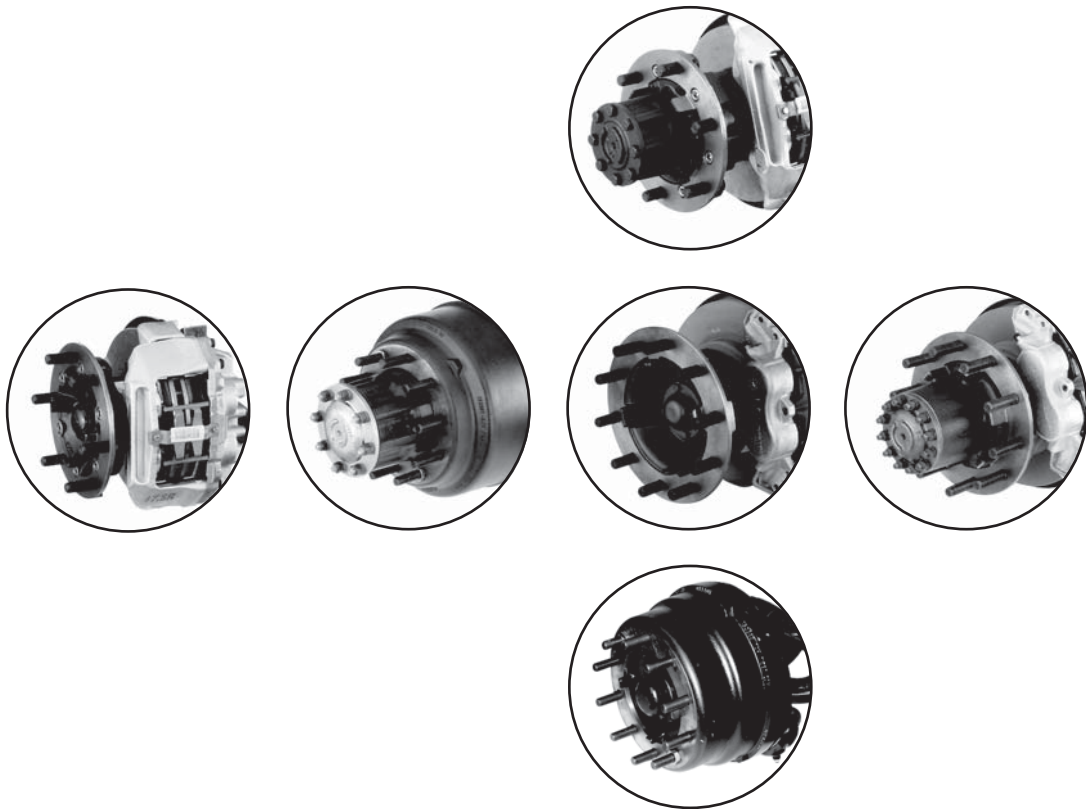


Maintenance Manual MM-0409

Wheel-End Components

Meritor Conventional and Unitized Wheel Ends

Revised 11-21



Service Notes

About This Manual

This manual provides maintenance and service information for the Meritor front non-drive steer axle, tag and rear drive axle wheel-end components.

Before You Begin

1. Read and understand all instructions and procedures before you begin to service components.
2. Read and observe all 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

DANGER

A Danger indicates imminent danger. Failure to follow this instruction will result in death or serious injury.

WARNING

A Warning indicates a possibly impending danger. Failure to follow this instruction can result in death or serious injury.

CAUTION

A Caution indicates a hazardous situation or unsafe practice which, if not avoided, could result in injury or damage to components.

How to Obtain Additional Maintenance, Service and Product Information

Visit Literature on Demand at meritor.com to access and order additional information.

Contact the Meritor OnTrac™ Customer Service Center at 866-668-7221 (United States and Canada) between 7:30 AM and 10:00 PM ET Monday through Friday, and between 9:00 AM and 6:00 PM ET on Saturday; 001-800-889-1834 (Mexico); or visit our website: www.meritor.com/warranty#OnTracSC.

For inspection, preventive maintenance and service procedures for ConMet® PreSet® hubs, refer to the ConMet® Service Manual for PreSet® Hub Assemblies. The manual can be accessed at www.conmet.com/pdfs/preset_service_manual.pdf.

If Tools and Supplies are Specified in This Manual

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

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

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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 any 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/m³ 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.

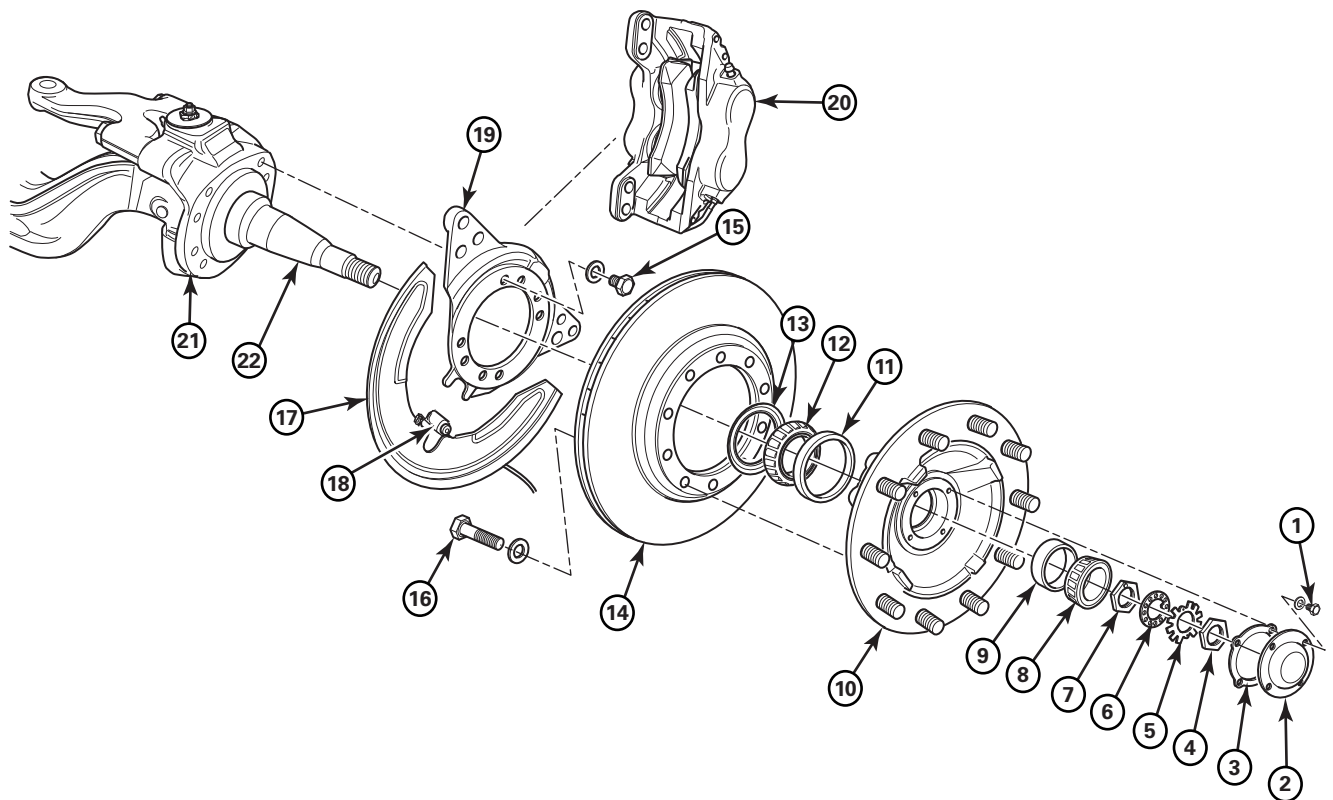
Regulatory Guidance

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.

Exploded Views

Conventional MFS Series Wheel End — Front Non-Drive Steer Axle

MFS-08-113 (QUADRAULIC™ DISC BRAKE)



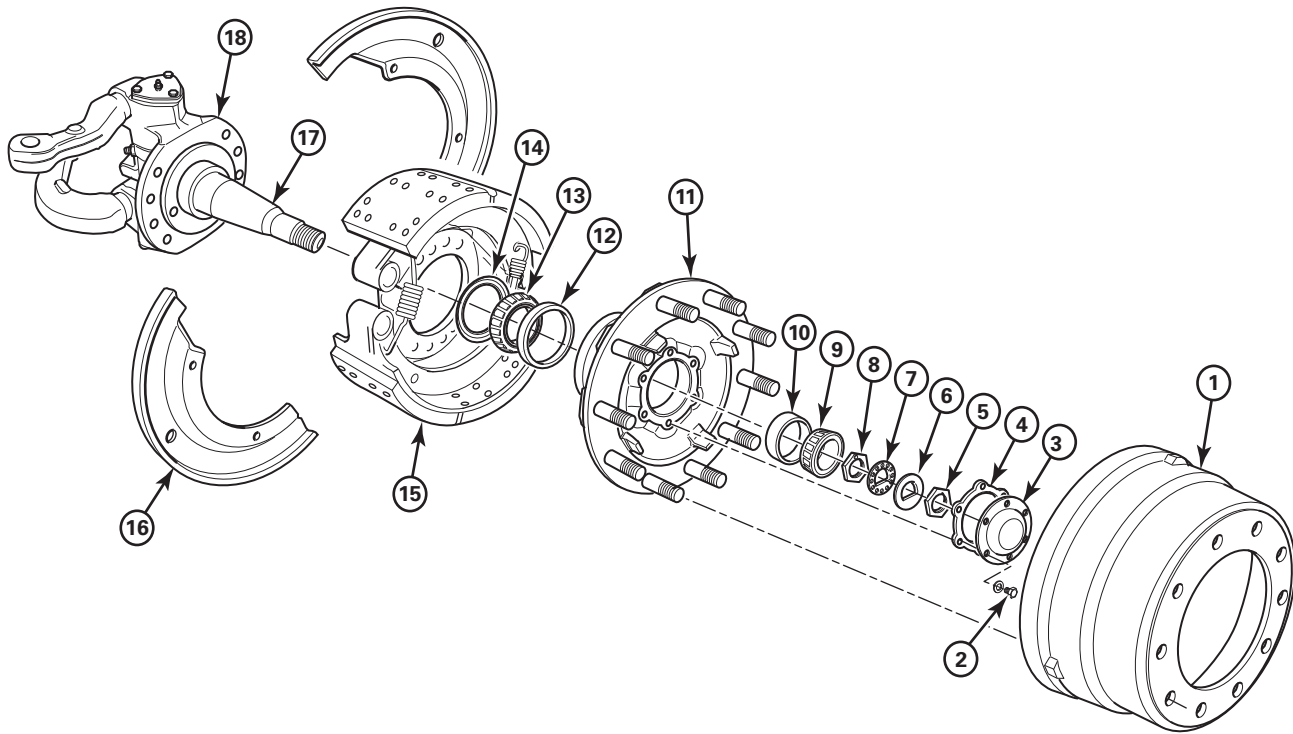
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Item	Description	Item	Description
1	Capscrew and Flat Washer	12	Inner Wheel Bearing
2	Hubcap	13	Grease Seal
3	Gasket	14	Brake Rotor
4	Outer Wheel Bearing Jam Nut	15	Capscrew and Washer
5	Tabbed Lock Washer	16	Capscrew and Washer
6	Pierced Lock Ring with Keyway Tab	17	Backing Plate
7	Outer Wheel Bearing Adjusting Nut	18	ABS Sensor
8	Outer Wheel Bearing	19	Torque Plate
9	Outer Race	20	Quadraulic Disc Brake Caliper Assembly
10	Hub	21	Knuckle
11	Inner Race		

1 Exploded Views

Conventional MFS Series Wheel End — Front Non-Drive Steer Axle

MFS-12-122 (Q+™ CAM BRAKE)



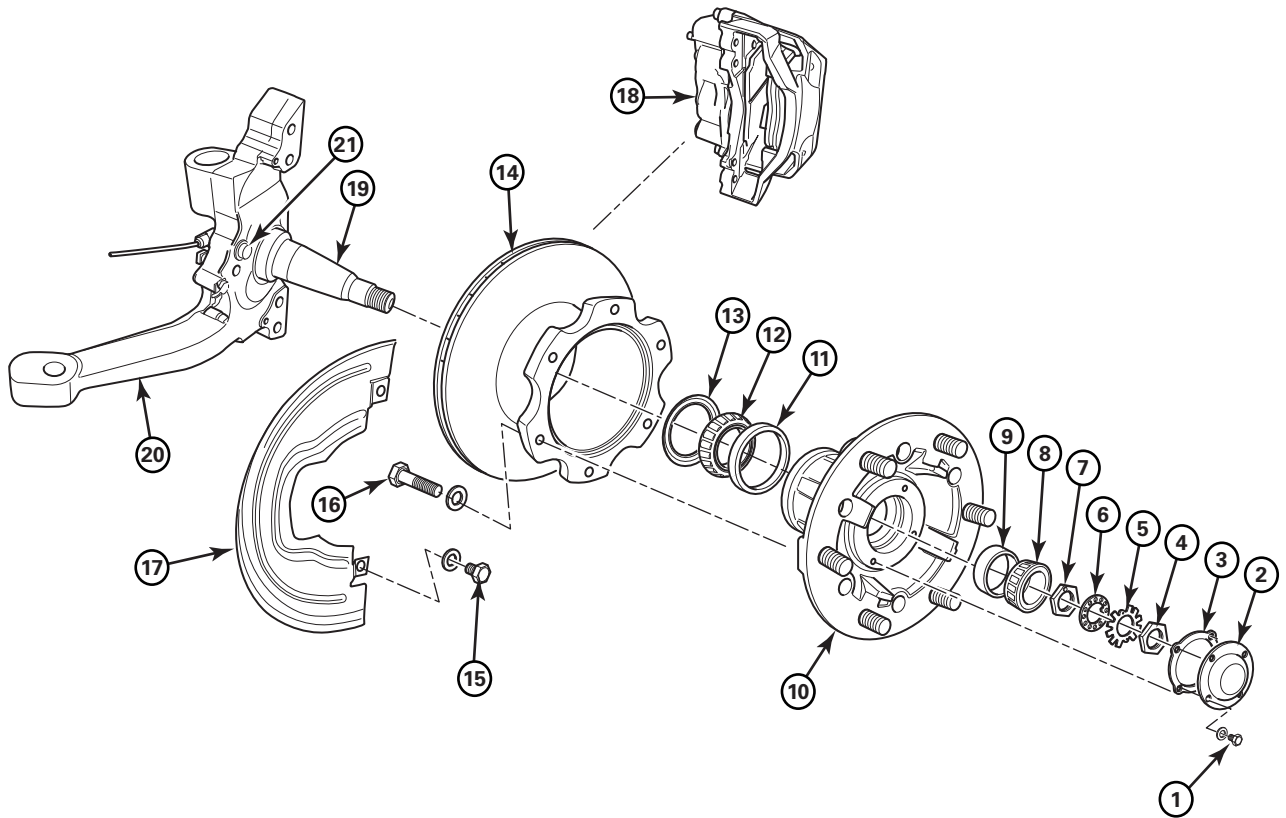
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Item	Description
1	Brake Drum
2	Capscrew and Flat Washer
3	Hubcap
4	Gasket
5	Outer Wheel Bearing Jam Nut
6	D-Style Lock Washer
7	D-Style Pierced Lock Ring
8	Outer Wheel Bearing Adjusting Nut
9	Outer Wheel Bearing
10	Outer Race
11	Hub
12	Inner Race
13	Inner Wheel Bearing
14	Grease Seal

Item	Description
15	Q+ Cam Brake Assembly
16	Backing Plate
17	Spindle
18	Knuckle

Conventional MFS Series Wheel End — Front Non-Drive Steer Axle

MFS-06-162 (REACTION BEAM – B-FRAME DISC BRAKE)



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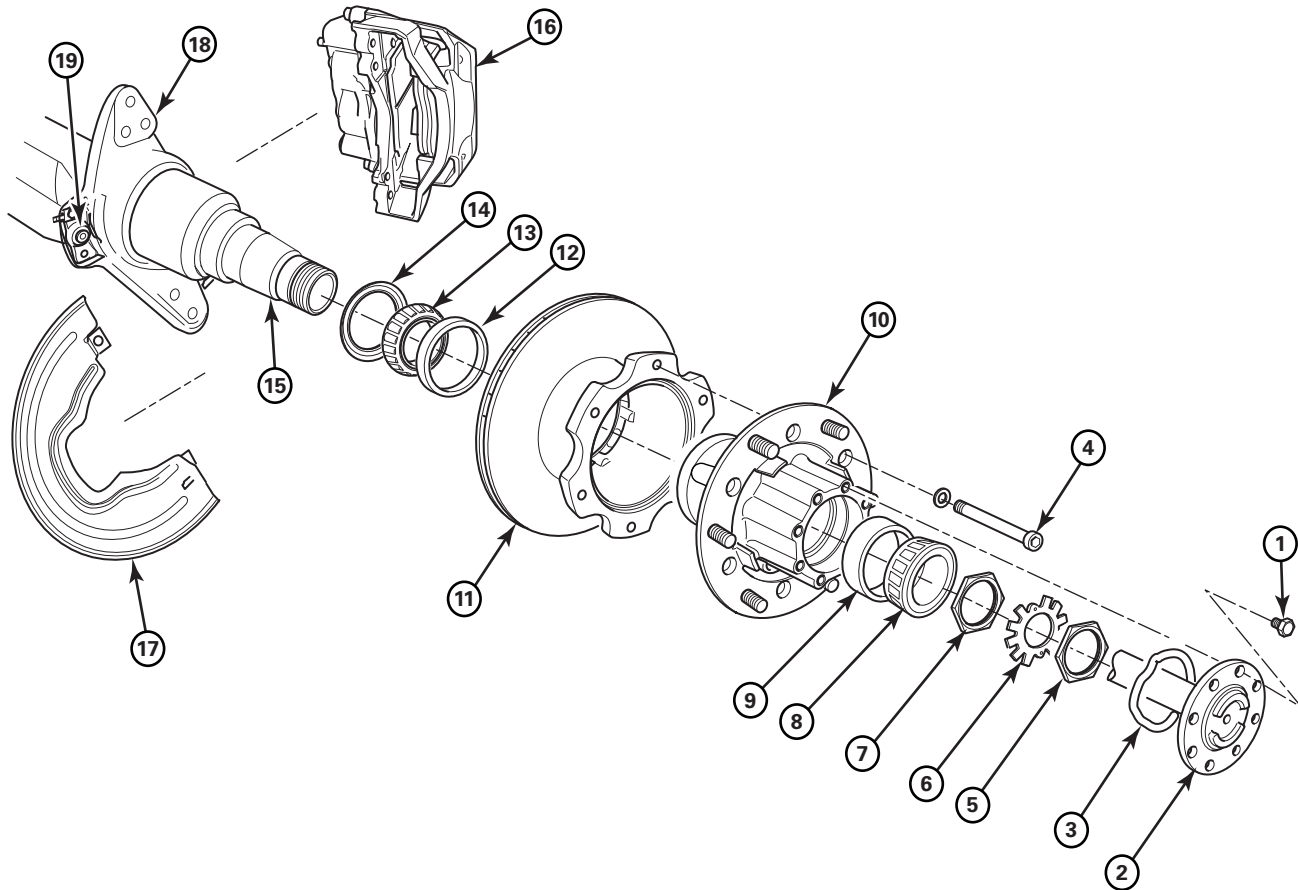
Item	Description
1	Capscrew and Flat Washer
2	Hubcap
3	Gasket
4	Outer Wheel Bearing Jam Nut
5	Tabbed Lock Washer
6	Pierced Lock Ring with Keyway Tab
7	Outer Wheel Bearing Adjusting Nut
8	Outer Wheel Bearing
9	Outer Race
10	Hub
11	Inner Race
12	Inner Wheel Bearing
13	Grease Seal

Item	Description
14	Hub
15	Capscrew and Washer
16	Capscrew and Washer
17	Backing Plate
18	Reaction Beam Disc Brake Assembly
19	Spindle
20	Integral Steering Arm
21	ABS Sensor

1 Exploded Views

Conventional MS and RS Series Wheel End — Rear Drive Axle

MS-12-113 (REACTION BEAM – B-FRAME DISC BRAKE)



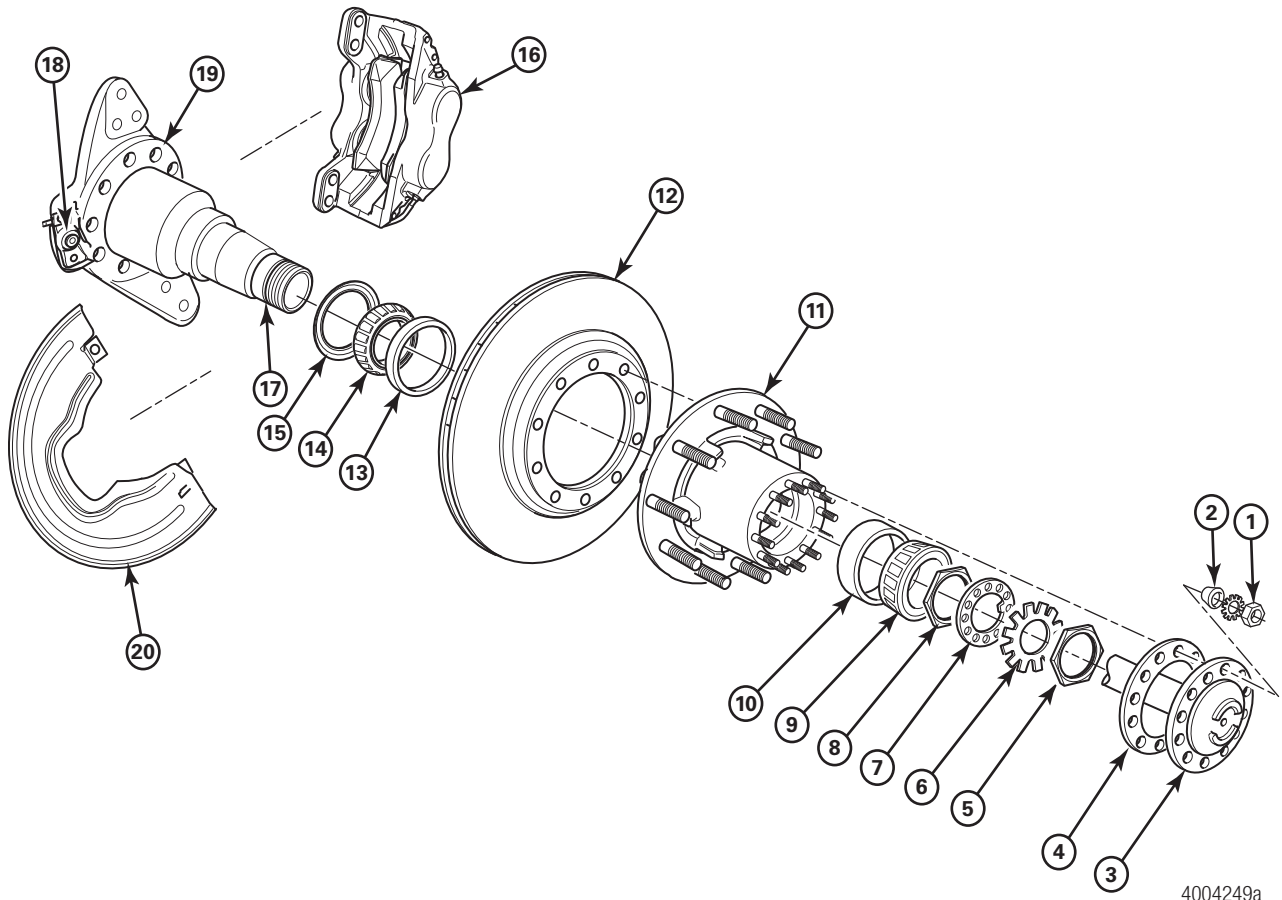
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Item	Description
1	Capscrew
2	Axle Shaft
3	RTV Gasket Material
4	Capscrew and Washer
5	Outer Wheel Bearing Jam Nut
6	Tabbed Lock Washer
7	Outer Wheel Bearing Adjusting Nut
8	Outer Wheel Bearing
9	Outer Race
10	Hub
11	Disc Brake Rotor

Item	Description
12	Inner Race
13	Inner Wheel Bearing
14	Oil Seal
15	Spindle
16	Reaction Beam Brake Caliper Assembly
17	Backing Plate
18	Integral Caliper Bracket
19	ABS Sensor

Conventional MS and RS Series Wheel End — Rear Drive Axle

RS-19-145 AND RS-13-120 (QUADRAULIC DISC BRAKE)



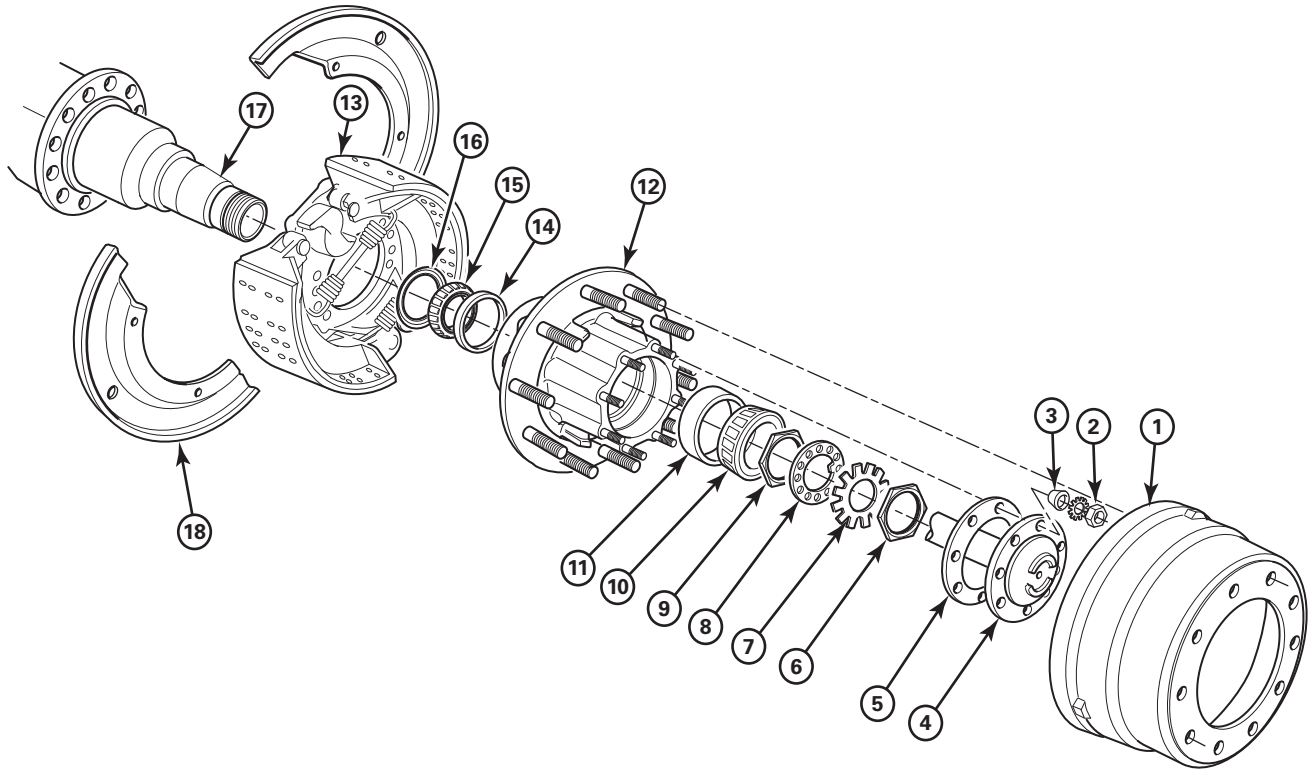
Item	Description
1	Nut and Star Lock Washer
2	Tapered Dowel
3	Axle Shaft
4	Gasket
5	Outer Wheel Bearing Jam Nut
6	Tabbed Lock Washer
7	Pierced Lock Ring with Keyway Tab
8	Outer Wheel Bearing Adjusting Nut
9	Outer Wheel Bearing
10	Outer Race
11	Hub
12	Disc Brake Rotor

Item	Description
13	Inner Race
14	Inner Wheel Bearing
15	Oil Seal
16	Reaction Beam Caliper Assembly
17	Spindle
18	ABS Sensor
19	Knuckle
20	Backing Plate

1 Exploded Views

Conventional MS and RS Series Wheel End — Rear Drive Axle

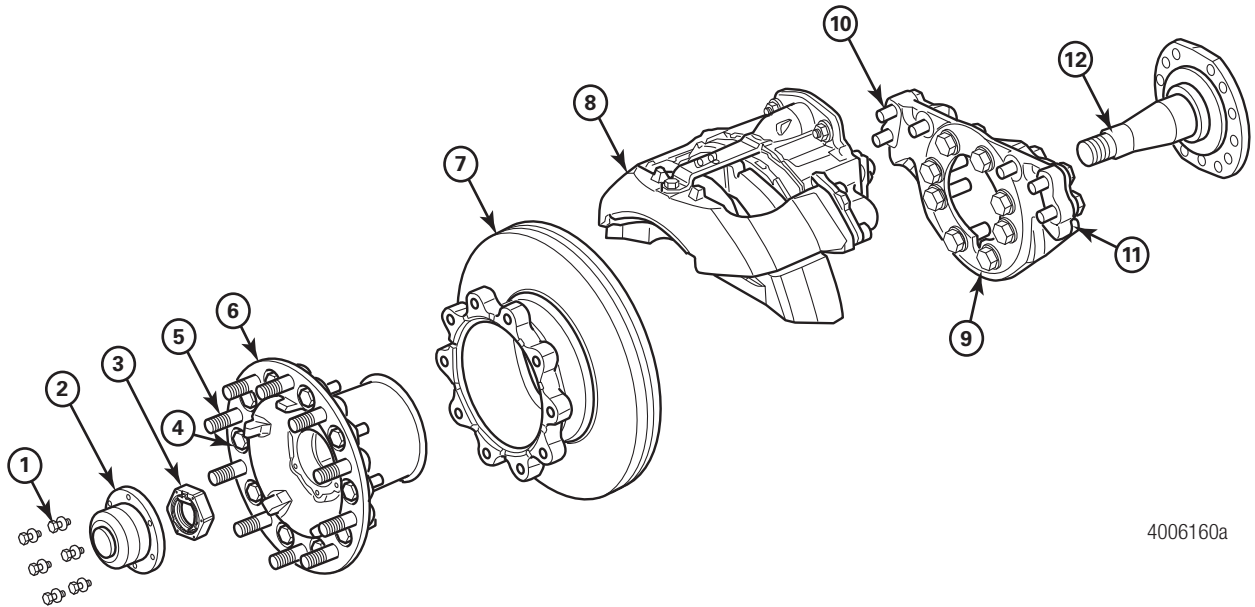
RS-21-145 (Q+ CAM BRAKE)



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Item	Description	Item	Description
1	Brake Drum	15	Inner Wheel Bearing
2	Nut and Star Lock Washer	16	Oil Seal
3	Tapered Dowel	17	Spindle
4	Axle Shaft	18	Backing Plate
5	Gasket		
6	Outer Wheel Bearing Jam Nut		
7	Tabbed Lock Washer		
8	Pierced Lock Ring with Keyway Tab		
9	Outer Wheel Bearing Adjusting Nut		
10	Outer Wheel Bearing		
11	Outer Race		
12	Hub		
13	Q+ Cam Brake Assembly		
14	Inner Race		

PreSet® Hub — MC Series Tag Axle with EX+ Brakes

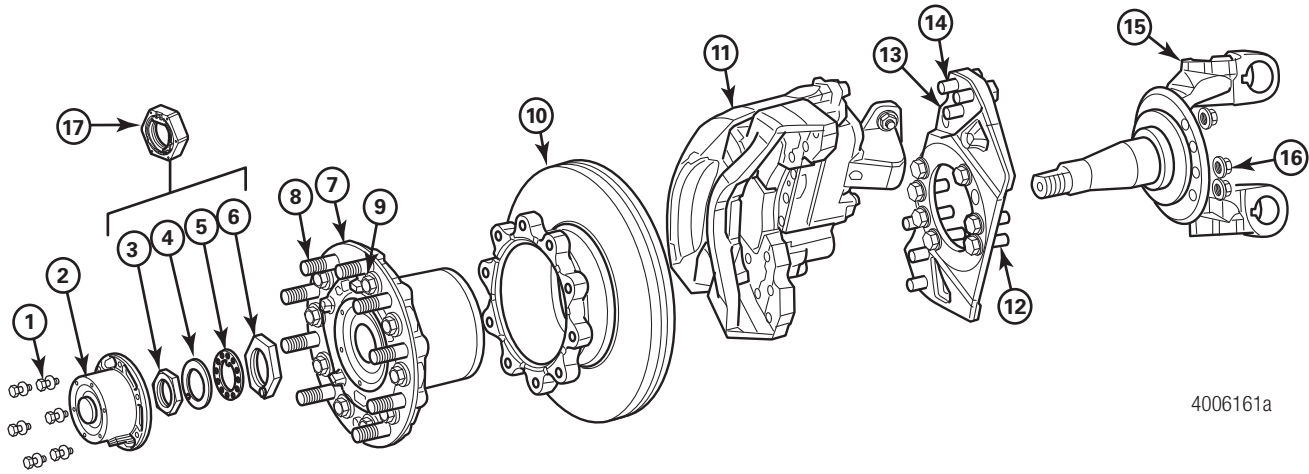


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Item	Description
1	Capscrew
2	Hubcap
3	PRO-TORQ™ Spindle Nut
4	Rotor-to-Hub Capscrew
5	Wheel Stud
6	PreSet® Hub
7	Rotor
8	EX+ Brake
9	Torque Plate-to-Spindle Capscrew
10	Torque Plate-to-Caliper Capscrew
11	Torque Plate
12	Spindle

1 Exploded Views

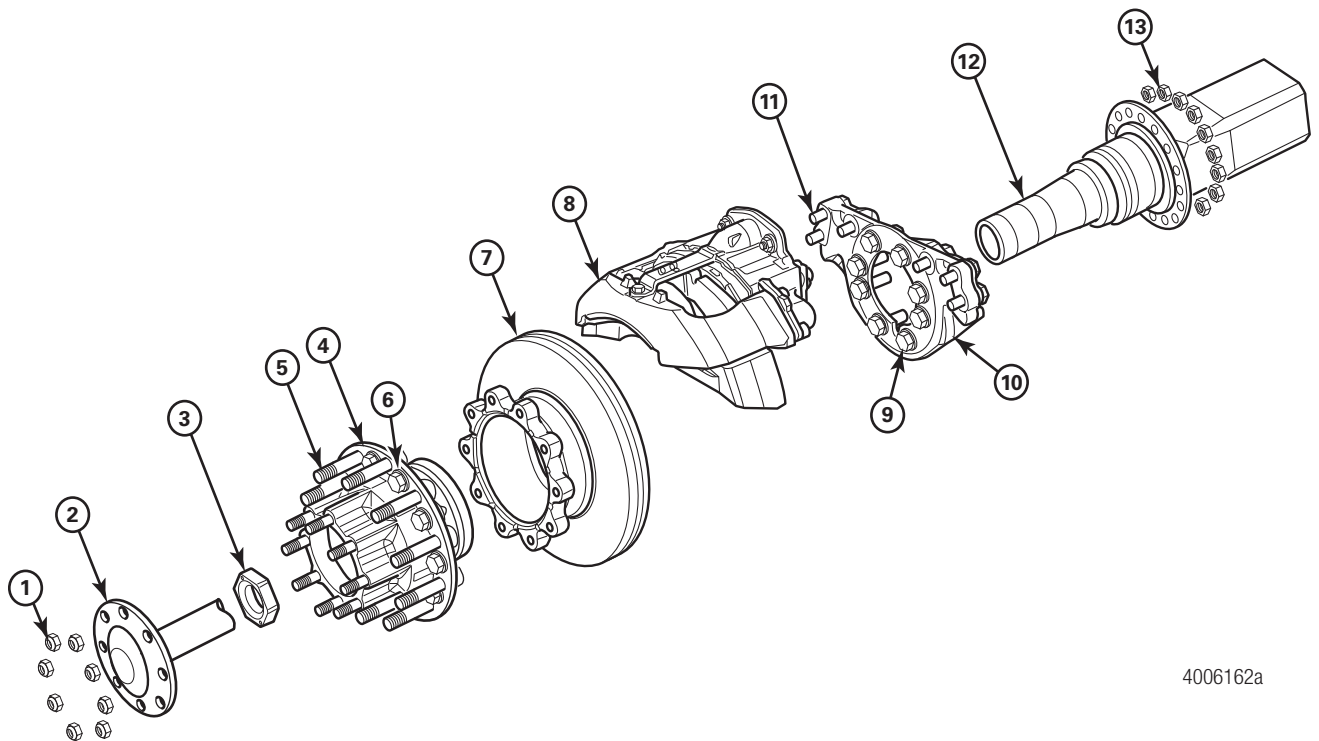
Conventional or PreSet[®] Hub — FL, FG, MFS Series Front Axle with EX+ Brakes



4006161a

Item	Description
1	Capscrew
2	Hubcap
3	Outer Nut
4	Lock Washer
5	Lock Ring
6	Inner Nut
7	Conventional or PreSet [®] Hub
8	Wheel Stud
9	Rotor-to-Hub Capscrew
10	Rotor
11	EX+ Brake
12	Torque Plate-to-Knuckle Capscrew
13	Torque Plate
14	Torque Plate-to-Caliper Capscrew
15	Knuckle
16	Nut
17	PRO-TORQ [™] Nut for PreSet [®] Hub

PreSet[®] Hub — Rear Drive Axle with DiscPlus[™] Brakes

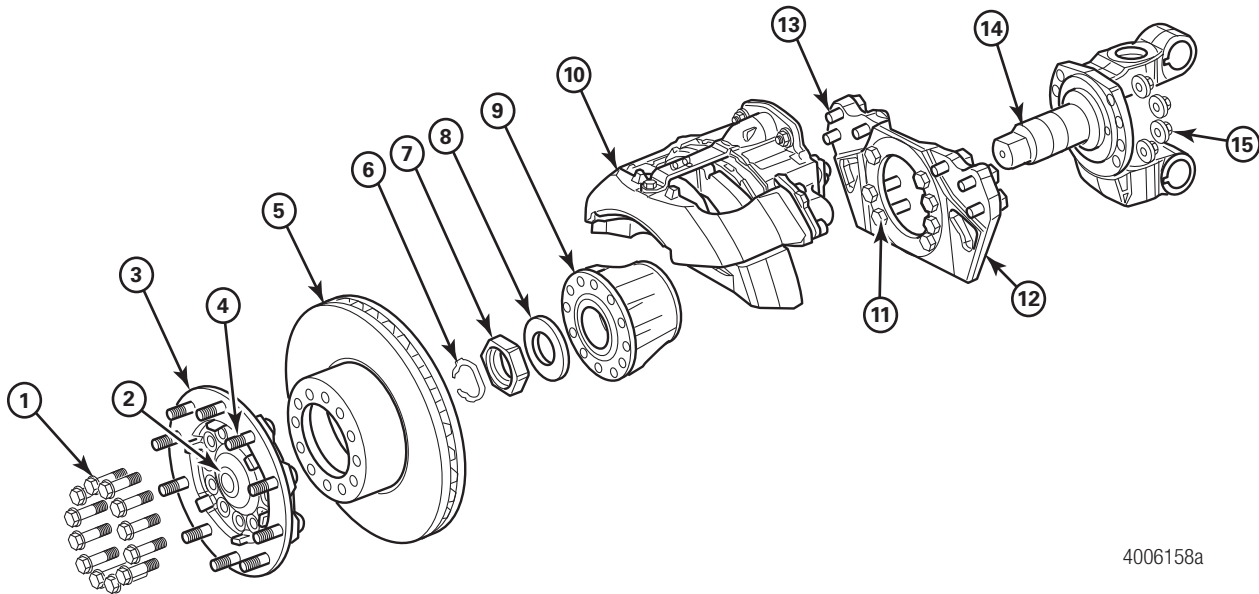


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Item	Description
1	Nut
2	Axle Shaft
3	PRO-TORQ [™] Spindle Nut
4	PreSet [®] Hub
5	Wheel Stud
6	Hub-to-Rotor Capscrew
7	Rotor
8	DiscPlus [™] Brake
9	Torque Plate-to-Spindle Capscrew
10	Torque Plate
11	Torque Plate-to-Caliper Capscrew
12	Spindle
13	Nut

1 Exploded Views

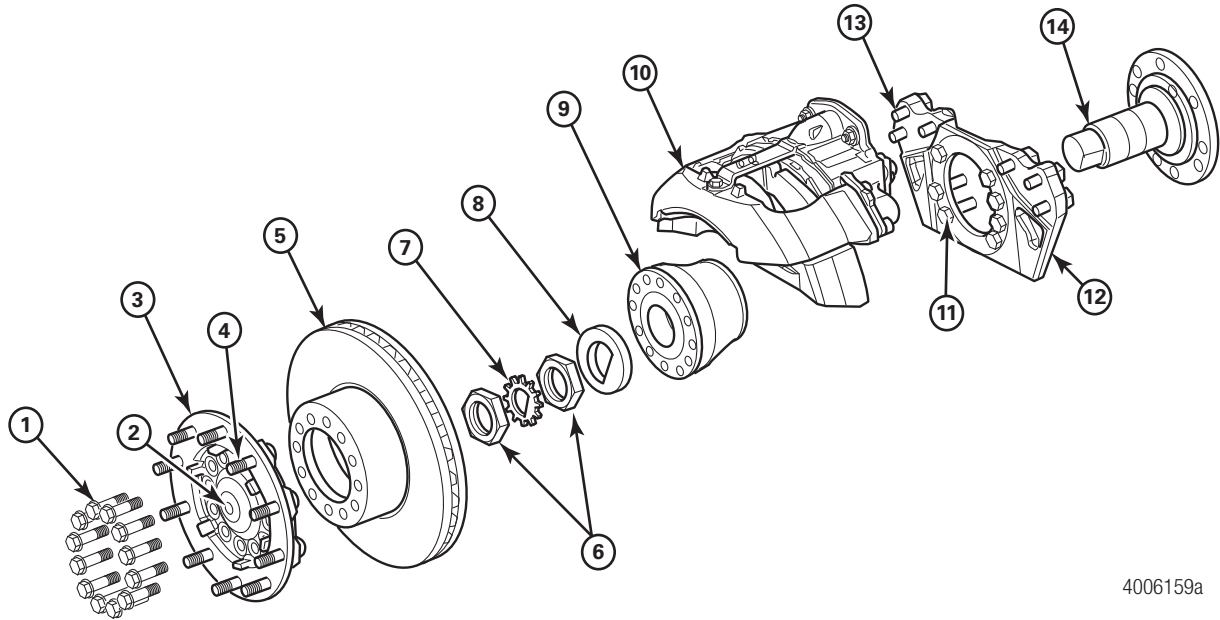
Unitized Wheel End — FH Series Front Tag Axle with EX+ Brakes



4006158a

Item	Description
1	Wheel Adapter Capscrew
2	Inspection Plug
3	Wheel Adapter
4	Wheel Stud
5	Rotor
6	Keeper
7	PRO-TORQ™ Spindle Nut
8	Thick Washer
9	Unitized Hub Bearing
10	EX+ Brake Assembly
11	Torque Plate-to-Spindle Capscrew
12	Torque Plate
13	Torque Plate-to-Brake Caliper Capscrew
14	FH Series Knuckle
15	Nut

Unitized Wheel End — MC Series Tag Axle with EX+ Brakes



4006159a

Item	Description
1	Wheel Adapter Capscrew
2	Inspection Plug
3	Wheel Adapter
4	Wheel Stud
5	Rotor
6	Spindle Nut
7	Lock Washer
8	Thick Washer
9	Unitized Hub Bearing
10	EX+ Brake Assembly
11	Torque Plate-to-Spindle Capscrew
12	Torque Plate
13	Torque Plate-to-Brake Caliper Capscrew
14	Spindle

2 Introduction

Hazard Alert Messages

Read and observe all hazard alert messages in this publication.

⚠ DANGER

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. NEVER work under a vehicle only supported by jacks. Jacks can slip or fall over. Serious personal injury and damage to components can result.

⚠ WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Technical Publications

Additional reference documentation is required to perform the various wheel-end service and maintenance procedures contained within this manual. Refer to the publications in Table A. To obtain these publications, refer to the Service Notes page on the front inside cover of this manual.

Table A: Publications

Reference	Document Title
MM1	Preventive Maintenance and Lubrication
MM2	Front Non-Drive Steer Axle
MM5A	Single Reduction Rear Differential Carrier
MM23	Bus and Coach Front Axles
Pneumatic ABS	
MM-0112	E-Version ABS for Trucks, Tractors and Buses
MM30	D-Version ABS for Trucks, Tractors and Buses
MM28	C-Version ABS for Trucks, Tractors and Buses
Hydraulic ABS	
MM38	C-Version HABS for Medium Duty-Trucks, Buses and Motor Home Chassis
MM39	D-Version HABS for Medium-Duty Trucks, Buses and Motor Home Chassis
Brakes	
MM4	Q+™ Cam Brake
MM-0328	Reaction Beam Hydraulic Disc Brake Caliper Assembly
MM-2075	Four-Piston Quadrauc™ Disc Brake Caliper

Reference	Document Title
MM-0467	EX+™ Air Disc Brake

Description

Conventional Wheel-End Components

The descriptions and procedures contained in this maintenance manual are applicable to the Meritor front non-drive steer, tag and rear drive axle wheel-end components.

Conventional wheel ends have the hub, seal, lubricant and bearings installed onto the axle spindle as separate components. Figure 2.1. These bearings and seals require periodic inspections and lubrication to maintain performance.

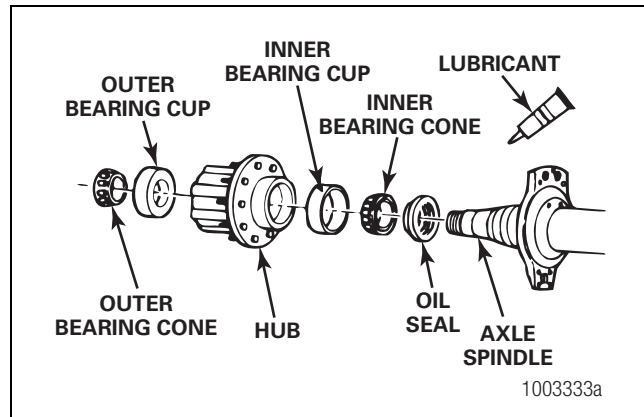


Figure 2.1

The front non-drive axle wheel bearings, and related components, are grease-lubricated. Figure 2.2.

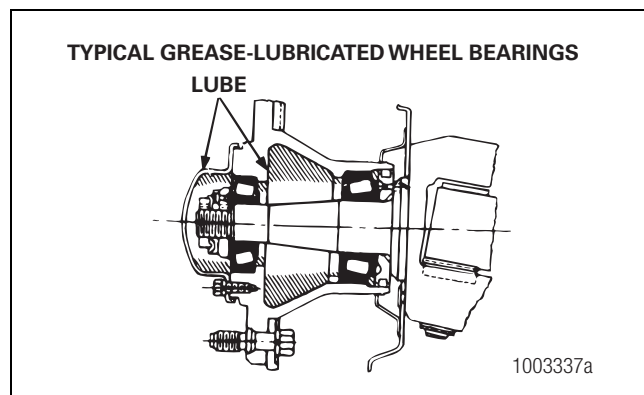


Figure 2.2

The rear drive axle wheel bearings, and related components, are oil-lubricated. Lubrication of these components occurs as fluid is circulated from the differential carrier or housing oil fill bowl out to the hub and wheel bearings and then back to the carrier or housing. Figure 2.3.

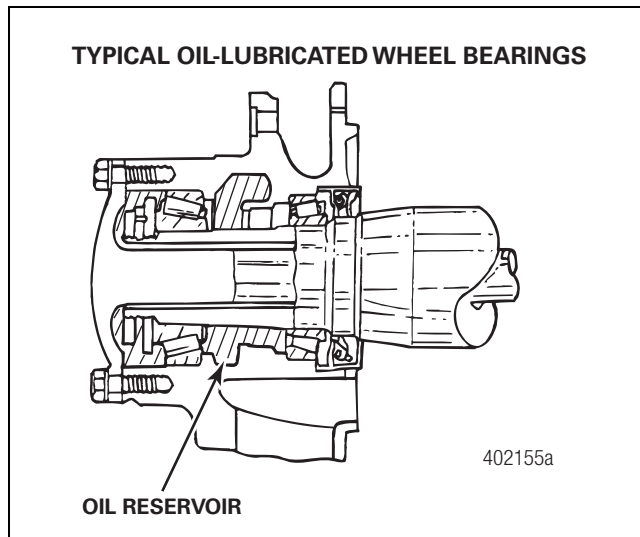


Figure 2.3

Unitized Wheel-End Components

Certain Meritor FH Series front and tag axle, and MC Series rear drive axle models are equipped with unitized wheel ends.

Unitized wheel-end components include a wheel adapter, rotor and unitized hub bearing mounted to a knuckle or spindle. There are two different spindle nut designs used on unitized wheel ends, double nut pack and PRO-TORQ™ nut. They are different and not interchangeable. Figure 2.4, Figure 2.5 and Figure 2.6.

2 Introduction

Wheel ends with unitized hub bearings are sealed and greased for life and do not require lubrication. These unitized wheel ends require periodic inspections to maintain performance.

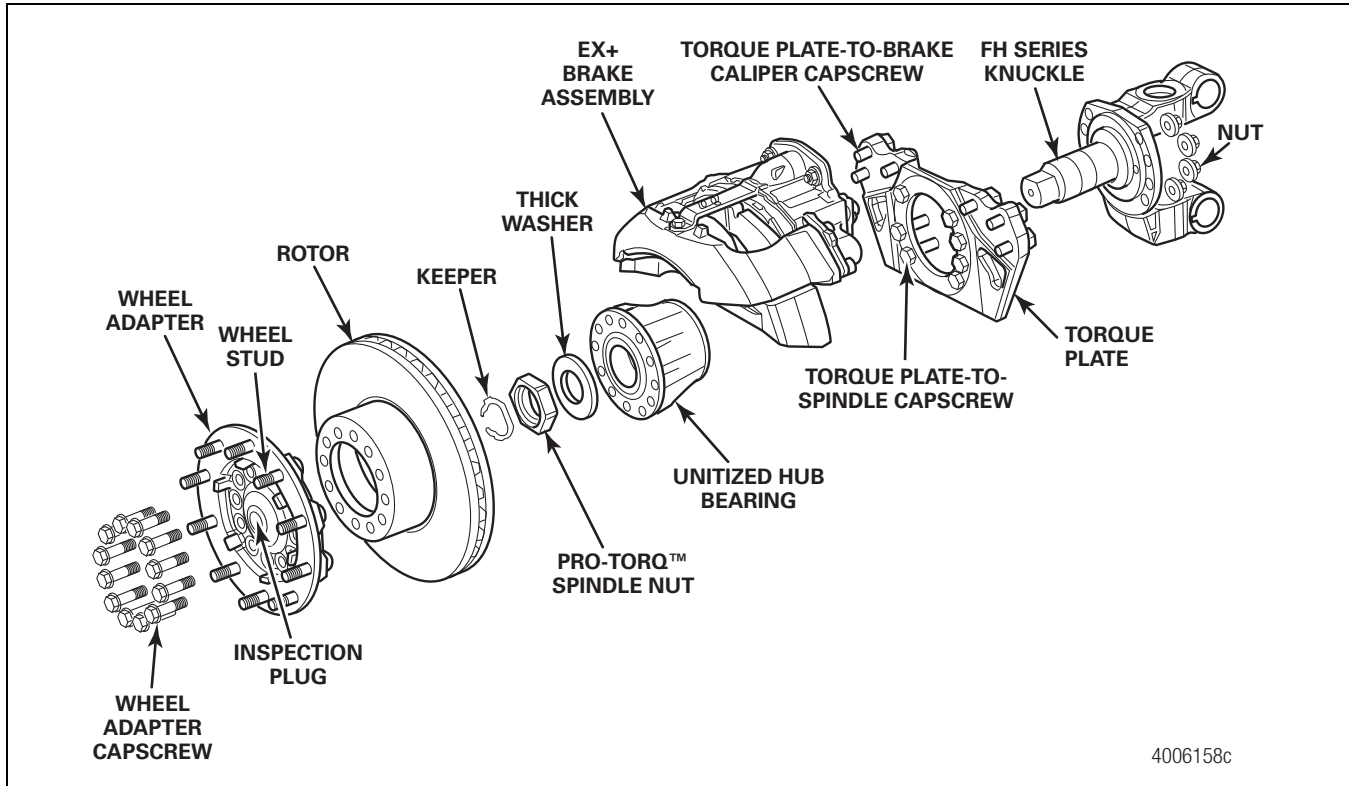


Figure 2.4

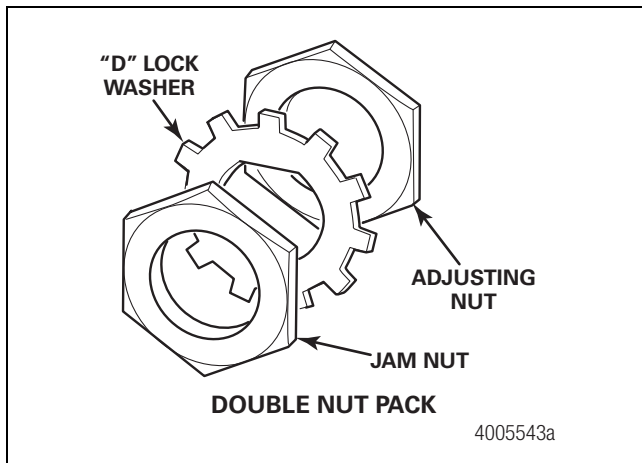


Figure 2.5

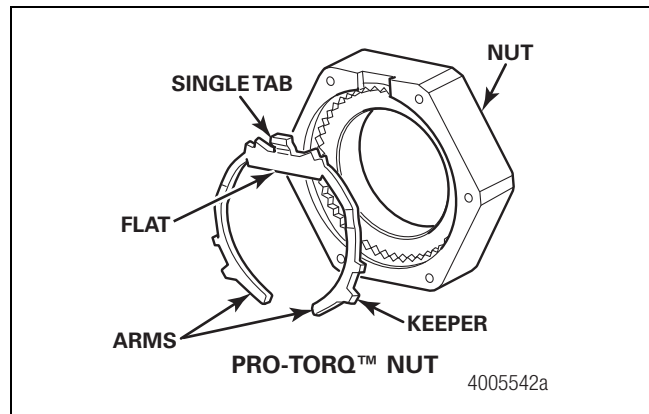


Figure 2.6

Identification

Front and Rear Axle Wheel Ends

The axle build information and assembly date for Meritor front non-drive steer and rear drive axles is on the axle identification tag. Figure 2.7 and Figure 2.8.

The identification tag is fastened to the center of the beam at the front surface. The axle assembly date is located in either the lower right-hand or left-hand corner of the tag.

The Julian method is used to indicate the axle assembly date and is shown in Figure 2.7. The first two digits indicate the year, and the last three digits indicate the day of the year.

In the following example, 01 is the year 2001 and 327 refers to November 22.

To identify the model number, refer to the identification plate on the front of the beam. Use the complete model number to obtain parts.

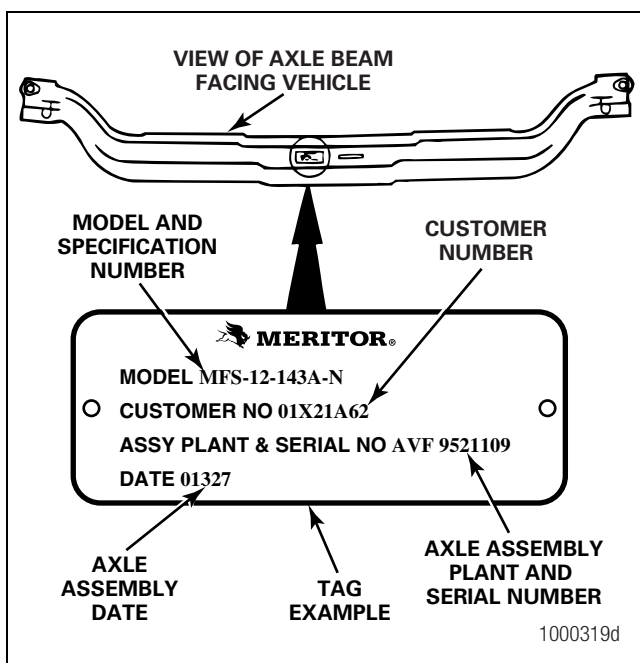


Figure 2.7

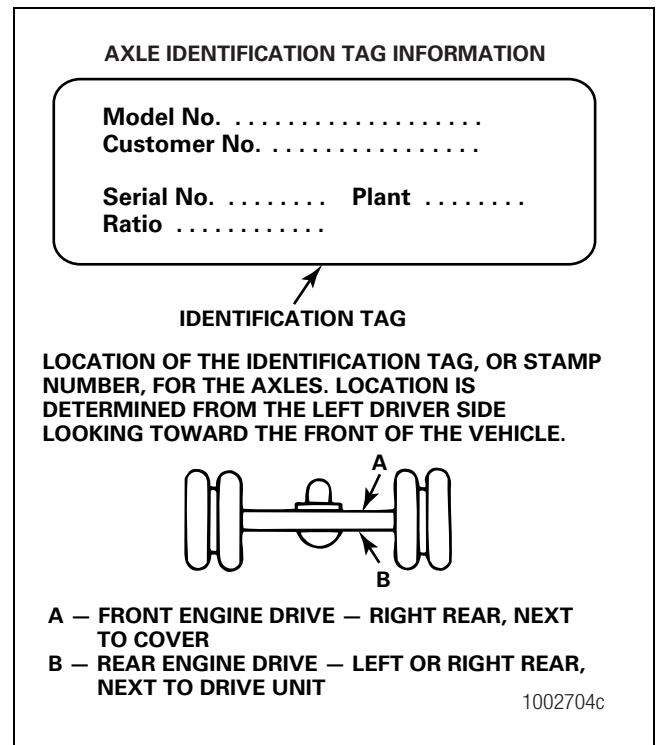


Figure 2.8

3 Inspection

Hazard Alert Messages

Read and observe all hazard alert messages in this publication.

⚠ DANGER

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. NEVER work under a vehicle only supported by jacks. Jacks can slip or fall over. Serious personal injury and damage to components can result.

Release all air from the air suspension system before raising the vehicle or remove any components. Pressurized air can cause serious personal injury.

Verify that all personnel are clear of the vehicle before inflating or deflating the air springs. The air suspension system has various pinch points that can cause serious personal injury.

⚠ WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Use a brass or synthetic mallet for assembly and disassembly procedures. NEVER hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

Inspection

ABS Warning Signal

Inspect the wheel end for smooth rotation, movement and bearing end play if a driver reports that an ABS light has been coming on and ABS diagnostics indicates excessive sensor gap.

ABS Tone Ring (Press-Fit Style)

1. Wear safe eye protection.
2. Inspect the ABS tone ring for any damage that may have occurred during operation or hub removal.
 - **If the ABS tone ring is damaged.** Remove it and install a new one using the steps in Section 4 and Section 6.
3. Inspect the ABS tone ring for a gap greater than 0.125" (3 mm) between the tone ring and the mounting seat shoulder of the hub. Figure 3.1.

- **If the ABS tone ring gap between the tone ring and the hub shoulder is greater than 0.125" (3 mm):** Identify the cause and correct the problem. Use the steps in Section 4 to remove the tone ring.

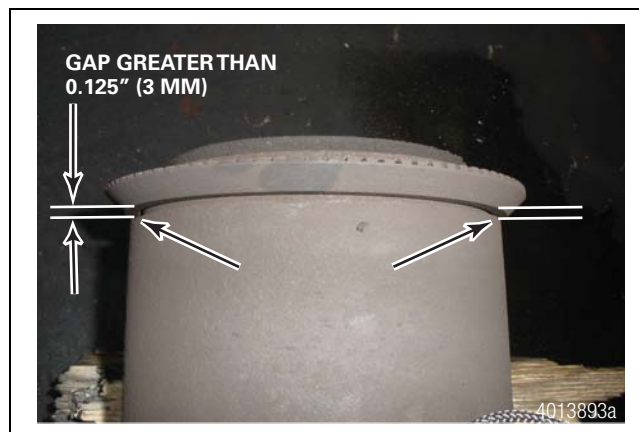


Figure 3.1

NOTE: Some tone rings are mounted against the hub top and a gap should be checked at the ID as shown in Figure 3.2.

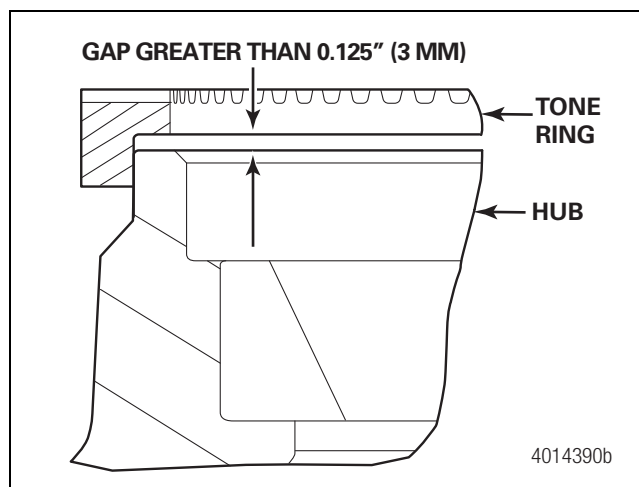


Figure 3.2

ABS Tone Ring (Bolt-On Style)

1. Wear safe eye protection.
2. Inspect the ABS tone ring mounting face and teeth as well as the mating face on the rotor for corrosion or damage.
 - **If the ABS tone ring has damage or corrosion that would cause an ABS sensor fault:** Remove it and install a new one using the steps in Section 4 and Section 6.

Unitized Wheel End

These procedures apply to bus and coach FH Series front and tag axles, and MC Series tag axles equipped with unitized wheel ends.

⚠ CAUTION

The unitized wheel end is sealed and greased for life and does not require lubrication. Do not disassemble, or attempt to repair or lubricate a unitized wheel-end assembly. Failure to heed this caution will void the Meritor warranty.

- Unitized wheel ends are not adjustable.
- Do not attempt to set or adjust the end play.

You must perform detailed and basic inspections at the following intervals. In addition to scheduled preventive maintenance, if driver reports indicate the ABS light has been coming on, and ABS diagnostics indicate the sensor gap is out of adjustment, check for possible wheel end looseness as the cause.

Detailed Inspections

- After the initial 100,000 miles (160 900 km) of operation or one year, whichever comes first
- After every additional 100,000 miles (160 900 km) of operation or one year, whichever comes first

Unitized Wheel-End Bearing Replacement (North America Applications Only)

Meritor recommends the following guidelines for replacing unitized wheel-end bearings.

- Replace the bearings at 500,000 miles (804 682 km) or after five years of service, whichever comes first. This is to help ensure maximum bearing reliability while the vehicle is in service.
- Replace all unitized wheel end bearings that are exposed to extreme temperatures during operation. High temperatures can result from brake drag, which can cause excessive brake pad and rotor wear, and possible heat checking on the rotor.

Unitized Wheel-End Bearing Monitoring Using Wheel-End Monitor Units

Meritor recommends the use of wheel-end monitor units. A unit is mounted onto the outboard side of each unitized wheel end and continuously monitors bearing vibration changes. Figure 3.3.

A green light indicates the bearing is in good condition, a red light indicates a potential bearing problem, and a blinking red light signals that the bearing needs to be replaced at the next service interval.

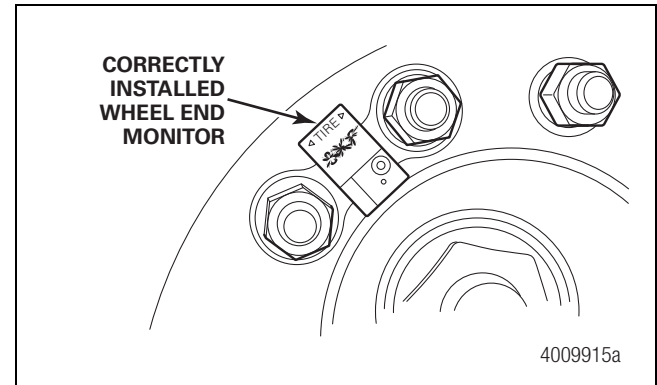


Figure 3.3

How to Obtain Wheel-End Monitor Units and Additional Information

Wheel-end monitor units, and installation and operating instructions can be obtained through the OEM.

Wheel Adapter Fasteners Inspection

- Recheck the torque on the wheel adapter bolts every 30,000 miles (48 280 km), or sooner.
- Refer to the procedure in this section.

Unitized Wheel-End Bearings — Basic Inspections

- Perform basic inspections between detailed inspections but not to exceed 30,000 miles (48 280 km) or six months of operation, whichever comes first.
- For vehicles operating on rough terrains, such as gravel roads, for significant periods, the basic inspection interval should be reduced to 20,000 miles (32 187 km).

Basic Inspection

1. Park the vehicle on a level surface. Block the rear wheels to prevent the vehicle from moving.
2. Raise the vehicle so that the inspected axle is off the ground. Support the vehicle with safety stands. Do not use a jack to support the vehicle.

3 Inspection

3. Back off the brake caliper until the rotor is clear from the pad linings about 1/16-inch (1.588 mm) gap or more. Refer to Maintenance Manual MM-0467, EX+™ EX225 Air Disc Brake, for more information about EX225 disc brake inspection and adjustment. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.
4. Visually inspect the unitized wheel end as you rotate the tire. Verify that it rotates smoothly and without noise.
 - **If a clicking sound is detected during rotation:** This does not necessarily indicate a hub problem.
5. While rotating the wheel, grasp the brake chamber to feel for unitized wheel-end hub vibration.
 - **If the tire and unitized wheel-end assembly does not rotate smoothly, or you hear noise such as wheel bearing grind or feel wheel-end hub vibration during rotation:** Replace the unitized wheel-end hub. Refer to Section 4, Disassembly; and Section 6, Assembly, for the procedures.
 - **If the wheel end rotates smoothly:** Proceed to Step 6.
6. Grasp the tire and wheel-end assembly at the nine and three o'clock positions. Check for vertical and horizontal movement. With your hands, apply approximately 50 lb (23 kg) of force to the assembly. You should not feel or see any looseness or movement.
 - **If you feel or see any movement or looseness in the tire and wheel-end assembly:** Perform more inspections to determine the cause of the movement. Check for worn king pin bushings or pins; wheel-to-hub-mounting end play; unitized hub bearing end play; or a combination of them all. To determine unitized hub bearing end play, refer to the detailed inspection procedure in this section.

Wheel-to-Hub Mounting

Before proceeding with the detailed inspection, first check the wheel-to-hub mounting.

1. Verify that the wheel is mounted correctly and all wheel-end fasteners and hardware are tightened to the correct specification. Figure 3.4.

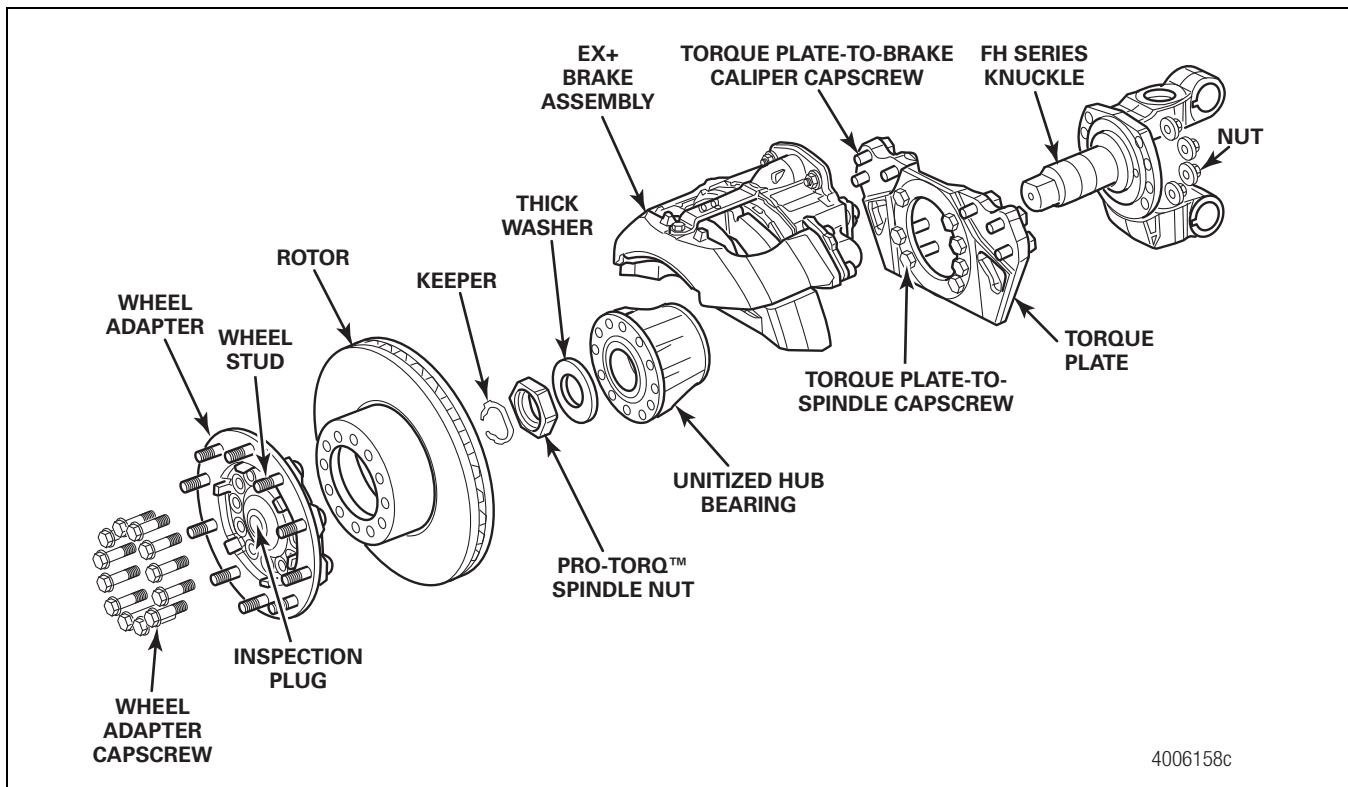


Figure 3.4

- Grasp the tire and wheel-end assembly at the nine and three o'clock positions. Check for vertical and horizontal movement. With your hands, apply approximately 50 lb (23 kg) of force to the assembly. You should not feel or see any looseness or movement.
 - If you detect movement or looseness on a tag axle:** Proceed to the Detailed Inspection.
 - If you detect movement or looseness on a front axle:** Inspect the king pin, bushings and seals for wear, leakage or damage. Refer to the procedures in Maintenance Manual 23, Bus and Coach Front Axles. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.
 - If applying the service brake eliminates movement or looseness:** Proceed to the detailed inspection procedures to determine the unitized hub bearing end play.

Wheel Adapter Fasteners Inspection

- Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Set the parking brake.
- Using a calibrated torque wrench, tighten the wheel adapter bolts in a star pattern to 275 ±25 lb-ft (373 ±34 N•m). Repeat to ensure consistent torques.

NOTE: It is important that the torque on the wheel adapter bolts be rechecked every 30,000 miles (48 280 km), or sooner.

Detailed Inspection

- Park the vehicle on a level surface. Block the rear wheels to prevent the vehicle from moving.
- Raise the vehicle so that the inspected axle is off the ground. Support the vehicle with safety stands. Do not use a jack to support the vehicle.
- Back off the brake caliper until the rotor is clear from the pad linings about 1/16-inch (1.588 mm) gap or more. Refer to Maintenance Manual MM-0467, EX+™ EX225 Air Disc Brake, for more information about EX225 disc brake inspection and adjustment. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.
- Verify that the unitized wheel end rotates smoothly and without noise.

If a clicking sound is detected during rotation, this does not necessarily indicate a hub problem.

While rotating the wheel, grasp the brake chamber to feel for unitized wheel-end hub vibration.

- If the tire and unitized wheel end assembly does not rotate smoothly, or you hear noise such as wheel bearing grind or feel wheel-end hub vibration during rotation:** Replace the unitized hub bearing. Inspect the unitized hub bearing before installing it. Refer to the new hub inspection procedure in Section 6.
 - If the wheel end rotates smoothly:** Proceed to Step 5.
- Use a 5/16-inch drive tool to remove the pipe plug at the center of the wheel adapter. Install and tighten the adapter fitting into the hole. Refer to Figure 11.14 in Section 11.
 - Attach the dial indicator. Loosen the locking set screw and slowly slide the dial indicator through the fitting hole. Position the dial indicator against the hub face and tighten the locking set screw as the needle starts moving. Set the dial indicator to ZERO. Do not rotate the wheel end. Figure 3.5.

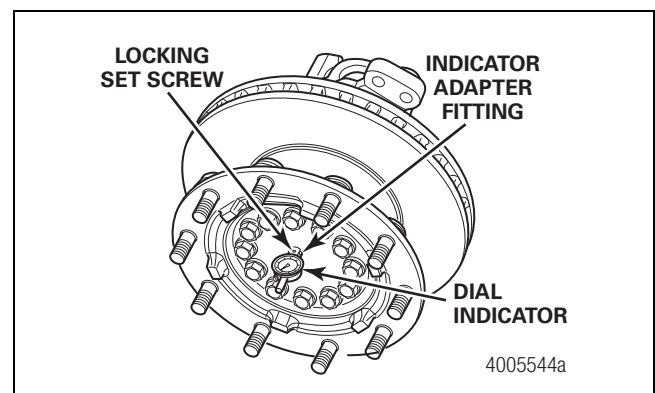


Figure 3.5

- Place your hands on the wheel hub at the nine and three o'clock positions. Push the wheel end straight IN. Note the reading. Then pull the wheel end straight OUT. Note the reading. The difference between the first and second readings is the total bearing end play.

Take at least two readings to obtain a correct end play measurement.

- If the total movement of the dial indicator is 0-0.002-inch (0.05 mm):** The inspection is complete. Go to Step 8.

3 Inspection

- **If the total movement of the dial indicator is greater than 0.002-inch (0.05 mm) but less than 0.004-inch (0.1 mm):** Check and retighten the spindle nut to specifications. Set the dial indicator to ZERO and measure the end play again. Take at least two readings and record the measurement in a maintenance log. Perform another detailed inspection at the next regularly-scheduled maintenance interval, or up to 50,000 miles (80 467 km), whichever comes first.
- **If the total movement of the dial indicator is equal to or greater than 0.004-inch (0.1 mm):** Replace the unitized hub bearing as soon as possible. The unitized hub bearing may not be safe to operate. Refer to Section 6.

8. Remove the dial indicator and adapter fitting.
9. Apply a thin coat of sealant to the pipe plug threads. Install it into the wheel adapter and tighten it to a minimum of 15 lb-ft (20.34 N•m).

PreSet® Wheel Hub Assemblies

ConMet® PreSet® hubs are the same as conventional wheel bearing hubs except that all PreSet® hubs come complete with pre-installed bearings, cups, cones and oil seals. These hubs have a precision tubular spacer between the bearings which eliminates the need for manual bearing adjustment.

The ConMet® PreSet® hubs are currently used on Meritor bus and coach MC12, FG952 tag and RC rear drive axles.

Refer to the ConMet® Service Manual for PreSet® Hub Assemblies for inspection, preventive maintenance and service procedures. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

Inspection Guidelines

NOTE: Operating temperature can be checked as the vehicle enters the service area following a normal run. If the hub is running in excess of 150°F above the ambient temperature in normal operating conditions, service is required.

There are three levels of inspection criteria for PreSet® hub assemblies. Follow this schedule of inspection and maintenance for PreSet® hub assemblies.

- Driver pre-trip
- In conjunction with preventive maintenance schedule
- Every 12 months or 100,000 miles (whichever comes first)

Perform a Pre-Trip Visual Inspection

Each time before operating a vehicle on the road, perform this pre-trip inspection.

1. Park the vehicle on a level surface. Set the parking brake.
2. Walk around the vehicle and visually inspect each wheel assembly for the following conditions.
 - Loose, damaged or missing fasteners
 - Loose, damaged or missing hubcaps
 - Oil leaks at hubcap, axle flange gasket or fill plug
 - Lubricant on the hub, brake components or inside of wheel and tire
 - Insufficient oil level and poor oil condition

If You Find Any of the Conditions Listed Above

1. Place the vehicle out-of-service.
2. Repair the vehicle as necessary before returning the vehicle to service.

In Conjunction with Preventive Maintenance Schedule

Wheel end inspections should be conducted during any routine preventive maintenance on the vehicle.

1. Check all items listed in the driver pre-trip visual inspection.
2. Lift and support the axle and rotate the wheel. Check that the wheel rotates freely. Listen and feel for any signs of rough bearing operation or vibration.
3. On oil-lubricated steer and trailer hubs, place a magnet through the hubcap fill plug into the lubricant. Check for any signs of metal picked up by the magnet.
4. Push and pull on top of the tire or use a pry bar to lift the bottom of the tire to check for loose bearings or “chucking”.

If any of these conditions are found, the vehicle should be placed out of service until the item can be repaired.

Every 12 Months or 100,000 Miles (Whichever Occurs First)

⚠ DANGER

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. NEVER 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.
2. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
3. Raise the axle until the tires are off the floor.
4. Place safety stands under the trailer frame or under each axle spring seat. Figure 3.6.

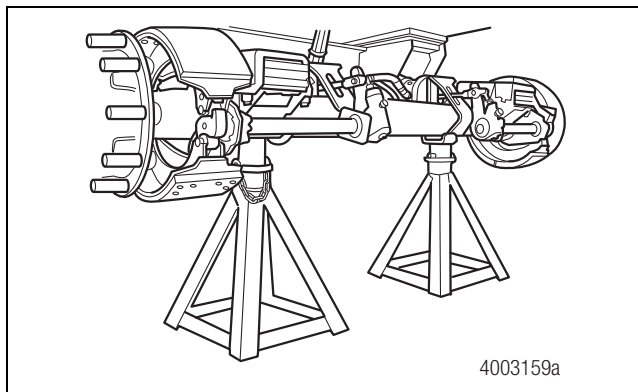


Figure 3.6

5. Remove the tire and wheel assembly using procedures specified by the wheel manufacturer. Figure 3.7.

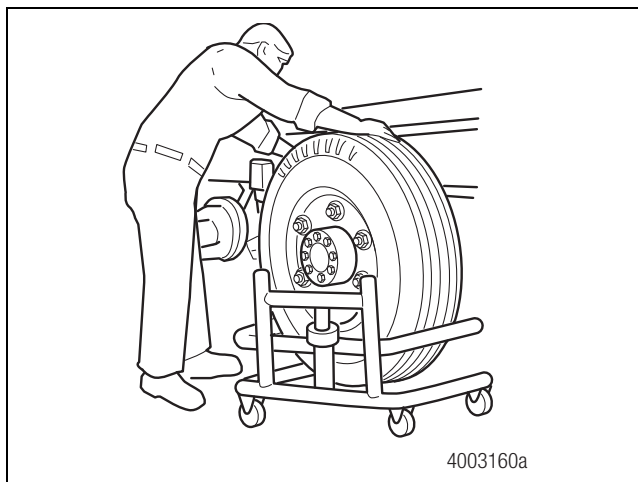


Figure 3.7

Inspect Components

Check for the following conditions.

- Loose, damaged or missing fasteners
- Loose, damaged or missing hubcaps

Inspect for Leaks

1. Check that no lubricant is present around the hubcap or on the wheel.
 - **If lubricant is present:** Investigate the cause and take corrective action.
2. Check that no lubricant is present on the hub, brake hardware or brake shoes.
 - **If lubricant is present:** Check the inboard seal and replace as necessary.

Inspect for Correct Lubricant Level and Condition

1. Allow any air in the lubricant to escape prior to inspection. Visually inspect the lubricant for discoloration. Under normal conditions, the lubricant will darken. A white or milky appearance indicates water contamination.
2. Visually inspect the lubricant for foreign materials such as metal shavings, rust or other contaminants. A magnet can be used to detect any metallic materials that may be present in the lubricant.
 - **If the inspection indicates contamination:** Service the wheel hub according to the instructions outlined in the ConMet® Service Manual for PreSet® Hub Assemblies. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

⚠ CAUTION

Do not mix different types of lubricants. Only use lubricants approved by the seal manufacturer. Damage to components can result.

3. On wheel ends filled with semi-fluid grease, remove the hubcap and verify that sufficient grease is flowing through the bearing rollers and that the ends of the bearing are lubricated. Check to be sure there are no signs of contamination present.
 - **If additional grease is required:** Use the fill hole in the barrel of the hub to add additional grease until grease flows from the outboard bearing.

3 Inspection

⚠ CAUTION

Use caution not to overfill the hub as it could lead to incorrect venting and seal leaks. Damage to components can result.

Functional Checks

Rotate the hub and check for free, smooth and quiet rotation. If rotation is hampered, PreSet® hubs should be serviced immediately.

Check End Play

⚠ DANGER

Always install a new spacer before adjusting or retightening the spindle nut. If a new spacer is not installed, the wheel bearings can become damaged, which can cause the wheels to loosen and separate from the vehicle. Serious personal injury and damage to components can result.

If the spindle nut is loose when attempting to remove a PreSet® hub, discard the old spacer and replace it with a new spacer before reinstalling the PreSet® hub and tighten the spindle nut. If a new spacer is not installed, the wheel bearings can become damaged, which can cause the wheels to loosen and separate from the vehicle. Serious personal injury and damage to components can result.

1. Remove the hubcap or drive axle shaft. Use an appropriate container to catch the lubricant. Attach the magnetic base of the dial indicator to the spindle. Touch the dial indicator stem to the hubcap mounting surface. Figure 3.8.

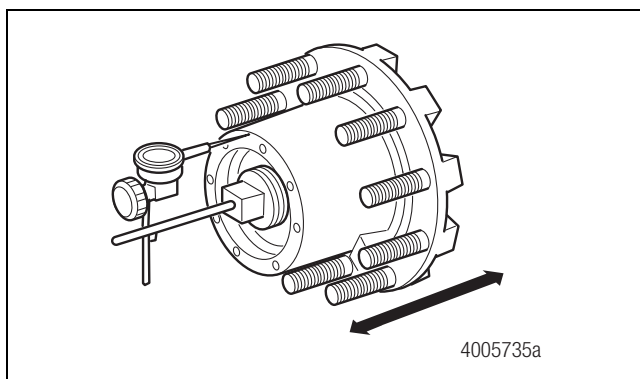


Figure 3.8

2. Grasp two wheel studs across from each other. Pull and push while oscillating the hub.
3. Measure the end play by calculating the difference between the minimum and maximum dial indicator readings.

- If the end play measurement does NOT exceed 0.006-inch (0.15 mm): No additional service is necessary. Do not adjust or retighten the spindle nut.
- If end play measurement exceeds 0.006-inch (0.15 mm): Service the hub. Refer to the ConMet® Service Manual for PreSet® Hub Assemblies. 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 hazard alert messages in this publication.

⚠ DANGER

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. NEVER work under a vehicle only supported by jacks. Jacks can slip or fall over. Serious personal injury and damage to components can result.

Release all air from the air suspension system before raising the vehicle or remove any components. Pressurized air can cause serious personal injury.

Verify that all personnel are clear of the vehicle before inflating or deflating the air springs. The air suspension system has various pinch points that can cause serious personal injury.

⚠ WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Use a brass or synthetic mallet for assembly and disassembly procedures. NEVER hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

Removal

MFS Series Wheel End — Front Non-Drive Steer Axle

Model MFS-08-113 — Quadraulic Disc Brake

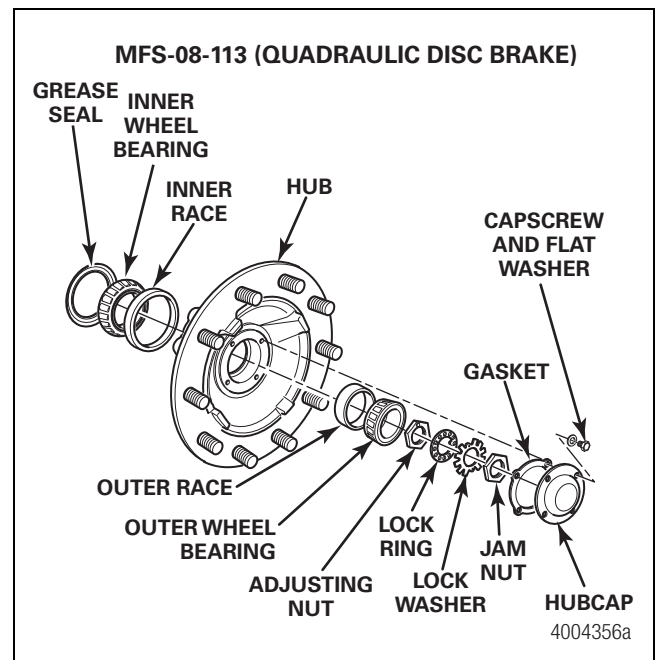


Figure 4.1

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Set the parking brake.
2. Raise the front of the vehicle until the front wheels are off the ground. Support the vehicle with safety stands.
3. Remove the tire and wheel assembly.
4. Remove the four fasteners securing the Quadraulic disc brake caliper assembly to the torque plate.
5. Remove the caliper assembly from the torque plate.
6. Remove the four fasteners securing the hubcap to the hub. Remove the hubcap and gasket.
7. Remove the fastening hardware securing the wheel bearings.
 - A. Bend the tabs of the tabbed lock washer away from the outer wheel bearing jam nut.
 - B. Remove the outer wheel bearing jam nut, the tabbed lock washer, the pierced lock ring with keyway tab and the outer wheel bearing adjusting nut from the spindle.

4 Disassembly

- Carefully rock the hub from side-to-side to free the outer wheel bearing. Remove the outer wheel bearing. Remove the hub and rotor assembly.
- Using a seal puller, remove the inner wheel bearing grease seal from the hub. Discard the seal.
- Remove the inner wheel bearing.
- Inspect the bearings, races and spindle for signs of damage. Refer to Section 5.

NOTE: Worn or damaged wheel-end components must be replaced as a set.

- If damage to either race is observed, tap out the inner and outer races with a brass drift and discard.
- Use the correct cleaning solution to remove the old lubricant from all parts. Refer to Section 5.

Model MFS-06-162 — Reaction Beam (B-Frame) Disc Brake

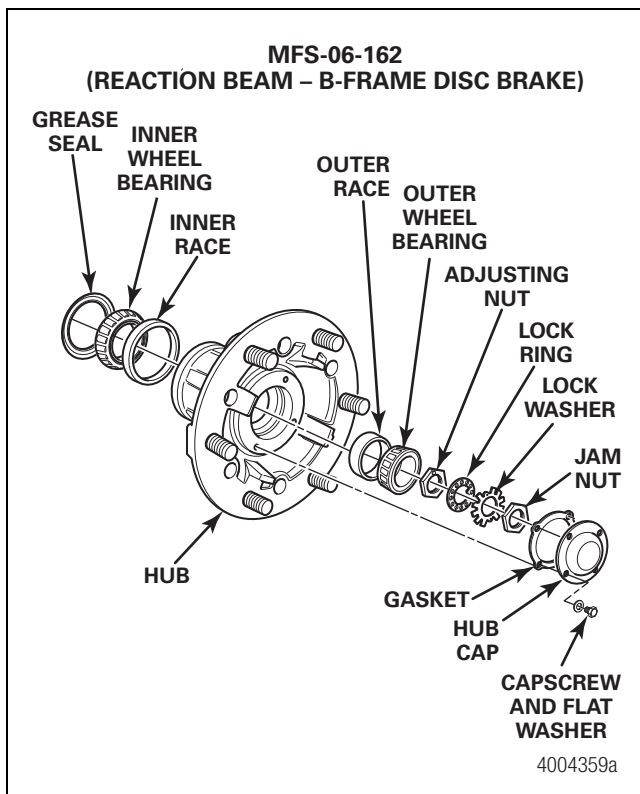


Figure 4.2

- Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Set the parking brake.
- Raise the front of the vehicle until the front wheels are off the ground. Support the vehicle with safety stands.
- Remove the tire and wheel assembly.
- Remove the four fasteners securing the reaction beam disc brake caliper assembly to the integral torque plate.
- Remove the caliper assembly from the torque plate.
- Remove the four fasteners securing the hubcap to the hub. Remove the hubcap and gasket.
- Remove the fastening hardware securing the wheel bearings.
 - Bend the tabs of the tabbed lock washer away from the outer wheel bearing jam nut.
 - Remove the outer wheel bearing jam nut, the tabbed lock washer, the pierced lock ring with keyway tab and the outer wheel bearing adjusting nut from the spindle.
- Carefully rock the hub from side-to-side to free the outer wheel bearing. Remove the outer wheel bearing. Remove the hub and rotor assembly.
- Using a seal puller, remove the inner wheel bearing grease seal from the hub. Discard the seal.
- Remove the inner wheel bearing.
- Inspect the bearings, races and spindle for signs of damage. Refer to Section 5.

NOTE: Worn or damaged wheel-end components must be replaced as a set.

- If damage to either race is observed, tap out the inner and outer races with a brass drift and discard.
- Use the correct cleaning solution to remove the old lubricant from all parts. Refer to Section 5.

MFS-12-122 — Q+ Cam Brake

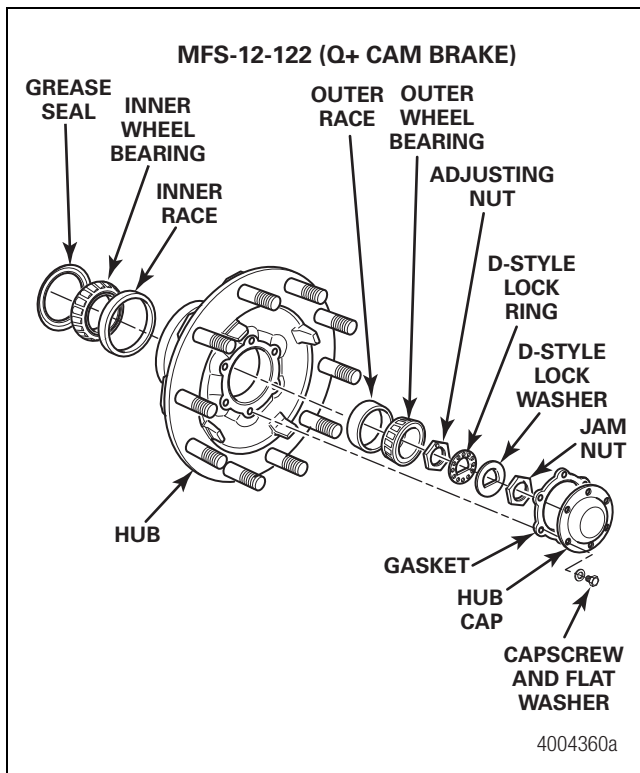


Figure 4.3

NOTE: It is not necessary to remove the brake shoes and backing plate to perform a wheel-end component inspection.

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Set the parking brake.
2. Raise the front of the vehicle until the front wheels are off the ground. Support the vehicle with safety stands.
3. Remove the tire and wheel assembly.
4. Remove the brake drum.
5. Remove the six fasteners securing the hubcap to the hub. Remove the hubcap and gasket.
6. Remove the fastening hardware securing the wheel bearings.
 - A. Bend the D-style lock washer away from the outer wheel bearing jam nut.
 - B. Remove the outer wheel bearing jam nut, the D-style lock washer, the pierced D-style lock ring and the outer wheel bearing adjusting nut from the spindle.

7. Carefully rock the hub from side-to-side to free the outer wheel bearing. Remove the outer wheel bearing. Remove the hub assembly.
8. Using a seal puller, remove the inner wheel bearing grease seal from the hub. Discard the seal.
9. Remove the inner wheel bearing.
10. Inspect the bearings, races and spindle for signs of damage. Refer to Section 5.

NOTE: Worn or damaged wheel-end components must be replaced as a set.

11. If damage to either race is observed, tap out the inner and outer races with a brass drift and discard.
12. Use the correct cleaning solution to remove the old lubricant from all parts. Refer to Section 5.

MS and RS Series Wheel End — Rear Drive Axle

MS-12-113 — Reaction Beam (B-Frame) Disc Brake

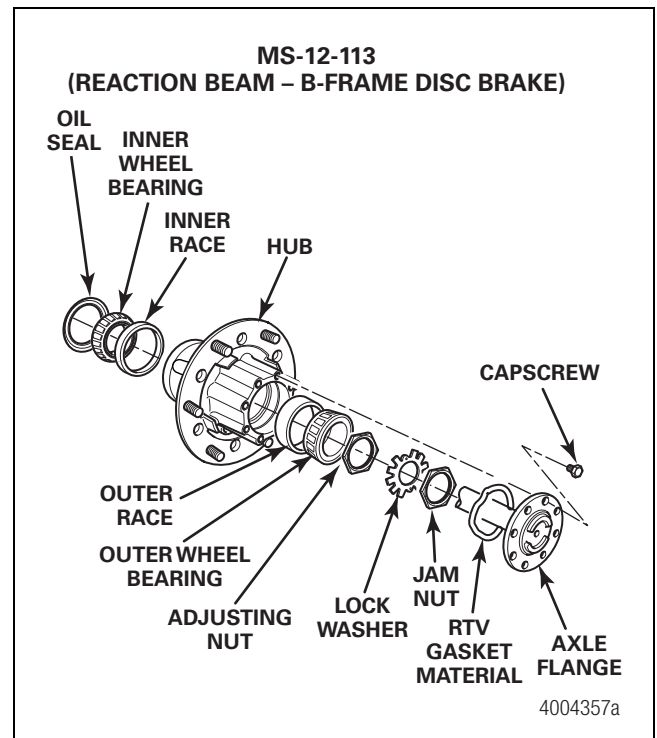


Figure 4.4

4 Disassembly

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Set the parking brake.
2. Raise the vehicle until the wheels are off the ground. Support the vehicle with safety stands.
3. Remove the tire and wheel assembly.
4. Remove the four fasteners securing the reaction beam disc brake caliper assembly to the torque plate.
5. Remove the caliper assembly from the knuckle.
6. Remove the eight fasteners securing the axle shaft to the hub. Remove the axle shaft.
7. Remove the fastening hardware securing the wheel bearings.
 - A. Bend back the tabs of the tabbed lock washer holding the outer wheel bearing jam nut.
 - B. Remove the outer wheel bearing jam nut, the tabbed lock washer and the outer wheel bearing adjusting nut from the spindle.
8. Carefully rock the hub from side-to-side to free the outer wheel bearing. Remove the outer wheel bearing. Remove the hub and rotor assembly.
9. Using a seal puller, remove the inner wheel bearing oil seal from the hub. Discard the seal.
10. Remove the inner wheel bearing.
11. Inspect the bearings, races and spindle for signs of damage. Refer to Section 5.

NOTE: Worn or damaged wheel-end components must be replaced as a set.

12. If damage to either race is observed, tap out the inner and outer races with a brass drift and discard.
13. Use the correct cleaning solution to remove the old lubricant from all parts. Refer to Section 5.

RS-19-145 — Quadraulic Disc Brake

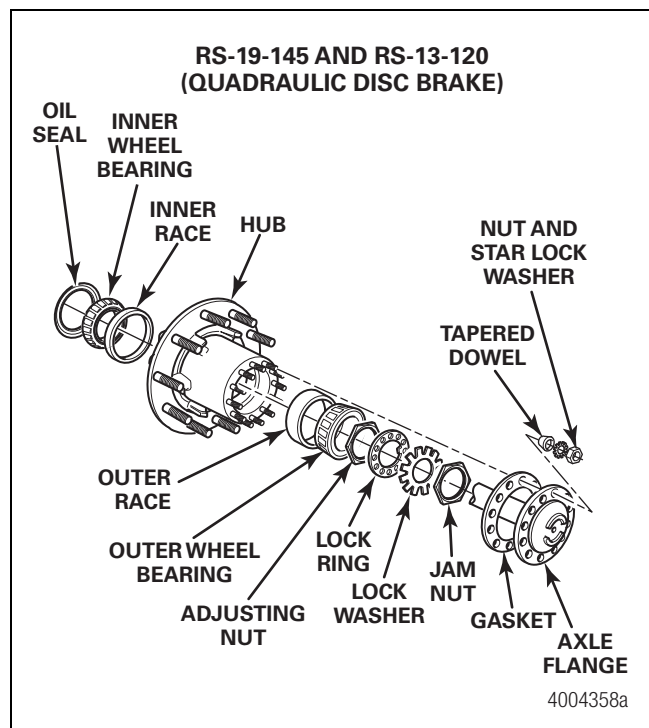


Figure 4.5

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Set the parking brake.
2. Raise the vehicle until the wheels are off the ground. Support the vehicle with safety stands.
3. Remove the tire and wheel assembly.
4. Remove the four fasteners securing the Quadraulic disc brake caliper assembly to the torque plate.
5. Remove the caliper assembly from the torque plate.
6. Remove the 12 nut fasteners and star lock washers securing the axle shaft to the hub.

NOTE: These nuts cannot be reused and must be replaced during assembly.

7. Tap the axle shaft flange on the strike bars to loosen the tapered dowels.
8. Remove the tapered dowels, axle shaft and gasket.

9. Remove the fastening hardware securing the wheel bearings.
 - A. Bend back the tabs of the tabbed lock washer holding the outer wheel bearing jam nut.
 - B. Remove the outer wheel bearing jam nut, the tabbed lock washer, the pierced lock ring with keyway tab and the outer wheel bearing adjusting nut from the spindle.
10. Carefully rock the hub from side-to-side to free the outer wheel bearing. Remove the outer wheel bearing. Remove the hub and rotor assembly.
11. Using a seal puller, remove the inner wheel bearing oil seal from the hub. Discard the seal.
12. Remove the inner wheel bearing.
13. Inspect the bearings, races and spindle for signs of damage. Refer to Section 5.

NOTE: Worn or damaged wheel-end components must be replaced as a set.

14. If damage to either race is observed, tap out the inner and outer races with a brass drift and discard.
15. Use the correct cleaning solution to remove the old lubricant from all parts. Refer to Section 5.

RS-21-145 — Q+ Cam Brake

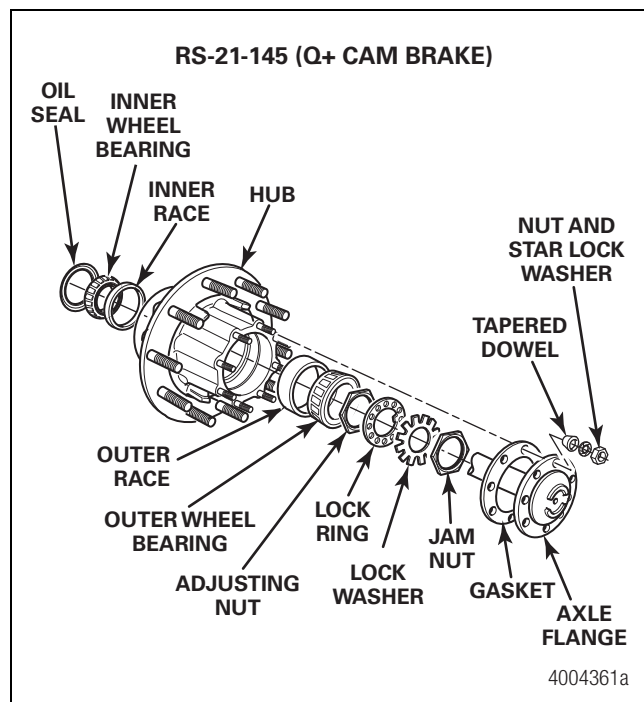


Figure 4.6

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Set the parking brake.
 2. Raise the vehicle until the wheels are off the ground. Support the vehicle with safety stands.
 3. Remove the tire and wheel assembly.
 4. Cage the brake chamber.
 5. Remove the brake drum.
 6. Remove the eight nuts and star lock washers securing the axle shaft to the hub.
 7. Tap the axle shaft flange on the strike bars to loosen the tapered dowels.
 8. Remove the tapered dowels, axle shaft and gasket.
 9. Remove the fastening hardware securing the outer wheel bearing.
 - A. Bend back the tabs of the tabbed lock washer holding the outer wheel bearing jam nut.
 - B. Remove the outer wheel bearing jam nut.
 - C. Remove the tabbed lock washer, the pierced lock ring with keyway tab and the outer wheel bearing adjusting nut from the spindle.
 10. Carefully rock the hub from side-to-side to free the outer wheel bearing. Remove the outer wheel bearing and hub.
 11. Using a seal puller, remove the inner wheel bearing oil seal from the hub. Discard the seal.
 12. Remove the inner wheel bearing.
 13. Inspect the bearings, races and spindle for signs of damage. Refer to Section 5.
- NOTE:** Worn or damaged wheel-end components must be replaced as a set.
14. If damage to either race is observed, tap out the inner and outer races with a brass drift and discard.
 15. Use the correct cleaning solution to remove the old lubricant from all parts. Refer to Section 5.

4 Disassembly

Conventional Wheel End — Front and Tag Axles with EX+ Brakes

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Set the parking brake.
2. Raise the front of the vehicle until the front wheels are off the ground. Support the vehicle with safety stands.
3. Remove the tire and wheel assembly.
4. Remove the fasteners securing the brake caliper assembly to the torque plate.
5. Remove the caliper assembly from the torque plate.
6. Remove the hubcap and gasket.
7. Remove the fastening hardware securing the wheel bearings.
8. Carefully rock the hub from side-to-side to free the outer wheel bearing. Remove the outer wheel bearing. Remove the hub and rotor assembly.
9. Using a seal puller, remove the inner wheel bearing seal from the hub. Discard the seal.
10. Remove the inner wheel bearing.
11. Inspect the bearings, races and spindle for signs of damage. Worn or damaged wheel-end components must be replaced as a set. Refer to Section 5.
12. If damage to either race is observed, tap out the inner and outer races with a brass drift and discard.
13. Use the correct cleaning solution to remove the old lubricant from all parts. Refer to Section 5.

PreSet® Wheel Hub Assemblies

ConMet® PreSet® hubs are the same as conventional wheel bearing hubs except that all PreSet® hubs come complete with pre-installed bearings, cups, cones and oil seals. These hubs have a precision tubular spacer between the bearings which eliminates the need for manual bearing adjustment.

The ConMet® PreSet® hubs are currently used on Meritor bus and coach MC12, FG952 tag and RC rear drive axles.

Refer to the ConMet® PreSet® Hub Service Manual for inspection, preventive maintenance and service procedures.

For PreSet® hubs with PRO-TORQ™ spindle nuts, refer to the PRO-TORQ™ nut steps in the unitized wheel-end procedures.

Unitized Wheel End — Bus and Coach FH Series Front and Tag Axle, and MC Series Tag Axle

These procedures apply to bus and coach FH Series front and tag axles, and MC Series tag axles equipped with unitized wheel ends.

WARNING

The unitized wheel-end maintenance and inspection procedures provided in this manual must be followed to prevent serious personal injury and damage to components.

CAUTION

The unitized wheel end is sealed and greased for life and does not require lubrication. Do not disassemble, or attempt to repair or lubricate a unitized wheel-end assembly. Failure to heed this caution will void the Meritor warranty.

CAUTION

There are two different spindle nut designs used on unitized wheel ends, double nut pack and PRO-TORQ™ nut. They are different and not interchangeable. The components must be replaced with the same type and the correct tightening procedure for the nut system must be used to prevent damage to components.

Models with a Double Nut Pack

1. Park the vehicle on a level surface. Block the rear wheels to prevent the vehicle from moving.
2. Raise the vehicle so that the axle is off the ground. Support the vehicle with safety stands. Do not use a jack to support the vehicle.
3. Remove the brake caliper assembly. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.
4. Remove the wheel adapter and rotor. Inspect the rotor for cracks and signs of wear. Replace the rotor if necessary. Figure 4.7.

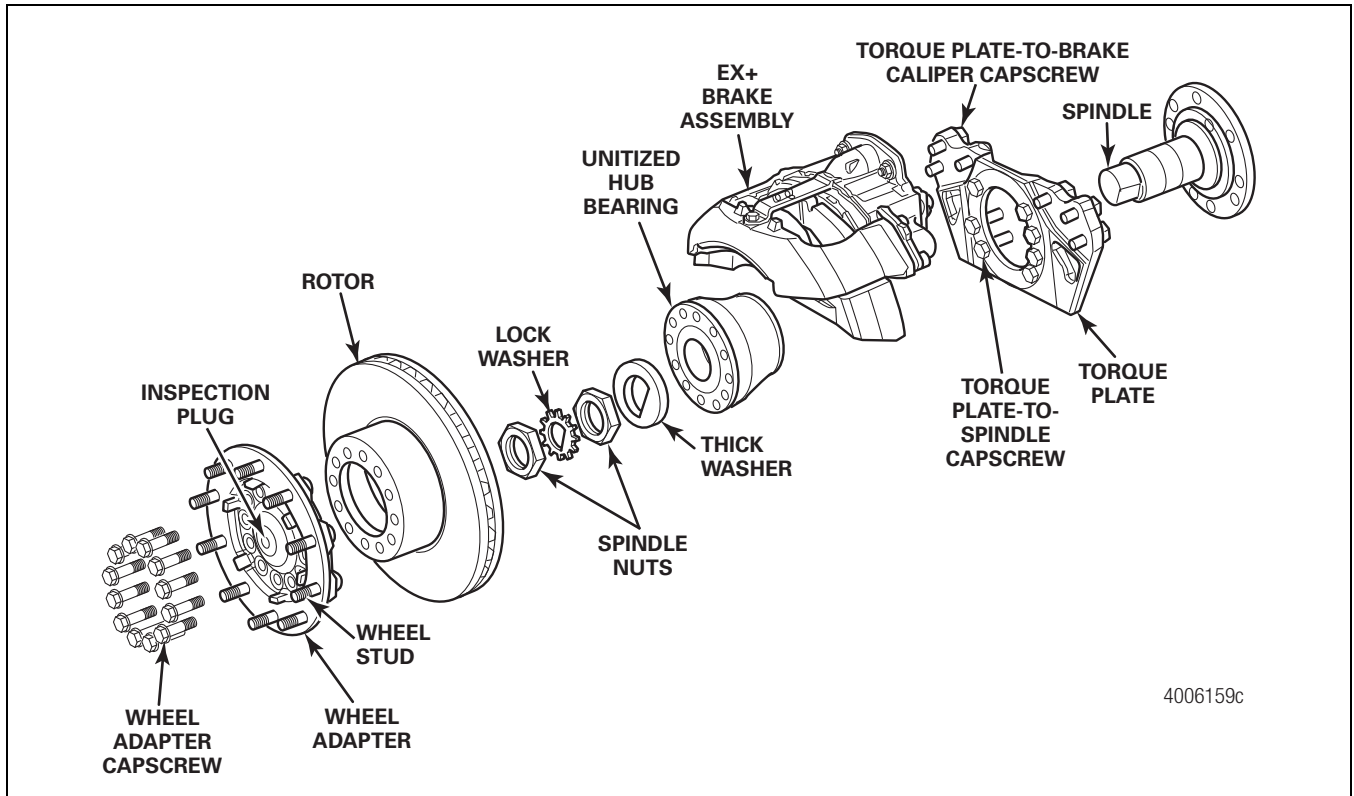


Figure 4.7

- Use a 3.5-inch (89 mm) socket wrench to remove the jam nut, "D" lock washer and adjusting nut. Figure 4.8.

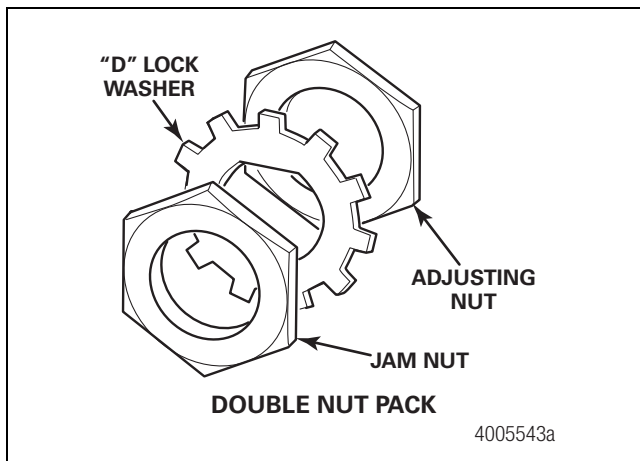


Figure 4.8

- Remove the thick washer and unitized hub bearing.

Models with a PRO-TORQ™ Nut

- Park the vehicle on a level surface. Block the rear wheels to prevent the vehicle from moving.
- Raise the vehicle so that the axle is off the ground. Support the vehicle with safety stands. Do not use a jack to support the vehicle.
- Remove the brake caliper assembly. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.
- Remove the wheel adapter and rotor. Inspect the rotor for cracks and signs of wear. Replace the rotor if necessary. Figure 4.9.

Rotor Removal

- Rotors shipped prior to 2011 have a 0.85" pilot length at the hub bearing interface. These rotors only have two M14x2.0 jack screw holes. These may not provide enough force where heavy corrosion exists. If this is the case, remove the rotor using the "Rotor seized to hub" procedure at the end of this section.

4 Disassembly

- Rotors shipped after 2011 have a shorter 0.20" pilot length at the hub bearing interface. The rotor has been updated to have four M16x2.0 jack screw holes to generate more force to remove the rotor. You can also remove the rotor using the "Rotor seized to hub" procedure at the end of this section.

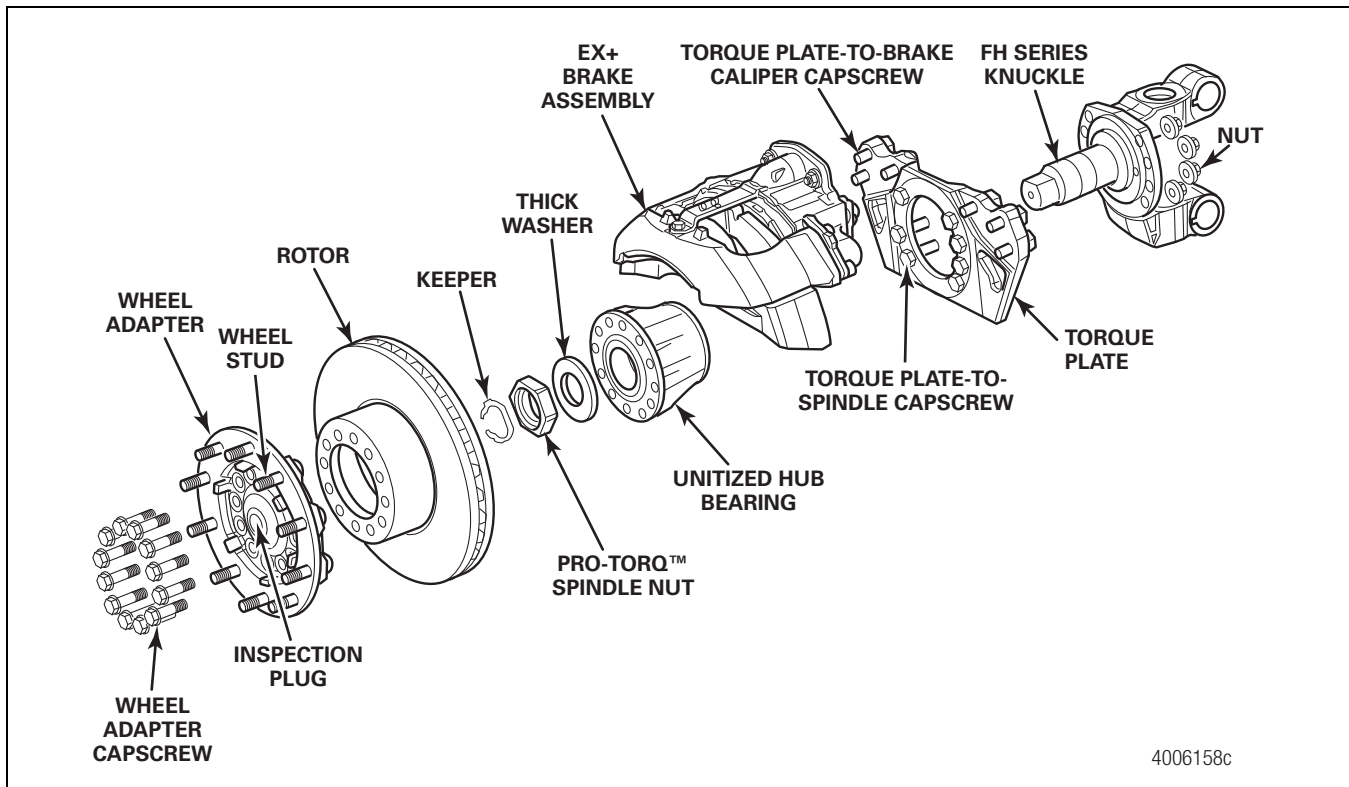


Figure 4.9

⚠ CAUTION

Remove the keeper from the PRO-TORQ™ nut before attaching the nut to the axle spindle, or tighten and loosen the nut, to prevent damage to the nut and axle spindle.

- Remove the keeper from the PRO-TORQ™ nut. Use a screwdriver to pry out the keeper arm from the groove on each side of the nut until the keeper is released. Meritor recommends replacing the keeper with a new one each time the PRO-TORQ™ nut is removed to maintain the integrity of the locking mechanism. Use a 3.5-inch (89 mm) socket wrench to remove the PRO-TORQ™ nut. Figure 4.10.

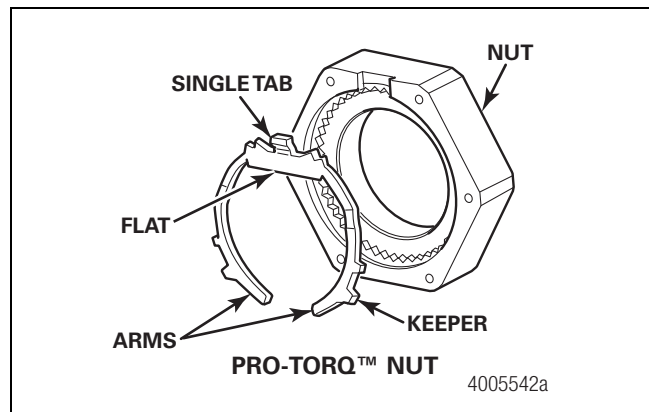


Figure 4.10

- Remove the thick washer and unitized hub bearing.

Removing a Unitized Wheel End with a Meritor Rotor Seized to the Hub — Bus and Coach FH Series Front and Tag Axle, and MC Series Tag Axle

1. Park the vehicle on a level surface. Block the rear wheels to prevent the vehicle from moving.
2. Raise the vehicle so that the axle is off the ground. Support the vehicle with safety stands. Do not use a jack to support the vehicle.
3. Remove the brake caliper assembly. Refer to Section 5 of Maintenance Manual MM-0467, EX+™ Air Disc Brake. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.
4. Remove the wheel adapter.
5. Remove the keeper from the PRO-TORQ™ nut. Use a screwdriver to pry out the keeper arm from the groove on each side of the nut until the keeper is released. Meritor recommends replacing the keeper with a new one each time the PRO-TORQ™ nut is removed to maintain the integrity of the locking mechanism.
6. Use a 3.5-inch (89 mm) socket wrench to remove the PRO-TORQ™ nut.
7. Remove the thick washer.
8. Remove the rotor and unitized bearing as an assembly.
9. Place the rotor and hub assembly flange face down on a bench or the floor.
10. Apply and saturate the inner portion of the hub barrel with penetrating oil. AeroKroil is preferred. Let the oil soak for at least 30 minutes. Figure 4.11.

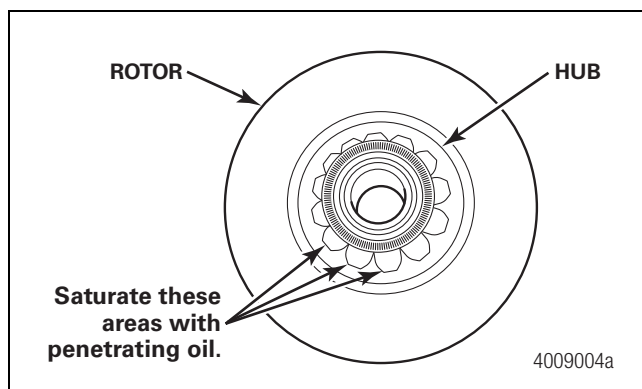


Figure 4.11

⚠ DANGER

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

11. Once the soak is complete, place the rotor into an arbor press with the back face of the rotor facing down and supported correctly.
12. Place the tool on top of the rotor and hub assembly. Refer to Figure 11.15 in Section 11 for a tool drawing. Figure 4.12.

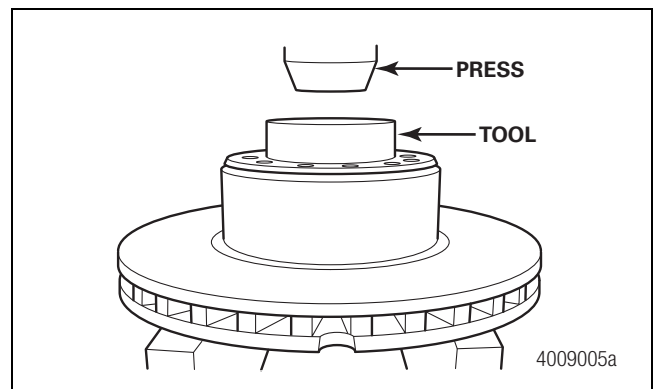


Figure 4.12

13. Apply pressure until the hub assembly is free from the rotor.

ABS Tone Ring (Press-Fit Style)

NOTE: Hubs manufactured after July 2017 have Loctite® 620 retaining compound applied during tone ring mounting. Removal of the tone ring will require much higher force which may result in damage to the hub. A new hub with a tone ring already installed may be required to complete the repair.

1. Use a small pry bar or hammer and chisel to remove the ABS tone ring from the hub. Use care with the tool to avoid bending and damaging both components. Use a circular pattern around the wheel to remove it from the hub. Figure 4.13.

4 Disassembly

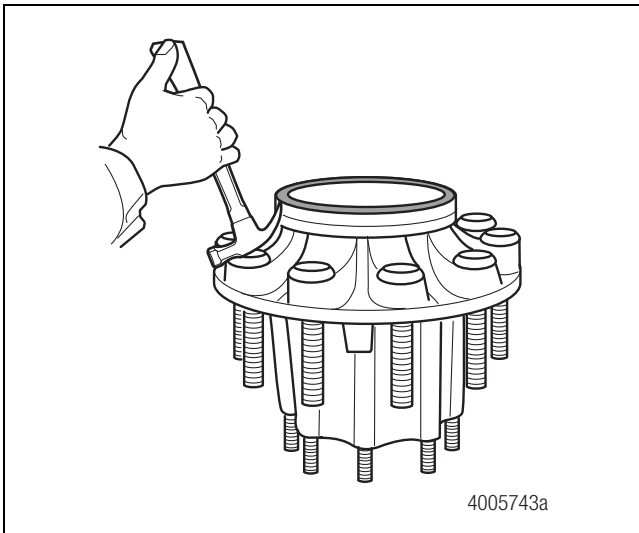


Figure 4.13

2. Thoroughly clean and degrease the ABS tone ring seat on the hub using a non-flammable solvent.
3. Inspect the ABS tone ring seat on the hub for damage or fretting from tone ring rotation.
 - **If the ABS tone ring seat on the hub is damaged:**
Replace the hub.
4. Remove all debris and clean the outside diameter of the hub where the ABS tone ring seats using a Scotch-Brite™ pad or 3M brand cleaning pad. Make sure it is clear of all grime or contaminants. If necessary, use a mild-abrasive wire wheel to remove any surface rust. Figure 4.14 and Figure 4.15.



Figure 4.14



Figure 4.15

ABS Tone Ring (Bolt-On Style)

1. Remove the mounting bolts and remove the tone ring from the rotor. Figure 4.16.

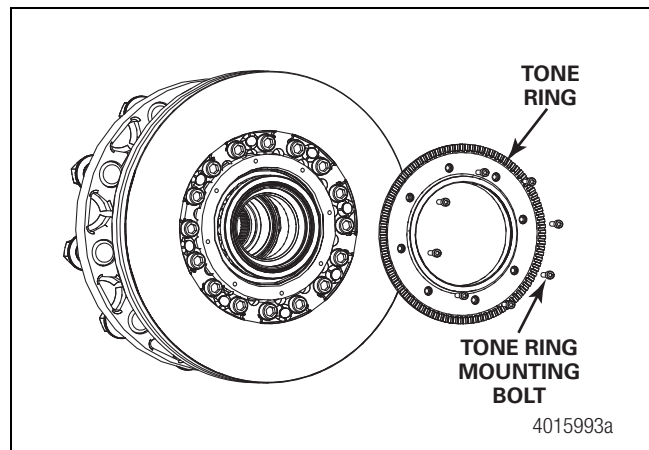


Figure 4.16

2. Thoroughly clean and degrease the ABS tone ring seat on the rotor using a non-flammable solvent.
3. Inspect the ABS tone ring seat on the rotor for damage or fretting from tone ring rotation.
 - **If the ABS tone ring seat on the rotor is damaged:**
Replace the rotor.

Hazard Alert Messages

Read and observe all hazard alert messages in this publication.

DANGER

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.

WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Replace

Worn or Damaged Parts

Do not repair or recondition wheel-end components. Replace damaged, worn or out-of-specification components. Do not mill or machine any components.

DANGER

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 eye protection.
- Wear clothing that protects the skin.
- Work in a well-ventilated area.
- NEVER use gasoline, or solvents that contain gasoline. Gasoline can explode.
- Hot solution tanks or alkaline solutions must be used correctly. Read the manufacturer's instructions before using hot solution tanks and alkaline solutions. Then carefully follow the instructions.

CAUTION

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

Clean, Dry and Inspect Parts

Ground or Polished Parts

1. Use a cleaning solvent to clean the ground or polished parts and surfaces. Kerosene or diesel fuel can be used for this purpose. DO NOT USE GASOLINE.
2. Do NOT clean ground or polished parts in a hot solution tank or with water, steam or alkaline solutions. These solutions will cause corrosion of the parts.
3. Thoroughly clean the hub cavity with spray degreaser. The cavity must be free of any metal chips or dirt.
4. To remove grease from a wheel end, use a stiff fiber brush, not steel, and kerosene or diesel fuel, not gasoline. Allow the parts to dry. Note that any solvent residue must be completely wiped dry since it may either dilute the grease or oil or prevent the lubricant from correctly adhering to the wheel-end components.
5. Clean and inspect the wheel bearings, race, spindle bearing journals and hub. Bearings should be cleaned in a suitable non-flammable solvent and dried with either compressed air or a lint-free rag.

NOTE: If compressed air is used, do not spin dry the bearings as the rollers may score due to lack of lubricant. Ensure that the air line is moisture free.

Rough Parts

Rough parts can be cleaned with the ground or polished parts. Rough parts also can be cleaned in hot solution tanks with a weak alkaline solution. Parts must remain in the hot solution tanks until they are completely cleaned and heated.

Dry Cleaned Parts

Parts must be dried immediately after cleaning. Dry parts with clean paper or rags, or compressed air. Do not dry bearings by spinning with compressed air.

Prevent Corrosion on 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.

5 Prepare Parts for Assembly

If the 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.

NOTE: All tapered joints must be clean and dry with no lubrication or corrosion preventative applied to the mating surfaces.

Inspection

Wheel-End Components

1. Following disassembly and cleaning of the wheel-end components, inspect the spindle journals, hub and wheel bearings for signs of wear and damage.

NOTE: Damage to either the wheel bearing or race will require replacement of both bearings and races as a set.

2. Inspect the cup, the cone and the rollers and cage of the wheel bearings for the following defects.
 - Cracked or broken separators
 - Broken or cracked rollers
 - Flaked areas on rollers or races
 - Spalled rollers or races
 - Overheated bearings
 - Brinelled races
 - Scored or etched rollers or races
 - Pitting of rollers or races
 - Wear bands on critical surfaces
 - Rust or corrosion on critical surfaces

If any of the following conditions exist, you must replace the bearing.

- The center of the large diameter end of the rollers is worn level or below the outer surface. Figure 5.1.
- The radius at the large diameter end of the rollers is worn to a sharp edge. Figure 5.1.
- There is a visible roller groove in the cup or the cone inner race surfaces. The groove can be seen at the small or large diameter end of both parts.

- There are deep cracks or breaks in the cup, the cone inner race or the roller surfaces. Figure 5.2.
- There are bright wear marks on the outer surface of the roller cage. Figure 5.3.
- There is damage on the rollers and on the surfaces of the cup and the cone inner race that touch the rollers. Figure 5.4.
- There is damage on the cup and the cone inner surfaces that touch the rollers. Figure 5.5.

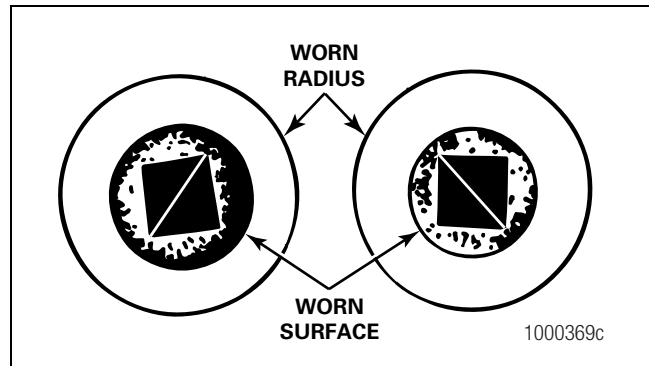


Figure 5.1

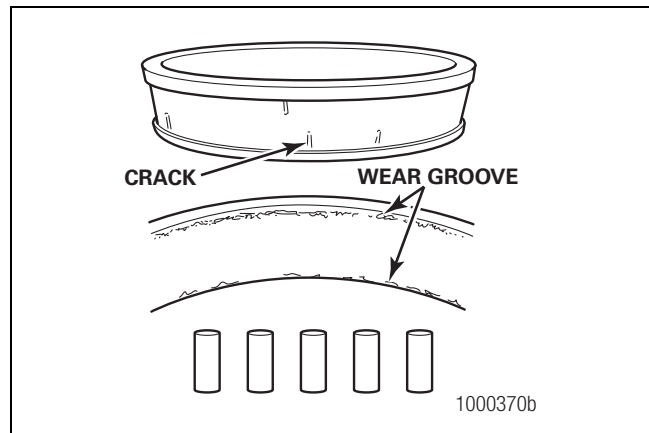


Figure 5.2

5 Prepare Parts for Assembly

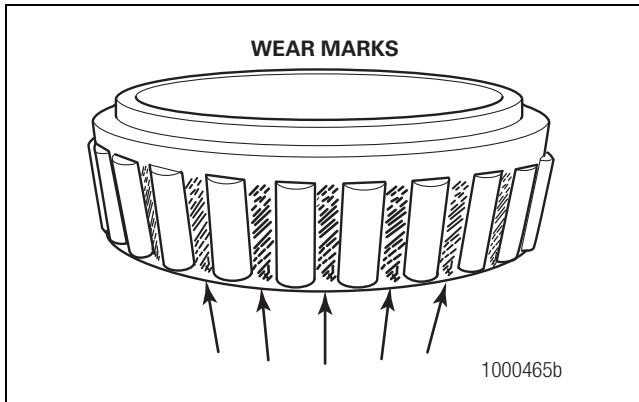


Figure 5.3

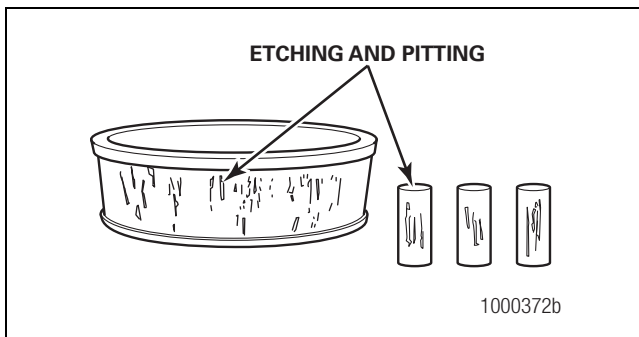


Figure 5.4

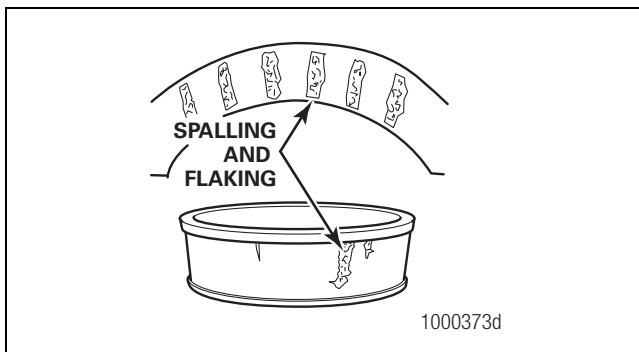


Figure 5.5

6 Assembly

Hazard Alert Messages

Read and observe all hazard alert messages in this publication.

⚠ WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Installation

ABS Tone Ring (Press-Fit Style)

If a tone ring was removed, use the following procedure to install a new one.

⚠ WARNING

Wear heat-resistant gloves and appropriate protective clothing when working with heating equipment and heated parts. Coming into contact with hot surfaces and parts can result in serious personal injury.

1. Apply Loctite® 620 adhesive sealant to the ABS tone ring hub seat in a continuous band 0.12" wide (3 mm) 360 degrees around the hub.

⚠ CAUTION

Only use an appropriate oven to heat the tone ring; do not use a torch or flame. Using a torch or flame can warp the tone ring or damage the tone ring coating.

⚠ CAUTION

When heating the tone ring, do not allow the tone ring to exceed a temperature of 400°F (204°C) or damage to the tone ring coating can occur.

2. Heat the ABS tone ring in an appropriate oven approximately 20 minutes until the ring reaches a temperature of 350°F (177°C). Do not use a torch or flame to heat the tone ring. Do not allow the tone ring to exceed a temperature of 400°F (204°C). Using correct personal protection thermal gloves, drop the ABS tone ring onto the hub journal and press down with hand force. The tone ring must seat against the mounting seat shoulder of the hub. Figure 6.1.

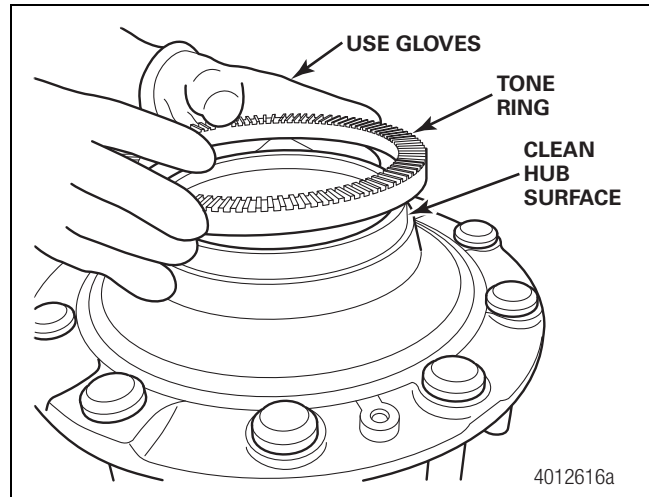


Figure 6.1

⚠ WARNING

The tone ring will remain hot for a period of time after installation. Allow the tone ring to cool before continuing assembly. Contact with heated parts can result in serious personal injury.

3. Allow the tone ring and hub to cool before you continue servicing the hub.
4. Check the hub for any gaps between the ABS tone ring and the hub seat.
5. Use a 0.005" (0.127 mm) feeler gauge as shown at four places 90 degrees apart to ensure the tone ring is fully seated and is not cocked on the hub. Figure 6.2 and Figure 6.3.

NOTE: Some tone rings are seated against the hub top and require the gap to be checked as shown in Figure 6.4.

- **If a gap between the tone ring and the hub seat shoulder greater than 0.005" (0.127 mm) is found:** Use the appropriate driver to seat the ABS tone ring against the hub seat shoulder. Figure 6.5 and Figure 6.6.
- **If the ABS tone ring cannot be seated with less than 0.005" (0.127 mm) gap:** Remove the tone ring and install a new one.



Figure 6.2

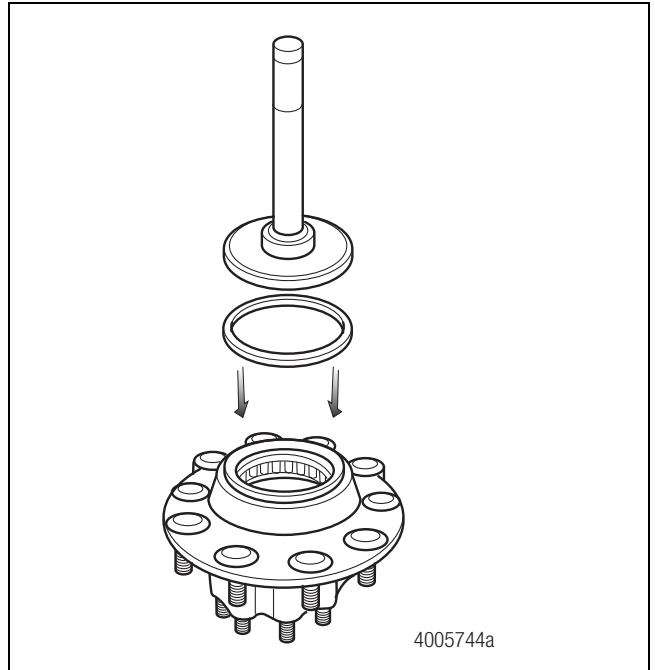


Figure 6.5

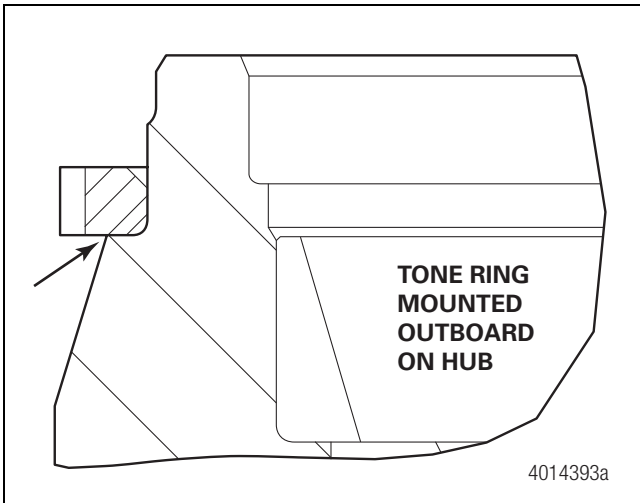


Figure 6.3

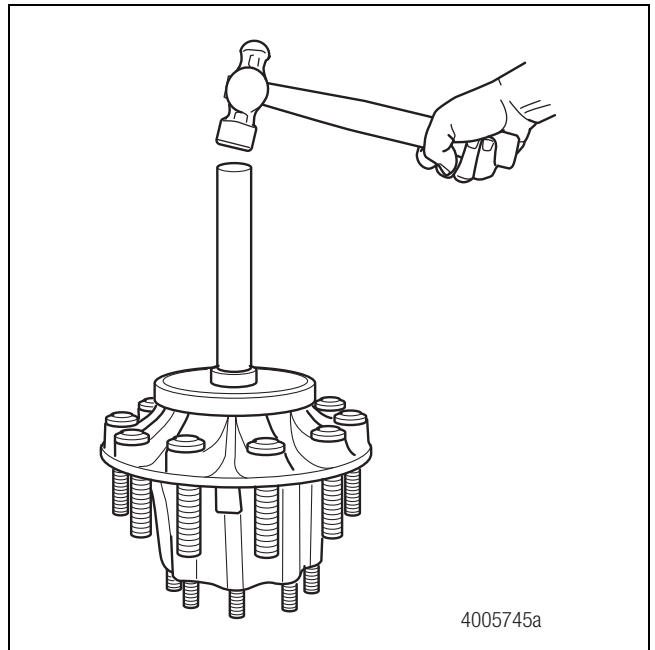


Figure 6.6

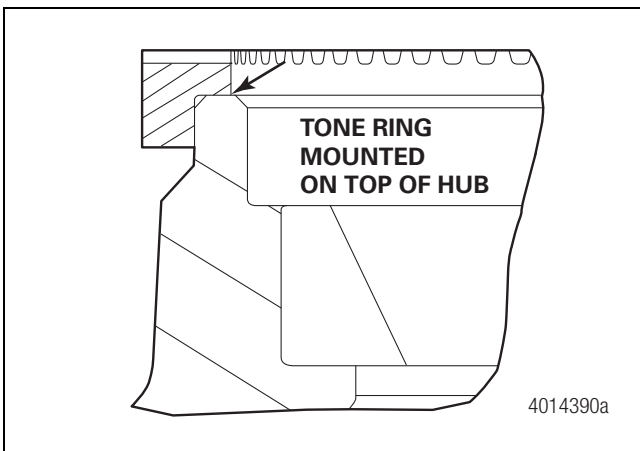


Figure 6.4

⚠ CAUTION
Use care to ensure the ABS tone ring is not damaged. If the tone ring is damaged, replace it with a new tone ring.

6. Continue the hub assembly and installation in this section.

6 Assembly

ABS Tone Ring (Bolt-On Style)

If a tone ring was removed, use the following procedure to install a new one.

1. Place the tone ring in position on the rotor and align the mounting bolt holes.
2. Apply Loctite® 680 threadlocker to the tone ring mounting bolts if there is no locking patch on the threads.
3. Install and tighten the tone ring mounting bolts in a cross pattern as shown in Figure 6.7. Refer to Section 9 for torque specifications. Retighten starting at the bolt at the end of the sequence. Continue the hub assembly and installation in this section.

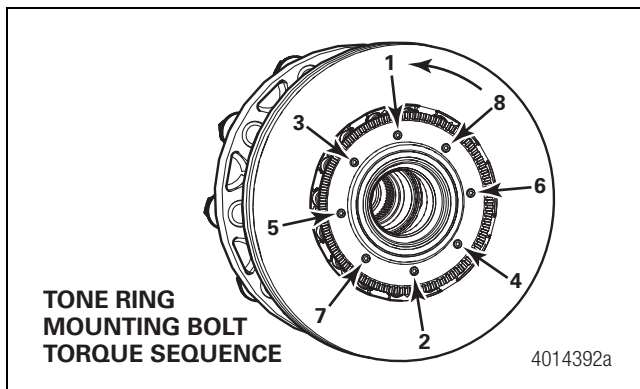


Figure 6.7

MFS Series Wheel End — Front Non-Drive Steer Axle

MFS-08-113 — Quadraulic™ Disc Brake

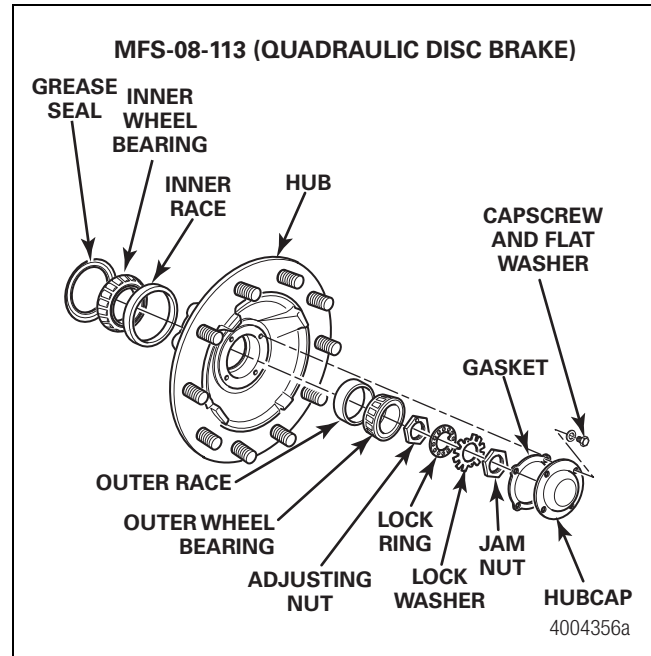


Figure 6.8

1. If removed during the previous wheel-end disassembly procedure, install the torque plate and backing plate onto the knuckle.
2. Lubricate both the inner and outer wheel bearings. Refer to Section 10.
 - **If race or wheel bearing replacement is required as a result of damage observed during the disassembly procedure:** Replace these components as a set. If necessary, drive new inner and outer bearing races into the hub.
3. Use a pressure packer to force the specified grease from the large end of the cones into the cavities between the rollers and cage. Pack the hub between the bearing cups with grease to the level of the smallest diameter of the cups.
 - **If a pressure packer is not available:** Grease the bearings by hand. Wear the correct protection.
4. Insert the inner wheel bearing into the hub bore.
5. Install a new grease seal using the correct seal driver. Refer to Section 11.

6. Carefully install the hub and rotor assembly onto the spindle. Ensure that the assembly is correctly seated.
7. Insert the outer wheel bearing into the hub bore.
8. Secure the hub and rotor assembly on the spindle using the outer wheel bearing adjusting nut. The adjusting nut must be installed so that the nipple faces outward toward the hubcap. Tighten finger-tight.
9. Tighten the outer wheel bearing adjusting nut to 150 lb-ft (203 N•m) while rotating the hub a minimum of five complete turns. This will ensure correct bearing-to-hub bore contact. Refer to Section 9.
10. Back off the outer wheel bearing adjusting nut one complete turn. Retighten to 50 lb-ft (68 N•m) while rotating the hub.
11. Back off the outer wheel bearing adjusting nut 1/3 turn.
12. Install the pierced lock ring so that the inner tab locks into the spindle keyway and the outer wheel bearing adjusting nut nipple engages one of the through holes on the lock ring.
13. Install a new tabbed lock washer onto the spindle so that the two nipples engage the through holes on the lock ring.
14. Install the outer wheel bearing jam nut. Tighten to 150-225 lb-ft (203-305 N•m). Refer to Section 9.
15. Measure bearing end play with a dial indicator. Bearing end play should be 0.001 to 0.005-inch (0.025-0.127 mm). Refer to Section 7.
16. If necessary, adjust bearing end play to obtain the correct dial indicator reading. Refer to Section 7.
17. Bend two opposed lock washer tabs over the outer wheel bearing jam nut to lock it in position.
18. Install the gasket and hubcap with four capscrews and flat washers. Tighten to 12-16 lb-ft (16-22 N•m).
19. Install the Quadraulic disc brake caliper assembly onto the torque plate with four fasteners and washers. Tighten to 320-360 lb-ft (435-490 N•m). Refer to Section 9.

MFS-06-162 — Reaction Beam (B-Frame) Disc Brake

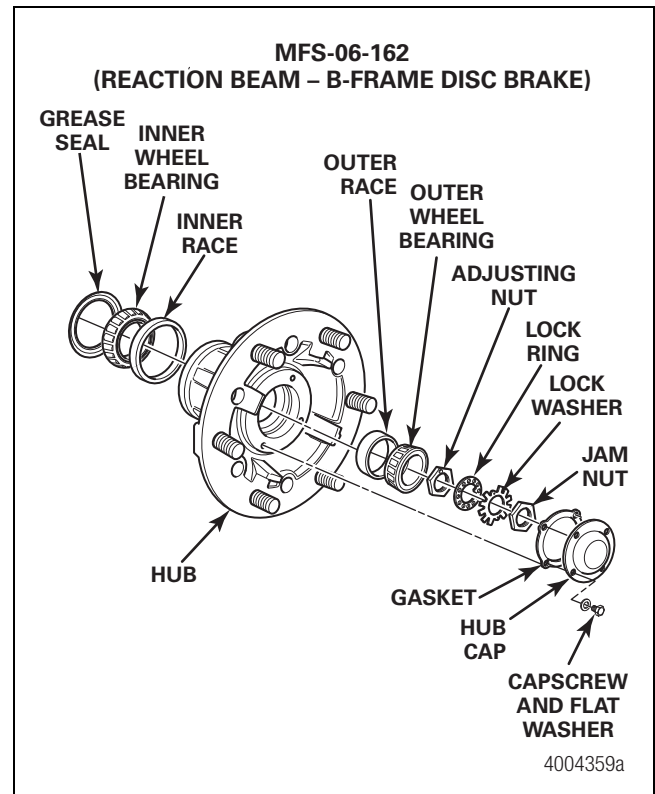


Figure 6.9

1. Lubricate both the inner and outer wheel bearings. Refer to Section 10.
 - **If race or wheel bearing replacement is required as a result of damage observed during the disassembly procedure:** Replace these components as a set. If necessary, drive new inner and outer bearing races into the hub.
2. Use a pressure packer to force the specified grease from the large end of the cones into the cavities between the rollers and cage. Pack the hub between the bearing cups with grease to the level of the smallest diameter of the cups.
 - **If a pressure packer is not available:** Grease the bearings by hand. Wear the correct protection.
3. Insert the inner wheel bearing into the hub bore.
4. Install a new grease seal using the correct seal driver. Refer to Section 11.

6 Assembly

- Carefully install the hub and rotor assembly onto the spindle. Ensure that the assembly is correctly seated.
- Insert the outer wheel bearing into the hub bore.
- Secure the hub and rotor assembly on the spindle using the outer wheel bearing adjusting nut. The adjusting nut must be installed so that the nipple faces outward toward the hubcap. Tighten finger-tight.
- Tighten the outer wheel bearing adjusting nut to 150 lb-ft (203 N•m) while rotating the hub a minimum of five complete turns. This will ensure correct bearing-to-hub bore contact. Refer to Section 9.
- Back off the outer wheel bearing adjusting nut one complete turn. Retighten to 50 lb-ft (68 N•m) while rotating the hub.
- Back off the outer wheel bearing adjusting nut 1/3 turn.
- Install the pierced lock ring so that the inner tab locks into the spindle keyway and the outer wheel bearing adjusting nut nipple engages one of the through holes on the lock ring.
- Install a new tabbed lock washer onto the spindle so that the two nipples engage the through holes on the lock ring.
- Install the outer wheel bearing jam nut. Tighten to 150-225 lb-ft (203-305 N•m). Refer to Section 9.
- Measure bearing end play with a dial indicator. Bearing end play should be 0.001 to 0.005-inch (0.025-0.127 mm). Refer to Section 7.
- If necessary, adjust bearing end play to obtain the correct dial indicator reading. Refer to Section 7.
- Bend two opposed lock washer tabs over the outer wheel bearing jam nut to lock it in position.
- Install the gasket and hubcap with four capscrews and flat washers. Tighten to 12-16 lb-ft (16-22 N•m).
- Install the reaction beam (B-frame) disc brake caliper assembly onto the knuckle with four fasteners and washers. Tighten to 81-96 lb-ft (110-130 N•m). Refer to Section 9.

MFS-12-122 — Q+ Cam Brake

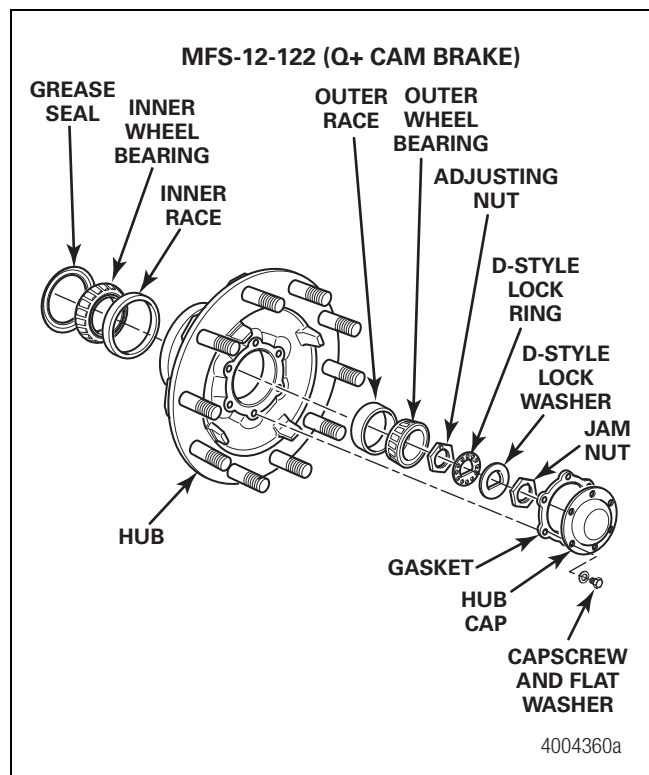


Figure 6.10

- Lubricate both the inner and outer wheel bearings. Refer to Section 10.
 - If race or wheel bearing replacement is required as a result of damage observed during the disassembly procedure:** Replace these components as a set. If necessary, drive new inner and outer bearing races into the hub.
- Use a pressure packer to force the specified grease from the large end of the cones into the cavities between the rollers and cage. Pack the hub between the bearing cups with grease to the level of the smallest diameter of the cups.
 - If a pressure packer is not available:** Grease the bearings by hand. Wear the correct protection.
- Insert the inner wheel bearing into the hub bore.
- Install a new grease seal using the correct seal driver. Refer to Section 11.
- Carefully install the hub assembly onto the spindle. Ensure that the assembly is correctly seated.

6. Insert the outer wheel bearing into the hub bore.
7. Secure the hub assembly on the spindle using the outer wheel bearing adjusting nut. The adjusting nut must be installed so that the nipple faces outward toward the hubcap. Tighten finger-tight.
8. Tighten the outer wheel bearing adjusting nut to 150 lb-ft (203 N•m) while rotating the hub a minimum of five complete turns. This will ensure correct bearing-to-hub bore contact. Refer to Section 9.
9. Back off the outer wheel bearing adjusting nut one complete turn. Retighten to 50 lb-ft (68 N•m) while rotating the hub.
10. Back off the outer wheel bearing adjusting nut 1/3 turn.
11. Install the D-style pierced lock ring so that it passes through the flat on the spindle. Ensure that the outer wheel bearing adjusting nut nipple engages one of the through holes on the lock ring.
12. Install a new D-style lock washer so that it passes through the flat on the spindle.
13. Install the outer wheel bearing jam nut. Tighten to 200-300 lb-ft (271-407 N•m). Refer to Section 9.
14. Measure bearing end play with a dial indicator. Bearing end play should be 0.001 to 0.005-inch (0.025-0.127 mm). Refer to Section 7.
15. If necessary, adjust bearing end play to obtain the correct dial indicator reading. Refer to Section 7.
16. Bend one side of the D-style lock washer over the outer wheel bearing jam nut to lock it in position.
17. Install the gasket and hubcap with six capscrews and flat washers. Tighten to 12-16 lb-ft (16-22 N•m).
18. Install the brake drum onto the hub.

MS and RS Series Wheel End — Rear Drive Axle

MS-12-113 — Reaction Beam (B-Frame) Disc Brake

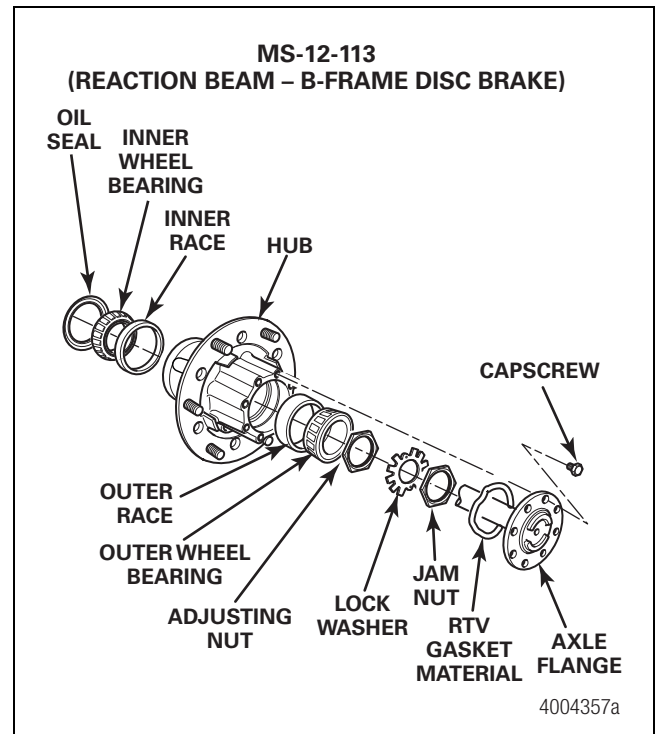


Figure 6.11

1. 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.
 - **If race or wheel bearing replacement is required as a result of damage observed during the disassembly procedure:** Replace these components as a set. If necessary, drive new inner and outer bearing races into the hub.
2. Insert the inner wheel bearing into the hub bore.
3. Install a new oil seal using the correct seal driver. Refer to Section 11.
4. Carefully install the hub and rotor assembly onto the spindle. Ensure that the assembly is correctly seated.

CAUTION

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

6 Assembly

- Before the outer wheel bearing is installed, fill the wheel cavity with the same lubricant as used in the differential carrier housing. Typically, one-half pint of lubricant is required.
- Insert the outer wheel bearing into the hub bore.
- Secure the hub and rotor assembly on the spindle with the outer wheel bearing adjusting nut. Tighten finger-tight.
- Tighten the outer wheel bearing adjusting nut to 200 lb-ft (272 N•m) while rotating the hub in both directions. This will ensure correct bearing-to-hub bore contact. Refer to Section 9.
- Back off the outer wheel bearing adjusting nut one full turn.
- Retighten the outer wheel bearing adjusting nut to 50 lb-ft (68 N•m) while rotating the hub a minimum of five complete turns.
- Back off the outer wheel bearing adjusting nut 1/4 turn.
- Install a new tabbed lock washer onto the spindle.
- Install the outer wheel bearing jam nut. Tighten to 100-150 lb-ft (136-203 N•m). Refer to Section 9.
- Measure bearing end play with a dial indicator. Bearing end play should be 0.001 to 0.005-inch (0.025-0.127 mm). Refer to Section 7.
- If necessary, adjust bearing end play to obtain the correct dial indicator reading. Refer to Section 7.
- Bend two opposed lock washer tabs over the outer wheel bearing jam nut to lock it in position.
- Apply a bead of RTV gasket material around the circumference of the inside surface of the axle shaft flange.
- Install the axle shaft with eight capscrews. No flat or lock washers are required. Tighten to 85-95 lb-ft (115-130 N•m).
- Install the reaction beam (B-frame) disc brake caliper assembly onto the torque plate with four fasteners and washers. Tighten to 81-96 lb-ft (110-130 N•m). Refer to Section 9.
- Check the rear end differential fluid level by removing the oil fill plug from the carrier or housing bowl. If necessary, add the specified fluid through the carrier or housing bowl oil fill hole. Fill so that the fluid level is even with the bottom of the fill plug hole.

RS-19-145 and RS-13-120 — Quadraulic Disc Brake

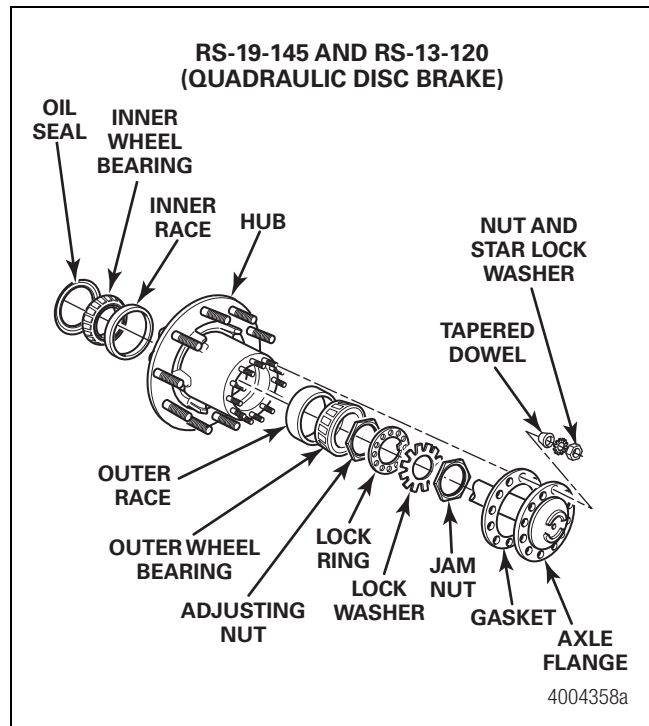


Figure 6.12

- If removed during the previous wheel-end disassembly procedure, install the torque plate and backing plate onto the knuckle.
- 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.
 - If race or wheel bearing replacement is required as a result of damage observed during the disassembly procedure:** Replace these components as a set. If necessary, drive new inner and outer bearing races into the hub.
- Insert the inner wheel bearing into the hub bore.
- Install a new oil seal using the correct seal driver. Refer to Section 11.
- Carefully install the hub and rotor assembly onto the spindle. Ensure that the assembly is correctly seated.

CAUTION

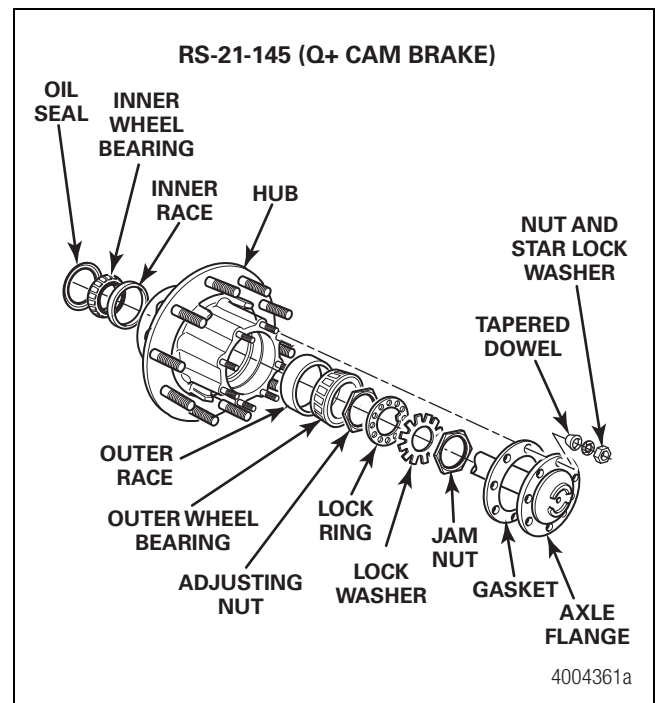
Do not assemble dry. Damage to wheel end components may result.

6. Before the outer wheel bearing is installed, fill the wheel cavity with the same lubricant as used in the differential carrier housing. Typically, one-half pint of lubricant is required.
7. Insert the outer wheel bearing into the hub bore.
8. Secure the hub and rotor assembly on the spindle using the outer wheel bearing adjusting nut. The adjusting nut must be installed so that the nipple faces outward toward the axle shaft flange. Tighten finger-tight.
9. Tighten the outer wheel bearing adjusting nut to 200 lb-ft (272 N•m) while rotating the hub in both directions. This will ensure correct bearing-to-hub bore contact. Refer to Section 9.
10. Back off the outer wheel bearing adjusting nut one full turn.
11. Retighten the outer wheel bearing adjusting nut to 50 lb-ft (68 N•m) while rotating the hub a minimum of five complete turns.
12. Back off the outer wheel bearing adjusting nut 1/4 turn.
13. Install the pierced lock ring so that the inner tab locks into the spindle keyway and the outer wheel bearing adjusting nut nipple engages one of the through holes on the lock ring.
14. Install a new tabbed lock washer onto the spindle.
15. Install the outer wheel bearing jam nut. Tighten to 100-200 lb-ft (136-272 N•m). Refer to Section 9.

NOTE: For axle model RS-13-120, tighten the outer wheel bearing jam nut to 100-150 lb-ft (136-203 N•m).

16. Measure bearing end play with a dial indicator. Bearing end play should be 0.001 to 0.005-inch (0.025-0.127 mm). Refer to Section 7.
17. If necessary, adjust bearing end play to obtain the correct dial indicator reading. Refer to Section 7.
18. Bend two opposed lock washer tabs over the outer wheel bearing jam nut to lock it in position.
19. Install the axle shaft and gasket.
20. Install the tapered dowels.
21. Secure the axle shaft with 12 star lock washers and 12 new nuts. Tighten to 75-115 lb-ft (102-156 N•m).

22. Install the Quadrauc disc brake caliper assembly onto the torque plate with four fasteners and washers. Tighten to 320-360 lb-ft (435-490 N•m). Refer to Section 9.
23. Check the rear end differential fluid level by removing the oil fill plug from the carrier or housing bowl. If necessary, add the specified fluid through the carrier or housing bowl oil fill hole. Fill so that the fluid level is even with the bottom of the fill plug hole.

RS-21-145 — Q+ Cam Brake**Figure 6.13**

1. 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.
 - **If race or wheel bearing replacement is required as a result of damage observed during the disassembly procedure:** Replace these components as a set. If necessary, drive new inner and outer bearing races into the hub.
2. Insert the inner wheel bearing into the hub bore.
3. Install a new oil seal using the correct seal driver. Refer to Section 11.

6 Assembly

- Carefully install the hub assembly onto the spindle. Ensure that the assembly is correctly seated.

CAUTION

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

- Before the outer wheel bearing is installed, fill the wheel cavity with the same lubricant as used in the differential carrier housing. Typically, one-half pint of lubricant is required.
- Insert the outer wheel bearing into the hub bore.
- Secure the hub assembly on the spindle using the outer wheel bearing adjusting nut. The adjusting nut must be installed so that the nipple faces outward toward the axle shaft flange. Tighten finger-tight.
- Tighten the outer wheel bearing adjusting nut to 200 lb-ft (272 N•m) while rotating the hub a minimum of five complete turns. This will ensure correct bearing-to-hub bore contact. Refer to Section 9.
- Back off the outer wheel bearing adjusting nut one full turn.
- Retighten the outer wheel bearing adjusting nut to 50 lb-ft (68 N•m) while rotating the hub.
- Back off the outer wheel bearing adjusting nut 1/4 turn.
- Install the pierced lock ring so that the inner tab locks into the spindle keyway and the outer wheel bearing adjusting nut nipple engages one of the through holes on the lock ring.
- Install a new tabbed lock washer onto the spindle.
- Install the outer wheel bearing jam nut. Tighten to 100-200 lb-ft (136-272 N•m). Refer to Section 9.
- Measure bearing end play with a dial indicator. Bearing end play should be 0.001 to 0.005-inch (0.025-0.127 mm). Refer to Section 7.
- If necessary, adjust bearing end play to obtain the correct dial indicator reading. Refer to Section 7.
- Bend two opposed lock washer tabs over the outer wheel bearing jam nut to lock it in position.
- Install the axle shaft and gasket.
- Install the tapered dowels.
- Secure the axle shaft with eight star lock washers and nuts. Tighten to 150-230 lb-ft (203-312 N•m).

- Install the brake drum onto the hub.
- Check the rear end differential fluid level by removing the oil fill plug from the carrier or housing bowl. If necessary, add the specified fluid through the carrier or housing bowl oil fill hole. Fill so that the fluid level is even with the bottom of the fill plug hole.

Conventional Wheel End — Front and Tag Axles with EX+ Brakes

- Lubricate both the inner and outer wheel bearings. Refer to Section 10.
 - If race or wheel bearing replacement is required as a result of damage observed during the disassembly procedure:** Replace these components as a set. If necessary, drive new inner and outer bearing races into the hub.
- Insert the inner wheel bearing into the hub bore.
- Install a new grease seal using the correct seal driver. Refer to Section 11.
- Carefully install the hub and rotor assembly onto the spindle. Ensure that the assembly is correctly seated.
- Insert the outer wheel bearing into the hub bore.
- Secure the hub assembly on the spindle using the outer wheel bearing adjusting nut. The adjusting nut must be installed so that the nipple faces outward toward the hubcap. Tighten finger-tight.
- Tighten the adjusting nut to 100 lb-ft (136 N•m) while rotating the hub in both directions. This will ensure correct bearing-to-hub bore contact. Refer to Section 9.
- Loosen the adjusting nut completely. Retighten to 20 lb-ft (27 N•m) while rotating the hub.
- Back off the outer wheel bearing adjusting nut 1/3 turn.
- Install the D-style pierced lock ring so that it passes through the flat on the spindle. Ensure that the adjusting nut nipple engages one of the through holes on the lock ring.
- Install a new D-style lock washer so that it passes through the flat on the spindle.
- Install the outer wheel bearing jam nut. Tighten to 200-300 lb-ft (271-407 N•m). Refer to Section 9.

13. Measure bearing end play with a dial indicator. Bearing end play should be 0.001 to 0.005-inch (0.025-0.127 mm). Refer to Section 7.
14. If necessary, adjust bearing end play to obtain the correct dial indicator reading. Refer to Section 7.
15. Bend one side of the D-style lock washer over the outer wheel bearing jam nut to lock it in position.
16. Install the gasket and hubcap with the capscrews and flat washers. Tighten the capscrews to 6 lb-ft (8.13 N•m) maximum using a star pattern. Then use a star pattern to apply a final torque of 15-18 lb-ft (20.34-24.4 N•m). For models with CR Zytel hubcaps, apply a final torque of 12-16 lb-ft (16.27-21.7 N•m).
17. Install the disc brake caliper assembly onto the torque plate. Refer to Maintenance Manual MM-0467, EX+™ Disc Brake, for more information.

PreSet® Wheel Hub Assemblies

ConMet® PreSet® hubs are the same as conventional wheel bearing hubs except that all PreSet® hubs come complete with pre-installed bearings, cups, cones and oil seals. These hubs have a precision tubular spacer between the bearings which eliminates the need for manual bearing adjustment.

The ConMet® PreSet® hubs are currently used on Meritor bus and coach MC12, FG952 tag and RC rear drive axles.

Refer to the ConMet® PreSet® Hub Service Manual for inspection, preventive maintenance and service procedures. The manual can be accessed at http://www.conmet.com/pdfs/preset_service_manual.pdf.

For ConMet® PreSet® hubs with PRO-TORQ™ spindle nuts, tighten the PRO-TORQ™ nut to 300 lb-ft (408 N•m). DO NOT BACK OFF THE SPINDLE NUT. Insert and engage the keeper, then advance the nut until engagement takes place and the nut is locked.

Unitized Wheel End — Bus and Coach FH Series Front and Tag Axle, and MC Series Tag Axle

These procedures apply to bus and coach FH Series front and tag axles, and MC Series tag axles equipped with unitized wheel ends.

DANGER

Carefully follow the manufacturer's application and curing (drying) instructions when applying an anaerobic sealant. Incorrectly applied sealant or an insufficient cure time can cause fasteners and mating surfaces to loosen during vehicle operation. Serious personal injury and damage to components can result.

WARNING

The unitized wheel-end maintenance and inspection procedures provided in this manual must be followed to prevent serious personal injury and damage to components.

WARNING

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

CAUTION

The unitized wheel end is sealed and greased for life and does not require lubrication. Do not disassemble, or attempt to repair or lubricate a unitized wheel-end assembly. Failure to heed this caution will void the Meritor warranty.

CAUTION

There are two different spindle nut designs used on unitized wheel ends, double nut pack and PRO-TORQ™ nut. They are different and not interchangeable. The components must be replaced with the same type and follow the correct tightening procedure for the nut system used to prevent damage to components.

Models with a Double Nut Pack

1. Inspect the new unitized hub bearing. Remove the replacement hub from the box and place it onto a clean surface. Examine the hub to verify the following.
 - A. All bearing seals and the O-ring seal are clean and show no signs of damage.

6 Assembly

- B. The O-ring is correctly installed into the groove at the inner bearing shoulder prior to installation onto the spindle.
 - C. The bearing mounting face and bore are clean with no seal coating, dirt or dust.
 - D. The tooth wheel is not damaged or bent.
2. Apply a light coat of anti-seize lubricant such as Molykote-D paste to the bearing bore and to the O-ring before installing the hub and spindle. Do not apply any lubricant to the spindle or on the bearing end face. The spindle should be clean and free of any contamination. Figure 6.14.

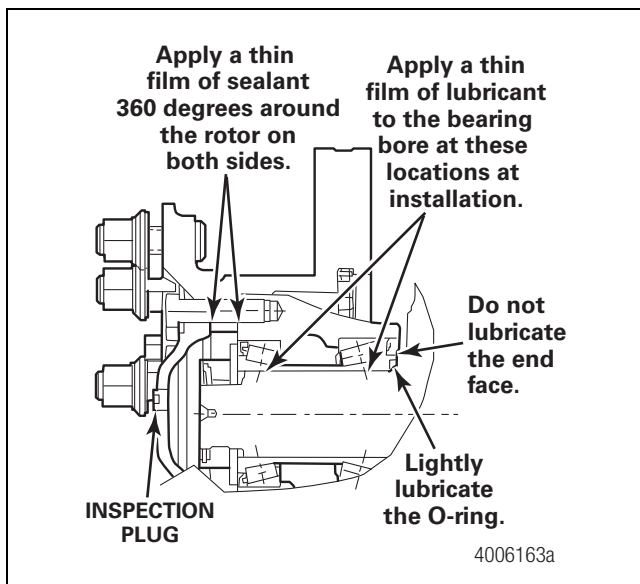


Figure 6.14

- 3. Verify the O-ring is correctly seated before installing the bearing onto the spindle.
- 4. Install the unitized hub bearing onto the knuckle spindle. Use care to avoid damaging the O-ring on the spindle threads. Figure 6.15.

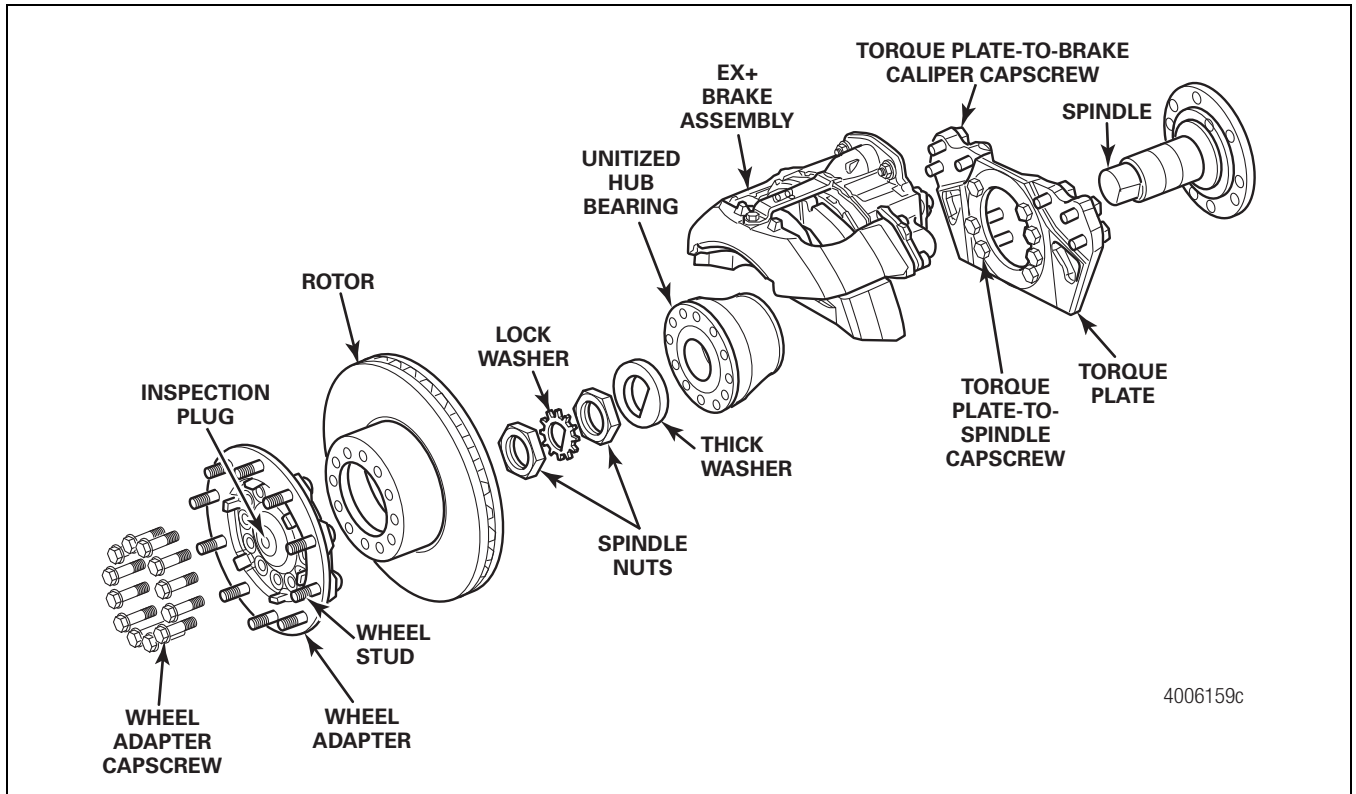


Figure 6.15

5. Install the spindle nut onto the spindle threads.
6. Install the double nut pack onto the spindle. Figure 6.16.
 - A. Apply Never-Seez™ to the spindle threads.
 - B. Install the thick washer and the adjusting nut onto the spindle.
 - C. Rotate the hub while tightening the adjusting nut to 600 ± 75 lb-ft (813 ± 101 N•m).
 - D. Install a new "D" lock washer and jam nut onto the spindle.
 - E. Tighten the jam nut to 250 ± 50 lb-ft (339 ± 68 N•m).
 - F. Bend the "D" lock washer tabs over the flat sides of the jam nut and adjusting nut. Ensure that the washer tabs secure a minimum of one flat side on each nut.

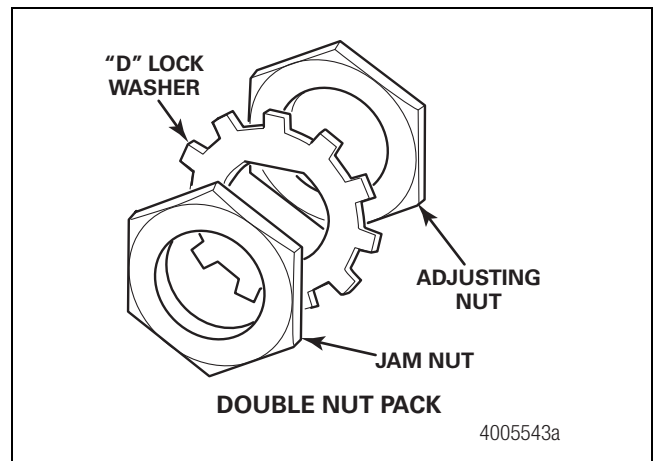


Figure 6.16

7. Apply a bead of anaerobic sealant such as Loctite® 518 Gasket Eliminator 360 degrees around the rotor on both mating surfaces and on the inside of the bolt circle. Figure 6.17. You must apply the sealant before you assemble the rotor and wheel adapter to prevent moisture from entering into the bearing. Do not use any type of gasket sealant other than anaerobic sealant.

6 Assembly

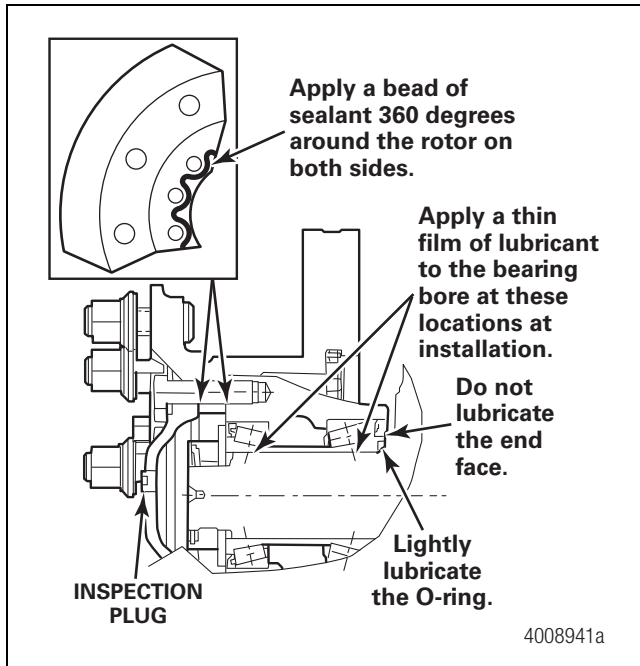


Figure 6.17

8. Install guide pins (optional) into the unitized hub bearing to aid in the alignment and installation of the rotor and wheel adapter. Refer to Section 11. Figure 6.18.

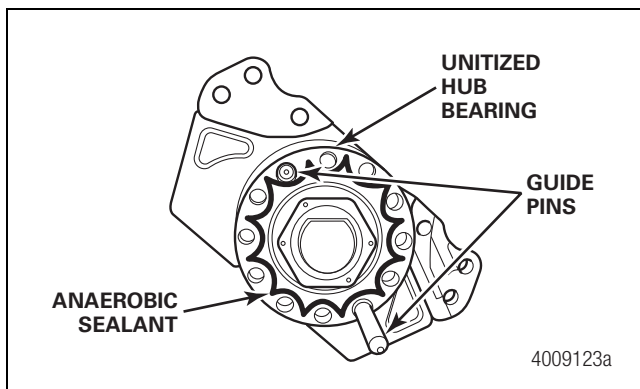


Figure 6.18

9. Install the rotor onto the unitized hub bearing. Figure 6.19.

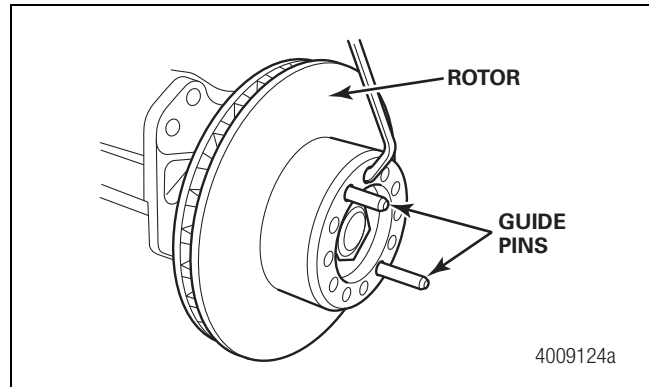


Figure 6.19

10. Install the wheel adapter onto the rotor. Figure 6.20.

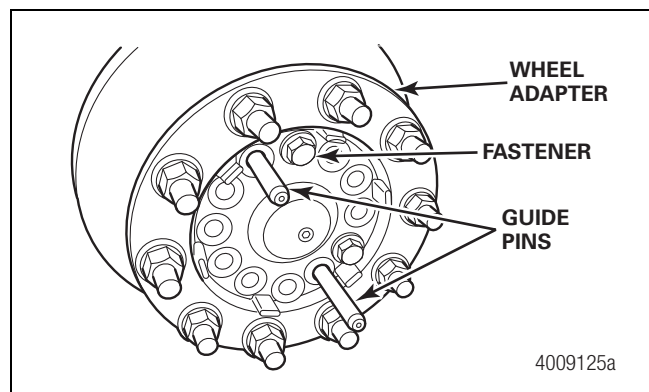


Figure 6.20

11. Install the fasteners. Slightly tighten the fasteners in a star pattern to seat the rotor and wheel adapter correctly. If used, remove the guide pins and install the remaining fasteners. Tighten the fasteners in a star pattern to 275 ± 25 lb-ft (373 ± 34 N•m).
12. Verify the end play of the new bearing. The end play must be 0.000-0.002-inch (0-0.0508 mm). Refer to Section 3.
13. Install the wheel and check if the ABS is operating correctly.
 - **If the warning lamp remains illuminated or comes on during vehicle operation:** Check for possible tooth wheel damage or a sensor gap out of specification. Refer to your vehicle ABS version and the appropriate maintenance manual. To obtain the publication, refer to the Service Notes page on the front inside cover of this manual.

Models with a PRO-TORQ™ Nut

1. Inspect the new unitized hub bearing. Remove the replacement hub from the box and place it onto a clean surface. Examine the hub to verify the following.
 - A. All bearing seals and the O-ring seal are clean and show no signs of damage.
 - B. The O-ring is correctly installed into the groove at the inner bearing shoulder prior to installation onto the spindle.
 - C. The bearing mounting face and bore are clean with no seal coating, dirt or dust.
 - D. The tooth wheel is not damaged or bent.
2. Apply a light coat of anti-seize lubricant such as Molykote-D paste to the bearing bore and to the O-ring before installing the hub and spindle. Do not apply any lubricant to the spindle or on the bearing end face. The spindle should be clean and free of any contamination. Figure 6.21.

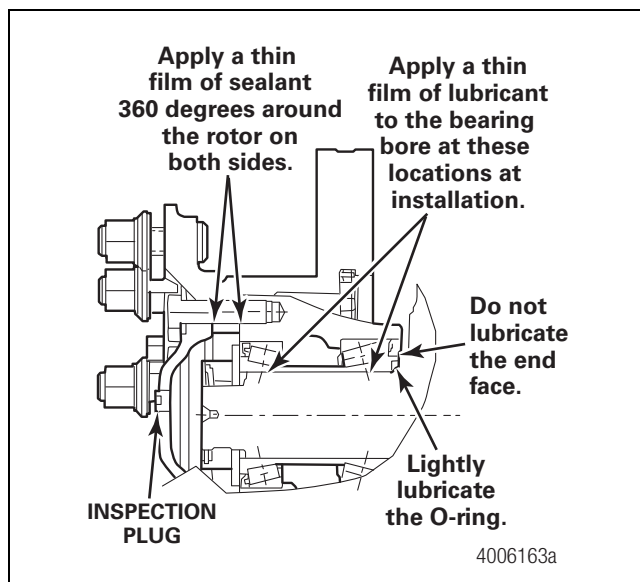


Figure 6.21

3. Verify the O-ring is correctly seated before installing the bearing onto the spindle.
4. Install the unitized hub bearing onto the knuckle spindle. Use care to avoid damaging the O-ring on the spindle threads. Figure 6.22.

6 Assembly

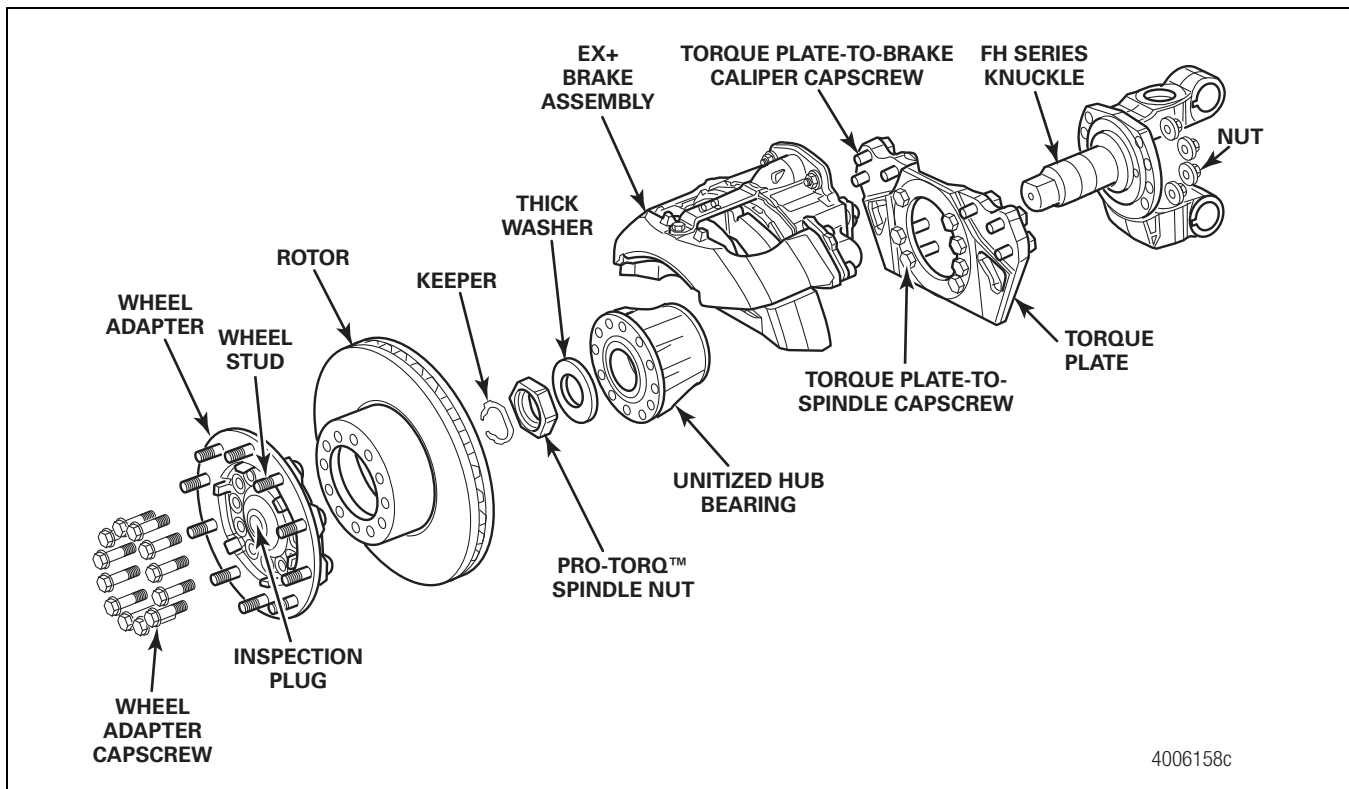


Figure 6.22

⚠ CAUTION

Remove the keeper from the PRO-TORQ™ nut before attaching the nut to the axle spindle, or tighten and loosen the nut, to prevent damage to the nut and axle spindle.

5. Install the PRO-TORQ™ nut. Figure 6.23.
 - A. Apply Never-Seez™ to the spindle threads.
 - B. Remove the keeper from the PRO-TORQ™ nut. Use a screwdriver to pry out the keeper arm from the groove on each side of the nut until it is released. Meritor recommends replacing the keeper with a new one each time the PRO-TORQ™ nut is removed to maintain the integrity of the locking mechanism.
 - C. Install the thick washer and the PRO-TORQ™ nut onto the spindle.
 - D. Rotate the bearing while tightening the PRO-TORQ™ nut to 600 ± 75 lb-ft (813 ± 101 N•m).

- E. Install a new keeper against the nut with the orange side facing OUT. Align the flat of the keeper with the flat on the spindle. Insert the single keeper tab into the undercut groove on the nut. Engage the mating teeth.
- F. Use a screwdriver to compress and insert the keeper arms one at a time into the undercut groove on the nut. Ensure that the keeper tab and arms are fully seated into the undercut groove.

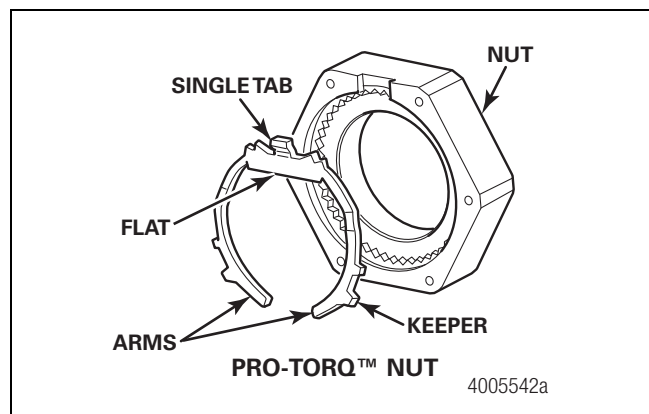


Figure 6.23

6. Apply a bead of anaerobic sealant such as Loctite® 518 Gasket Eliminator 360 degrees around the rotor on both mating surfaces and on the inside of the bolt circle. Figure 6.24. You must apply the sealant before you assemble the rotor and wheel adapter to prevent moisture from entering into the bearing. Do not use any type of gasket sealant other than anaerobic sealant.

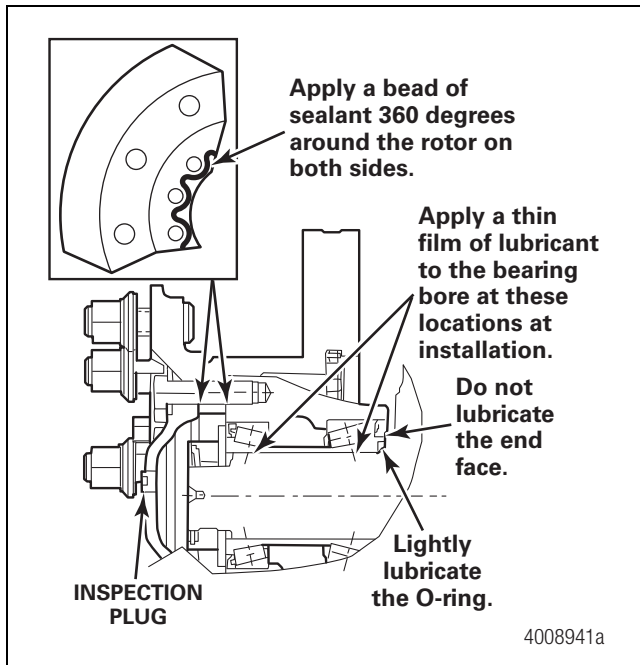


Figure 6.24

7. Install guide pins (optional) into the unitized hub bearing to aid in the alignment and installation of the rotor and wheel adapter. Refer to Section 11. Figure 6.25.

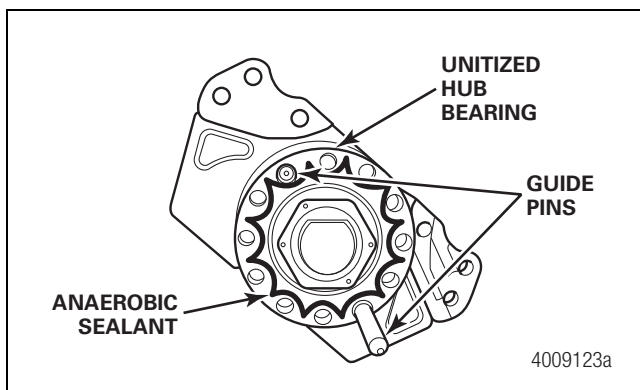


Figure 6.25

8. Install the rotor onto the unitized hub bearing. Figure 6.26.

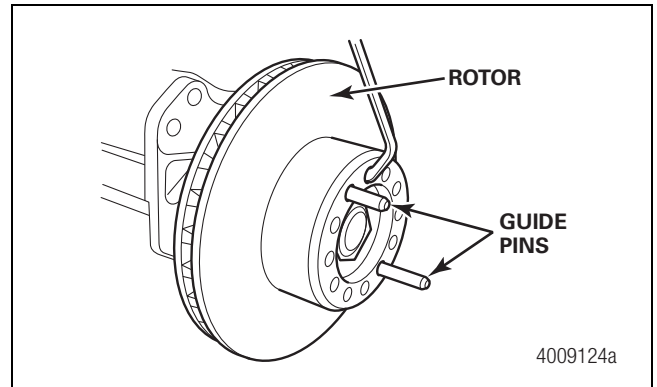


Figure 6.26

9. Install the wheel adapter onto the rotor. Figure 6.27.

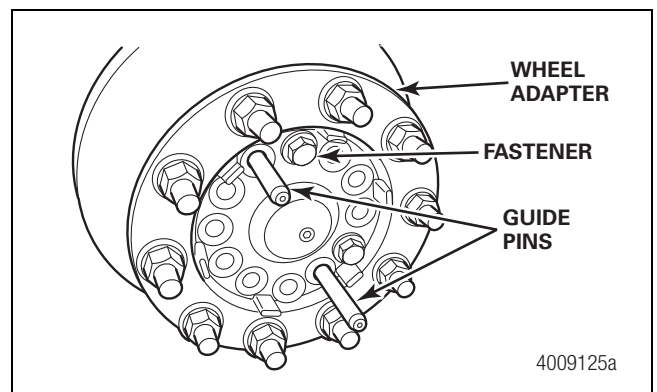


Figure 6.27

10. Install the fasteners. Slightly tighten the fasteners in a star pattern to seat the rotor and wheel adapter correctly. If used, remove the guide pins and install the remaining fasteners. Tighten the fasteners in a star pattern to 275 ± 25 lb-ft (373 ± 34 N•m).
11. Verify the end play of the new bearing. The end play must be 0.000-0.002-inch (0-0.0508 mm). Refer to Section 3.
12. Install the wheel and check if the ABS is operating correctly.
 - **If the warning lamp remains illuminated or comes on during vehicle operation:** Check for possible tooth wheel damage or a sensor gap out of specification. Refer to your vehicle ABS version and the appropriate maintenance manual. To obtain the publication, refer to the Service Notes page on the front inside cover of this manual.

6 Assembly

Studs and Nuts

The following dangers are to alert you to stud and nut conditions and maintenance procedures that can affect your safety and the integrity of the vehicle and its components.

Carefully read the dangers before you install disc wheels.

DANGER

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

Always replace a serrated stud, bolt, with a new one. Do not reuse a serrated stud, which will not tighten correctly and can cause the wheels to loosen and separate from the vehicle. Serious personal injury and damage to components can result.

Do not apply paint to mounting surfaces, studs or nuts. Paint decreases a fastener assembly's capability to maintain clamp load, which can cause wheels to loosen and separate from the vehicle. Serious personal injury and damage to components can result.

Ensure that the stud threads are not damaged. Damaged threads will not allow the stud to provide the required clamp load to support the wheel retention system. The wheels can loosen and separate from the vehicle. Serious personal injury and damage to components can result.

Check that stud standout is correct for stud-piloted wheels. If standout exceeds specifications even though the correct torque is used, the cap nut can bottom against the hub stud and loosen both wheels and the brake drum, which will cause the wheels to separate from the vehicle. If standout is too short, the cap nut will overload and crack, causing the inner and dual wheels to separate from the vehicle. Serious personal injury and damage to components can result.

Install right-hand studs onto the right side of the vehicle and left-hand studs onto the left side of the vehicle. Studs that are not installed correctly can loosen, which can cause the wheels to loosen and separate from the vehicle. Serious personal injury and damage to components can result.

If the wheel studs are being reused, apply two drops of oil to the last two or three threads at the end of each stud. Do not over lubricate the studs or nut threads. Over lubricating the fasteners can cause excessive clamp load. The studs can break and cause the wheels to loosen and separate from the vehicle. Serious personal injury and damage to components can result.

Install aluminum wheel nuts onto an aluminum disc wheel. Do not install steel wheel nuts. Steel wheel nuts can damage an aluminum wheel or cause the dual wheels to loosen and separate from the vehicle. Serious personal injury and damage to components can result.

Install steel wheel nuts onto steel wheels. Do not install aluminum wheel nuts. The extension on an aluminum wheel nut can bottom against the hub flange or brake drum before the disc wheel is clamped correctly, which can cause the wheels to separate from the vehicle. Serious personal injury and damage to components can result.

Install the nuts with the correct thread size onto the studs. A nut with an incorrect thread size will not turn freely on the stud or will fit loosely on the stud. The thread can strip, which can cause loss of clamp load. The wheels can loosen and separate from the vehicle. Serious personal injury and damage to components can result.

Install the correct wheel system components for the application. Do not mix wheel system components. The wheels can loosen and separate from the vehicle. Serious personal injury and damage to components can result.

Apply two drops of oil between the nut flange and the hex portion of the swivel area at each installation if reinstalling the two-piece flange nuts that have been in service. Without lubricant, the fasteners may not produce adequate clamp load, and a wheel can loosen and separate from the vehicle. Serious personal injury and damage to components can result.

Lightly lubricate the hub pilots to ease wheel installation and removal. Do not lubricate the mounting face of the drum or wheel. Lubricant on the drum or wheel mating surfaces can reduce friction and cause the components to slip during operation. Serious personal injury and damage to components can result.

1. Check the studs. Repair or replace loose, bent, stripped or broken studs.
2. Check for correct serrated stud stand-out.
 - A. Figure 6.28 shows correct stand-out.
 - B. Figure 6.29 and Figure 6.30 show incorrect stand-out.

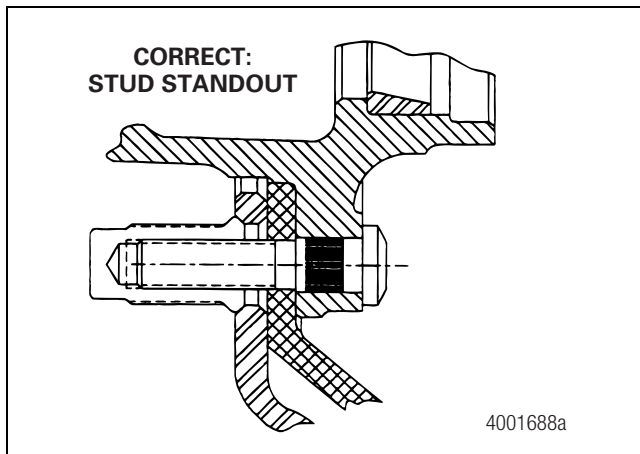


Figure 6.28

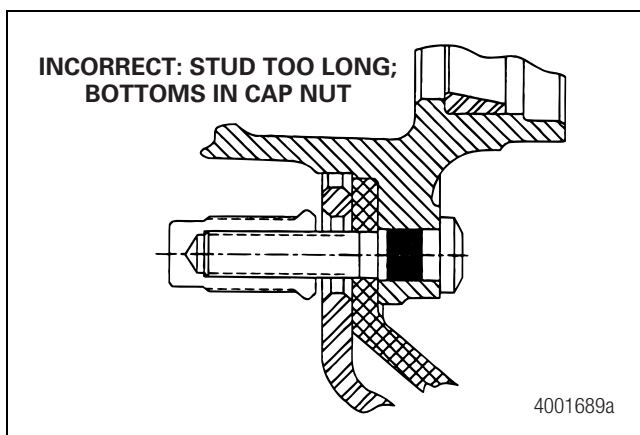


Figure 6.29

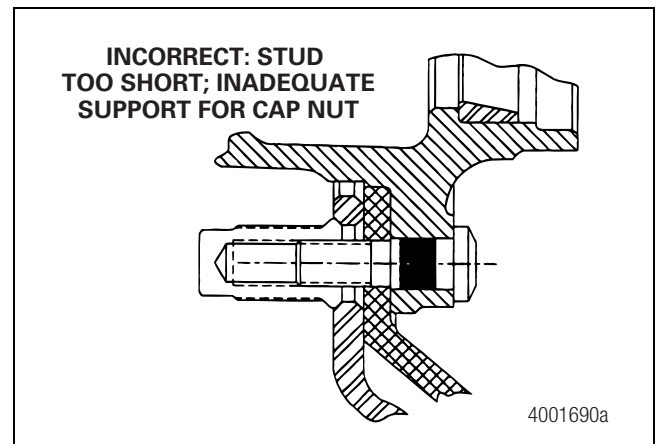


Figure 6.30

- C. Serrated studs do not usually interchange with those in various hub part numbers. Check the application. Call the Meritor OnTrac™ Customer Call Center at 866-OnTrac1 (668-7221) for more information.
3. Check for **R** and **L** stamped in the end of the stud. Figure 6.31. Install right-hand studs onto the right side of the vehicle, and left-hand studs onto the left side of the vehicle.

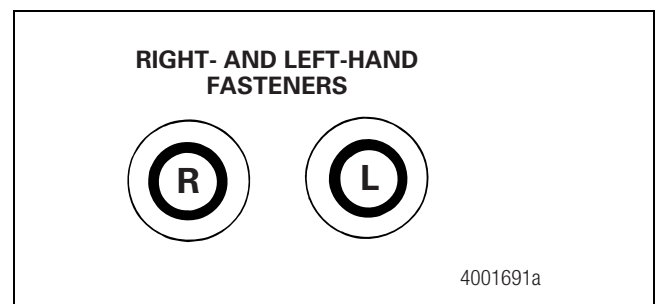


Figure 6.31

4. Some manufacturers color code studs. Check the manufacturer's instructions to verify the color code used.
5. Install the correct nut into all applications. Do not install rusty, galled or worn nuts. Ensure that you use the correct nuts in the following installations.
 - Install 33 mm hex two-piece flange nuts into ISO 285.75 mm bolt circle diameter (BC) and ISO 335 mm BC systems.

6 Assembly

- Install 1-1/2-inch hex two-piece flange nuts into a 275 mm system with M22 x 1.5 serrated studs. Do not install 1-1/2-inch hex two-piece flange nuts onto M22 x 1.5 serrated studs when 33 mm two-piece hex nuts are used on the CentroMount-8™ system.

6. Install aluminum wheel nuts onto aluminum wheels. Do not install steel wheel nuts. An aluminum wheel nut has an extension to accommodate the thickness of the aluminum. Figure 6.32 and Figure 6.33.

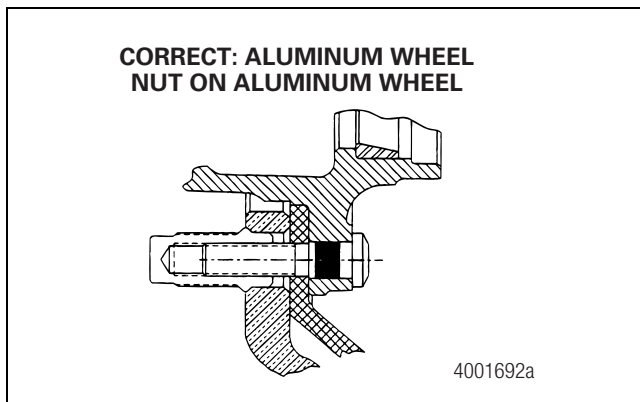


Figure 6.32

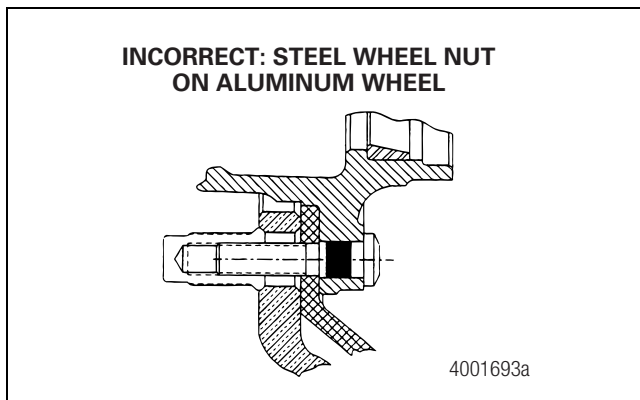


Figure 6.33

7. Install steel wheel nuts onto steel wheels. Do not install aluminum wheel nuts. The extension of the aluminum wheel nut can bottom against the hub flange or brake drum before the disc is clamped correctly. Figure 6.34 and Figure 6.35.

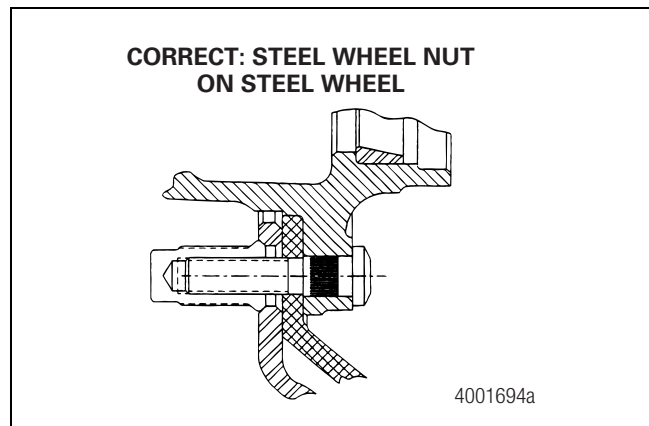


Figure 6.34

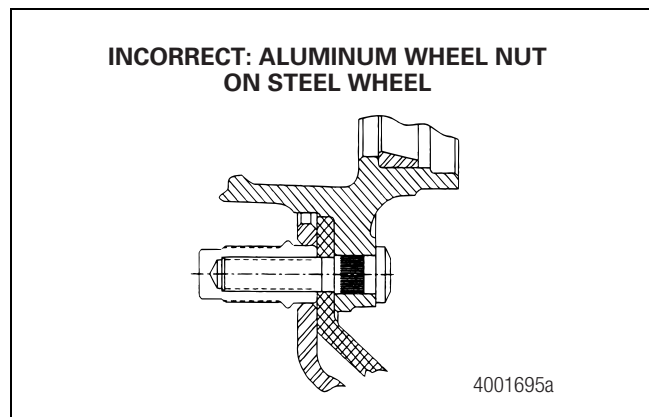


Figure 6.35

8. Install nuts with the correct thread size onto the studs. A correct thread size enables the nut to turn freely on the stud. An incorrect nut will fit very loosely on the stud thread, which can cause the thread to strip.
9. Check the extension of the stud through the nut after you tighten the nut to the specified torque.
 - **If less than two threads extend through the nut, or more than 3/8-inch (9.5 mm) of the stud extends through the nut:** Check all parts to verify that they are correct for the wheel system you will install onto the vehicle.
10. Ensure that the nut and wheel mate correctly. Ensure that you install the correct components onto the wheel systems. Figure 6.36 and Figure 6.37.
 - **If the wheel has a ball seat bolt hole pattern:** The nut must have a spherical surface that seats in the ball seat.

- If the wheel has a cylindrical bolt hole pattern: The nut must have a flat surface that seats against the wheel.

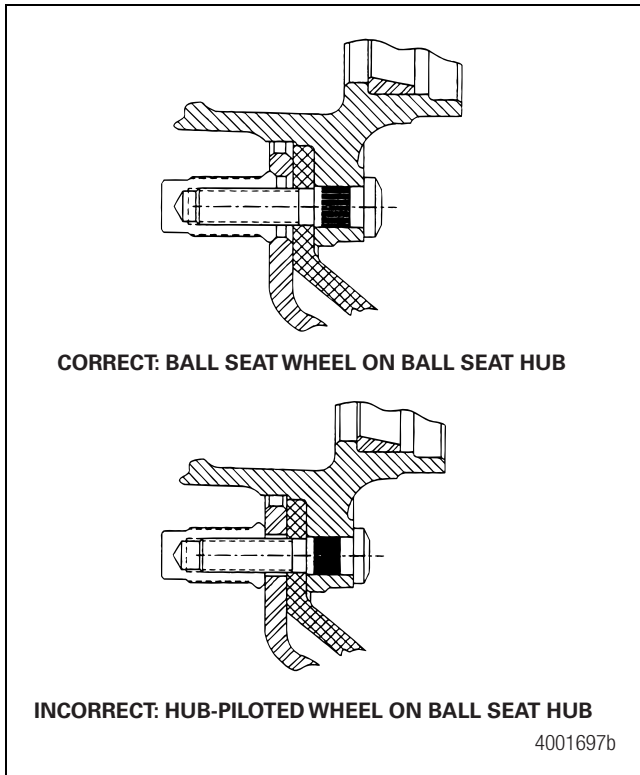


Figure 6.36

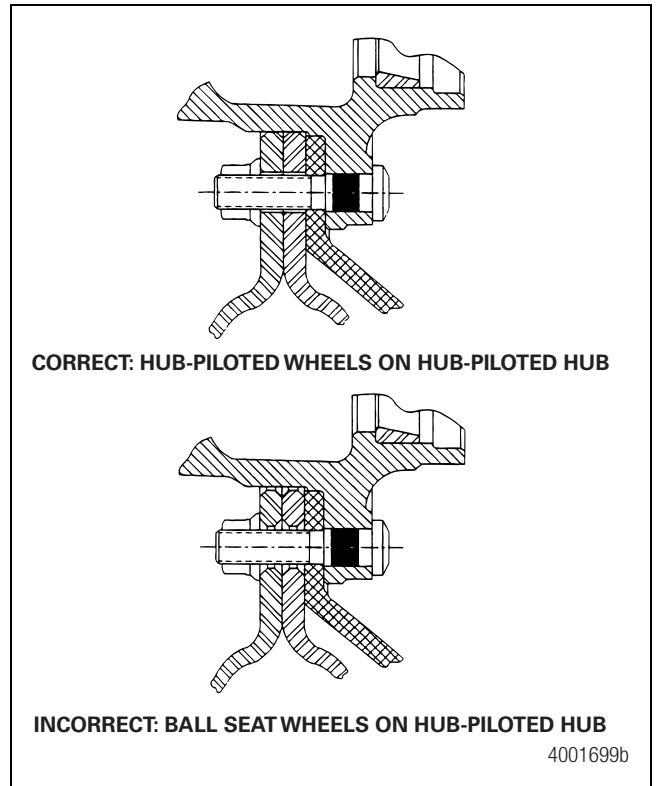


Figure 6.37

11. Follow the disc wheel manufacturer's fastener tightening sequence when you install fasteners to help ensure a higher and more uniform clamp load. Figure 6.38. Always check fasteners at the wheel manufacturer's recommended service intervals.

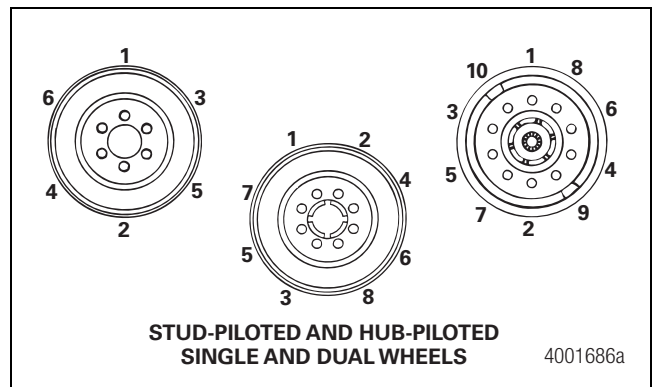


Figure 6.38

6 Assembly

⚠ DANGER

Apply two drops of oil between the nut flange and the hex portion of the swivel area at each installation if reinstalling the two-piece flange nuts that have been in service. Without lubricant, the fasteners may not produce adequate clamp load, and a wheel can loosen and separate from the vehicle. Serious personal injury and damage to components can result.

12. Apply two drops of oil between the nut flange and the hex portion of the swivel area at each installation if you reinstall the two-piece flange nuts that have been in service.
13. Apply two drops of oil to the last two or three threads at the end of each stud.

⚠ DANGER

Lightly lubricate the hub pilots to ease wheel installation and removal. Do not lubricate the mounting face of the drum or wheel. Lubricant on the drum or wheel mating surfaces can reduce friction and cause the components to slip during operation. Serious personal injury and damage to components can result.

14. Lightly lubricate the hub pilots to ease wheel installation and removal. Do not lubricate the mounting face of the drum or wheel.
15. Retighten all wheel nuts on all systems at 50-100 miles (80-160 km) to the correct torque specifications.
16. Use the correct installation tools.
17. Ensure that the gross weight does not exceed gross vehicle weight (GVW). Ensure that the axle loads do not exceed gross axle weight ratings (GAWR).

Stud Replacement Procedures

⚠ DANGER

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

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

If a stud is stripped and needs replacement, use one of the following procedures.

Preferred Method — Replacing Studs with the Hub Installed onto the Vehicle

⚠ DANGER

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. NEVER 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. Block the wheels to prevent the vehicle from moving.
2. Raise the vehicle so that the front wheels are off the ground. Support the vehicle with safety stands.
3. Mark the wheel and hub relationship. Remove the wheel and tire assembly. Use a paint stick to mark the wheel studs you are removing. Figure 6.39. Do not reuse the studs.

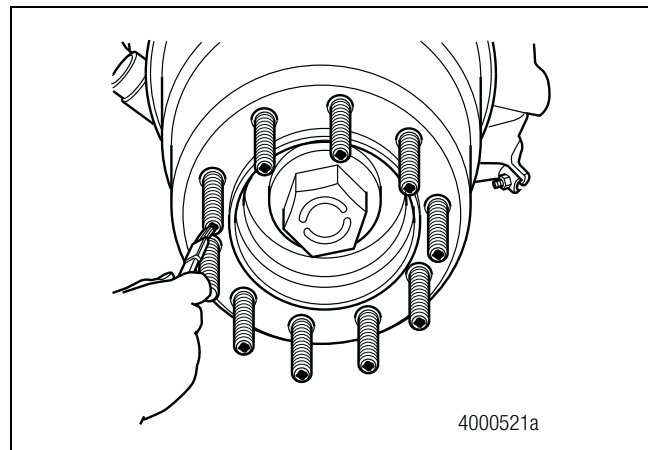


Figure 6.39

4. If necessary, back off the brake at the slack adjuster until the brake shoes retract and the drum clears the linings. Figure 6.40.

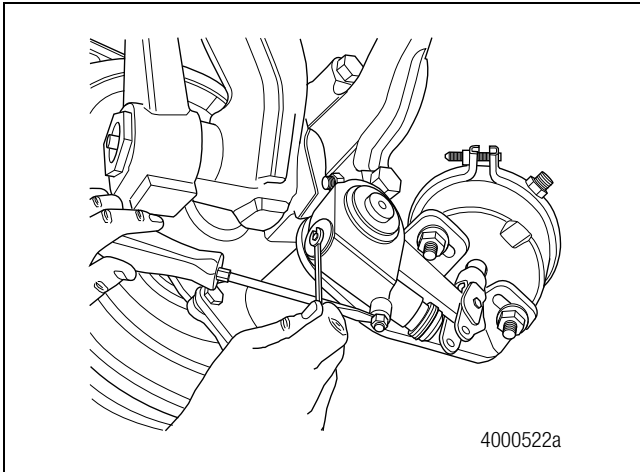


Figure 6.40

- Remove the brake drum. Figure 6.41.

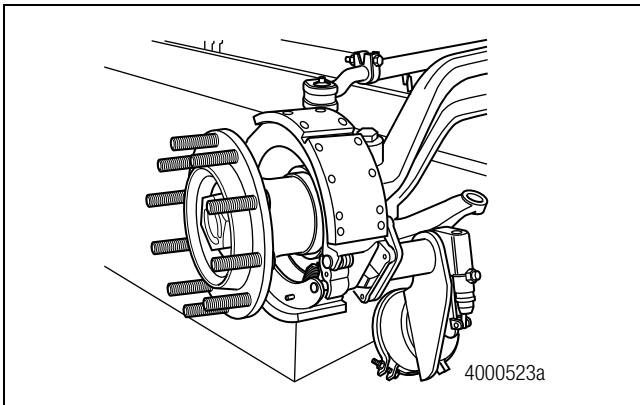


Figure 6.41

- Use a 1/2-inch (12.7 mm) drive impact wrench and a ball joint removal kit to remove the studs. Figure 6.42.

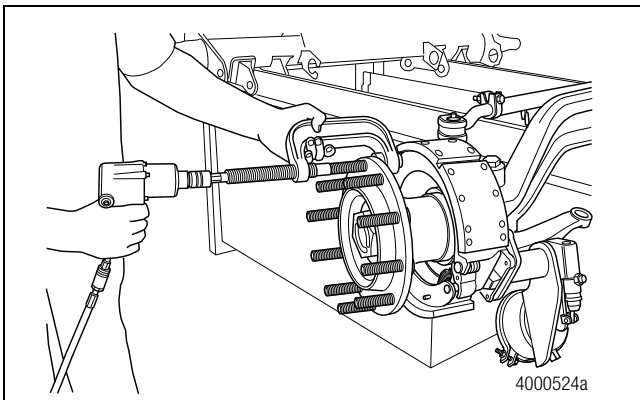


Figure 6.42

- Use a crocus cloth to clean all the flat surfaces on the wheel and hub.
- Position the new studs into the hub. Align the stud knurls with the impressions in the hub stud hole. Figure 6.43.

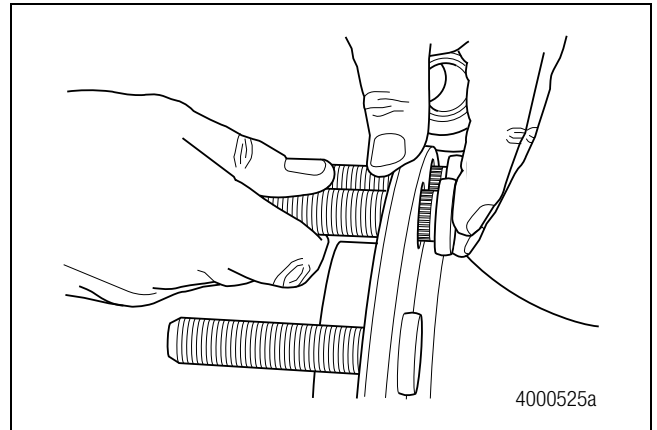


Figure 6.43

⚠ DANGER

Do not lubricate studs or nut threads. Lubricants will not allow the fasteners to be tightened correctly, which causes excessive clamp load. Studs can break and cause wheels to loosen and separate from the vehicle. Serious personal injury can result.

- Add two drops of oil between the nut flange and the hex portion of the swivel area on the two-piece flange nuts. Do not use more than two drops of oil. Figure 6.44.

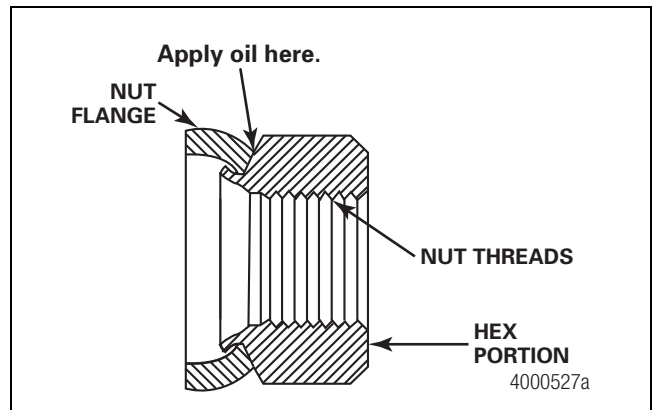


Figure 6.44

6 Assembly

⚠ DANGER

Install nuts with the correct thread size onto the studs. A nut with an incorrect thread size will not turn freely on the stud or will fit loosely on the stud. The thread can strip, which can cause loss of clamp load. The wheels can loosen and separate from the vehicle. Serious personal injury and damage to components can result.

10. Position the nuts onto the studs. Use a 1/2-inch (12.7 mm) drive impact wrench to draw the stud into the hub. Do not exceed 300 lb-ft (408 N•m). Figure 6.45.

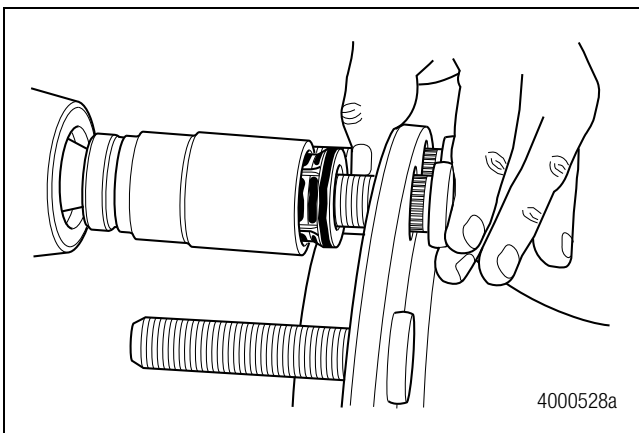


Figure 6.45

11. Use a 0.0015-inch (0.0381 mm) feeler gauge to check that the stud is correctly seated. Figure 6.46.

- **If the stud is not correctly seated:** Remove the stud, clean all surfaces and install a new stud as described previously.
- **If the stud is still not correctly seated:** Replace the hub.

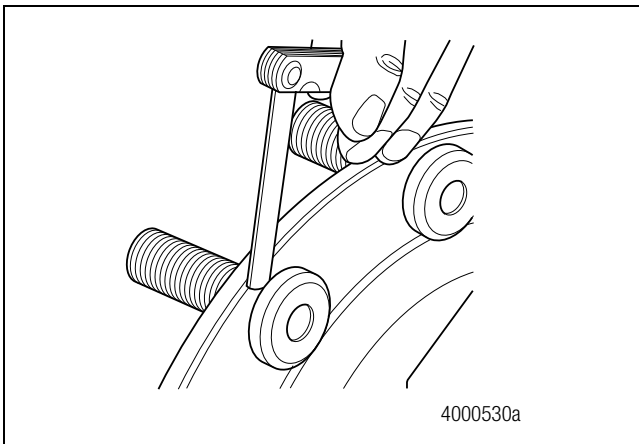


Figure 6.46

12. Remove all the nuts. Install the wheel and tire assembly.
13. Discard all removed studs.

Hazard Alert Messages

Read and observe all hazard alert messages in this publication.

⚠ WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

When performing a wheel bearing adjustment, observe the following guidelines.

- Always use the correct size wrench socket.
- Always use a torque wrench to tighten the adjusting nuts to their correct adjusting torque.
- Do not tighten or loosen the adjusting nuts by hitting the nuts with a hammer or by hitting a chisel or a drift placed against the nuts with a hammer. Damage to the nuts can result. Damaged adjusting nuts can prevent a correct wheel bearing adjustment, cause possible loss of vehicle wheel-end equipment and cause serious personal injury.

Check and Adjust the Wheel Bearings

Refer to technical publication TP-89159, Axle Wheel Bearing Installation Specifications, for a summary of all wheel end installation specifications. To obtain this publication, refer to the service notes page on the front inside cover of this manual.

The most accurate bearing end play measurement is obtained with the brake drum and tires removed.

- **If the brake drum and tires are installed and the bearing end play is greater than 0.003-inch (0.0762 mm):** Remove the brake drum and the tire-wheel assembly. Recheck bearing end play.

Front Axles

⚠ DANGER

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. NEVER 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. Block the wheels to prevent the vehicle from moving. Set the parking brake.
2. Raise the vehicle so that the wheels are off the floor. 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 7.1.

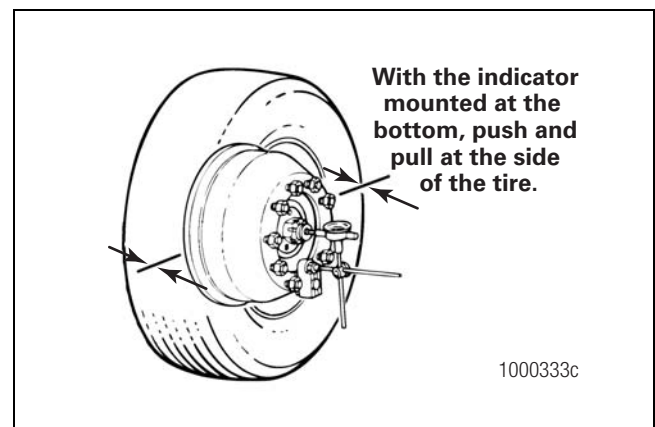


Figure 7.1

NOTE: Do not push or pull at the top and bottom of the hub or drum, which can affect the end play measurement.

6. Measure the end play by pushing and pulling on each side of the hub or drum while looking at the dial indicator. The end play is the total travel observed.
 - **If the end play is 0.001-0.005-inch (0.025-0.127 mm):** The bearings do not need adjustment.
 - **If the end play is not 0.001-0.005-inch (0.025-0.127 mm):** Adjust the wheel bearings. Figure 7.1.
7. **On double nut and lock fasteners:** Bend the lock washer off the wheel bearing nut. Remove the wheel bearing nut, the lock washer and the pierced lock ring. Figure 7.2.

7 Adjustment

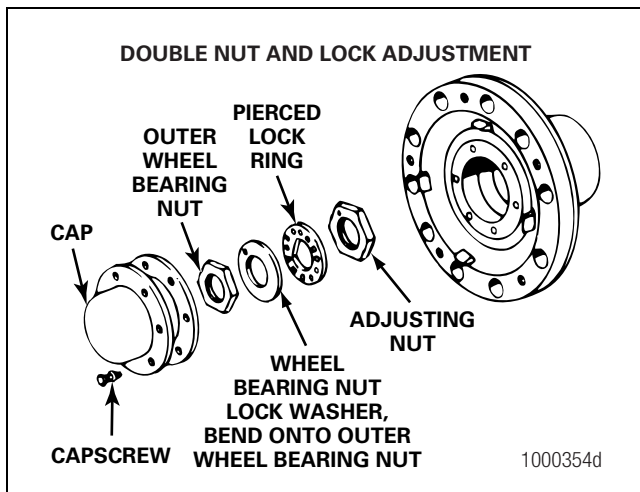


Figure 7.2

8. For disc brake wheel ends, back off the brake caliper until the rotor is clear from the pad linings about 1/16-inch (1.588 mm) gap or more. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake, for more information about EX225 disc brake inspection and adjustment. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual. Figure 7.3.

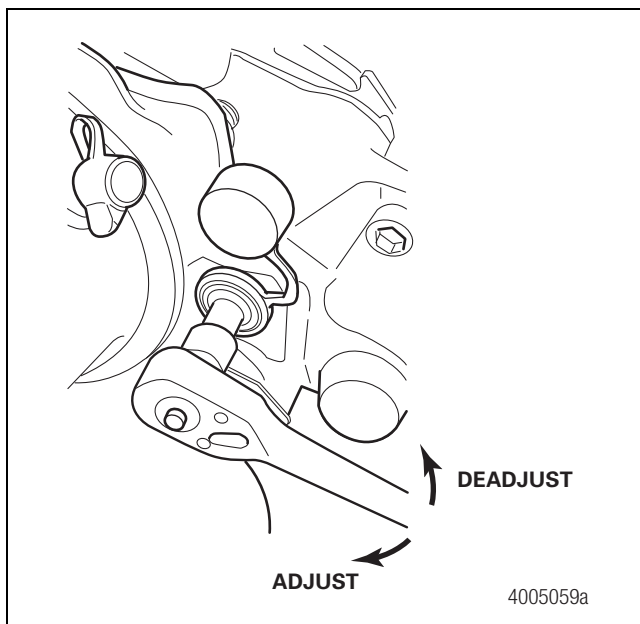


Figure 7.3

9. Use a torque wrench to tighten the adjusting nut to 150 lb-ft (203 N•m) while rotating the tire a minimum of five revolutions. Figure 7.4.

10. Back off the nut one complete turn. Tighten the nut to 50 lb-ft (68 N•m). Figure 7.4.

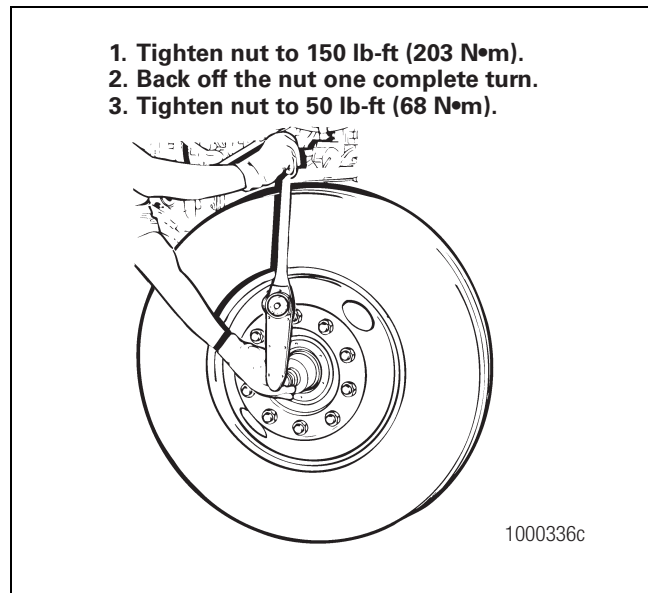


Figure 7.4

11. Perform the following adjustment procedure.
 - A. Back off the adjusting nut.
 - For spindle thread diameters of 1-1/8-inches (28.6 mm) and 1-1/2-inches (38.1 mm): Back off the nut 1/3 turn.
 - For spindle thread diameters of 1-3/4-inches (44.45 mm) and more: Back off the nut 1/4 turn.
 - B. Install the pierced lock ring, the lock washer and the wheel bearing nut.
 - C. Tighten the wheel bearing nut.
 - For MFS-06/07/08 with spindle thread diameters of 1-1/8-inches (28.6 mm): Tighten the nut to 150-225 lb-ft (203-305 N•m).
 - For spindle thread diameters over 1-1/8-inches (28.6 mm) up to 2-5/8-inches (66.67 mm): Tighten the nut to 200-300 lb-ft (271-407 N•m).
 - For spindle thread diameters of 2-5/8-inches (66.67 mm) and more: Tighten the nut to 250-400 lb-ft (339-542 N•m).

- D. Measure the end play. The end play must be 0.001-0.005-inch (0.025-0.127 mm). Refer to Step 5 and Step 6. Readjust if necessary.
- E. If the end play is to specification, bend the washer to at least one flat edge of the outer wheel bearing nut. Figure 7.2.

- 12. Install the gasket and the cap onto the hub. Install the capscrews and tighten to 12-16 lb-ft (16-22 N•m).
- 13. Lower the vehicle to the ground. Check for correct vehicle operation.

Drive Axles

- 1. If not already installed, install the inner wheel bearing adjusting nut onto the spindle and against the outer bearing so that the pin in the inner bearing adjusting nut is pointing away from the bearing. Figure 7.5.

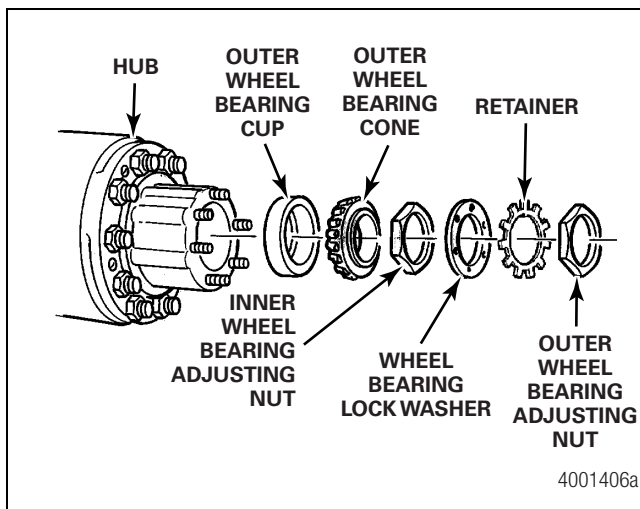


Figure 7.5

- 2. Tighten the adjusting nut to 200 lb-ft (272 N•m) while rotating the hub a minimum of five revolutions to fully seat the wheel bearings.
- 3. Loosen the inner adjusting nut one full turn.
- 4. Retighten to 50 lb-ft (68 N•m).
- 5. Loosen the inner adjusting nut 1/4 turn.

- 6. Install the lock washer. If the hole in the washer is not aligned with the inner adjusting nut pin, remove the washer, turn the washer over and reinstall it. The pin and the hole should now be aligned. If not, slightly adjust the inner adjusting nut. Use whichever lock washer side causes the least movement of the adjusting nut. Figure 7.6.

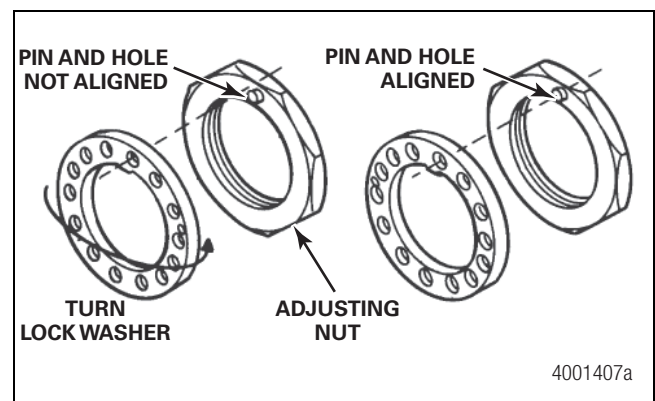


Figure 7.6

- 7. Assemble the stamped retainer and the outer wheel bearing adjusting nut onto the spindle.
- 8. Tighten the outer nut.
 - **If the thread pitch diameter is 2.62-inches or greater:**
Tighten the outer nut to 100-200 lb-ft (136-272 N•m).
 - **If the thread pitch diameter is 1.12-2.61-inches:**
Tighten the outer nut to 100-150 lb-ft (136-203 N•m).
- 9. Check and adjust the wheel end play to ensure it is 0.001-0.005 inch (0.025-0.127 mm). Use the following procedure to check the end play.
 - A. Attach the magnetic base of a dial indicator to the hub face. Touch the dial indicator stem against the end of the spindle.
 - B. Slightly rotate the hub in both directions while pushing inward until the dial indicator does not change. Set the dial indicator to ZERO.
 - C. Slightly rotate the hub in both directions while pulling OUTWARD until the dial indicator does not change.
 - D. Read the end play measurement on the dial indicator.

7 Adjustment

- **If end play does not meet specification:** Remove the outer wheel bearing adjusting nut, the stamped retainer and the lock washer. Tighten or loosen the inner adjusting nut as required to set the correct end play. Repeat Step 6 through Step 8.

NOTE: If you rotate the inner adjusting nut by one hole position, the end play setting will change by approximately 0.005-inch (0.127 mm). If the lock washer is turned over and installed, the end play setting will change by approximately 0.002 inch (0.051 mm).

10. When end play is correct, bend the two opposing tabs on the stamped retainer over the flats of the outer wheel bearing adjusting nut.
11. For optional grease-lubricated wheel ends, install a new grease seal onto the hub studs and the housing spindle.
12. Install the axle shafts, gasket and tapered dowels at each stud.
13. Install the nuts and the washers onto the studs. Tighten the nuts to the correct torque value. Refer to Section 9.

Hazard Alert Messages

Read and observe all hazard alert messages in this publication.

WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Troubleshooting

Diagnostic Chart

Significant wheel end component wear may enable the ABS warning light and cause a fault code to be set. Slow return of the steering wheel to its neutral position following completion of a turn may be another indication of wheel end component wear. Refer to Table B.

Table B: Wheel-End Component Troubleshooting

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

8 Troubleshooting

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

Torque Specifications

Wheel-End Components

Specifications can also be found in Technical Publication TP-89159, Axle Wheel Bearing Installation Specifications. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

Table C: Rotor Attachment Torque Specifications

Rotor Attachment Bolt Size	Rotor Attachment Bolt Torque Lb-Ft (N•m)
1/2-13	75-100 (102-136)
9/16-12	100-125 (136-169)
9/16-18	70-95 (95-129)
5/8-18	220-240 (298-325)

NOTE: Refer to the procedures in the Assembly and Adjustment sections for correct tightening instructions.

Table D: Tone Ring Attachment Torque Specifications

Thread	Torque Lb-In (N•m)
#10-24	45-59 (5.08-6.66)
M5x0.8 mm	
1/4x20	85-105 (9.6-11.86)
M6x1.0 mm	

NOTE: Refer to the procedures in the Section 6 for correct tightening instructions.

Table E: Axle Shaft Attachment Torque Specifications

Axle Shaft Attachment Nut Size	Axle Shaft Attachment Nut Torque Lb-Ft (N•m)
M12x1.75	85-95 (115-129)
1/2-20	75-115 (102-156)
5/8-18	150-230 (203-312)

NOTE: Refer to the procedures in the Assembly and Adjustment sections for correct tightening instructions.

Table F: Conventional, Unitized and ConMet Wheel-End System Torque Specifications

Axle	Initial Adjusting Nut Torque¹	Final Adjusting Nut Torque²	Spindle Thread Diameter	Jam Nut Torque Specification	Acceptable End Play Range²
Conventional Wheel-End System					
Drive axles without lock washers	200 lb-ft (272 N•m) Back off 1 turn	50 lb-ft (68 N•m) Back off 1/4 turn	Less than 2-5/8" (66.67 mm) and 2-5/8" (66.67 mm) and over	200-300 lb-ft (272-408 N•m) and 300-400 lb-ft (408-544 N•m)	0.001"-0.005" (0.025-0.127 mm)
Drive axles with bendable lock washers	200 lb-ft (272 N•m) Back off 1 turn	50 lb-ft (68 N•m) Back off 1/4 turn	Less than 2-5/8" (66.67 mm) and 2-5/8" (66.67 mm) and over	100-150 lb-ft (136-204 N•m) and 100-200 lb-ft (136-272 N•m)	0.001"-0.005" (0.025-0.127 mm)

9 Specifications

Axle	Initial Adjusting Nut Torque ¹	Final Adjusting Nut Torque ²	Spindle Thread Diameter	Jam Nut Torque Specification	Acceptable End Play Range ²
Front non-drive steer axles	150 lb-ft (203 N•m) Back off 1 turn	50 lb-ft (68 N•m) Back off 1/3 turn for 1-1/8" (28.6 mm), 1-1/2" (38.1 mm)	1-1/8" (28.6 mm) MFS-06, MFS-07, MFS-08	150-225 lb-ft (203-305 N•m)	0.001"-0.005" (0.025-0.127 mm)
		Back off 1/4 turn for 1-3/4" (44.45 mm) and over	Over 1-1/8" (28.6 mm), less than 2-5/8" (66.67 mm)	200-300 lb-ft (272-408 N•m)	
			2-5/8" (6.67 mm) and over	250-400 lb-ft (339-542 N•m)	
Trailer axles	200 lb-ft (272 N•m) Back off 1 turn	50 lb-ft (68 N•m) Back off 1/4 turn	2-5/8" (66.67 mm) and over	300-400 lb-ft (408-544 N•m)	0.001"-0.005" (0.025-0.127 mm)
PRO-TORQ™ front and drive axles	200 lb-ft (272 N•m) Back off 1 turn	100 lb-ft (136 N•m) Back off 1/6 turn	Less than 2-5/8" (66.67 mm)	NA	0.001"-0.005" (0.025-0.127 mm)
		Back off 1/8 turn	2-5/8" (66.67 mm) and over		
Unitized Wheel-End System					
PRO-TORQ™ front and tag axles	600 ±75 lb-ft (813 ±102 N•m)	NA	FH941/946 MC14 and MC16 wheel ends	NA	0.002" (0.051 mm)
ConMet Wheel-End System					
PRO-TORQ™ drive axles	300 lb-ft (408 N•m)	NA	All ConMet® PreSet®	NA	0.006" (0.152mm)

NOTE: For disc brake wheel ends, back off the brake caliper until the rotor is clear from the pad linings about 1/16-inch (1.588 mm) gap or more. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake, for more information. To obtain this publication, visit Literature on Demand at meritor.com.

¹ Rotate the hub a minimum of five complete turns while tightening the nut.

² The nut may need to be slightly tightened or loosened to meet the required end play.

Table G: Long-Life Wheel-End System Torque Specifications

	Inner Nut Torque Specification ¹		Outer Nut Torque Specification		Out-of-service End Play Criteria ²
Front non-drive steer (Easy Steer Plus™)	500-700 lb-ft (680-952 N•m)		200-300 lb-ft (272-408 N•m)		0.006" (0.1524 mm) or more
	Inner Nut Torque ¹		Outer Nut Torque		Out-of-service End Play Criteria ²
Trailer (TB Series)	700-750 lb-ft (952-1020 N•m)		250-300 lb-ft (340-408 N•m)		0.006" (0.1524 mm) or more
	Initial Adjusting Nut Torque	Tighten Adjusting Nut	Install Tab Washer and Retainer Nut	Final Adjusting Nut Torque (Counter-clockwise) ³	Acceptable End Play Range
Trailer (TRIAD™ wheel-end system)	150-200 lb-ft (204-272 N•m) Back off until loose	50-60 lb-ft (68-82 N•m) Back off 1/8 turn	20-25 lb-ft (27-34 N•m)	50 lb-ft (68 N•m)	0.001"-0.005" (0.025-0.127 mm)
	Adjusting Nut Torque ^{1 4}		Out-of-Service End Play Criteria		
Trailer (TL Unitized)	810-850 lb-ft (1100-1150 N•m)		Greater than 0.003" (0.08 mm)		
	Inner Spindle Nut Torque ¹		Outer Nut Torque		Out-of-service End Play Criteria ²
Trailer (PreSet® by Meritor)	300 lb-ft (408 N•m)		200 lb-ft (272 N•m)		0.006" (0.1524 mm) or more, service the PreSet hub assembly

NOTE: For disc brake wheel ends, back off the brake caliper until the rotor is clear from the pad linings about 1/16-inch (1.588 mm) gap or more. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake, for more information. To obtain this publication, visit Literature on Demand at meritor.com.

¹ Rotate the hub a minimum of five complete turns while tightening the nut.

² After the retightening procedure is complete.

³ Rotated counter-clockwise against the retainer nut.

⁴ Use a hammer and staking tool to stake the stake washer to the spindle nut in **three** positions.

9 Specifications

FH and MC Series Wheel-End Components

Table H: Wheel-End Torque Specifications

Axle Model	Bolt Joint	Fastener Size	Torque Lb-Ft	Torque N•m
FH Series	Torque Plate-to-Knuckle	0.75 x 16	310-400	420-540
FH Series	Brake Spider-to-Knuckle	0.75 x 16	310-400	420-540
MC12	Torque Plate/Spindle/Frame Flange	0.625 x 11	180-230	245-310
MC12	Brake Spider/Spindle/Frame Flange	0.625 x 11	180-230	245-310
MC14/MC16	Torque Plate/Spindle/Frame Flange	0.75 x 10	326-420	440-570
MC14/MC16	Brake Spider/Spindle/Frame Flange	0.75 x 10	326-420	440-570
FH and MC Series	UWE Bearing/Rotor/Wheel Adapter	M18 x 1.5	250-300 ¹	340-410 ¹
FH and MC Series	UWE PRO-TORQ™ Nut	2.25-12	525-675 ²	714-918 ²
FH and MC Series	UWE Wheel Adapter Inspection Plug	0.375-18	25 Min	34 Min
FH and MC Series	EX225H Carrier-to-Torque Plate Bolts	M20 x 1.5	350-450	475-610
FH and MC Series	Hub Cap	0.31 x 18	12-18	16-24
FH and MC Series	Hub Cap	0.375-16	12-18	16-24
FH and MC Series	Hub Cap Filler Plug	—	15-25	20-34

¹ Tighten bolts in a star pattern, repeat pattern to verify. Re-check torques every 30,000 miles, or before.

² Assemble PRO-TORQ™ nut with anti-seize compound on the threads.

Drive Axle Wheel-End Components

Table I: Axle Shaft Torque Specifications

Description	Size	Torque Range*	
		Lb-ft	N•m
Axle Shaft-to-Flange Capscrew	0.312"-24	18-24	24-33
	0.50"-13	85-115	115-156
Axle Shaft-to-Flange Nut (Plain Nut)	0.438"-20	50-75	68-102
	0.50"-20	75-115	102-156
	0.562"-18	110-165	149-224
	0.625"-18	150-230	203-312
	0.438"-20	40-65	54-88
Axle Shaft-to-Flange Nut (Locknut)	0.50"-20	65-100	88-136
	0.562"-18	100-145	136-197
	0.625"-18	130-190	176-258
	0.625"-18	130-190	176-258

*Target the middle torque value in the range shown.

10 Lubrication and Maintenance

Hazard Alert Messages

Read and observe all hazard alert messages in this publication.

⚠ DANGER

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. NEVER work under a vehicle only supported by jacks. Jacks can slip or fall over. Serious personal injury and damage to components can result.

⚠ WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Conventional Wheel Ends

Wheel-End Maintenance

Grease-Lubricated Wheel Bearings

1. Park the vehicle on a level surface. Place blocks under the wheels to prevent the vehicle from moving.
2. Raise the vehicle so that the wheels are off the ground. Support the vehicle with safety stands.
3. Remove the tire and wheel assembly. Remove and disassemble the hub.
4. Use the correct cleaning solvent to remove the old grease from all parts. Discard the seals. Inspect the wheel bearings for wear or damage. Replace worn or damaged bearings.
5. Before installing the wheel bearings, lubricate the bearing journals on the spindle with the grease that is used for the bearings. Figure 10.1.

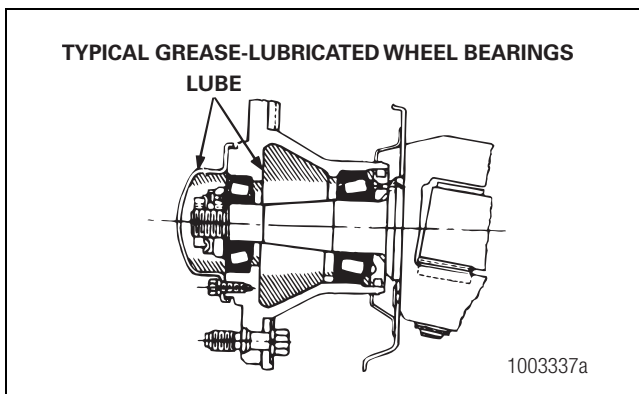


Figure 10.1

6. Use a pressure packer to force the specified grease from the large end of the cones into the cavities between the rollers and cage. Pack the hub between the bearing cups with grease to the level of the smallest diameter of the cups.
 - If a pressure packer is not available: Grease the bearings by hand.
7. Install the inner and outer bearing cones into the cups in the hubs. The bearing cups must be pressed tight against the shoulder in the hubs.
8. Install new wheel seals into the hubs.
9. Install the hub and the wheel and tire assembly. Install the outer wheel bearing cone into the hub. Install the adjusting nut.
10. Adjust the wheel bearings.

Oil-Lubricated Wheel Bearings — Recommended Hub Fill Procedure for Drive Axles Equipped With Hub or Axle Shaft Fill Plugs

1. Park the vehicle on a level surface. Place blocks under the wheels to prevent the vehicle from moving.
2. Rotate the hub until the fill plugs are at the top.
3. Remove the oil fill plugs. Fill each hub cavity with two pints (1 L) of rear axle lubricant. Figure 10.2.

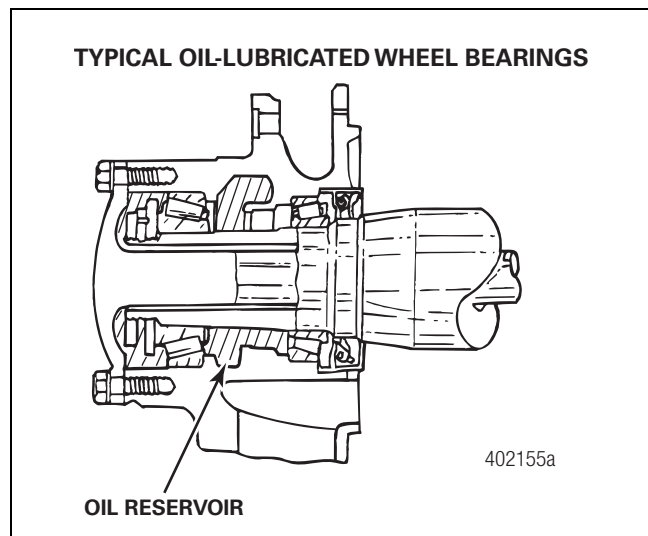


Figure 10.2

4. Install and tighten the fill plugs to 10 lb-ft (13.8 N•m) minimum.

- Road test the vehicle after the initial hub fill in an unloaded condition for one to two miles at safe speeds, but no higher than 25 mph (40 km/h). During the road test, make at least four full left turns and four full right turns with some articulation each time between left and right sides.
- Wait approximately ten minutes after completing the road test for the oil to settle. Remove the oil fill plug in the axle housing and check the axle oil level.
- If necessary, add oil so the oil level is at the bottom of the fill plug.
- Install and tighten the axle fill plug. Refer to Section 9 for the correct torque values.

Oil-Lubricated Wheel Bearings — Recommended Hub Fill Procedures for Drive Axles Without Hub or Axle Shaft Fill Plugs

Option A

- Park the vehicle on a level surface. Place blocks under the wheels to prevent the vehicle from moving.

⚠ WARNING

Verify the vehicle is unloaded before raising the end of an axle. A loaded vehicle can change an axle's center of gravity and safe allowable tilt angle. If the axle of a loaded vehicle is raised, the vehicle can tip over. Serious personal injury and damage to components can result.

Ensure the tilt angle of the vehicle does not exceed the maximum allowable angle when the end of the axle is raised. A vehicle tilted beyond the maximum allowable angle can lose stability and cause the vehicle to tip over. Serious personal injury and damage to components can result.

- Verify the vehicle is unloaded. Ensure the tilt of the vehicle does not exceed the maximum allowable angle. Raise one end of an axle 11-12-inches (28-31 cm). Hold the axle in that position for at least 15 minutes to allow the oil to flow out to the wheel hub. Repeat the procedure on the other end of the axle. Figure 10.2.
- Check the oil level in the axle housing and refill to the bottom of the fill plug. Install and tighten the axle fill plug. Refer to Section 9 for the correct torque values.

- Road test the vehicle after the initial hub fill in an unloaded condition for one to two miles at safe speeds, but no higher than 25 mph (40 km/h). During the road test, make at least four full left turns and four full right turns with some articulation each time between left and right sides.
- Wait approximately ten minutes after completing the road test for the oil to settle. Remove the oil fill plug in the axle housing and check the axle oil level.
- If necessary, add oil so the oil level is at the bottom of the fill plug.
- Install and tighten the axle fill plug. Refer to Section 9 for the correct torque values.
- Road test the vehicle in an unloaded condition for one to two miles (1.6-3.2 km) at speeds not more than 25 mph (40 km/h). Recheck the lubricant levels and all of the fasteners. Adjust as necessary.

Option B

- Park the vehicle on a level surface. Place blocks under the wheels to prevent the vehicle from moving.
- Remove the axle shaft fasteners and slide the axle shaft out of the drive axle assembly.
- Remove the wheel end nuts and lock washers.
- Remove the outer bearing cone.
- Insert a filling nozzle into the hub cavity and fill with approximately 6-9 oz. (177-266 ml) of axle lubricant. Figure 10.3.

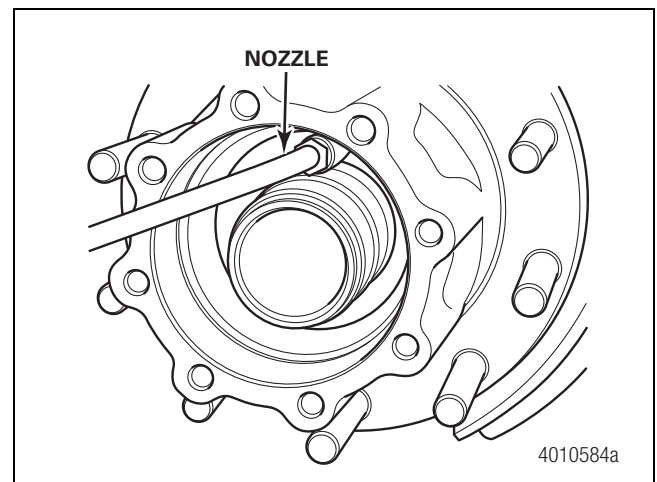


Figure 10.3

10 Lubrication and Maintenance

6. Place a drain pan under the hub. Continue to fill until you observe fluid beginning to flow out of the hub cavity down the face of the hub. Some fluid loss is to be expected.
7. Install the outer bearing cone, wheel end nuts and lock washers. Refer to Section 6 for procedures.
8. Thoroughly clean the hub so it is free of any lubricant or debris. Reinstall the axle shaft gasket and axle shaft.
9. Road test the vehicle in an unloaded condition for one to two miles (1.6-3.2 km) at speeds not more than 25 mph (40 km/h). Recheck the lubricant levels and all of the fasteners. Adjust as necessary.

Lubrication Intervals and Specifications

For military on/off highway and military severe duty applications, refer to TP-10109. For a copy of this technical bulletin, contact the Meritor OnTrac™ Customer Call Center at 866-OnTrac1 (668-7221).

Table J: Wheel-End Axle Greasing Intervals and Specifications

Greasing Interval	Grease	Meritor Specification	NLGI Grade	Grease Description	Typical Application	Outside Temperature
Whichever comes first: Replacing Seals Relining Brakes On-Highway: 30,000 miles (48 000 km)/Once a year On/Off Highway and Off-Highway: 15,000 miles (24 140 km)/Twice a year	Multi-Purpose Grease ¹	0-617-A, preferred, or 0-617-B, acceptable 0-704, recommended	1 or 2 2	Lithium 12-Hydroxy Stearate or Lithium Complex ² TEK-678 Calcium Sulfonate	Wheel Bearings Hubs Spindle King Pins Tie Rod Ends Brake Anchor Pins Brake Camshafts	Refer to the grease manufacturer's specifications for the temperature service limits.

¹ Meritor recognizes that industry trends are moving toward increased selection and usage of synthetic grease in vehicle maintenance. However, some seals are known to expand when in contact with synthetic grease. Consult your local Meritor representative for synthetic grease application references before using any synthetic grease when performing wheel-end service and maintenance.

² Engineered Custom Lubricants (ECL), 45800 Mast Street, Plymouth, MI 48170, 734-451-2800, www.ecllube.com

Table K: Wheel-End Oil Change Intervals and Specifications

Operation	On-Highway	Off-Highway
Check Oil Level	1,000 miles (1600 km)	1,000 miles (1600 km)
Petroleum Oil Change	Whichever comes first. Seals replaced. Brakes relined. 100,000 miles (160 000 km). Once a year.	Whichever comes first. Seals replaced. Brakes relined. Once a year.
Synthetic Oil Change	Whichever comes first. Seals replaced. Brakes relined. 100,000 miles (160 000 km). Once a year.	Whichever comes first. Seals replaced. Brakes relined. Once a year.

Table L: Approved Lubricants

Meritor Specifications	Military/SAE Specifications	Oil Description	Outside Temperature			
			°F		°C	
			Min.	Max.	Min.	Max.
O-76-A Gear Oil	MIL-PRF-2105-E and SAE J2360	GL-5, SAE 85W/140	-10	None	-12	None
O-76-D Gear Oil		GL-5, SAE 80W/90	-15	None	-26	None
O-76-E Gear Oil		GL-5, SAE 75W/90	-40	None	-40	None
O-76-J Gear Oil		GL-5, SAE 75	-40	35	-40	2
O-76-M Full-Synthetic Oil		GL-5, SAE 75W/140	-40	None	-40	None
O-76-N Full-Synthetic Oil		GL-5, SAE 75W/90	-40	None	-40	None
Heavy-Duty Engine Oil	MIL-L-2104 E or F	A.P.I. -CD, -CE, -SG, -SH or -SJ SAE 40 or 50 ¹	-10	None	-12	None
Heavy-Duty Engine Oil	MIL-L-210 E or F	A.P.I. -CD, -CE, -SG, -SH or -SJ SAE 30 ²	-15	None	-26	None

¹ Current designations are acceptable. Multi-grade engine oils are acceptable if the SAE rating ends in 40 or 50.

² Current designations are acceptable. Multi-grade engine oils are acceptable if the SAE rating ends in 30.

11 Special Tools

Description

Wheel-End Seal Driver Application Chart

To obtain these tools, refer to the Service Notes page on the front inside cover of this manual.

Table M: Seal Drivers and Corresponding Axle Models

<u>Seal Driver Figure Reference</u>	<u>Base Axle Model Number</u>
Figure 11.1	MS-12-113
Figure 11.2	RS-17-145 and RS-19-145
Figure 11.3 and Figure 11.4	RS-13-120
Figure 11.5	RS-21-145 Cam Brake and Disc Brake
Figure 11.6	MFS-6
Figure 11.7	MFS-8
Figure 11.8	MFS-10
Figure 11.9	MFS-12
Figure 11.10	RS-23-186
Figure 11.11	MS-30-185
Figure 11.12	FH and FL Series
Figure 11.13	71163KX, 71163WX and 71163RX

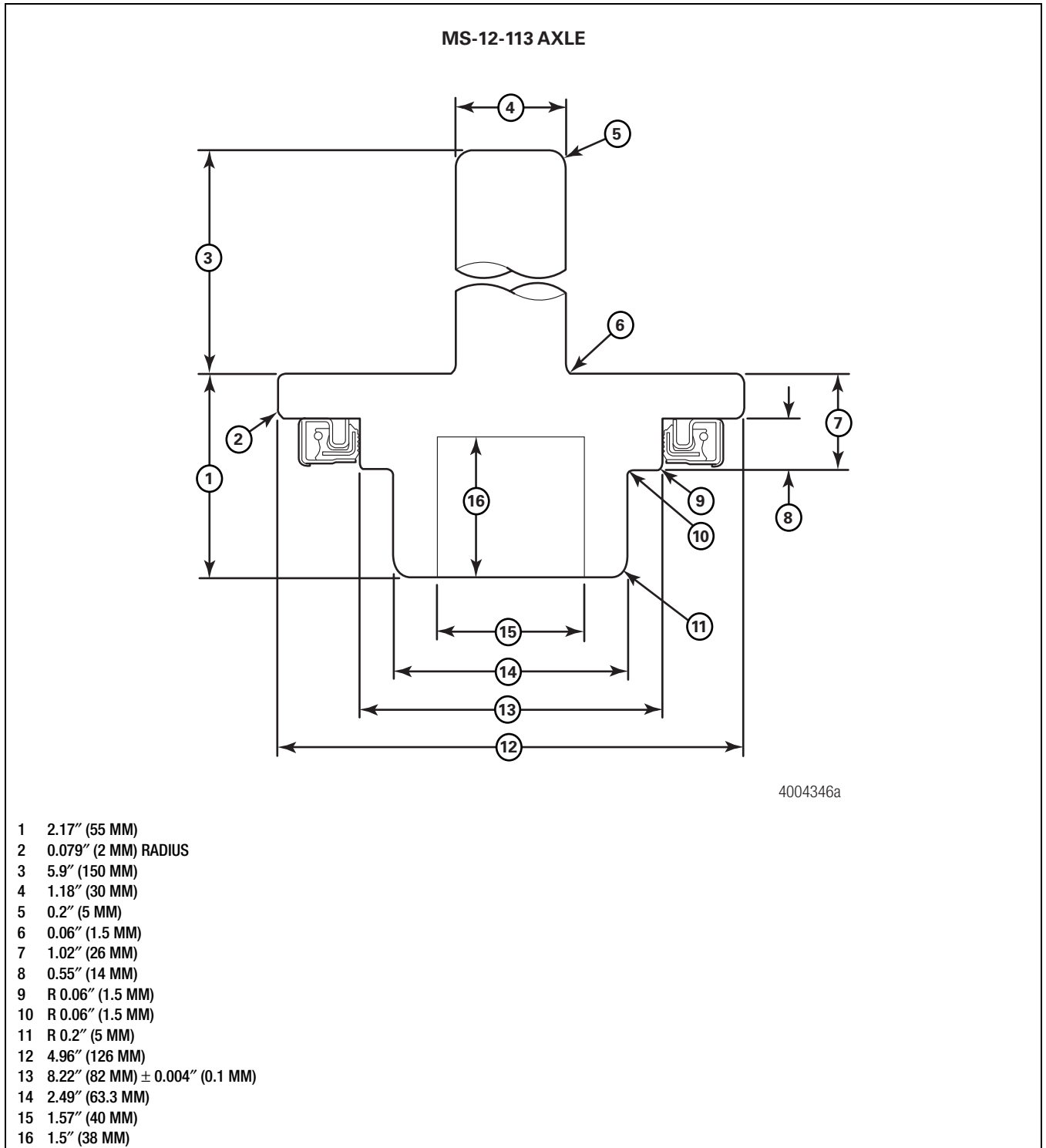
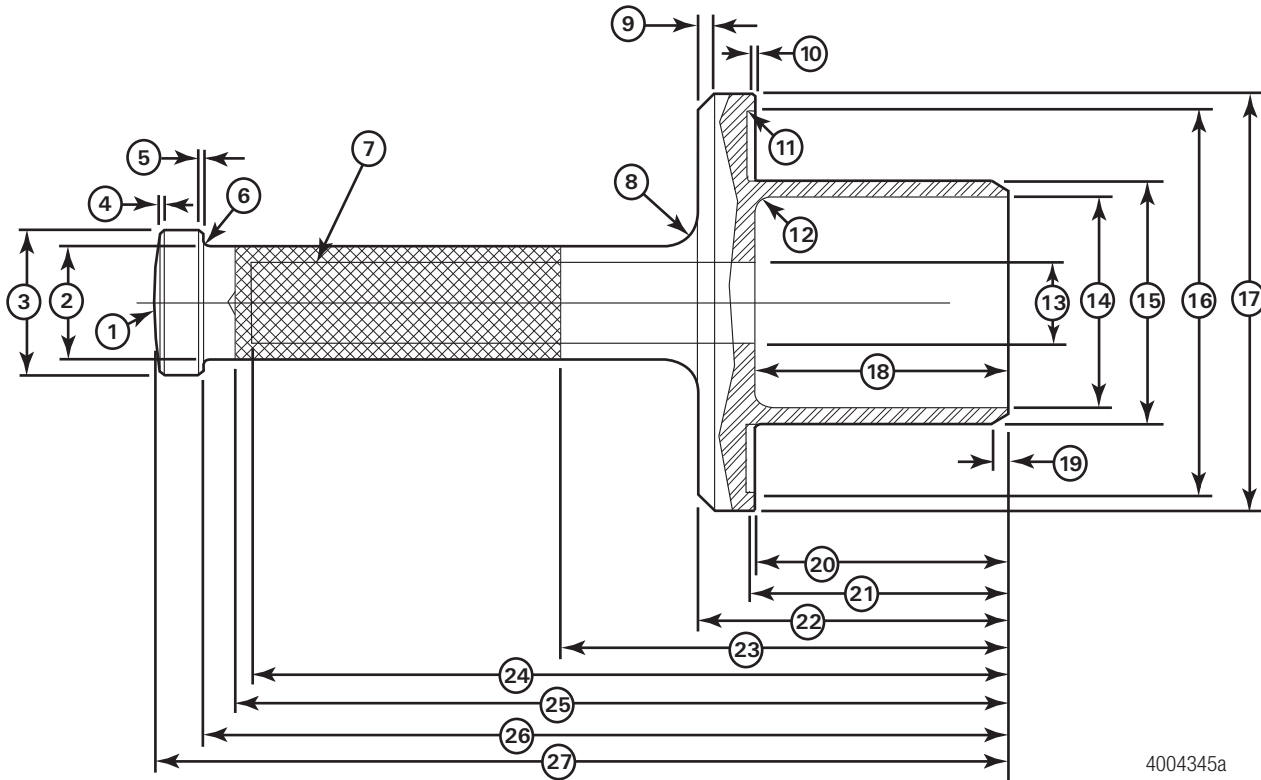


Figure 11.1

11 Special Tools

RS-17-145AND RS-19-145 AXLE



4004345a

- 1 6" (152.4 MM) SPHERE RADIUS
- 2 1.75" (44.45 MM) DIAMETER
- 3 2.25" (57.15 MM) DIAMETER
- 4 0.06" (1.52 MM) X 45° TYP
- 5 0.06" (1.52 MM) X 45°
- 6 0.13" (3.3 MM) RADIUS
- 7 COARSE KNURL
- 8 0.5" (12.7 MM) RADIUS
- 9 0.25" (6.35 MM) X 45°
- 10 0.03" (0.76 MM) X 45°
- 11 0.06" (1.52 MM) R-TYP
- 12 0.25" (6.35 MM) RADIUS
- 13 1.25" (31.75 MM)
- 14 2.75" (69.85 MM)
- 15 3.24" (82.296 MM) DIAMETER
- 16 5.25" (133.1 MM) DIAMETER
- 17 5.63" (143 MM) DIAMETER
- 18 3.5" (88.9 MM)
- 19 0.25" (6.35 MM) X 30°
- 20 3.25" (82.55 MM)
- 21 3.37" (85.6 MM)
- 22 4.25" (107.95 MM)
- 23 6.25" (158.75 MM)
- 24 11" (279.4 MM)
- 25 11.25" (285.75 MM)
- 26 11.75" (298.45 MM)
- 27 12.5" (317.5 MM)

Figure 11.2

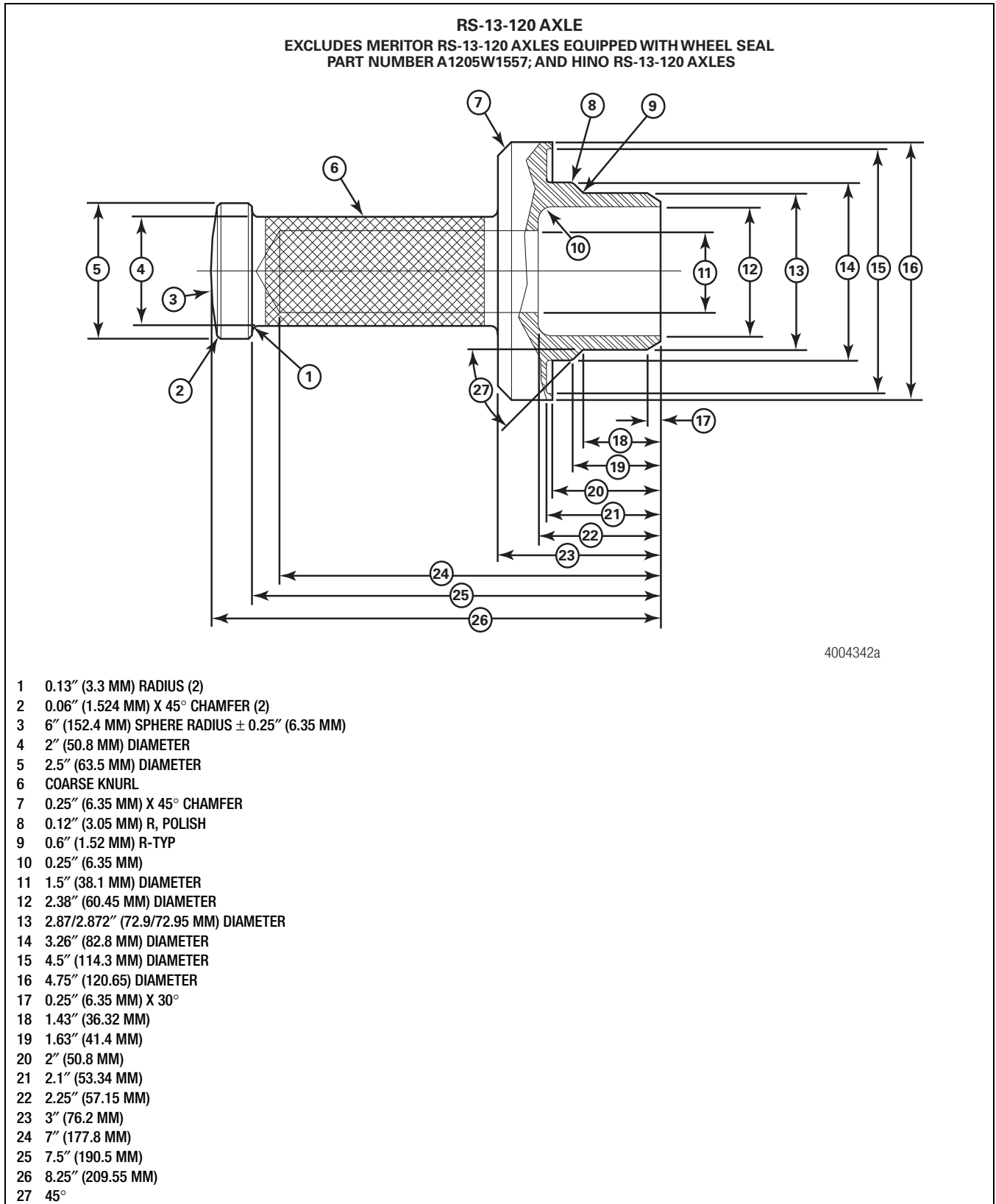
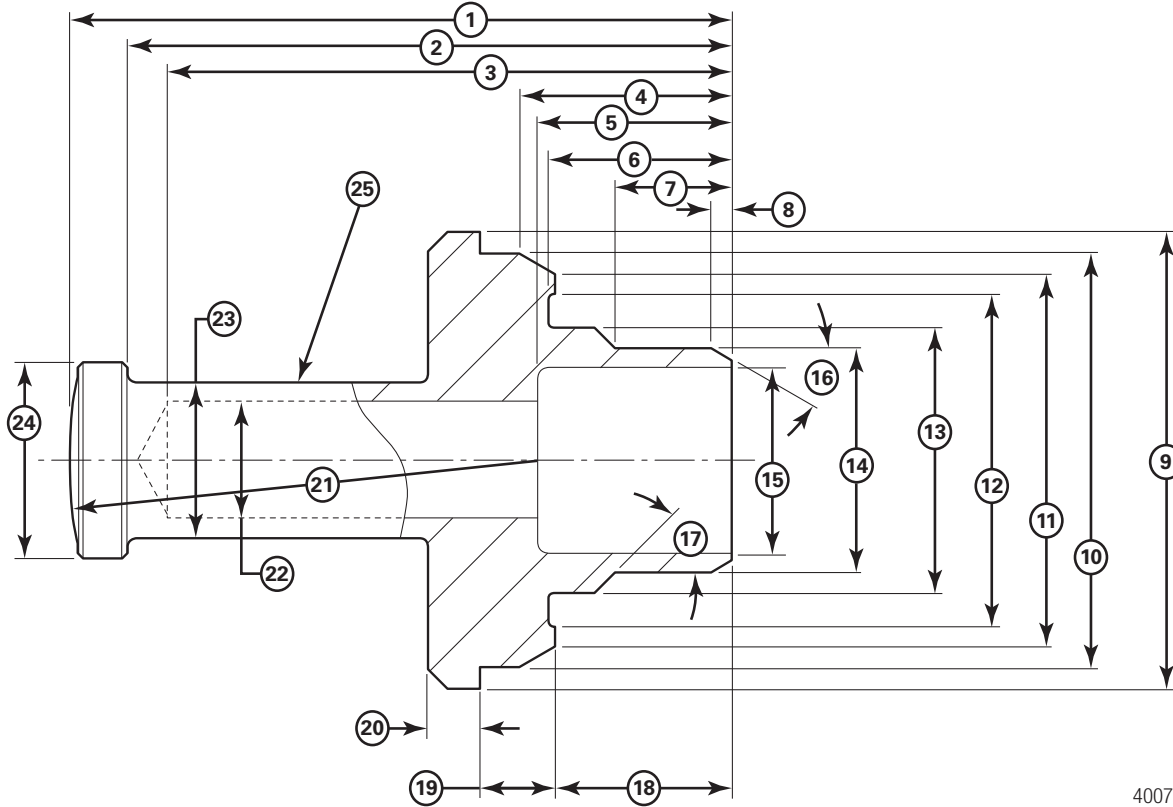


Figure 11.3

11 Special Tools

**RS-13-120 AXLE WITH QUADRAULIC DISC BRAKES
INCLUDES MERITOR RS-13-120 AXLES EQUIPPED WITH WHEEL SEAL
PART NUMBER A1205W1557; AND HINO RS-13-120 AXLES**



4007377a

- 1 8.5" (215.9 MM)
- 2 7.75" (196.85 MM)
- 3 7.25" (184.15 MM)
- 4 2.7" (68.58 MM)
- 5 2.5" (63.5 MM)
- 6 2.35" (59.69 MM)
- 7 1.5" (38.1 MM)
- 8 0.25" (6.35 MM)
- 9 5.87" (149.1 MM) ± 0.001 " DIAMETER
- 10 5.3" (134.62 MM) DIAMETER
- 11 4.79" (121.67 MM) DIAMETER
- 12 4.25" (107.95 MM) DIAMETER
- 13 3.405" (86.487 MM) DIAMETER
- 14 2.871" (72.923 MM) ± 0.001 " DIAMETER
- 15 2.38" (60.452 MM) DIAMETER
- 16 30°
- 17 45°
- 18 2.25" (57.15 MM)
- 19 0.965" (24.511 MM) ± 0.005 " SEAL DEPTH
- 20 0.67" (17.018 MM)
- 21 6.0" (152.4 MM) RADIUS
- 22 1.5" (38.1 MM) DIAMETER
- 23 2.0" (50.8 MM) DIAMETER
- 24 2.5" (63.5 MM) DIAMETER
- 25 KNURLED SURFACE ON HANDLE

Figure 11.4

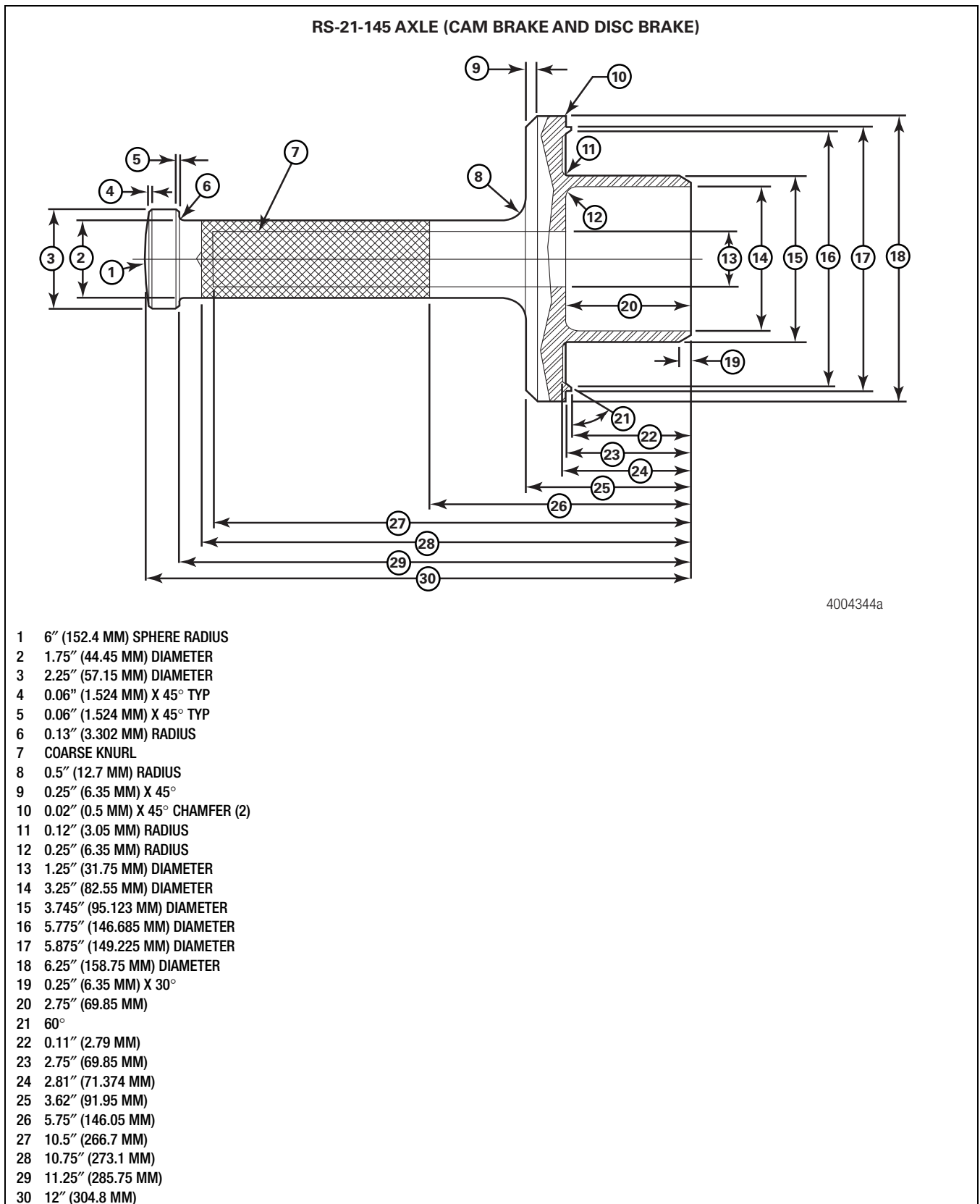


Figure 11.5

11 Special Tools

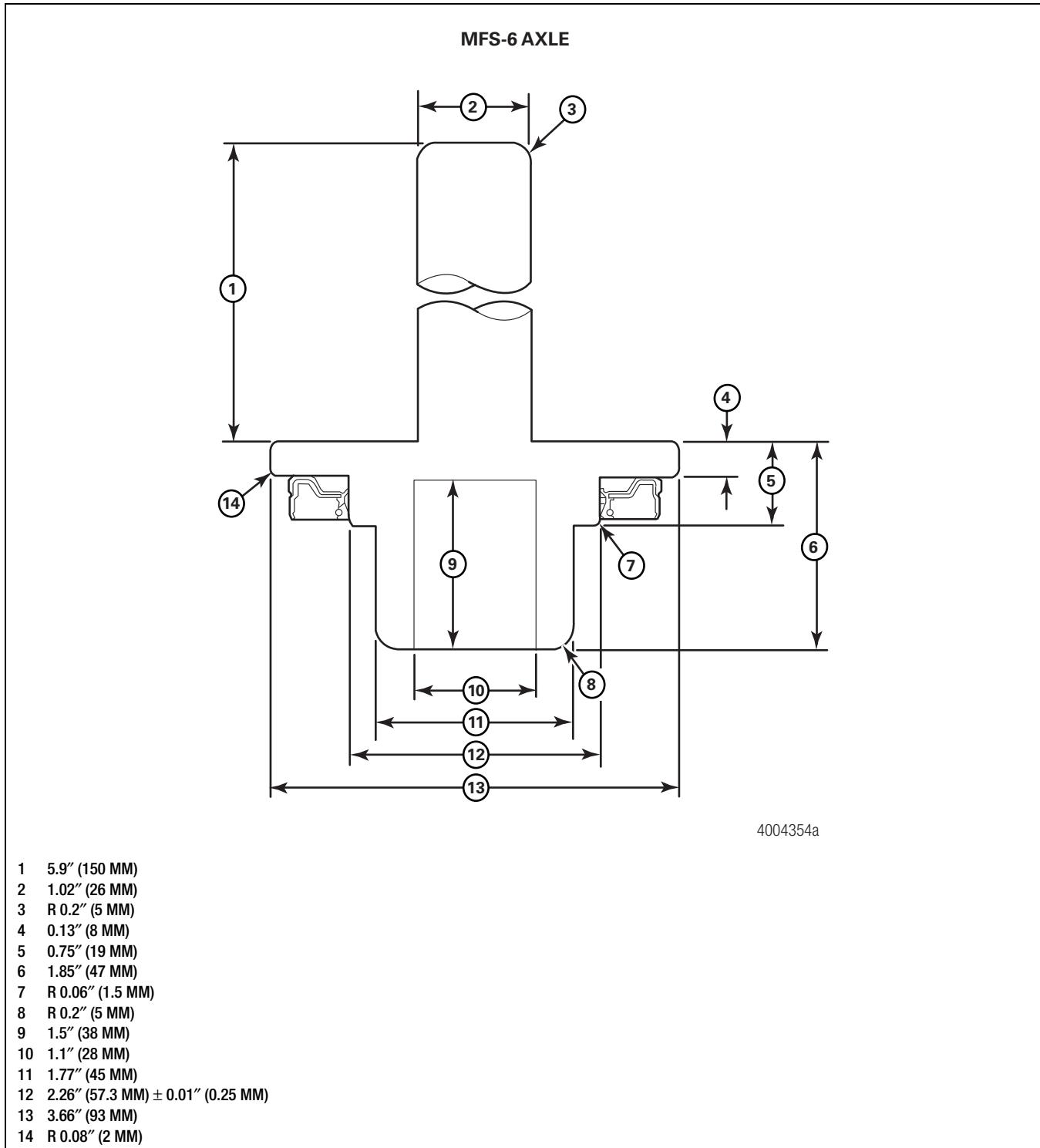


Figure 11.6

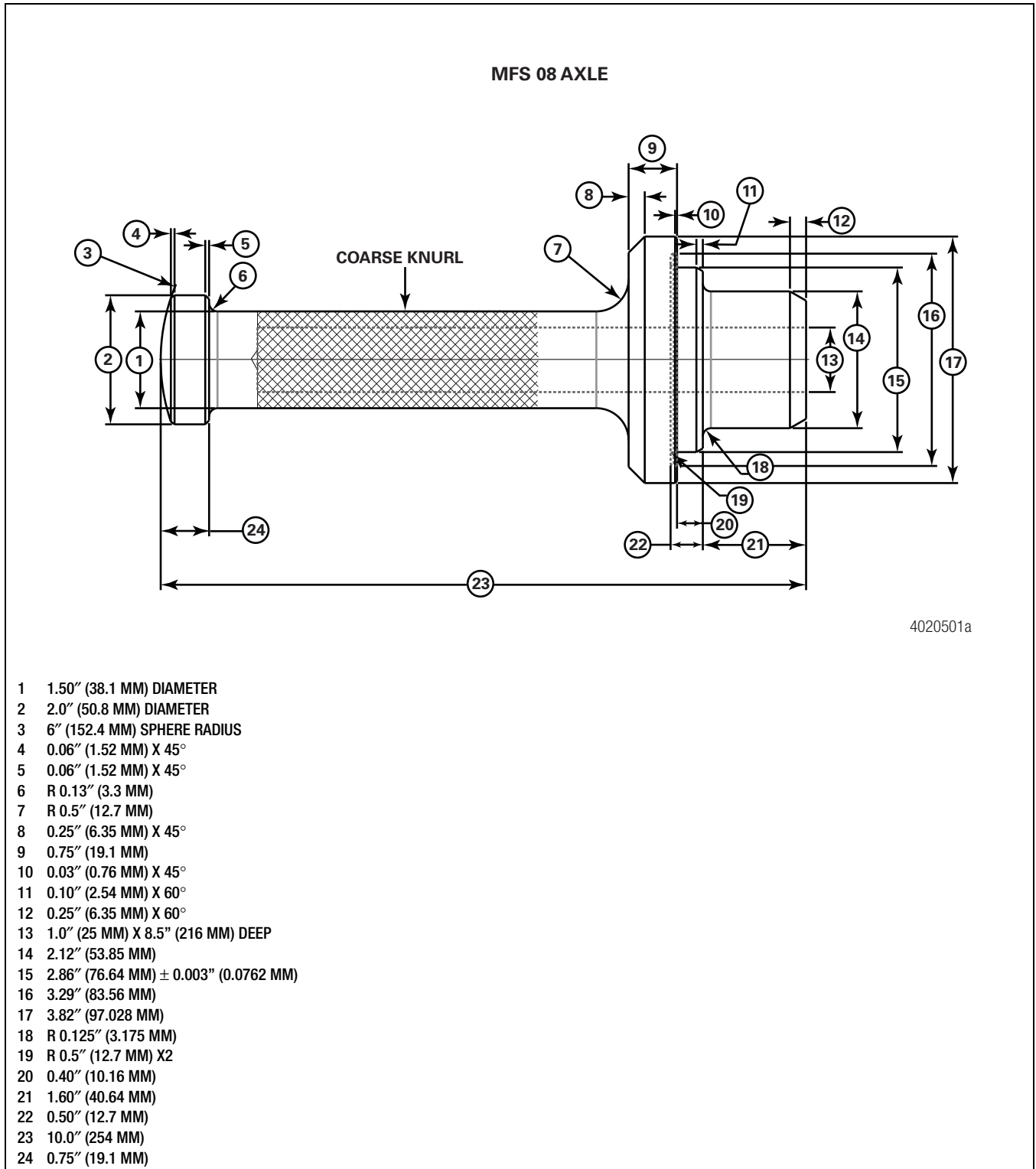


Figure 11.7

11 Special Tools

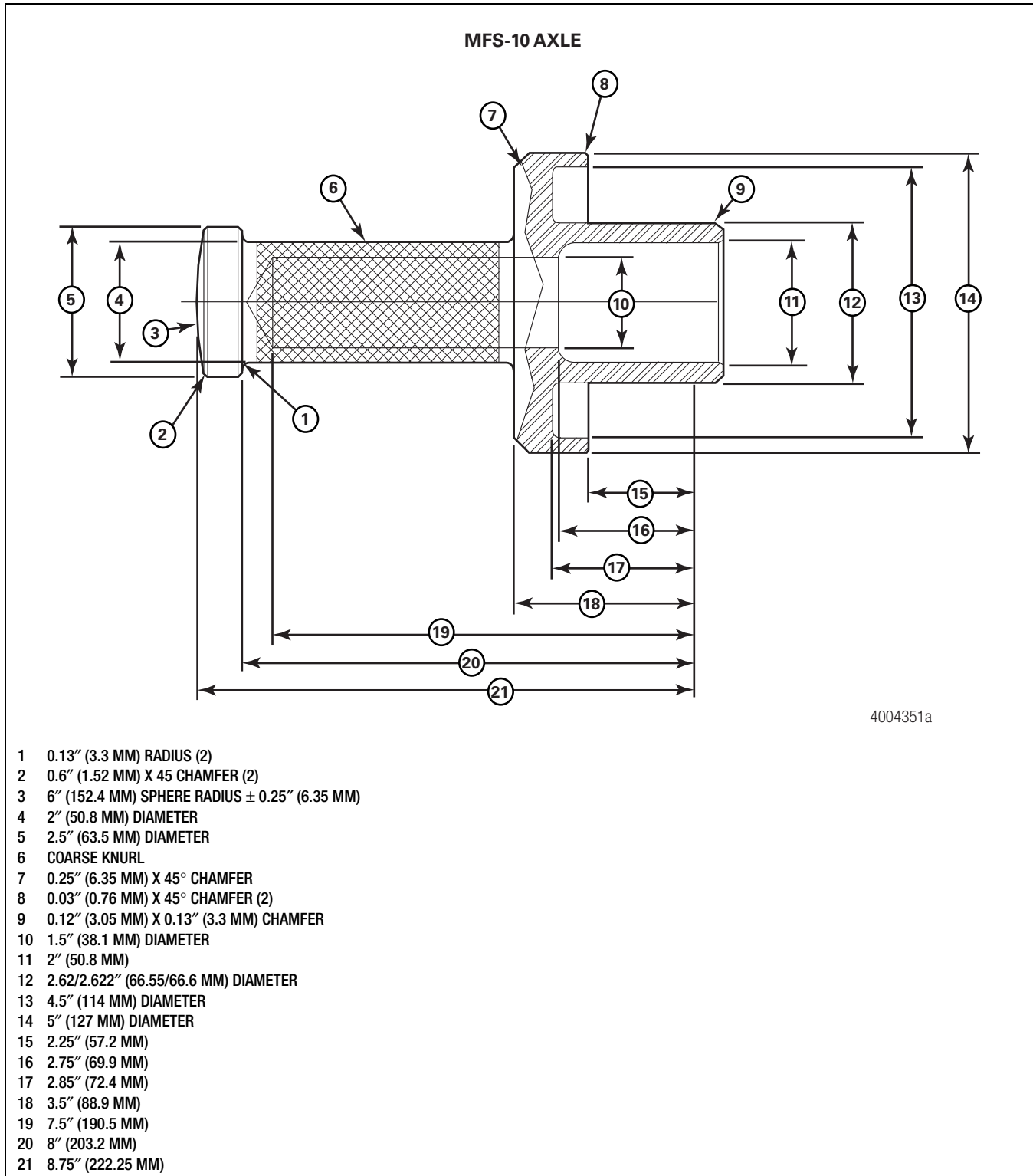


Figure 11.8

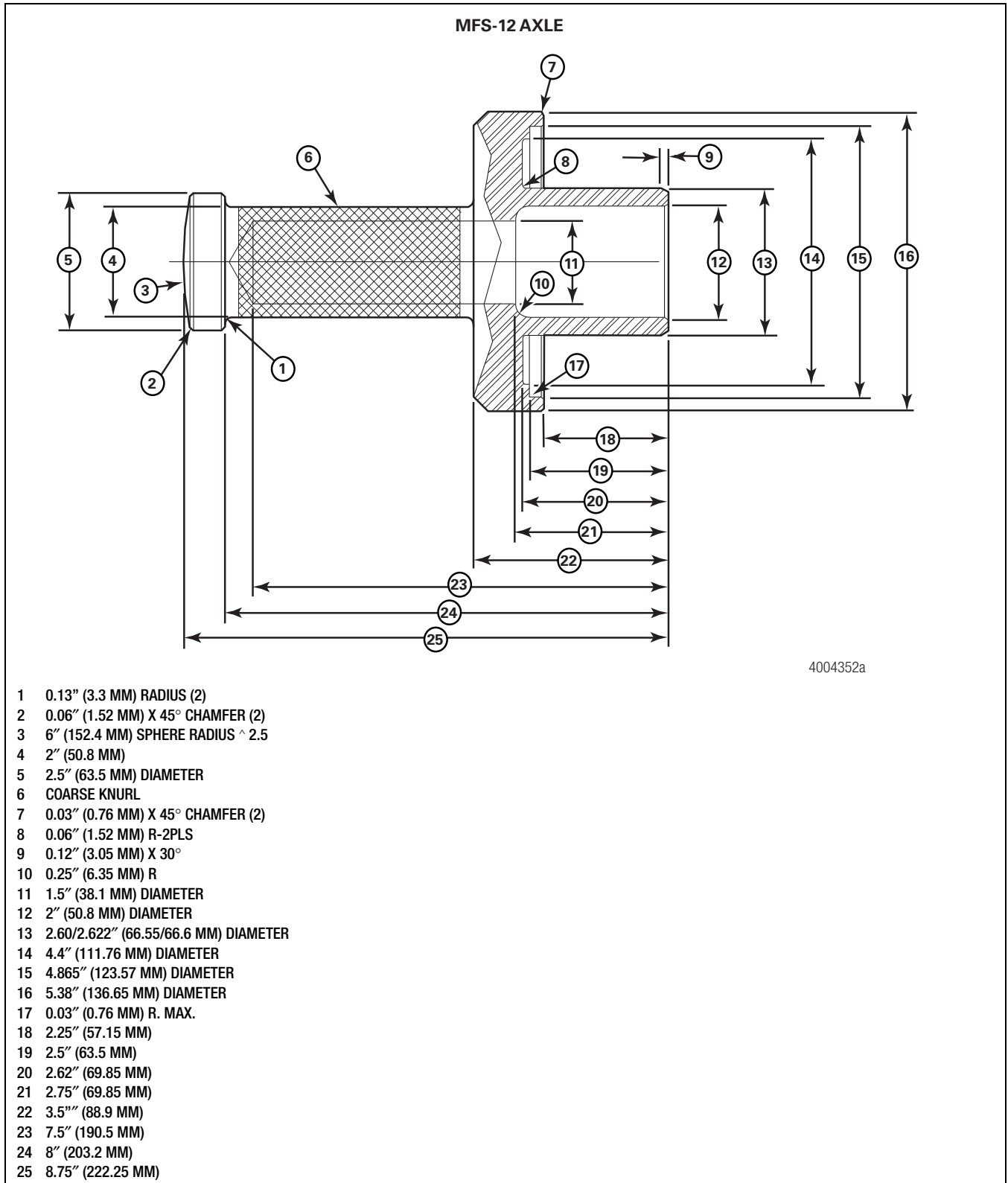


Figure 11.9

11 Special Tools

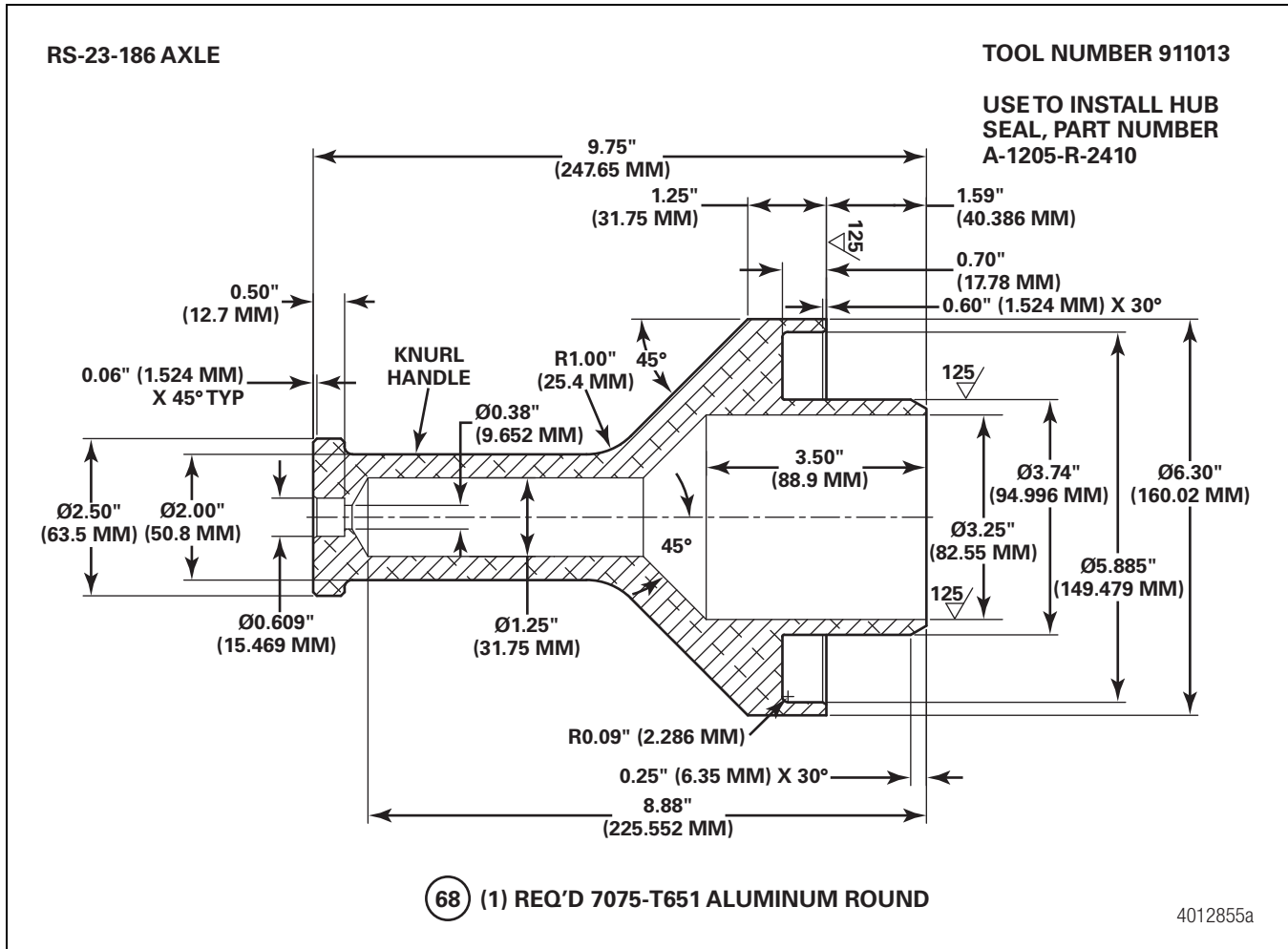


Figure 11.10

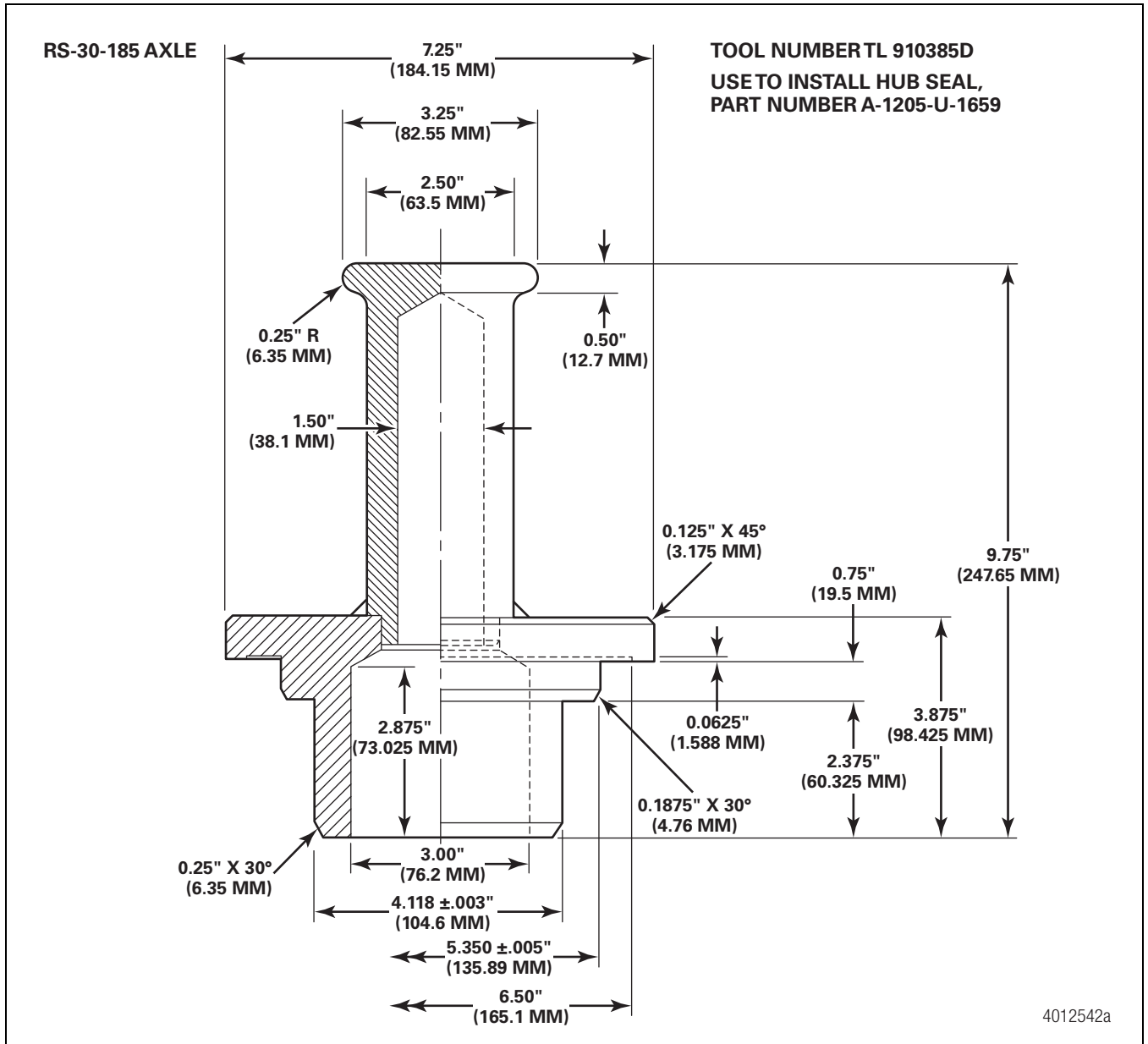


Figure 11.11

11 Special Tools

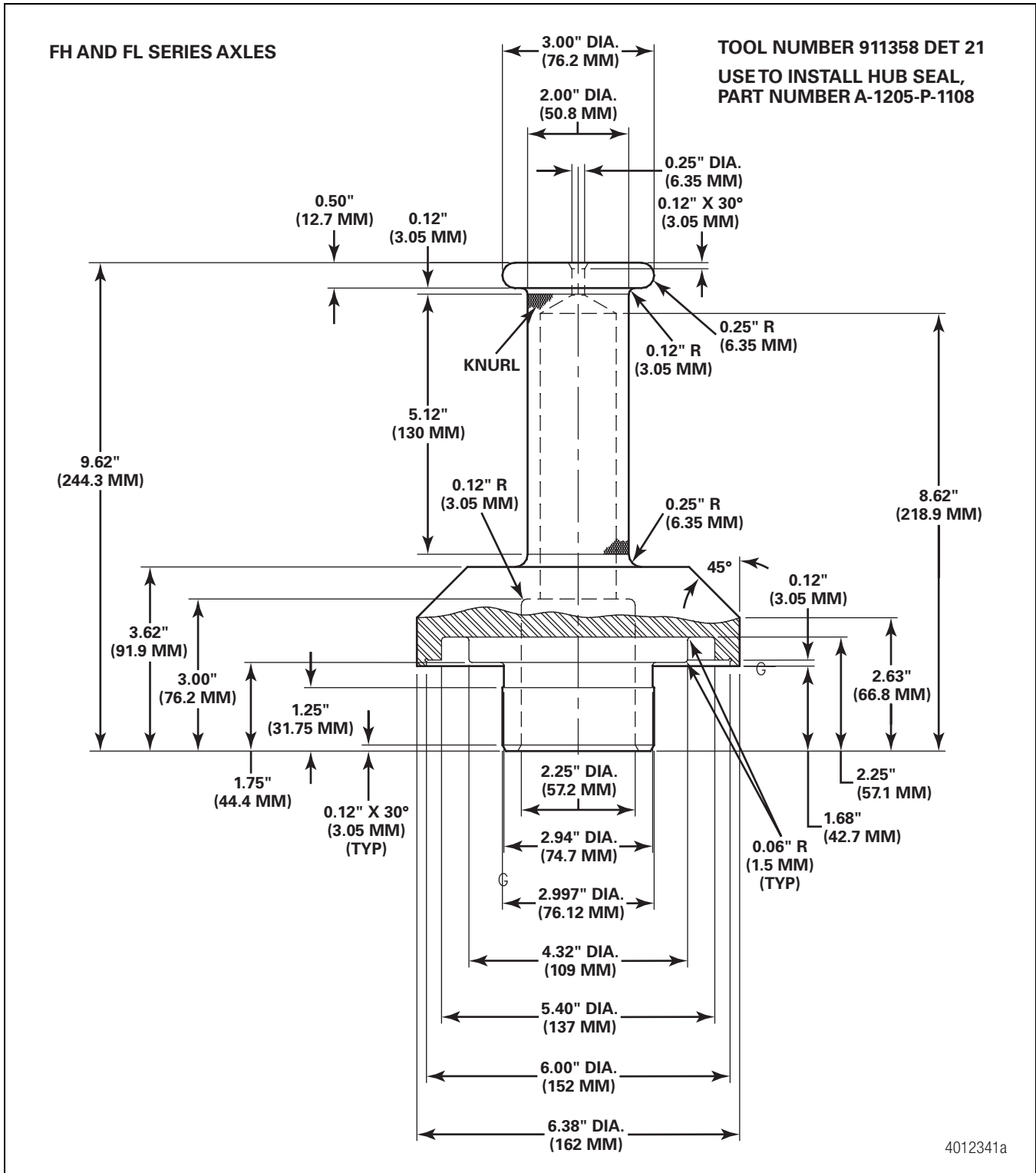


Figure 11.12

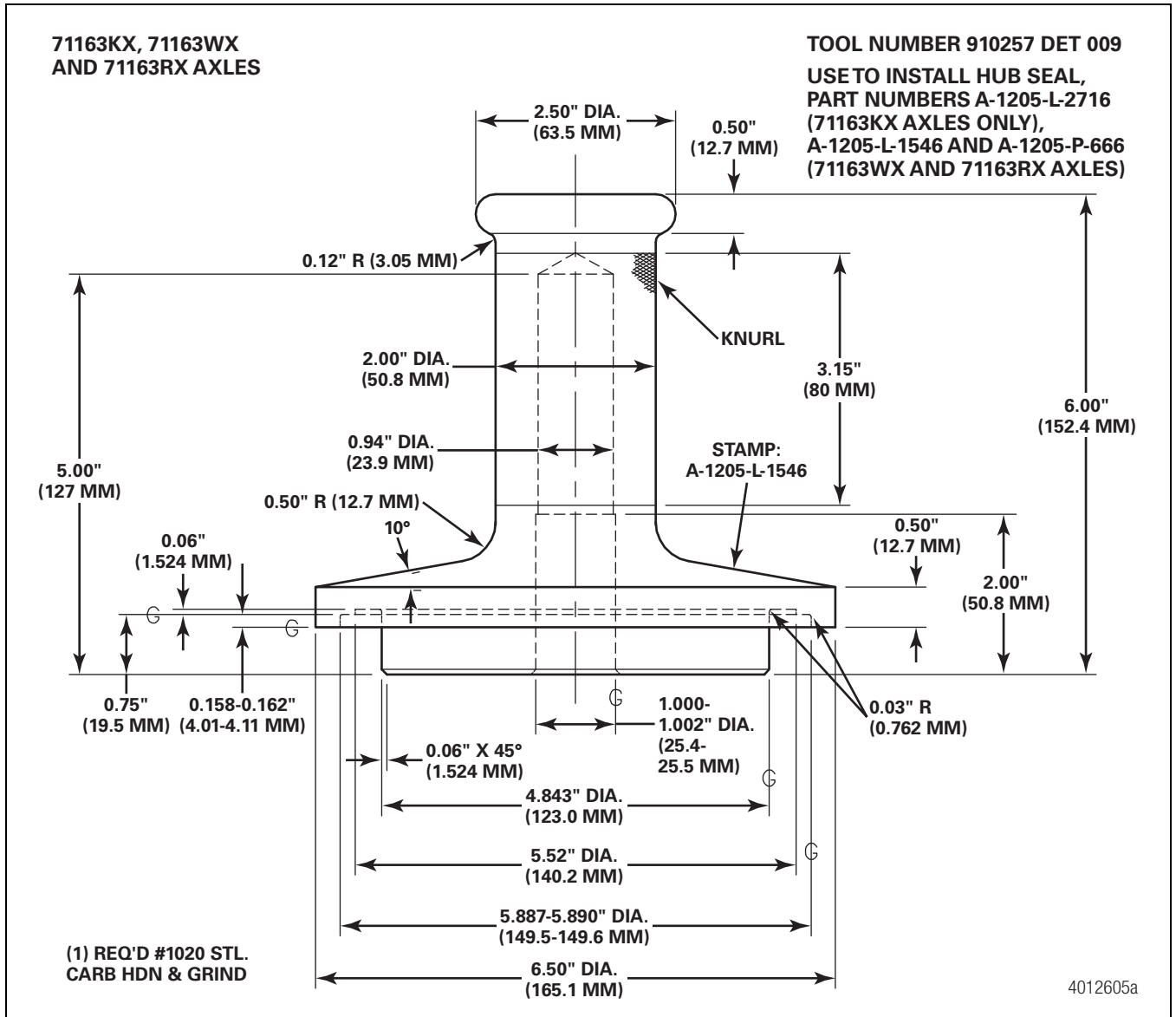


Figure 11.13

11 Special Tools

Unitized Wheel-End Dial Indicator Adapter Fitting

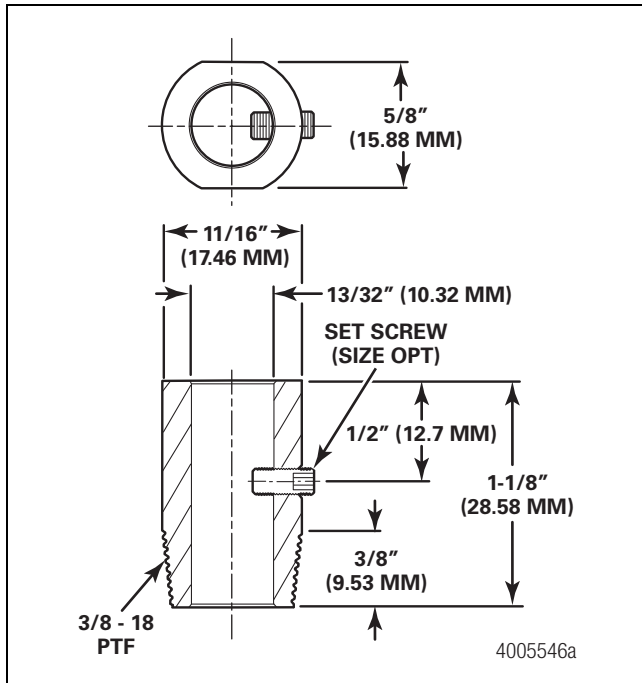


Figure 11.14

Tool for Removal of Rotors Seized on Unitized Wheel Ends — Bus and Coach FH Series Front and Tag Axle, and MC Series Tag Axle

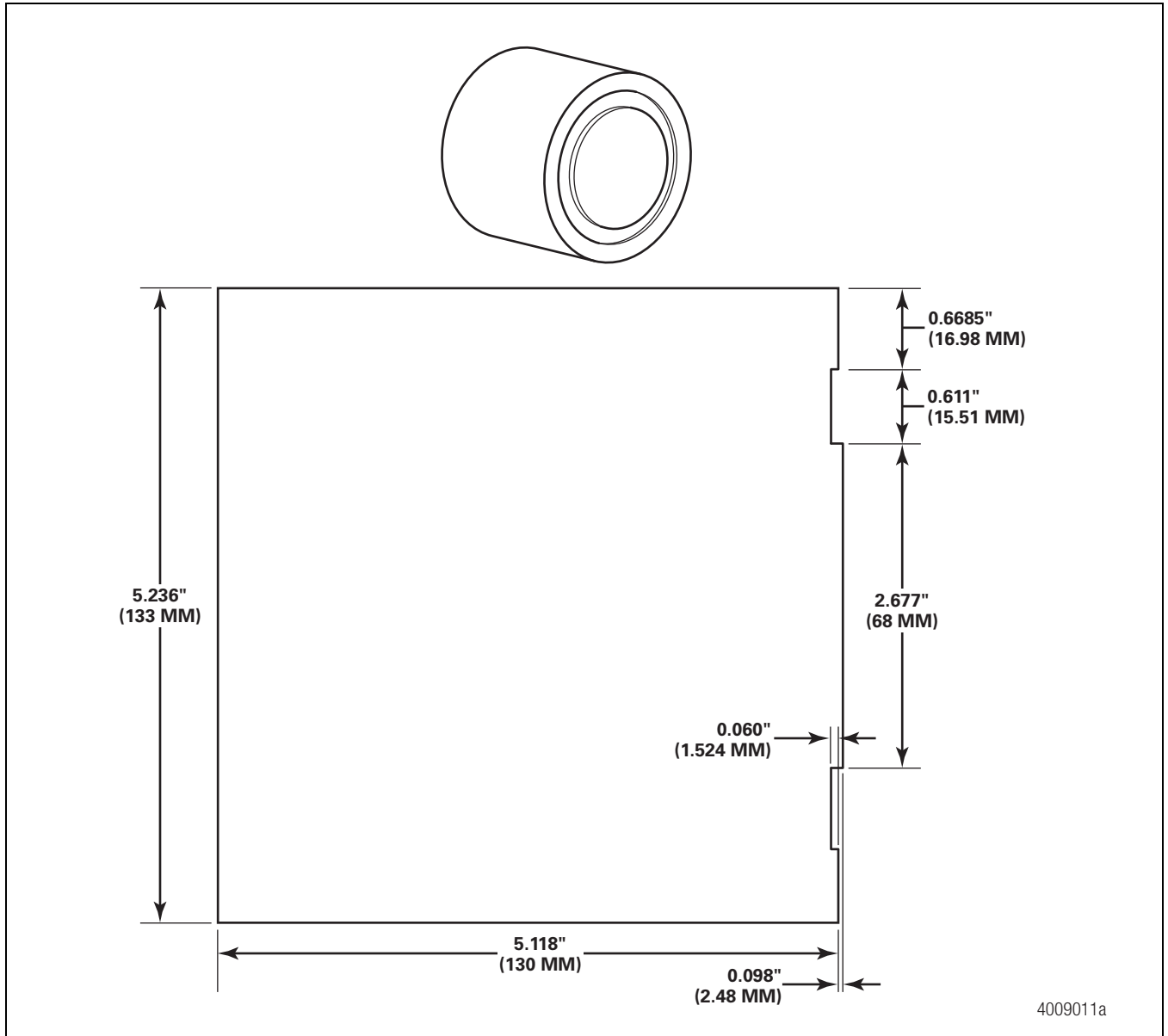


Figure 11.15

11 Special Tools

Guide Pin for Unitized Wheel Ends — Bus and Coach FH Series Front and Tag Axle, and MC Series Tag Axle

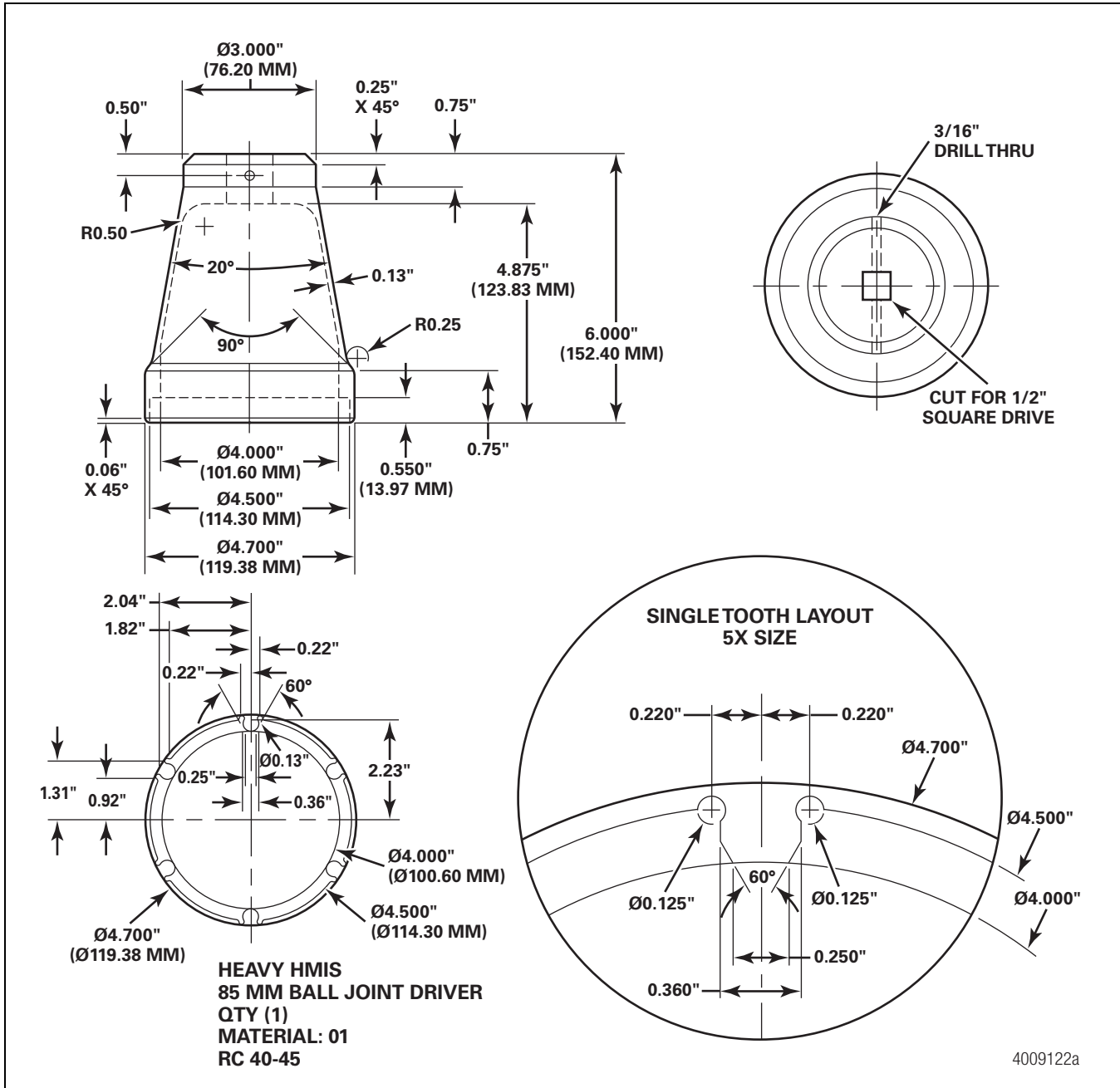


Figure 11.16

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