1. Install the housing drain plug and tighten it to the torque specified in Section 11.
2. Install the wheel end drain plugs and tighten them to the torque specified in Section 11. Figure 8.25.

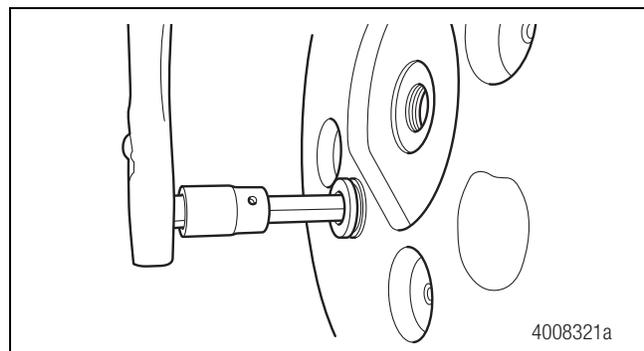


Figure 8.25

3. Rotate the wheel ends until the fill line marked on the hub is horizontal. Fill each wheel end until the oil reaches the bottom of the hole.
4. Fill the center section of the axle with approximately 60 pints (28 liters) of Meritor-approved gear oil.
5. Allow enough time for the oil to circulate throughout the axle. Check the fluid levels again and top off as necessary until the fluid is even with the bottom of the fill hole.

## Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

### **⚠ WARNING**

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

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

Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

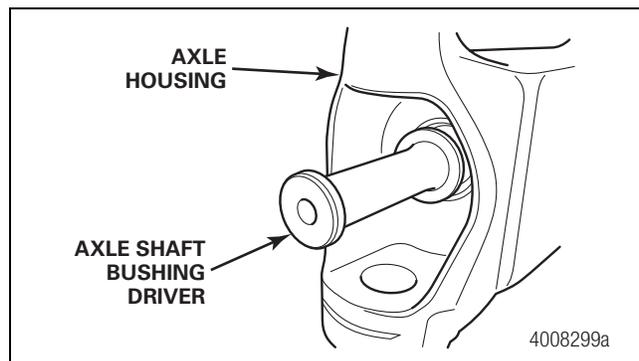
Observe all warnings and cautions provided by the press manufacturer to avoid damage to components and serious personal injury.

To avoid serious personal injury and damage to components, take care when using lifting devices during service and maintenance procedures. Inspect a lifting strap to ensure that it is not damaged. Do not subject the lifting straps to shocks or drop-loading.

## Installation

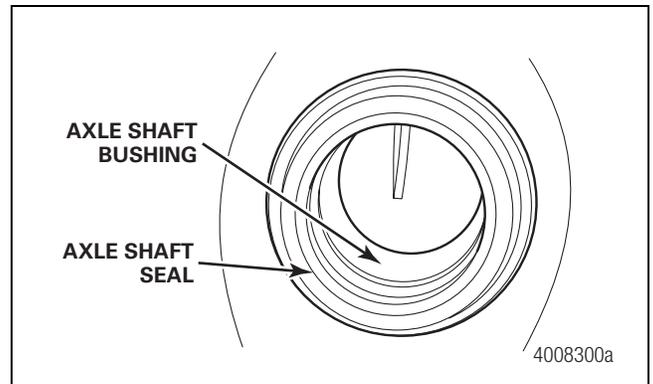
### Knuckle

1. If removed, use a driver and hammer to install the axle shaft bushing into the housing. Figure 9.1.



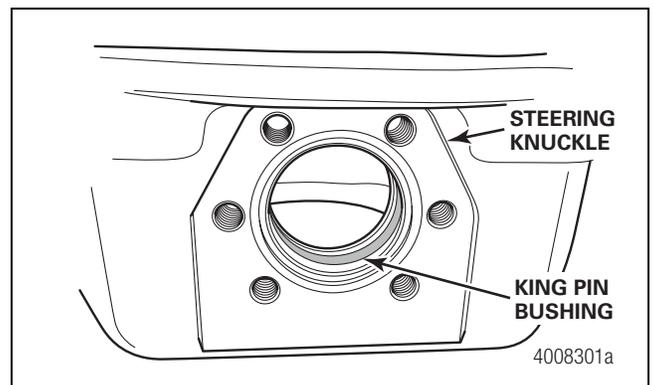
**Figure 9.1**

2. Use a seal driver and hammer to install the retaining seal into the axle housing. Figure 9.2.



**Figure 9.2**

3. If removed, apply grease to the upper and lower knuckle bores and use a hammer and a driver to install the upper king pin bushing into the bore until flush with the surface. Figure 9.3.



**Figure 9.3**

4. If removed, use a hammer and driver to install the lower king pin bushing into the bore to a depth of  $0.2125 \pm 0.0071$ -inch ( $5.4 \pm 0.2$  mm) from the outside face.
5. Install the upper and lower king pin seals on the inner side of both bushings. Install the seals with the flat edge facing in and the seal lip facing out. Figure 9.4.

## 9 MOX-N5/MOX-P8 Axle Assembly and Installation

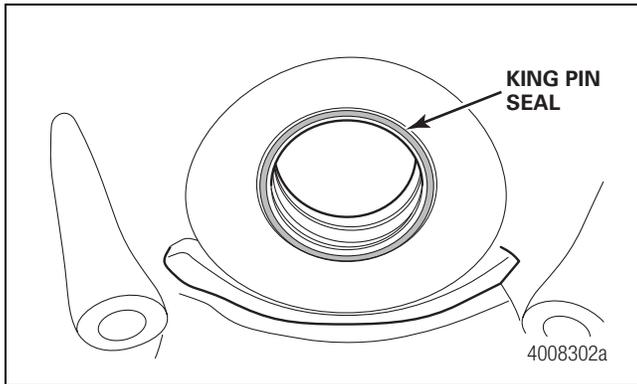


Figure 9.4

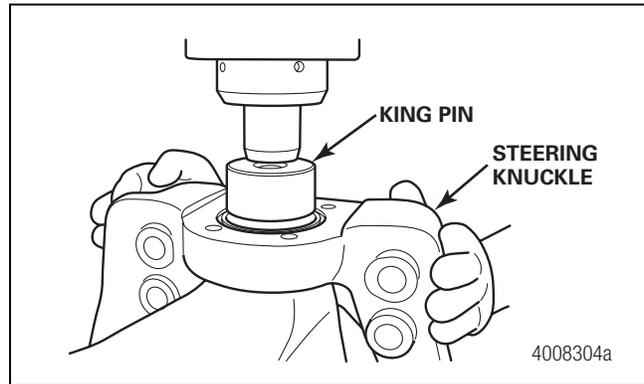


Figure 9.6

6. Apply grease to the bushings, seals and king pins.
7. Use a lifting device to support the knuckle assembly. Guide the knuckle assembly into position and install it onto the axle. Figure 9.5.

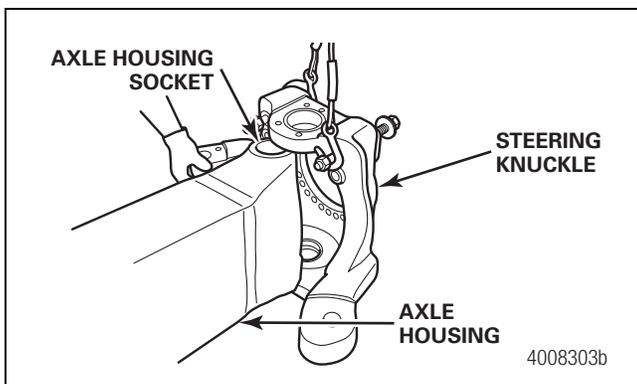


Figure 9.5

### ⚠ CAUTION

Align parts carefully to prevent the king pin from damaging the bushing or moving the bushing out of position.

8. Use a press and suitable driver to install the king pins through the knuckle and into the housing sockets. The pin is fully seated once it has bottomed out against the housing socket face. Figure 9.6.

9. Grease the axle shaft journals and install the axle shaft into the housing. Use care to avoid damaging the housing seal during shaft installation.
10. If removed, install a new axle shaft bushing and inner seal into the spindle. Take care to prevent damage to the metal face and edges of the seal.
11. Dip the spindle half of the face seal into isopropyl alcohol, and while it is still wet, use the special driver to manually install the seal squarely into the spindle. Do not use a hammer or press for installation. Figure 9.7.

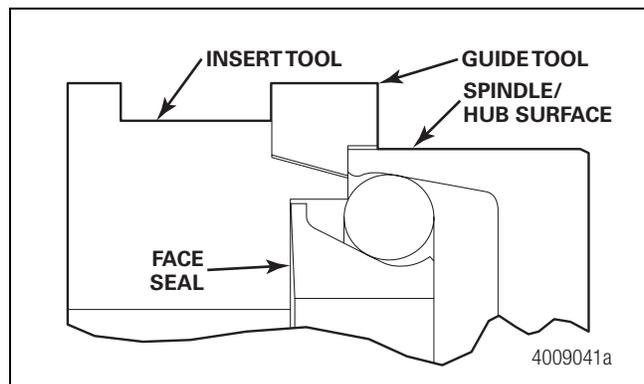
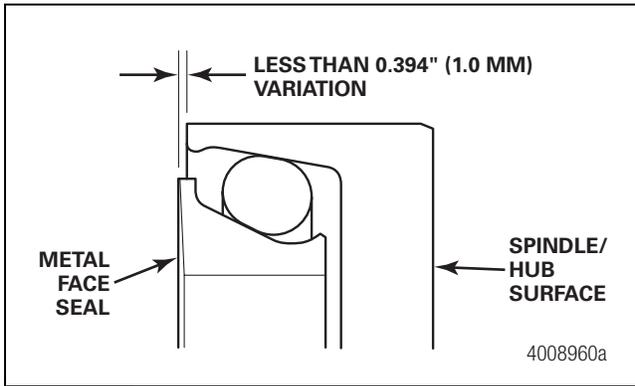


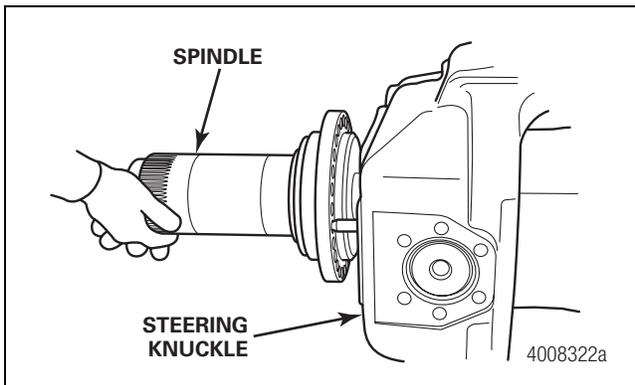
Figure 9.7

12. Check the seal's assembled height in at least four places 90 degrees apart. The variation cannot exceed 0.394-inch (1.0 mm). Figure 9.8.



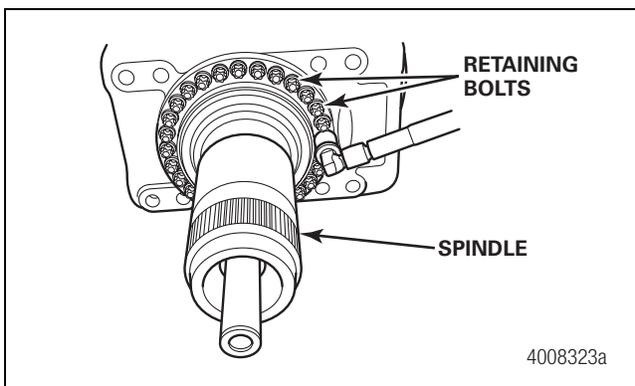
**Figure 9.8**

13. Use steel rods or studs to help align the spindle to the knuckle. Figure 9.9.



**Figure 9.9**

14. Install the spindle mounting bolts and tighten to the torque specified in Section 11. Figure 9.10.



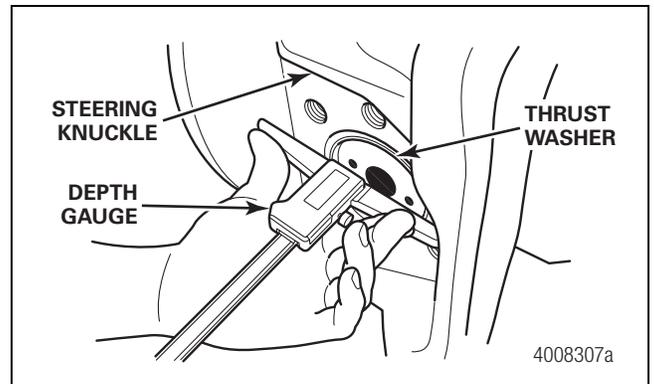
**Figure 9.10**

## Adjust the King Pin End Play

### ⚠ CAUTION

The axle shaft and planetary carrier must be installed prior to shimming the king pins to ensure accurate measurements. Incorrect shim selection may result in hard steering, premature wear or component damage.

1. Position the axle as it would sit in the vehicle with the axle raised to remove any vehicle weight from the wheel ends.
2. Install the O-ring, upper king pin cap, washer and bolts. Tighten the bolts to the torque specified in Section 11.
3. Temporarily hold the thrust washer against the lower king pin. The thrust washer will sit below the lower king pin boss.
4. Use a depth gauge to measure from the king pin boss to the thrust washer face. Figure 9.11.



**Figure 9.11**

5. Choose shims to create a shim pack that is 0.001-0.010-inch (0.025-0.250 mm) less than the measurement taken in the previous step.
6. If removed, install new roll pins. The roll pins must not stand out above the shim pack and thrust washer. Figure 9.12.

## 9 MOX-N5/MOX-P8 Axle Assembly and Installation

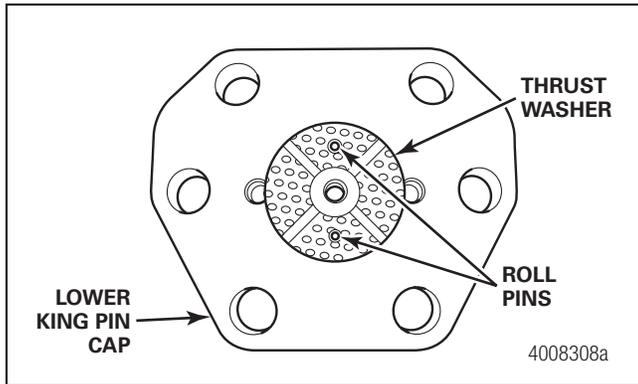


Figure 9.12

7. Install the shims and thrust washer onto the king pin cap.
8. Install the king pin cap assembly onto the axle with all of the bolts and washers. Tighten the bolts to the torque specified in Section 11.
9. Install a dial indicator to the axle housing so that the tip is located on the upper king pin cap. Figure 9.13.

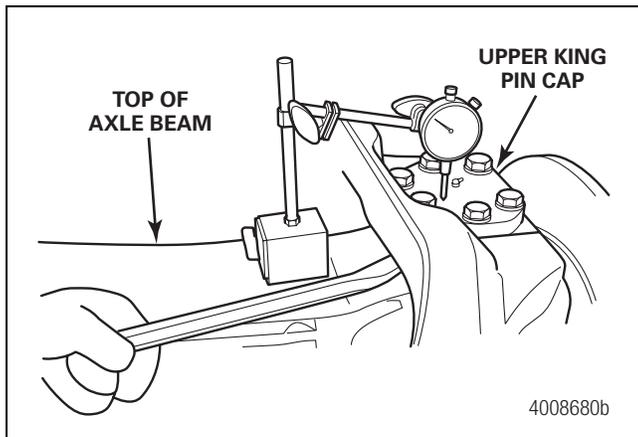


Figure 9.13

10. Wedge a pry bar between the axle housing and the king pin boss of the knuckle to measure the vertical movement of the knuckle. Use only enough force to lift the knuckle from the king pin boss.
11. If final end play is not within 0.001-0.010-inch (0.0250-0.250 mm), adjust the shim pack as necessary.

### ⚠ CAUTION

Verify king pin end play to ensure the shim selection is correct. Incorrect shim selection can result in hard steering, premature wear or component damage.

12. Verify steering resistance. Incorrect shim selection can result in hard steering, component damage or premature wear.
13. If removed, install the grease fittings into the king pin caps. Tighten the fittings to the torque specified in Section 11, and then additionally rotate them until the fittings point towards the center of the cap.

## Tie Rod

1. Install the tie rod end into the steering arm.
2. Check the toe setting to ensure it is within specification. Refer to Section 10.
3. Tighten the tie rod pinch bolts to the torque specified in Section 11.
4. Install the tie rod end castle nuts and tighten them to the torque specified in Section 11. Continue to advance the nut until it allows for the cotter pin to be installed without exceeding the maximum torque specified in Section 11.
5. Install the cotter pin through the nut. Bend the end of the cotter pin over to lock it in place. Figure 9.14.

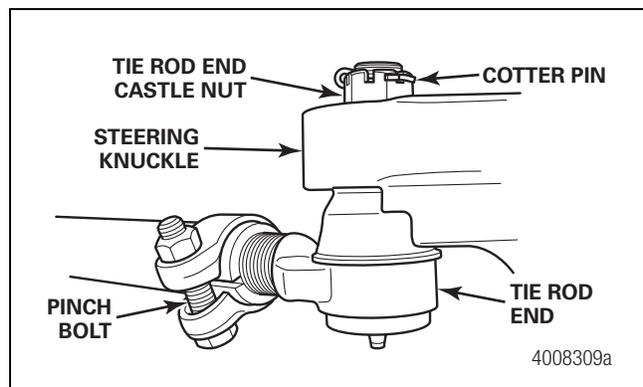


Figure 9.14

## Assembly

### Wheel End

1. If removed, lubricate the hub bores and use a press and driver to install the inner and outer bearing cups into the hub assembly. Figure 9.15.

## 9 MOX-N5/MOX-P8 Axle Assembly and Installation

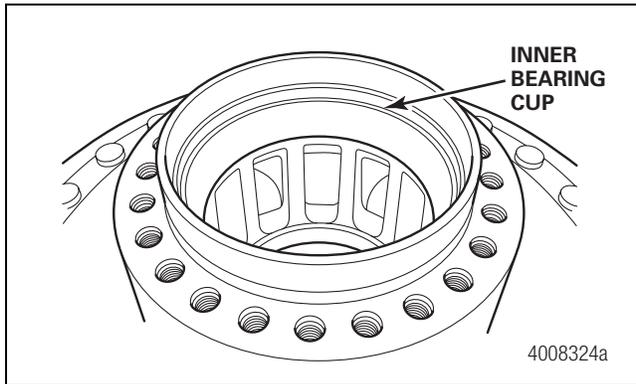


Figure 9.15

2. Use a suitable driver to install the inner bearing cone into the hub assembly.
3. If equipped, install the seal sleeve into the hub assembly until it bottoms out.
4. Dip the hub half of the face seal into isopropyl alcohol. While it is still wet, use the special driver to manually install the inner hub seal squarely into the hub assembly. Do not use a hammer or press. Figure 9.16 and Figure 9.17.

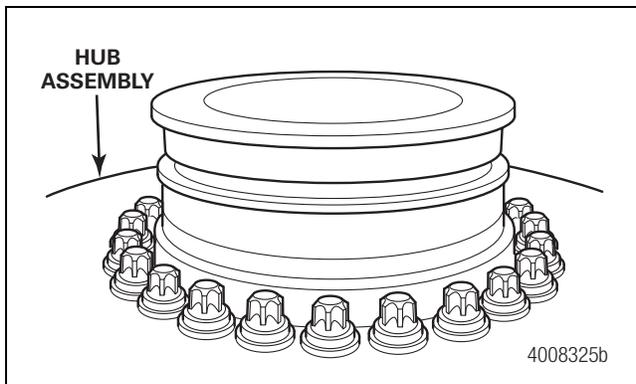


Figure 9.16

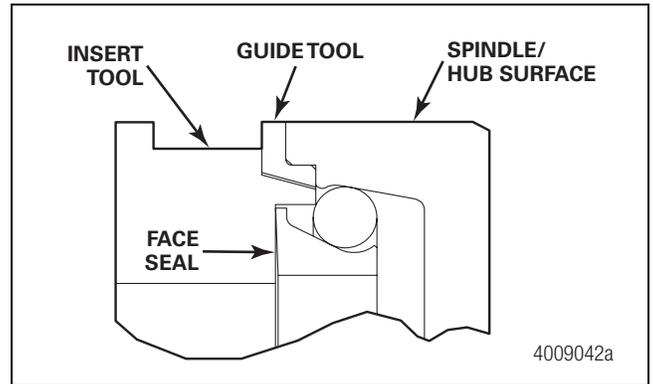


Figure 9.17

5. Check the seal's assembled height in at least four places 90 degrees apart. The variation must not exceed 0.394-inch (1.0 mm). Figure 9.18.

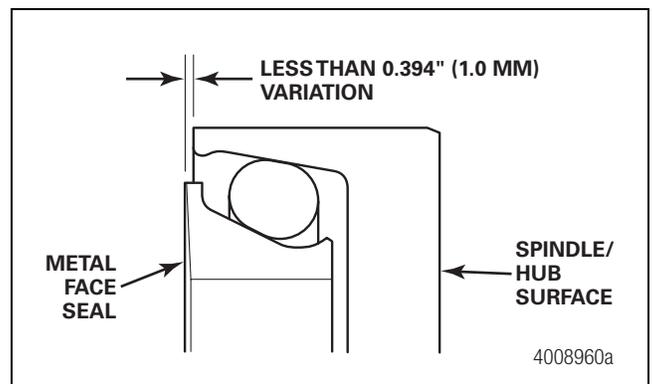


Figure 9.18

6. Install the rotor onto the hub. Install the rotor mounting bolts and tighten them to the torque specified in Section 11.

### Planetary Assembly

The gear and bearing assemblies are non-serviceable. These must be replaced as an assembly if damaged or worn. If removed, press a new planetary gear and bearing assembly onto the carrier stem.

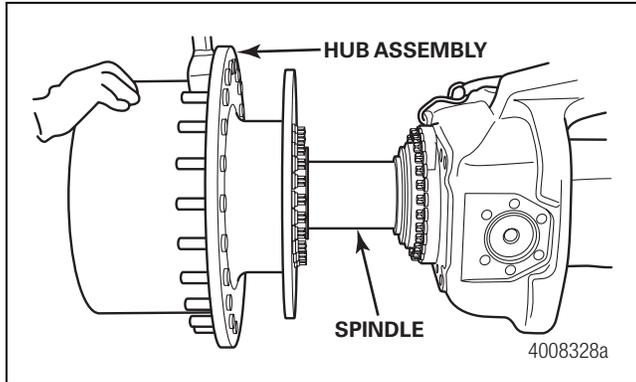
### Installation

#### Wheel End

1. Ensure there is no contamination present and lubricate both sealing surfaces of the face seal with a light coating of oil.

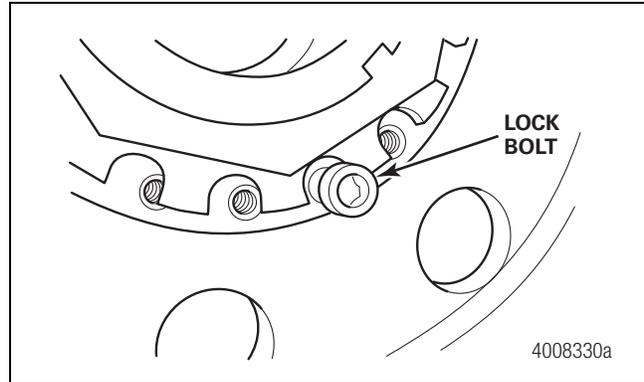
## 9 MOX-N5/MOX-P8 Axle Assembly and Installation

- Use a lifting device to guide the hub assembly onto the spindle until seated. Use care to avoid damaging the hub seal during installation. Figure 9.19.



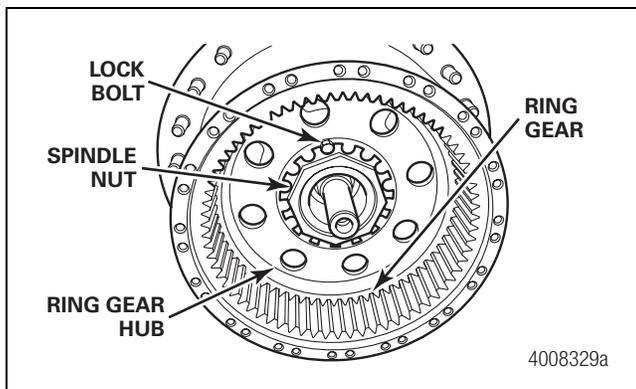
**Figure 9.19**

- Apply Loctite® 242 threadlocker to the lock bolt threads. Install the lock bolt through one of the nut slots and tighten to the torque specified in Section 11. Figure 9.21. 



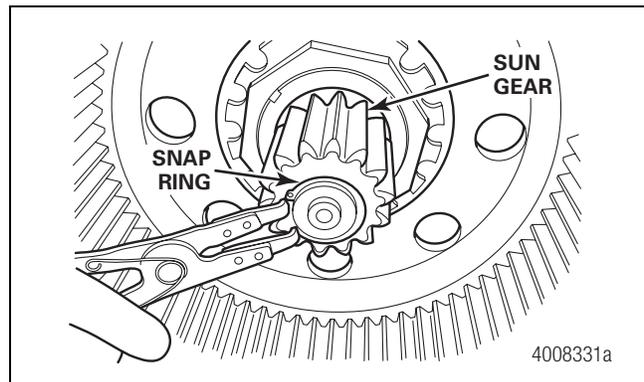
**Figure 9.21**

- Install the outer bearing cone into the hub assembly.
- If removed, assemble the ring gear to the ring gear hub and then install the snap ring to secure them.
- Install the ring gear assembly onto the spindle. Figure 9.20.



**Figure 9.20**

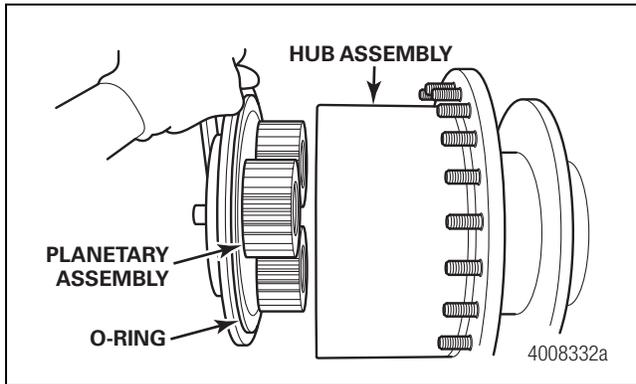
- Apply grease to the thrust washers. If equipped, install the brass washer first with the oil grooves facing out, then the steel washer into the end of the spindle. Make sure to align the locking tangs correctly with the spindle during installation.
- Install the sun gear onto the axle shaft.
- Install the retaining snap ring. If necessary, carefully push out the axle shaft assembly from the cardan joint. Figure 9.22.



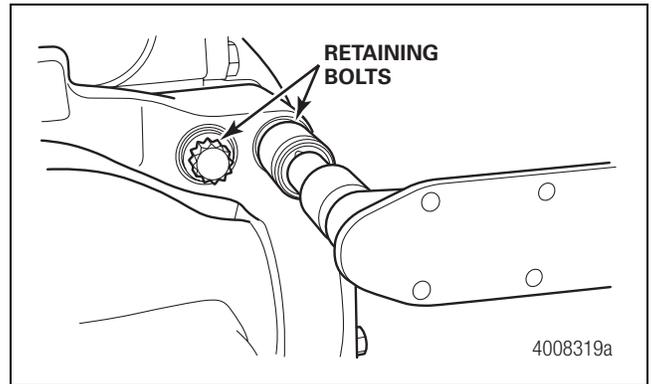
**Figure 9.22**

- Lightly coat the spindle nut threads with oil.
- While rotating the hub by hand, tighten the nut to the torque specified in Section 11.
- Further rotate the hub three times in alternating directions, then mark the location of the nut.
- Retighten the nut. If it moves, repeat the previous steps until the required torque is maintained.

- Install a new O-ring onto the planetary carrier.
- Install the planetary assembly into the hub. Figure 9.23.



**Figure 9.23**



**Figure 9.24**

16. Install the bolts and tighten them to the torque specified in Section 11.
17. Apply Loctite® 30557 to the thrust screw threads.
18. Install the thrust screw and tighten to the torque specified in Section 11 then back it off 90 degrees (1/4 turn).
19. Tighten the jam nut to the torque specified in Section 11 while holding the adjustment of the thrust screw.

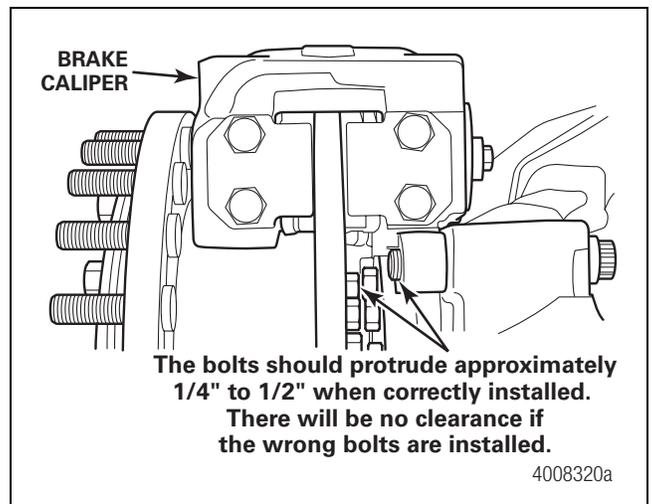
### Brake Caliper

1. Use a lifting device to install the brake caliper onto the knuckle.

#### **⚠ WARNING**

**You must install the longer bolts in the upper mounting holes and the shorter bolts in the lower mounting holes. Do not install the bolts in the wrong positions. Serious personal injury and damage to components can result.**

2. Install washers on the caliper mounting bolts. Install the two longer caliper mounting bolts into the upper holes and the two shorter caliper mounting bolts into the lower holes. Tighten the mounting bolts to the torque specified in Section 11. Figure 9.24 and Figure 9.25.



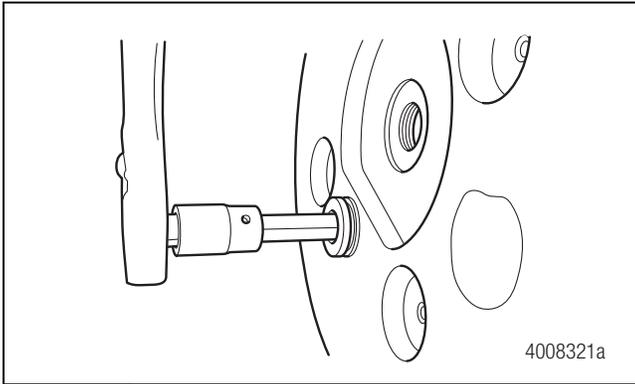
**Figure 9.25**

3. If removed, install the brake pads into the caliper.
4. Install the brake pad retainer plates onto the caliper. Install the retainer plate bolts and tighten them to the torque specified in Section 11.

### Fill the Axle with Oil

1. Install the housing drain plug and tighten it to the torque specified in Section 11.
2. Install the wheel end drain plugs and tighten them to the torque specified in Section 11. Figure 9.26. **ⓘ**

## 9 MOX-N5/MOX-P8 Axle Assembly and Installation



**Figure 9.26**

3. Rotate the wheel ends until the fill line marked on the hub is horizontal. Fill each wheel end until the oil level is up to the bottom of the fill plug hole.
4. Fill the center section of the axle until the oil level is up to the bottom of the fill plug hole.
5. Allow enough time for the oil to circulate throughout the assembly. Check the fluid levels again and top off as necessary until the fluid is even with the bottom of the fill hole.

## Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

### **WARNING**

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

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

**Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.**

**Observe all warnings and cautions provided by the press manufacturer to avoid damage to components and serious personal injury.**

## Inspection and Maintenance

Before performing an inspection of axle components, verify that the correct tools are available. Using the correct tools will ensure safety and provide the most accurate results. Check for the following tools.

- Dial indicator
- Tire blocks
- Jack
- Safety stands
- Pry bar
- Torque wrench

## Components

### Axle

Visually inspect for signs of oil or grease leaking as well debris in or around the breather. Repair as necessary.

Verify that all fasteners are tightened to the specified torque. Use a torque wrench to check the torque in a tightening direction. As soon as the fastener starts to move, record the torque. Correct if necessary. Replace any worn or damaged fasteners.

Inspect the parts of the axle for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts.

Verify that looseness does not exist at the pivot points. Verify that the pivot points are lubricated.

Verify that all the parts move freely through the complete turning radius.

Inspect the tires for wear patterns that indicate suspension damage or misalignment.

### Brakes

Refer to the manufacturer's recommended instructions for brake maintenance procedures and intervals.

Inspect the brakes at least every six months or during any reline of the brakes.

### Wheel Bearing End Play — MOX-H2

Wheel bearing end play should be checked periodically according to the inspection intervals in this section. End play should be less than 0.001-inch (0.0254 mm). If end play is detected, perform an internal inspection using the following procedure.

1. Mark the location of the spindle nut in relation to the planetary ring gear hub.
2. Un-stake the spindle nut from the spindle.
3. Tighten the spindle nut to the torque specified in Section 11.
4. If the nut advances more than 30 degrees from its original marked position, disassemble the wheel hub assembly and inspect for bearing damage.
5. If the nut does not advance more than 30 degrees, a bearing inspection is not required.

**NOTE:** Spindle nuts cannot be re-used once they have been un-staked or removed.

6. Remove the used nut. Install and tighten a new nut. Refer to Section 8 or Section 9 for the correct procedure.

## 10 Inspection and Maintenance

### Wheel Bearing End Play — MOX-N5/P8

Wheel bearing end play should be checked periodically according to the inspection intervals in this section. End play should be less than 0.001-inch (0.0254 mm). If end play is detected, perform an internal inspection using the following procedure.

1. Mark the location of the spindle nut in relation to the planetary ring gear hub.
2. Remove the lock bolt from the ring gear hub.
3. Tighten the spindle nut to the torque specified in Section 11.
4. If the nut advances more than 30 degrees from its original marked position, disassemble the wheel hub assembly and inspect for bearing damage.
5. If the nut does not advance more than 30 degrees, a bearing inspection is not required.
6. Re-install the lock bolt and tighten to the torque specified in Section 11.

### Breather

#### CAUTION

**Cover the breather when steam cleaning the housing to prevent water from entering the housing and contaminating the oil. Damage to components can result. Baffle-type breathers help keep axles free from external moisture and dirt, which can cause premature oil and component damage.**

During operation, an oil mist may be noticeable at the breather and its surrounding area. This occurrence is normal and may be exaggerated by a build-up of dust and other airborne contaminants. Perform a weekly inspection and clean the breather as necessary. If a leak is found, repair as required.

### Lubrication

Drive axles generate small metal wear particles at a fairly steady rate, especially during the break-in period. If these fine, but hard particles are allowed to circulate in the lubricant, along with external moisture and dirt, internal components will wear at a much faster rate than normal.

### Magnets and Magnetic Drain Plugs

Meritor driving axles are equipped with magnetic drain plugs. Inspect the magnetic drain plug each time the oil is changed. Use the correct part. Pipe plugs may leak if used as a drain plug.

### Seals

#### CAUTION

**Always use the correct tools and procedures when replacing seals to prevent incorrect installation and help prevent seals from leaking.**

Always use the correct tools and procedures when replacing seals to prevent incorrect installation and help prevent seals from leaking. Seals keep lubricant in and dirt out of a component. When they are worn or damaged, seals leak and produce low lubricant levels which may damage components. Durable triple-lip seals, standard in Meritor axles, protect the quality and levels of the lubricant and provide superior performance.

### Temperature Indicators

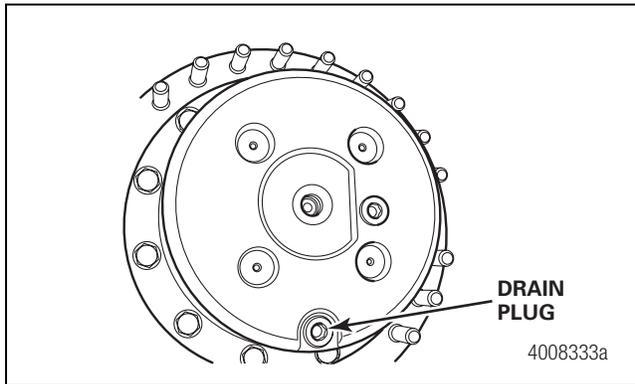
#### CAUTION

**If the oil temperature reaches 250°F (121°C), stop the vehicle immediately and check for the cause of overheating. Damage to components can result.**

Meritor axles can operate above 190°F (88°C) without damage. However, if the oil temperature reaches 250°F (121°C), stop the vehicle immediately and check for the cause of overheating. Damage to components can result. Many Meritor axles have a tapped hole in the housing for the installation of a lubricant temperature indicator that will help reduce the failure of axle parts from overheated oil.

### Drain the Oil

1. Wear safe eye protection.
2. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
3. Raise the vehicle so the wheels to be serviced are off the ground. Support the axle to be serviced with safety stands.
4. Remove the wheel and tire assemblies from the wheel ends.
5. Place a drain pan under the hub drain plug. Rotate the wheel end so the drain plug is at its lowest position. Remove the drain plug and allow the hub oil to drain completely from the wheel end. Figure 10.1.

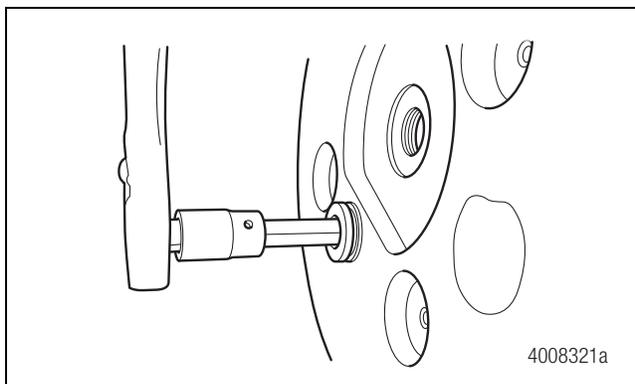


**Figure 10.1**

- Place a drain pan under the housing drain plug. Remove the drain plug and allow the oil to drain completely from the axle housing.

### Fill the Axle with Oil

- Install the housing drain plug and tighten it to 60 lb-ft (81 N•m).
- Install the wheel end drain plugs and tighten them to 60 lb-ft (81 N•m). Figure 10.2.



**Figure 10.2**

- Rotate the wheel ends until the fill line marked on the hub is horizontal. Fill each wheel end up to that mark with Meritor-approved gear oil.
- Fill the center section of the axle to the bottom of the fill plug with Meritor-approved gear oil.

### Drive Axle Shaft Universal Joints

- Clean all grease fittings prior to lubrication.

- Apply the specified grease at the grease fitting on the universal joint. Apply grease until new grease purges from all the seals.

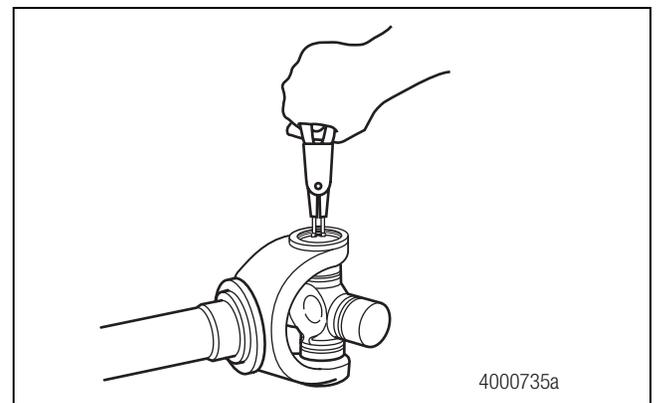
- If new grease does not purge at every seal:** Move the drive shaft while applying grease at the fittings until new grease purges at every seal.
- If new grease still does not purge:** Disassemble the universal joint. Inspect the grease and the components. Service as necessary.

### Universal Joint Service

**NOTE:** Do not disassemble Permalube™ joints. Disassembly will void the Meritor warranty. The cross assemblies are a Permalube™ design and are non-greaseable.

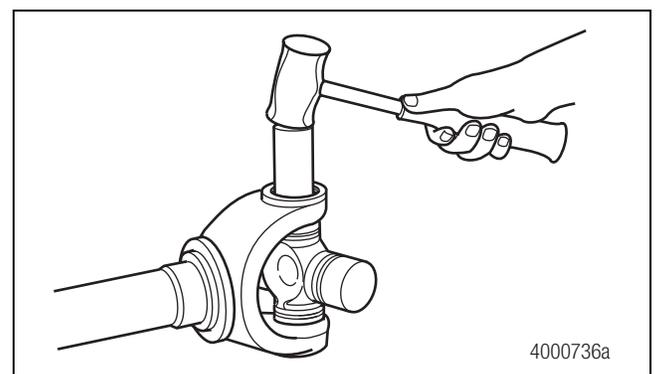
#### Disassemble

- Use snap ring pliers to remove the snap rings. Figure 10.3.



**Figure 10.3**

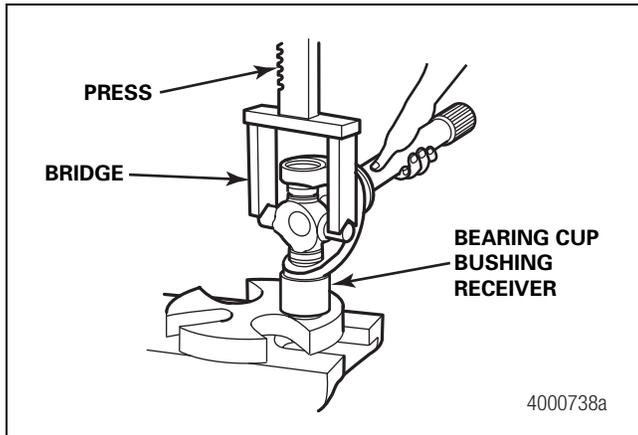
- If necessary, use a brass drift and lightly tap the center of the bushing to assist in snap ring removal. Figure 10.4.



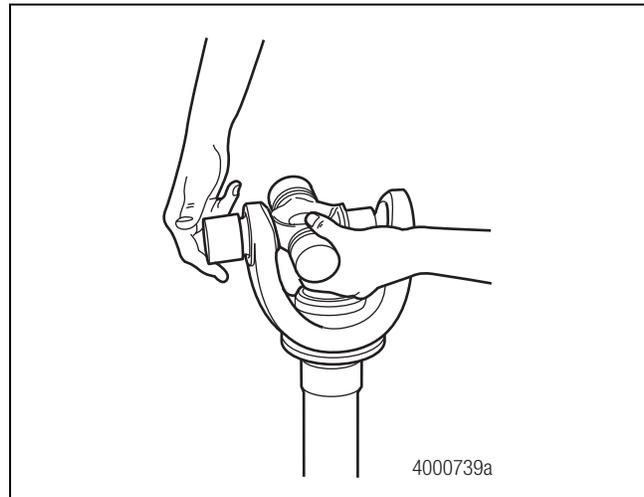
**Figure 10.4**

# 10 Inspection and Maintenance

- Repeat the previous step on the other side of the yoke.
- Use a press, bridge and bearing cup bushing receiver as shown in Figure 10.5. The bridge and bearing cup bushing receiver are detailed in Figure 10.6.

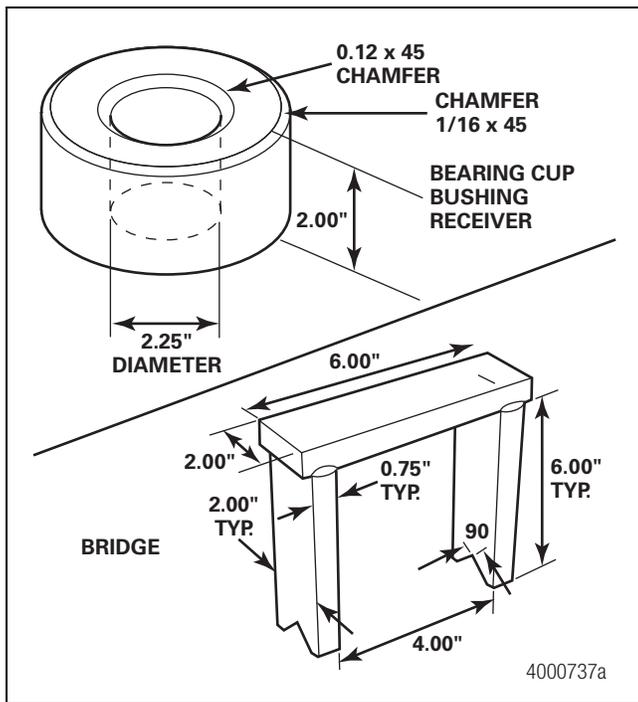


**Figure 10.5**

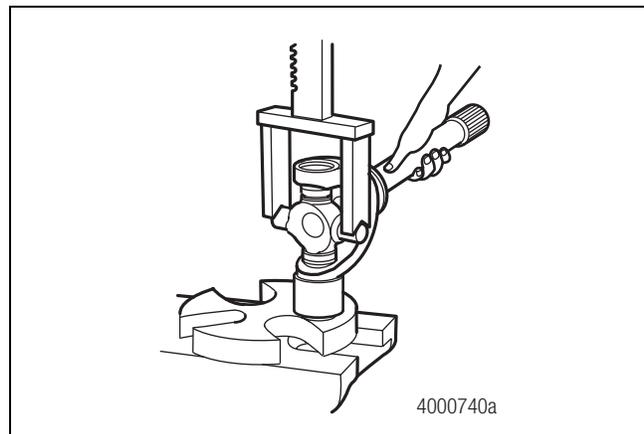


**Figure 10.7**

- Turn over the universal joint. Repeat the procedure for the opposite side of the universal joint. Figure 10.8.



**Figure 10.6**

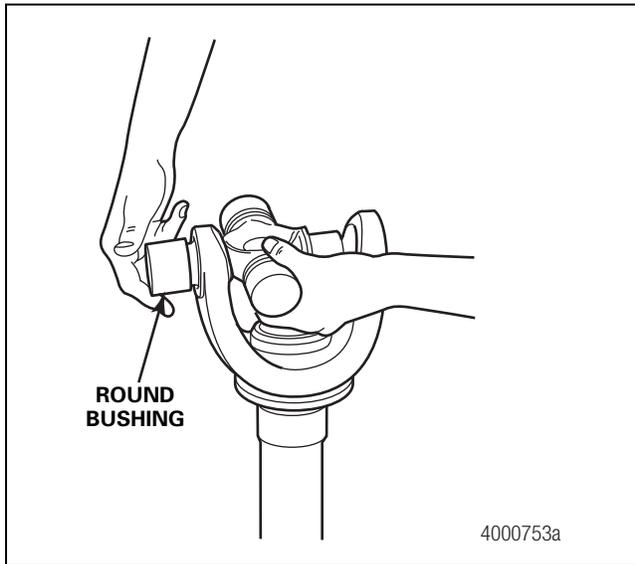


**Figure 10.8**

## Assemble

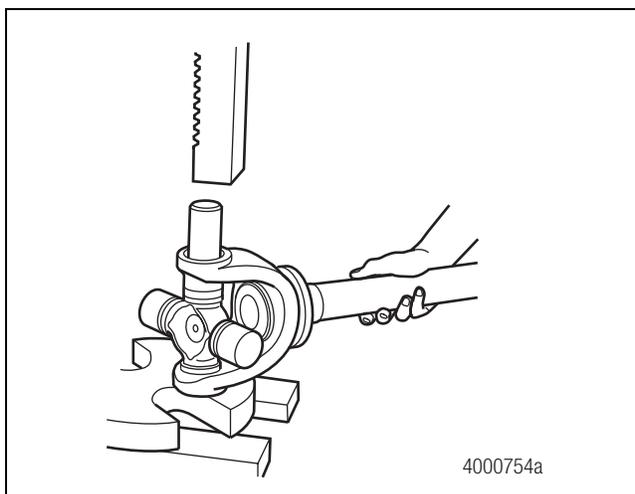
- Slide the first bushing onto the trunnion. Figure 10.9.

- Press down until the first round bushing is loose. Figure 10.5.
- Remove the round bushing. Figure 10.7.



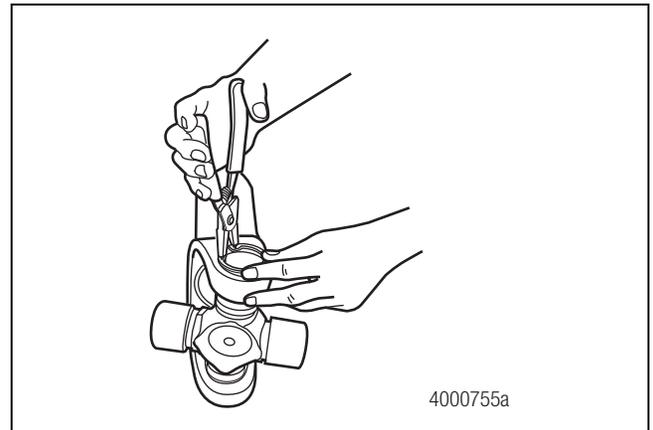
**Figure 10.9**

2. Press the first round bushing into the yoke slightly past the snap ring groove. Check that the bushing is aligned with the universal joint trunnion. Figure 10.10.



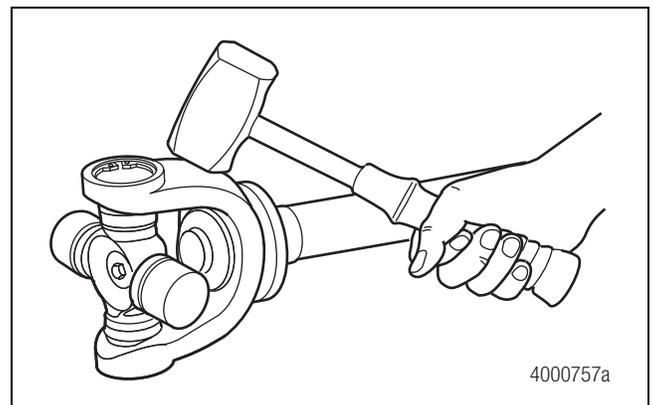
**Figure 10.10**

3. Use snap ring pliers to install the snap ring into the snap ring groove. You must fully seat the snap ring into the snap ring groove to avoid damage to the drive shaft. Figure 10.11.



**Figure 10.11**

4. Confirm that the snap ring is fully seated in the snap ring groove.
5. Repeat the previous four steps to install the remaining bushing into the yoke.
6. Lubricate the universal joint when the joint includes a grease fitting.
  - **If the universal joint does not move freely:** Strike the yoke ear with a brass or copper hammer. Figure 10.12.



**Figure 10.12**

### King Pins

#### Check Upper and Lower Knuckle Bushings

1. Park the vehicle on a level surface. Place blocks under the wheels not being serviced to prevent the vehicle from moving.
2. Raise the vehicle so that the wheels to be serviced are off the ground. Support the vehicle with safety stands.

## 10 Inspection and Maintenance

3. Check the upper king pin bushing for wear. Install the base of a dial indicator onto the axle beam. Place the indicator tip against the upper side of the knuckle. Figure 10.13.

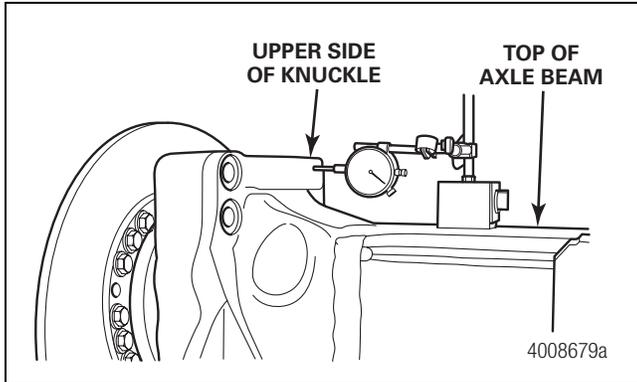


Figure 10.13

4. Set the dial indicator on ZERO.
5. Move the tire UP and DOWN.
  - **If the dial indicator moves a total of 0.020-inch (0.5 mm):** The upper bushing is worn or damaged. Replace both bushings in the knuckle.
6. Check the lower king pin bushing. Install a dial indicator so that the base is on the axle housing and the tip is against the bottom side of the knuckle.
7. Set the dial indicator on ZERO.
8. Move the tire UP and DOWN.
  - **If the dial indicator moves a total of 0.020-inch (0.5 mm):** The lower bushing is worn or damaged. Replace both bushings in the knuckle.

### Check the Steering Knuckle Vertical End Play

1. Park the vehicle on a level surface and block the wheels to prevent the vehicle from moving.
2. Use a jack to raise the vehicle until the wheels are off the ground. Support the axle with safety stands.
3. Install a dial indicator for each side of the axle beam.
  - A. Turn the wheels straight ahead.
  - B. Install the dial base onto the axle beam.
  - C. Place the dial indicator tip onto the upper king pin cap.

- D. Place a jack and a wood block, with a hole that allows clearance for the lower grease fitting, under the lower king pin cap area. Figure 10.14.

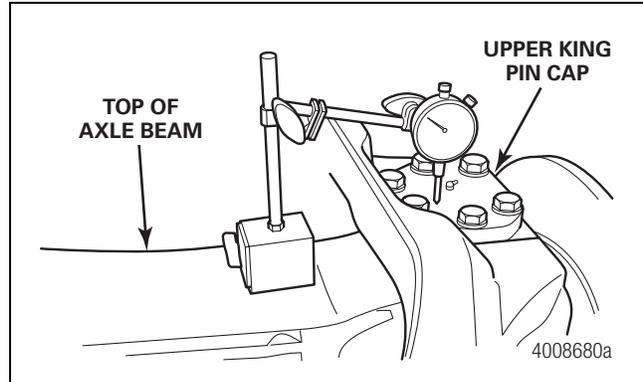


Figure 10.14

- E. Set the dial indicator on ZERO.
- F. Raise the jack until you start to lift the axle beam off the safety stands. Measure and record the dial indicator reading.
- G. Lower the jack.

**NOTE:** If the knuckle vertical end play exceeds 0.025-inch (0.64 mm) the axle shaft bushings should be inspected for wear in addition to the king pin thrust washers. Excessive end play may result in premature wear or component damage.

4. The reading must be less than 0.025-inch (0.64 mm). Figure 10.14. Add or remove shims from between the lower knuckle cap/steering arm and the housing to obtain the correct end play.

### Lubricate the King Pins

With the vehicle weight on the wheel end, pump grease through the grease fittings located on the upper and lower cap assemblies. Grease should purge between the knuckle and housing.

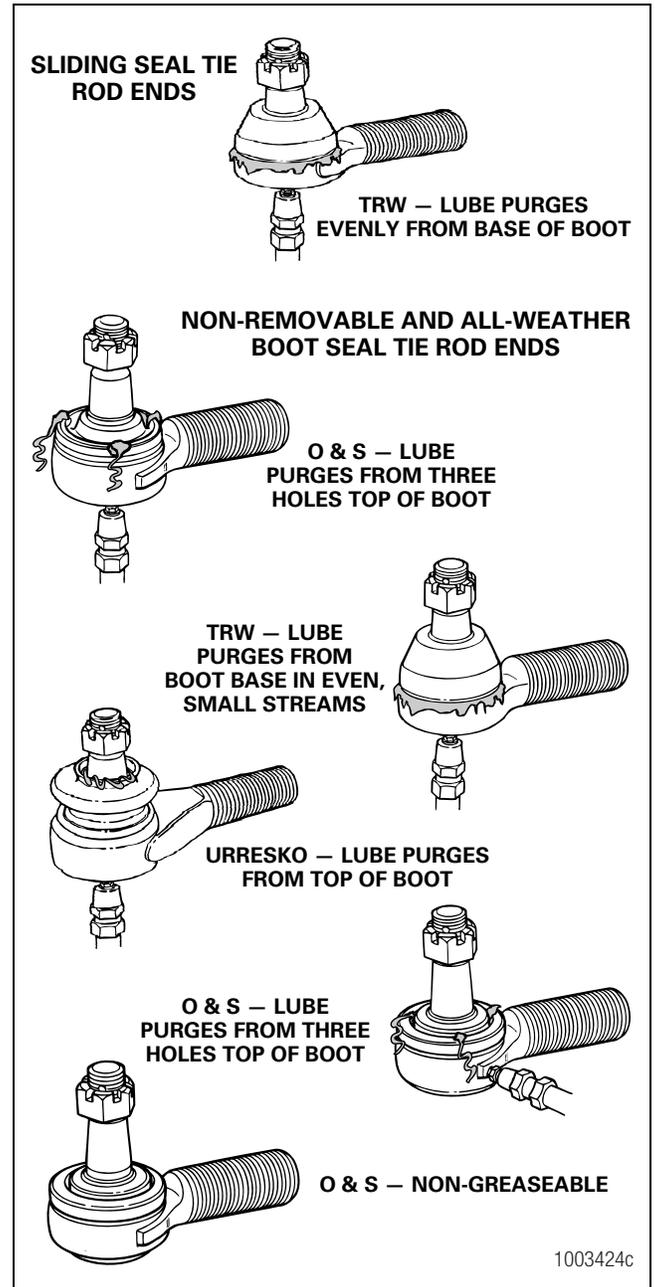
1. Verify that the vehicle weight is on the wheel end. Do not raise the vehicle.
2. Clean all grease fittings prior to lubrication.
3. Lubricate the king pins through the grease fittings located on the upper cap and lower cap.
4. Apply the specified grease until new grease purges through the seals and thrust bearing.

- **If new grease does not purge:** Perform the following procedure.
  - A. Remove the grease fitting and inspect for obstructions in the king pin cap.
  - B. Install a new grease fitting.
  - C. Continue the lubrication procedure.
    - **If grease still does not purge:** Disassemble the king pin cap and check for wear. If more than 0.04-inch (1 mm) of wear is found on the inner surface of the king pin cap, replace the components.

## Tie Rod Ends

### Lubricate the Tie Rods

1. Turn the vehicle wheels straight ahead.
2. Wipe the grease fitting and boot with shop towels.
3. Apply the specified grease at the grease fitting until new grease purges from the boot. If using air pressure, do not exceed 150 psi (1035 kPa). Grease should purge from the holes near the boot crimp or bellows area, usually at three or more places. Figure 10.15.



**Figure 10.15**

4. If new grease does not purge at the boot, perform the following procedure.
  - A. Remove the grease fitting.
  - B. Inspect the threaded grease fitting hole in the tie rod end and remove any obstructions.
  - C. Install a new grease fitting.

## 10 Inspection and Maintenance

D. Continue the lubrication procedure.

5. If new grease still does not purge at the seal, disassemble the cross tube, inspect the grease and components. Service as necessary.

### Check Tie Rod End Play

1. Park the vehicle on a level surface with the front wheels in the straight-ahead position.
2. Place blocks under the rear wheels to prevent the vehicle from moving.
3. Remove dirt and grease from the tie rod end seals.
4. Place the dial indicator base on the **BOTTOM** of the tie rod arm.
5. Place the indicator tip near the tie rod end grease fitting. Figure 10.16. Set the dial indicator on **ZERO**.

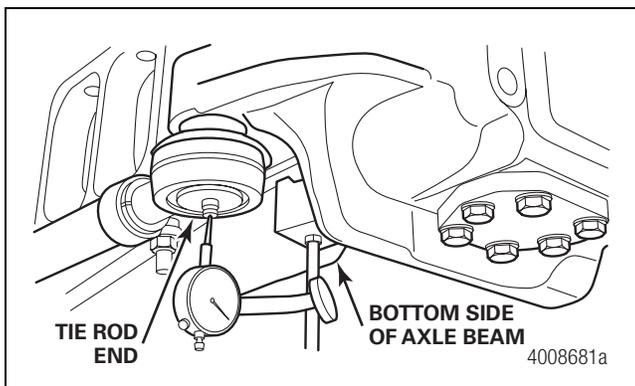


Figure 10.16

### ⚠ CAUTION

Check the tie rod end play by hand. Do not use a pry bar which can affect the accuracy of the dial indicator reading. Damage to components can result.

6. Move the tie rod and cross tube assembly **UP** and **DOWN** by hand. Record the dial indicator reading.
  - If the dial indicates a reading of more than 0.125-inch (3.175 mm): Replace the tie rod end.
7. Place the dial indicator on the tie rod end assembly at the opposite side of vehicle. Repeat Step 1 through Step 6.

### Inspect the Tie Rod Assembly for Movement

**NOTE:** Do not grease the tie rod assembly before you perform the inspection.

1. Park the vehicle on a level surface. Place blocks under the rear wheels to prevent the vehicle from moving.
2. Raise the front end of the vehicle off the ground. Support the vehicle with safety stands.
3. With the engine off, turn wheels from full left to full right, and then return to the straight-ahead position. This step will require more force for vehicles with the power steering off.

**NOTE:** The boot may be missing completely or may not completely cover the ball joint.

4. Check that the boot is in place and completely installed over the tie rod end.
5. Check for cracking or tears in the boot. Also check the boot seals for damage. Replace the entire tie rod end if the boot is damaged or missing. Figure 10.17.

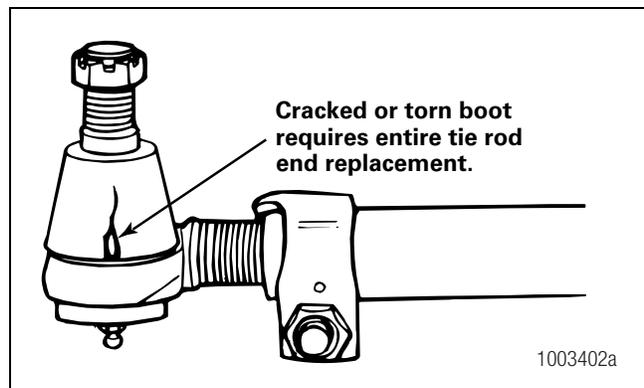


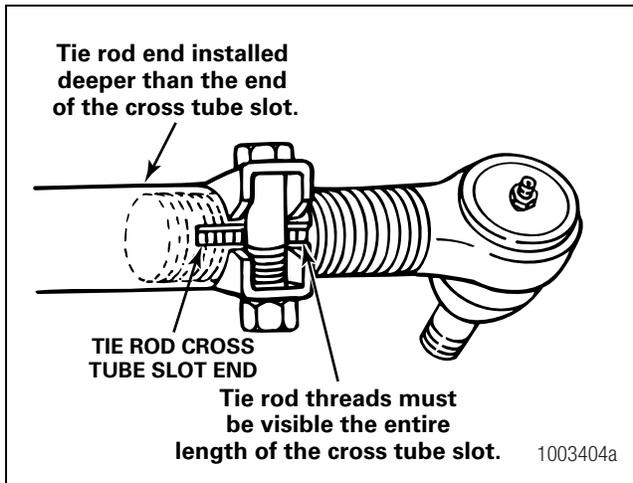
Figure 10.17

### ⚠ WARNING

Verify that a cotter pin is installed through the tie rod end, and the tie rod end nut is tightened to the correct torque specification. Replace a missing cotter pin and tighten a loose tie rod end nut. A missing cotter pin or loose tie rod end nut can cause loss of steering control. Serious personal injury and damage to components can result.

6. Check that the tie rod nut is installed and secured with a cotter pin.
  - If the cotter pin is missing: Check the nut torque specification. Install a new cotter pin. Always tighten the tie rod nut to the torque specified in Section 11 when installing the cotter pin. 🔧

7. Check that the tie rod end is threaded correctly into the cross tube and installed deeper than the end of the cross tube slot. The tie rod end must be visible the entire length of the cross tube slot. Figure 10.18.



**Figure 10.18**

8. Check that grease fittings are installed. Replace a damaged grease fitting.
9. By hand or using a pipe wrench with jaw protectors to avoid gouging the cross tube, rotate the cross tube toward the FRONT of the vehicle and then toward the REAR.
  - **After rotating:** Center the cross tube.
  - **If the cross tube will not rotate in either direction:** Replace both tie rod ends.
10. Position yourself directly underneath the ball stud socket. Grasp the end of the tie rod assembly with both hands as close as possible to the socket. Your hands should be within 6-inches (152.4 mm) of the socket.

### **CAUTION**

**Only use your hands to check for movement or looseness of the tie rod assembly. Do not use a crow bar, pickle fork or two-by-four. Do not apply pressure or force to tie rod assembly ends or joints. Do not rock the tires with the vehicle on the ground or with the wheels raised. Damage to components can result.**

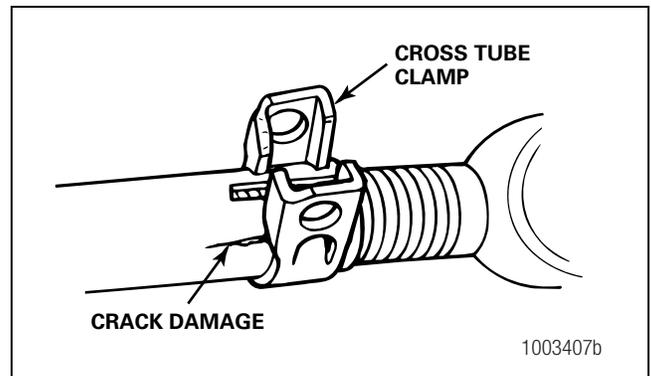
11. Use a push-pull movement to apply approximately 100 pounds (45 kg) of hand pressure several times to the tie rod assembly. Check for movement or looseness at both tie rod ends.

- **If there is movement or looseness in the tie rod assembly:** Replace both tie rod ends.

### **CAUTION**

**Replace bent or damaged cross tubes with original equipment parts of the same length, diameter and threads. Do not attempt to straighten a bent cross tube. Damage to components can result.**

12. Inspect the cross tube and clamps for damage. Figure 10.19.
  - **If the cross tube is bent or cracked:** Replace it. Use original equipment parts of the same length, diameter and threads.
  - **If the clamps are damaged:** Replace them.
  - **If either clamp has become welded to the cross tube:** Replace the entire cross tube assembly. Use original equipment parts of the same length, diameter and threads.



**Figure 10.19**

## Servicing the Tie Rod End

Use a service pit, if available. Otherwise, use one of the following procedures.

1. Park the vehicle on a level surface. Place blocks under the wheels not being serviced to prevent the vehicle from moving.
2. Raise the vehicle so that the area to be serviced is off the ground. Support the vehicle with safety stands.
3. Inspect and lubricate the tie rod ends.

## Ramps

1. Drive the vehicle onto ramps. Follow the ramp manufacturer's instructions.
2. Inspect and lubricate the tie rod ends.

### Why It's Important to Inspect the Tie Rod Ends for Wear and Allowable Movement at Regularly-Scheduled Intervals

You may not be able to detect loose or worn tie rod ends during operation. Under normal operating conditions, wear occurs over time. The preload bearings inside each tie rod end provide less resistance, which can affect steering control, front tire wear and other axle components. Figure 10.20.

Regularly-scheduled inspection and maintenance helps to minimize the effects of tie rod end wear on the vehicle. Figure 10.20.

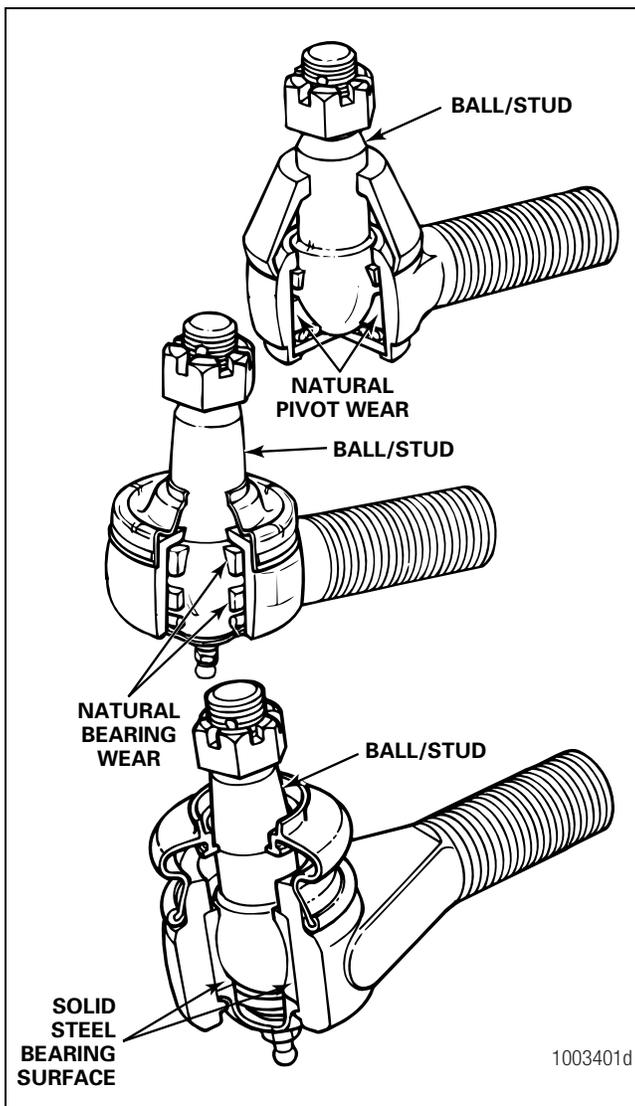


Figure 10.20

## Wheel End Alignment

### Inspection

#### Before Alignment

Check the following before doing a front wheel alignment.

#### Wheels and Tires

1. Verify that the tires are inflated to the specified pressure.
2. Verify that the tires are the same size and type.
3. Verify that the lug nuts are tightened to the specified torque.
4. Verify that the wheels are balanced.
5. Check for bent or damaged wheels.

#### Rear Axle and Rear Suspension

Front tire wear can be caused by the rear axle. If the outer edge of one front tire is worn and the inner edge of the other front tire is worn, check the following.

1. Verify that all fasteners are tightened to the specified torque.
2. Verify that the leaf springs are not worn or damaged.
3. Verify that the bushings in the leaf springs are not worn or damaged.
4. Verify that the torque rods, if used, are correctly adjusted.
5. Verify that the frame is not bent.
6. Verify that the rear axle, especially a tandem axle, is correctly aligned. Refer to the vehicle or suspension manufacturer's information for correct procedures.
7. Refer to any additional rear axle and suspension recommendations and specifications from the vehicle manufacturer.

### Adjustment

#### Wheel Alignment

Check the wheel alignment:

- Every 3,000 hours of operation.
- When the vehicle does not steer correctly.
- To correct a tire wear condition.

### Wheel Alignment

Perform a wheel alignment to correct steering and tire wear conditions using the following procedure.

1. Inspect all the systems that affect the wheel alignment.
2. Check and adjust the wheel bearings.
3. Check and adjust the maximum turn angle, if adjustable.
4. If the vehicle has power steering, check and adjust the pressure relief in the power steering system.
5. Check and adjust the turning radius angle, toe-out on turns or Ackerman angle.
6. Check the steering axis or king pin inclination.
7. Check the camber angle.

#### WARNING

**Axle camber angle is not adjustable. Do not change the axle camber angle or bend an axle beam to change the axle camber angle. A bent axle beam reduces axle strength, affects vehicle operation and voids Meritor's warranty. Serious personal injury and damage to components can result.**

8. Check the caster angle.
9. Check and adjust the toe-in.

### Maximum Turn Angle

#### CAUTION

**Do not exceed the maximum turn angle specified by the vehicle manufacturer. Damage to the cross tube and the tie rod ends will result.**

The stop bolt, if equipped, on the back of the knuckle controls the maximum turn angle. If the stop bolt is missing, bent or broken, the system requires adjustment.

Use an alignment machine to check the angle if the front tires rub against the frame, or if the steering gear has been serviced. Refer to the alignment equipment manufacturer's procedures.

The stop bolt should always have a minimum clearance of 1/16-inch (1.5 mm). Stop bolt contact is acceptable if no other stops are used for the maximum turn angle of the steering knuckle.

If the steering system is out-of-adjustment, inspect the steering arm for damage.

1. Use a magnetic particle or liquid dye penetrant inspection procedure to inspect the steering arm, especially the bend area.
2. Refer to the vehicle manufacturer's manual for additional inspection procedures.

In power steering systems, the hydraulic pressure should relieve or "drop off" at the steering stroke with 1/16-inch (1.5 mm) minimum clearance at the stop bolt. If the pressure does not relieve, damage to the front components will result. Refer to the vehicle manufacturer's manual for adjustment procedures.

### Measure and Adjust the Toe

#### WARNING

**Incorrect toe settings affect tire wear. If the axle assembly is bent to change camber, the strength of the axle is reduced and the warranty is voided. An axle will be damaged by bending and may cause a vehicle accident resulting in serious personal injury.**

Toe is the relationship of the distance between the front of the front tires and the rear of the front tires.

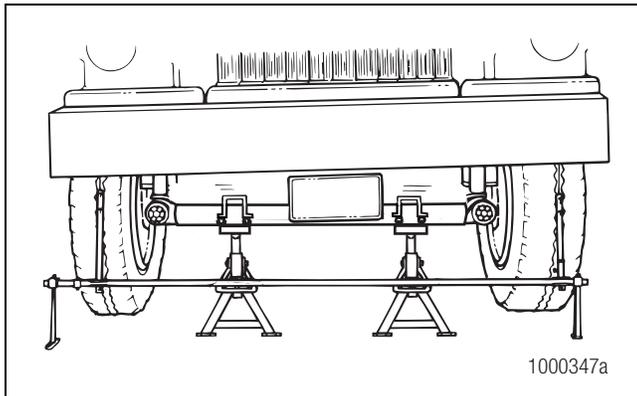
When the front distance is less than the rear distance, the wheels are toed in. Toe-in is designed into the vehicle to counteract the tendency of the tires to toe-out when the vehicle is driven.

Incorrect toe setting will result in rapid tire wear. The toe setting for part-time 4x4 or 6x6 vehicles depends on the vocation. Frequent front-drive axle use requires a nominal toe-out setting, while infrequent front-drive axle use requires a nominal toe-in setting.

Contact the vehicle manufacturer for the correct toe settings. If no reference material is available, total toe on the 48" (1200 mm) diameter tires should be  $0 \pm 0.0625"$  (1.6 mm).

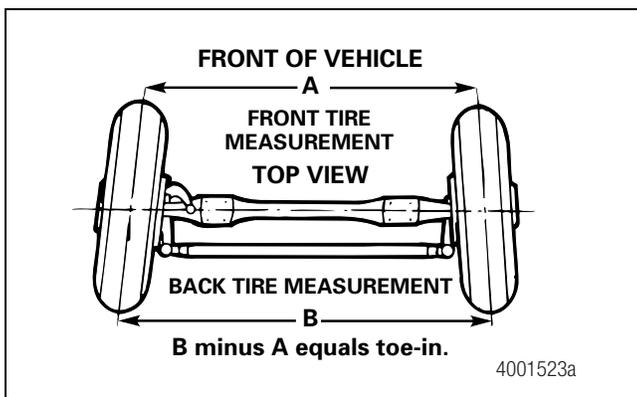
1. Park the vehicle on a level surface. Place blocks under the rear wheels to prevent the vehicle from moving.
2. Raise the vehicle so that the front tires are off the ground. Support the front axle with safety stands.
3. Use paint or chalk to mark the center area of both front tires around the complete outer surface of the tire.
4. Place the pointers of a trammel bar on the marks of each tire. Rotate the tires. Verify that a straight line is marked on the outer surface of the tire. Figure 10.21.

## 10 Inspection and Maintenance



**Figure 10.21**

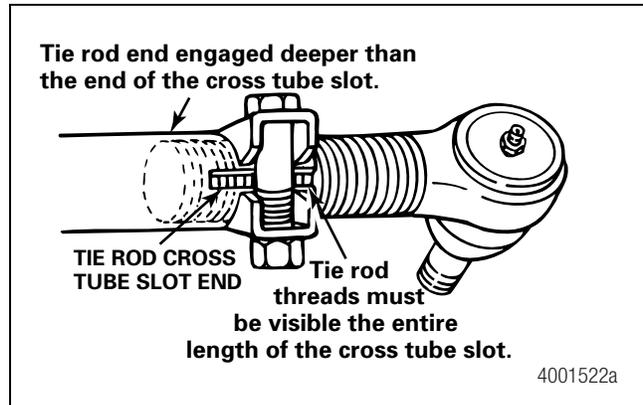
5. Lower the vehicle to the floor. Do not measure toe with the front axle in the raised position. Move the vehicle FORWARD and BACKWARD 10 feet (3 meters).
6. Place the trammel bar at the back of the tires. Raise the pointers so that the pointers are level with the spindles. Align the pointers with the marks on the tires. Measure and record the distance between the pointers.
7. Repeat Step 6 for the front of the tires.
8. To obtain the toe measurement, subtract the distance between the front of the tires from the distance between the back of the tires. Figure 10.22.



**Figure 10.22**

9. Perform the following procedure if toe measurement is not within specification.
  - A. Loosen the tube clamp nut and bolt on each end of the cross tube.
  - B. Turn the cross tube until the specified toe-in distance is obtained.

- C. Install the threaded portion of the tie rod end into the cross tube beyond the point where the tube slot stops. Figure 10.23.



**Figure 10.23**

- D. Tighten the nut and bolt on each end of the cross tube to the torque specified in Section 11.
- E. Repeat Step 1 through Step 8 to check the toe-in dimension.

### Lubricant Specifications and Maintenance Intervals

Meritor recommends using a lubricant analysis program. The schedules listed below should be used in combination with lubricant analysis as a foundation for establishing a maintenance schedule that provides the optimum equipment performance with minimal down time for any particular fleet. Perform lubricant analysis at regularly-scheduled preventive maintenance intervals.

For complete information on lubricating drive axles and carriers, refer to Maintenance Manual 1, Preventive Maintenance and Lubrication. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

Refer to Table A and Table B for standard information on lubricants, schedules and capacities.

**Table A: Lubricant Cross Reference, Viscosity and Temperature Chart**

Meritor Lubricant Specification	Description	Cross Reference	Minimum Outside Temperature	Maximum Outside Temperature
O-76-A	Hypoid Gear Oil	GL-5, S.A.E. 85W/140	10°F (-12.2°C)	*
O-76-B	Hypoid Gear Oil	GL-5, S.A.E. 80W/140	-15°F (-26.1°C)	*
O-76-D	Hypoid Gear Oil	GL-5, S.A.E. 80W/90	-15°F (-26.1°C)	*
O-76-E	Hypoid Gear Oil	GL-5, S.A.E. 75W/90	-40°F (-40°C)	*
O-76-J	Hypoid Gear Oil	GL-5, S.A.E. 75W	-40°F (-40°C)	35°F (1.6°C)
O-76-L	Hypoid Gear Oil	GL-5, S.A.E. 75W/140	-40°F (-40°C)	*
M50-705	Multi-Purpose Grease (NLGI Grade 2)	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.	

\*There is no upper limit on these outside temperatures, but the axle sump temperature must never exceed 250°F (121°C).

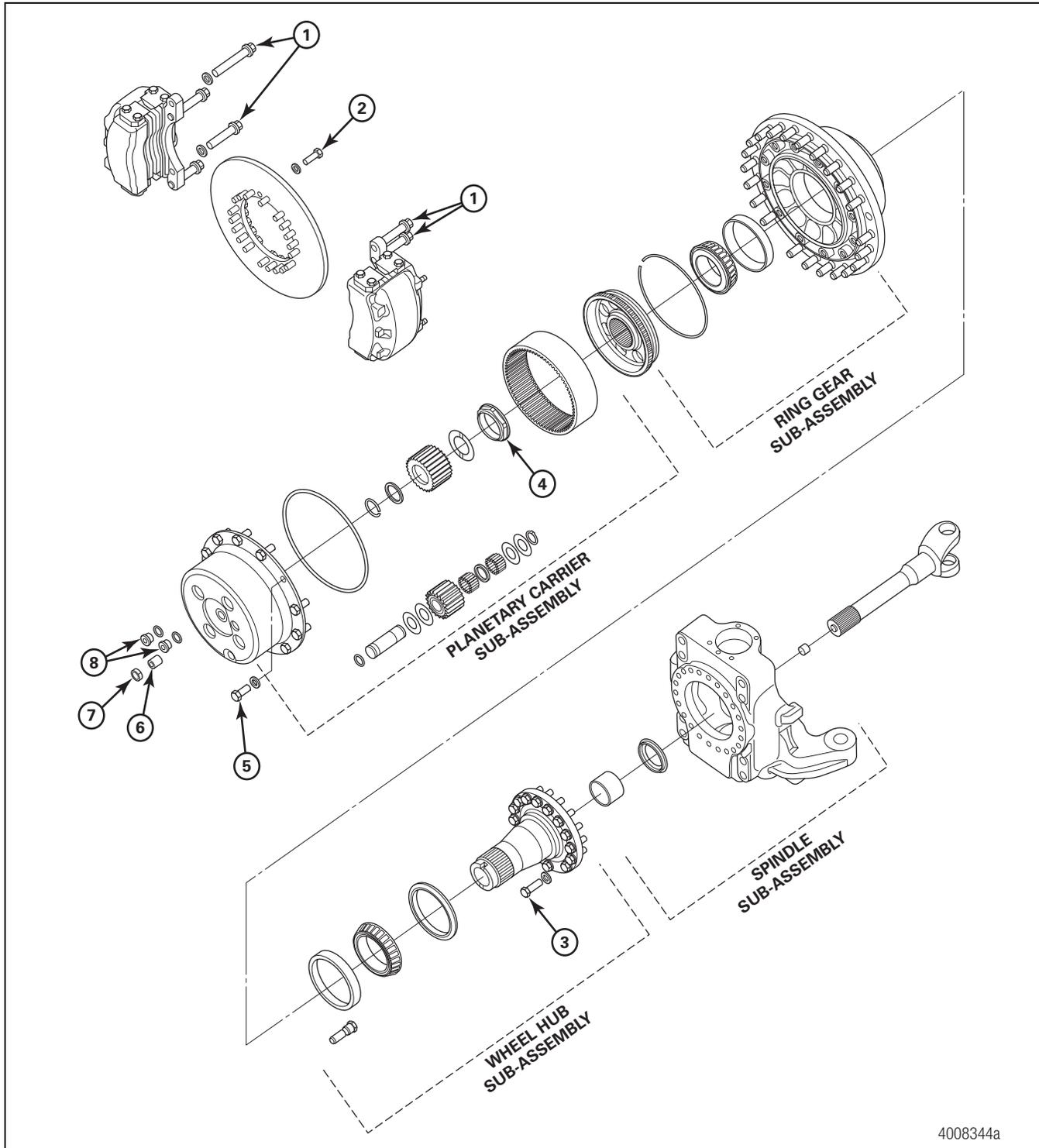
**Table B: Intervals**

Component/Operation	Maintenance Interval (whichever comes first)		
	Miles Driven, or	Months, or	Hours of Operation
<b>Axle/Wheel End</b>			
Check Wheel End Oil Level	1,000	1	250
Check Axle Oil Level	5,000		
Detailed Visual Inspection of the Entire Axle	10,000	6	
Inspect the Carrier Thrust Screw			
Change Oil in Carrier and Wheel Ends	25,000	12	1,500
Check Hub Bearing End Play			
<b>Steering Components</b>			
Inspect Tie Rod Ends	100,000	24	6,000
Lubricate Tie Rod Ends			
Inspect King Pins			
Lubricate King Pins			
Lubricate Axle Shaft Joints			
Check Toe Setting			
<b>Brakes</b>			
Basic Visual Inspection	12,500	3	250
Detailed Inspection	50,000	12	1,000

# 11 Specifications

## Torque Specifications

### MOX-H2 Planetary Wheel End



4008344a

Figure 11.1

**Table C: Torque Specifications**

Item	Description	Thread Size	Torque Range		Nominal Torque	
			Lb-Ft	N•m	Lb-Ft	N•m
1	Caliper-to-Knuckle Bolt	7/8" UNC	504-617	684-836	560	760
2	Rotor-to-Hub Bolt	M16x2	192-235	260-318	213	289
3	Spindle-to-Knuckle Bolt	M16x2	192-235	260-318	213	289
4	Wheel Bearing Nut	M80x2	133-162	180-220	148	200
5	Planetary Carrier-to-Hub Bolt	M16x2	229-254	311-344	241	327
6	Thrust Screw	M22x1.5	10 lb-ft (13 N•m) then back off 1/4 turns (90 degrees)			
7	Thrust Screw Jam Nut	M22x1.5	132-179	179-243	156	211
8	Oil Plugs, Planetary Carrier	M24x1.5	44-74	60-100	60	80

# 11 Specifications

## MOX-N5/MOX-P8 Planetary Wheel End

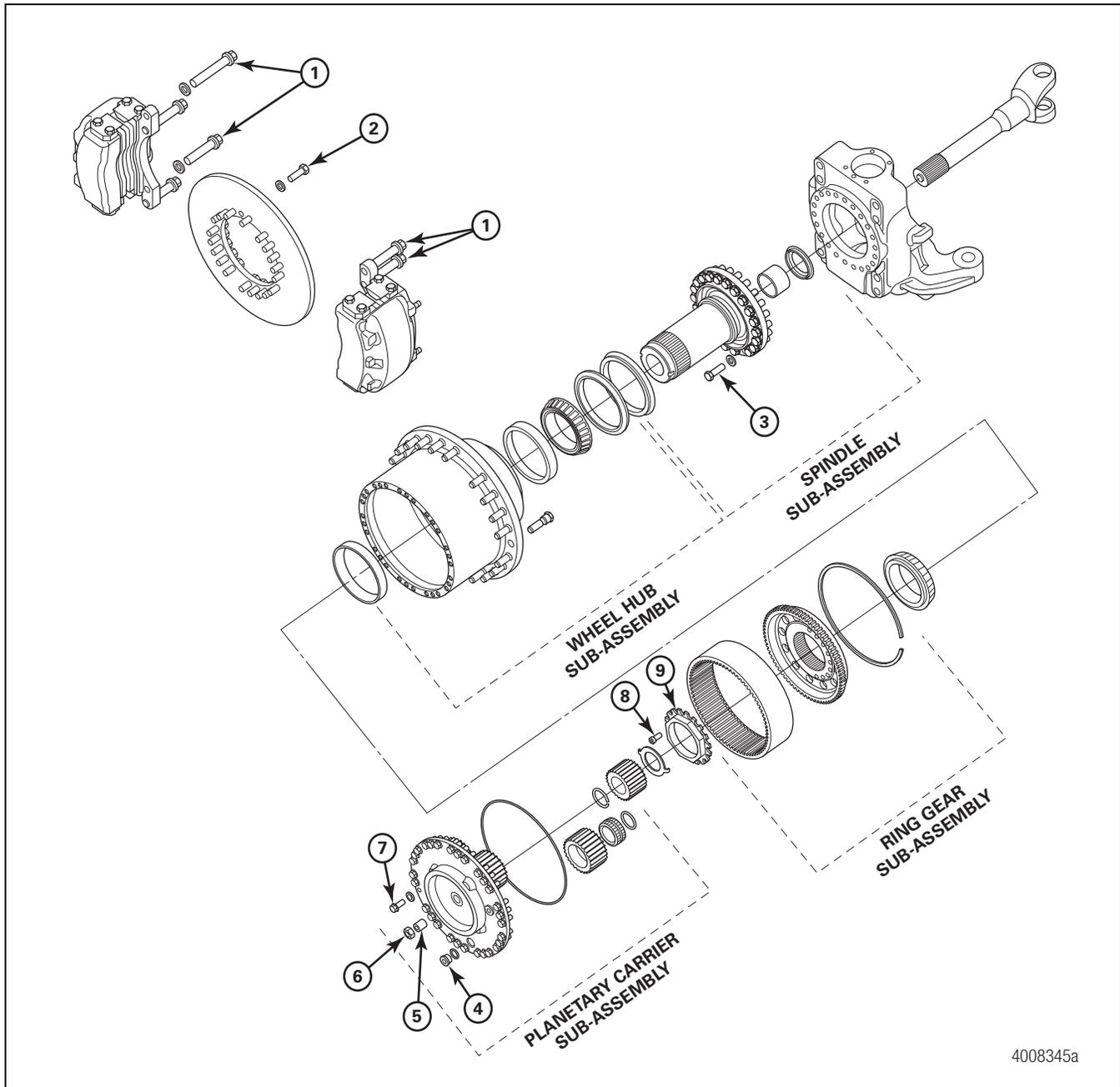


Figure 11.2

Table D: Torque Specifications

Item	Description	Thread Size	Torque Range		Nominal Torque	
			Lb-Ft	N•m	Lb-Ft	N•m
1	Caliper-to-Knuckle Bolt	7/8" UNC	504-617	684-836	560	760
2	Rotor-to-Hub Bolt	M16x2	192-235	260-318	213	289
3	Spindle-to-Knuckle Bolt	M16x2	192-235	260-318	213	289
4	Oil Plugs, Planetary Carrier	M24x1.5	44-74	60-100	60	80
5	Thrust Screw	M22x1.5	10 lb-ft (13 N•m) then back off 90 degrees or 1/4 turn			
6	Thrust Screw Jam Nut	M22x1.5	132-179	179-243	156	211
7	Planetary Carrier-to-Hub Bolt	M12x1.75	92-103	125-139	97	132
8	Wheel Bearing Nut Lock Bolt	M10x1.5	44-54	60-73	49	67
9	Wheel Bearing Nut	M115x2	266-325	360-440	295	400

# 11 Specifications

## Axle Assembly

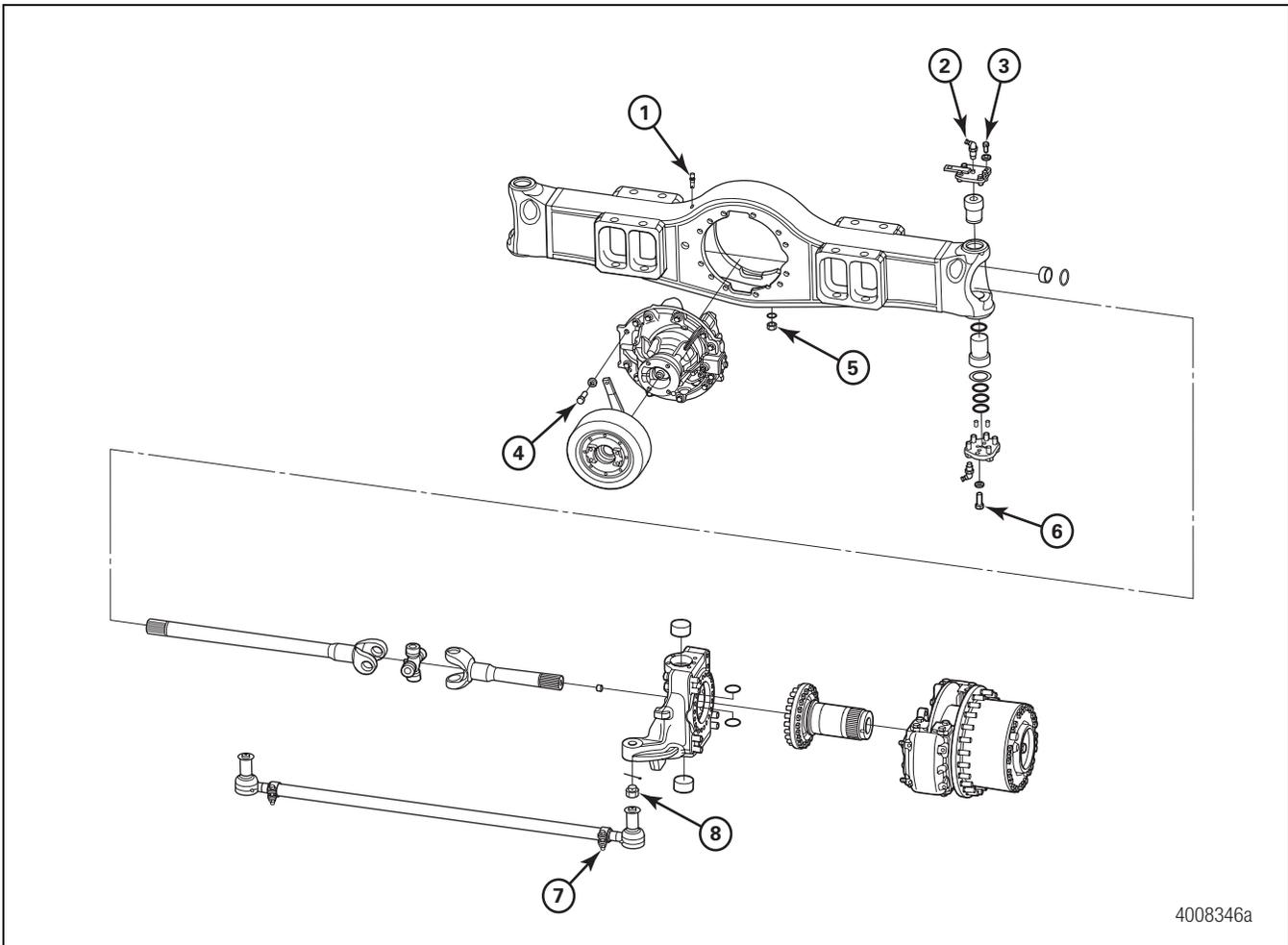


Figure 11.3

Table E: Torque Specifications

Item	Description	Thread Size	Torque Range		Nominal Torque	
			Lb-Ft	N•m	Lb-Ft	N•m
1	Breather	3/8" NPTF	44-79	5-9	62	7
2	Grease Fitting	1/8" NPTF	36-53	4-6	44	5
3	Upper Cap-to-Knuckle Bolt	M12x1.75	77-94	105-128	86	116
4	Carrier-to-Housing Bolt	M16x2	192-235	260-318	214	289
5	Fill/Drain Plug	M24x1.5	44-74	60-100	60	80
6	Lower Cap-to-Knuckle Bolt	M16x2	192-235	260-318	214	289
7	Tie Rod Clamp Bolt	5/8" UNC	110-130	149-176	120	163
8*	Tie Rod End Castle Nut (H2 Model)	7/8" UNF	120-146	163-198	133	180
	Tie Rod End Castle Nut (N5 Model)	1-1/4" UNF	230-281	312-381	256	347
	Tie Rod End Castle Nut (P8 Model)	1-1/2" UNF	300-366	407-496	333	451

\*If necessary, advance the nut to align the cotter pin.

## 12 Special Tools

### Special Tools

To obtain these tools, call ArvinMeritor's Commercial Vehicle Aftermarket at 888-725-9355.

#### MOX-H2 Wheel Bearing Nut Socket Wrench (OTC 1926)

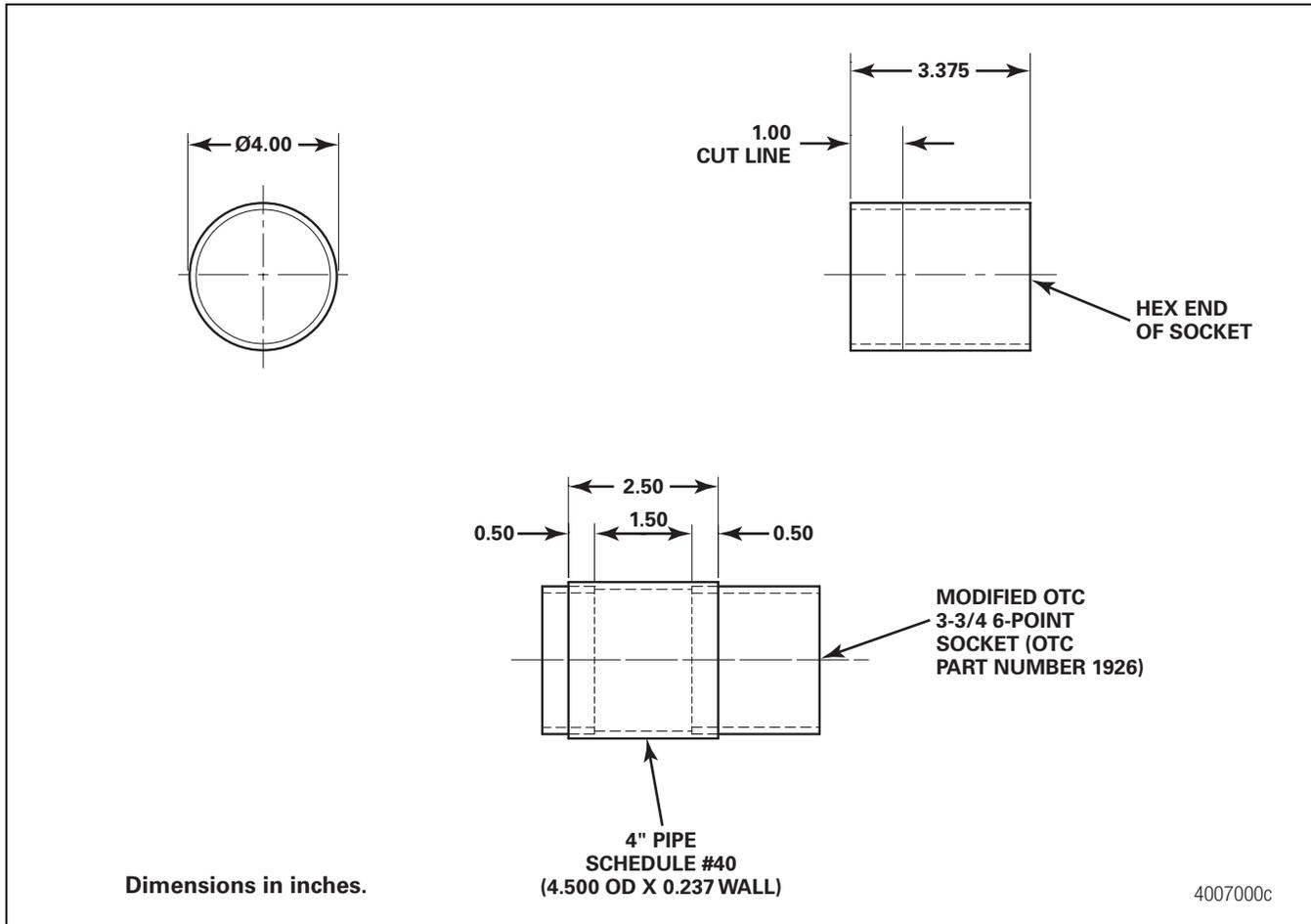


Figure 12.1

MOX-N5/P8 Wheel Bearing Nut Socket Wrench

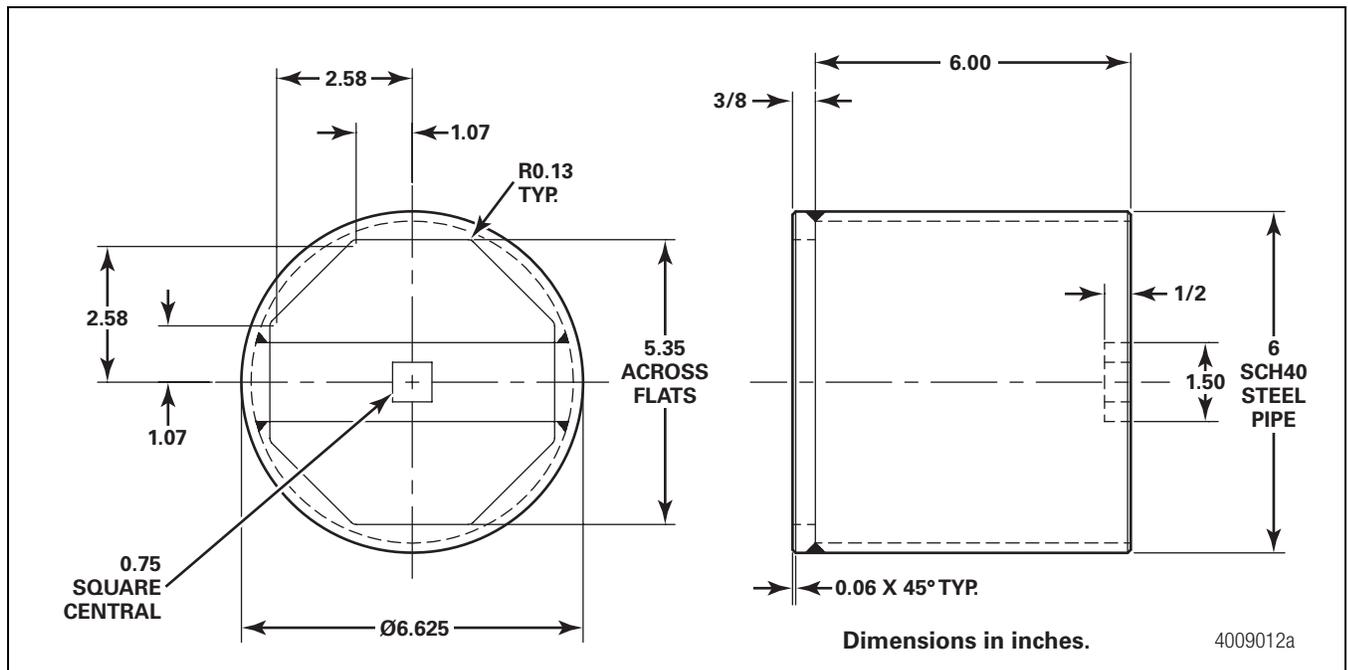


Figure 12.2

## 12 Special Tools

### MOX-N5/P8 Metal Face Seal Insert Tool

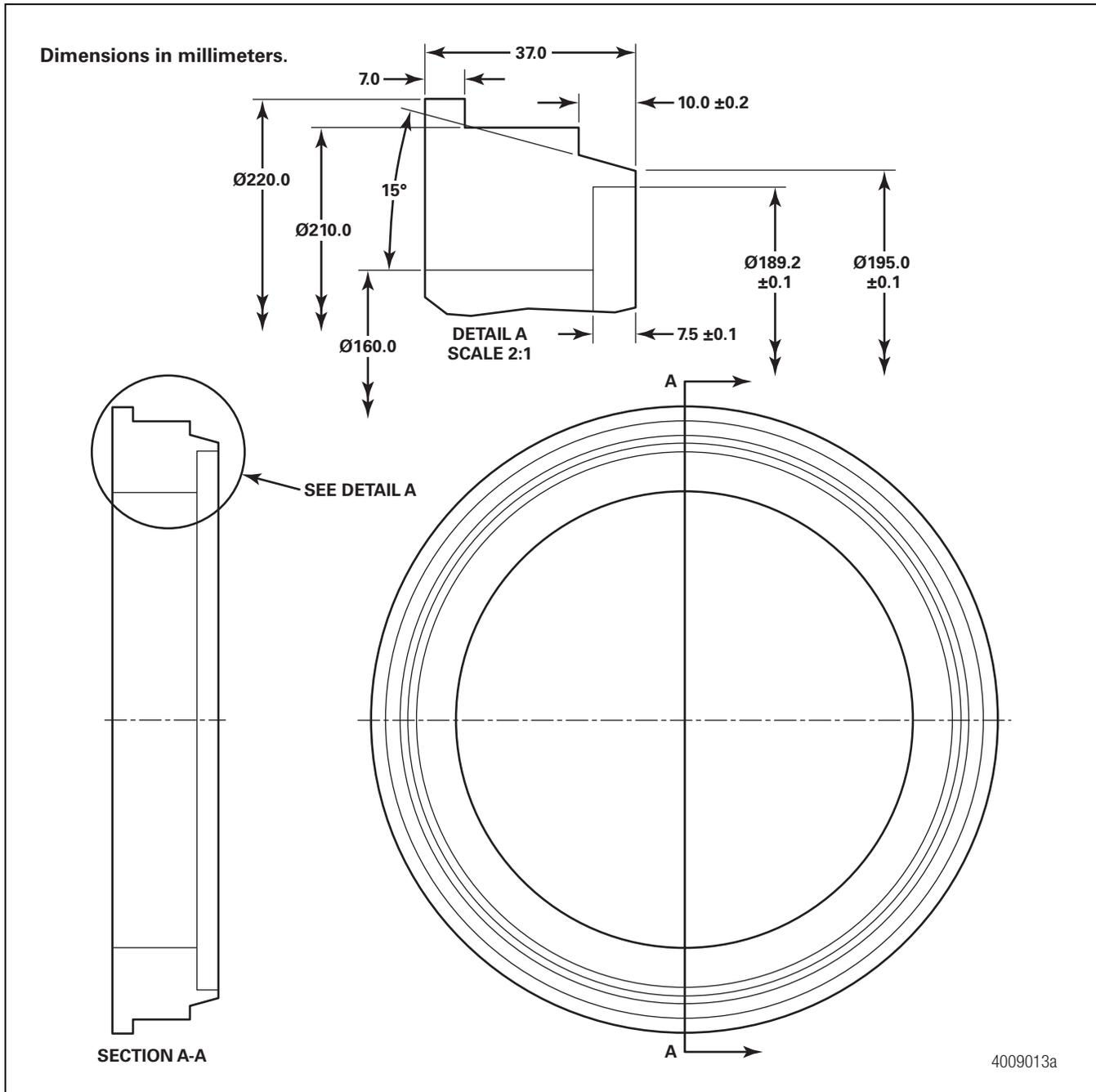


Figure 12.3

MOX-N5/P8 Metal Face Seal Outside Diameter Guide Tool

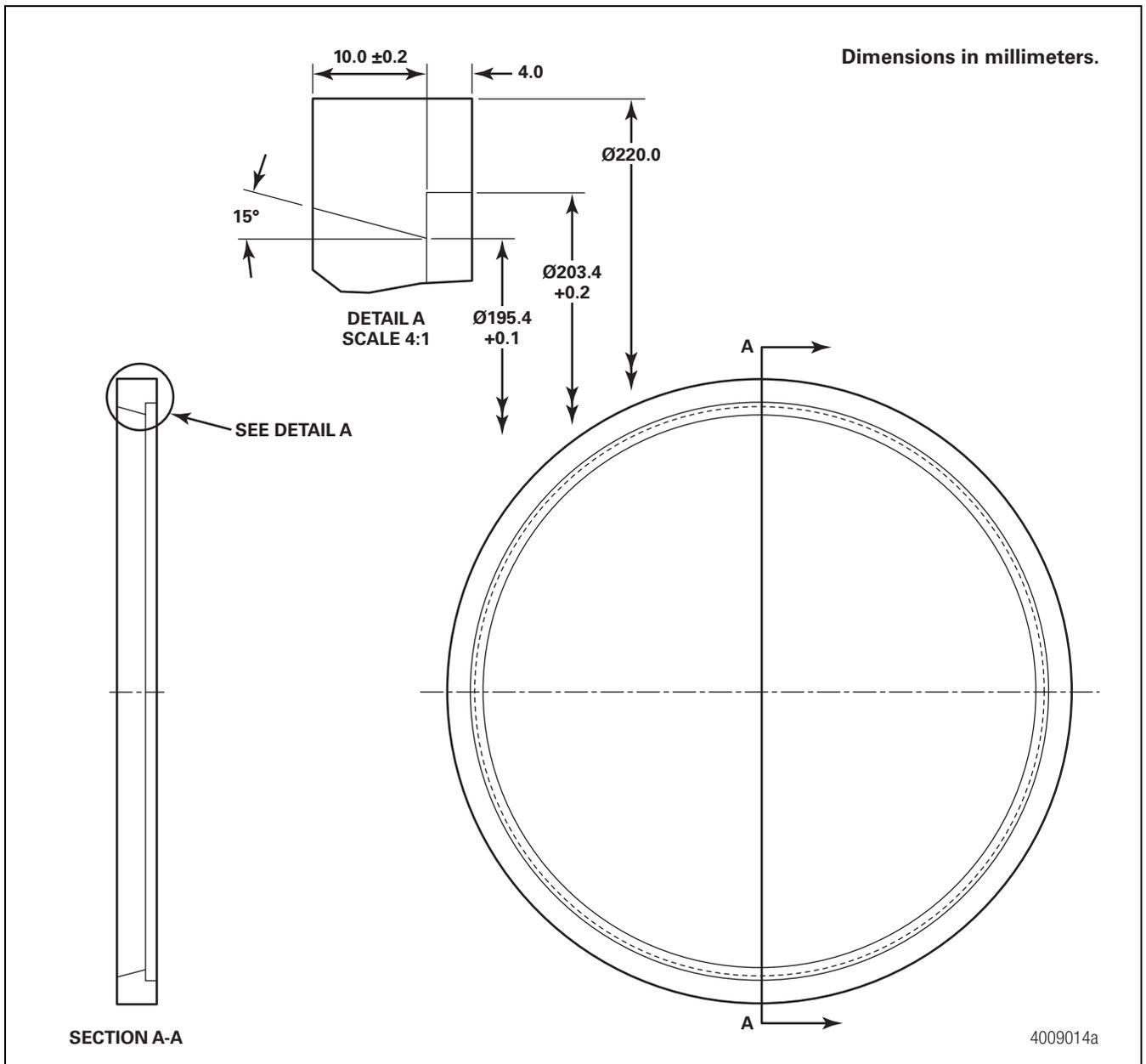


Figure 12.4

## 12 Special Tools

### MOX-N5/P8 Metal Face Seal Inside Diameter Guide Tool

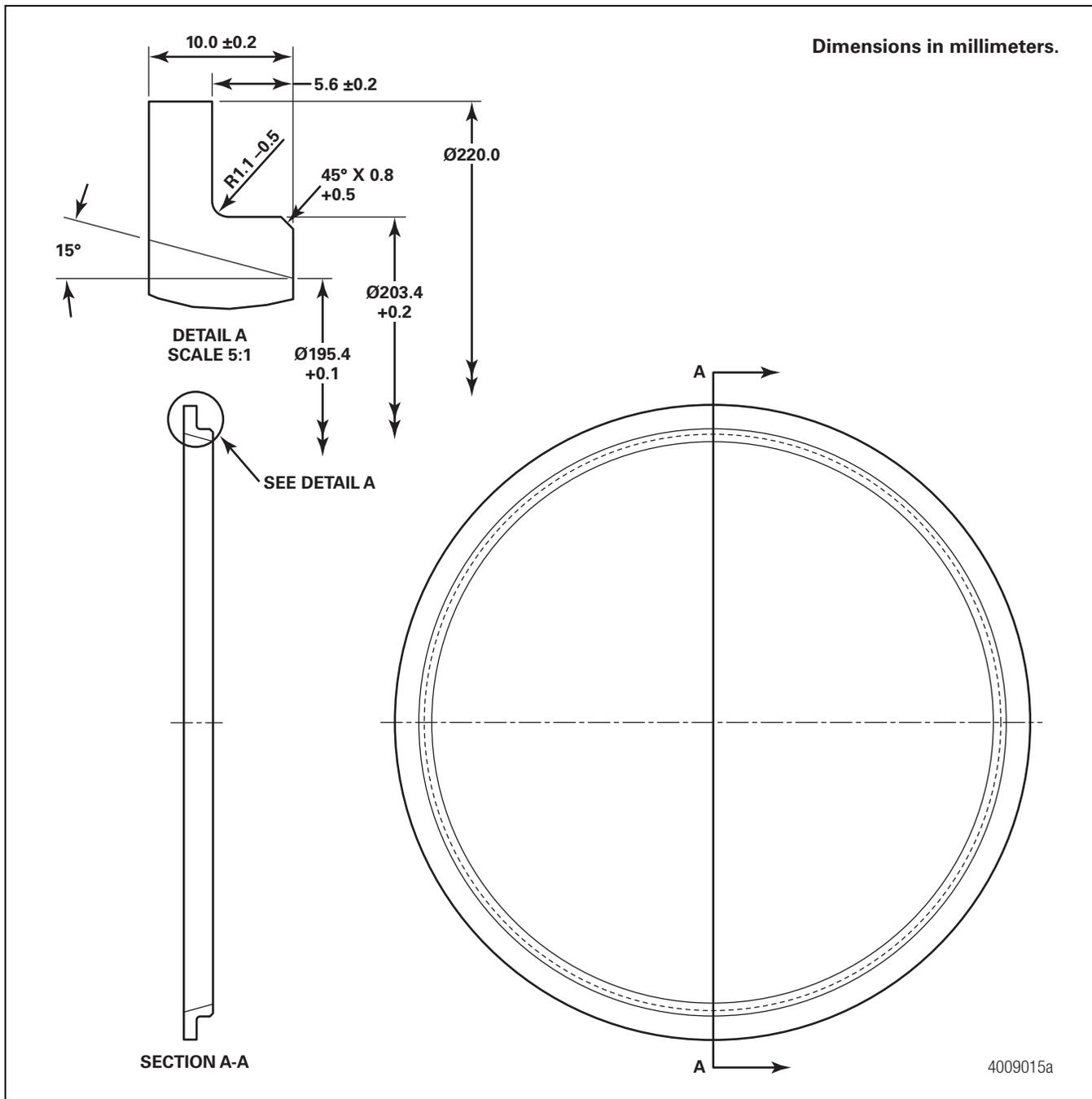


Figure 12.5

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