

Maintenance Manual MM-0170

# Medium-Duty Front Drive Steer Axles

**MX-120 and MX-120-EVO Series**

**Applies to 120 Standard and 120-HR High-Retardation Carriers**

Revised 02-17



# Service Notes

## About This Manual

This manual provides maintenance and service information for Meritor MX-120 and MX-120-EVO Series medium-duty front 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, Service and Product Information

Visit Literature on Demand at [meritor.com](http://meritor.com) to access and order additional information.

Contact the Meritor OnTrac™ Customer Call Center at 866-668-7221 (United States and Canada); 001-800-889-1834 (Mexico); or email [OnTrac@meritor.com](mailto:OnTrac@meritor.com).

## If Tools, Supplies and Kits are Specified in This Manual

Contact Meritor's Commercial Vehicle Aftermarket at 888-725-9355.

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pg. i	<b>Asbestos and Non-Asbestos Fibers</b>	pg. 36	Installation
1	<b>Section 1: Exploded Views</b>		Drive Flange and Hubcap
	MX-120 and MX-120-HR Series		Assembly
5	MX-120-EVO Series		Slack Adjuster
9	<b>Section 2: Introduction</b>	38	Adjustment
	Overview		Brakes
	MX Series Medium-Duty Front Drive Steer Axles	<b>39</b>	<b>Section 7: Assembly and Installation -</b>
	Model Nomenclature		<b>MX-120-EVO Series</b>
	Axles		Prepare Parts for Assembly
11	<b>Section 3: Removal and Disassembly -</b>	41	Check Steering Knuckle Turning Torque
	<b>MX-120 and MX-120-HR Series</b>		Installation
	Removal		Axle Shaft Through the Steering Knuckle
	Wheel from the Drum		Assembly
18	<b>Section 4: Removal and Disassembly -</b>		Spindle, Brake Assembly and Dust Shield to the Steering
	<b>MX-120-EVO Series</b>		Knuckle
	Removal	43	Installation
	Wheel from the Drum		Wheel Bearings Into the Hub
26	<b>Section 5: Prepare Parts for Assembly</b>		Hub Onto the Axle
	Clean	44	Adjustment
	Ground and Polished Parts		Wheel Bearings
	Rough Parts	45	Wheel Speed Sensors on Units Equipped with ABS
	Axle Assemblies		Installation
	Dry Cleaned Parts		Drive Flange and Hubcap
	Corrosion Protection	46	Assembly
	Cleaned Parts		Slack Adjuster
	Inspection	47	Adjustment
	Parts		Brakes
28	Repair or Replace Parts	<b>48</b>	<b>Section 8: Adjustment</b>
29	Applying Adhesive and Silicone Gasket Material		Inspection
	Silicone (RTV) Gasket Material		Adjustment
30	<b>Section 6: Assembly and Installation -</b>		Front Wheel Alignment
	<b>MX-120 and MX-120-HR Series</b>		Check and Adjust
	Prepare Parts for Assembly	49	Wheel Bearings
32	Check Steering Knuckle Turning Torque		Maximum Turn Angle
	Installation	51	Turning Radius Angle
	Axle Shaft Through the Steering Knuckle		Steering Axis Inclination
33	Assembly		Camber Angle
	Spindle, Brake Assembly and Dust Shield to the Steering	52	Caster Angle
	Knuckle	53	Measure and Adjust the Toe
34	Installation	<b>55</b>	<b>Section 9: Troubleshooting</b>
	Wheel Bearings Into the Hub		Troubleshooting
	Hub Onto the Axle		Front Drive Steer Axle Troubleshooting
35	Adjustment	<b>57</b>	<b>Section 10: Lubrication and Maintenance</b>
	Wheel Bearings		Lubrication
	Wheel Speed Sensors on Units Equipped with ABS		Magnets and Magnetic Drain Plugs
			Seals

# Contents

pg. 57	Temperature Indicators
	Check and Adjust the Axle Oil Level
	Drain and Replace the Axle Oil
58	Hub Check, Drain and Fill Procedures for Drive Axles Equipped with Wheel-End Fill Plugs
	Knuckle King Pins
59	Cross Tube End Assembly
60	Wheel Bearings and Hub Seal
	Camshaft Retainer Bushing and Cam Bushing
61	Front Drive Axle Greasing Intervals and Specifications
62	Front Drive Axle and Wheel End Oil Intervals and Specifications
	Front Drive Steer Axle Oil Change Intervals
	EVO Lube Bath Wheel End Oil Change Intervals
63	Lubricant Specifications
	Maintenance
	Inspection and Maintenance
<b>71</b>	<b>Section 11: Specifications</b>
	MX-120 and MX-120HR Series
73	MX-120-EVO Series
<b>75</b>	<b>Section 12: Special Tools</b>
	Tool Drawings
	Axle Shaft Seal Driver
76	Hub Seal Driver
77	Bushing Driver

## ASBESTOS FIBERS WARNING

The following procedures for servicing brakes are recommended to reduce exposure to asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from Meritor.

### Hazard Summary

Because some brake linings contain asbestos, workers who service brakes must understand the potential hazards of asbestos and precautions for reducing risks. Exposure to airborne asbestos dust can cause serious and possibly fatal diseases, including asbestosis (a chronic lung disease) and cancer, principally lung cancer and mesothelioma (a cancer of the lining of the chest or abdominal cavities). Some studies show that the risk of lung cancer among persons who smoke and who are exposed to asbestos is much greater than the risk for non-smokers. Symptoms of these diseases may not become apparent for 15, 20 or more years after the first exposure to asbestos.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to asbestos dust follow. Consult your employer for more details.

### Recommended Work Practices

1. **Separate Work Areas.** Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons. OSHA has set a maximum allowable level of exposure for asbestos of 0.1 f/cc as an 8-hour time-weighted average and 1.0 f/cc averaged over a 30-minute period. Scientists disagree, however, to what extent adherence to the maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling asbestos dust. OSHA requires that the following sign be posted at the entrance to areas where exposures exceed either of the maximum allowable levels:

**DANGER: ASBESTOS  
CANCER AND LUNG DISEASE HAZARD  
AUTHORIZED PERSONNEL ONLY  
RESPIRATORS AND PROTECTIVE CLOTHING  
ARE REQUIRED IN THIS AREA.**

2. **Respiratory Protection.** Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA for use with asbestos at all times when servicing brakes, beginning with the removal of the wheels.
3. **Procedures for Servicing Brakes.**
  - a. Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.
  - b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.
  - c. If an enclosed vacuum system or brake washing equipment is not available, employers may adopt their own written procedures for servicing brakes, provided that the exposure levels associated with the employer's procedures do not exceed the levels associated with the enclosed vacuum system or brake washing equipment. Consult OSHA regulations for more details.
  - d. Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.
  - e. **NEVER** use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. **NEVER** use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.
4. **Cleaning Work Areas.** Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. **NEVER** use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.
5. **Worker Clean-Up.** After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.
6. **Waste Disposal.** Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

### Regulatory Guidance

References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.

## NON-ASBESTOS FIBERS WARNING

The following procedures for servicing brakes are recommended to reduce exposure to non-asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from Meritor.

### Hazard Summary

Most recently manufactured brake linings do not contain asbestos fibers. These brake linings may contain one or more of a variety of ingredients, including glass fibers, mineral wool, aramid fibers, ceramic fibers and silica that can present health risks if inhaled. Scientists disagree on the extent of the risks from exposure to these substances. Nonetheless, exposure to silica dust can cause silicosis, a non-cancerous lung disease. Silicosis gradually reduces lung capacity and efficiency and can result in serious breathing difficulty. Some scientists believe other types of non-asbestos fibers, when inhaled, can cause similar diseases of the lung. In addition, silica dust and ceramic fiber dust are known to the State of California to cause lung cancer. U.S. and international agencies have also determined that dust from mineral wool, ceramic fibers and silica are potential causes of cancer.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to non-asbestos dust follow. Consult your employer for more details.

### Recommended Work Practices

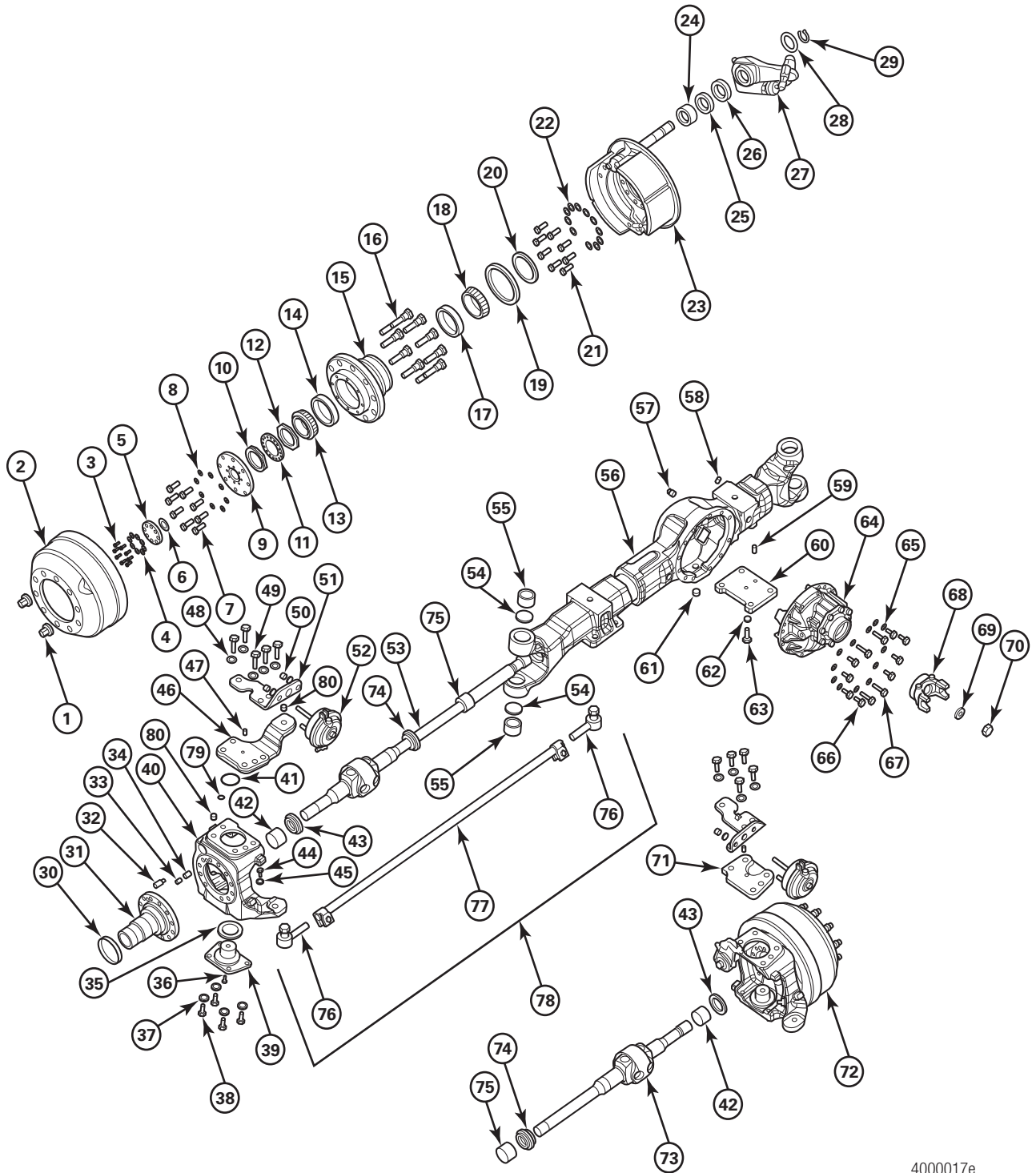
1. **Separate Work Areas.** Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons.
2. **Respiratory Protection.** OSHA has set a maximum allowable level of exposure for silica of 0.1 mg/m<sup>3</sup> as an 8-hour time-weighted average. Some manufacturers of non-asbestos brake linings recommend that exposures to other ingredients found in non-asbestos brake linings be kept below 1.0 f/cc as an 8-hour time-weighted average. Scientists disagree, however, to what extent adherence to these maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling non-asbestos dust.
 

Therefore, wear respiratory protection at all times during brake servicing, beginning with the removal of the wheels. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA, if the exposure levels may exceed OSHA or manufacturers' recommended maximum levels. Even when exposures are expected to be within the maximum allowable levels, wearing such a respirator at all times during brake servicing will help minimize exposure.
3. **Procedures for Servicing Brakes.**
  - a. Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.
  - b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.
  - c. If an enclosed vacuum system or brake washing equipment is not available, carefully clean the brake parts in the open air. Wet the parts with a solution applied with a pump-spray bottle that creates a fine mist. Use a solution containing water, and, if available, a biodegradable, non-phosphate, water-based detergent. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.
  - d. Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.
  - e. **NEVER** use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. **NEVER** use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.
4. **Cleaning Work Areas.** Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. **NEVER** use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA, to minimize exposure. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.
5. **Worker Clean-Up.** After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.
6. **Waste Disposal.** Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

### Regulatory Guidance

References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.

MX-120 and MX-120-HR Series



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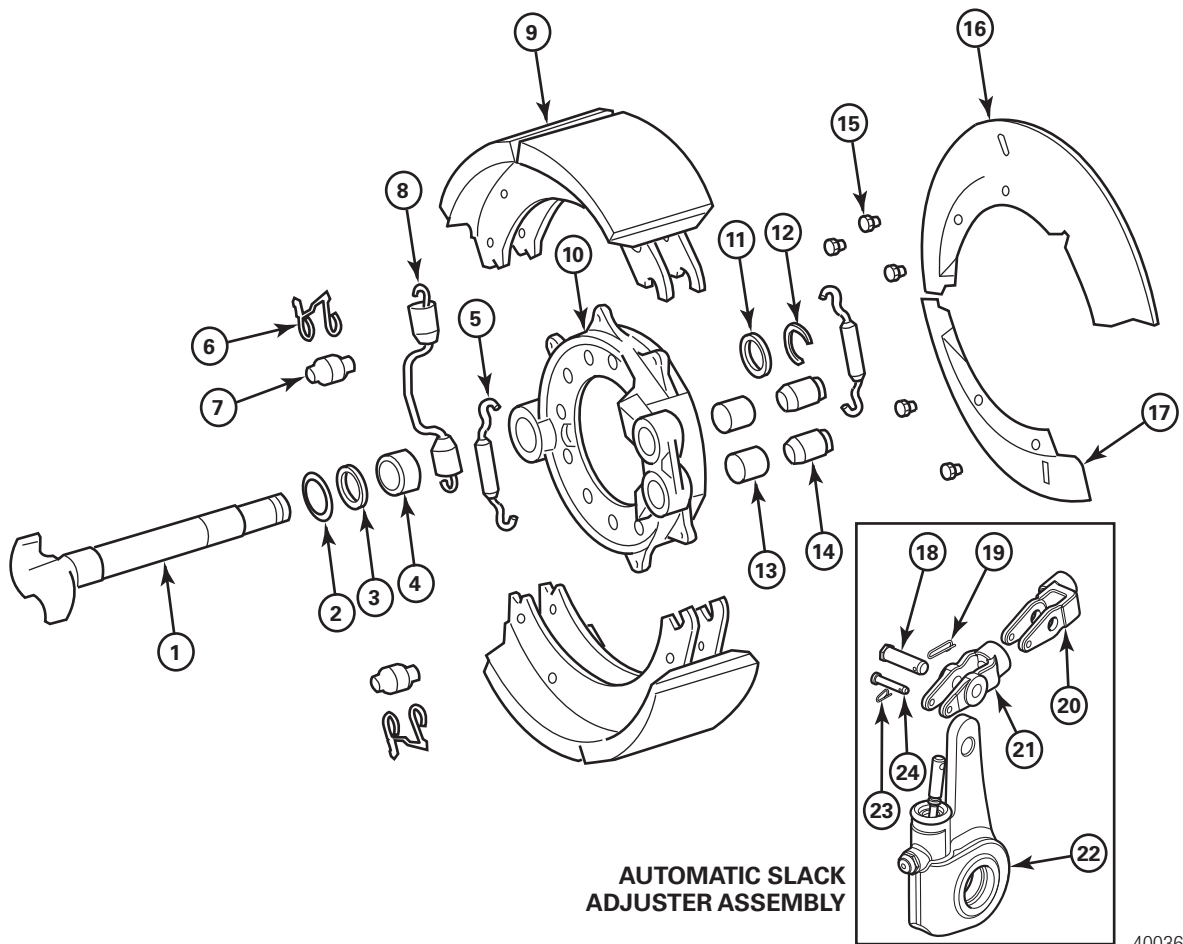
# 1 Exploded Views

Item	Description
1	Wheel Stud Nuts
2	Brake Drum
3	Capscrews
4	Washers
5	Hubcap
6	Snap Ring
7	Capscrews
8	Washers
9	Drive Flange
10	Outer Adjusting Nut
11	Lock Washer
12	Inner Adjusting Nut
13	Outer Bearing Cone
14	Outer Bearing Cup
15	Hub
16	Wheel Studs
17	Inner Bearing Cup
18	Inner Bearing Cone
19	Tooth Wheel
20	Grease Seal
21	Capscrews
22	Washers
23	Brake Assembly
24	Camshaft Bushing
25	Camshaft Seal
26	Spacing Washer, Outer
27	Automatic Slack Adjuster
28	Spacing Washer, Inner
29	Camshaft Snap Ring
30	Oil Seal Sleeve
31	Spindle
32	ABS Sensor Assembly
33	ABS Clip
34	ABS Bushing
35	Thrust Bearing

Item	Description
36	Grease Fitting
37	Lower Knuckle Cap Washers
38	Capscrews
39	Lower Knuckle Cap
40	Steering Knuckle
41	Grease Seal, Upper Cap/Steering Arm
42	Outer Axle Shaft Bushing
43	Grease Seal
44	Steering Stop Adjusting Screw
45	Steering Stop Adjusting Nut
46	Steering Arm
47	Grease Fitting
48	Washer
49	Capscrews
50	Nuts and Washers
51	Chamber Bracket
52	Air Brake Chamber
53	Universal Joint and Axle Shaft Assembly, Long
54	Socket Plug
55	Bushing
56	Axle Housing
57	Lube Fill Plug
58	Breather Assembly
59	Spring Plate Dowel
60	Spring Plate
61	Lube Drain Plug
62	Spring Plate Washer
63	Spring Plate Capscrew
64	Carrier Assembly
65	Carrier Housing Washers
66	Short Capscrew
67	Long Capscrew
68	Yoke
69	Yoke Washer
70	Yoke Nut

# 1 Exploded Views

Item	Description
71	Upper Knuckle Cap
72	Steering Knuckle and Wheel Assembly
73	Universal Joint and Axle Shaft Assembly, Short
74	Oil Seal
75	Inner Axle Shaft Bushing
76	Tie Rod End
77	Cross Tube
78	Tie Rod Assembly
79	Shim
80	ABS Cable Grommet



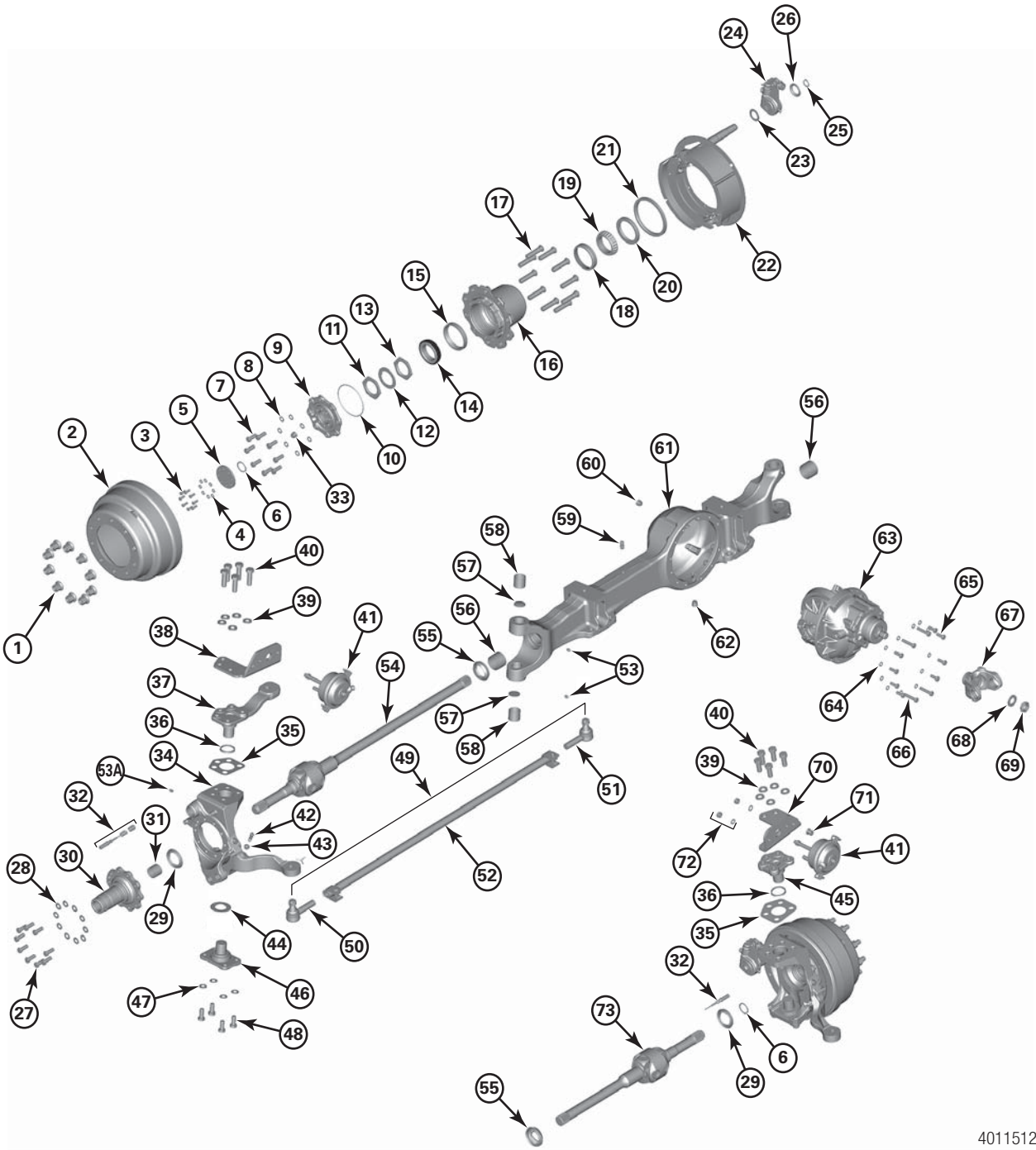
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# 1 Exploded Views

<b>Item</b>	<b>Description</b>
1	Camshaft
2	Washer
3	Camshaft Seal
4	Camshaft Bushing
5	Brake Shoe Retaining Spring
6	Brake Shoe Roller Retainer
7	Brake Shoe Roller
8	Brake Shoe Return Spring
9	Brake Shoe and Lining Assembly
10	Brake Spider Assembly
11	Camshaft Seal
12	Snap Ring
13	Anchor Pin Bushing
14	Brake Shoe Anchor Pin
15	Dust Shield Capscrew
16	Dust Shield
17	Dust Shield
18	Large Clevis Pin
19	Large Clip
20	Offset Clevis
21	Standard Clevis
22	Automatic Slack Adjuster
23	Small Clip
24	Small Clevis Pin

MX-120-EVO Series



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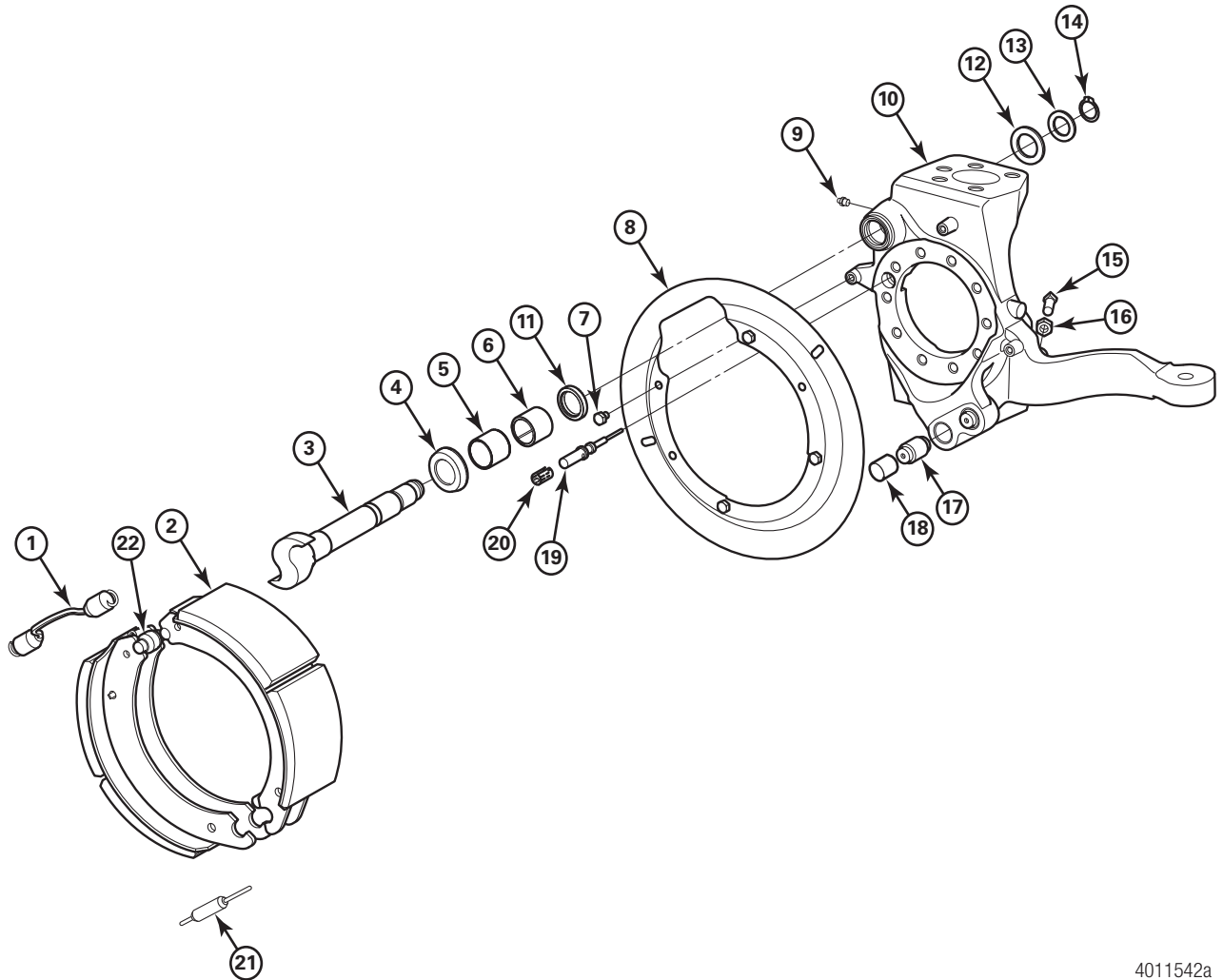
# 1 Exploded Views

Item	Description
1	Wheel Stud Nuts
2	Brake Drum
3	Capscrews
4	Washers
5	Hubcap
6	Snap Ring
7	Capscrews
8	Washers
9	Drive Flange
10	O-Ring
11	Outer Adjusting Nut
12	Lock Washer
13	Inner Adjusting Nut
14	Outer Bearing Cone
15	Outer Bearing Cup
16	Hub
17	Wheel Studs
18	Inner Bearing Cup
19	Inner Bearing Cone
20	Grease Seal
21	Tooth Wheel
22	Brake Assembly
23	Outer Flat Washer
24	Automatic Slack Adjuster
25	Snap Ring
26	Inner Spacing Washer
27	Capscrews
28	Washers
29	Oil Seal Sleeve
30	Spindle
31	Outer Axle Shaft Bushing
32	ABS Sensor, Clip and Bushing
33	Oil Fill/Drain Plug
34	Steering Knuckle
35	Shim

Item	Description
36	Grease Seal, Upper Cap/Steering Arm
37	Steering Arm
38	Chamber Bracket, LH
39	Washers
40	Capscrews
41	Air Brake Chamber
42	Steering Stop Adjusting Screw
43	Steering Stop Adjusting Nut
44	Thrust Bearing
45	Pin Cap Steering Knuckle
46	Lower Knuckle Cap
47	Lower Knuckle Cap Washers
48	Capscrews
49	Tie Rod Assembly
50	Tie Rod End, LH
51	Tie Rod End, RH
52	Cross Tube
53	Grease Fitting
54	Universal Joint and Axle Shaft Assembly, Long
55	Oil Seal
56	Inner Axle Shaft Bushing
57	Socket Plug
58	Bushing
59	Breather Assembly
60	Lube Fill Plug
61	Axle Housing
62	Lube Drain Plug
63	Carrier Assembly
64	Carrier Housing Washers
65	Short Capscrew
66	Long Capscrew
67	Yoke
68	Yoke Washer
69	Yoke Nut
70	Chamber Bracket, RH

# 1 Exploded Views

Item	Description
71	ABS Cable Grommet
72	Brake Chamber Nuts and Washers
73	Universal Joint and Axle Shaft Assembly, Short



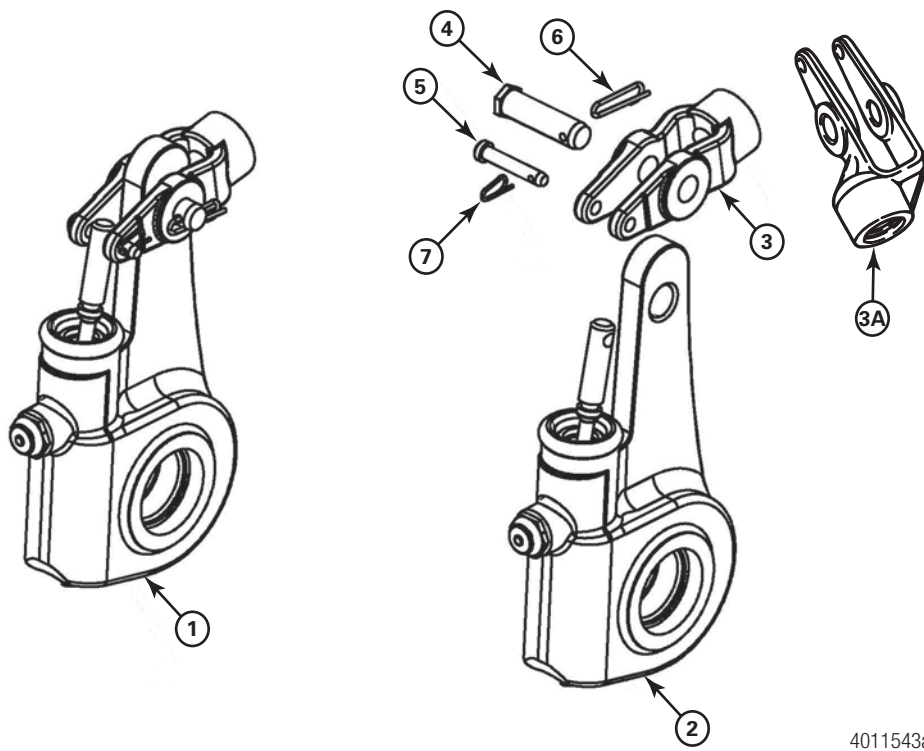
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Item	Description
1	Spring Shoe Return
2	Brake Shoe and Lining Assembly
3	Camshaft
4	Outer Camshaft Seal
5	Inner Camshaft Bushing
6	Outer Camshaft Bushing

Item	Description
7	Capscrew (3/8-16 x 0.5)
8	Dust Shield
9	Grease Fitting
10	Knuckle Steering Assembly
11	Inner Camshaft Seal
12	Flat Washer

# 1 Exploded Views

Item	Description
13	Flat Washer
14	Snap Ring
15	Square Head Set Screw
16	Nut
17	Brake Shoe Anchor Pin
18	Anchor Pin Bushing
19	ABS Sensor
20	Bushing Sensor
21	Spring
22	Brake Shoe Roller



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Item	Description
1	Slack Adjuster Assembly
2	Slack Adjuster
3	Clevis
3A	Offset Clevis
4	Large Clevis Pin

Item	Description
5	Small Clevis Pin
6	Large Clip
7	Small Clip

## Overview

### MX Series Medium-Duty Front Drive Steer Axles

This publication provides maintenance and service information for Meritor MX-120, MX-120-HR and MX-120-EVO Series medium-duty front drive steer axles. Both the 120 standard and 120-HR carriers are available with these axles. These axles are designed specifically for use with the MTC-4210 and -4213 transfer cases as part of the Meritor medium-duty part-time 4x4 or 6x6 system.

To obtain maintenance and service information on the MTC Series transfer cases, refer to the Service Notes page on the inside front cover of this manual.

### MX Series Axles Standard Features Include

- Single axle capacities of 10,000 lb (4536 kg) to 18,000 lb (28 968 kg) GAWR
- 16.5 Q+™ cam brakes with outboard-mounted brake drums
- Meritor automatic slack adjusters
- Hub-piloted wheel mountings for 10 stud x 11.25-inch wheels
- Easy Steer™ king pin bushings
- ABS-ready wheel-ends with installed tooth wheel and sensor
- 120 Standard Series carrier with hypoid gearing with a wide range of ratio selections from 4.30 to 6.14
- 120 High Retardation (HR) Series carrier with hypoid gearing with ratio selections of 4.88, 5.57 and 6.14

### Typical Applications

- Utility vehicles
- Snow plows
- Block trucks
- Oil drillers

## Model Nomenclature

### Axles

Front drive steer axle models are identified by a letter and number system. The letters and numbers give important information about the specific axle model.

The first seven positions of the designations identify a basic axle model. The second group of letters and numbers identify particular specifications.

MX-120-EVO Series axles will include an “EV” designation in the axle model nomenclature. Figure 2.1.

## 2 Introduction

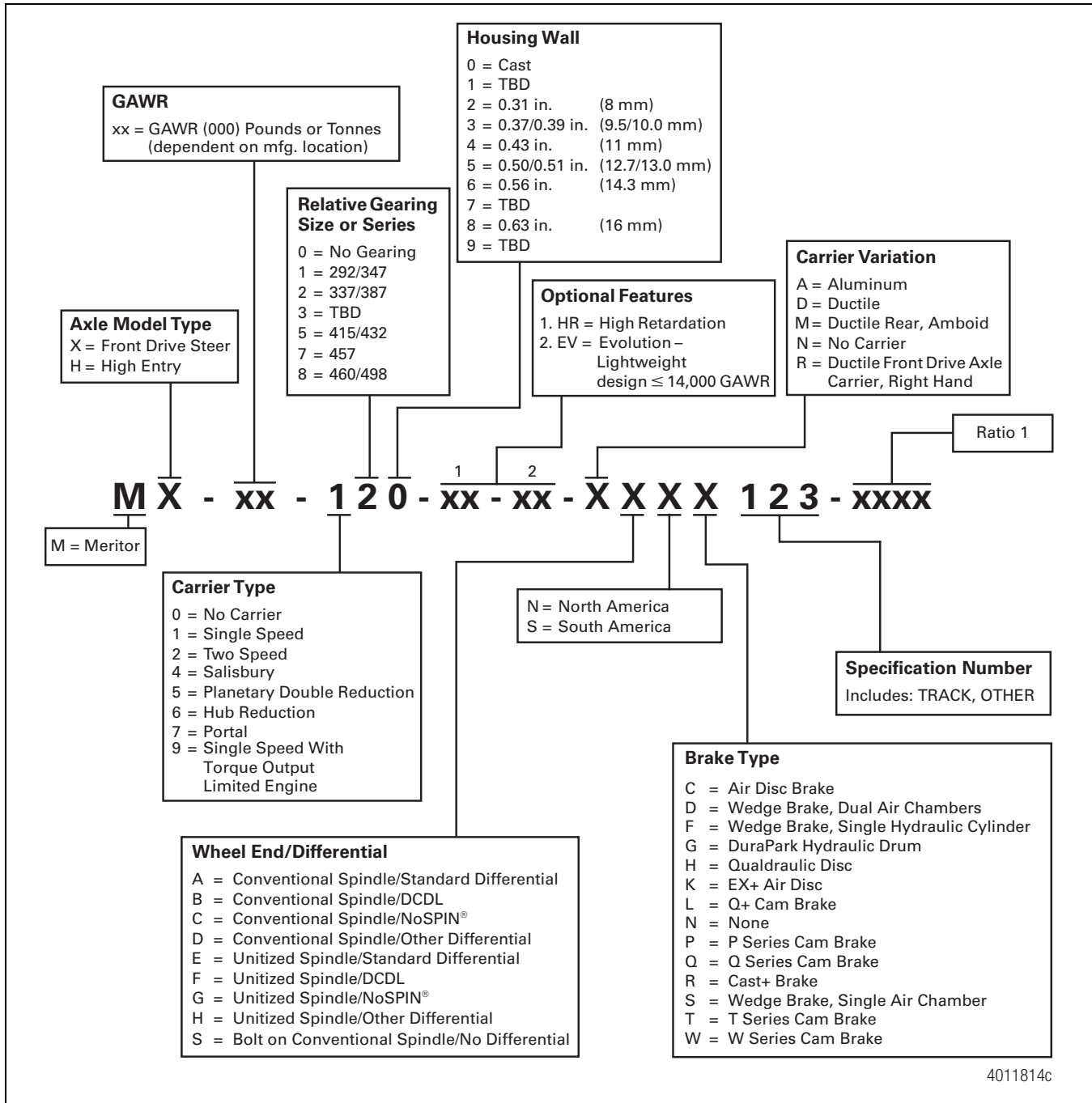


Figure 2.1

### 3 Removal and Disassembly - MX-120 and MX-120-HR Series

#### 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.

Use a brass or leather mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury.

#### Removal

##### Wheel from the Drum

#### **⚠ WARNING**

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.

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.
3. Retract the brake linings so that the drums will clear the linings.
4. If the steering universal joint is to be removed from the housing, remove the oil drain plug and drain the lubricant from the axle.
5. Remove the rim and tire.
6. Remove the wheel and drum assembly.

##### Disconnect the Tie Rod Assembly, Tie Rod End and Cross Tube

1. Remove the cotter pins and the nuts that fasten each tie rod end to the tie rod arms.
2. Disconnect the cross tube assembly from the tie rod arms. If available, use a tie rod end puller to separate the tie rod end from the tie rod arm. Figure 3.1.

- If necessary, tap on the tie rod end with a leather or plastic mallet to loosen and remove it.

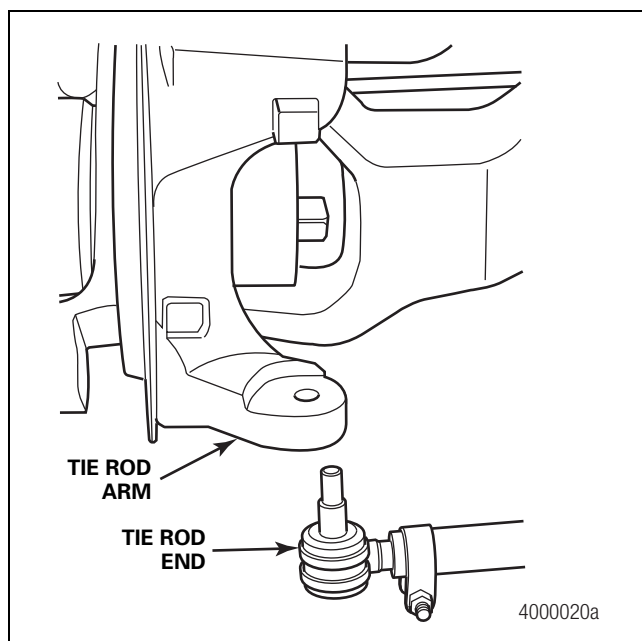


Figure 3.1

3. Position the tie rod end and cross tube out of the way.
4. If necessary, remove the tie rod ends from the cross tube using the following procedure.
  - A. Mark the position that each tie rod end is installed into the cross tube. Count and record the number of threads that appear outside of the cross tube. Figure 3.2.

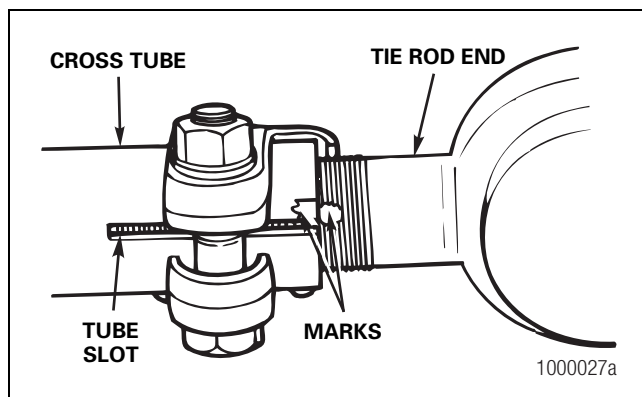


Figure 3.2



### 3 Removal and Disassembly - MX-120 and MX-120-HR Series

- B. Remove the bolts and the nuts from the clamp on the cross tube. The rotating style clamp on the cross tubes can be rotated for easier accessibility when removing the clamp bolt and nut. Figure 3.3.

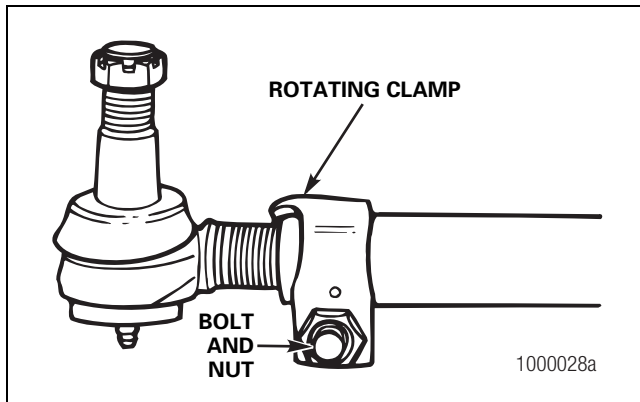


Figure 3.3

- C. Remove the tie rod ends from the cross tube.

5. Inspect the parts. Refer to Section 5.

#### Remove the Hub from the Axle

1. Remove the capscrews and washers that connect the hubcap to the drive flange. Remove the hubcap. Figure 3.4.

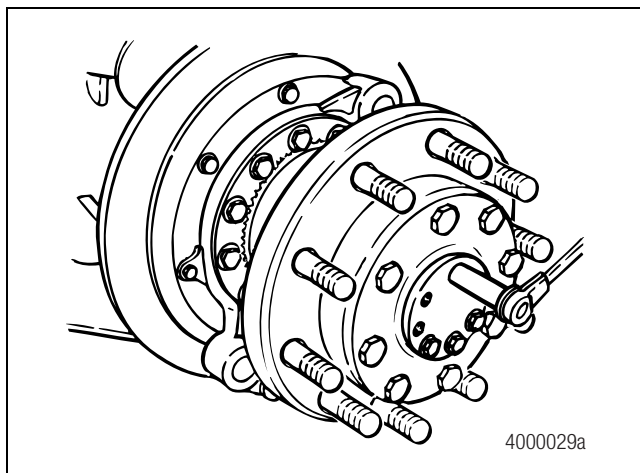


Figure 3.4

2. Remove the snap ring from the end of the axle shaft. Figure 3.5.

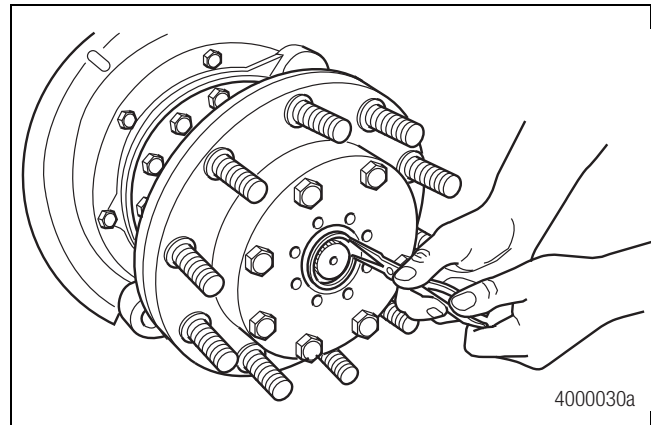


Figure 3.5

3. Remove the capscrews and washers that connect the drive flange to the wheel hub. Figure 3.6.

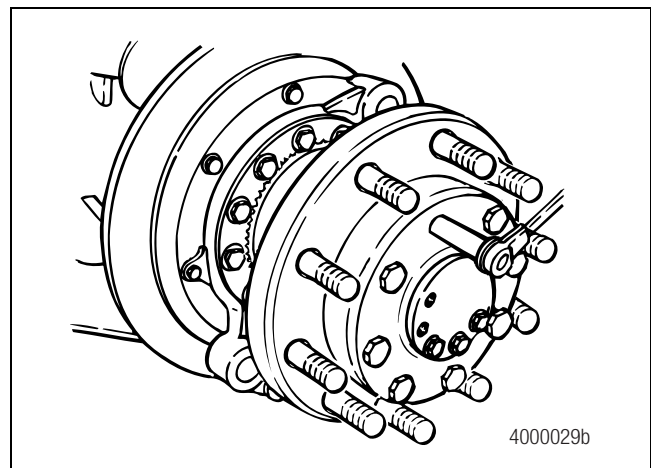


Figure 3.6

#### ⚠ WARNING

Use a brass or leather mallet to loosen the drive flange from the hub during removal procedures. Do not use a sharp tool to pry the flange from the hub, which can damage mounting surfaces. Do not hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury and damage to components.

4. Remove the drive flange from the hub. If necessary, use a puller to remove the drive flange. Figure 3.7.

### 3 Removal and Disassembly - MX-120 and MX-120-HR Series

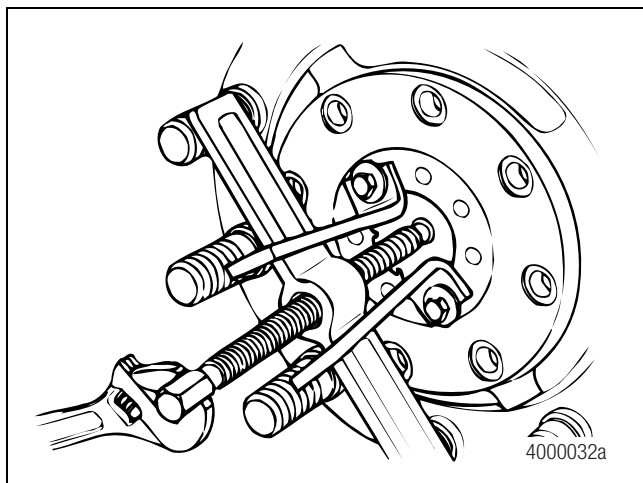


Figure 3.7

#### **⚠ WARNING**

Use a torque wrench to tighten or loosen adjusting nuts. Do not use a hammer to directly hit adjusting nuts, or to hit a chisel or drift placed against them. Damaged adjusting nuts can prevent you from obtaining correct wheel bearing end play, which can affect vehicle operation and cause the wheels to separate from the vehicle. Serious personal injury and damage to components will result.

5. Remove the outer adjusting nut, lock washer and the inner adjusting nut from the spindle. Figure 3.8. Use a 4-7/8-inch socket wrench to remove the adjusting nut. Figure 3.9.

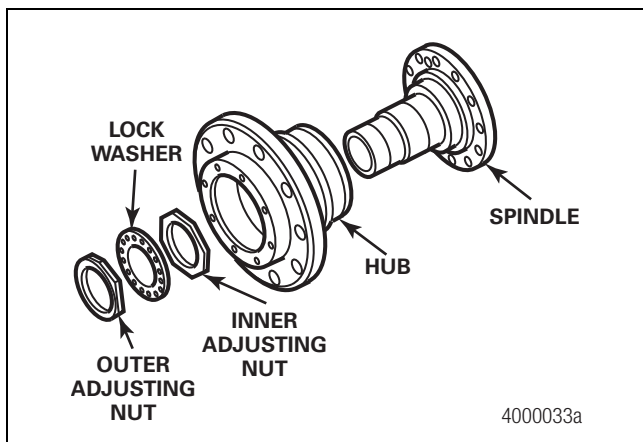


Figure 3.8

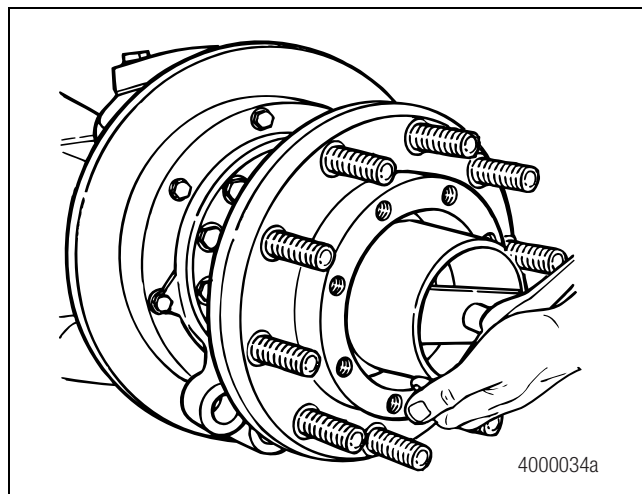


Figure 3.9

6. Remove the hub straight off the spindle. Prevent the outer bearing cone from falling when you remove the hub.
  - If the hub is difficult to remove: Tap it with a plastic or leather mallet to loosen it.
7. Remove the outer bearing cone from the hub.

#### Disassemble the Bearing Cups and Oil Seal from the Hub

#### **⚠ WARNING**

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

**NOTE:** If a press is not available, use a brass hammer or drift.

1. If it is necessary to remove the wheel studs from the hub, place the hub into a press. Support the hub flange and press the studs through the hub.
2. Remove the grease seal from the hub with a suitable tool. Discard the grease seal. Figure 3.10.

### 3 Removal and Disassembly - MX-120 and MX-120-HR Series

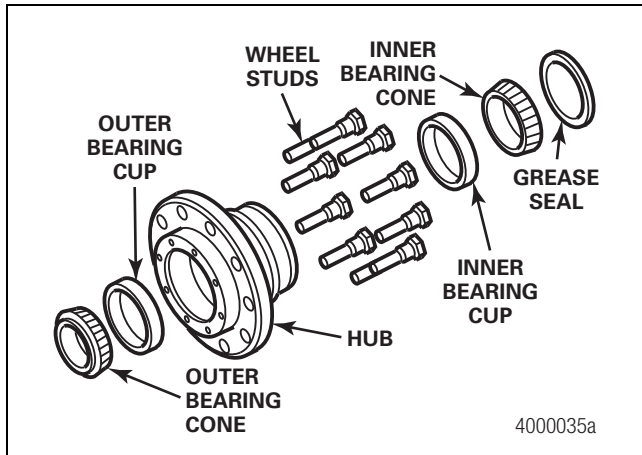


Figure 3.10

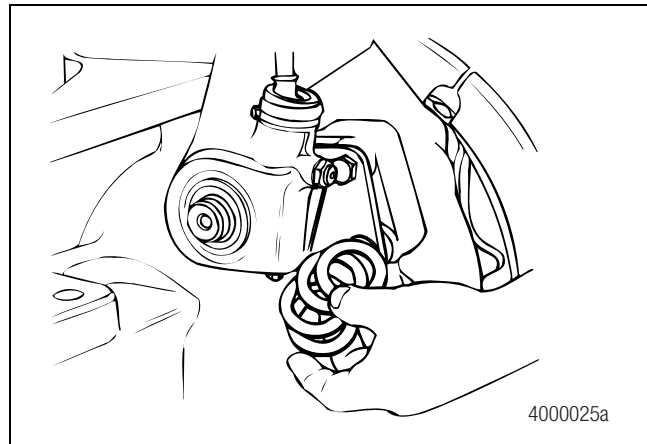


Figure 3.12

3. If necessary, on units equipped for ABS, remove the ABS tooth wheel from the hub with a suitable puller.
4. Remove the inner bearing cone from the hub. Figure 3.10.
5. Remove the inner and outer bearing cups from the hub with a press and sleeve or a bearing puller. Figure 3.10.

3. Remove the pins that engage the push rod yoke and the slack adjuster. Figure 3.13.

#### Remove the Automatic Slack Adjuster from the Steering Knuckle

1. Remove the slack adjuster retaining ring at the adjuster end of the camshaft. Figure 3.11.

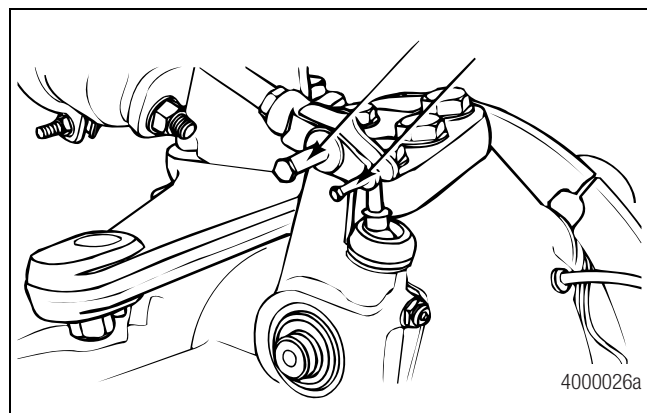


Figure 3.13

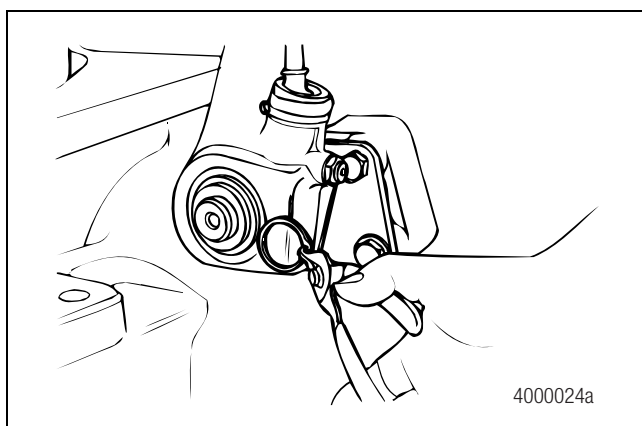


Figure 3.11

4. Adjust the slack forward by lifting on the pawl and rotating the hex nut.
5. Remove the slack adjuster and inner washer from the camshaft.
6. Drain the air tank.
7. Disconnect the air lines at the brake chamber.
8. Remove the air brake chamber and bracket. Figure 3.14.

2. Remove the slack adjuster shims at the adjuster end of the camshaft. Figure 3.12.

### 3 Removal and Disassembly - MX-120 and MX-120-HR Series

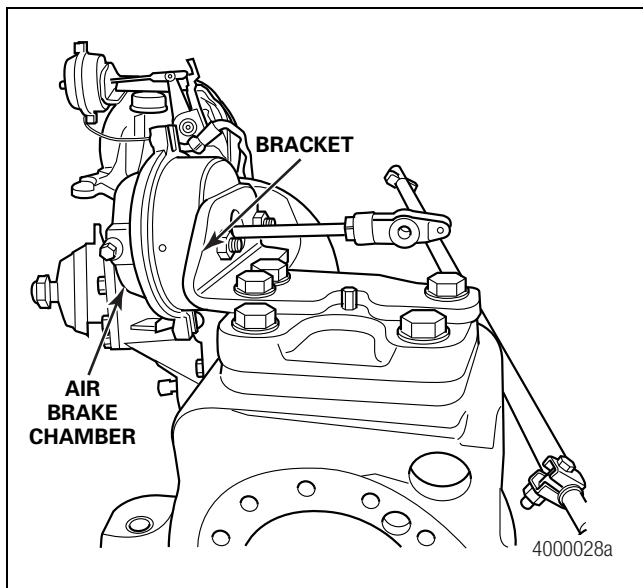


Figure 3.14

#### Remove the Brake Assembly and Spindle from the Knuckle

1. Remove the capscrews that secure the brake assembly and spindle to the steering knuckle. Figure 3.15.

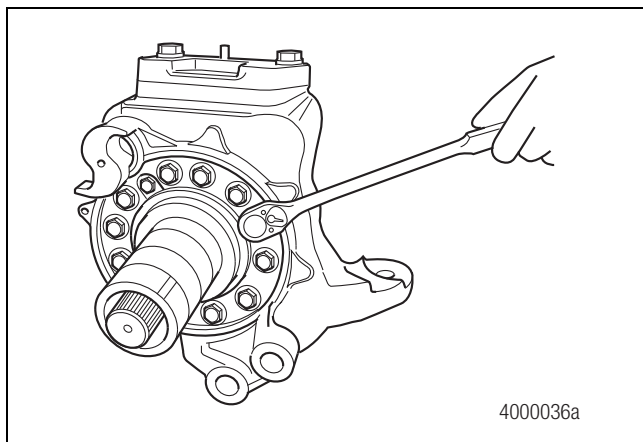


Figure 3.15

- **If the vehicle is equipped with ABS:** Push the ABS sensor into the steering knuckle cavity. Figure 3.16.

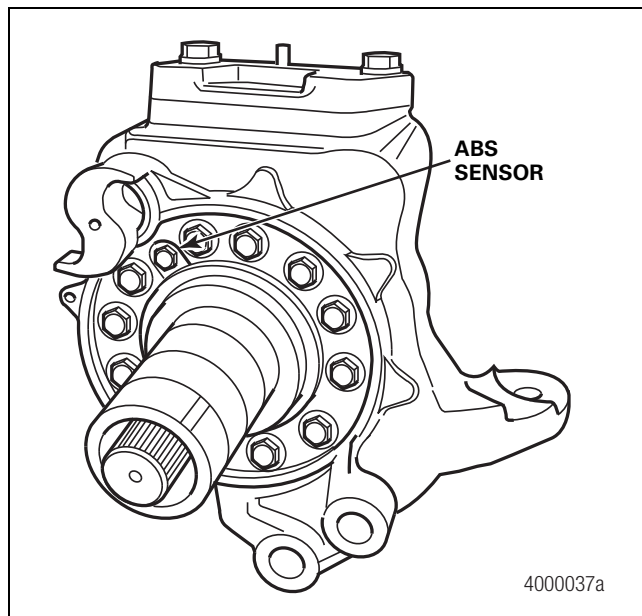


Figure 3.16

2. Pull the brake assembly off the spindle. Take care to prevent the spindle from falling.
    - **If the vehicle is equipped with ABS:** The steel sleeve and sensor clip that position the ABS sensor will remain on the spindle. If necessary, push out the sensor clip to remove it. Use a suitable driver to remove the steel sleeve.
- NOTE:** The stop screw maintains the vehicle manufacturer's maximum turning angle and does not have to be removed. If you do remove it, mark the installed depth for reassembly.
3. Pull the spindle straight from the knuckle and axle shaft. The axle shaft bushing and oil seal will remain inside the spindle. If necessary, remove these parts with the appropriate tool. Figure 3.17.

### 3 Removal and Disassembly - MX-120 and MX-120-HR Series

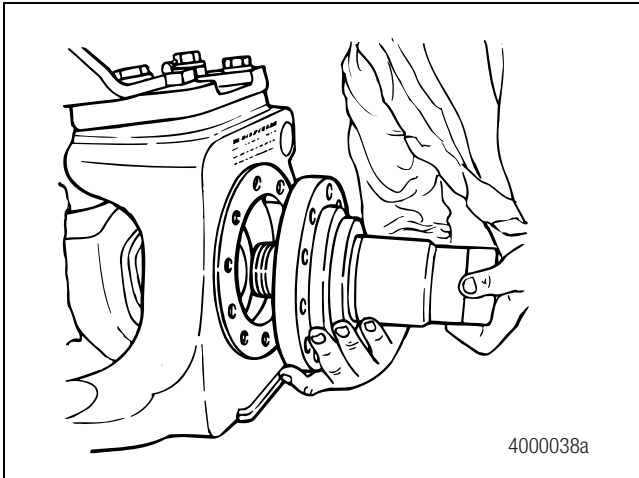


Figure 3.17

#### Remove the Steering Knuckle from the Axle Housing

**NOTE:** You can pull the axle shaft double-cardan joint assembly through the steering knuckle opening. If you are only removing the axle shaft without the knuckle, go to Remove the Axle Shaft Without Removing the Steering Knuckle in this section.

**NOTE:** You can service the steering arm and cross tube assemblies without removing the steering knuckle from the housing.

1. Remove the four capscrews and washers from the lower knuckle cap. Figure 3.18.

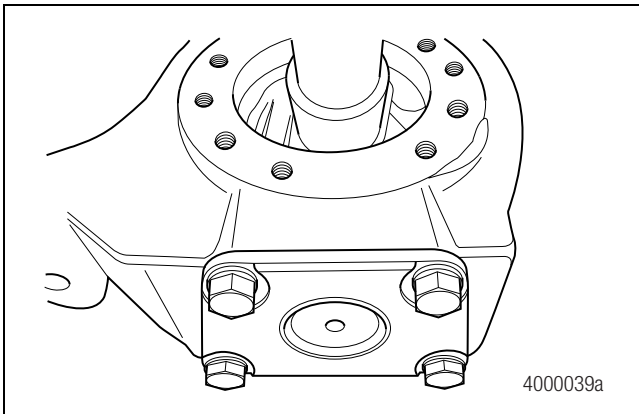


Figure 3.18

2. Remove the lower knuckle cap and inspect the thrust bearing for wear or damage. Replace a worn or damaged thrust bearing at reassembly. Figure 3.19.

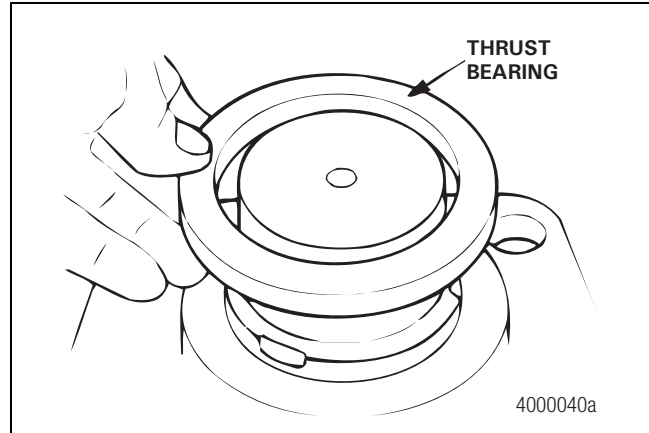


Figure 3.19

3. Remove the six capscrews from the upper knuckle cap.
4. Remove the air chamber mounting bracket. Remove the upper knuckle cap from the bore. Figure 3.20. Inspect the cap for wear and damage. Replace damaged or worn parts.

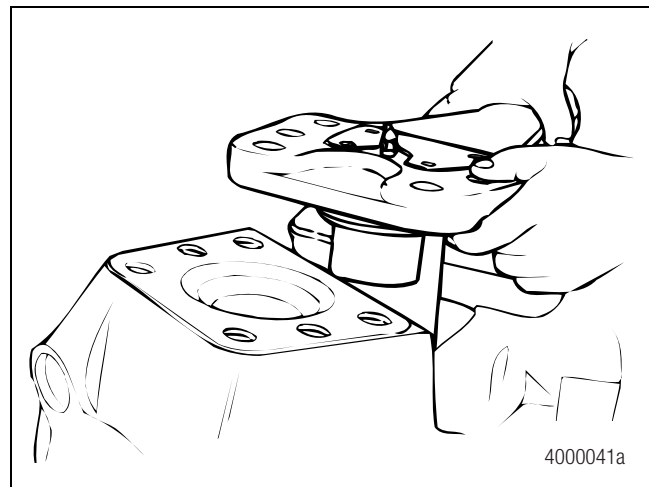


Figure 3.20

5. Remove the steering knuckle from the axle housing. The bushings will remain in the housing sockets.
6. Inspect the upper and lower bushings for wear or damage while they're still in the housing sockets. Figure 3.21. Use the following procedure to remove worn or damaged bushings.

### 3 Removal and Disassembly - MX-120 and MX-120-HR Series

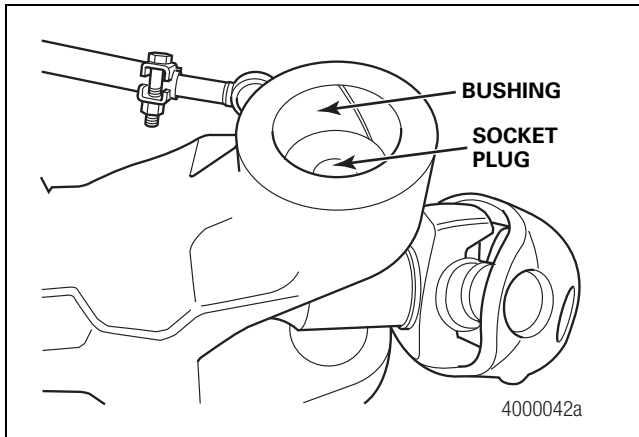


Figure 3.21

- A. Drive the socket plug and bushing toward the outside of the socket. Use a sleeve that is slightly smaller than the socket bore. Figure 3.22.

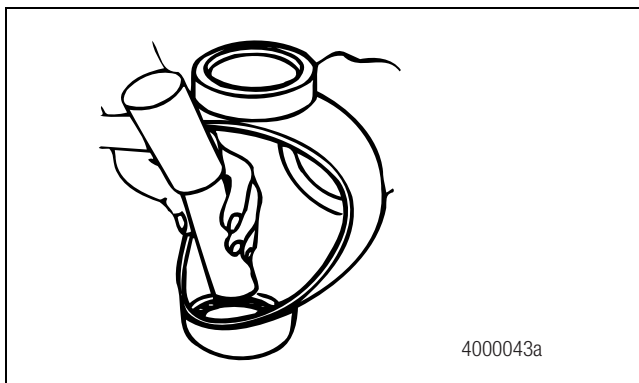


Figure 3.22

- B. Clean grease and dirt from the bore before reassembly.

#### Remove the Axle Shaft from the Axle Housing

##### CAUTION

The cross assembly is not greaseable. Do not disassemble it. Damage to components can result. If the cross assembly requires service, replace the assembly.

1. Remove the axle shaft double-cardan joint assembly from the carrier housing by pulling the assembly STRAIGHT out of the carrier housing. Do not disassemble the universal joints, which will void the Meritor warranty. Figure 3.23.

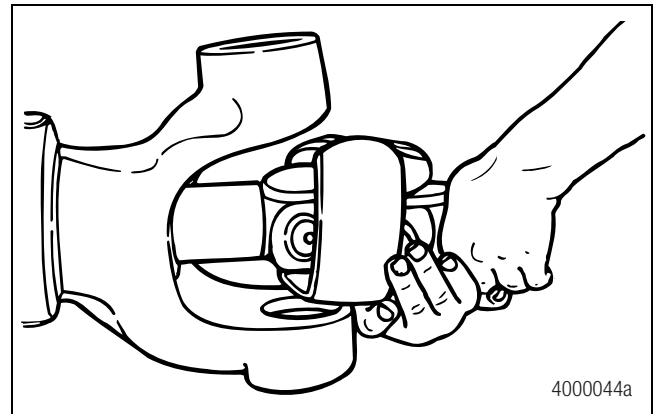


Figure 3.23

2. If required, remove the inner axle shaft oil seal and bushing from the axle housing. Figure 3.24.

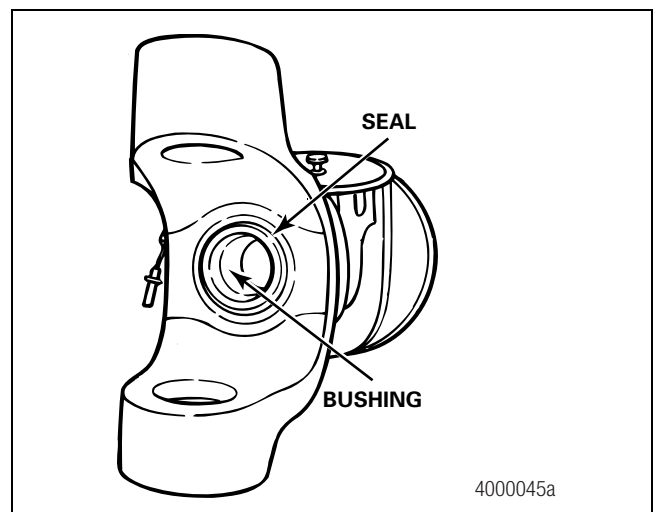


Figure 3.24

#### Remove the Axle Shaft Without Removing the Steering Knuckle

1. Remove the axle shaft double-cardan joint assembly from the carrier housing by pulling the assembly STRAIGHT out of the carrier housing.
2. Inspect the inner bushing. Replace the bushing if damaged, always replace the seal.

#### Remove the Axle Differential Carrier

Refer to Maintenance Manual 5A, Single Reduction Rear Differential Carriers, for differential carrier maintenance and service information. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

## 4 Removal and Disassembly - MX-120-EVO Series

### 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.

Use a brass or leather mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury.

### Removal

#### Wheel from the Drum

#### **⚠ WARNING**

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.

1. Wear safe eye protection. 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.
3. Retract the brake linings so that the drums will clear the linings.
4. If the steering universal joint is to be removed from the housing, remove the oil drain plug and drain the lubricant from the axle.
5. Remove the rim and tire.
6. Remove the wheel and drum assembly.

#### Disconnect the Tie Rod Assembly, Tie Rod End and Cross Tube

1. Remove the cotter pins and the nuts that fasten each tie rod end to the tie rod arms.
2. Disconnect the cross tube assembly from the tie rod arms. If available, use a tie rod end puller to separate the tie rod end from the tie rod arm. Figure 4.1.

- If necessary, tap on the tie rod end with a leather or plastic mallet to loosen and remove it.

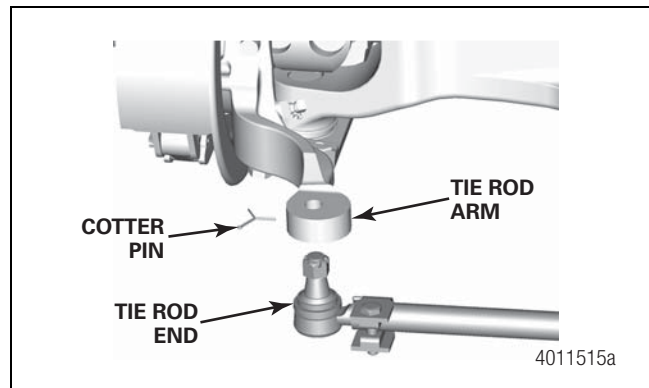


Figure 4.1

3. Position the tie rod end and cross tube out of the way.
4. If necessary, remove the tie rod ends from the cross tube using the following procedure.
  - A. Mark the position that each tie rod end is installed into the cross tube. Count and record the number of threads that appear outside of the cross tube. Figure 4.2.

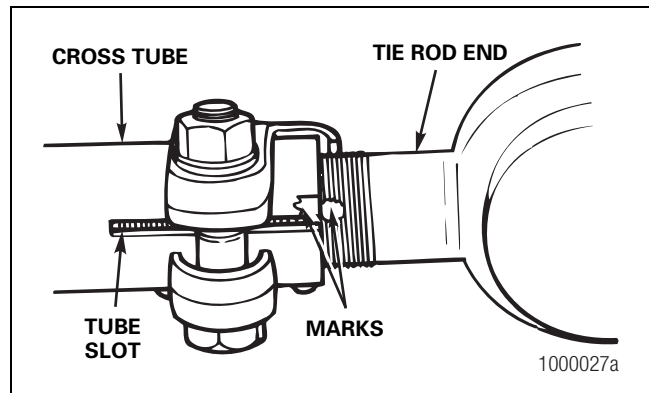


Figure 4.2

- B. Remove the bolts and the nuts from the clamp on the cross tube. The rotating style clamp on the cross tubes can be rotated for easier accessibility when removing the clamp bolt and nut. Figure 4.3.

## 4 Removal and Disassembly - MX-120-EVO Series

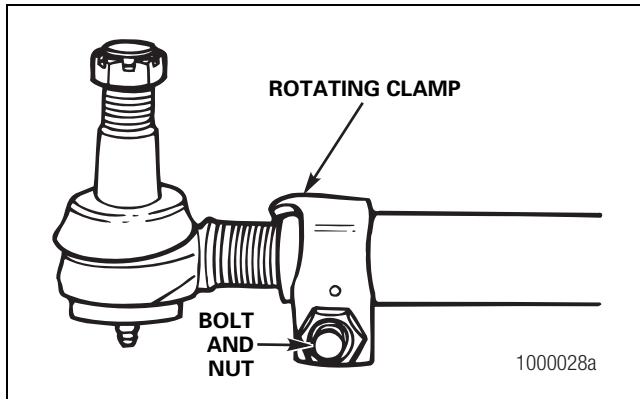


Figure 4.3

C. Remove the tie rod ends from the cross tube.

5. Inspect the parts. Refer to Section 5.

### Remove the Hub from the Axle

1. Place a drain pan under the hub.
2. Rotate the hub so the oil fill/drain plug is at the 6 o'clock position. Remove the oil fill/drain plug and allow the oil to drain. Reinstall the plug. Figure 4.4.

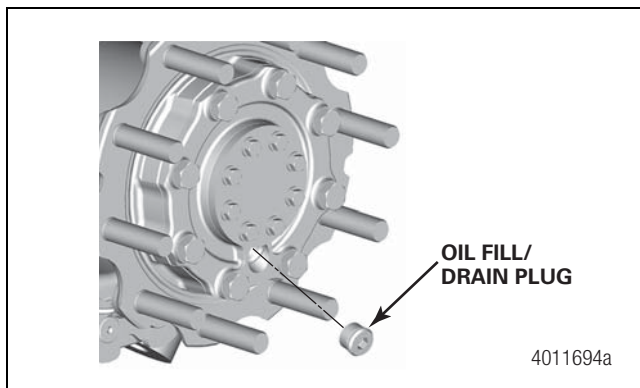


Figure 4.4

3. Remove the capscrews and washers that connect the hubcap to the drive flange. Remove the hubcap. Figure 4.5.

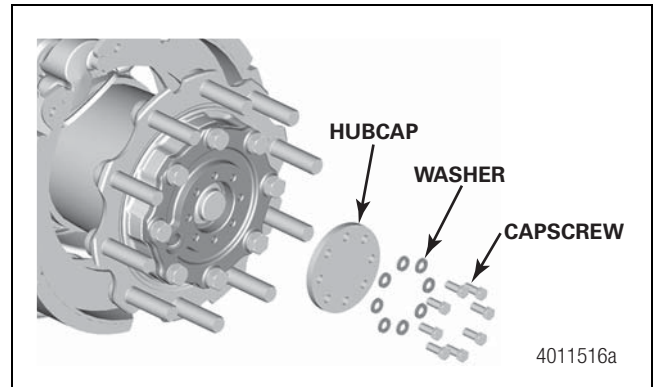


Figure 4.5

4. Remove the snap ring from the end of the axle shaft. Figure 4.6.

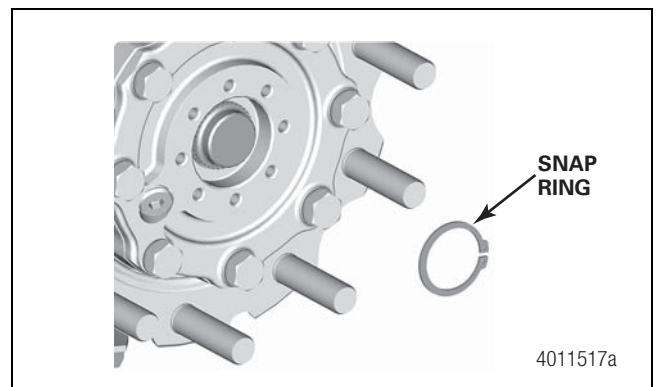


Figure 4.6

5. Remove the capscrews and washers that connect the drive flange to the wheel hub. Figure 4.7.

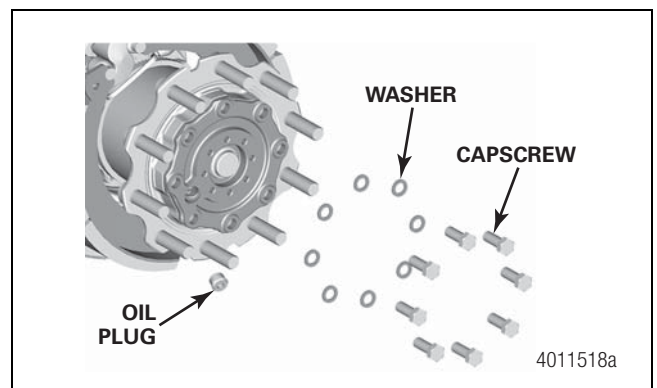


Figure 4.7



## 4 Removal and Disassembly - MX-120-EVO Series

### **⚠ WARNING**

Use a brass or leather mallet to loosen the drive flange from the hub during removal procedures. Do not use a sharp tool to pry the flange from the hub, which can damage mounting surfaces. Do not hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury and damage to components.

6. Remove the drive flange from the hub. If necessary, use a puller to remove the drive flange. Figure 4.8 and Figure 4.9.

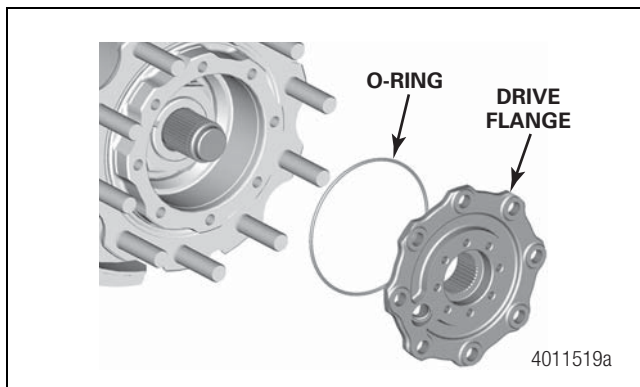


Figure 4.8

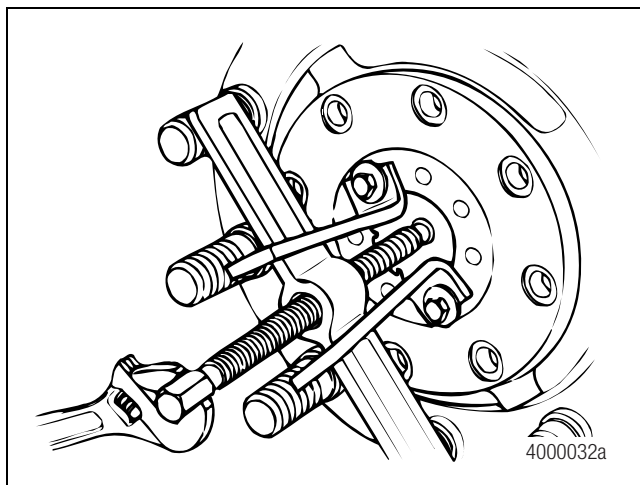


Figure 4.9

7. Remove the O-ring and discard it. The O-ring must be replaced with a new one at reassembly.

### **⚠ WARNING**

Use a torque wrench to tighten or loosen adjusting nuts. Do not use a hammer to directly hit adjusting nuts, or to hit a chisel or drift placed against them. Damaged adjusting nuts can prevent you from obtaining correct wheel bearing end play, which can affect vehicle operation and cause the wheels to separate from the vehicle. Serious personal injury and damage to components will result.

8. Remove the outer adjusting nut, lock washer and the inner adjusting nut from the spindle. Figure 4.10. Use a 4-inch socket wrench to remove the adjusting nut. Figure 4.11.

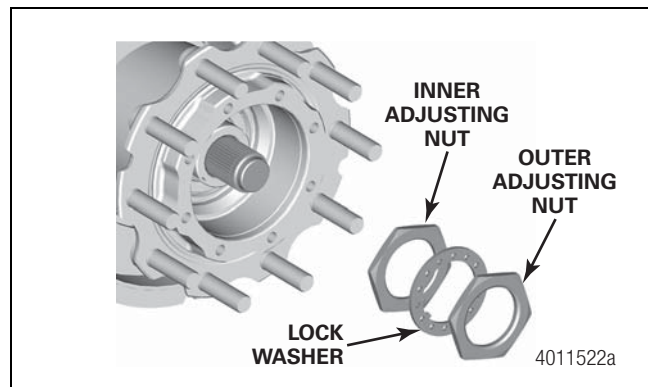


Figure 4.10

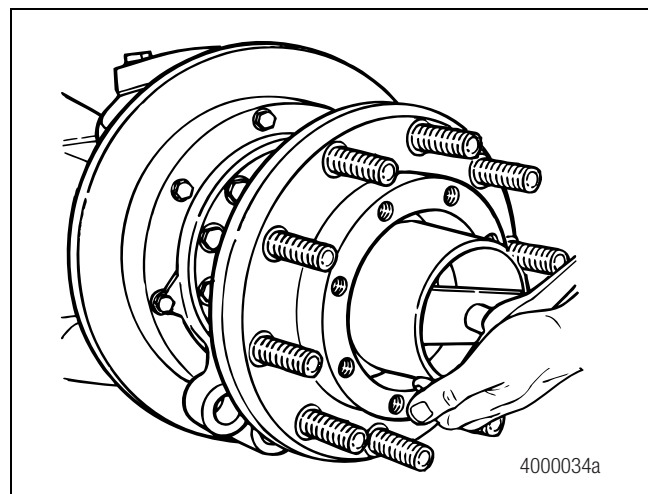


Figure 4.11

9. Remove the hub straight off the spindle. Prevent the outer bearing cone from falling when you remove the hub. Figure 4.12.

## 4 Removal and Disassembly - MX-120-EVO Series

- **If the hub is difficult to remove:** Tap it with a plastic or leather mallet to loosen it.

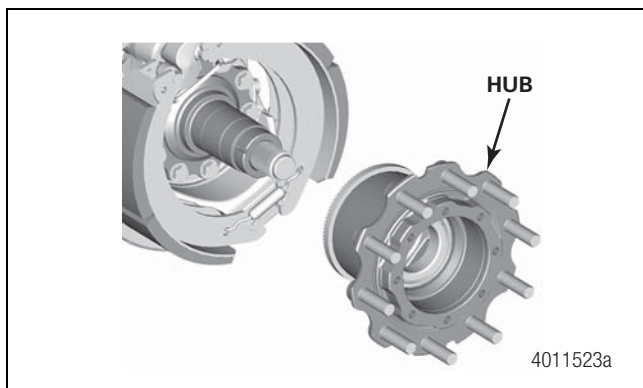


Figure 4.12

10. Remove the outer bearing cone from the hub.

### Disassemble the Bearing Cups and Oil Seal from the Hub

#### **WARNING**

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

**NOTE:** If a press is not available, use a brass hammer or drift.

1. If it is necessary to remove the wheel studs from the hub, place the hub into a press. Support the hub flange and press the studs through the hub.
2. Remove the grease seal from the hub with a suitable tool. Discard the grease seal. Figure 4.13.

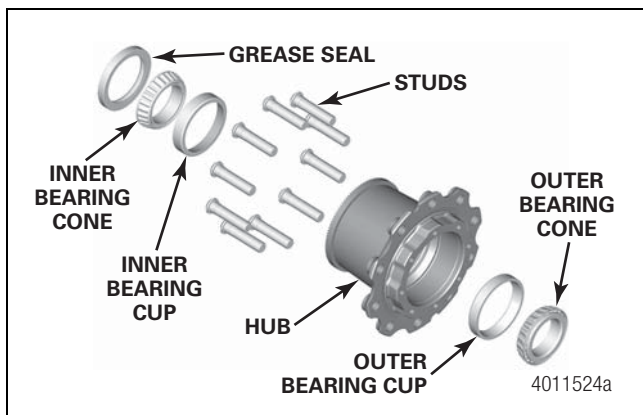


Figure 4.13

3. If necessary, on units equipped for ABS, remove the ABS tooth wheel from the hub with a suitable puller.
4. Remove the inner bearing cone from the hub. Figure 4.13.
5. Remove the inner and outer bearing cups from the hub with a press and sleeve or a bearing puller. Figure 4.13.

### Remove the Automatic Slack Adjuster from the Steering Knuckle

1. Remove the slack adjuster retaining ring at the adjuster end of the camshaft. Figure 4.14.

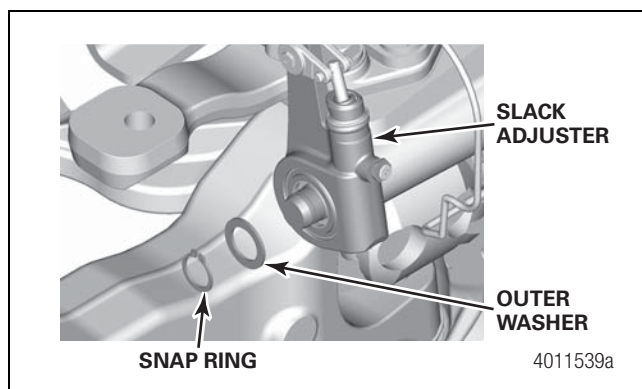


Figure 4.14

2. Remove the pins that engage the push rod yoke and the slack adjuster. Figure 4.15.

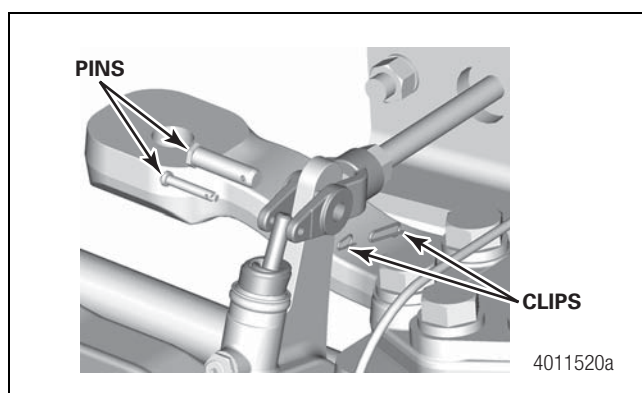


Figure 4.15

3. Adjust the slack forward by lifting on the pawl and rotating the hex nut.
4. Remove the slack adjuster and inner washer from the camshaft. Figure 4.16.

## 4 Removal and Disassembly - MX-120-EVO Series

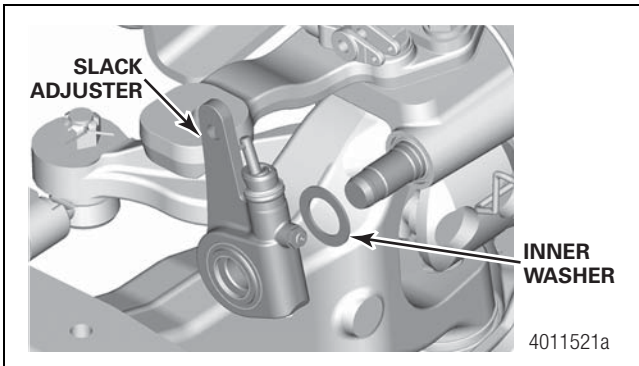


Figure 4.16

5. Drain the air tank.
6. Disconnect the air lines at the brake chamber.
7. Remove the air brake chamber and bracket. Figure 4.17.

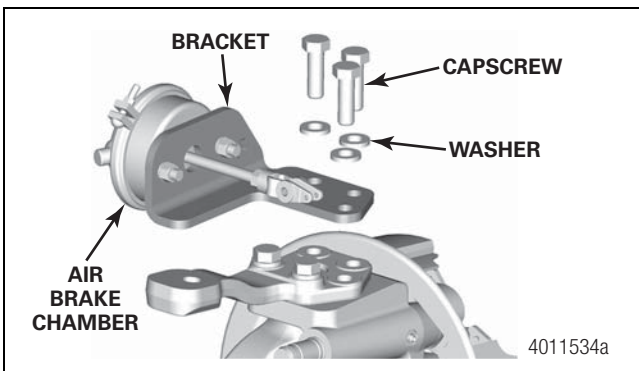


Figure 4.17

### Remove the Brake Assembly and Spindle from the Knuckle

1. Remove the return springs and retainer springs from the brake shoes. Remove the brake shoes. Figure 4.18.

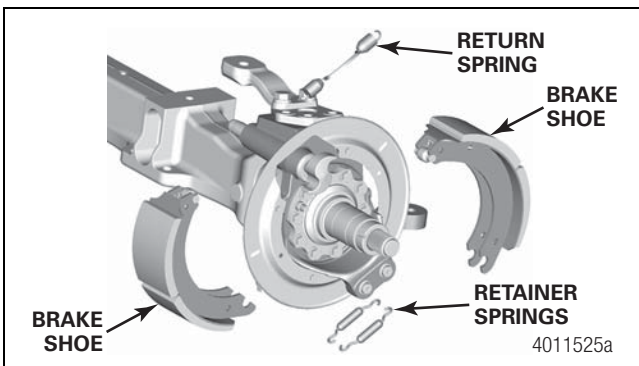


Figure 4.18

2. Remove the brake dust shield mounting screws and remove the brake dust shield. Figure 4.19.

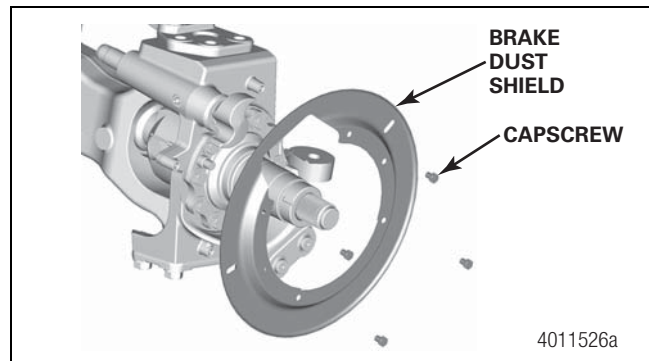


Figure 4.19

3. Remove the brake camshaft seals, bushings and the brake camshaft from the steering knuckle. Figure 4.20.

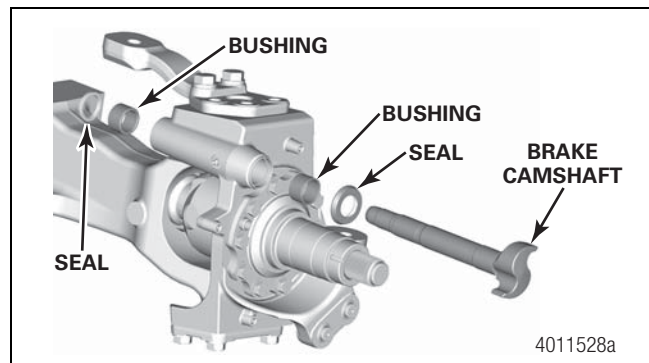


Figure 4.20

4. Remove the cap screws that secure the spindle to the steering knuckle. Figure 4.21.
  - If the vehicle is equipped with ABS: Push the ABS sensor into the steering knuckle cavity. Figure 4.22.

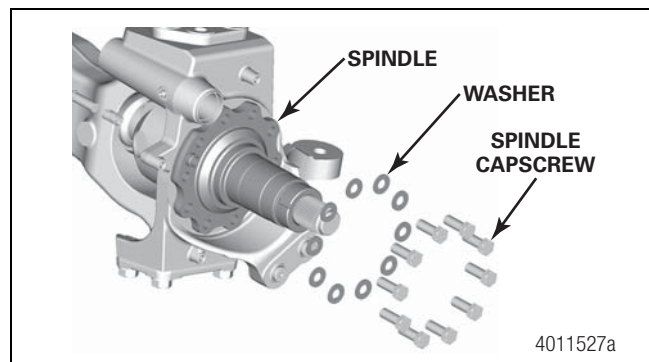
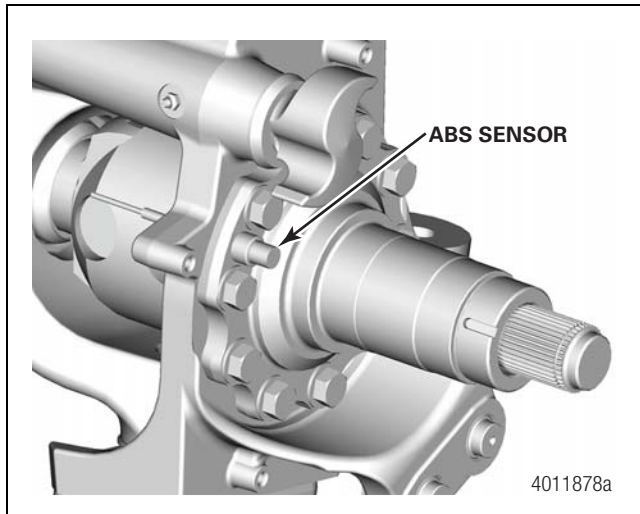


Figure 4.21

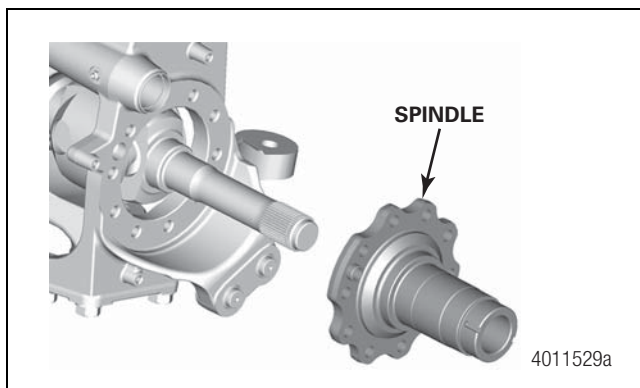


**Figure 4.22**

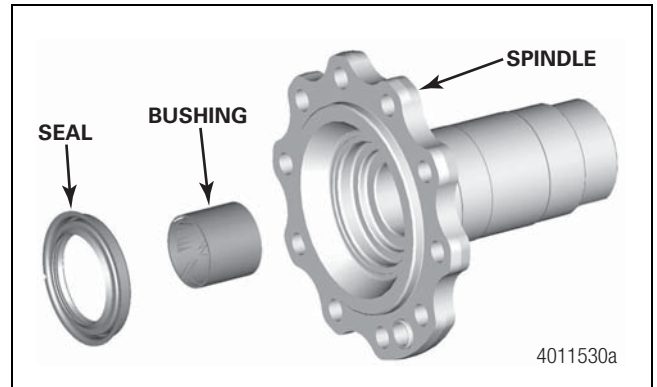
5. Support the spindle to prevent it from falling.
  - **If the vehicle is equipped with ABS:** The steel sleeve and sensor clip that position the ABS sensor will remain on the spindle. If necessary, push out the sensor clip to remove it. Use a suitable driver to remove the steel sleeve.

**NOTE:** The stop screw maintains the vehicle manufacturer's maximum turning angle and does not have to be removed. If you do remove it, mark the installed depth for reassembly.

6. Pull the spindle straight from the knuckle and axle shaft. The axle shaft bushing and oil seal will remain inside the spindle. Remove these parts with the appropriate tool and discard them. Figure 4.23 and Figure 4.24.



**Figure 4.23**

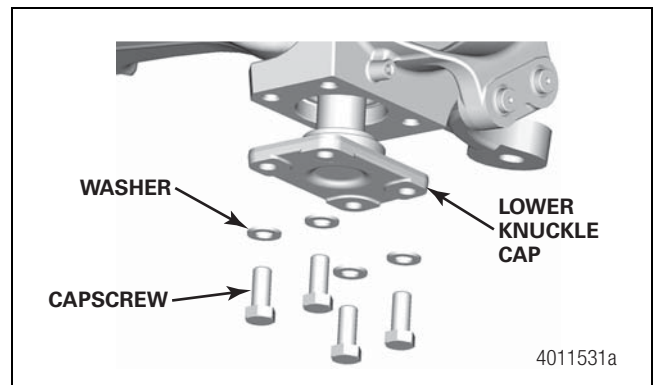


**Figure 4.24**

### Remove the Steering Knuckle from the Axle Housing

**NOTE:** You can service the steering arm and cross tube assemblies without removing the steering knuckle from the housing.

1. Remove the four capscrews and washers from the lower knuckle cap. Figure 4.25.



**Figure 4.25**

2. Remove the lower knuckle cap and inspect the thrust bearing for wear or damage. Replace a worn or damaged thrust bearing at reassembly. Figure 4.26.

## 4 Removal and Disassembly - MX-120-EVO Series

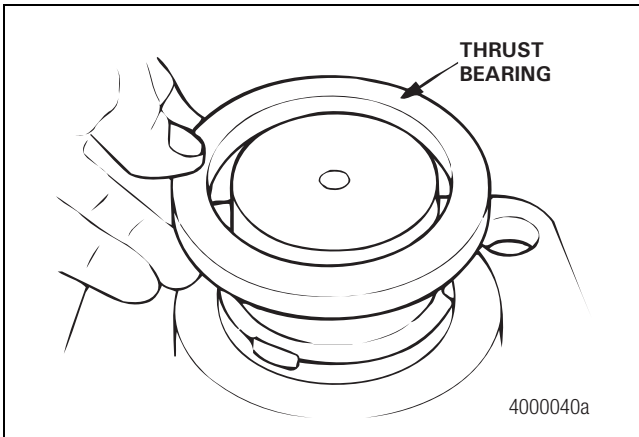


Figure 4.26

3. Remove the five capscrews from the upper knuckle cap.
4. Remove the air chamber mounting bracket. Figure 4.27. Remove the upper knuckle cap from the bore. Figure 4.28. Inspect the cap for wear and damage. Replace damaged or worn parts.

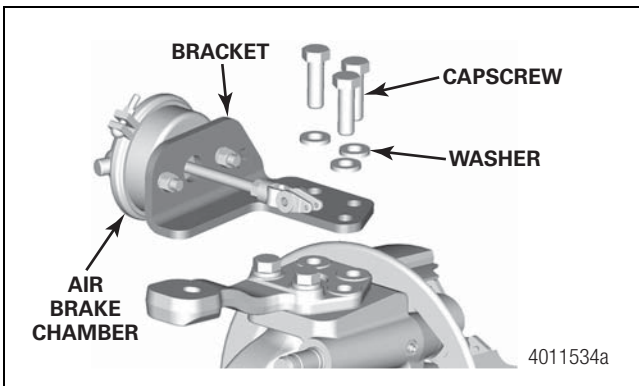


Figure 4.27

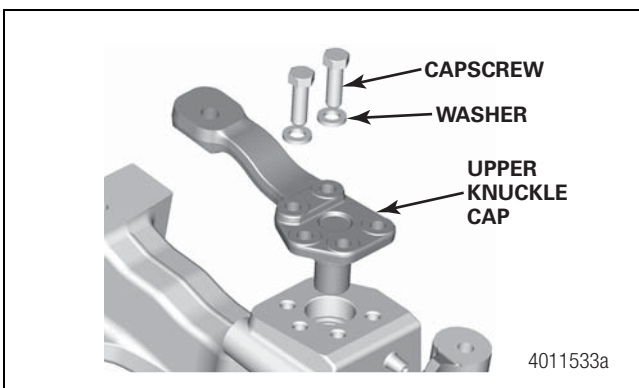


Figure 4.28

5. Remove the steering knuckle from the axle housing. The bushings will remain in the housing sockets.
6. Inspect the upper and lower bushings for wear or damage while they're still in the housing sockets. Figure 4.29. Use the following procedure to remove worn or damaged bushings.

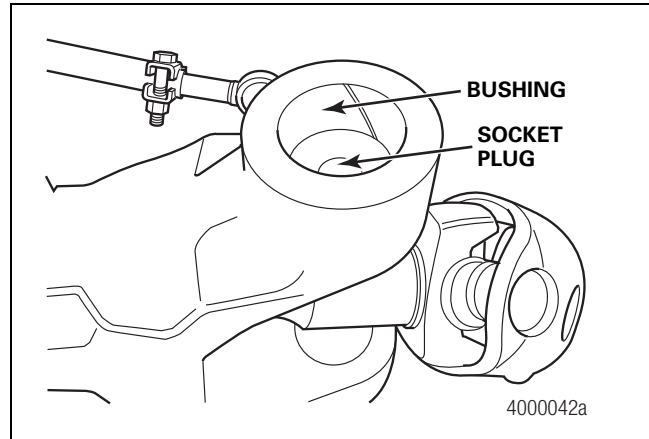


Figure 4.29

- A. Drive the socket plug and bushing toward the outside of the socket. Use a sleeve that is slightly smaller than the socket bore. Figure 4.30.

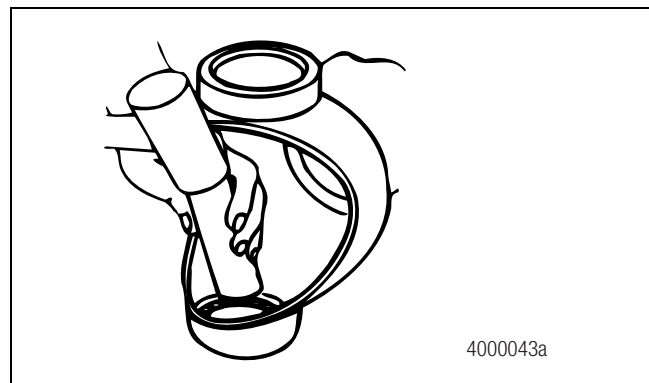


Figure 4.30

- B. Clean grease and dirt from the bore before reassembly.

### Remove the Axle Shaft from the Axle Housing

#### **⚠ CAUTION**

The cross assembly is not greaseable. Do not disassemble it. Damage to components can result. If the cross assembly requires service, replace the assembly.

1. Remove the axle shaft double-cardan joint assembly from the carrier housing by pulling the assembly STRAIGHT out of the carrier housing. Do not disassemble the joints, which will void the Meritor warranty. Figure 4.31.

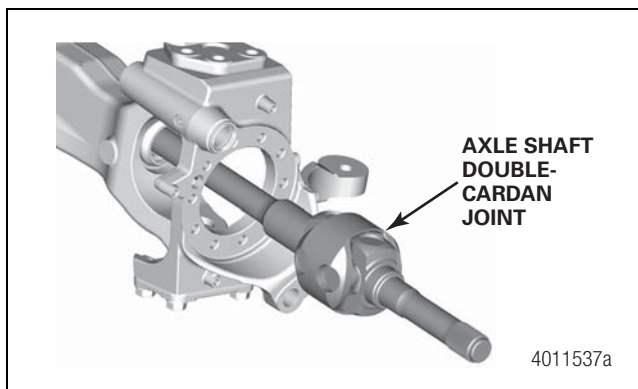


Figure 4.31

2. Remove and replace the inner axle shaft oil seal and bushing in the axle housing. Figure 4.32.

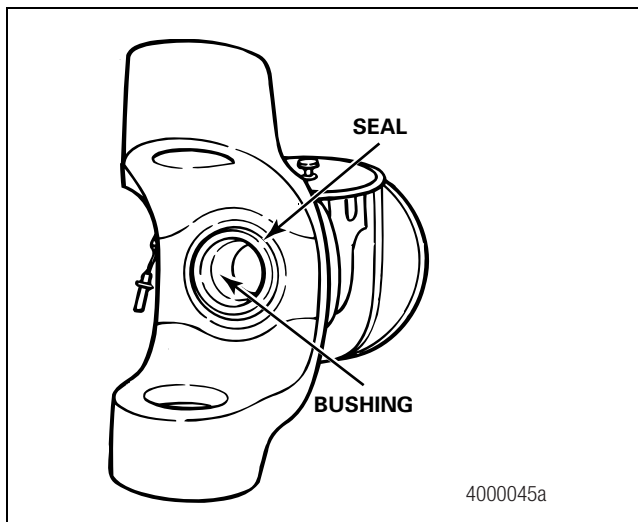


Figure 4.32

### Remove the Axle Shaft Without Removing the Steering Knuckle

1. Remove the axle shaft double-cardan joint assembly from the carrier housing by pulling the assembly STRAIGHT out of the carrier housing.
2. Inspect the inner bushing. Replace the bushing if damaged, always replace the seal.

### Remove the Axle Differential Carrier

Refer to Maintenance Manual 5A, Single Reduction Rear Differential Carriers, for differential carrier maintenance and service information. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

## 5 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.

### Clean

#### Ground and Polished Parts

Use a cleaning solvent to clean ground or polished parts or surfaces. Kerosene or diesel fuel oil can be used for this purpose. DO NOT USE GASOLINE.

- Do NOT clean ground or polished parts in a hot solution tank, water, steam or alkaline solutions.
- Use a knife, if required, to remove gasket material from parts. Be careful not to damage the ground or polished surfaces.

#### Rough Parts

- Rough parts can be cleaned with cleaning solvent or in a hot solution tank with a weak alkaline solution.
- Parts must remain in hot solution tanks until completely cleaned and heated.

- When removed from the hot solution, wash the parts with water until the alkaline solution is removed.

#### Axle Assemblies

- A completely assembled axle assembly can be steam cleaned on the outside to remove heavy amounts of dirt.
- Before the axle is steam cleaned, close or put a cover over all openings in the axle assembly. Examples of openings are breathers or vents in air chambers.

#### Dry Cleaned Parts

- Parts must be dried immediately after cleaning and washing.
- Dry the parts using soft clean paper or cloth rags.
- Except for bearings, parts can be dried with compressed air. Do not dry bearings by spinning with compressed air.

**NOTE:** Bearings can be damaged if dried by rotating with compressed air.

### Corrosion Protection

#### Cleaned Parts

- Apply a light oil to cleaned and dried parts that are not damaged and are to be immediately assembled. Do not apply oil to the brake linings or the brake drums.
- If parts are to be stored, apply a good corrosion preventative to all surfaces. Do NOT apply the material to the brake linings or the brake drums. Store the parts inside special paper or other material that prevents corrosion.

### Inspection

#### Parts

##### Tapered Roller Bearings

Inspect the cup, cone, rollers and cage of all tapered roller bearings in the assembly. If you find any of the following conditions, replace the bearing. Figure 5.1.

- The center of the large-diameter end of the rollers is worn level or below the outer surface.
- The radius at the large-diameter end of the rollers is worn to a sharp edge.

## 5 Prepare Parts for Assembly

- You find a roller groove at the small- or large-diameter end of the cup or cone inner race surfaces.
- You can see deep cracks or breaks in the cup, cone, and inner race or roller surfaces. Figure 5.2.
- You can see bright wear marks on the outer surface of the roller cage. Figure 5.3.
- The rollers are damaged. Figure 5.4.
- The cup and cone inner race surfaces that touch the rollers are damaged. Figure 5.5.

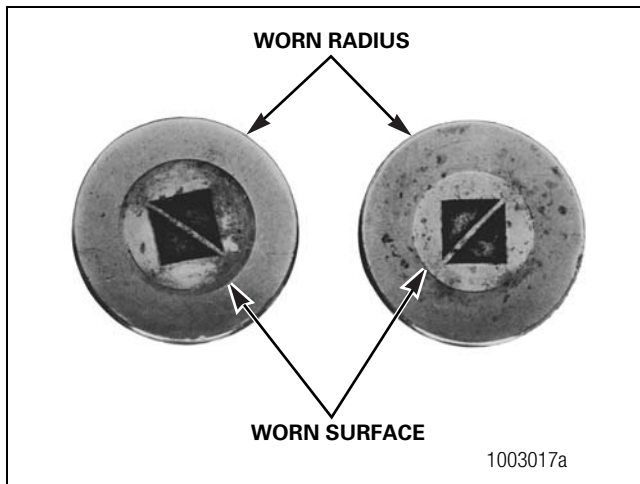


Figure 5.1

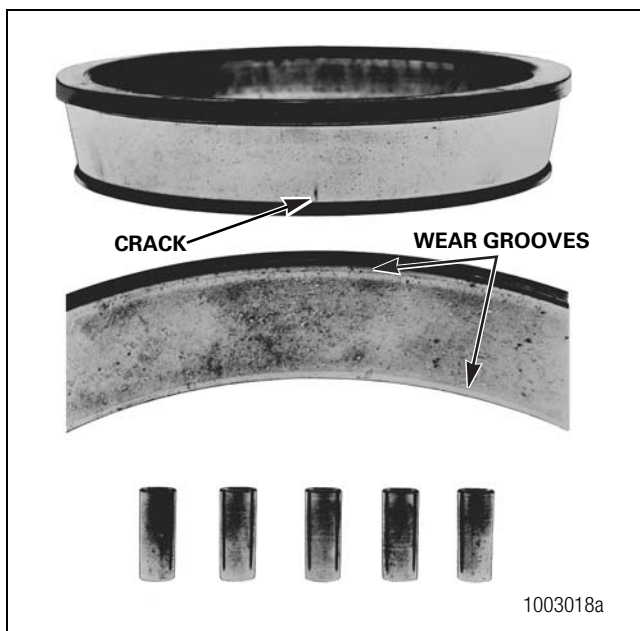


Figure 5.2

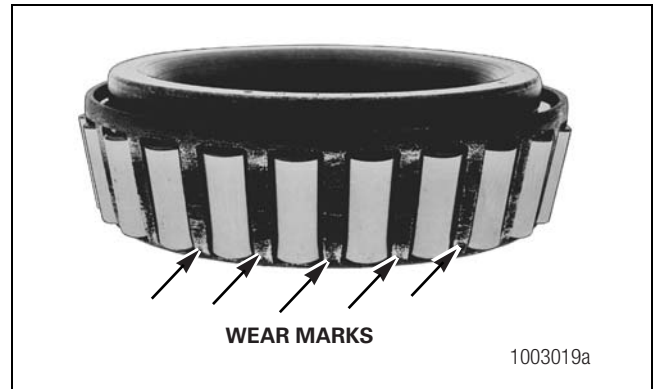


Figure 5.3

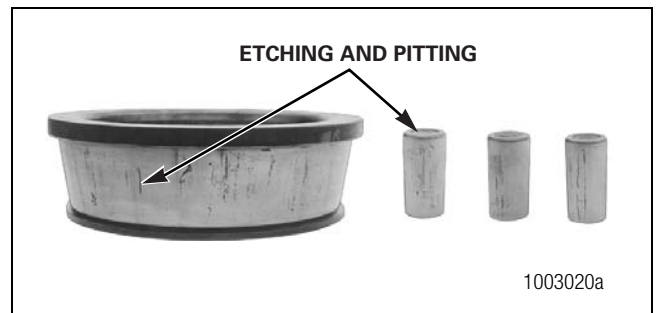


Figure 5.4

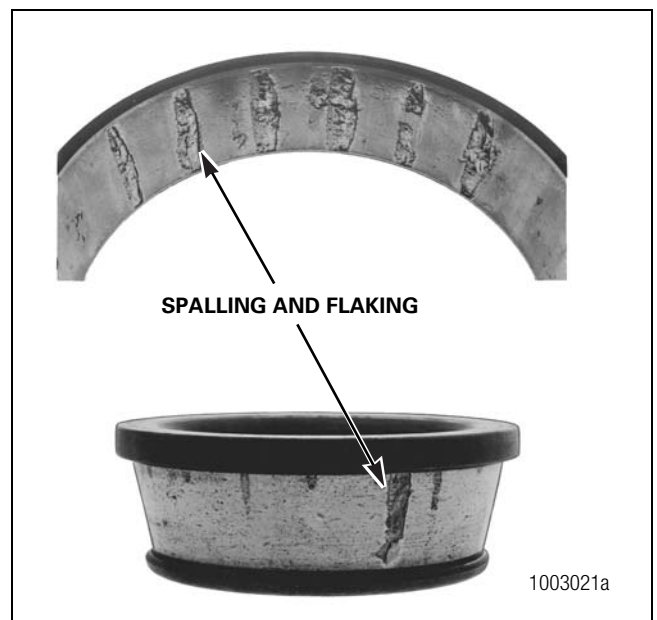


Figure 5.5



## 5 Prepare Parts for Assembly

### Axle Housing

1. Remove dirt from the housing sleeves. Check for cracks, loose studs and damage to machined surfaces. Repair or replace damaged parts.
2. Check the king pin bushing for wear or damage. Replace worn or damaged parts.
3. Inspect the needle roller thrust bearing for wear or damage. Replace worn or damaged parts.
4. Inspect the knuckle or steering stops for wear or damage. Replace worn or damaged parts.
5. Inspect the axle housing knuckle socket bushings for wear. Replace worn components.

### Axle Shafts

1. Inspect the axle shafts for wear, stress and cracks at the splines, shaft and yoke ears. Replace damaged components.
2. Inspect the inner and outer axle shaft bushings in the housing and spindle for wear or damage. Replace worn or damaged bushings.
3. Replace all seals.

### Tie Rod Ends

1. Inspect the tie rod ends for wear and damage. Replace worn or damaged tie rod ends. Do not repair them.
2. Check seals for damage. Replace damaged seals. Verify that seals are fastened correctly on the socket.
3. If the tie rod ends have grease fittings, check fittings for wear and damage. Replace worn or damaged fittings. If a grease fitting is missing, install a new one. Don't try to install a grease fitting onto a tie rod end that's a non-greaseable design. Figure 5.6.

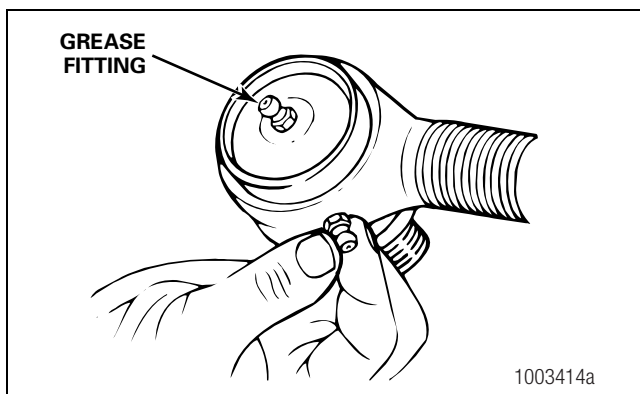


Figure 5.6

4. Tighten all grease fittings to the correct torque. Do not overtighten, which can damage the threads. Refer to Section 11 for torque specifications.

### Camshaft Bushings

Inspect the camshaft bushings for wear and damage. Replace worn or damaged parts.

### Steering Arm and Ball Joint

Inspect the steering arm and ball joint for wear and damage. Replace worn or damaged parts.

### Repair or Replace Parts

#### **⚠ 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.**

Replace worn or damaged parts of an axle assembly. The following are some conditions to check.

1. Replace the fasteners if the corners of the head are worn.
2. Replace damaged washers.
3. Replace the gaskets, oil seals, grease seals or felt seals at the time of axle or carrier repair.
4. Clean the parts. Apply new silicone gasket material, where required, when the axle or carrier is assembled.
5. Use a fine file, emery cloth or crocus cloth to remove rough edges from parts that have machined or ground surfaces.
6. Clean and repair fastener threads and holes. Use a die or tap of the correct size or a fine file.
7. Verify that threads are clean and not damaged, so that correct torque specifications for fasteners can be obtained.
8. Tighten all fasteners to the correct torque specifications. Refer to Section 11.

### Applying Adhesive and Silicone Gasket Material

#### Silicone (RTV) Gasket Material

#### **⚠ 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.

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.

The following silicone gasket products or their equivalent can be used on Meritor components.

Product Name	Description
Loctite® 5699 Ultra Grey	Adhesive/Sealant
Permatex® 82194 Ultra Grey	Silicone Sealant
Three Bond 1216	Silicone Sealant
Three Bond 1216E	Silicone Sealant

#### Application

1. Remove all old gasket material from both surfaces.
2. Clean the surfaces where you'll apply the silicone gasket material. Remove all oil, grease, dirt and moisture. Dry both surfaces.

#### **⚠ CAUTION**

The amount of silicone gasket material applied must not exceed a 0.125-inch (3.18 mm) diameter bead. Too much gasket material can block lubrication passages. Damage to components can result.

3. Apply a 0.125-inch (3.18 mm) diameter continuous bead of silicone gasket material around one surface. Also apply the gasket material around the edge of all the fastener holes on that surface. Figure 5.7.

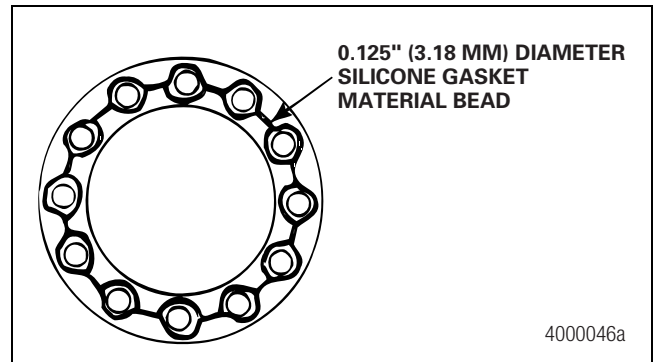


Figure 5.7

4. Assemble the components immediately to permit the gasket material to compress evenly between the parts.
5. Tighten the fasteners to the required torque specification for that size fastener. Refer to Section 11.
6. Wait 20 minutes before filling the assembly with lubricant.

## 6 Assembly and Installation - MX-120 and MX-120-HR Series

### 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.

### Prepare Parts for Assembly

1. If required, install a new bushing into the spindle.
2. Install a new inner and outer seal into the housing. The oil seal must be installed with the notch at the top. Figure 6.1. Use a correct size sleeve or driver. Refer to Section 12 for seal driver tool specifications.

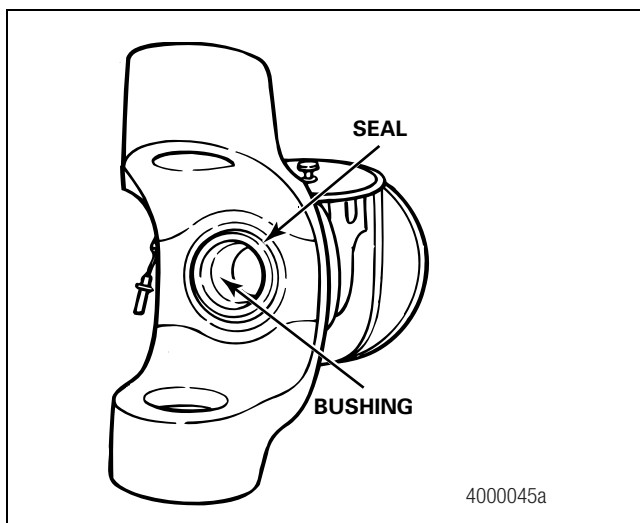


Figure 6.1

#### **⚠ WARNING**

Take care when you use Loctite<sup>®</sup> 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.

3. Apply a layer of Loctite<sup>®</sup> 680 sealant on the outside diameter of the bushing.

#### **⚠ CAUTION**

Do not force or hit the seal after it is correctly installed in its seat. Damage to the seal retainer can result.

4. If the socket plugs were removed from the housing, use the following procedure to reinstall them.
  - A. Position the socket plugs in the housings up against the counter bore.
  - B. Strike the socket plugs with a hammer to flatten and seat the plugs.
5. Drive the new bushings into the socket bores so that the bushings are level with the outside of the socket. Use the correct size sleeve or driver. Refer to Section 12 for tool specifications.
6. Pack the bushing with grease before assembly.

### Install the Axle Shaft and Assemble the Steering Knuckle

**NOTE:** If the axle shaft was removed without removing the steering knuckle, refer to the Install the Axle Shaft Through the Steering Knuckle in this section.

1. Inspect the housing seal to verify that it is correctly installed.
2. Install the axle shaft double-cardan joint assembly into the housing. Carefully align the inner shaft splines with the splines of the differential side gear. Figure 6.2.

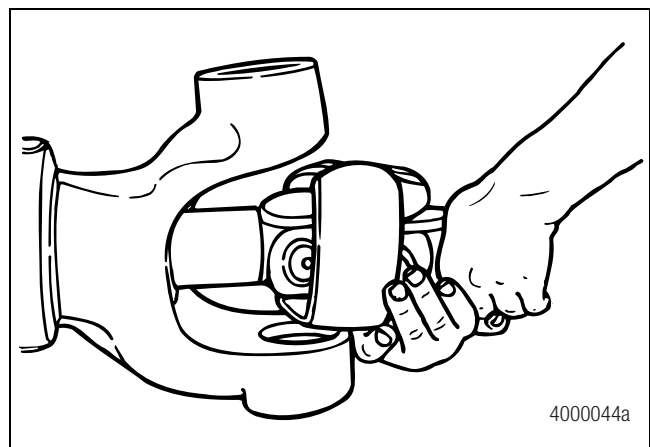
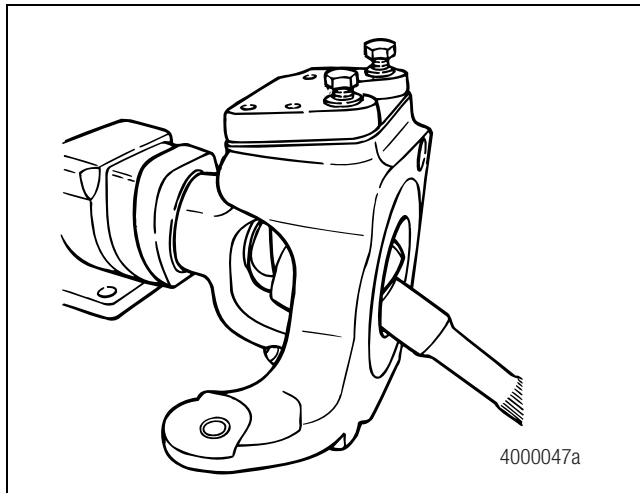


Figure 6.2

3. Place the knuckle in its correct position over the end of the housing. Align the knuckle bores with the housing socket bores.
4. Position the cap assembly through the upper bores of the knuckle and housing until the cap is against the knuckle.

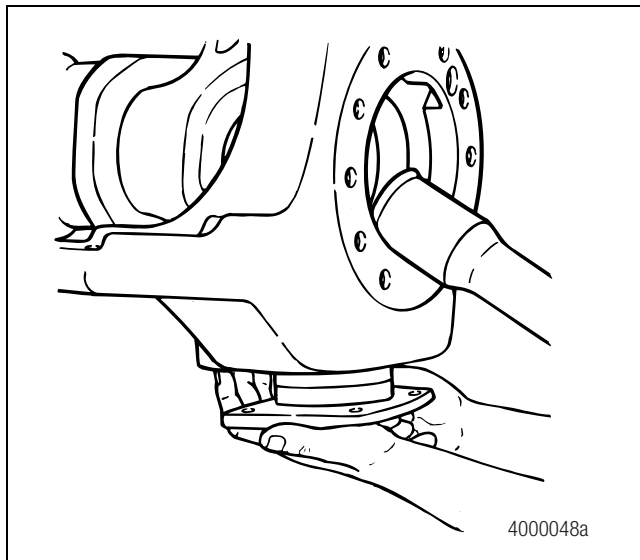
## 6 Assembly and Installation - MX-120 and MX-120-HR Series

5. Install two capscrews and loosely tighten them to hold the upper knuckle cap in place. Figure 6.3.





**Figure 6.3**

6. Install the dust sleeve and thrust bearing against the journal on the lower cap.
7. Position the lower cap assembly through the bottom bores of the knuckle and housing until the cap is against the knuckle. Figure 6.4.

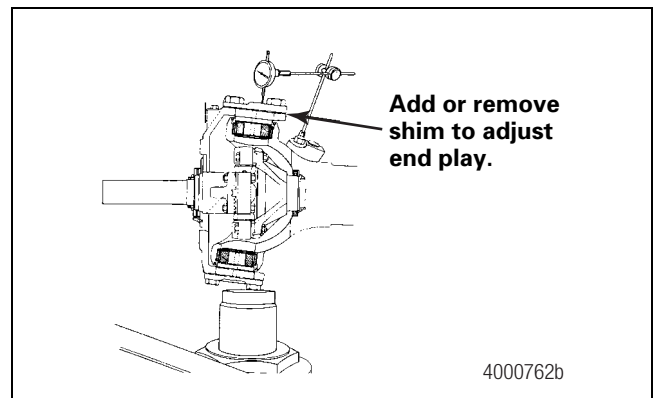


**Figure 6.4**

8. Install the bolts for the lower and upper knuckle caps.
  - A. Tighten the lower knuckle cap bolt to 310-400 lb-ft (420-542 N•m). 

- B. Tighten the upper knuckle cap bolt to 500-600 lb-ft (678-881 N•m). 

9. Turn the knuckle back and forth to verify that it travels freely.
10. Check the steering knuckle end play.
  - A. Support the vehicle with safety stands under the axle housing.
  - B. Place a magnetic base dial indicator into position on the housing. Figure 6.5.
  - C. Use a jack to place pressure onto the lower knuckle cap. Set the dial indicator to ZERO. If necessary, remove the grease fitting from the lower knuckle cap to prevent damage.
  - D. Fully release the jack pressure and read the end play on the dial indicator. Correct end play is 0.005-0.015-inch (0.127-0.381 mm). Remove or add shims from between the upper knuckle cap/steering arm and the axle housing to obtain the correct end play. Figure 6.6.



**Figure 6.5**

## 6 Assembly and Installation - MX-120 and MX-120-HR Series

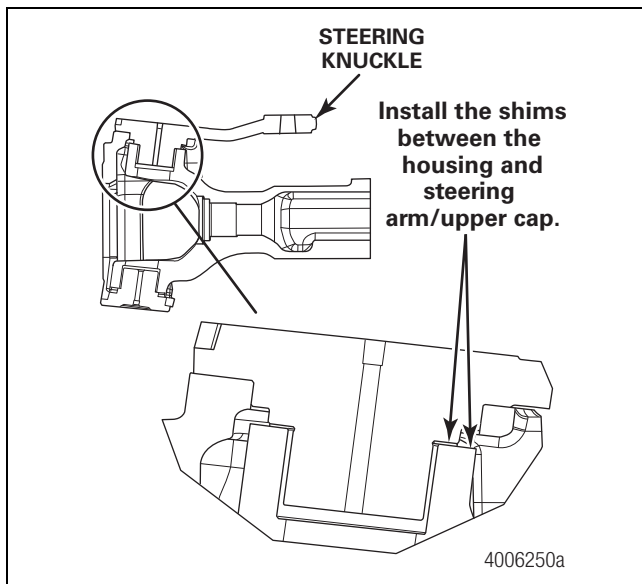



Figure 6.6

### Check Steering Knuckle Turning Torque

1. Fasten a soft wire or cord to the tie rod arm. Attach a pound scale to the opposite end of the wire or cord.
2. Hold the outer shaft of the universal joint away from the knuckle opening. Pull on the pound scale to rotate the knuckle.

**NOTE:** Read the pull necessary to rotate the knuckle, not start the movement. The correct rotating torque is 8-25 lb-ft (20.8-33.9 N•m). 

3. Read the pounds on the scale. Read the pull necessary to rotate the knuckle. The scale must read 10-30 lbs (4.5-13.5 kg). Figure 6.7.

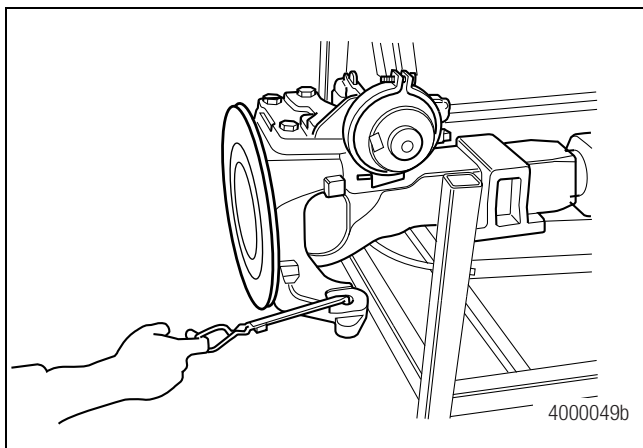


Figure 6.7

4. Verify that the rotating torque is within specification. If it is not, follow the instructions below.
  - A. Turn the knuckle back and forth. Check the torque again.
  - B. Check the trunnion for damage.
  - C. Check the knuckle assembly end play.

## Installation

### Axle Shaft Through the Steering Knuckle

**NOTE:** Use this procedure to install the axle shafts if they were removed without removing the steering knuckle.

It can be difficult to correctly support and align the inner shaft when installing the longer axle shaft and universal joint assembly through the steering knuckle. The following procedure has been developed to aid in the installation process.

1. Obtain a strong, smooth piece of wood, like an ax handle or sledge hammer handle.
2. Place one end of the piece of wood between the steering knuckle and the axle housing.
3. Install the inner axle shaft through the steering knuckle and into the axle housing. Use the piece of wood as a lever to support the axle shaft. Figure 6.8.

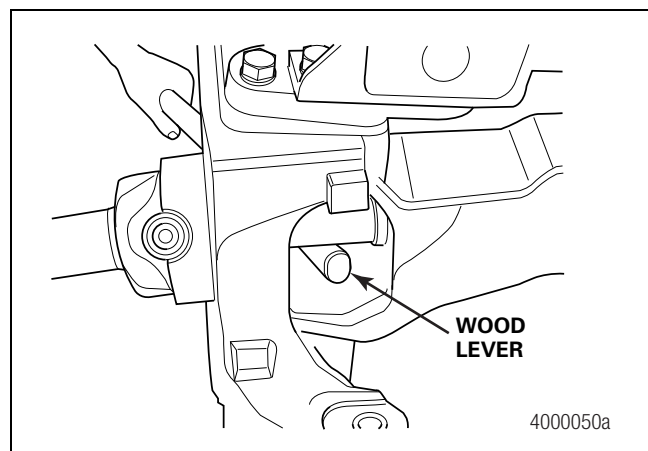
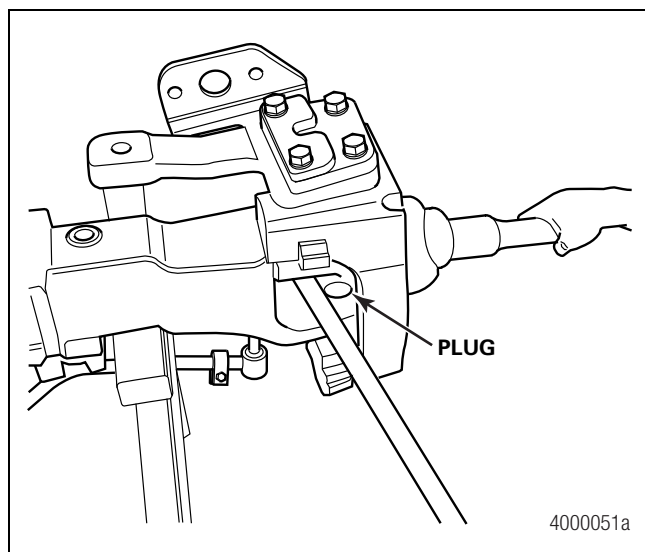


Figure 6.8

### **CAUTION**

Be careful to avoid damaging the inner oil seal when installing the axle shaft.

- Carefully align the inner shaft splines with the splines of the differential side gear.
- Install the axle shaft and universal joint assembly through the steering knuckle. Figure 6.9.



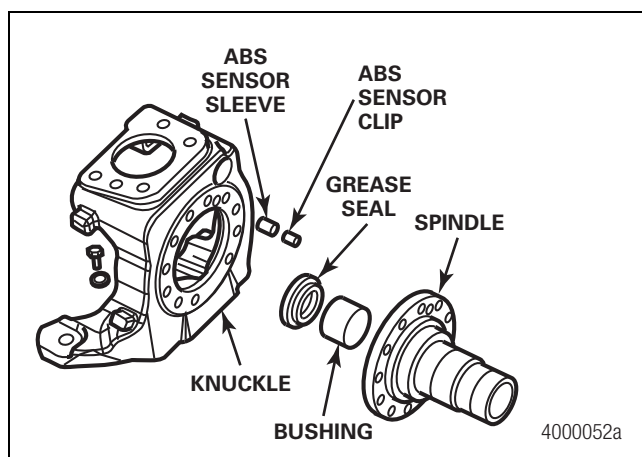
**Figure 6.9**

## Assembly

### Spindle, Brake Assembly and Dust Shield to the Steering Knuckle

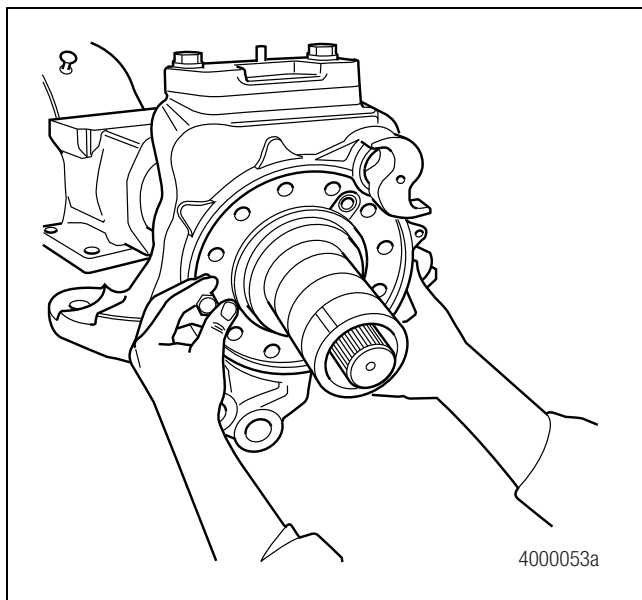
#### Prepare the Spindle

- On units equipped for ABS, if the steel sleeve for holding the ABS sensor clip and ABS sensor has been disassembled, install the sleeve with a suitable driver.
- Install the sleeve into the spindle until it is 15/16-inch (0.9375-inch or 23.8 mm) below the inner bearing shoulder.
- Install the ABS sensor clip into the sleeve. Figure 6.10.




**Figure 6.10**

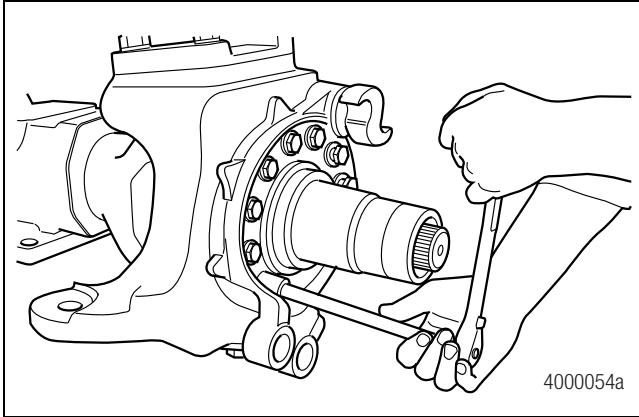
- If removed, install a new camshaft bushing and grease seals into the knuckle.
- If disassembled, use the correct size drivers to install the bushing and grease seal into the spindle. Refer to Section 12 for tool specifications. Figure 6.10.
- Pack the spindle bushing and seal with grease.
- Install the spindle against the knuckle with the keyway slot for the wheel bearing adjusting nut system toward the TOP for ABS spindles. Figure 6.11.



**Figure 6.11**

## 6 Assembly and Installation - MX-120 and MX-120-HR Series

8. Install the brake assembly onto the spindle. Fasten all parts to the knuckle with 12 capscrews and washers. Tighten to 180-230 lb-ft (244-312 N•m). Figure 6.12. 



**Figure 6.12**

9. On units equipped for ABS, install the ABS cable into the knuckle. Install the ABS sensor into the ABS bushing in the spindle.
10. If removed, install the stop screw to the depth marked during removal.

### Installation

#### Wheel Bearings Into the Hub

##### **WARNING**

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

1. If the wheel studs were removed from the hub, put the hub in a press with the drum side at the BOTTOM.
  - A. Align the grooves on the studs with the grooves in the stud holes in the hub.
  - B. Press the studs into position.

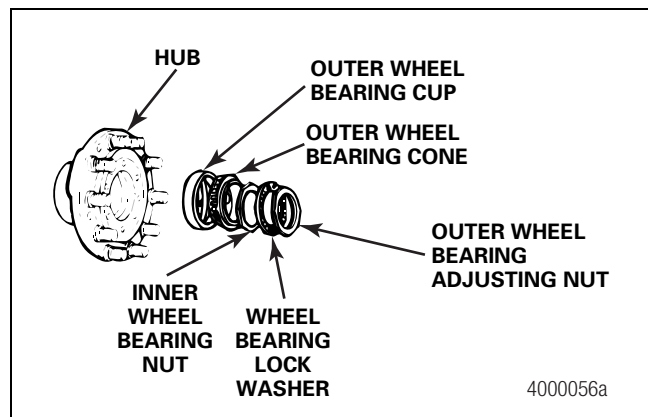
##### **WARNING**

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.

2. Use a press and sleeve to install the inner and outer bearing cups into the hub. The bearing cup must be pressed tight against the shoulder in the hub.
  - **If a press is not available:** Use a brass hammer.
3. Inspect the wheel bearings for wear or damage. Refer to Section 5 for instructions.
4. Use a pressure packer to force the specified grease from the large end of the cones into the cavities between the rollers and cage.
  - **If a pressure packer is not available:** Grease the bearing by hand.
5. Fill the hub cavity between the bearing cups with the specified grease until it is level with the smallest diameter of the cups.
6. Install the inner bearing cone into the cup inside the hub.
7. On units equipped with ABS, install the ABS tooth wheel onto the hub with a suitable driver.
8. Install the hub seal into the correct position against the hub bore. Refer to Section 12 for seal driver tool specification. Do not force or hit the seal after it has reached the bottom of the bore, which can damage the seal.

#### Hub Onto the Axle

1. Install the hub assembly onto the spindle. Be careful the grease seal is not damaged during installation. Press the hub until the inner bearing is flat against the face of the spindle.
2. Install the outer bearing cone onto the spindle and push it into its cup inside the hub. Figure 6.13.



**Figure 6.13**

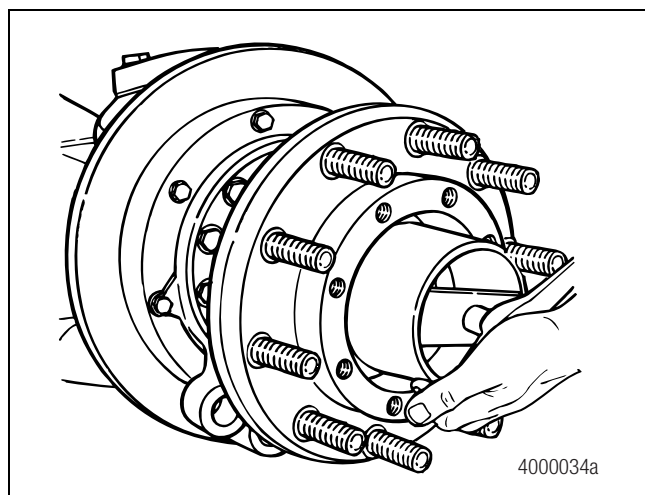
## Adjustment

### Wheel Bearings

#### **⚠ WARNING**

Use a torque wrench to tighten or loosen the adjusting nuts. Do not use a hammer to directly hit the adjusting nuts, or to hit a chisel or drift placed against them. Damaged adjusting nuts can prevent you from obtaining correct wheel bearing end play, which can affect vehicle operation and cause the wheels to separate from the vehicle. Serious personal injury and damage to components will result.

1. Use a torque wrench to tighten the adjusting nut to 100 lb-ft (136 N•m). Figure 6.14. **ⓘ**



**Figure 6.14**

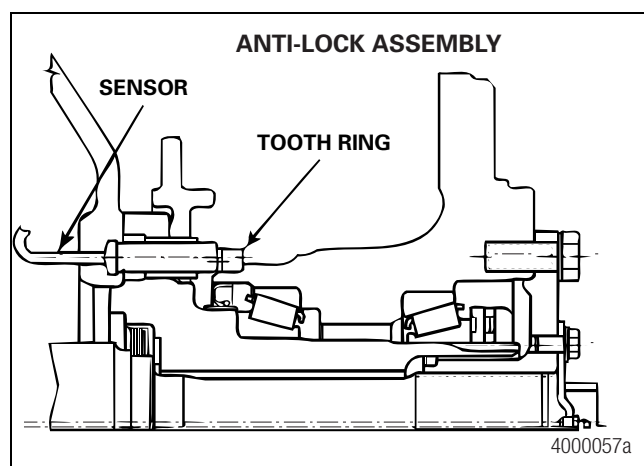
2. Rotate the hub three full turns to ensure all the bearings and seal surfaces are in contact.
3. Back off the adjusting nut 1/4 turn, 2-1/2 studs of the drum bolt circle. Do not rotate the hub assembly after backing off the adjusting nut.
4. Assemble the lock ring and jam nut. Tighten the jam nut to 250-400 lb-ft (339-542 N•m). If the lock ring does not line up with the adjusting nut, rotate the adjusting nut clockwise, tightening, to the closest lock ring hole. To make the smallest turn possible, flip the lock ring over if necessary. **ⓘ**
5. Check the resulting end play with a dial indicator and perform the following actions.

End Play (inch)	Action
0.000-0.002	No action required.
>0.002-0.005	Remove the jam nut and lock ring. Tighten the adjusting nut 1/32 turn by flipping the lock ring over and turning the adjusting nut to align with the next hole.
>0.005-0.008	Remove the jam nut and lock ring. Tighten the adjusting nut 1/16 turn by turning the adjusting nut to align with the next hole. Do not flip the lock ring.
>0.008-0.011	Remove the jam nut and lock ring. Tighten the adjusting nut 3/32 turn by flipping the lock ring over and turning the adjusting nut to align with the second hole from the current position.
>0.011	Return to Step 1 and repeat the procedure.

### Wheel Speed Sensors on Units Equipped with ABS

For complete maintenance and service procedures for Meritor WABCO anti-lock braking systems, refer to Maintenance Manual 28, Anti-Lock Braking Systems (ABS) for Trucks, Tractors and Buses — C Version ECUs, and Maintenance Manual 30, Anti-Lock Braking Systems (ABS) for Trucks, Tractors and Buses — D Version ECUs. To obtain these publications, refer to the Service Notes page on the front inside cover of this manual.

Push the wheel speed sensor IN until it contacts the tooth wheel. Do not use sharp objects to pry or push sensors. Sensors will self-adjust during wheel rotation. Figure 6.15.



**Figure 6.15**



## 6 Assembly and Installation - MX-120 and MX-120-HR Series

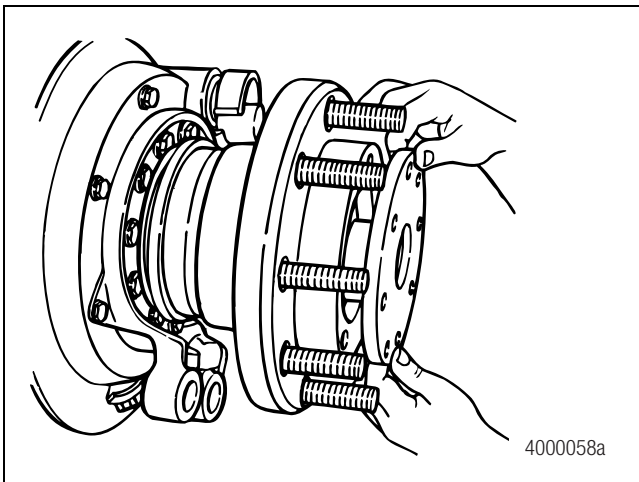
### Installation

#### Drive Flange and Hubcap

##### **⚠ WARNING**

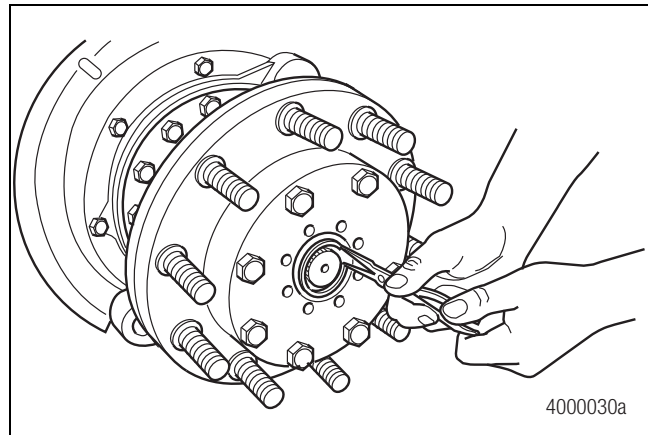
When you apply some silicone gasket materials, a small amount of acid vapor is present. To prevent serious personal injury, ensure that the work area is well-ventilated. Read the manufacturer's instructions before using a silicone gasket material, then carefully follow the instructions. If the silicone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

1. Apply a layer of silicone gasket material to the hub mounting surface of the drive flange only. Refer to Section 5.
2. Apply Meritor specification O-617-A or O-617-B wheel bearing grease to the inside splines of the drive flange and the splines of the driveshaft. Refer to Section 10.
3. Install the drive flange onto the hub and fasten with washers and capscrews. Figure 6.16. Tighten the capscrews to 180-230 lb-ft (244-312 N•m). **ⓘ**



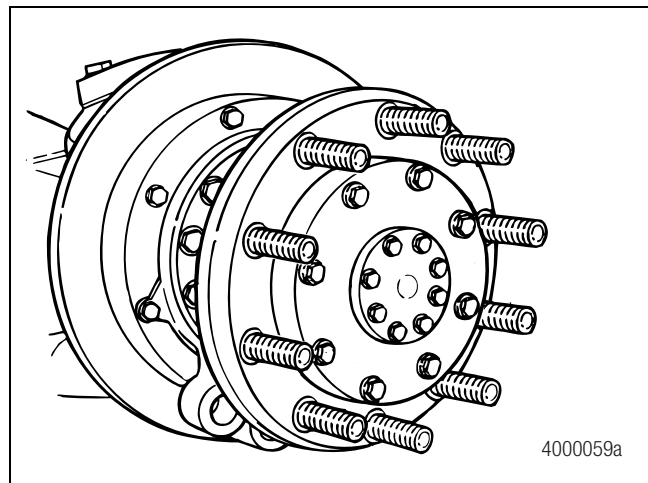
**Figure 6.16**

4. Install the snap ring onto the end of the axle shaft. Figure 6.17. Ensure the snap ring is positioned in the groove at the end of the axle shaft.



**Figure 6.17**

5. Apply a 0.125-inch continuous bead of silicone gasket material around either the mounting surface of the hubcap or the drive flange. Refer to Section 5.
6. Install the hubcap and tighten the capscrews to 35-50 lb-ft (47-68 N•m). Figure 6.18. **ⓘ**



**Figure 6.18**

### Assembly

#### Slack Adjuster

For complete maintenance and service procedures for Meritor's automatic slack adjusters, refer to Maintenance Manual 4, Cam Brakes and Automatic Slack Adjusters. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

## 6 Assembly and Installation - MX-120 and MX-120-HR Series

### **⚠ WARNING**

Before you service a spring chamber, carefully follow the manufacturer's instructions to compress and lock the spring to completely release the brake. Verify that no air pressure remains in the service chamber before you proceed. Sudden release of compressed air can cause serious personal injury and damage to components.

1. Install the air brake chamber and bracket. Tighten the bracket mounting capscrews to 500-650 lb-ft (678-881 N•m). Figure 6.19. **ⓘ**

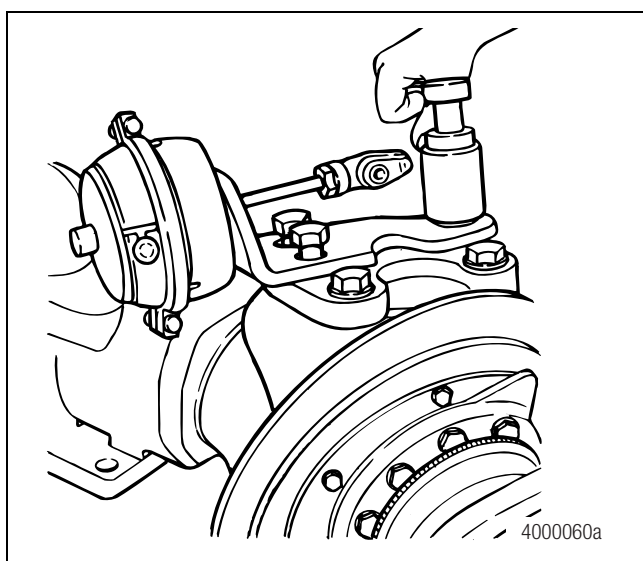


Figure 6.19

2. Install the inner washer onto the camshaft, then install the slack adjuster onto the camshaft. Figure 6.20.

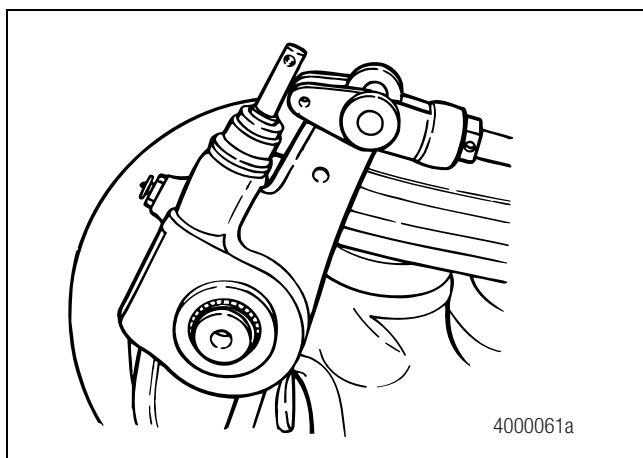


Figure 6.20

3. Install the slack adjuster washers at the adjuster end of the camshaft. Figure 6.21. Use as many washers as required to keep slack end play at 0.060-inch (1.5 mm) maximum.

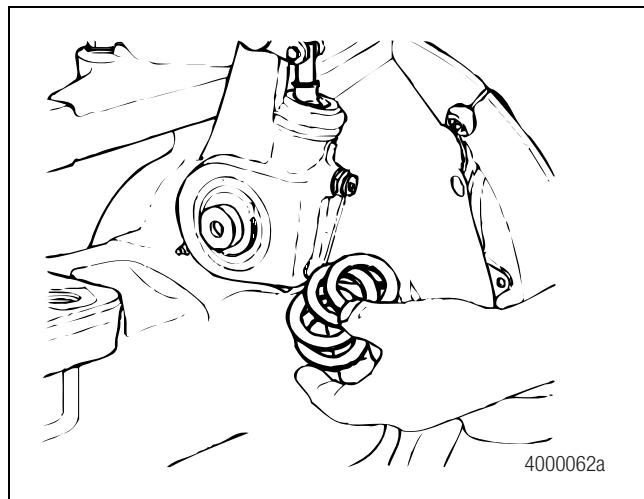


Figure 6.21

4. Install the slack adjuster retaining ring at the adjuster end of the camshaft. Figure 6.22.

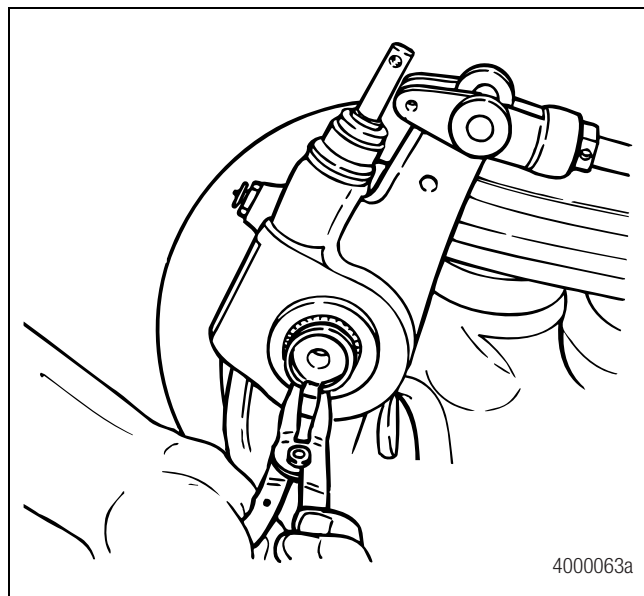


Figure 6.22

5. Install the pin and retainer that engages the push rod yoke and the slack adjuster plunger rod. Figure 6.23.

## 6 Assembly and Installation - MX-120 and MX-120-HR Series

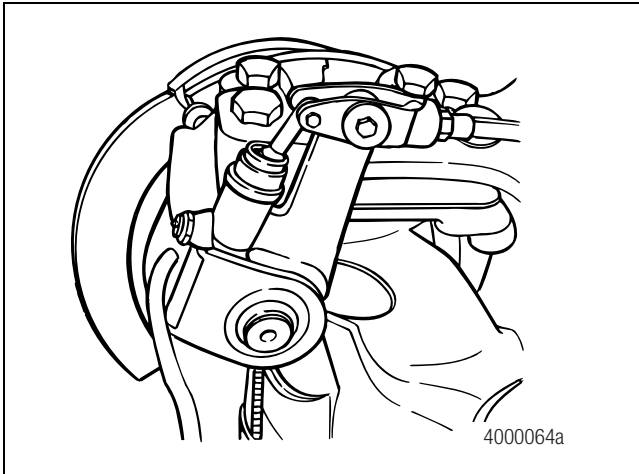



Figure 6.23

- Adjust the slack adjuster position to obtain the following BSAP dimension from the back of the brake air chamber to the center of the clevis pin.

Clevis Type	SL (Slack Adjuster Length)	BSAP (Brake Slack Adjuster Position)
Standard	5.5" (139.7 mm)	7.4" (188 mm)
Offset	5.5" (139.7 mm)	7.75" (196.85 mm)

- Tighten the nut on the push rod to the clevis pin to 95-115 lb-ft (129-156 N•m). 
- Connect the air lines to the brake chambers.
- Install the brake drum. Figure 6.24.

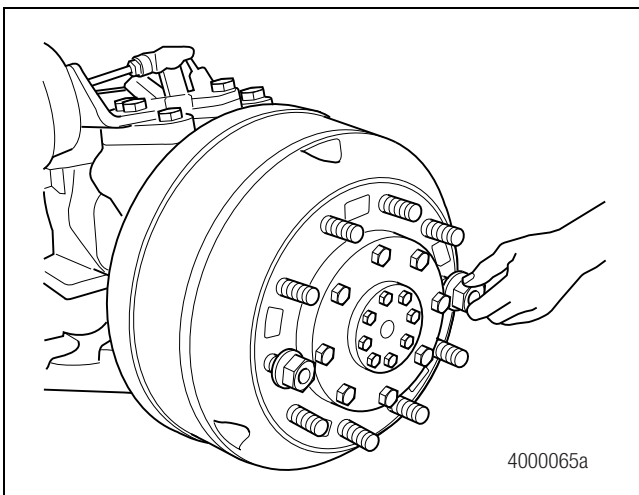


Figure 6.24

- Check the axle lubricant level. Fill if required. Refer to Maintenance Manual 1, Lubrication, for lubricant specifications. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

## Adjustment

### Brakes

Refer to Maintenance Manual 4, Cam Brakes and Automatic Slack Adjusters, for complete brake adjustment procedures. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

### 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.

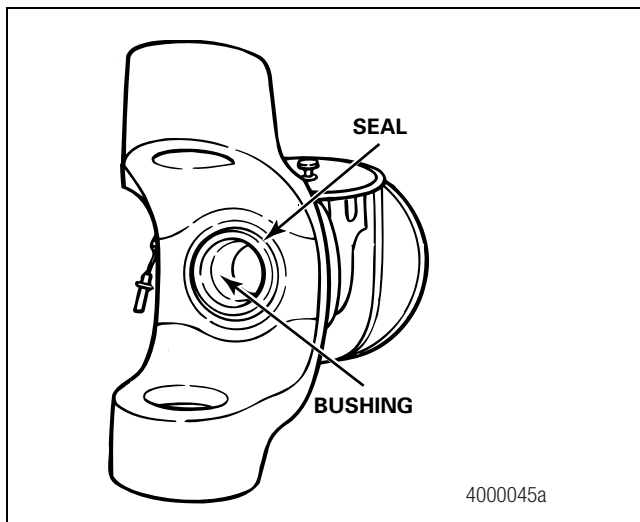
### Prepare Parts for Assembly

1. If required, install a new bushing and seal into the spindle.
  - A. Apply a layer of Loctite® 680 sealant on the outside diameter of the bushing. Use the correct size sleeve or driver to install the bushing into the housing.

#### **⚠ CAUTION**

Do not force or hit the seal after it is correctly installed in its seat. Damage to the seal retainer can result.

- B. Install a new seal into the housing using a correct size sleeve or driver. The oil seal must be installed with the notch at the top. Figure 7.1. Refer to Section 12 for seal driver tool specifications.



**Figure 7.1**

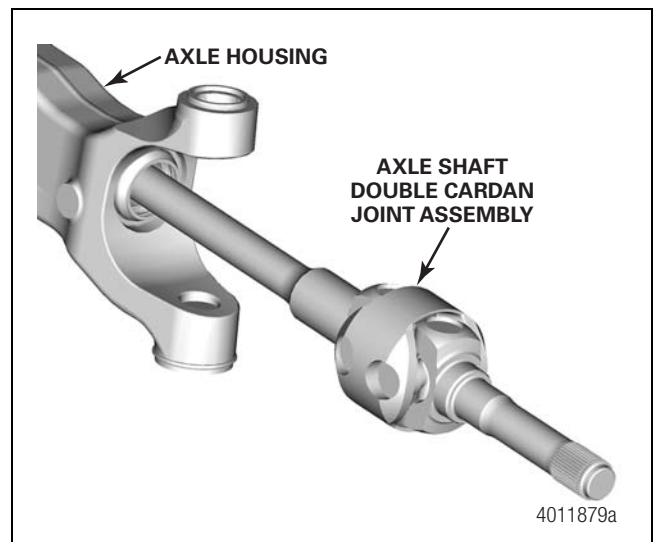
2. If the socket plugs were removed from the housing, use the following procedure to reinstall them.
  - A. Position the socket plugs in the housings up against the counter bore.

- B. Strike the socket plugs with a hammer to flatten and seat the plugs.

3. Drive the new bushings into the socket bores so that the bushings are level with the outside of the socket. Use the correct size sleeve or driver. Refer to Section 12 for tool specifications.
4. Apply grease to the bushing before assembly.

### Install the Axle Shaft and Assemble the Steering Knuckle

1. Inspect the housing seal to verify that it is correctly installed.
2. Install the axle shaft double-cardan joint assembly into the housing. Carefully align the inner shaft splines with the splines of the differential side gear. Figure 7.2.



**Figure 7.2**

3. Place the knuckle in its correct position over the end of the housing. Align the knuckle bores with the housing socket bores.
4. Position the cap assembly through the upper bores of the knuckle and housing until the cap is against the knuckle.
5. Install two capscrews and loosely tighten them to hold the upper knuckle cap in place. Figure 7.3.

## 7 Assembly and Installation - MX-120-EVO Series

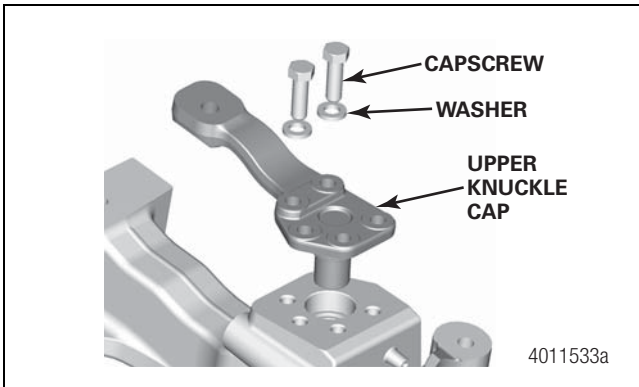


Figure 7.3

6. Install the thrust bearing on the lower cap. Figure 7.4.

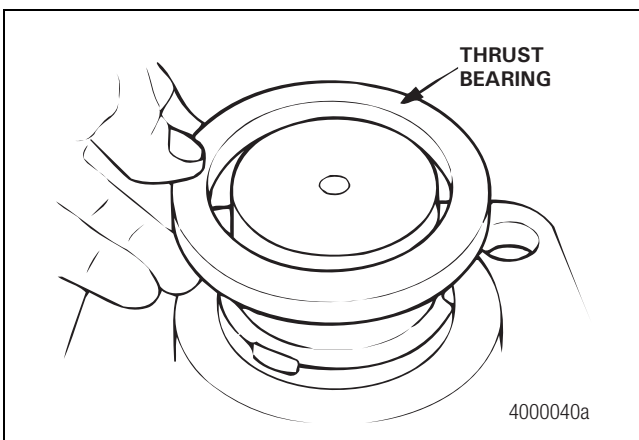


Figure 7.4

7. Position the lower cap assembly through the bottom bores of the knuckle and housing until the cap is against the knuckle. Figure 7.5.

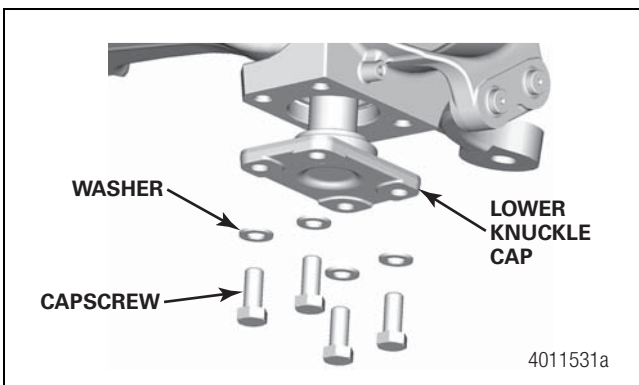




Figure 7.5

8. Install the bolts for the lower and upper knuckle caps.
- A. Tighten the lower knuckle cap bolt to 310-400 lb-ft (420-542 N•m). 
  - B. Tighten the upper knuckle cap bolt to 500-600 lb-ft (678-881 N•m). 
9. Turn the knuckle back and forth to verify that it travels freely.
10. Check the steering knuckle end play.
- A. Support the vehicle with safety stands under the axle housing.
  - B. Place a magnetic base dial indicator into position on the housing. Figure 7.6.
  - C. Use a jack to place pressure onto the lower knuckle cap. Set the dial indicator to ZERO. If necessary, remove the grease fitting from the lower knuckle cap to prevent damage.
  - D. Fully release the jack pressure and read the end play on the dial indicator. Correct end play is 0.005-0.015-inch (0.127-0.381 mm). Remove or add shims from between the upper knuckle cap/steering arm and the axle housing to obtain the correct end play. Figure 7.7.

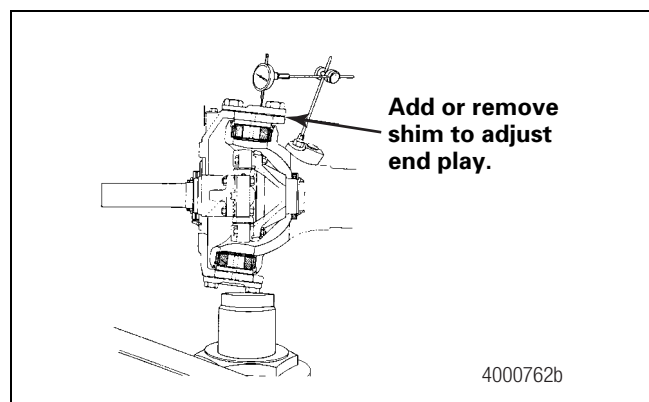
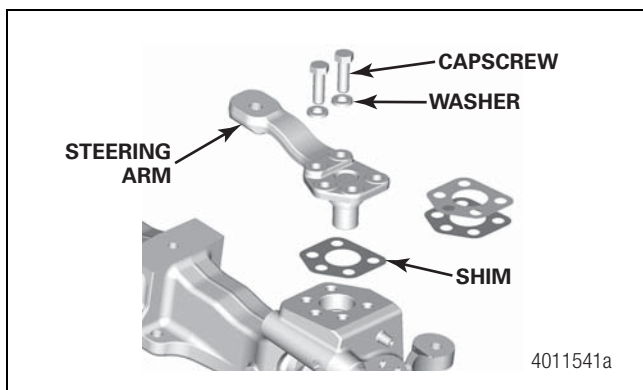



Figure 7.6



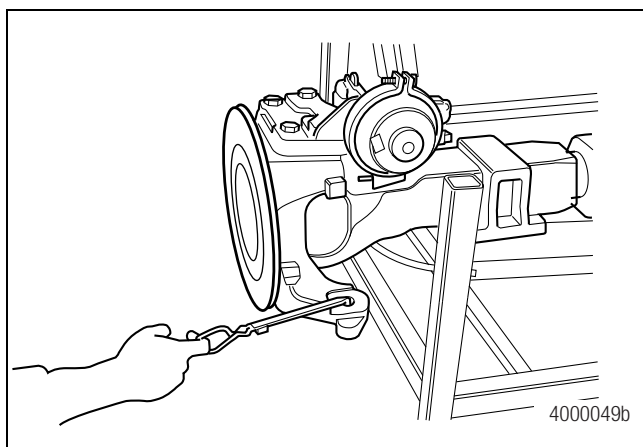
**Figure 7.7**

### Check Steering Knuckle Turning Torque

1. Fasten a soft wire or cord to the tie rod arm. Attach a pound scale to the opposite end of the wire or cord.
2. Hold the outer shaft of the universal joint away from the knuckle opening. Pull on the pound scale to rotate the knuckle.

**NOTE:** Read the pull necessary to rotate the knuckle, not start the movement. x-x lb-ft (x-x N•m). 

3. Read the pounds on the scale. Read the pull necessary to rotate the knuckle. The scale must read 10-30 lbs (4.5-13.5 kg). Figure 7.8.



**Figure 7.8**

4. Verify that the rotating torque is within specification. If it is not, follow the instructions below.
  - A. Turn the knuckle back and forth. Check the torque again.
  - B. Check the trunnion for damage.

- C. Check the knuckle assembly end play.

## Installation

### Axle Shaft Through the Steering Knuckle

**NOTE:** Use this procedure to install the axle shafts if they were removed without removing the steering knuckle.

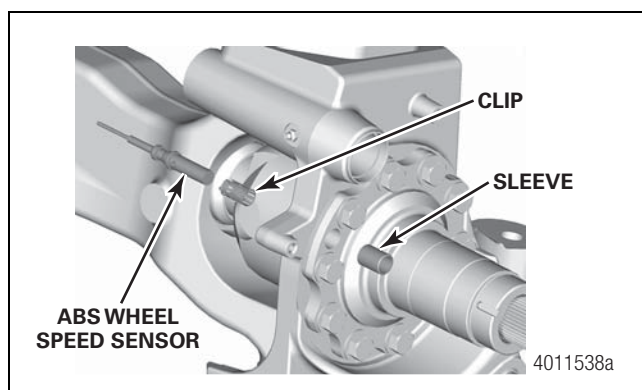
1. Obtain a strong, smooth piece of wood, like an ax handle or sledge hammer handle.
2. Place one end of the piece of wood between the steering knuckle and the axle housing.
3. Install the inner axle shaft through the steering knuckle and into the axle housing. Use the piece of wood as a lever to support the axle shaft.

## Assembly

### Spindle, Brake Assembly and Dust Shield to the Steering Knuckle

#### Prepare the Spindle

1. On units equipped for ABS, if the steel sleeve for holding the ABS sensor clip and ABS sensor has been disassembled, install the sleeve with a suitable driver.
2. Install the sleeve into the spindle until it is 15/16-inch (0.9375-inch or 23.8 mm) below the inner bearing shoulder.
3. Install the ABS sensor clip into the sleeve. Figure 7.9.



**Figure 7.9**

4. If removed, install a new camshaft bushing and grease seals into the knuckle. Install the brake camshaft. Figure 7.10.

## 7 Assembly and Installation - MX-120-EVO Series

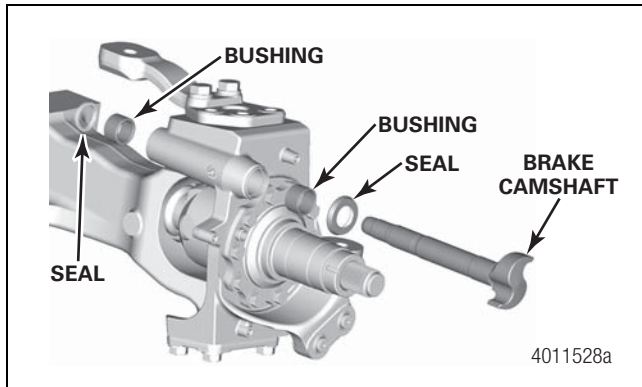


Figure 7.10

5. If disassembled, use the correct size drivers to install the bushing and grease seal into the spindle. Refer to Section 12 for tool specifications. Figure 7.11.

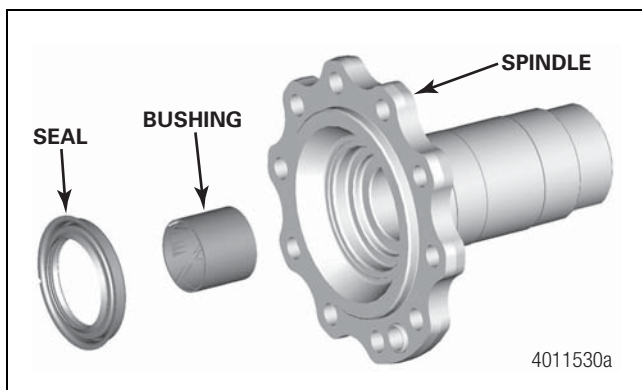


Figure 7.11

6. Apply a light coat of oil to the spindle bushing.
7. Install the spindle against the knuckle with the ABS sleeve aligned to the ABS through hole in the knuckle. Figure 7.12.

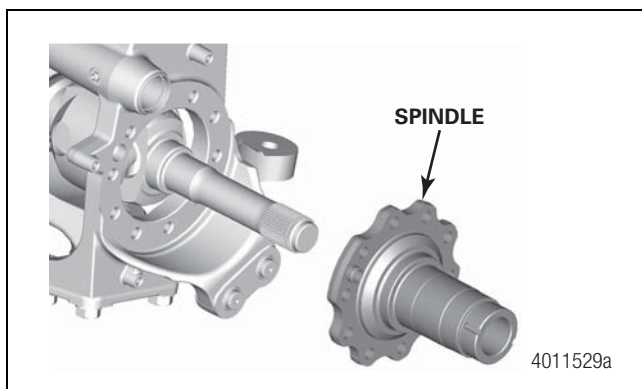


Figure 7.12

8. Install the spindle. Fasten all parts to the knuckle with 10 capscrows and washers. Tighten to 180-230 lb-ft (244-312 N•m). Figure 7.13.

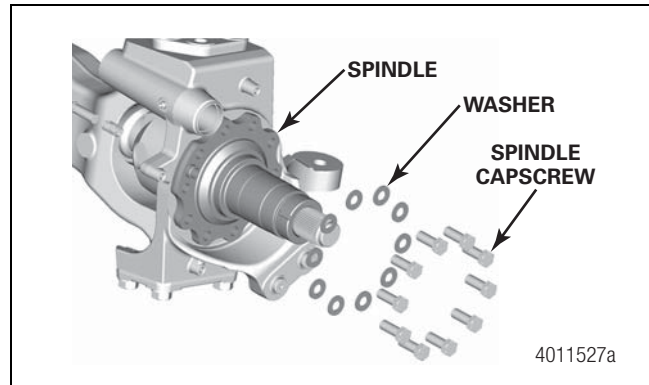


Figure 7.13

9. On units equipped for ABS, install the ABS cable into the knuckle. Install the ABS sensor into the ABS bushing in the spindle.
10. If removed, install the stop screw to the depth marked during removal.
11. Place the brake dust shield into position on the spindle and install the four mounting capscrows. Tighten to 35-50 lb-ft (47-68 N•m). Figure 7.14.

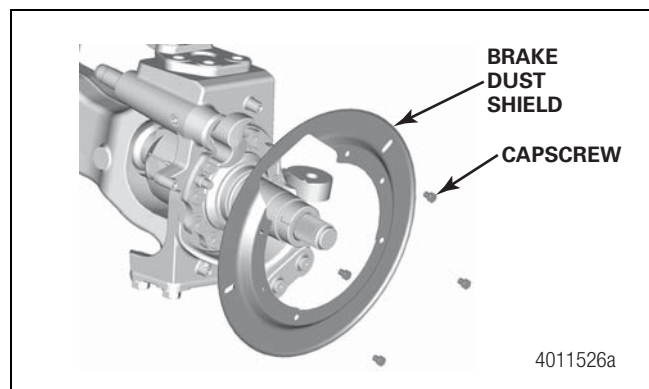


Figure 7.14

12. Install the brake shoes on the brake spider. Install the return springs and retainer springs. Lift the ends of the brake shoes and install the brake rollers. Figure 7.15.

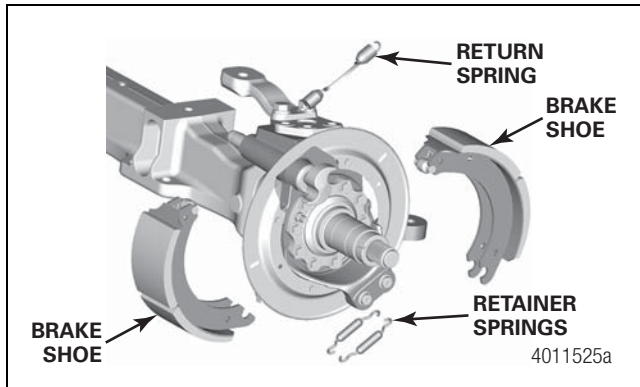


Figure 7.15

### Installation

#### Wheel Bearings Into the Hub

##### ⚠ WARNING

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

1. If the wheel studs were removed from the hub, put the hub in a press with the drum side at the BOTTOM. Figure 7.16.
  - A. Align the grooves on the studs with the grooves in the stud holes in the hub.
  - B. Press the studs into position.

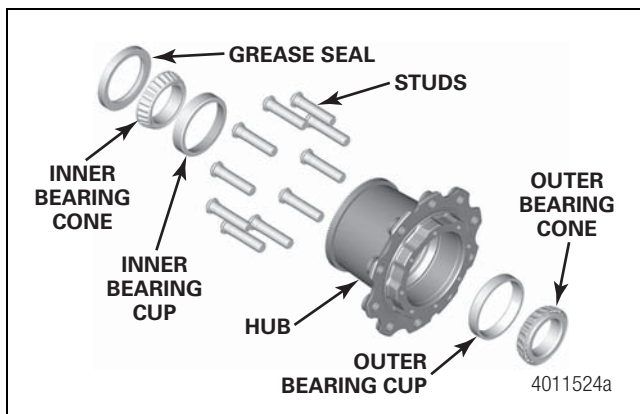


Figure 7.16

##### ⚠ WARNING

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.

**NOTE:** If a wheel bearing cup or wheel bearing was found to be damaged during disassembly, both the cup and bearing must be replaced as a set.

2. Use a press and sleeve to install the inner and outer bearing cups into the hub.
  - **If a press is not available:** Use a brass hammer.

##### ⚠ CAUTION

Do not assemble dry. Damage to wheel end components may result.

3. Lubricate both the inner and outer wheel bearings. Dip the wheel bearings into the same lubricant as used in the differential carrier housing. Refer to Section 10.
4. Insert the inner wheel bearing into the hub bore.

#### Hub Onto the Axle

##### ⚠ CAUTION

Do not force or hit the seal once it is installed flush with the hub, or damage to the seal can result.

1. Install the seal into its correct position flush with the outer surface of the hub. Refer to Section 12 for seal driver tool specifications.
2. On units equipped for ABS, install the ABS tooth wheel onto the hub with a suitable driver.
3. Install the hub assembly onto the spindle. Be careful the oil seal is not damaged during installation. Press the hub until the inner bearing is flat against the face of the spindle. Figure 7.17.



## 7 Assembly and Installation - MX-120-EVO Series

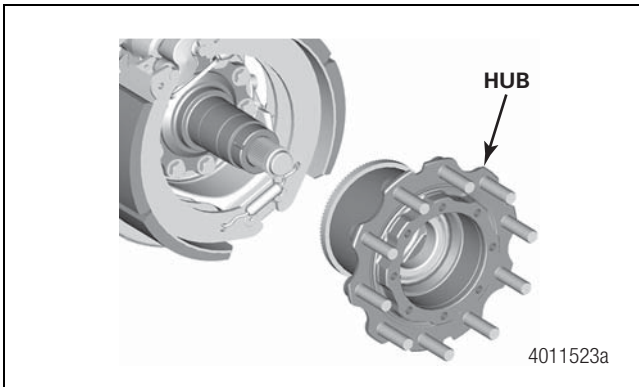


Figure 7.17

4. Install the outer bearing cone onto the spindle and push it into its cup inside the hub. Figure 7.16.
5. Install the inner wheel bearing nut, wheel bearing lock washer and outer wheel bearing adjusting nut. Figure 7.18.

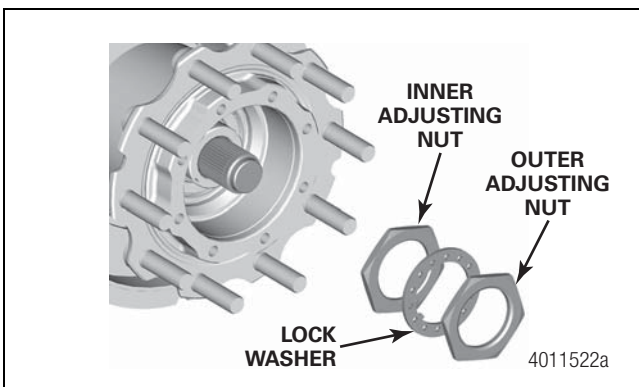


Figure 7.18

### Adjustment

#### Wheel Bearings

#### **⚠ WARNING**

Use a torque wrench to tighten or loosen the adjusting nuts. Do not use a hammer to directly hit the adjusting nuts, or to hit a chisel or drift placed against them. Damaged adjusting nuts can prevent you from obtaining correct wheel bearing end play, which can affect vehicle operation and cause the wheels to separate from the vehicle. Serious personal injury and damage to components will result.

1. Use a torque wrench to tighten the adjusting nut to 100 lb-ft (136 N•m). Figure 7.19. **ⓘ**

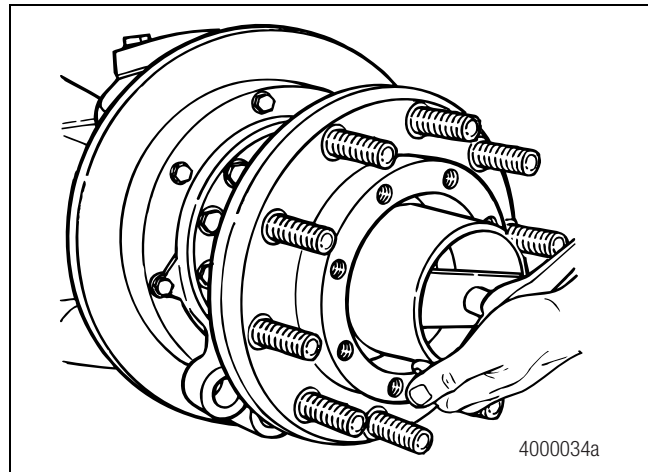


Figure 7.19

2. Rotate the hub three full turns to ensure all the bearings and seal surfaces are in contact.
3. Back off the adjusting nut 1/4 turn, 2-1/2 studs of the drum bolt circle. Do not rotate the hub assembly after backing off the adjusting nut.
4. Assemble the lock ring and jam nut. Tighten the jam nut to 250-400 lb-ft (339-542 N•m). If the lock ring does not line up with the adjusting nut, rotate the adjusting nut clockwise, tightening, to the closest lock ring hole. To make the smallest turn possible, flip the lock ring over if necessary. **ⓘ**
5. Check the resulting end play with a dial indicator and perform the following actions.

End Play (inch)	Action
0.000-0.002	No action required.
>0.002-0.005	Remove the jam nut and lock ring. Tighten the adjusting nut 1/32 turn by flipping the lock ring over and turning the adjusting nut to align with the next hole.
>0.005-0.008	Remove the jam nut and lock ring. Tighten the adjusting nut 1/16 turn by turning the adjusting nut to align with the next hole. Do not flip the lock ring.
>0.008-0.011	Remove the jam nut and lock ring. Tighten the adjusting nut 3/32 turn by flipping the lock ring over and turning the adjusting nut to align with the second hole from the current position.
>0.011	Return to Step 1 and repeat the procedure.

## Wheel Speed Sensors on Units Equipped with ABS

For complete maintenance and service procedures for Meritor WABCO anti-lock braking systems, refer to Maintenance Manual 28, Anti-Lock Braking Systems (ABS) for Trucks, Tractors and Buses — C Version ECUs, and Maintenance Manual 30, Anti-Lock Braking Systems (ABS) for Trucks, Tractors and Buses — D Version ECUs. To obtain these publications, refer to the Service Notes page on the front inside cover of this manual.

Push the wheel speed sensor IN until it contacts the tooth wheel. Do not use sharp objects to pry or push sensors. Sensors will self-adjust during wheel rotation. Figure 7.20.

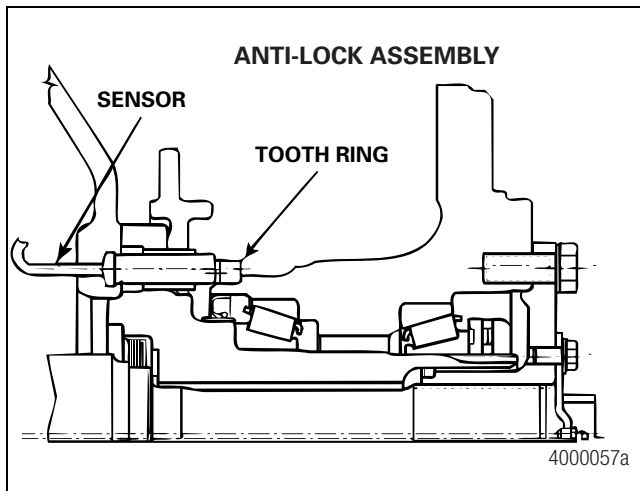


Figure 7.20

## Installation

### Drive Flange and Hubcap

#### **⚠ 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 the silicone gasket material gets into your eyes, follow the manufacturer's emergency procedures. Have your eyes checked by a physician as soon as possible.

1. Install a new O-ring on the drive flange. Figure 7.21.

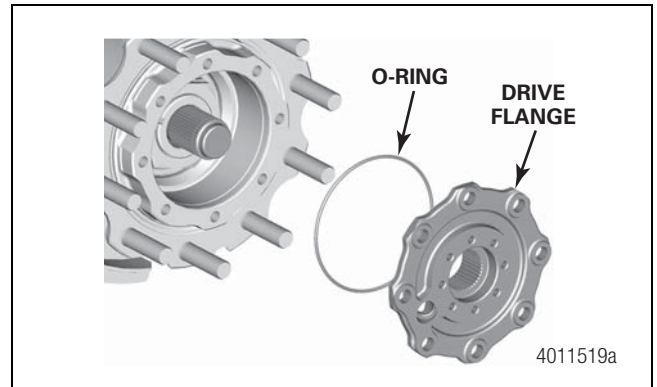


Figure 7.21

2. Apply Meritor specification O-617-A or O-617-B wheel bearing grease to the inside splines of the drive flange and the splines of the driveshaft. Refer to Section 10.
3. Install the drive flange onto the hub and fasten with washers and capscrews. Figure 7.22. Tighten the capscrews to 180-230 lb-ft (244-312 N•m). **ⓘ**

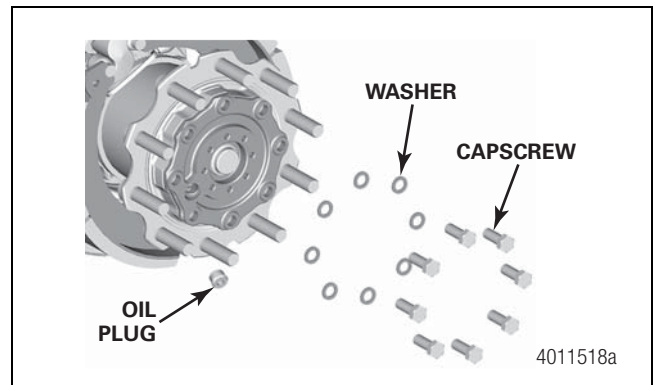


Figure 7.22

4. Install the snap ring onto the end of the axle shaft. Figure 7.23. Ensure the snap ring is positioned in the groove at the end of the axle shaft.

## 7 Assembly and Installation - MX-120-EVO Series

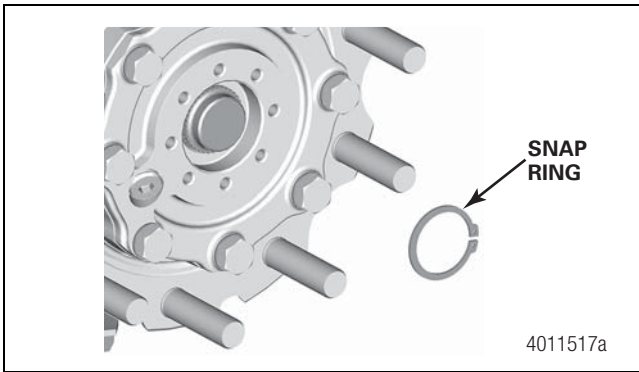



Figure 7.23

5. Apply a 0.125-inch continuous bead of silicone gasket material around either the mounting surface of the hubcap or the drive flange. Refer to Section 5.
6. Install the hubcap and tighten the capscrews to 35-50 lb-ft (47-68 N•m). Figure 7.24. 

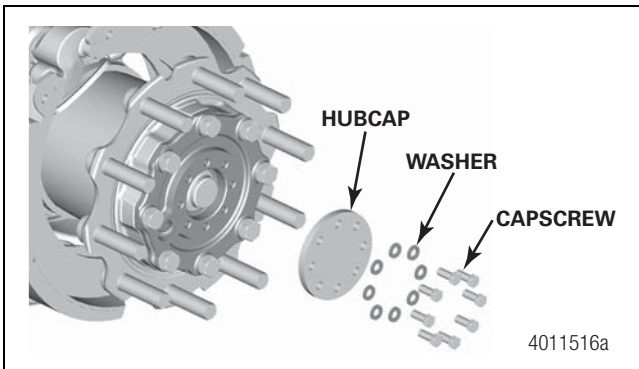


Figure 7.24

### CAUTION

If the wheel end hubs are not filled with the specified lubricant, the bearings can become damaged.

7. Add oil to the hub per the Hub Fill Procedure in Section 10.


## Assembly

### Slack Adjuster

For complete maintenance and service procedures for Meritor's automatic slack adjusters, refer to Maintenance Manual 4, Cam Brakes and Automatic Slack Adjusters. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

### WARNING

Before you service a spring chamber, carefully follow the manufacturer's instructions to compress and lock the spring to completely release the brake. Verify that no air pressure remains in the service chamber before you proceed. Sudden release of compressed air can cause serious personal injury and damage to components.

1. Install the air brake chamber and bracket. Tighten the bracket mounting capscrews to 500-650 lb-ft (678-881 N•m). Figure 7.25. 

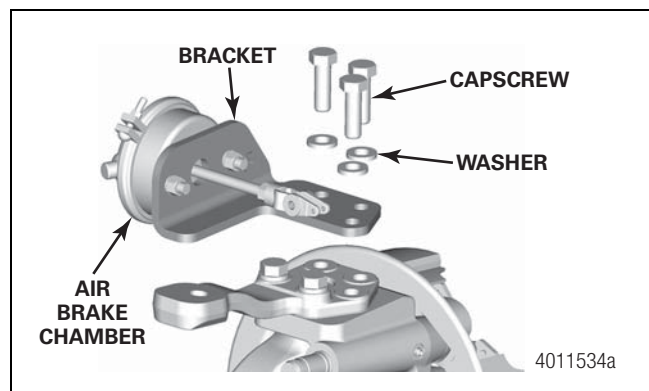


Figure 7.25

2. Install the inner washer onto the camshaft, then install the slack adjuster onto the camshaft. Figure 7.26.

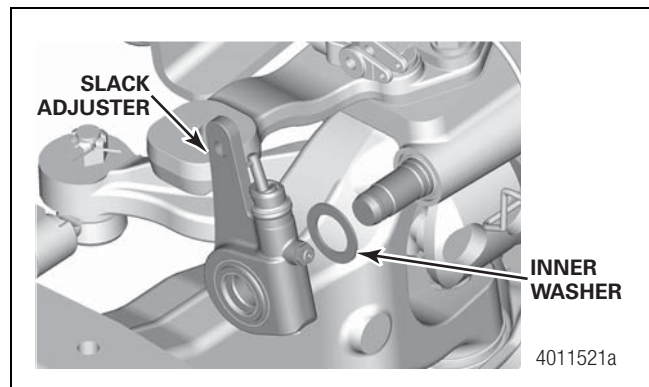


Figure 7.26

3. Install the slack adjuster washers at the adjuster end of the camshaft. Figure 7.27 and Figure 7.28. Use as many washers as required to keep slack end play at 0.060-inch (1.5 mm) maximum.

## 7 Assembly and Installation - MX-120-EVO Series

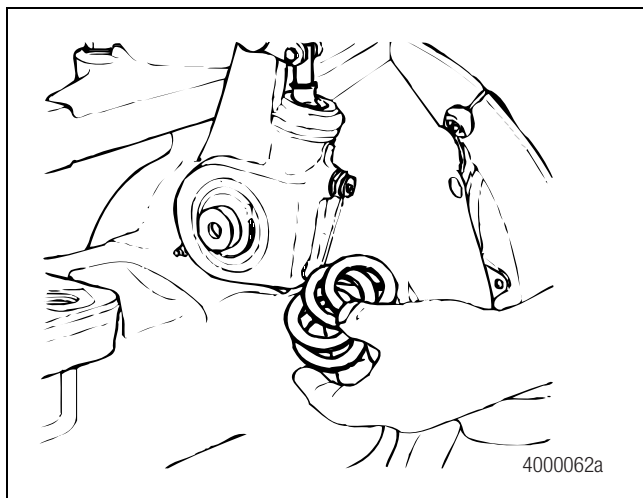


Figure 7.27

- Adjust the slack adjuster position to obtain the following BSAP dimension from the back of the brake air chamber to the center of the clevis pin.

Clevis Type	SL (Slack Adjuster Length)	BSAP (Brake Slack Adjuster Position)
Standard	5.5" (139.7 mm)	7.4" (188 mm)
Offset	5.5" (139.7 mm)	7.75" (196.85 mm)

- Tighten the nut on the push rod to the clevis pin to 95-115 lb-ft (129-156 N•m).
- Connect the air lines to the brake chambers.
- Install the brake drum. Figure 7.30.

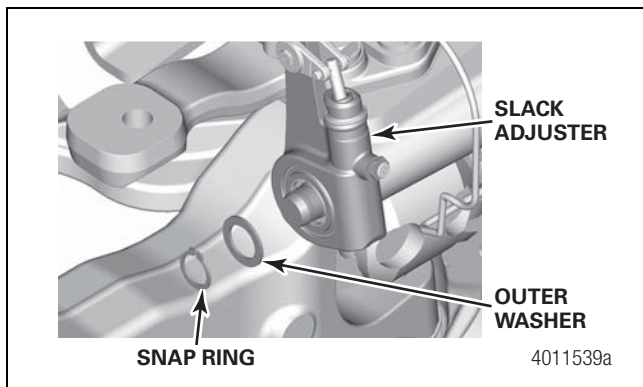


Figure 7.28

- Install the slack adjuster snap ring at the adjuster end of the camshaft.
- Install the pin and retainer that engages the push rod yoke and the slack adjuster plunger rod. Figure 7.29.

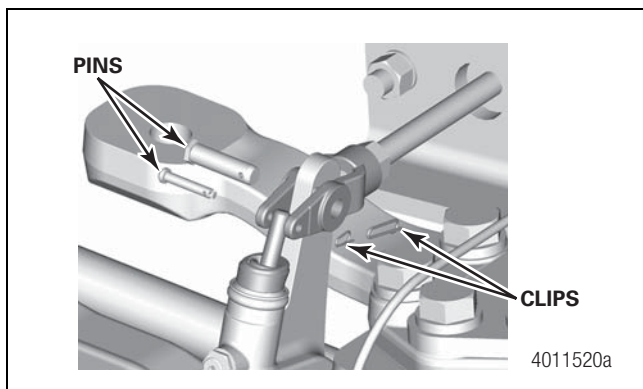


Figure 7.29

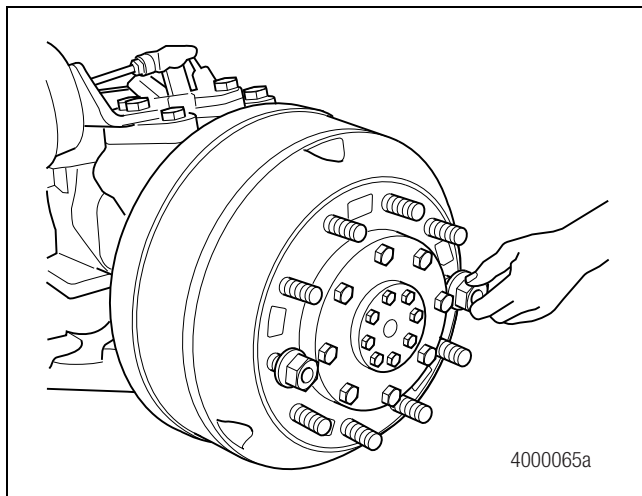


Figure 7.30

- Check the axle lubricant level. Fill if required. Refer to Maintenance Manual 1, Lubrication, for lubricant specifications. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

## Adjustment

### Brakes

Refer to Maintenance Manual 4, Cam Brakes and Automatic Slack Adjusters, for complete brake adjustment procedures. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

## 8 Adjustment

### 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.

### Inspection

#### Before Alignment

Check the following before doing a front wheel alignment.

#### Inspection

Refer to Section 10.

#### Wheels and Tires

1. Verify that the tires are inflated to the specified pressure.
2. Verify that the front 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.

#### Front Suspension

1. Verify that all fasteners are tightened to the specified torque.
2. Inspect the leaf springs for wear and damage.
3. Inspect the shock absorbers for wear and damage.

#### 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 procedure of the manufacturer of the vehicle or the suspension.
7. Refer to any additional rear axle and suspension recommendations and specifications from the vehicle manufacturer.

### Adjustment

#### Front Wheel Alignment

Check the front wheel alignment:

1. Every 20,000 miles (32 000 km) or 24 months, normal maintenance.
2. When the vehicle does not steer correctly.
3. To correct a tire wear condition.

#### Minor Front Wheel Alignment

Perform a minor front wheel alignment for all normal maintenance conditions using the following procedure.

1. Inspect all the systems that affect the wheel alignment. Refer to the procedures in this section.
2. Check and adjust the wheel bearings or wheel bearing end play for the truck hub unit.
3. Check and adjust the toe-in.

#### Major Front Wheel Alignment

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

1. Inspect all the systems that affect the wheel alignment. Refer to the procedures in this section.
2. Check and adjust the wheel bearings. For models with unitized hubs, check wheel bearing end play for the truck hub unit. Refer to Section 10.
3. Check and adjust the maximum turn angle.
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. Refer to the procedures in this section.
6. Check the steering axis, or king pin inclination. Refer to the procedures in this section.
7. Check the camber angle. Refer to the procedures in this section.

**⚠ 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 and adjust the caster angle. Refer to the procedures in this section.
9. Check and adjust the toe-in. Refer to the procedures in this section.

## Check and Adjust

### Wheel Bearings

#### Axles with Conventional Wheel Ends

**⚠ WARNING**

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.

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.
3. Remove the capscrews and remove the gasket and the cap from the hub.
4. Verify that the brake drum and the hub fasteners are tightened to the manufacturer's specifications.
5. Attach a dial indicator with the magnetic base at the bottom of the hub or the brake drum.

Adjust the dial indicator so that the pointer is against the center of the knuckle. Set the dial indicator on ZERO. Figure 8.1.

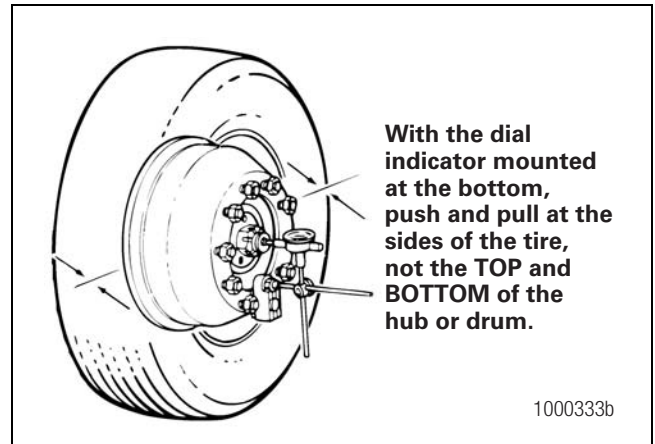


Figure 8.1

6. Measure the end play by pushing and pulling on each side of the hub or drum while looking at the indicator. The end play is the total travel observed. Do not push or pull at the top and the bottom of the hub or drum, which can affect the end play measurement. Figure 8.1.
  - If the end play is not 0.000-0.002-inch (0.025-0.051 mm): Adjust the wheel bearings. Refer to Step 7 through Step 12.
7. Remove the outer adjusting nut and lock washer from the spindle. Figure 8.2

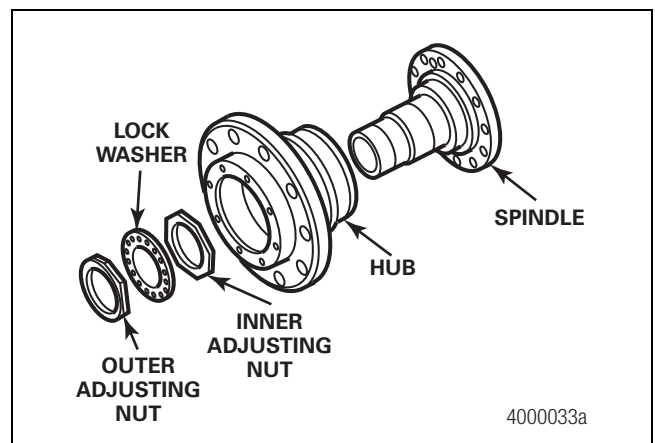


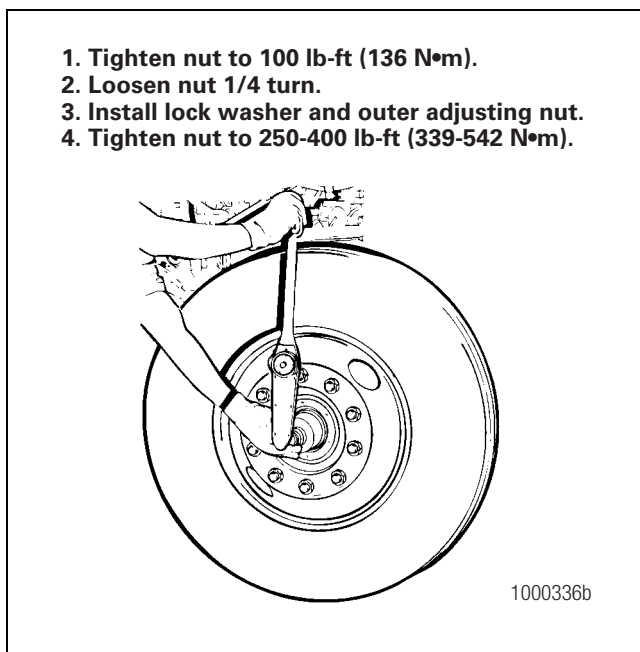
Figure 8.2

## 8 Adjustment

### **⚠ WARNING**

Use a torque wrench to tighten or loosen the adjusting nuts. Do not use a hammer to directly hit the adjusting nuts, or to hit a chisel or drift placed against them. Damaged adjusting nuts can prevent you from obtaining correct wheel bearing end play, which can affect vehicle operation and cause the wheels to separate from the vehicle. Serious personal injury and damage to components will result.

8. Use a torque wrench to tighten the adjusting nut to 100 lb-ft (136 N•m). Figure 8.3. **ⓘ**



**Figure 8.3**

9. Rotate the hub three full turns to ensure all the bearings and seal surfaces are in contact.
10. Back off the adjusting nut 1/4 turn, 2-1/2 studs of the drum bolt circle. Do not rotate the hub assembly after backing off the adjusting nut.
11. Assemble the lock ring and jam nut. Tighten the jam nut to 250-400 lb-ft (339-542 N•m). If the lock ring does not line up with the adjusting nut, rotate the adjusting nut clockwise, tightening, to the closest lock ring hole. To make the smallest turn possible, flip the lock ring over if necessary. **ⓘ**
12. Check the resulting end play with a dial indicator and perform the following actions.

End Play (inch)	Action
0.000-0.002	No action required.
>0.002-0.005	Remove the jam nut and lock ring. Tighten the adjusting nut 1/32 turn by flipping the lock ring over and turning the adjusting nut to align with the next hole.
>0.005-0.008	Remove the jam nut and lock ring. Tighten the adjusting nut 1/16 turn by turning the adjusting nut to align with the next hole. Do not flip the lock ring.
>0.008-0.011	Remove the jam nut and lock ring. Tighten the adjusting nut 3/32 turn by flipping the lock ring over and turning the adjusting nut to align with the second hole from the current position.
>0.011	Return to Step 1 and repeat the procedure.

### 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 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, taper and area near the ball stud.
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.

### Two-Piece Steering 3/4-Inch Bolt

1. Install the stop screw to a starting depth.
2. Turn the steering wheel until the stop bolt contacts the axle housing. Measure the turn angle.
  - **If the maximum turn angle does not meet the vehicle manufacturer’s specifications:** Correct the maximum angle by adjusting the stop bolt IN or OUT.
3. Once the correct turn angle is achieved, tighten the jam nut to 65-85 lb-ft (68-101 N•m). 

### Turning Radius Angle

When turning, the inner wheel must turn at a greater angle than the outer wheel. This angle is the turning radius angle, often called the Ackerman angle. Figure 8.4.

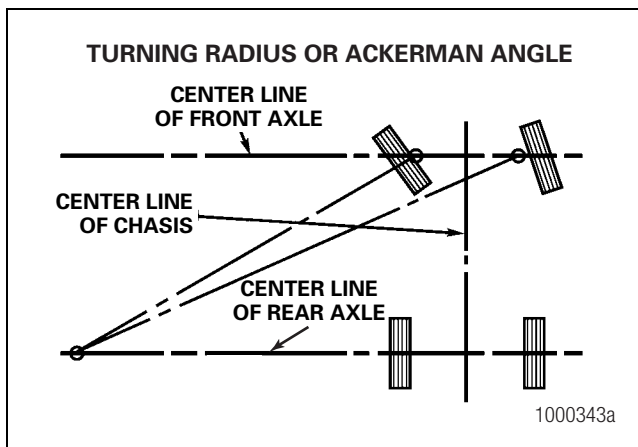


Figure 8.4

Check the turning radius angle with the radius plates on the alignment equipment. To determine the correct turning radius angle specification, refer to the vehicle manufacturer’s manual.

- **If the angle is not within specifications:** Premature tire wear will occur. Inspect the knuckle, tie rod arms, tie rod ends and cross tube for wear or damage. Service as necessary.

### Steering Axis Inclination

Steering axis or king pin inclination is the angle measured between the center line of the knuckle cap and the vertical position, as viewed from the front of the vehicle. Refer to the vehicle manufacturer’s steering axis inclination specifications. Figure 8.5.

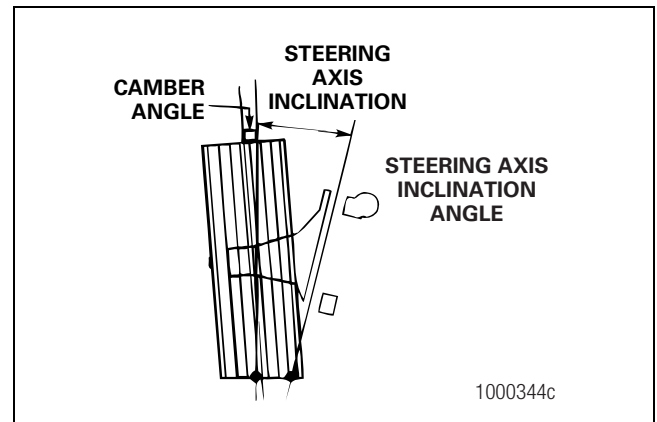


Figure 8.5

The steering axis inclination and the camber angle are designed into the axle to place the tire tread center line in contact with the road. This reduces steering effort and improves directional stability.

Use an alignment machine to check the steering axes inclination angle. Refer to the vehicle manufacturer’s inclination angle specifications.

The steering axis inclination is not adjustable. If the inclination is not at the specified angle, check the axle beam and knuckle for damage. Service as necessary.

### Camber Angle

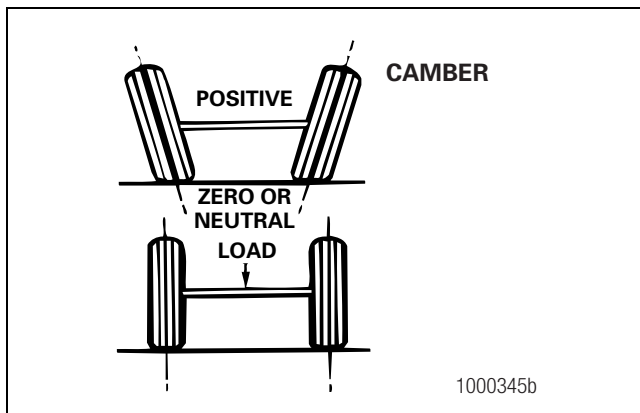
#### WARNING

**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 the Meritor warranty. Serious personal injury and damage to components can result.**

Camber is the angle of the tire with respect to the ground. Camber is positive when the distance between the top of the wheels is greater than the distance at the ground. Figure 8.6.



## 8 Adjustment



**Figure 8.6**

A small amount of positive camber is built into the knuckle, because camber changes with load. This results in a zero camber angle when the vehicle is operated at normal load.

If camber is out of specification by more than 1-1/2 degrees, rapid or uneven tire wear will occur. Bias ply tires show excess camber easily. Excess camber will not be as evident on vehicles equipped with radial tires.

The camber angle is not adjustable. The camber angle is machined into both the axle beam and the knuckle. If the camber angle is not at the specified angle, check the axle beam and the steering knuckle for damage. Service as necessary.

**Table A: Camber Angle Recommendations**

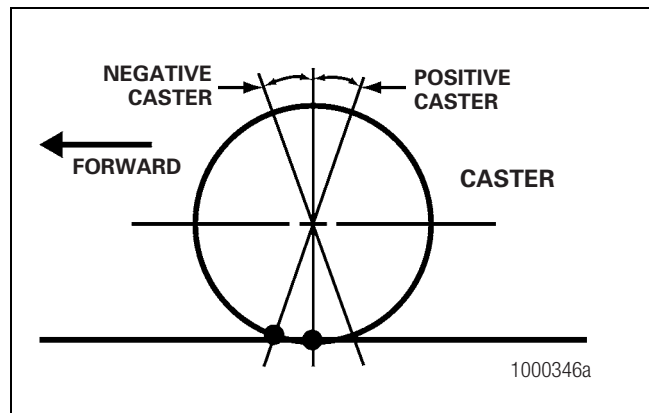
Conditions	Left and Right Sides
Camber angles machined into axles	+1/4 Nominal
<ul style="list-style-type: none"> <li>• Load not applied on axle</li> </ul>	
Camber angles under load	+3/16 to -3/16 (final reading)
<ul style="list-style-type: none"> <li>• Axle installed in vehicle</li> </ul>	

Use an alignment machine to check the camber angle. Refer to the alignment equipment manufacturer's procedures and vehicle manufacturer's instructions to determine specifications for the correct camber setting. The table above shows the specifications Meritor builds into an axle, but always use the vehicle manufacturer's specifications.

## Caster Angle

Caster is the FORWARD or REARWARD tilt of the king pin center line when viewed from the side of the vehicle. The caster angle is the angle from the vertical position to the center line of the king pin. If the top of the king pin axis is toward the rear of the vehicle, the caster is positive.

A slight positive caster creates a self-aligning action that helps to stabilize the vehicle after turning and stabilizes it for driving straight ahead. Figure 8.7.



**Figure 8.7**

Always use an alignment machine to check the caster angle. When checking caster, refer to the alignment equipment manufacturer's procedures.

If caster angle is greater than specification, steering effort can increase a shimmy condition.

The caster angle is controlled by the angle of the housing pad or by tapered shims installed under the leaf springs. Adjust caster according to the vehicle manufacturer's specifications and procedures.

Caster specifications are set by the vehicle manufacturer. Refer to the vehicle manufacturer's specifications for the caster setting. If caster specifications are not available from the vehicle manufacturer, Meritor recommends a caster setting of +1 degrees to +2-1/2 degrees for vehicles with manual steering and +2 degrees to +4-1/2 degrees for vehicles with power steering.

## Measure and Adjust the Toe

### **⚠ WARNING**

Incorrect toe settings affect tire wear. Do not change camber or caster settings to correct tire wear problems. If the axle assembly is bent to change caster or 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 setting. Refer to the table below for a sample toe recommendation.

### Front-Drive Axle Use

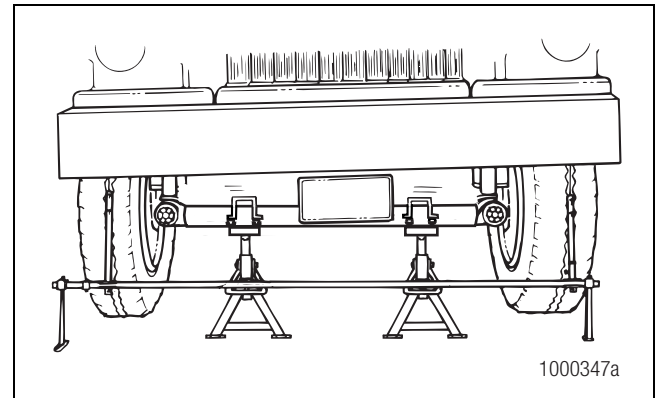
	Toe Recommendation	
	Unloaded (in.)	Loaded (in.)
Frequent (>75%)	+0 ± 1/32	-1/32 ± 1/32, toe out
Normal (25-75%)	+1/32 ± 1/32	+0 ± 1/32
Infrequent (<25%)	+1/16 ± 1/32	+1/32 ± 1/32, toe in

### **⚠ WARNING**

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.

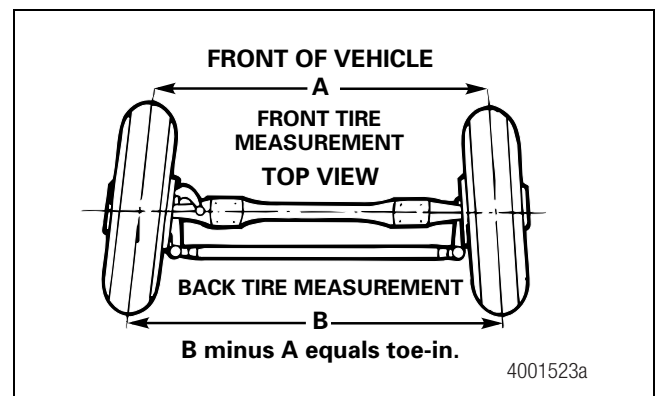
1. Park the vehicle on a level surface. Place blocks under the rear wheels to prevent the vehicle from moving.
2. Raise the vehicle so that the front tires are off the ground. Support the front axle with safety stands.
3. Use paint or chalk to mark the center area of both front tires around the complete 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 8.8.



**Figure 8.8**

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 8.9.

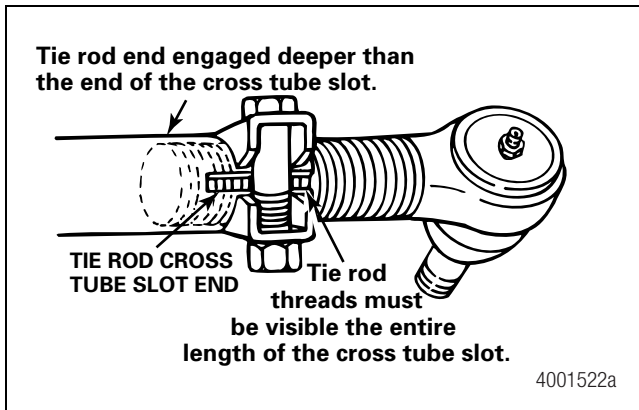


**Figure 8.9**


9. Perform the following procedure if toe measurement is not within specification.

## 8 Adjustment

- 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 8.10.



**Figure 8.10**

- D. Tighten the nut and bolt on each end of the cross tube to 80-90 lb-ft (108-122 N•m). 
- E. Repeat Step 1 through Step 8 to check the toe-in dimension.

## 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.

## Troubleshooting

### Front Drive Steer Axle Troubleshooting

Condition	Cause	Correction
<b>Tires wear out quickly or have uneven tire tread wear.</b>	Tires have incorrect air pressure	Place specified air pressure in the tires.
	Tires out-of-balance	Balance or replace the tires.
	Incorrect tandem axle alignment	Align the tandem axles.
	Incorrect toe-in setting	Adjust the toe-in specified setting.
	Incorrect steering arm geometry	Service the steering system as necessary.
	Excessive wheel end play	Readjust the wheel bearings.
<b>Vehicle is hard to steer.</b>	Power steering system pressure low	Repair the power steering system.
	Steering gear linkage not assembled correctly	Assemble the steering gear correctly.
	Steering linkage needs lubrication	Lubricate the steering linkage.
	King pins binding	Replace the king pins.
	Incorrect steering arm geometry	Service the steering system as necessary.
	Caster out-of-adjustment	Adjust the caster as necessary.
	Tie rod ends hard to move	Replace the tie rod ends.
	Worn thrust bearing	Replace the thrust bearing.
<b>Tie rod ends are worn and require replacement.</b>	Tie rod ends require lubrication	Lubricate the ends of cross tube. Verify that the lubrication schedule is followed.
	Severe operating conditions	Increase the frequency of inspection and lubrication intervals.
	Damaged boot on tie rod end	Replace the boot.

## 9 Troubleshooting

Condition	Cause	Correction
<b>Bent or broken cross tube, tie rod end ball stud, steering arm or tie rod end. Component requires replacement.</b>	Too much pressure in the power steering system; pressure exceeds vehicle manufacturer's specification	Adjust the power steering system to the specified pressure.
	Power steering system cut-off pressure, out of adjustment	Adjust the power steering system to the specified pressure.
	Vehicle operated under severe conditions	Verify that the vehicle is operated correctly.
	Add-on type of power steering system not installed correctly	Correctly install the add-on power steering system.
	Steering gear overtravel poppets incorrectly set or malfunctioning	Check for correct operation or adjust the overtravel of poppets to vehicle manufacturer's specifications.
<b>Worn or broken steering ball stud.</b>	Axle stops incorrectly set	Set the axle stops to vehicle manufacturer's specification.
	Drag link fasteners tightened higher than OEM specified	Tighten the drag link fasteners to the specified torque.
	Lack of lubrication or incorrect lubricant	Lubricate the linkage with the specified lubricant.
<b>Worn king pins and king pin bushings.</b>	Power steering stops out-of-adjustment	Adjust the stops to the specified dimension.
	Worn or missing seals and gaskets	Replace the seals and gaskets.
	Incorrect lubricant	Lubricate the axle with the specified lubricant.
	Axle not lubricated at scheduled frequency	Lubricate the axle at the scheduled frequency.
	Incorrect lubrication procedures	Use the correct lubrication procedures.
<b>Vibration or shimmy of front axle during operation.</b>	Lubrication schedule does not match operating conditions	Change the lubrication schedule to match the operating conditions.
	Caster out-of-adjustment	Adjust the caster.
	Wheels or tires out-of-balance	Balance or replace the wheels and tires.
	Worn shock absorbers	Replace the shock absorbers.

## 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.

## Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help you 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.**

## Lubrication

### Magnets and Magnetic Drain Plugs

Meritor front driving axles are equipped with magnetic drain plugs that have a minimum pickup capacity of 1.5 pounds (0.7 kilograms) of low carbon steel.

The magnetic drain plug can be reused if, after cleaning, the plug has a minimum pickup capacity of 1.5 pounds (0.7 kilograms) of low carbon steel. Inspect the magnetic drain plug each time the oil is changed. Use the correct part. Pipe plugs will 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.**

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



**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.

## Check and Adjust the Axle Oil Level

1. Verify that the vehicle is parked on a level surface.
2. Remove the fill plug from the axle.
3. The oil level must be even with the bottom of the fill plug hole.
  - **If oil flows from the hole when the plug is loosened:**  
The oil level is high. Let the oil drain to the correct level.
  - **If the oil level is below the bottom of the fill plug hole:**  
Add the specified oil.
4. Install and tighten the fill plug to 35-50 lb-ft (48-67 N•m). 

## Drain and Replace the Axle Oil

1. Verify that the vehicle is parked on a level surface. Place a large container under the axle.
2. Remove the drain plug from the bottom of the axle. Drain and discard the oil correctly.
3. Clean, install and tighten the drain plug to 35-50 lb-ft (48-67 N•m). 
4. Remove the fill plug from the axle.
5. Fill the axle to the bottom of the fill plug hole with the specified oil. Allow enough time for oil to circulate through the axle assembly.
6. Install and tighten the fill plug to 35-50 lb-ft (48-67 N•m). 

## 10 Lubrication and Maintenance

### Hub Check, Drain and Fill Procedures for Drive Axles Equipped with Wheel-End Fill Plugs

#### Wheel Hub Oil Level Inspection

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
2. Rotate the hub so the fill/drain plug is at 3 or 9 o'clock position.
3. Remove the plug and check if the oil is even with the bottom of the plug hole.
  - **If the oil flows from the hole when the plug is removed:**  
The oil level is high. Let the oil drain to the correct level.
  - **If the oil level is below the bottom of the plug hole:** Add the specified oil until it is at the bottom of the plug hole.

#### Wheel Hub Oil Drain

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
2. Rotate the hub so the fill/drain plug is at 6 o'clock position.
3. Place a drain pan under the wheel end to catch the oil.
4. Remove the drain/fill plug and drain the oil until it stops flowing.

#### Wheel Hub Oil Fill

1. Rotate the hub so the fill/drain plug is at 12 o'clock position. Figure 10.1.

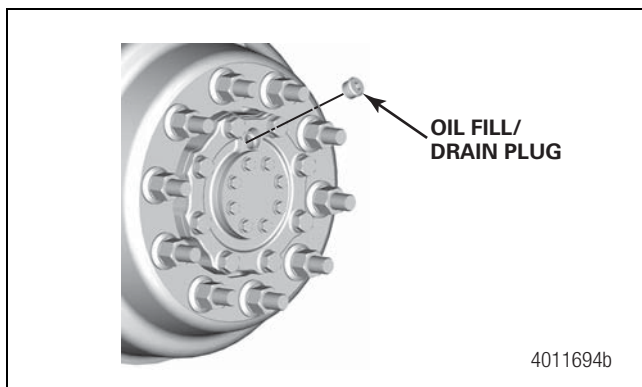


Figure 10.1

2. Refill the hub with 2 pints (1 L) of oil, and then perform the Road Test for Wheel End Oil Level procedure in this section.

3. Install the drain/fill plug and tighten to 51-59 lb-ft (69-80 N•m).

#### Road Test for Wheel End and Axle Housing Oil Level

1. Road test the vehicle after initial hub fill procedure in an unloaded condition for one to two miles at safe speeds, but no higher than 25 mph (40 km/h).
2. Wait approximately ten minutes after completing the road test for the oil to settle.
3. Rotate the wheel hub so the fill/drain plug is at 3 or 9 o'clock position.
4. Remove the wheel end oil fill/drain plug and check if the oil level is at the bottom of the plug hole. Perform oil level check on both wheel-end hubs.
5. Install the drain/fill plug and tighten to 51-59 lb-ft (69-80 N•m).
6. Remove the axle fill plug from the housing bowl and check if the oil is at the bottom of the plug hole.
7. If necessary, add the specified oil until the level reaches the bottom of the plug hole.
8. Install and tighten the axle fill plug to 35-50 lb-ft (48-67 N•m).

#### Knuckle King Pins

With the vehicle weight on the wheel end, pump grease through the grease fittings located on the upper cap or steering arm and lower cap assemblies. Grease should purge through the seals and thrust bearing.

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. The fittings may be located on the upper cap or steering arm and lower cap, or on the axle. Figure 10.2 and Figure 10.3.

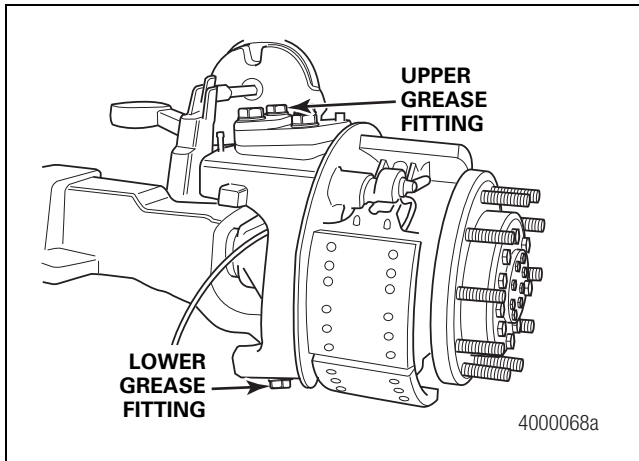


Figure 10.2

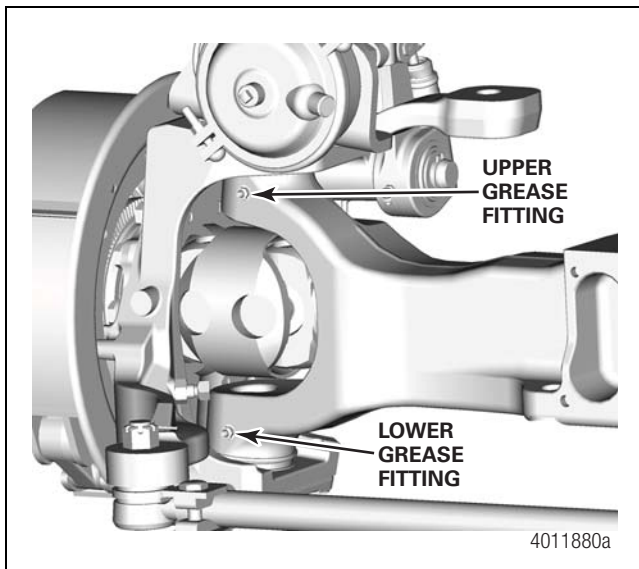


Figure 10.3

4. Apply the specified grease until new grease purges through the seals and thrust bearing.
  - **If new grease does not purge:** Disassemble the knuckle. Inspect the grease and the components. Service as necessary.

## Cross Tube End Assembly

1. Turn the vehicle wheels straight ahead. Figure 10.4.

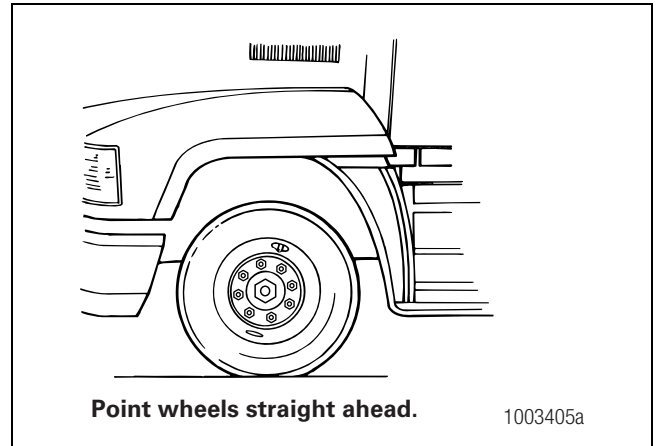
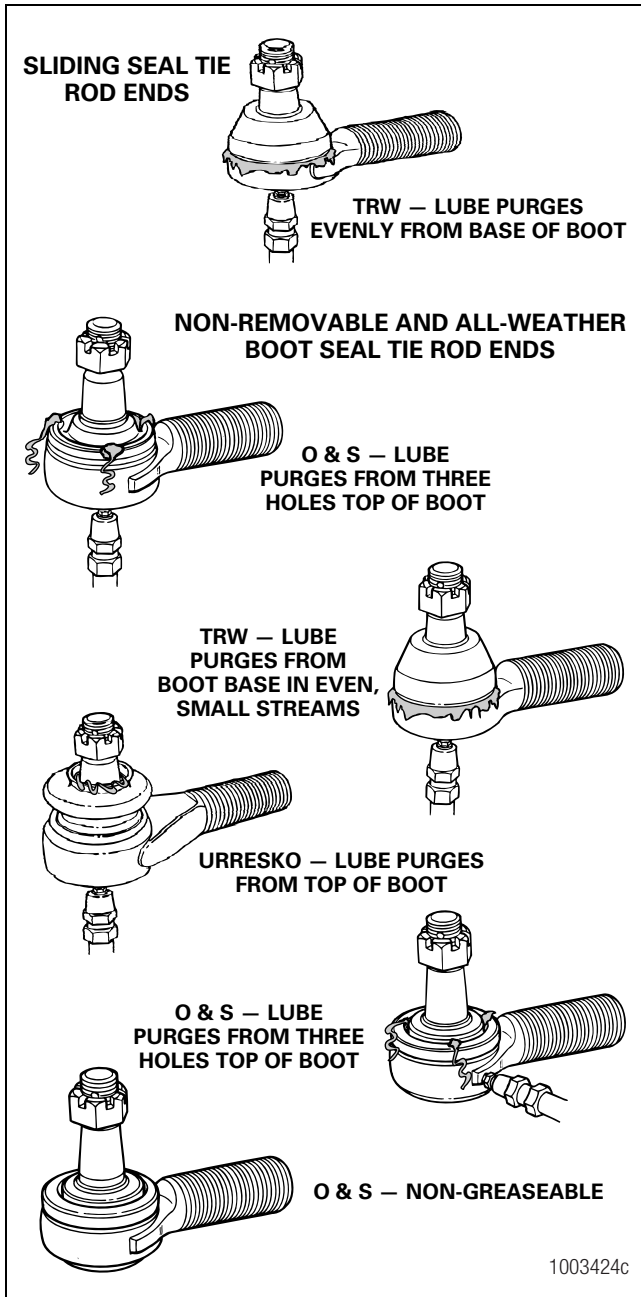


Figure 10.4

2. Wipe the grease fitting and seal boot with shop towels.
3. Apply the specified grease at the grease fitting until new grease purges from the seal. 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 10.5.





**Figure 10.5**

4. If new grease does not purge at the seal, 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.

D. Continue the lubrication procedure.

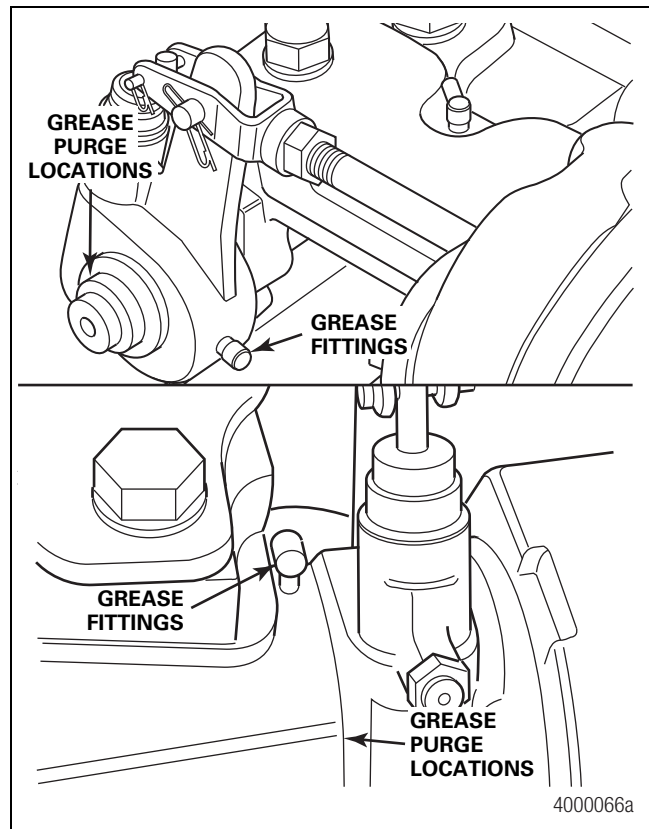
5. If new grease still does not purge at the seal, disassemble the cross tube, inspect the grease and components. Service as necessary.

## Wheel Bearings and Hub Seal

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.
3. Remove the tire and wheel assembly.
4. For grease lubricated bearings, refer to the procedures in Section 6.
5. For oil lubricated bearings, refer to the procedures in Section 7.

## Camshaft Retainer Bushing and Cam Bushing

Pump grease until it purges through the seals. Figure 10.6.



**Figure 10.6**

## Front Drive Axle Greasing Intervals and Specifications

**NOTE:** Axle lube oil capacity is 3.25 gallons (12.3 liters).

<b>Component</b>	<b>Greasing Intervals</b>	<b>Grease/Oil</b>	<b>Meritor Specification</b>	<b>NLGI Grade</b>	<b>Grease Classification</b>	<b>Outside Temperature</b>
Knuckle King Pins Brake Camshaft Bushings and Seals Cross Tube End Assembly	Every 3,000 miles (4800 km) or 200 hours of operation, whichever comes first.	Multi-Purpose Grease	O-617-A (preferred) or O-617-B (acceptable)	1 or 2	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.
Greased Wheel Bearings	On-Highway: 30,000 miles (48 000 km) or once a year, whichever comes first.  On/Off Highway and Off-Highway: 15,000 miles (24 140 km) or twice a year, whichever comes first.					
Spindle Axle Shaft Bushing	Every 100,000 miles (160 000 km) or 2 years, whichever comes first.					

## Front Drive Axle and Wheel End Oil Intervals and Specifications

### Front Drive Steer Axle Oil Change Intervals

**NOTE:** If the axle lubricant type is changed from synthetic to petroleum or from petroleum to synthetic, all seals and O-rings that are in contact with the lubricant should also be changed at that time to ensure adequate seal performance.

Operation	Interval
<b>Check Oil Level</b>	5,000 miles (8000 km), once a month, or the fleet maintenance interval, whichever comes first*
<b>Petroleum Oil Change</b>	25,000 miles (40 000 km) or annually, whichever comes first. See note above.
<b>Synthetic Oil Change</b>	50,000 miles (80 000 km) or annually, whichever comes first. See note above.

\*For continuous heavy-duty operation, check the oil level every 1,000 miles (1600 km). Add the correct type and amount of oil as required.

### EVO Lube Bath Wheel End Oil Change Intervals

**NOTE:** For EVO axles with oil-lubricated wheel-ends, if the lubricant type is changed from synthetic to petroleum or from petroleum to synthetic, the wheel-end seals and O-rings should also be changed at that time to ensure adequate seal performance.

Operation	On-Highway/Off-Highway
<b>Check Oil Level</b>	1,000 miles (1600 km)
<b>Synthetic or Petroleum Oil Change</b>	Whichever comes first. Seals replaced. Brakes relined. 50,000 miles (80 000 km). Once a year. See note above.

## Lubricant Specifications

Meritor Specification	Description	Approval	Oil Description	Outside Temperature			
				°F		°C	
				Min.	Max.	Min.	Max.
0-76-A	Gear Oil	SAE J2360	GL-5, SAE 85W/140	10	None	-12	None
0-76-D	Gear Oil		GL-5, SAE 80W/90	-15	None	-26	None
0-76-E	Gear Oil		GL-5, SAE 75W/90	-40	None	-40	None
0-76-J	Gear Oil		GL-5, SAE 75W	-40	35	-40	-2
0-76-L	Gear Oil		GL-5, SAE 75W/140	-40	None	-40	None
0-76-M	Full-Synthetic Oil		GL-5, SAE 75W/140	-40	None	-40	None
0-76-N	Full-Synthetic Oil		GL-5, SAE 75W/90	-40	None	-40	None
0-76-P	Semi-Synthetic Oil		GL-5, SAE 80W/90	-15	None	-26	None
0-76-Q	Extended-Drain Group II Petroleum Oil		GL-5, SAE 75W/90	-40	None	-40	None
			GL-5, SAE 75W/140	-40	None	-40	None
			GL-5, SAE 80W/90	-15	None	-26	None
0-76-R	Extended-Drain Group III Petroleum Oil		GL-5, SAE 75W/90	-40	None	-40	None
			GL-5, SAE 75W/140	-40	None	-40	None
			GL-5, SAE 80W/90	-15	None	-26	None
0-76-S	Extended-Drain Synthetic Oil		GL-5, SAE 75W/85	-40	None	-40	None

## Maintenance

### Inspection and Maintenance

#### WARNING

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.

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.

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

Inspect the axle for oil and grease leaks daily. Repair as necessary.

## 10 Lubrication and Maintenance

### Brakes

Inspect the brakes at least every four months when you replace the seals and reline the brakes.

Inspect the brakes every two weeks during the first four-month period for hardened or contaminated grease and for the absence of grease to help determine lubrication intervals.

Lubricate more often for severe-duty applications.

### Carrier

Replace the carrier seal as required or whenever the carrier is repaired. Refer to Maintenance Manual 5A, Single-Reduction Differential Carriers. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

### 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 failure.

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.

### Fasteners

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.

### Wear and Damage

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

### Pivot Points

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

### Operation

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

### Tire Wear

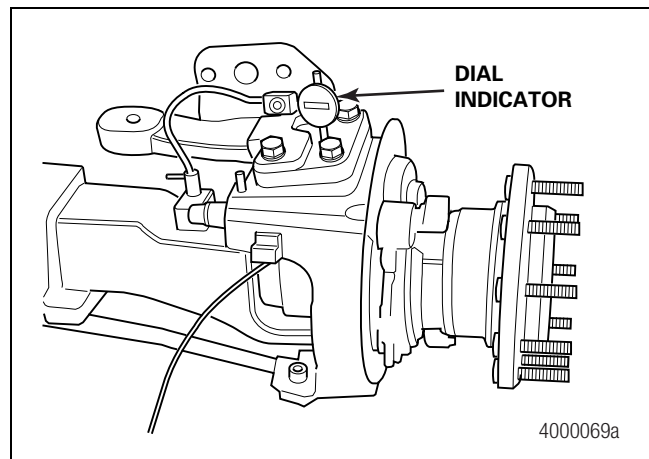
Inspect the tires for wear patterns that indicate suspension damage or misalignment.

### Steering Arm Bolts

Check torque every 200,000 miles (320 000 km). Refer to Inspect Steering Arm Bolts in this section.

### Checking 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 front wheels are off the ground. Support the front 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 knuckle 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 10.7.



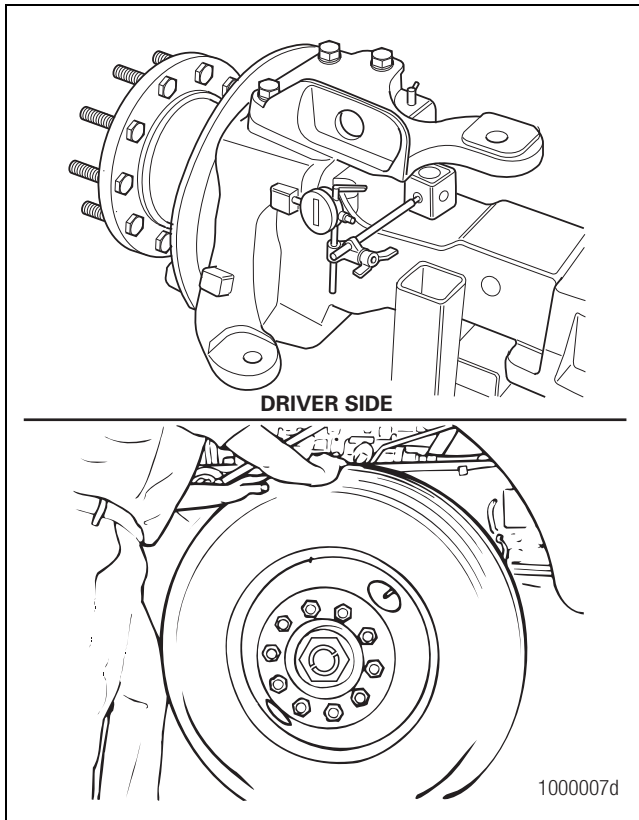
**Figure 10.7**

- 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.

- The reading must be 0.005-0.015-inch (0.127-0.381 mm). Figure 10.7. Add or remove shims from between the upper knuckle cap/steering arm and the housing to obtain the correct end play.

## Upper and Lower Knuckle Bushings

- Park the vehicle on a level surface. Place blocks under the wheels not being serviced to prevent the vehicle from moving.
- Raise the vehicle so that the wheels to be serviced are off the ground. Support the vehicle with safety stands.
- 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 side of the knuckle top, curbside, or the place indicator tip against the king pin cap, driver side. Figure 10.8.

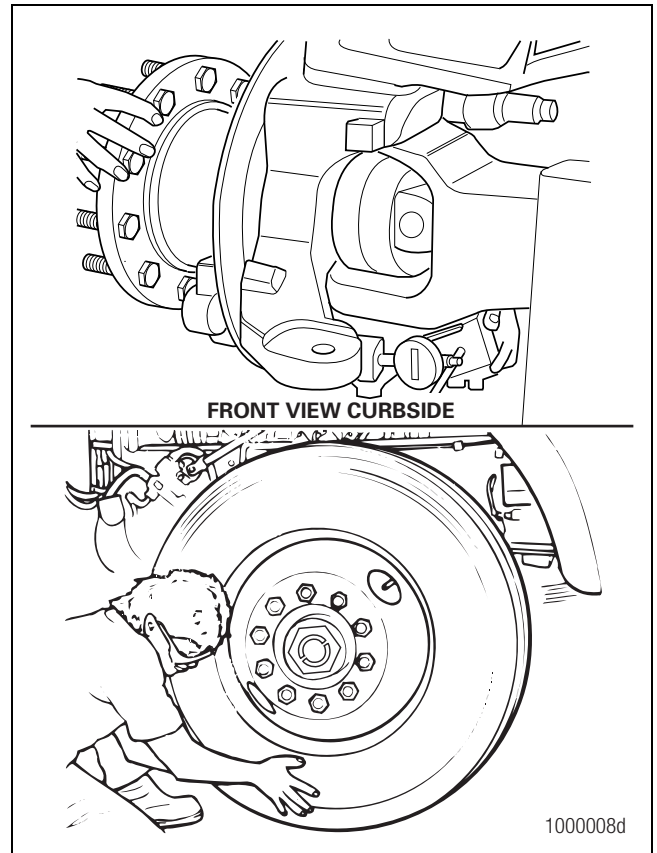


**Figure 10.8**

- Set the dial indicator on ZERO.
- Move the top of the tire side-to-side TOWARD and AWAY from the vehicle.

- If the dial indicator moves a total of 0.010-inch (0.254 mm):** The upper bushing is worn or damaged. Replace both bushings in the knuckle. Refer to Section 3 and Section 6. Figure 10.8.

- Check the lower king pin bushing. Install a dial indicator so that the base is on the I-beam and the tip is against the side of the bottom of the knuckle. Figure 10.9.



**Figure 10.9**

- Set the dial indicator on ZERO.
  - Move the bottom of the tire side-to-side TOWARD and AWAY from the vehicle.
- If the dial indicator moves a total of 0.010-inch (0.254 mm):** The lower bushing is worn or damaged. Replace both bushings in the knuckle. Refer to Section 3, Section 5 and Section 6. Figure 10.9.

## 10 Lubrication and Maintenance

### Sealed Hub Units

Inspect the truck hub unit end play every 50,000 miles (80 000 km) or six months, whichever comes first.

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.
3. Remove the wheel and tire. Remove the hubcap.

**NOTE:** As the truck hub unit warms up during operation, some small amounts of grease will purge out the OUTBOARD dust seal as pressure is released from inside the truck hub unit. The grease purge is permissible if it does not exceed two grams or about one-half teaspoon. Do not replace the truck hub unit if the grease purge does not exceed two grams.

4. Attach the magnetic base of a dial indicator stand to the end of the spindle. Touch the indicator stem against the face of the wheel pilot of the truck hub unit.
5. Set the dial indicator on ZERO.
6. Slightly rotate the truck hub unit in both directions while pushing INWARD until the dial indicator doesn't change. Repeat this step while pulling OUTWARD. The difference between the two readings is the end play.
  - **If the end play is 0.0-inch:** This reading is approved for the truck hub unit. Do not replace the unit if you obtain this reading.
  - **If the end play is greater than 0.003-inch (0.076 mm):** Recheck the torque on the inner wheel bearing nut as specified in Section 8.
7. Repeat Step 4. Record measurements greater than 0.003-inch (0.076 mm) and less than 0.009-inch (0.229 mm) in a maintenance log.
8. Check that the truck hub unit rotates smoothly.
  - **If the end play reaches 0.009-inch (0.229 mm) or the truck hub unit is very rough or noisy while rotating:** Replace the truck hub unit.

### Tie Rod Ends

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 10.10. Set the dial indicator on ZERO.

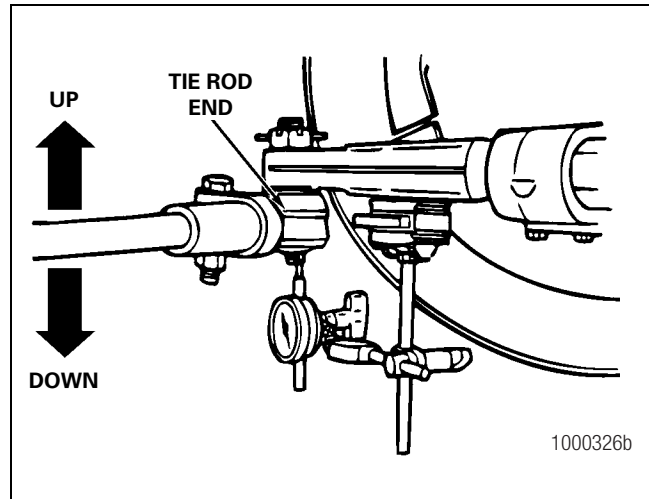


Figure 10.10

### ⚠ 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 0.060-inch (1.52 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.

- 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.

- Check that the boot is in place and completely installed over the tie rod end.
- 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 10.11.

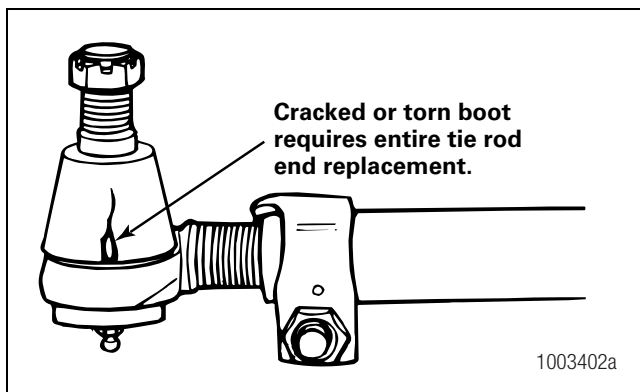



Figure 10.11

### ⚠ 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.

- 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 300 lb-ft (407 N•m) when installing the cotter pin. Figure 10.12. 

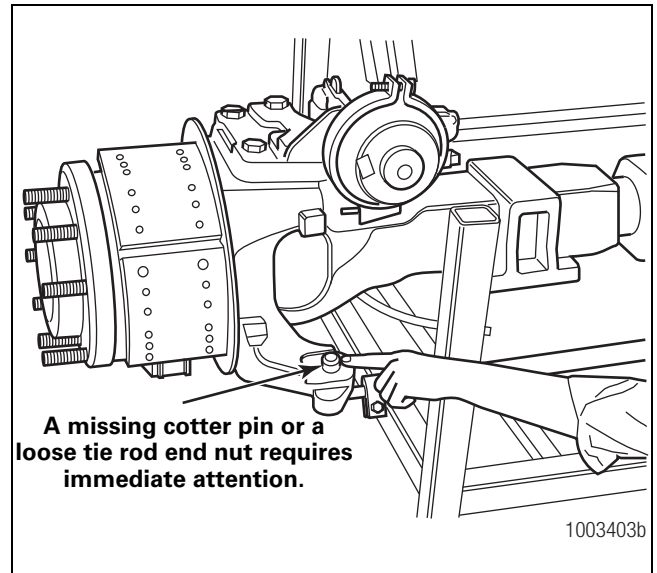


Figure 10.12

- 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 10.13.

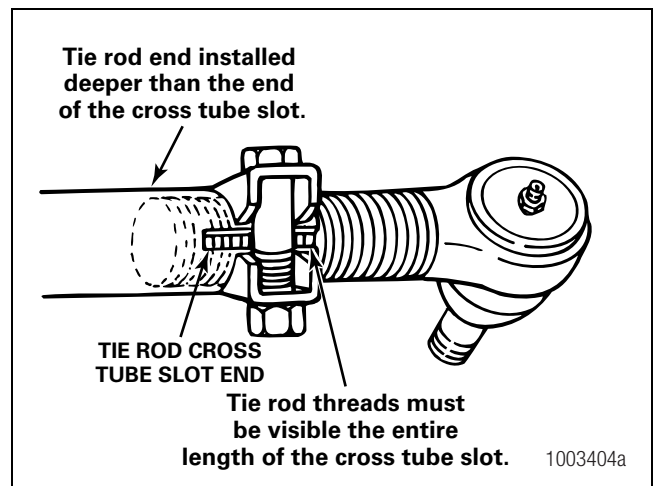


Figure 10.13

- Check that grease fittings are installed. Replace a damaged grease fitting.
  - If the tie rod ends are non-greaseable:** Do not install a grease fitting if the tie rod end is the non-greaseable type. Figure 10.14.



## 10 Lubrication and Maintenance

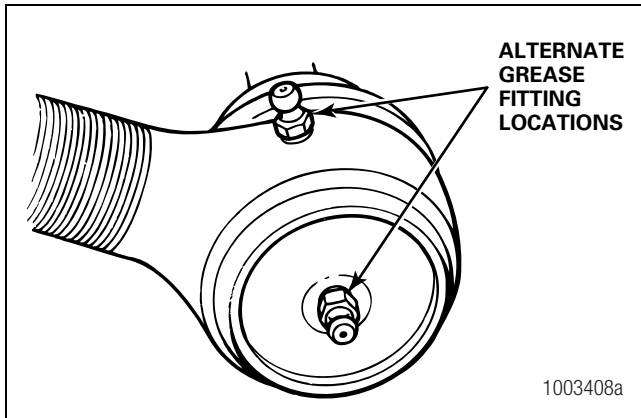


Figure 10.14

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 six-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 round 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. Figure 10.15.

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

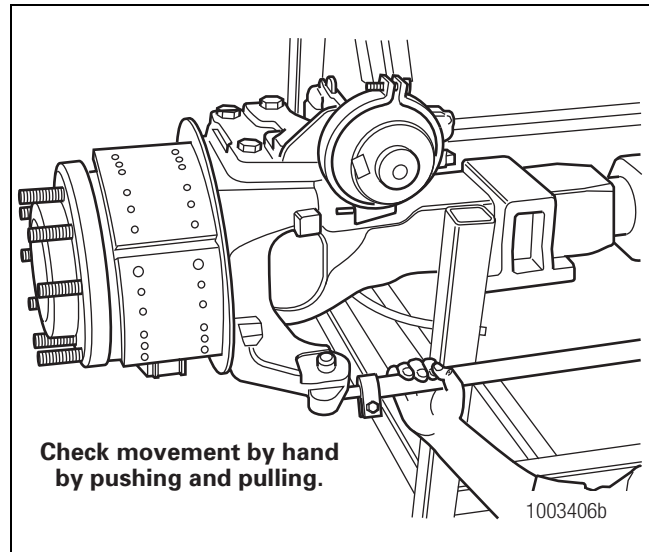


Figure 10.15

### ⚠ 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 10.16.
  - **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.

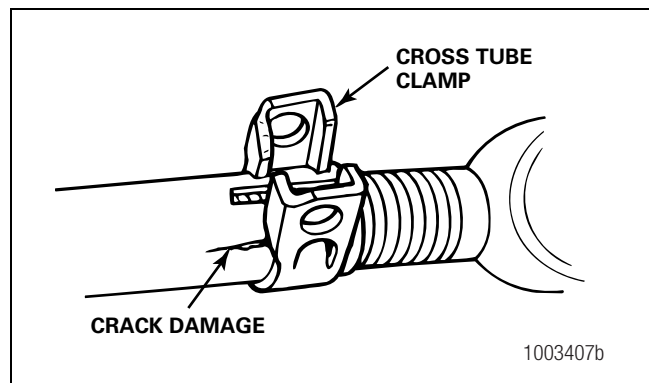


Figure 10.16

## 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 10.17.

Regularly-scheduled inspection and maintenance helps to minimize the effects of tie rod end wear on the vehicle. Figure 10.17.

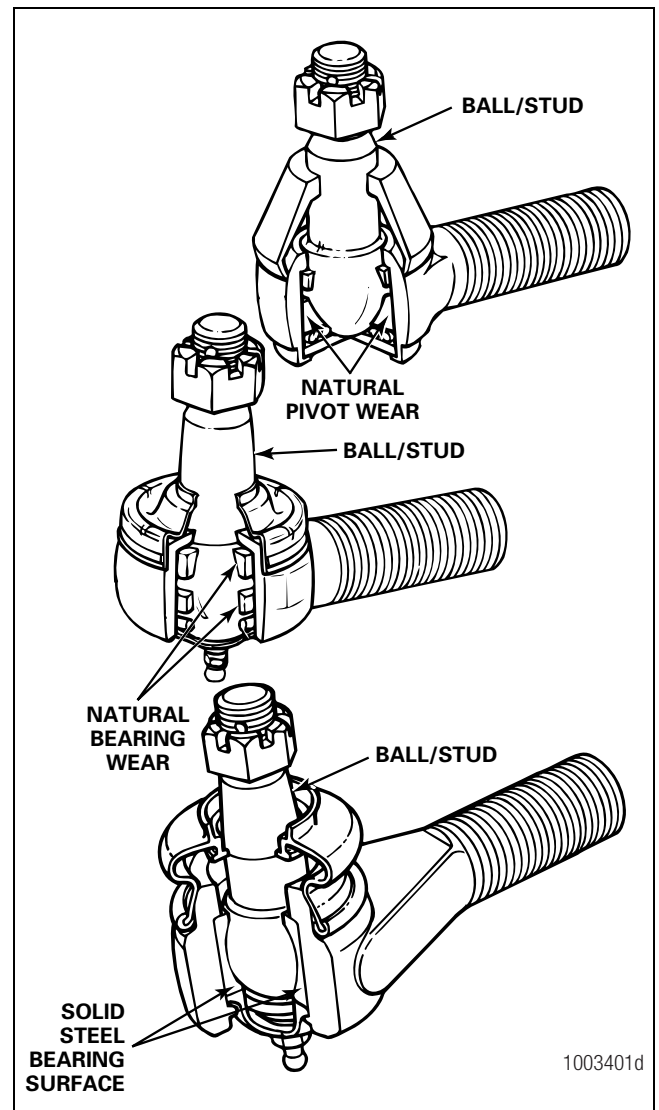


Figure 10.17


## Inspect Steering Arm Bolts

### ⚠ WARNING

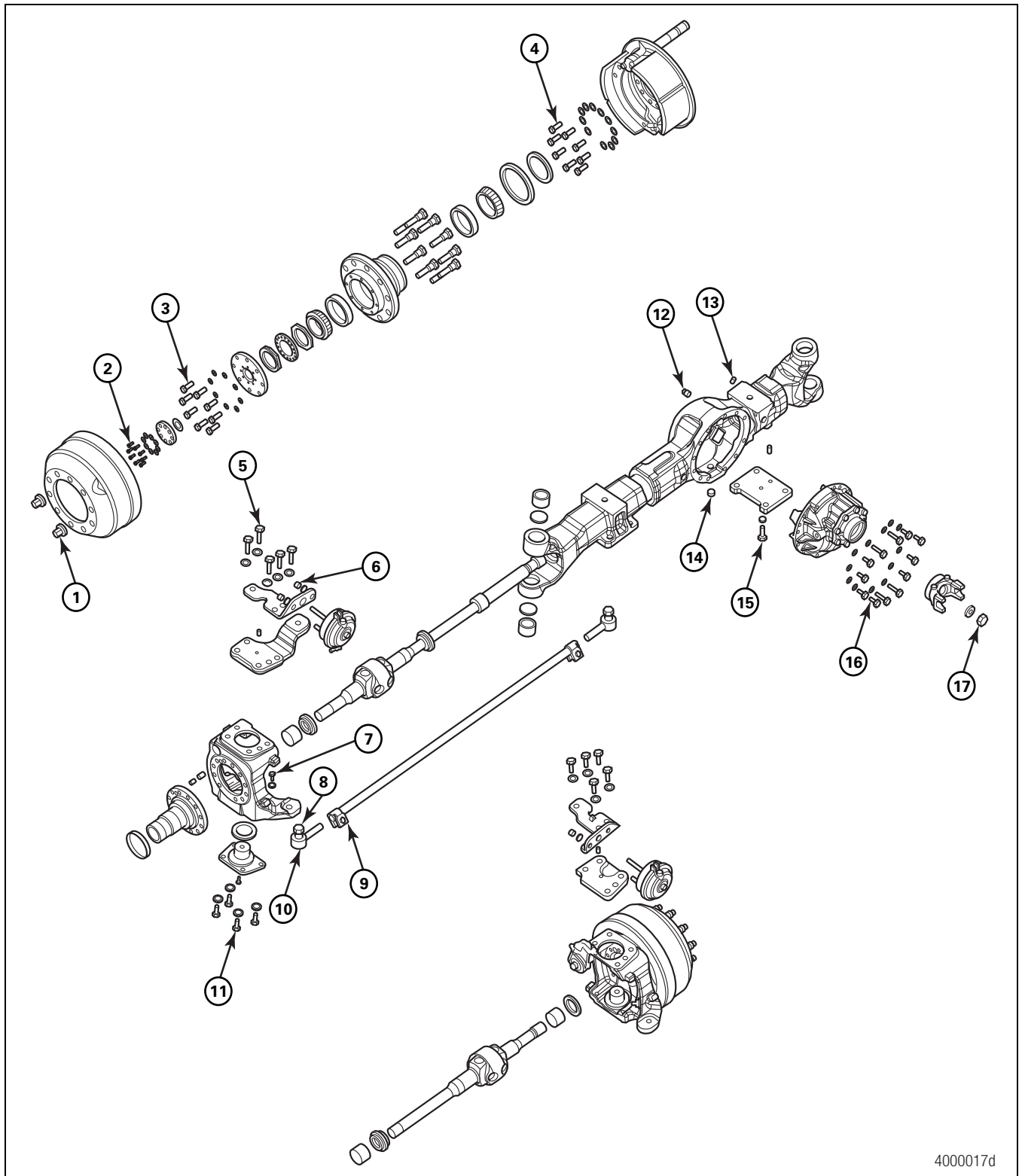
Take care when you use Loctite® adhesive to avoid serious personal injury. Read the manufacturer's instructions before using this product. Follow the instructions carefully to prevent irritation to the eyes and skin.

1. Inspect the steering arm bolts. Verify that torque is a minimum of 300 lb-ft (406 N•m). 

## 10 Lubrication and Maintenance

- **If the steering arm bolt torque is below 300 lb-ft (406 N•m):** Remove the bolts, clean all threads and install new Loctite® 680 sealant, Meritor part number 2297-K-5523. Tighten the bolts to 300-450 lb-ft (406-610 N•m). 
2. Check the steering arm bolt torque every 200,000 miles (320 000 km) or 24 months, whichever comes first.

MX-120 and MX-120HR Series



4000017d

Figure 11.1

# 11 Specifications

**Table B: Fastener Torque Chart**

<b>Item</b>	<b>Fastener</b>	<b>Thread Size (Inches)</b>	<b>Wrench Torque lb-ft (N•m)</b>
1	Wheel Nut	1-1/8-16 1-3/16-12	Refer to the manufacturer's specifications.
2	Hubcap Bolt	3/8-16	35-50 (47-68)
3	Drive Flange Bolt	5/8-11	180-230 (244-312)
4	Spindle and Brake Attachment Capscrew	5/8-11	180-230 (244-312)
5	Upper Knuckle Cap Bolt/Steering Arm Capscrew	7/8-9	500-650 (678-881)
6	Brake Chamber Attachment Nut	5/8-11	100-115 (135-156)
7	Stop Screw Jam Nut	9/16-12	75-100 (101-135)
8	Tie Rod End Nut	7/8-14	160-215, initial (217-292) 320 max, (after assembly) (434)
9	Tie Rod Clamp Sleeve Adjuster Locknut	5/8-11	40-60 (54-81)
10	Tie Rod Grease Fitting	1/4-28 UNF	3.0 (4.1)
11	Lower Knuckle Cap Bolt	3/4-10	310-400 (420-542)
12	Housing Oil Fill Plug	3/4-14	35 minimum (47.5)
13	Breather Assembly	3/8-18	20 minimum (27)
14	Housing Drain Plug	3/4-14	35 minimum (47.5)
15	Spring Plate Bolt	1/2-13	85-115 (115-156)
16	Carrier Bolts	1/2-13	100-115 (136-156)
17	Pinion Nut	M32 x 1.5 (metric)	700-900 (950-1220)

MX-120-EVO Series

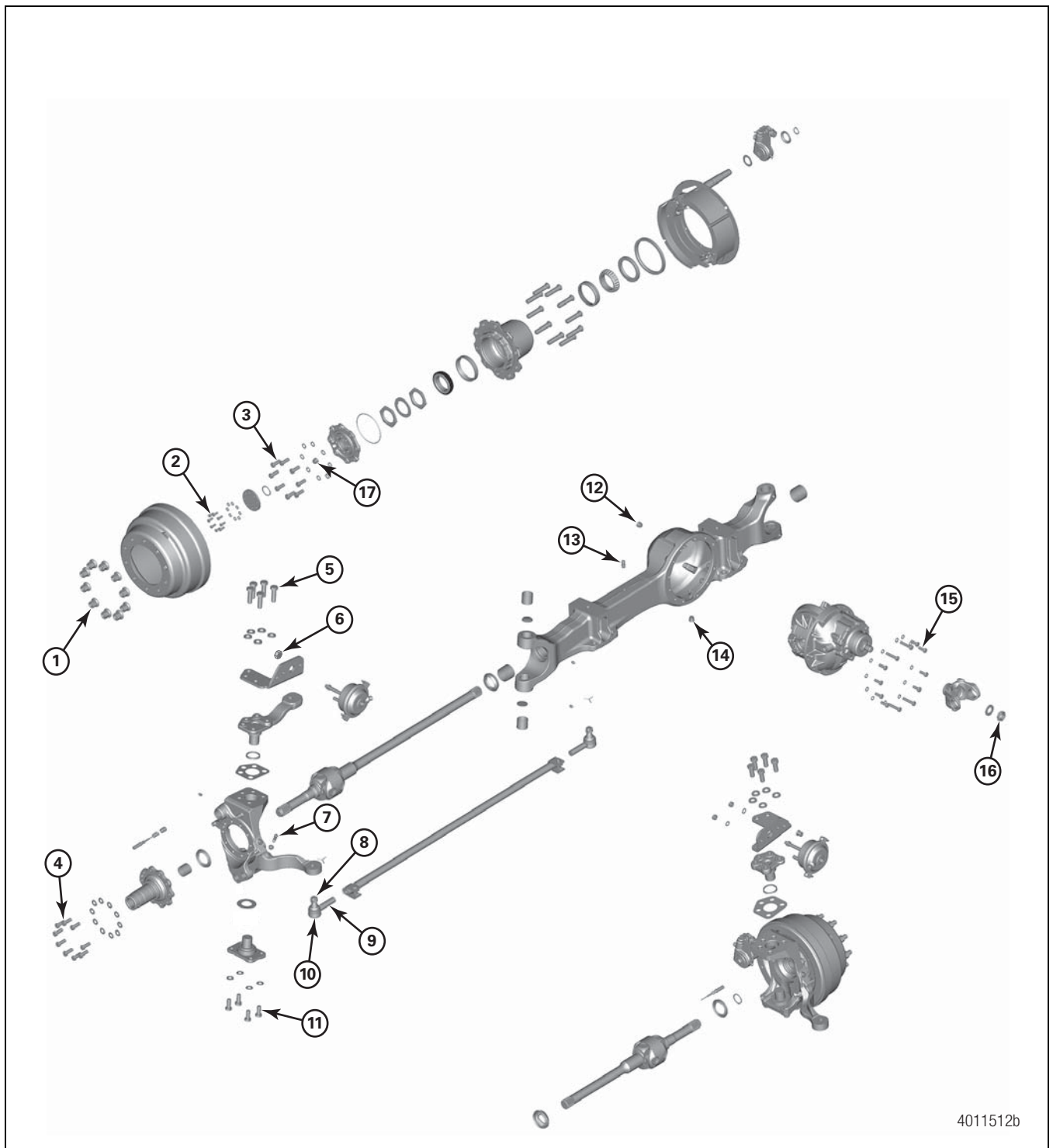


Figure 11.2

# 11 Specifications

**Table C: Fastener Torque Chart**

<b>Item</b>	<b>Fastener</b>	<b>Thread Size (Inches)</b>	<b>Wrench Torque lb-ft (N•m)</b>
1	Wheel Nut	1-1/8-16 1-3/16-12	Refer to the manufacturer's specifications.
2	Hubcap Bolt	3/8-16	35-50 (47-68)
3	Drive Flange Bolt	5/8-11	180-230 (244-312)
4	Spindle and Brake Attachment Capscrew	5/8-11	180-230 (244-312)
5	Upper Knuckle Cap Bolt/Steering Arm Capscrew	7/8-9	500-650 (678-881)
6	Brake Chamber Bracket Nut	5/8-11	100-115 (135-156)
7	Stop Screw Jam Nut	9/16-12	75-100 (101-135)
8	Tie Rod End Nut	7/8-14	160-215, initial (217-292) 320 max, (after assembly) (434)
9	Tie Rod Clamp Sleeve Adjuster Locknut	5/8-11	40-60 (54-81)
10	Tie Rod Grease Fitting	1/4-28 UNF	3.0 (4.1)
11	Lower Knuckle Cap Bolt	3/4-10	310-400 (420-542)
12	Housing Oil Fill Plug	3/4-14	35 minimum (47.5)
13	Breather Assembly	3/8-18	20 minimum (27)
14	Housing Drain Plug	3/4-14	35 minimum (47.5)
15	Carrier Bolts	1/2-13	100-115 (136-156)
16	Pinion Nut	M32 x 1.5 (metric)	700-900 (950-1220)
17	Hub Oil Fill/Drain Plug	M22 x 1.5	51-59 (69-80)

## Tool Drawings

### Axle Shaft Seal Driver

To fabricate the axle shaft seal driver tool, refer to Figure 12.1.  
Assemble the tool with the following additional parts.

- Two 3/4-inch SAE washers, zinc plated
- One 3/4-inch split lock washer
- One 3/4-inch hex nut

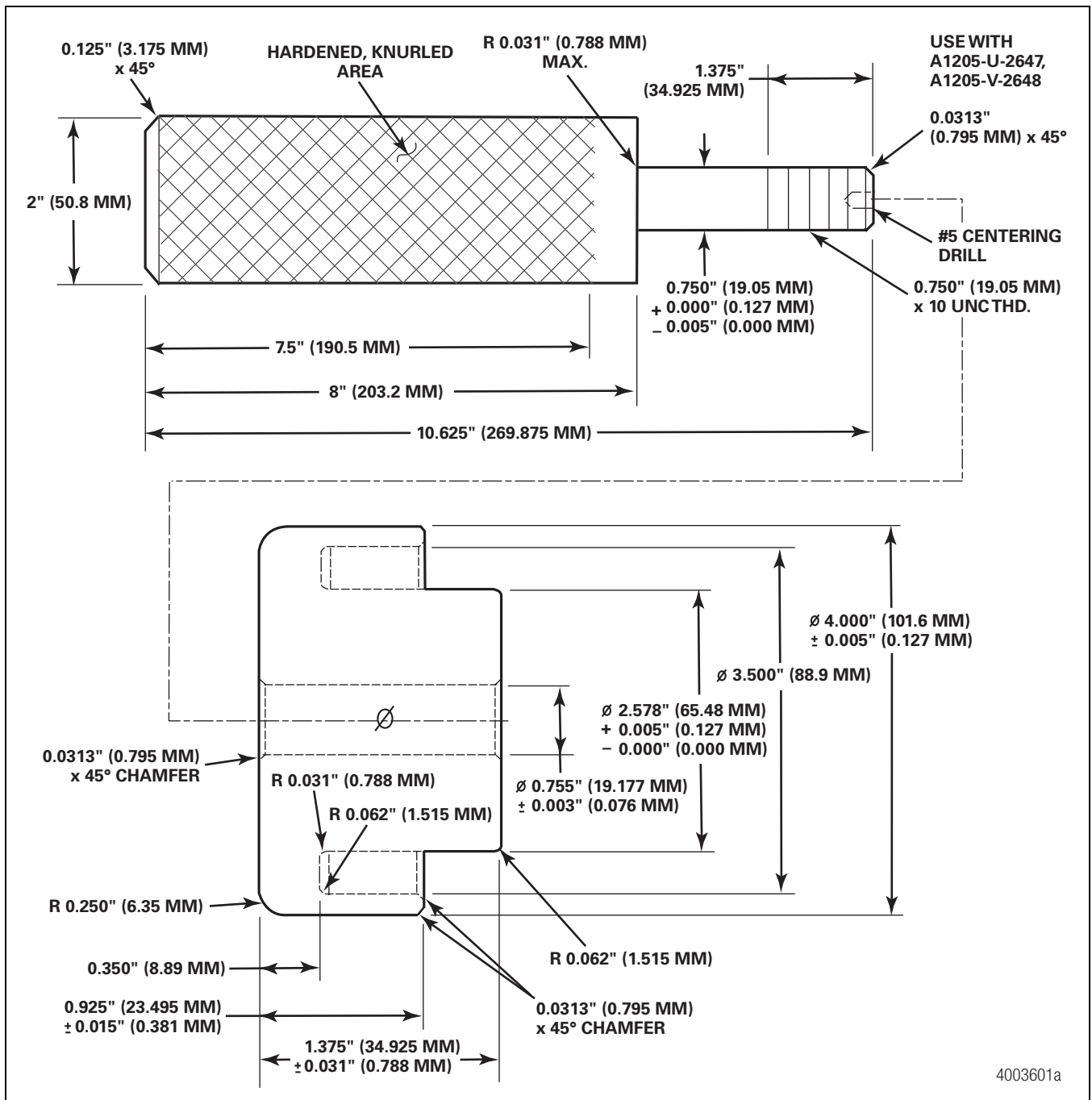


Figure 12.1



# 12 Special Tools

## Hub Seal Driver

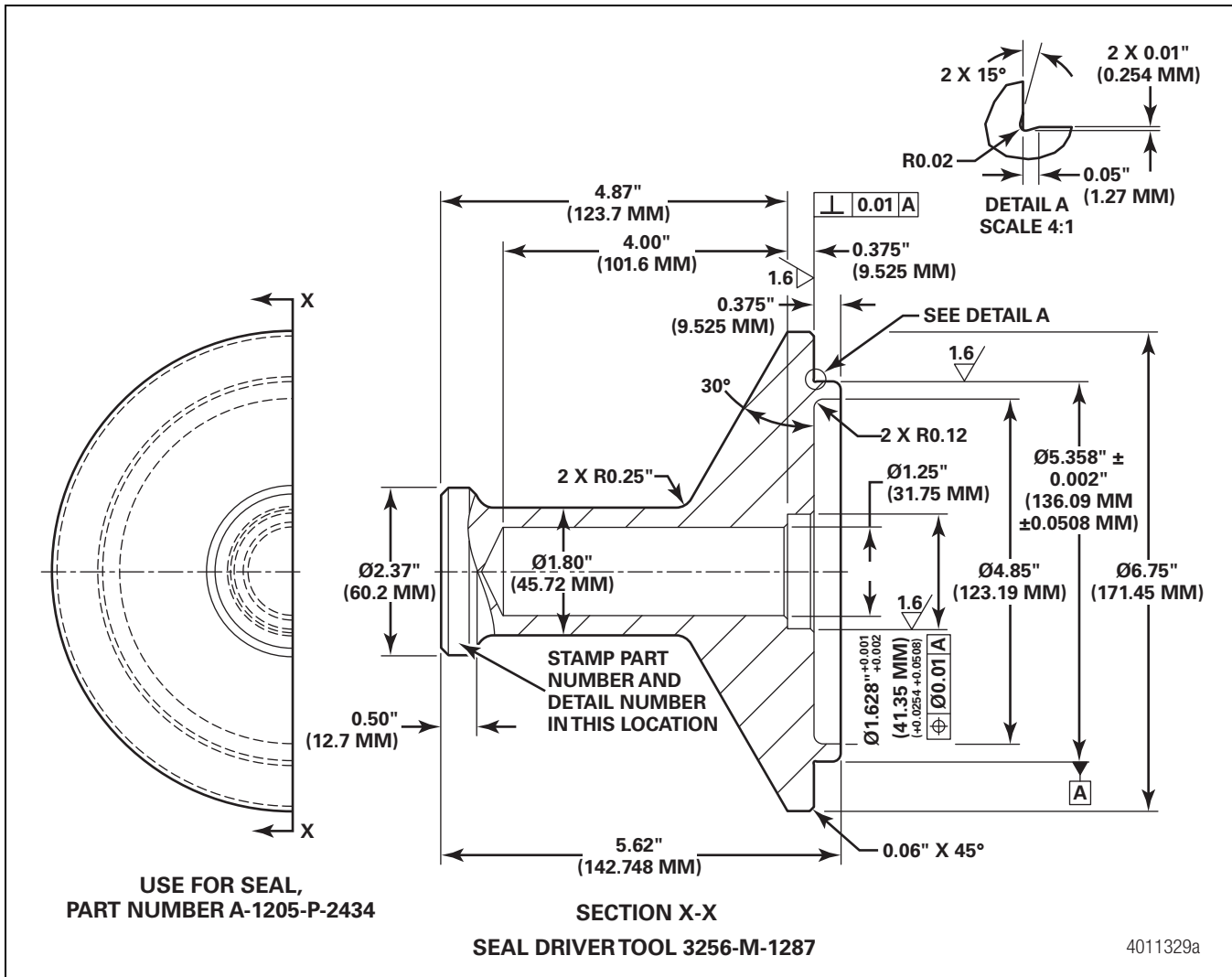


Figure 12.2

Bushing Driver

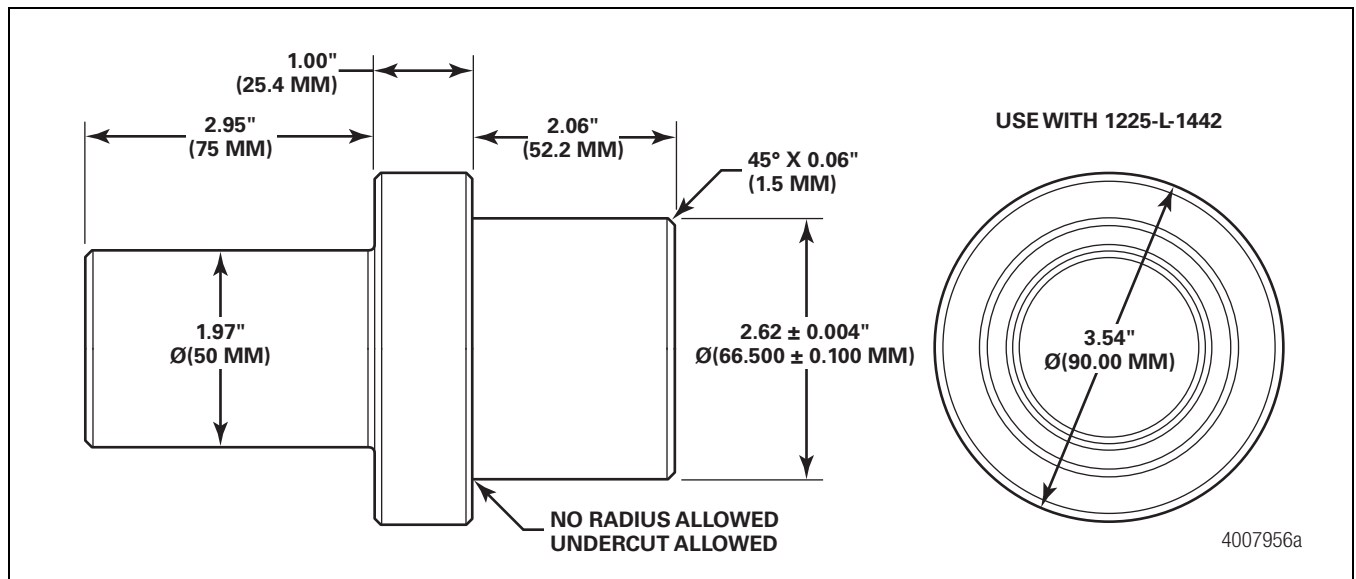


Figure 12.3

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