

Maintenance Manual MM-09168

Heavy-Duty P600 Series Rigid Drive Axles with Planetary Wheel Ends

Revised 03-18



Service Notes

About This Manual

This manual provides service and repair procedures for Meritor P600 series rigid rear drive axles with planetary wheel ends.

Before You Begin

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


Hazard Alert Messages and Torque Symbols

WARNING

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

CAUTION

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

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

How to Obtain Additional Maintenance, Service and Product Information

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

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

If Tools and Supplies are Specified in This Manual

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

SPX Kent-Moore, 28635 Mound Road, Warren, Michigan, 48092. Call the company's customer service center at 800-345-2233, or visit their website at spxkentmoore.com.

Meritor Maintenance Manuals

Refer to the following Meritor maintenance manuals for additional service procedures. To obtain these publications, visit Literature on Demand at meritor.com.

- Maintenance Manual MM-1189, Off-Highway Axle Planetary Wheel Ends
- Maintenance Manual 4, Cam Brakes and Automatic Slack Adjusters
- Maintenance Manual 5A, Single-Reduction Differential Carriers
- Maintenance Manual MM-0970, MT-14X Series Single-Reduction Forward Differential Carriers on Tandem Axles
- Maintenance Manual MM-0990, Amboid Rear Differential Carrier

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

Regulatory Guidance

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

NON-ASBESTOS FIBERS WARNING

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

Hazard Summary

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

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

Recommended Work Practices

1. **Separate Work Areas.** Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons.
2. **Respiratory Protection.** OSHA has set a maximum allowable level of exposure for silica of 0.1 mg/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.

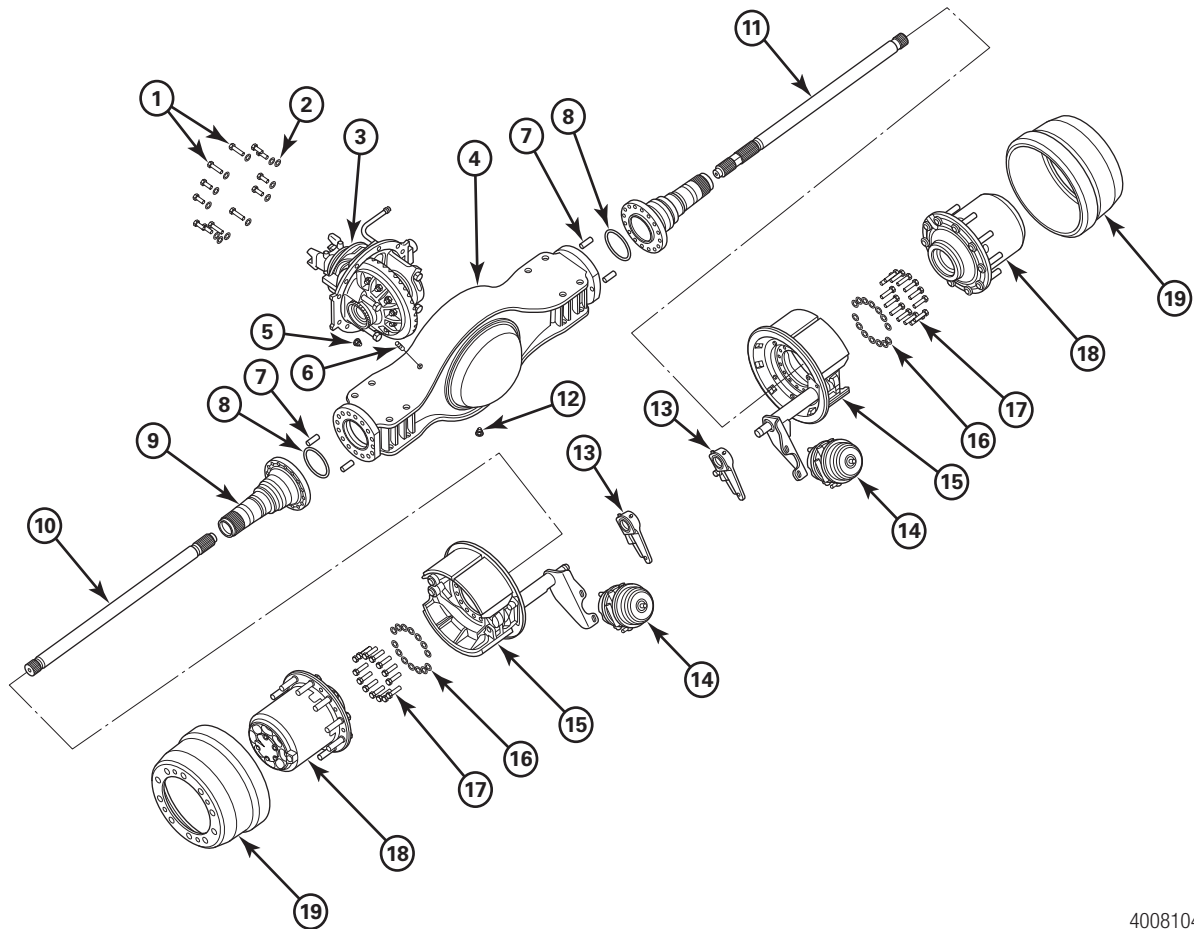
Therefore, wear respiratory protection at all times during brake servicing, beginning with the removal of the wheels. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA, if the exposure levels may exceed OSHA or manufacturers' recommended maximum levels. Even when 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.

Dual Tire H2 Hub Reduction Single Rear Axle Assembly

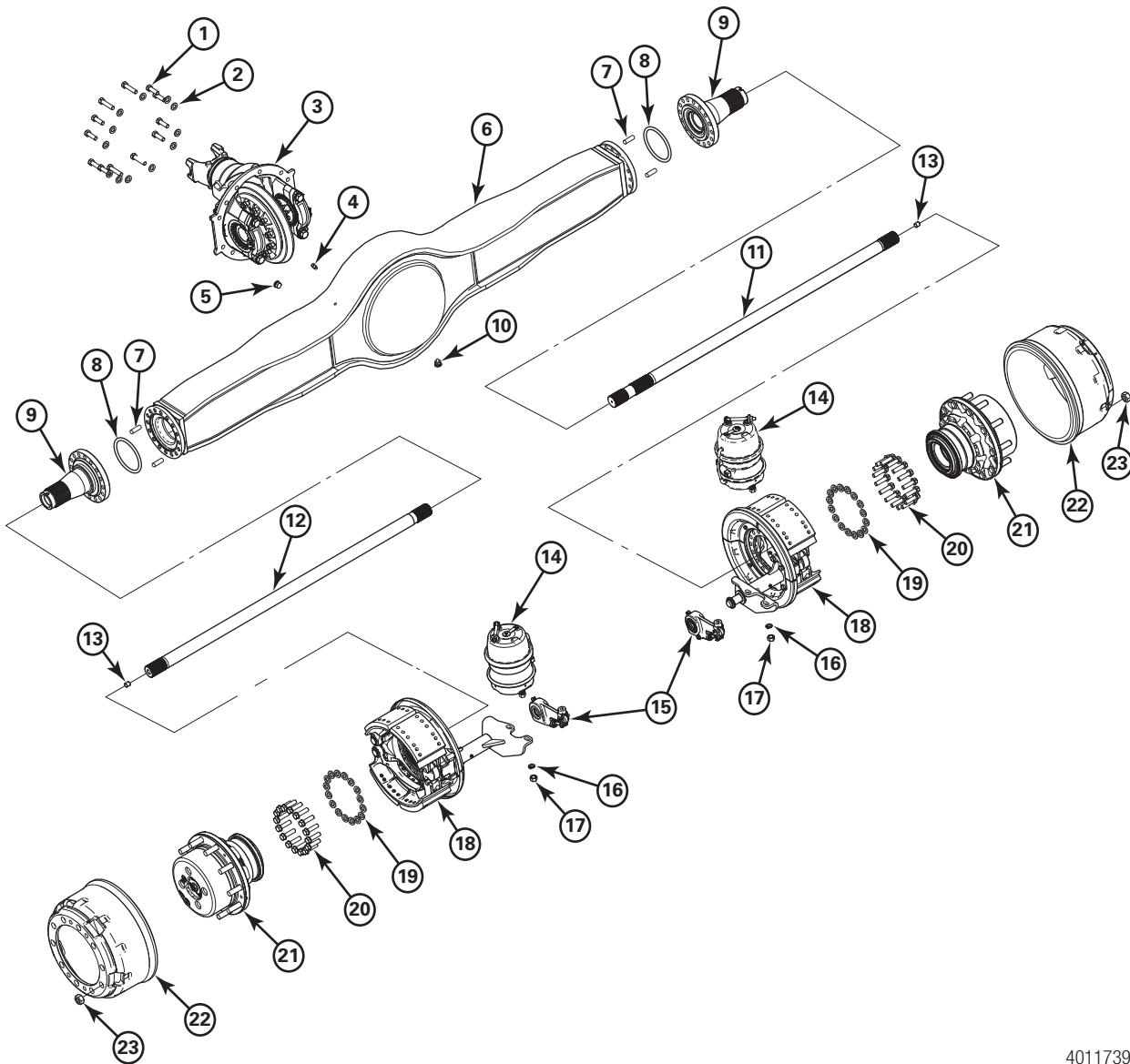


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Item	Description	Item	Description
1	Carrier-to-Housing Bolts	13	Slack Adjuster
2	Hardened Washers	14	Air Chamber
3	Carrier Assembly	15	Brake Assembly
4	Axle Housing	16	Washers
5	Fill Plug	17	Brake Spider-to-Housing Bolts
6	Breather	18	Planetary Hub Assembly
7	Spindle Dowels	19	Brake Drum
8	Housing O-Ring		
9	Spindle		
10	Axle Shaft (without DCCL)		
11	Axle Shaft (with DCCL)		
12	Drain Plug		

1 Exploded Views

Single Tire H2 Rear Axle Assembly



4011739a

Item	Description
1	Carrier-to-Housing Bolts
2	Hardened Washer
3	Carrier Assembly
4	Breather
5	Fill Plug
6	Axle Housing
7	Spindle Dowel

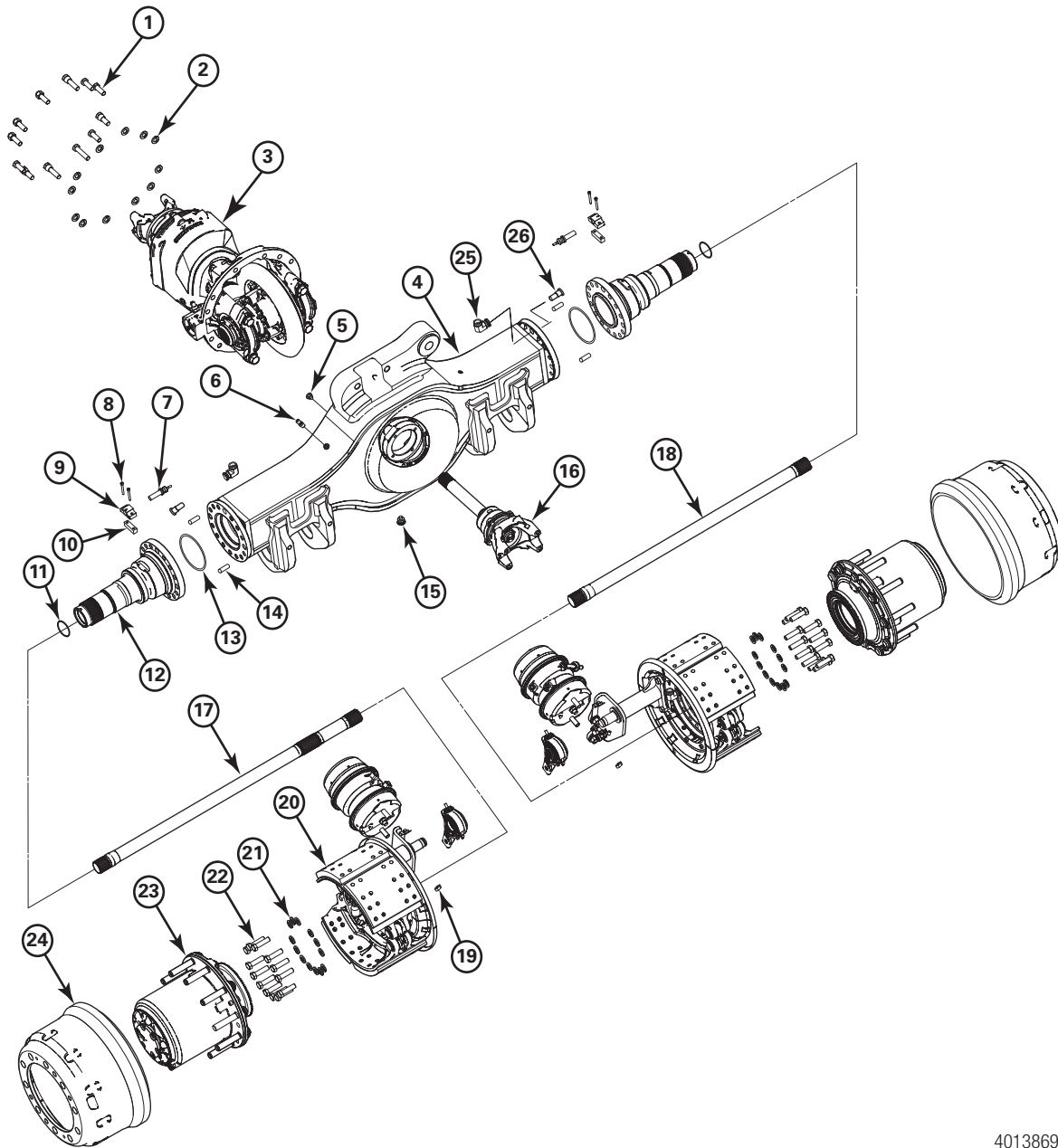
Item	Description
8	Housing O-Ring
9	Spindle
10	Drain Plug
11	Axle Shaft (with DCDL)
12	Axle Shaft (without DCDL)
13	Thrust Button
14	Air Chamber

1 Exploded Views

Item	Description
15	Slack Adjuster
16	Hardened Washer
17	Chamber Nut
18	Brake Assembly
19	Hardened Washer
20	Brake Spider-to-Housing Bolts
21	Planetary Hub Assembly
22	Brake Drum
23	Wheel Nut

1 Exploded Views

Tandem Forward-Rear Axle Assembly



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Item	Description
1	Carrier-to-Housing Bolts
2	Carrier-to-Housing Washer
3	Carrier Assembly
4	Axle Housing
5	Fill Plug

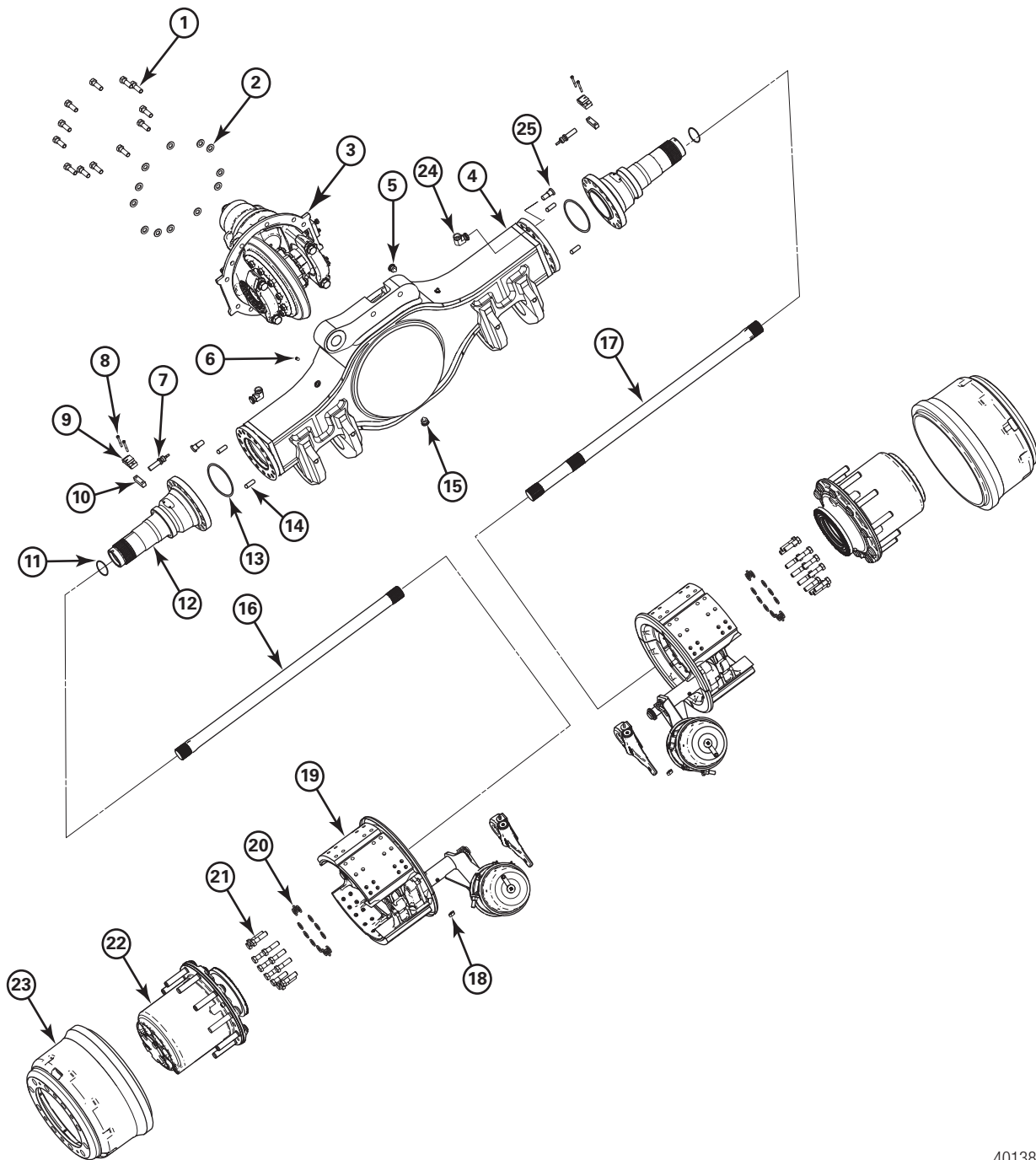
Item	Description
6	Breather
7	ABS Sensor
8	Sensor Block Capscrew
9	ABS Sensor Mount
10	Spacer Block

1 Exploded Views

Item	Description
11	Axle Shaft Seal
12	Spindle
13	O-Ring
14	Dowel
15	Drain Plug
16	Output Shaft Assembly
17	Axle Shaft, LH
18	Axle Shaft, RH
19	Brake Chamber Mounting Nut
20	Brake Assembly
21	Brake Assembly/Spindle Mounting Washer
22	Brake Assembly/Spindle Mounting Capscrew
23	Planetary Reduction Hub Assembly
24	Brake Drum
25	CTIS 90-Degree Elbow Fitting (Optional)
26	CTIS Inlet Bushing (Optional)

1 Exploded Views

Tandem Rear Axle Assembly



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Item	Description	Item	Description
1	Carrier-to-Housing Bolts	3	Carrier Assembly
2	Carrier-to-Housing Washer	4	Axle Housing

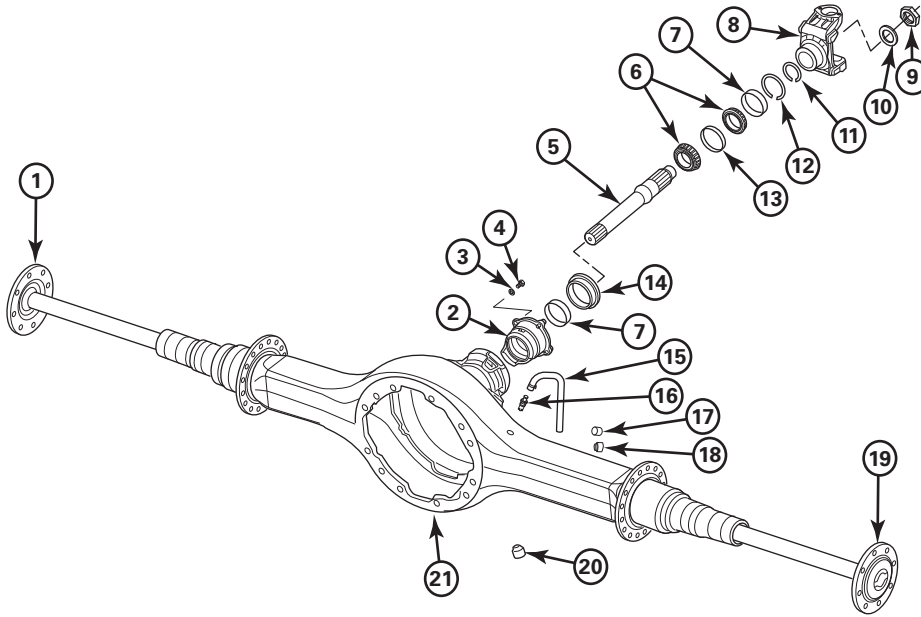
1 Exploded Views

Item	Description
5	Fill Plug
6	Breather
7	ABS Sensor
8	Sensor Block Capscrew
9	ABS Sensor Mount
10	Spacer Block
11	Axle Shaft Seal
12	Spindle
13	O-Ring
14	Dowel
15	Drain Plug
16	Axle Shaft, LH
17	Axle Shaft, RH
18	Brake Chamber Mounting Nut
19	Brake Assembly
20	Spindle Mounting Washer
21	Spindle Mounting Capscrew
22	Planetary Reduction Hub Assembly
23	Brake Drum
24	CTIS 90 Degree Elbow Fitting (Optional)
25	CTIS Inlet Bushing (Optional)

1 Exploded Views

Tandem Forward-Rear Thru-Shaft Assembly

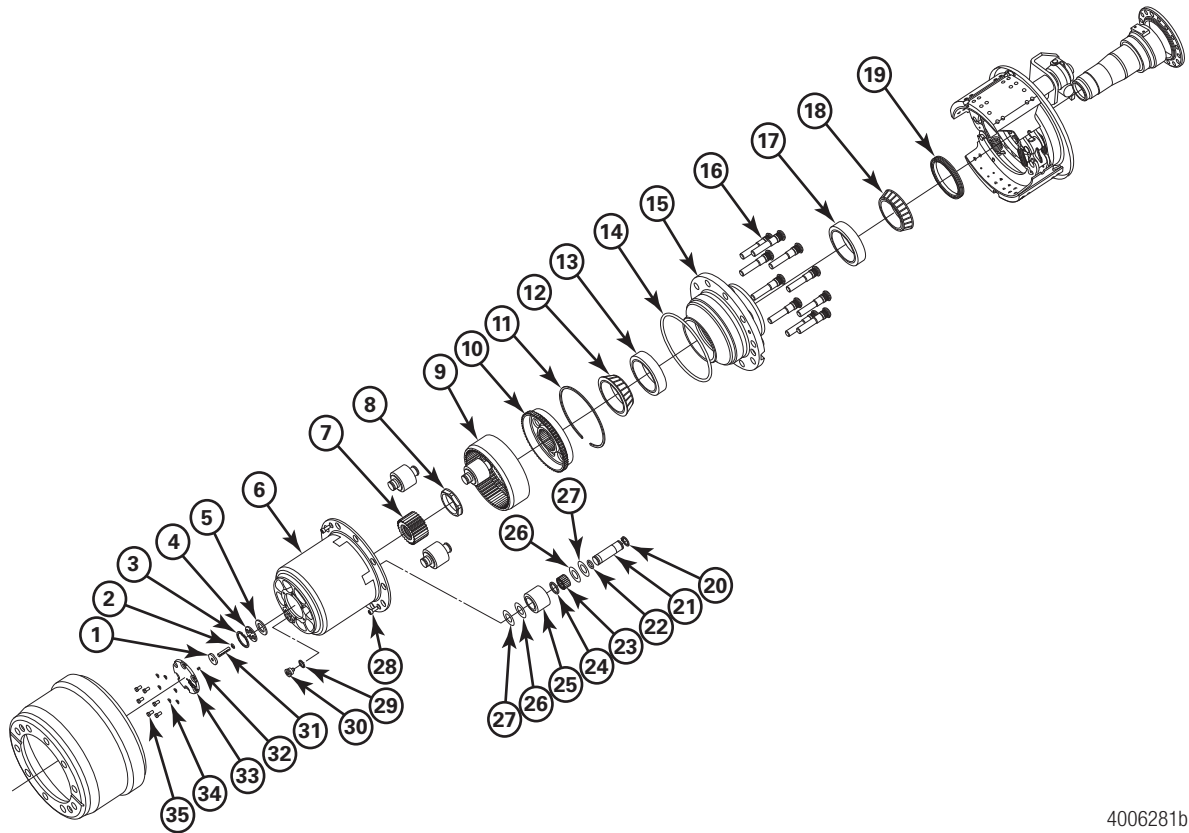
AXLE HOUSING WITH THRU-SHAFT



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Item	Description	Item	Description
1	Short Axle Shaft	19	Long Axle Shaft
2	Thru-Shaft Cage Assembly	20	Magnetic Plug
3	Hardened Washer	21	Housing
4	Capscrew		
5	Thru-Shaft		
6	Bearing Cone		
7	Bearing Cup		
8	Output Yoke		
9	Locknut		
10	Flat Washer		
11	Thru-Shaft Snap Ring Spacer		
12	Tapered Snap Ring		
13	Cup Spacer		
14	Oil Seal Assembly		
15	Breather Hose		
16	Breather		
17	Oil Fill Plug		
18	Magnetic Fill Plug (Optional)		

Hub Reduction Planetary Wheel End



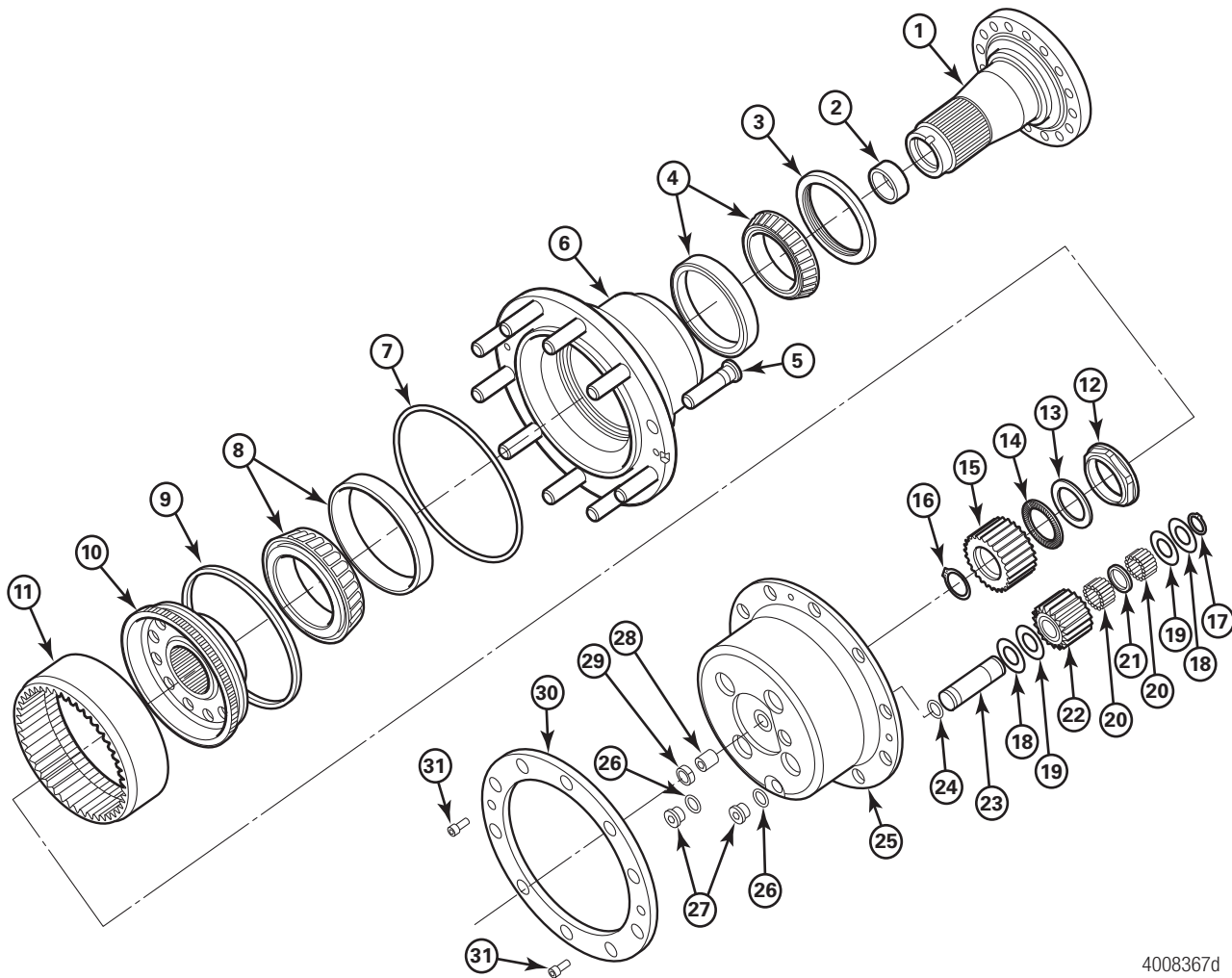
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Item	Description	Item	Description
1	Magnet	16	Hub Stud
2	Retaining Clip	17	Inner Bearing Cup
3	Retaining Clip	18	Inner Bearing Cone
4	Thrust Washer	19	Oil Seal
5	Spring Washer (2)	20	Retaining Clip
6	Planetary Carrier	21	Pinion Shaft
7	Sun Gear	22	O-Ring
8	Hub Nut	23	Needle
9	Ring Gear	24	Spacer Sleeve
10	Ring Gear Carrier	25	Planet Gear
11	Retaining Clip	26	Steel Washer
12	Outer Bearing Cone	27	Brass Washer
13	Outer Bearing Cup	28	Screw
14	O-Ring	29	Gasket
15	Hub	30	Magnetic Plug

1 Exploded Views

Item	Description
31	Pin
32	Washer
33	Cover
34	Washer
35	Screw

Single Tire H2 Planetary Wheel End — Rear Drive Axle



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Item	Description
1	Spindle
2	Sleeve

Item	Description
3	Hub Oil Seal
4	Inner Bearing Cone and Cup

1 Exploded Views

Item	Description
5	Wheel Stud
6	Wheel Hub
7	O-Ring
8	Outer Bearing Cone and Cup
9	Ring Gear Snap Ring
10	Ring Gear Hub
11	Ring Gear
12	Wheel Bearing Nut
13	Thrust Washer
14	Needle Thrust Bearing
15	Sun Gear
16	Snap Ring
17	Snap Ring
18	Thrust Washer, Brass
19	Thrust Washer, Steel
20	Bearing Rollers
21	Roller Spacer
22	Planetary Pinion
23	Pinion Shaft
24	O-Ring
25	Planetary Carrier
26	Seal Ring
27	Fill/Drain Plug
28	Thrust Screw
29	Jam Nut
30	Wheel Spacer (Disc Brake Only)
31	Planetary Carrier Bolt (Disc Brake Only)

2 Introduction

Components

Driver-Controlled Differential Lock

Both the forward and rear axles can be equipped with a driver-controlled differential lock (DCDL). The differential lock is operated by an air-actuated shift unit located on the axle carrier.

- When the differential lock is activated, the shift collar moves along the splines of the axle shaft toward the differential case.
- When the collar splines engage with the splines on the differential case, the axle shaft and the differential assembly lock together.

- When the carrier operates with the DCDL in the locked position, there is no differential action between the wheels.
- When the carrier is operated in the unlocked position, there is normal differential action between the wheels at all times.

Rear Axle Carrier

The axle is equipped with a single-reduction differential carrier with an optional DCDL feature. Figure 2.1.

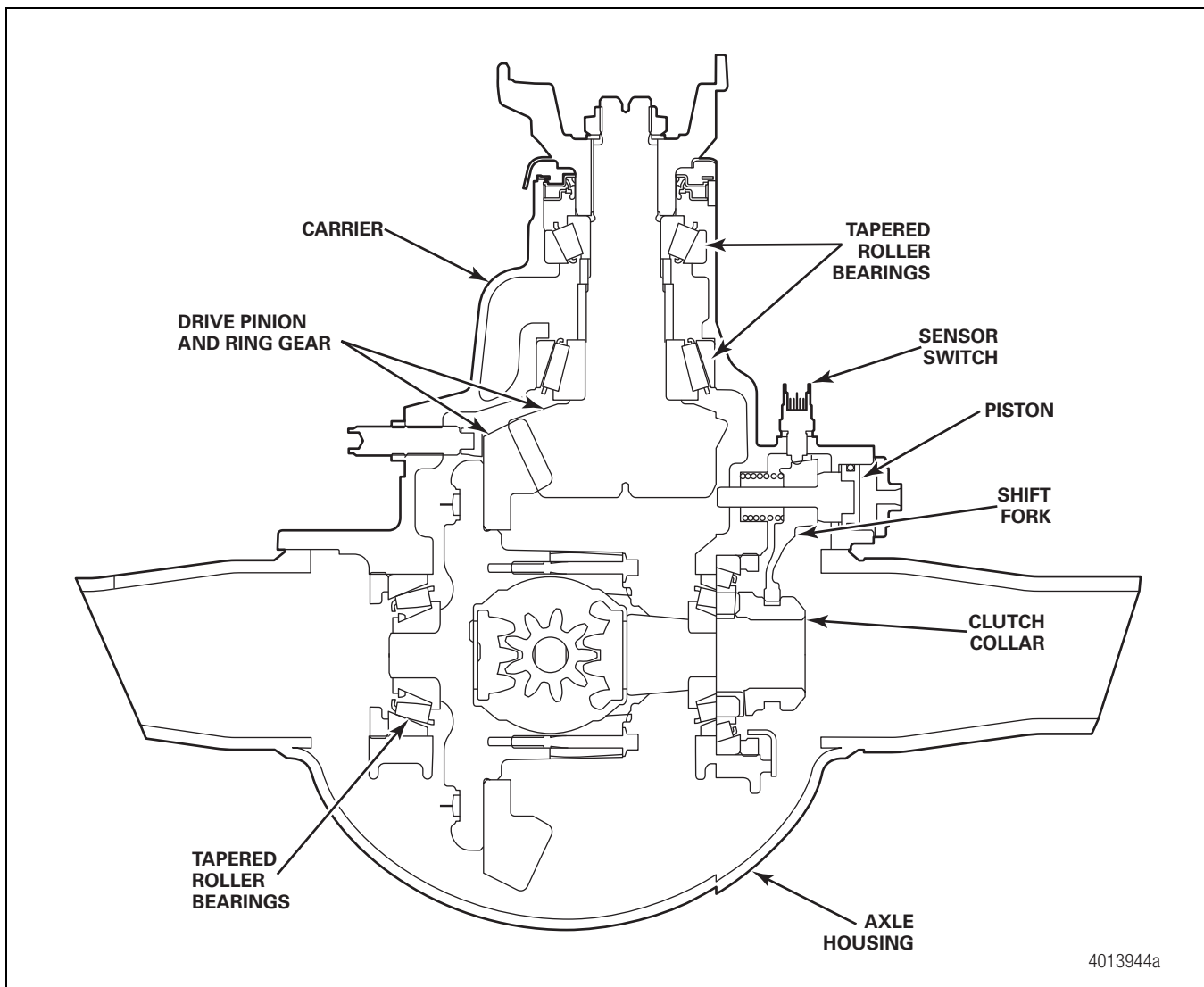


Figure 2.1

Hub Reduction Wheel Ends

The hub reduction wheel end consists of a cylindrical planetary assembly in each hub. The assembly is made up of a sun gear which is splined to the axle shaft, and four planetary gears which rotate around the sun gear within a ring gear. Figure 2.2.

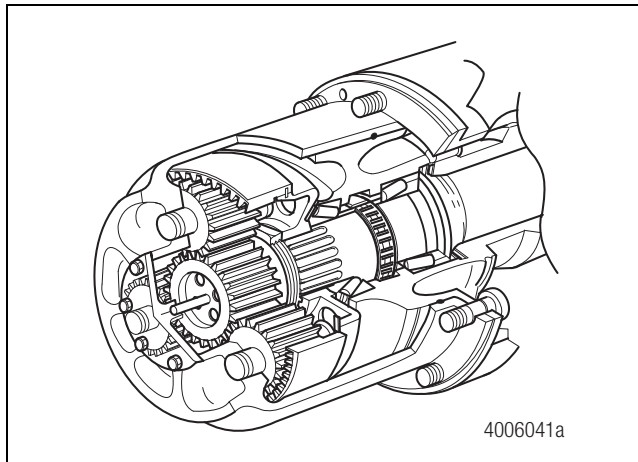


Figure 2.2

Identification

Model Number

An identification tag is riveted or tack welded on the axle housing and on the differential carrier. Figure 2.3. Use the model number and the ratio number marked on the identification tag and the number on the carrier to obtain replacement parts.

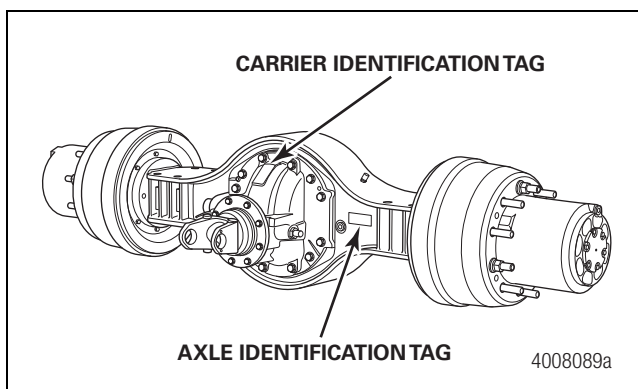


Figure 2.3

Refer to Figure 2.4 and Figure 2.5 for an explanation of the model number.

2 Introduction

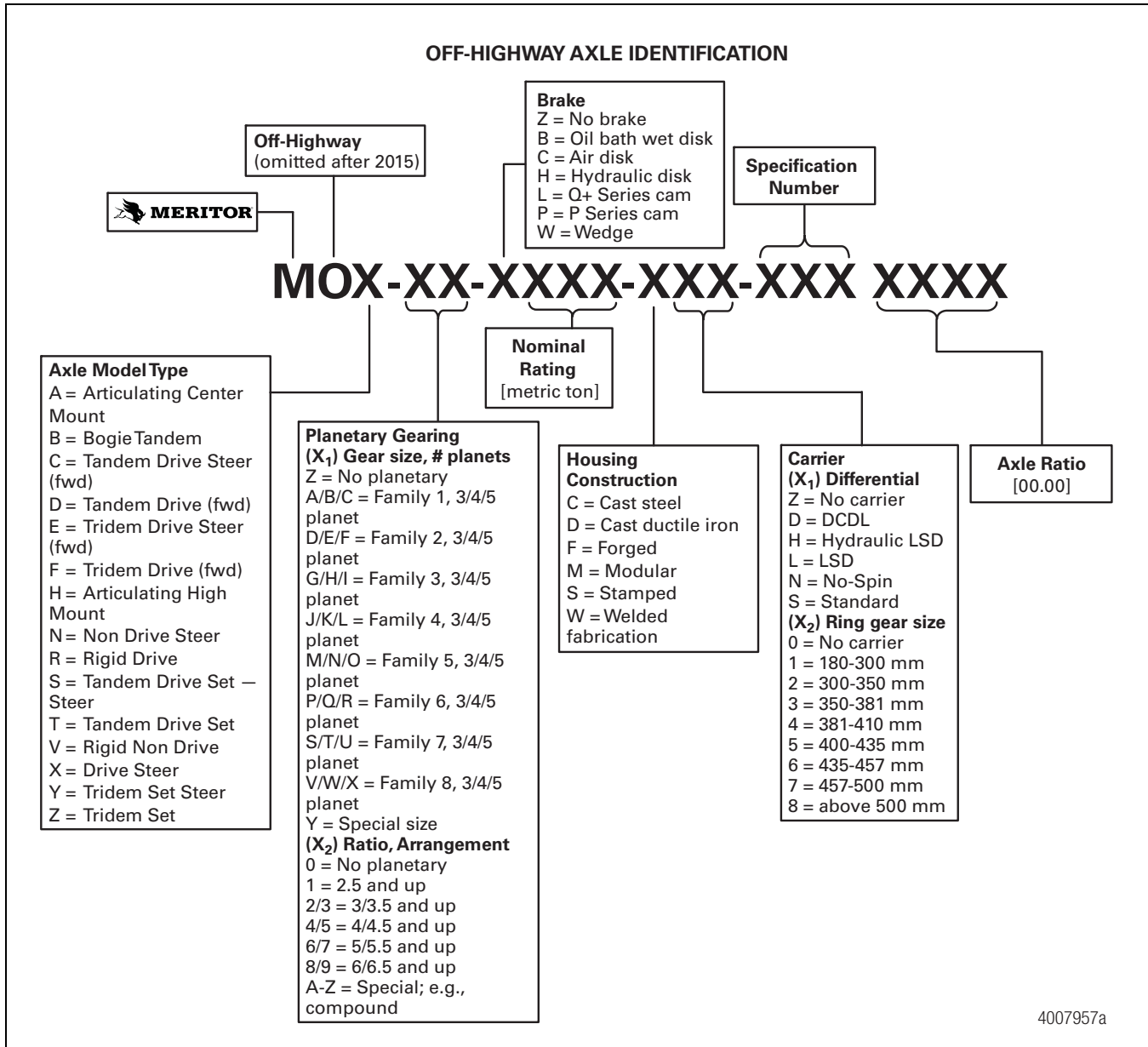


Figure 2.4

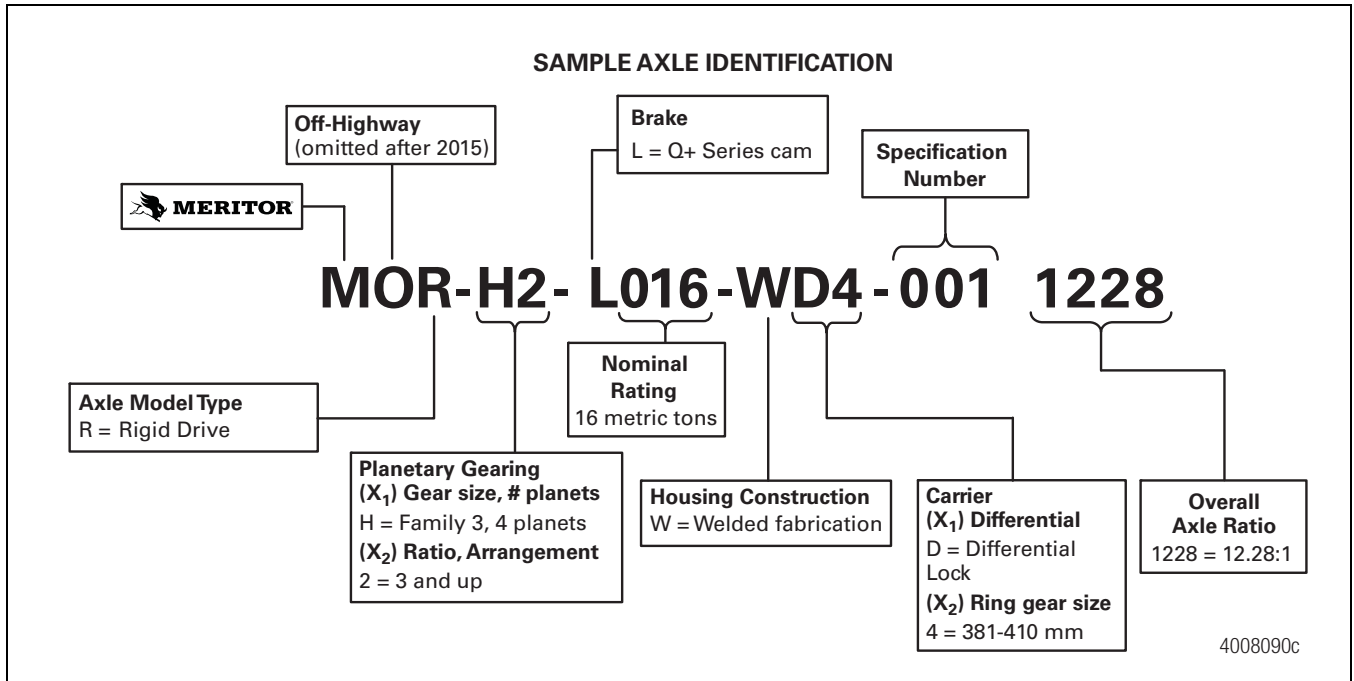


Figure 2.5

To Identify the Gear Teeth Number on the Rear Axle Drive Pinion

1. Remove the drive shaft. Refer to the vehicle manufacturer's procedures.
2. Identify and record the gear set teeth numbers stamped on the end of the rear axle drive pinion. Figure 2.6.

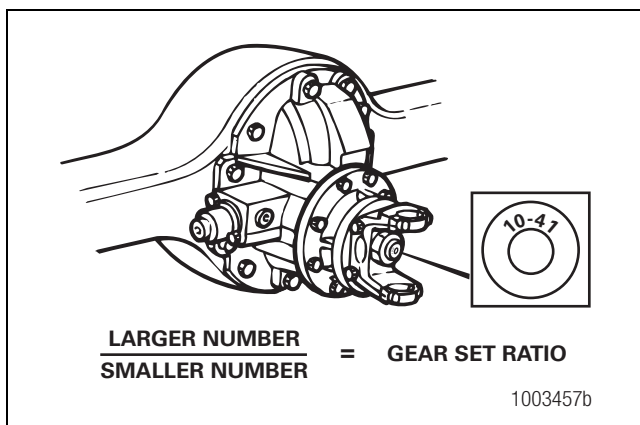


Figure 2.6

3. Calculate the gear set ratio by dividing the larger number by the smaller number. Figure 2.6.

3 Removal and Disassembly

Hazard Alert Messages

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

⚠ WARNING

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

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

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

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

Removal

Axle Shafts

Due to their full floating design, the axle shafts can easily be removed for field service or towing using the following steps.

1. Wear safe eye protection.
2. Rotate the wheel ends so the drain plug is on the bottom. Remove the drain plug and drain the lubricant from the wheel ends.
3. Cage the DCDL. Refer to Maintenance Manual 5A or MM-0990. To obtain these publications, refer to the Service Notes page on the front inside cover of this manual.
4. Use a wrench to remove the hub cover capscrews. Figure 3.1.

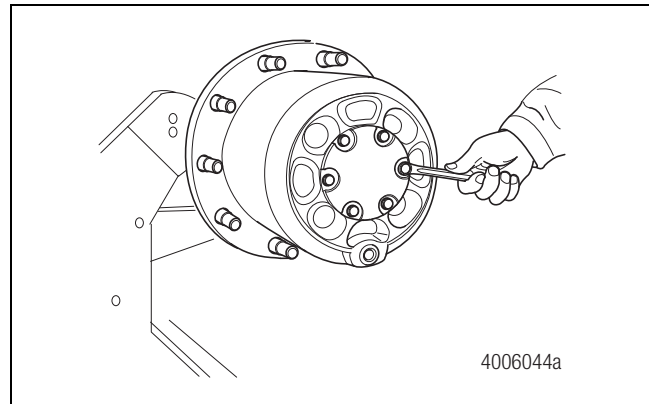


Figure 3.1

5. Use a screwdriver or pry bar to pry up and remove the hub cover. Figure 3.2.

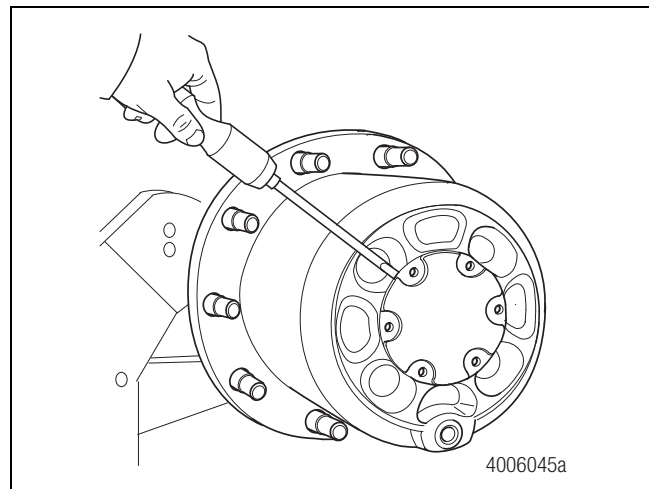


Figure 3.2

6. Use a suitable tool to secure and remove the sun gear from the hub housing. Figure 3.3.

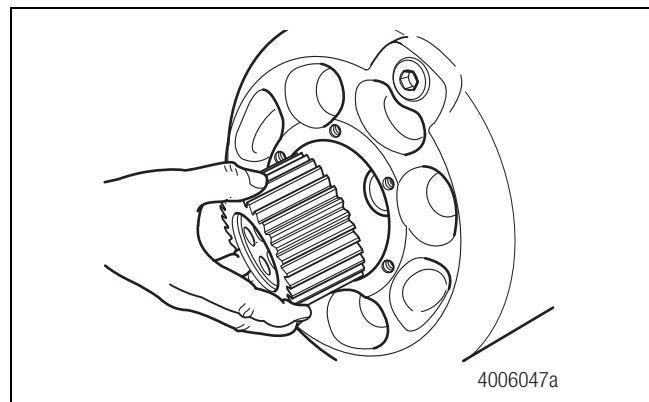


Figure 3.3

7. Pull to remove the axle shaft from the housing. If available, thread a 3/8" x 16 bolt into the end of the axle shaft to assist removal. Figure 3.4.

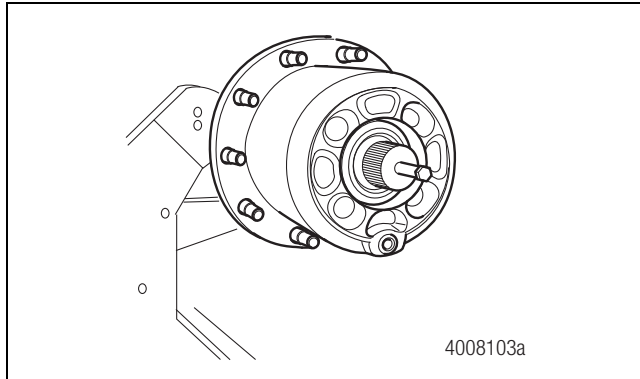


Figure 3.4

Prior to Disassembly

Refer to Maintenance Manual MM-1189 for instructions on removing the wheel and tire assemblies and draining the oil from the wheel ends. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

Removal

Planetary Assembly and Wheel End

Refer to Maintenance Manual MM-1189 for instructions on removing and disassembling the planetary assembly and wheel end. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

Removing Fasteners Secured with Adhesive

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

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

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

Brake and Spindle

⚠ WARNING

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

1. If the brake has spring chambers, carefully cage and lock the spring, so that it cannot actuate during assembly. Follow the chamber manufacturer's instructions to completely release the brake.
2. Verify that no air pressure remains in the service chamber. Sudden release of pressurized air can cause serious personal injury and damage to components.
3. Disconnect the brake lines.
4. Press the ABS sensor out of the mount block. Pull the ABS sensor and harness through the dust shield, if equipped, and secure it out of the way.
5. Note the orientation of the ABS sensor mount block. Remove the two capscrews and remove the ABS sensor mount and spacer block from the spindle. Figure 3.5.

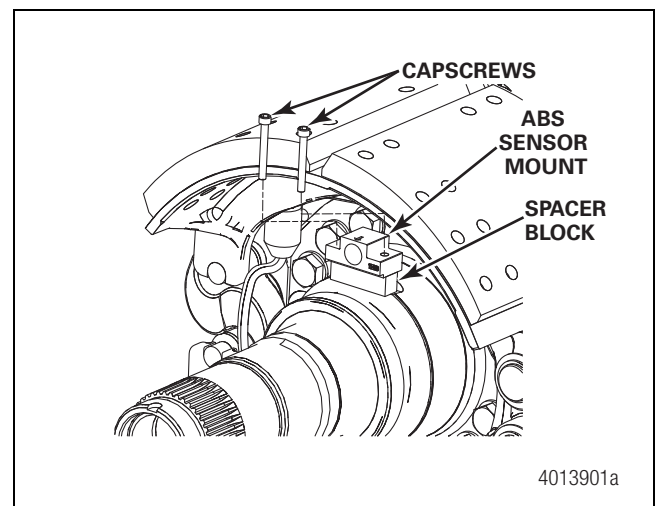


Figure 3.5

6. If equipped with the optional CTIS feature, disconnect the air line and remove the 90-degree elbow fitting from the spindle fitting. Figure 3.6.

3 Removal and Disassembly

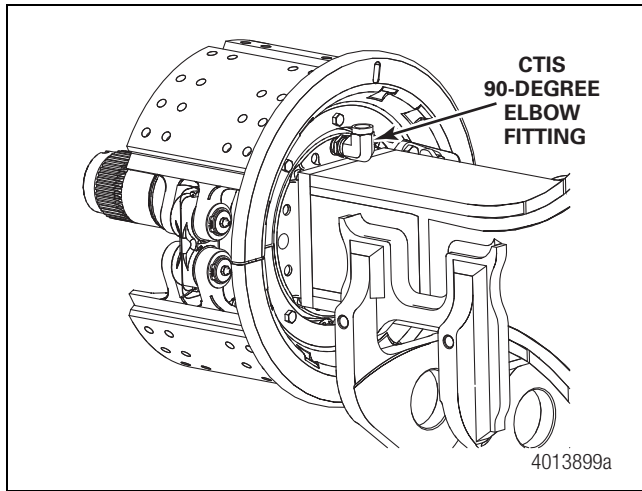


Figure 3.6

⚠ CAUTION

For a Meritor slack adjuster, you must disengage a pull pawl before rotating the manual adjusting nut, or you will damage the pawl teeth. A damaged pawl will not allow the slack adjuster to automatically adjust brake clearance. Replace damaged pawls before putting the vehicle in service.

NOTE: For non-Meritor slack adjusters, refer to the manufacturer's recommended instructions for removal and adjustment procedures.

7. Ensure the brake rollers are fully seating into the S-cam pockets by backing off the slack adjuster as needed. Before you rotate the manual adjusting nut on a Meritor slack adjuster, disengage the pull pawl. Use a screwdriver or equivalent tool to pry the pull pawl at least 1/32-inch (0.8 mm) to disengage the teeth from the actuator.
8. Disconnect the brake return spring and clips. Figure 3.7.

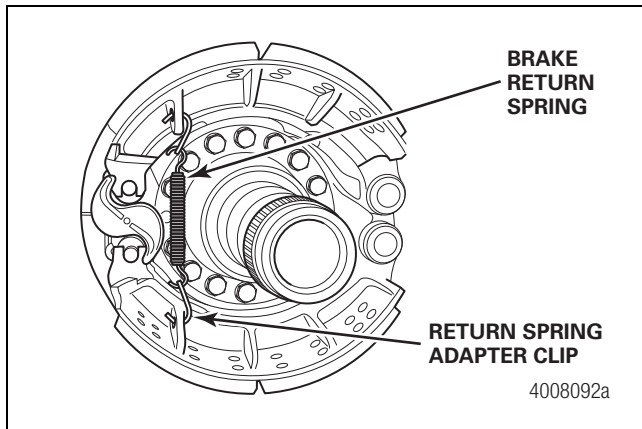


Figure 3.7

9. If equipped, remove the mounting bolts from the brake dust shields and remove the dust shields. Figure 3.8.

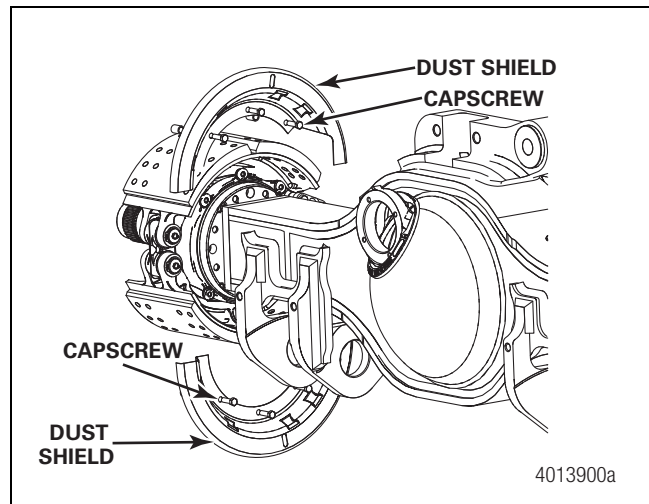


Figure 3.8

10. Remove the top fastener from the brake spider and insert a M16x2.0-100 mm stud.
11. Use a lifting device to support the brake assembly. Figure 3.9.

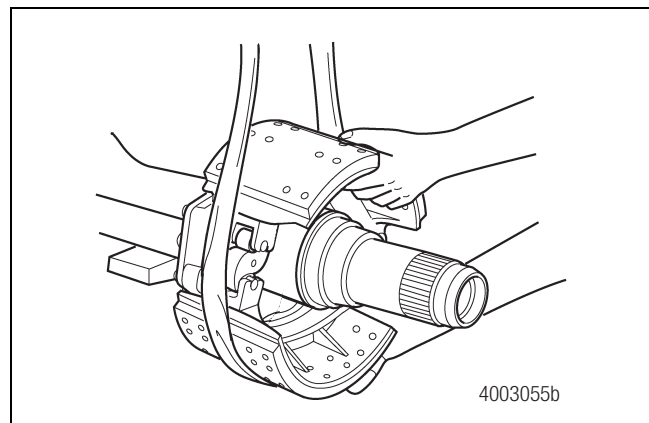


Figure 3.9

12. Use a socket and wrench to remove the brake spider/spindle-to-housing bolts. Figure 3.10.

3 Removal and Disassembly

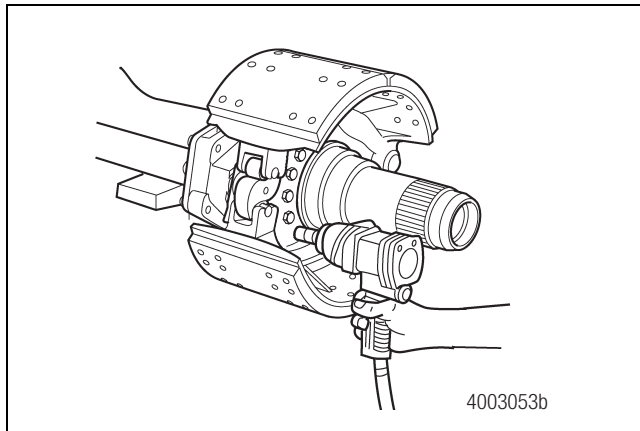


Figure 3.10

13. After removing the last brake spider bolt, carefully remove the complete brake assembly and set aside.

⚠ WARNING

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

14. Use a lifting device to support the spindle. Pull to remove the spindle from the housing and set aside. Figure 3.11.

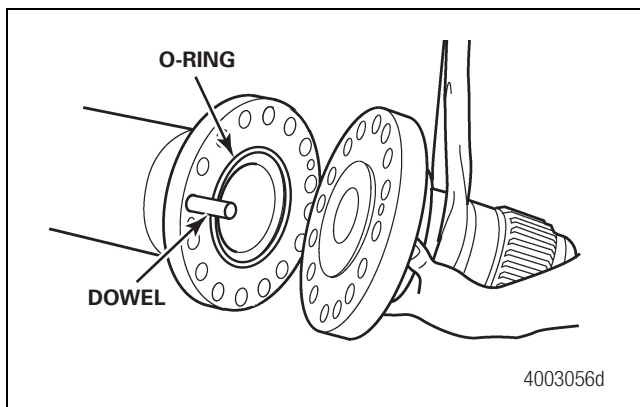


Figure 3.11

15. If equipped with the optional CTIS feature, remove the CTIS port O-ring from the back face of the spindle and discard. Figure 3.12.

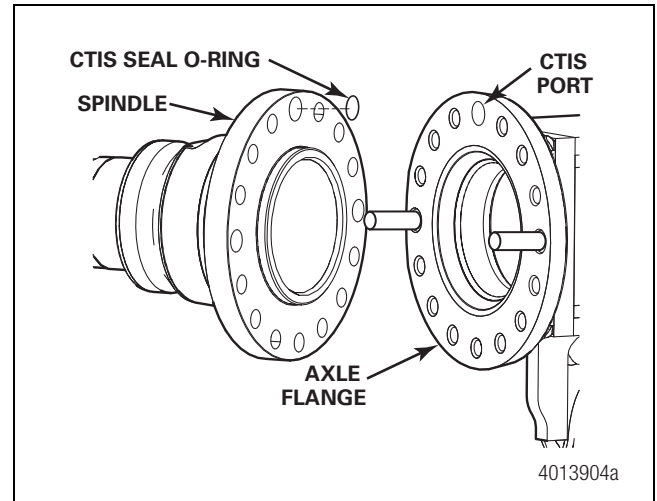


Figure 3.12

16. Remove the O-ring from the axle housing or spindle and discard it. Figure 3.11.
17. If the optional feature CTIS inlet bushing in the axle end requires replacement, press it out from the outer side of the housing flange. Figure 3.13.

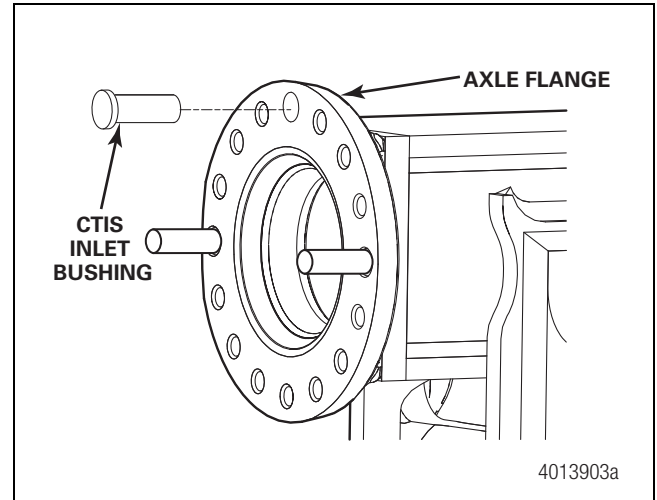


Figure 3.13

Thru-Shaft

1. Disconnect the inter-axle drive shaft.

⚠ CAUTION

Always use a flange or yoke bar during removal and installation of the flange yoke nut to prevent damage to the gearing.

3 Removal and Disassembly

2. Attach a flange bar to the flange or place a yoke bar over the input or output yoke to hold the yoke or flange while you remove the pinion nut.
3. Remove the thru-shaft nut, washer and yoke or flange. Use a puller tool to remove the yoke or flange from the shaft. Figure 3.14.

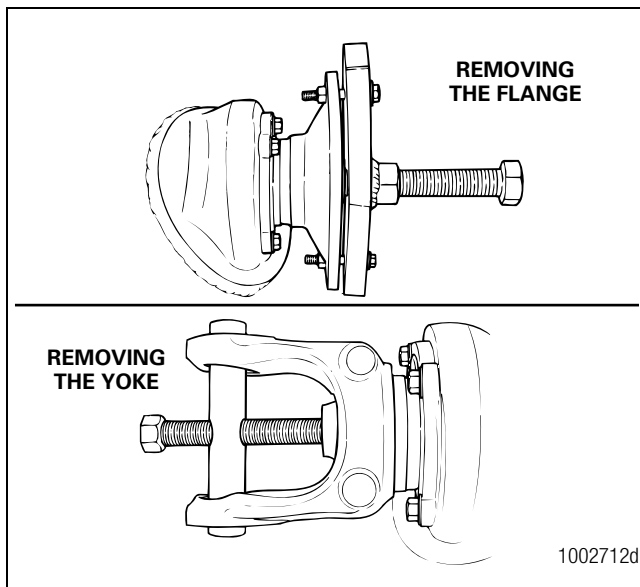


Figure 3.14

4. Remove the thru-shaft bearing cage capscrews and washers.
5. Pull the bearing cage, bearings and thru-shaft assembly from the axle housing. If necessary, loosen the cage from the housing with a soft mallet.

Disassembly

Thru-Shaft and Output Bearing Cage

1. Remove and discard the oil seal.
2. Remove the thru-shaft snap ring spacer from the thru-shaft. Figure 3.15 and Figure 3.16.

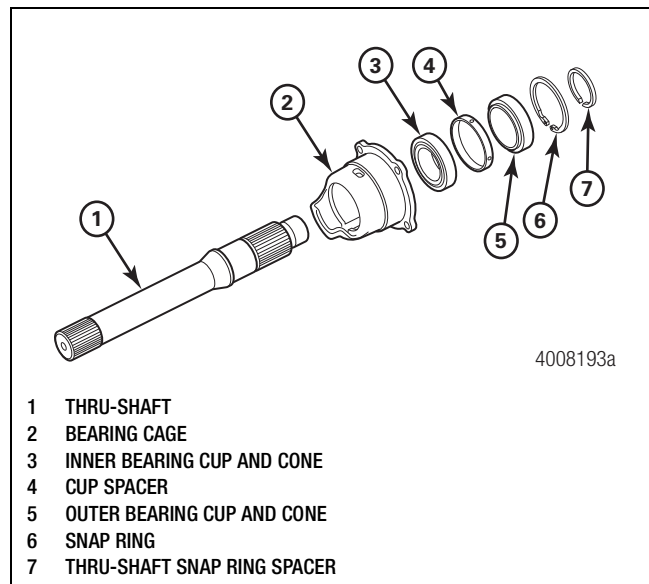


Figure 3.15

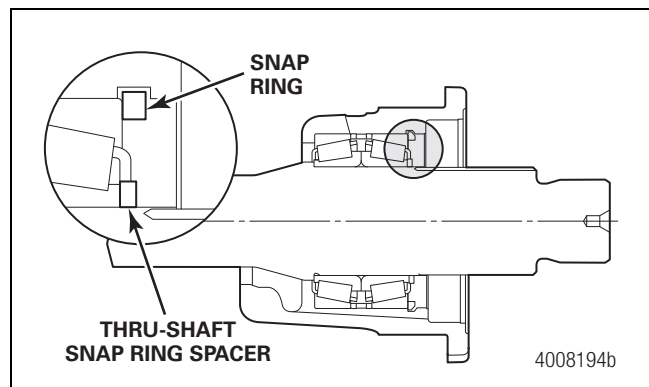


Figure 3.16

3. Remove the snap ring from the bearing cage assembly.
4. Install the thru-shaft assembly into a press with the threaded end DOWN and the bearing cage resting on the press. Press down on the shaft end until the bearing cones, cup spacer and outer bearing cup are free from the bearing cage.
5. Use a bearing cup remover or other suitable tool to remove the inner bearing cup from the bearing cage.
6. Install the thru-shaft in a press with the threads facing UP. Use a suitable tool or fixture to support the bearing cones. Press down on the shaft until the bearing cones are free from the shaft.

Removal

Differential Carrier from the Axle Housing

1. Place a hydraulic roller jack under the differential carrier to support the assembly. Figure 3.17.

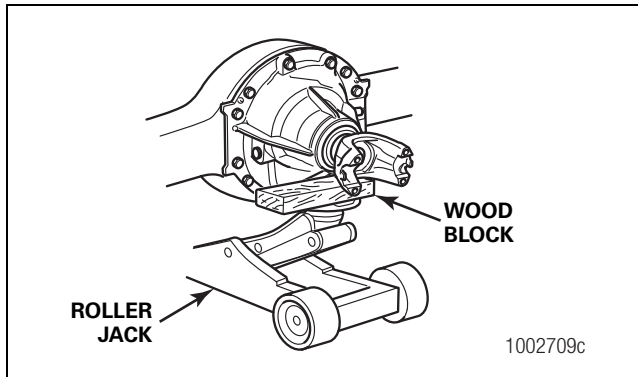


Figure 3.17

2. Remove all but the top two carrier-to-housing capscrews or stud nuts and washers.
3. Loosen the top two carrier-to-housing fasteners and leave attached to the assembly. The fasteners will hold the carrier in the housing.
4. Loosen the differential carrier in the axle housing. Use a leather mallet to hit the mounting flange of the carrier at several points.
5. After the carrier is loosened, remove the top two fasteners.

CAUTION

When you use a pry bar, be careful not to damage the carrier or housing flange. Damage to these surfaces will cause oil leaks.

6. Use the hydraulic roller jack to remove the carrier from the axle housing. Use a pry bar that has a round end to help remove the carrier from the housing.

NOTE: A carrier stand is available from SPX Kent-Moore. Refer to the Service Notes page on the front inside cover of this manual to obtain the stand. For carrier repair and service information, refer to Maintenance Manual MM-5A, MM-0970 or MM-0990. To obtain these publications, refer to the Service Notes page on the front inside cover of this manual.

7. Use a lifting tool to lift the differential carrier by the input yoke or flange and place the assembly in a repair stand. Figure 3.18. Do not lift by hand. A carrier stand can be built by referring to Section 9.

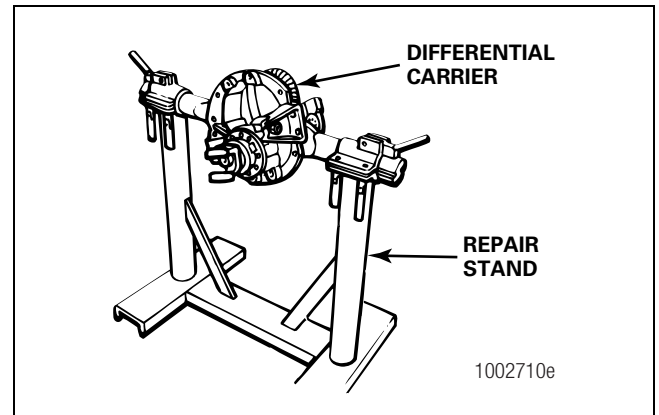


Figure 3.18

4 Prepare Parts for Assembly

Hazard Alert Messages

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

WARNING

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

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

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

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

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

Clean, Dry and Inspect Parts

Clean and Inspect the Companion Flange

CAUTION

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

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

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

Clean Ground and Polished Parts

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

CAUTION

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

4 Prepare Parts for Assembly

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

Clean Rough Parts

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

Clean Axle Assemblies

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

Dry Parts Immediately After Cleaning

All Parts Except Bearings

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

Bearings

CAUTION

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

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

Prevent Corrosion on Cleaned Parts

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

Inspect Parts

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

1. Inspect the cup, cone, rollers and cage of all tapered roller bearings in the assembly. If any of the following conditions exist, replace the bearing.
 - The center of the large-diameter end of the rollers is worn level with or below the outer surface. Figure 4.1.
 - The radius at the large-diameter end of the rollers is worn to a sharp edge. Figure 4.1.
 - There is a visible roller groove in the cup or cone inner race surfaces. The groove can be seen at the small- or large-diameter end of both parts. Figure 4.2.
 - There are deep cracks or breaks in the cup, cone inner race or roller surfaces. Figure 4.2.
 - There are bright wear marks on the outer surface of the roller cage. Figure 4.3.
 - There is damage on the rollers and on the surfaces of the cup and cone inner race that touch the rollers. Figure 4.4.
 - There is damage on the cup and cone inner race surfaces that touch the rollers. Figure 4.5.

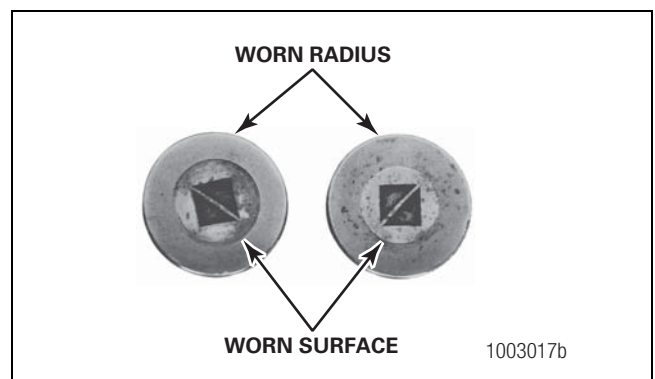


Figure 4.1

4 Prepare Parts for Assembly

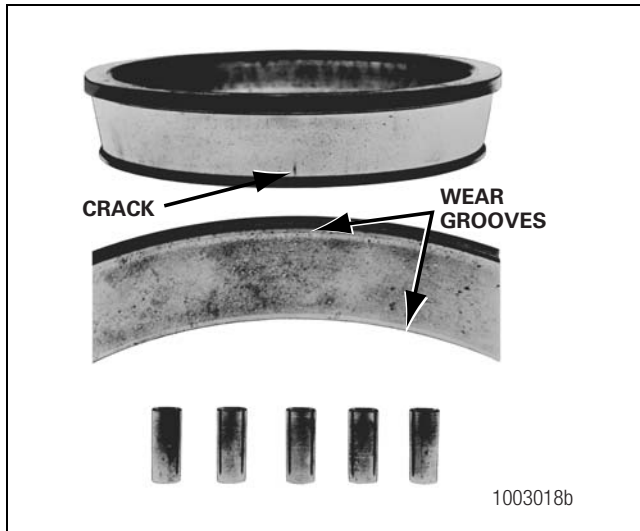


Figure 4.2

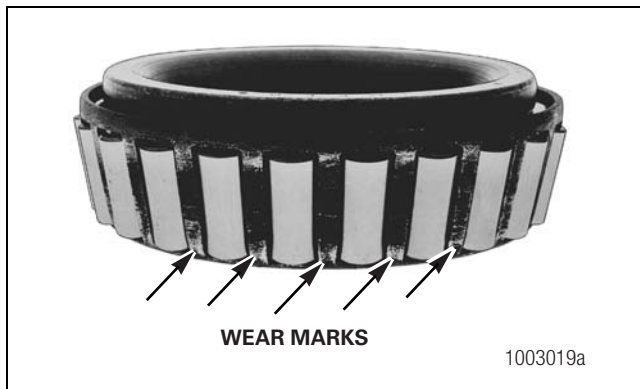


Figure 4.3

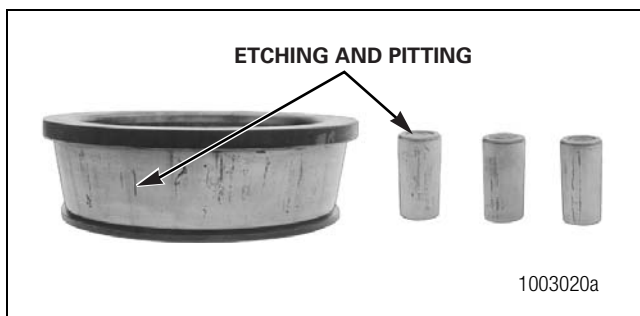


Figure 4.4

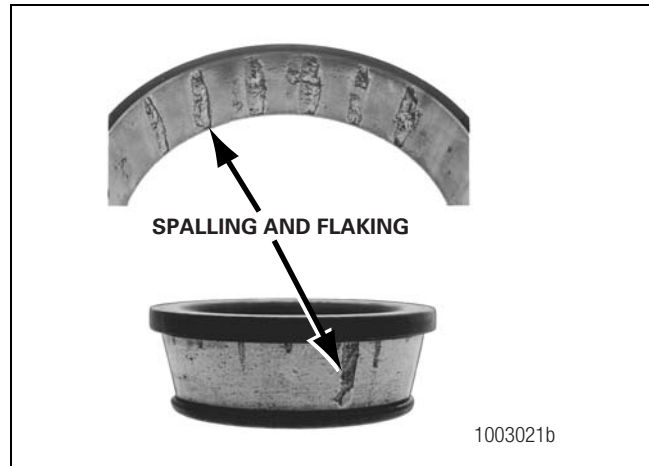


Figure 4.5

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

Repair or Replace Parts

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

1. Replace any fastener if the corners of the head are worn.
2. Replace the washers if damaged.
3. Replace the gaskets, oil seals or grease seals at the time of axle repair.
4. Clean the parts and apply new silicone gasket material where required when the axle is assembled. Figure 4.6.

4 Prepare Parts for Assembly

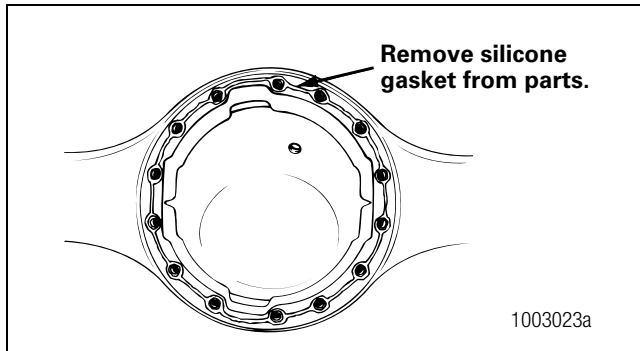


Figure 4.6

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

Do Not Bend or Straighten a Damaged Drive Axle Housing

⚠ WARNING

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

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

Do Not Repair Weld the Axle Housings

⚠ WARNING

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

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

New Fasteners with Pre-Applied Adhesive

1. Use a wire brush to clean the oil and dirt from threaded holes.

2. Install new fasteners with pre-applied adhesive to assemble parts. Do not apply adhesives or sealants to fasteners with pre-applied adhesive, or to fastener holes.
3. Tighten the fasteners to the required torque value for that size fastener. No drying time is required for fasteners with pre-applied adhesive.

Original or Used Fasteners

1. Use a wire brush to clean the oil, dirt and old adhesive from all threads and threaded holes.
2. Apply four or five drops of Meritor liquid adhesive 2297-C-7049, Loctite® 638 or 680 liquid adhesive or equivalent inside each threaded hole or bore. Do not apply adhesive directly to the fastener threads. Figure 4.7.

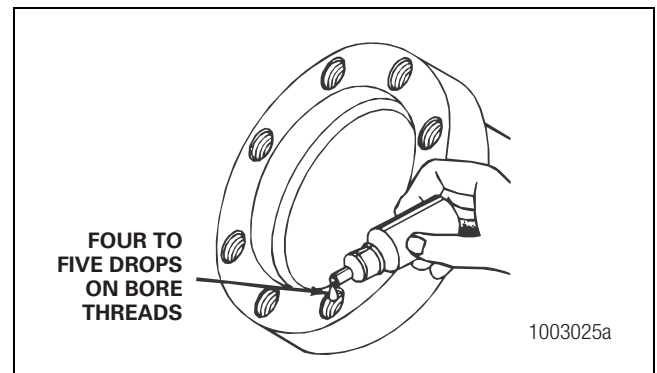


Figure 4.7

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

Carrier-to-Housing Joint Sealing Procedure

1. Remove the carrier from the housing.
2. Remove all debris from inside the housing.
3. Use a rotary tool with a scour pad to clean all silicone residue from the housing and carrier faces. Figure 4.8. Surfaces must be clean, dry and free of foreign matter. The surfaces must not be oily to the touch.

4 Prepare Parts for Assembly



Figure 4.8

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

CAUTION

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

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

CAUTION

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

10. Apply a 0.25-inch (6 mm) bead of Loctite® 5699 silicone gasket material to the housing face. Do not use ThreeBond 1216E silicone products. Figure 4.9.

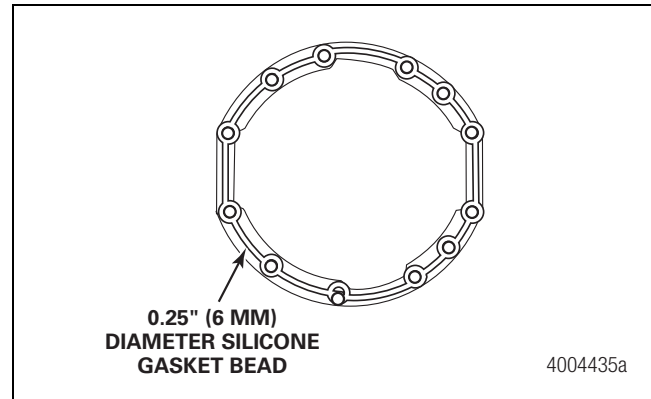


Figure 4.9

11. Install two long studs in the carrier to guide the carrier into the housing.
12. Immediately install the carrier into the housing to permit the silicone gasket material to compress evenly between the faces. If using a new capscrew kit with blue Dri-Loc® STS pre-applied threadlocker, skip the next step.

CAUTION

Apply silicone gasket material in a continuous 0.125-inch (3 mm) bead. If you use more than this amount, gasket material can break off and plug lubrication passages. Damage to components can result.

13. Apply a 0.125-inch (3 mm) bead of Loctite® 242 threadlocker around the capscrew threads approximately 0.25-inch (6 mm) from the end. Apply a 0.125-inch (3 mm) bead of Loctite® 242 threadlocker across the length of the threads. Figure 4.10.

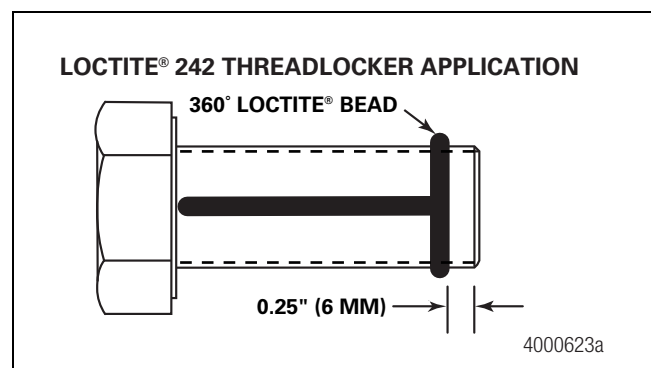



Figure 4.10

14. Install the capscrews. Use a crossing pattern to tighten the capscrews evenly to 225 lb-ft (306 N•m). The capscrews must be tightened within 10 minutes of initial application of Loctite® 242 threadlocker. 
15. Wait a minimum of 60 minutes before filling the assembly with lubricant.

Inspection

Wheel Studs

WARNING

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

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

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

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

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

Stud Removal

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

4. Use a press on the threaded end of the stud to force the stud out of the flange.

Stud Installation

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

CAUTION

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

3. Press the new stud all the way into the hub. Verify that the stud is fully seated and that the stud head is not embedded into the hub.
 - **If the stud head is embedded into the hub:** Replace the hub.
4. Examine the hub flange to verify the studs are not damaged, and make sure the flange was not damaged during the stud installation process.
 - **If the flange is damaged:** Replace the hub.

5 Assembly and Installation

Hazard Alert Messages

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

WARNING

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

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

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

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

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

Installation

Differential Carrier into the Axle Housing

WARNING

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

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

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

1. Use a cleaning solvent and rags to clean the inside of the axle housing and the carrier mounting surface.
2. Inspect the axle housing for damage. Repair or replace the axle housing.
3. Check for loose studs, if equipped, in the mounting surface of the housing where the carrier fastens. Remove and clean the studs that are loose.
4. Apply liquid adhesive to the threaded holes. Install the studs into the axle housing. Tighten the studs to the correct torque value.

CAUTION

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

5. Apply a 0.25-inch (6 mm) continuous bead of Loctite® 5699 gasket material to the mounting surface of the housing where the carrier fastens. Figure 5.1.

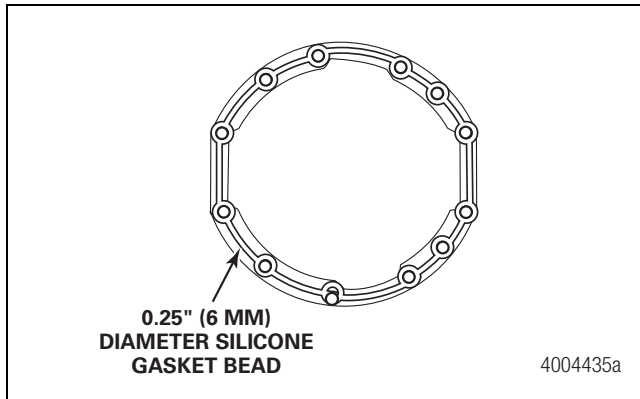


Figure 5.1

⚠ CAUTION

Do not use a hammer or mallet to install the carriers. A hammer or mallet will damage the mounting flange of the carrier and cause oil leaks.

6. Use a hydraulic roller jack or a lifting tool to install the carrier into the axle housing.
7. Install nuts and washers or capscrews and washers, if equipped, into the four corner locations around the carrier and axle housing. Hand-tighten the fasteners. Figure 5.2.

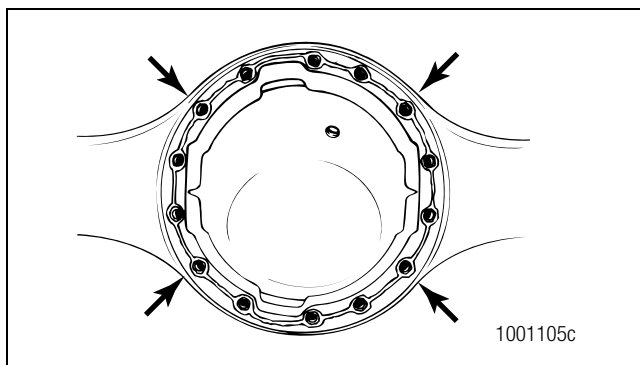


Figure 5.2

8. Carefully push the carrier into position. Tighten the four fasteners two or three turns each in a pattern opposite each other. Figure 5.2.
9. Repeat Step 8 until the four fasteners are tightened to 225 lb-ft (306 N•m). **ⓘ**
10. Install the other fasteners and washers that hold the carrier in the axle housing. Tighten fasteners to 225 lb-ft (306 N•m). **ⓘ**

11. Connect the driveline universal joint to the pinion input yoke or flange on the carrier.

Assembly

Output Bearing Cage and Thru-Shaft

1. Apply axle lubricant to bearing cups and cones. Figure 5.3.

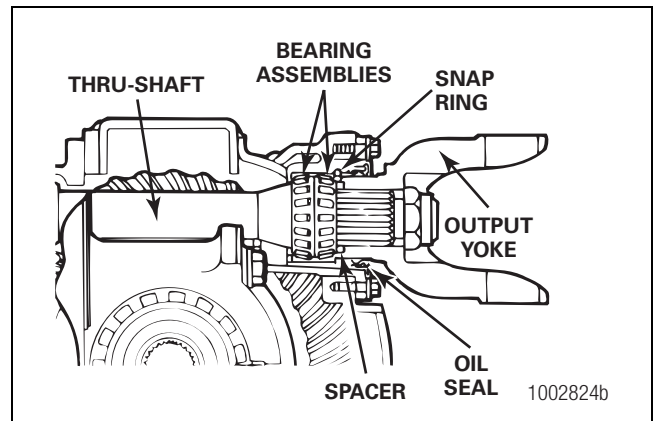


Figure 5.3

NOTE: If you replace either the bearing cup or the cone, replace both parts in a fully-matched set from the same manufacturer.

2. If the bearing cones were removed from the thru-shaft, install new bearing cones. Place both cones back-to-back onto the thru-shaft. Use a press and sleeve to install both cones. Apply pressure until the inner cone seats onto the shoulder of the thru-shaft. Figure 5.4.

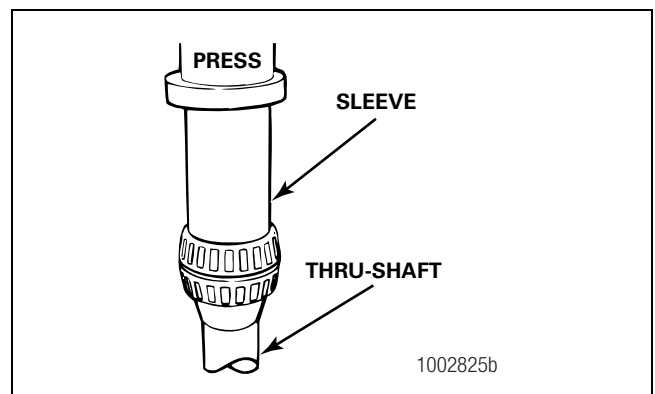


Figure 5.4

3. Use a press and sleeve to install the inner bearing cup into the cage. Place the thru-shaft and bearing assembly into the cage.

5 Assembly and Installation

4. Use a press and sleeve to install the outer bearing cup into the cage over the thru-shaft. Figure 5.5.

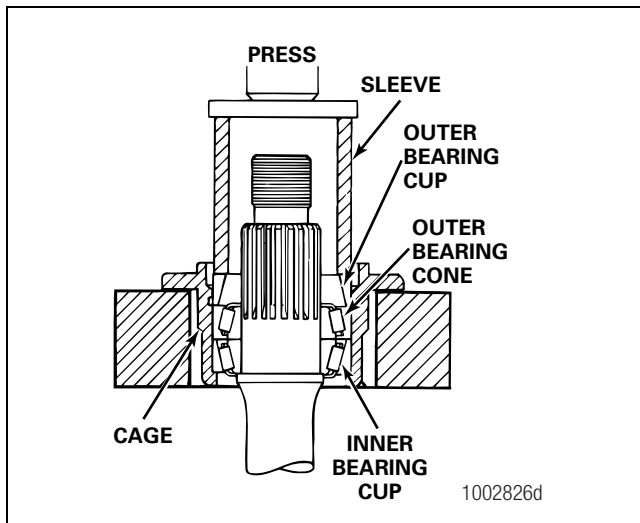


Figure 5.5

5. Install the snap ring that fastens the outer cup in the cage. The snap ring controls the end play of the output bearing. Figure 5.6.

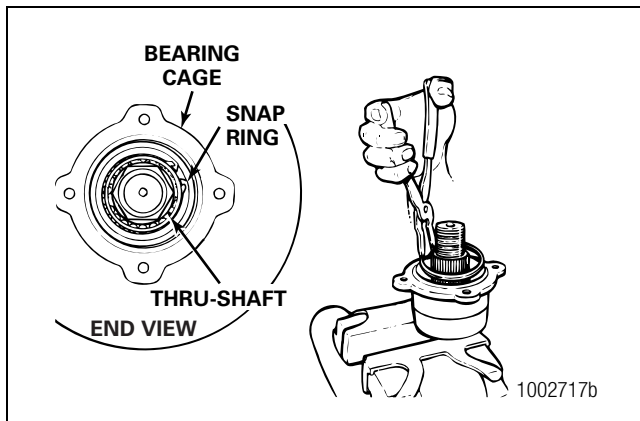


Figure 5.6

6. Install the snap ring or the yoke-to-cone spacer onto the thru-shaft until the snap ring touches the outer cone.
7. Inspect and adjust the end play of the thru-shaft bearing.

Adjustment

Adjust the Output Bearing End Play

The output bearing end play is controlled by the size of the snap ring that holds the bearings in the output cage. The snap rings are available in increments of 0.003-inch (0.076 mm). Install the snap ring which results in an end play of 0.004-0.008-inch (0.10-0.20 mm).

1. Place the thru-shaft and the bearing cage assembly into a vise with soft metal covers on the jaws of the vise.
2. Use an installation tool to install the yoke or flange onto the thru-shaft. Do not use the nut to draw the yoke onto the shaft. Do not install the oil seal at this time.
3. Install the nut that fastens the yoke or flange to the thru-shaft. Place a holding tool on the yoke or flange and tighten the nut to the specified torque.
4. Push the yoke or flange toward the cage and rotate the shaft in each direction to verify that the bearings are correctly installed.
5. Install a dial indicator so that the base of the indicator is on the mounting flange of the cage. The pointer of the indicator must touch the yoke or flange end of the thru-shaft. Set the dial indicator to ZERO. Figure 5.7.

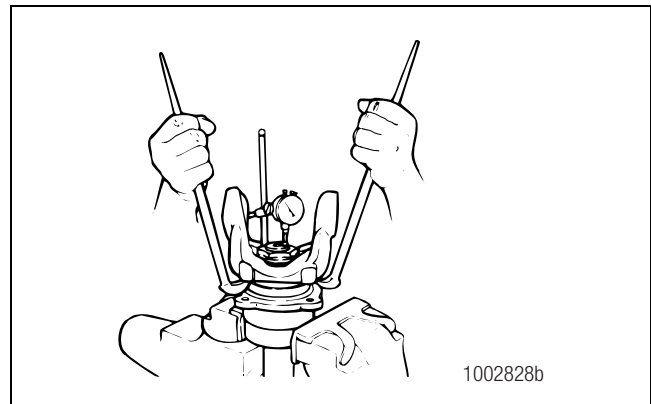


Figure 5.7

6. Place pry bars under the yoke or flange and push the yoke or flange away from the cage. Record the reading on the dial indicator. The reading must be 0.004-0.008-inch (0.10-0.20 mm). The reading is the measurement of the end play on the output bearing.

- If the end play reading is not 0.004-0.008-inch (0.10-0.20 mm): Remove and replace the snap ring that fastens the bearings in the cage. Install a thinner snap ring to increase the end play. Install a thicker snap ring to decrease the end play. Figure 5.8.

7. Remove the nut that fastens the yoke or flange to the thru-shaft. Use the correct puller tool to remove the yoke.

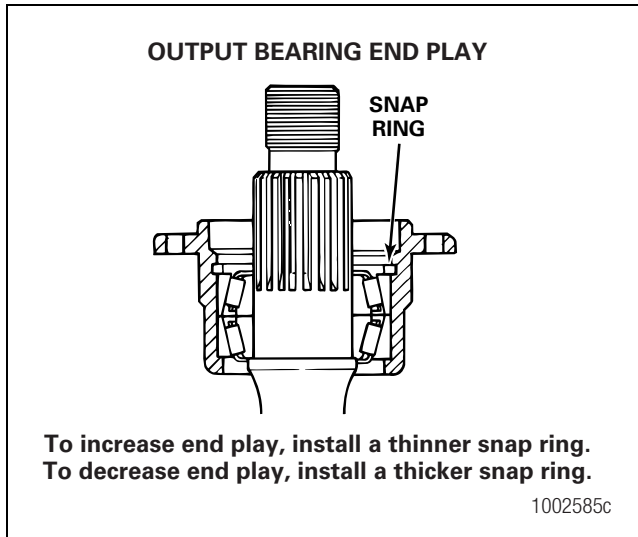


Figure 5.8

Installation

Output Shaft into the Axle Housing

1. Apply Loctite® Ultra-Grey 5699, Meritor specification 2297-H-7021, in a continuous 0.08" (2 mm) wide bead a full 360 degrees around the axle housing snorkel mounting face. Figure 5.9.

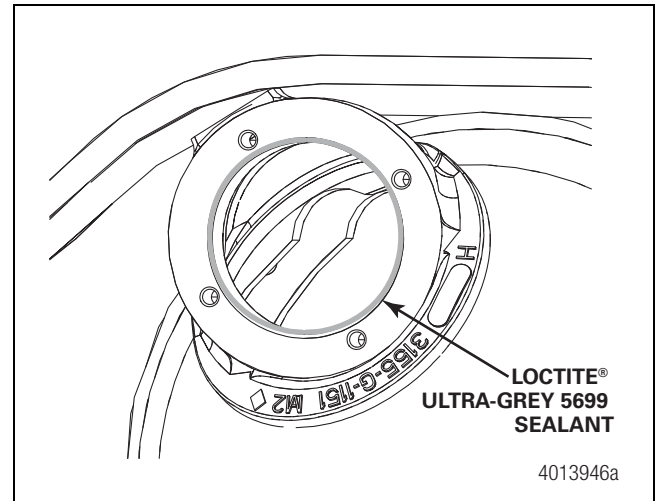



Figure 5.9

2. Install the output shaft and bearing cage assembly into the axle housing snorkel. Rotate the output shaft to align the splines of the output shaft with the splines of the rear side gear.
3. Apply Loctite® 518 threadlocker to the fasteners and install into the housing snorkel. Tighten the capscrew to 49-57 lb-ft (66-77 N•m). 

Output Yoke and Seal for the Output Bearing Cage

CAUTION

Hold the seal only on the outer diameter. Do not touch the lips in the inner diameter of the seal. If you touch the lips on the inner diameter of the seal, you will contaminate the lips and cause a leak between the shaft and the seal.

Do not apply pressure after the flange of the seal touches the top of the cage or you will damage the seal.

1. Install the multiple-lip seal (MLS). Refer to the procedure in this section for complete instructions.

When you install the seal, hold the sleeve and seal only on the outer diameter. Position the seal onto the seal driver and align it with the forward-rear axle output shaft. Do not touch the lips in the inner diameter of the seal. Use a dead-blow hammer and the appropriate driver to install the seal onto the output shaft. Figure 5.10.

5 Assembly and Installation

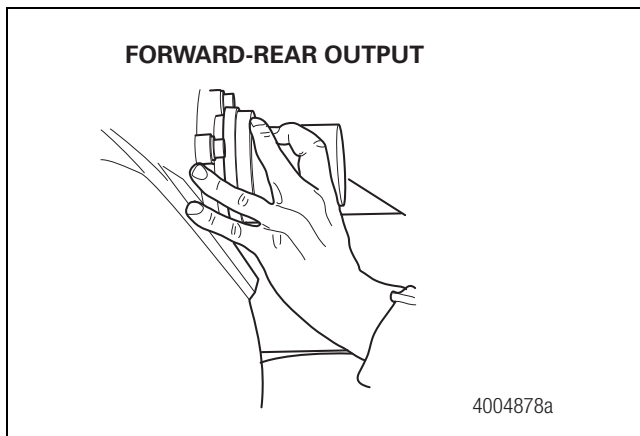


Figure 5.10

2. Use a feeler gauge to measure the gap around the complete flange-to-cage area. The seal is correctly installed if the gap is less than 0.010-inch (0.25 mm) around the circumference of the seal flange. Figure 5.11.

- **If the gap is more than 0.010-inch (0.25 mm):** Use a dead-blow hammer and the appropriate driver to completely install the seal.

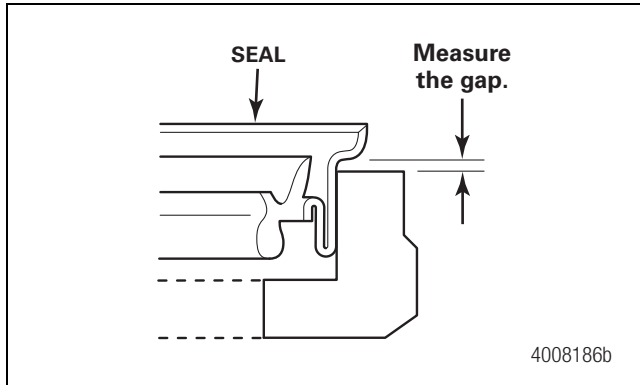


Figure 5.11

⚠ CAUTION

Use a press and a sleeve or yoke installation tool to install the yoke. Do not use a hammer or mallet. Using a hammer or mallet can damage the bearings, yoke or flange.

3. Use a press and sleeve or an installation tool to install the yoke onto the thru-shaft. Verify that the splines inside the yoke or flange are aligned with the splines on the thru-shaft. If a press and sleeve are used, verify that the thru-shaft is supported.

4. Install the nut that fastens the output yoke or flange to the thru-shaft. Place a holding tool on the yoke or flange and tighten the nut to 600-700 lb-ft (815-950 N•m). Figure 5.12.

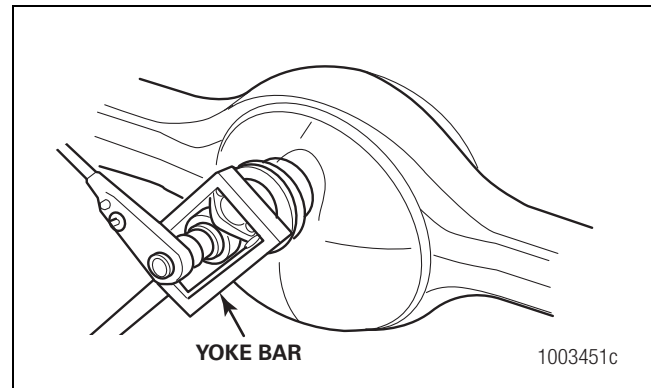


Figure 5.12

5. Rotate the yoke at least one full turn after the yoke nut is tightened to the correct torque specification. This ensures correct seating of the seal.

Assembly

Brake and Spindle

1. If the CTIS inlet bushing for the optional CTIS feature was removed, install the bushing by pressing it into the "D"-shaped hole at the 12 o'clock position of the axle housing end flange. Figure 5.13.

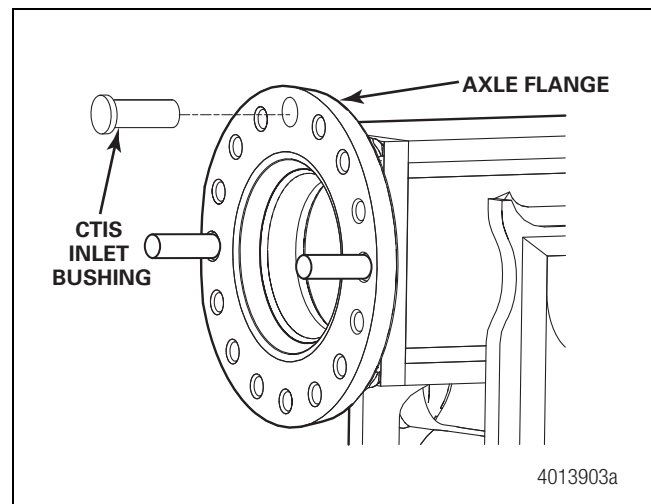


Figure 5.13

5 Assembly and Installation

- If equipped with the optional CTIS feature, lubricate and install a new CTIS port O-ring in the groove on the spindle. Figure 5.14.

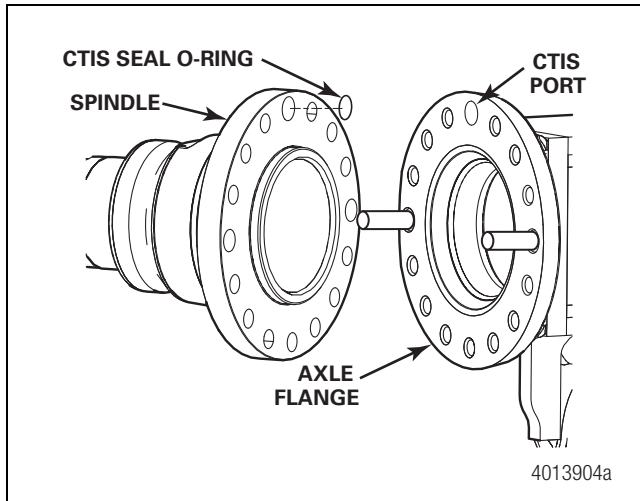


Figure 5.14

- Lubricate and install a new O-ring on the axle housing or spindle. Figure 5.15.

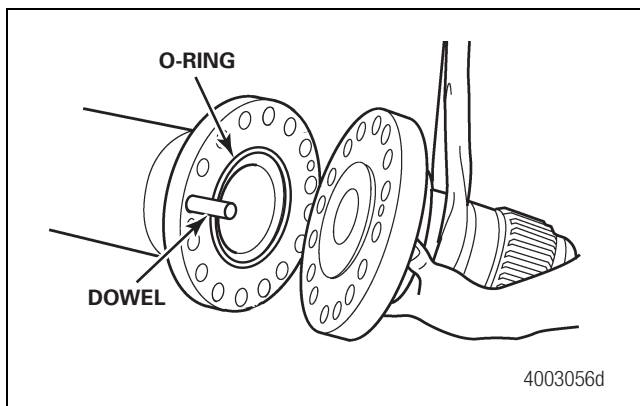


Figure 5.15

- Insert the dowels into the housing at the 3 and 9 o'clock position. The dowels will be used to align the spindle and brake assembly to the axle housing. Figure 5.15.
- Use a lifting device to support the spindle. Figure 5.15.
- If equipped with the optional CTIS feature, align the spindle with the CTIS port at the 12 o'clock position on the housing. Figure 5.14.
- Install the spindle over the stud and into mounting position on the axle housing. Figure 5.15.

- Use a lifting device to support the brake assembly.
- Carefully rotate and install the complete brake assembly into position. Figure 5.16.

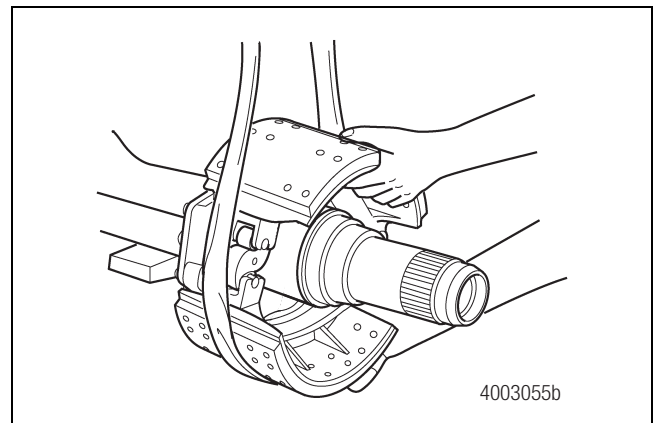




Figure 5.16

- Apply Loctite® 242 threadlocker to the brake spider-to-housing bolt threads.
- Install and tighten the brake spider-to-housing bolts according to their length. Figure 5.17.
 - Tighten the M16 x 2 bolts to 225 lb-ft (305 N•m). 
 - Tighten the M20 x 2.5 bolts to 420 lb-ft (570 N•m). 

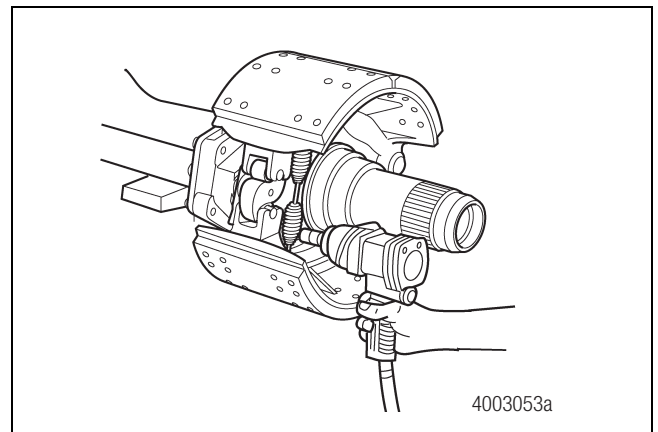


Figure 5.17

- Remove the stud and install the last brake spider-to-housing bolt. Tighten to specification.
- If equipped with brake dust shields, install the dust shields and mounting bolts. Figure 5.18.

5 Assembly and Installation

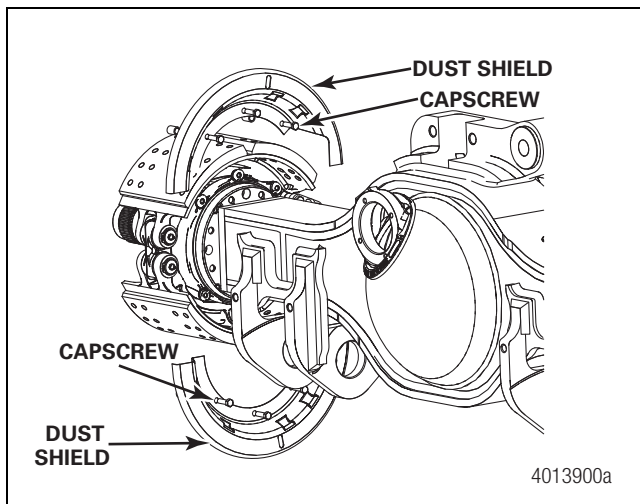


Figure 5.18

14. Route the ABS sensor through the brake dust shield. Place the ABS sensor mount and spacer block in position on the spindle with the same orientation as originally installed. Install the two ABS sensor block cap screws and tighten to 7-11 lb-ft (10-15 N•m). Figure 5.19.

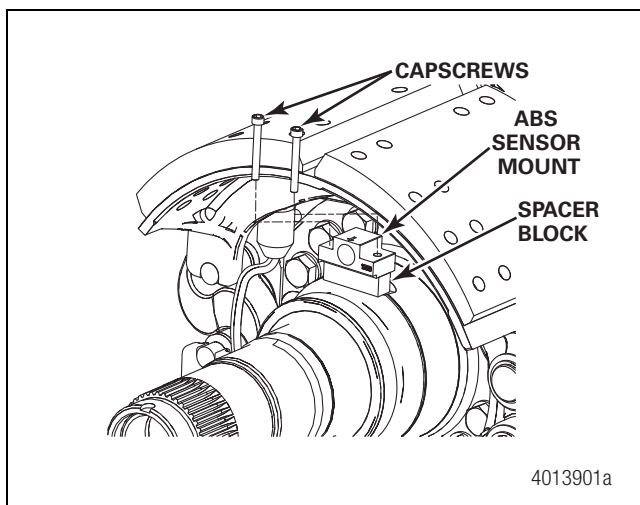


Figure 5.19

15. Install the brake return spring and clips. Figure 5.20.

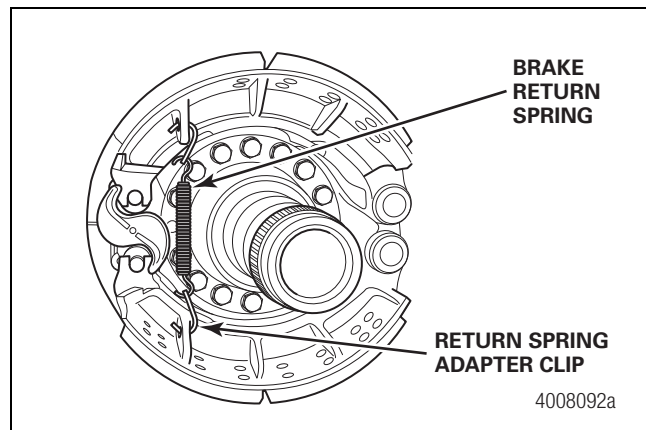


Figure 5.20

16. Connect the brake lines.
17. If equipped with the optional CTIS feature, install the 90-degree elbow fitting into the fitting bushing and tighten to 20 lb-ft (27 N•m). Connect the CTIS air line to the elbow. Figure 5.21.

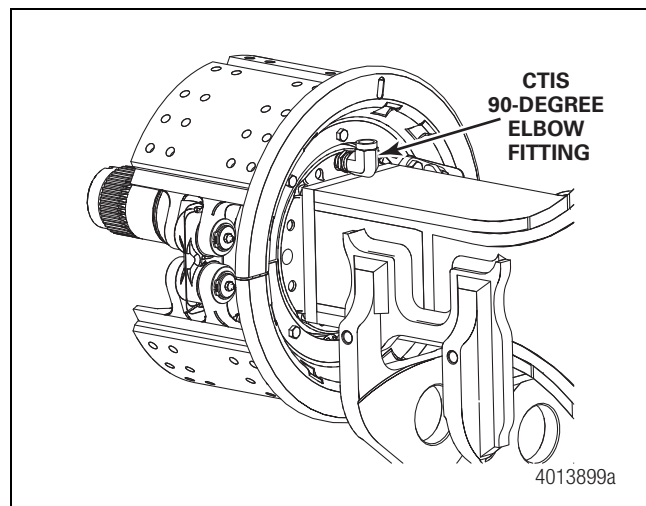


Figure 5.21

18. If the brake has spring chambers, carefully unlock the spring using the brake chamber manufacturer's instructions.

Installation

Wheel End and Planetary Assembly

Refer to Maintenance Manual MM-1189 for instructions on assembling and installing the wheel end and planetary assembly. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

Fill the Axle with Oil

Refer to the procedure in Section 7.

6 Troubleshooting

Diagnostic Charts

Refer to the following chart when troubleshooting axle problems.

Table A: Carriers

Condition	Possible Causes	Actions Required
Noise, Possibly Followed by High Temperature	The oil is incorrect.	Drain the oil. Fill the axle with the correct oil according to the specifications.
	The oil level is too low.	Check the oil level.
	The backlash is incorrect.	Adjust the backlash.
	The tooth contact is incorrect.	Adjust the tooth contact.
	The gears are damaged.	Remove the final drive. Inspect the gears for damage. Replace any damaged parts. Perform the necessary adjustments.
Thump in the Forward Axle Carrier When Applying the Accelerator Pedal (Noise due to U-joint wear ruled out)	The bearings are worn or incorrectly adjusted.	Check and adjust the bearings. Replace worn or damaged bearings.
	The thrust washers for the differential gears are worn.	Replace all thrust washers.
	The differential gears or spider are worn.	Replace the worn parts.
	The driving wheel is loose on the hub.	Tighten the wheel nuts.
	The splines are worn on the drive shafts or final drive.	Replace the worn parts.
Oil Leakage	The oil level is too high.	Check the oil level.
	The breather valve is clogged.	Check the breather valve.
	The oil seals are damaged.	Replace the oil seals.
	The wheel bearings are incorrectly adjusted or damaged.	Adjust or replace the wheel bearings.
	Damage is found on the pinion seal or the flange/yoke.	Replace the damaged parts.
	The pinion bearings are incorrectly adjusted or damaged.	Adjust or replace the bearings.
	The differential lock piston seal leaks so compressed air enters the final drive when the differential lock is engaged.	Replace the piston seal.
	The air lines are leaking.	Check the air lines and connections.
Differential Lock Does Not Engage	The lock cylinder is leaking.	<ol style="list-style-type: none"> 1. Tighten the lock cover capscrews and check for leaks using soapy water. 2. Replace the piston seal.
	The piston seal leaks.	Replace the piston seal.

Condition	Possible Causes	Actions Required
	The differential lock is deformed.	Replace the differential lock.
	The shift fork guide pin holes are bent or damaged.	Replace the guide pins.
	There is an electrical fault in the switch or solenoid valve.	<ol style="list-style-type: none"> 1. Check the cables and connections. 2. Check the solenoid valve. 3. Check the switch.
	The push rod is incorrectly adjusted.	Adjust the push rod according to the recommended procedure.
Differential Lock Does Not Disengage	The solenoid valve is faulty.	Replace the solenoid valve.
	The return spring is broken.	Replace the spring.
	The shift fork holes are bent or damaged.	Replace the guide pins.
Differential Lock Indicator Lamp Does Not Illuminate	The differential lock does not engage or engages only partially.	Refer to the "Differential Lock Does Not Disengage" condition.
	There is an electrical fault in the lines or connections.	Check the lines and connections.
	A bulb is blown.	Replace the bulb.
	The indicator contact is incorrectly adjusted.	Replace the indicator according to the recommended instructions.
Differential Lock Indicator Lamp Illuminates Continuously	The differential lock does not disengage or disengages only partially.	Refer to the "Differential Lock Does Not Disengage" condition.
	The electrical cable between the indicator lamp and the control cylinder has contact with the chassis.	Insulate or replace the cable.
	The indicator is incorrectly adjusted.	Adjust the indicator.

7 Maintenance

Hazard Alert Messages

WARNING

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

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

Inspection and Maintenance

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

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

Components

Axle

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

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

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

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

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

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

Brakes

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

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

Lubricate more often for severe-duty applications. Refer to Maintenance Manual 4, Cam Brakes and Slack Adjusters, for more information. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

Carrier

Replace the carrier seal as required or whenever the carrier is repaired. Refer to Maintenance Manual 5A, Single-Reduction Differential Carriers, or Maintenance Manual MM-0990, Amboid Rear Differential Carrier. To obtain these publications, refer to the Service Notes page on the front inside cover of this manual.

Wheel Bearing End Play

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

1. Mark the location of the spindle nut in relation to the planetary ring gear hub.
2. Un-stake the spindle nut from the spindle.
3. Tighten the spindle nut to the torque specified in Section 8.
4. If the nut advances more than 30 degrees from its original marked position, disassemble the wheel hub assembly and inspect for bearing damage.
5. If the nut does not advance more than 30 degrees, a bearing inspection is not required.

WARNING

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

6. Remove the used nut. Install and torque a new nut following the procedure listed in Section 5.

Breather

⚠ CAUTION

Cover the breather when steam cleaning the housing to prevent water from entering the housing and contaminating the oil. Damage to components can result.

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

Lubrication

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

Magnets and Magnetic Drain Plugs

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

Seals

⚠ CAUTION

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

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

Temperature Indicators

⚠ CAUTION

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

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

Planetary Wheel End Cover Type Identification

There are several different types of hub covers depending on the design of axle you are servicing. Refer to Figure 7.1, Figure 7.2, Figure 7.3 and Figure 7.4 for plug locations and fill lines.

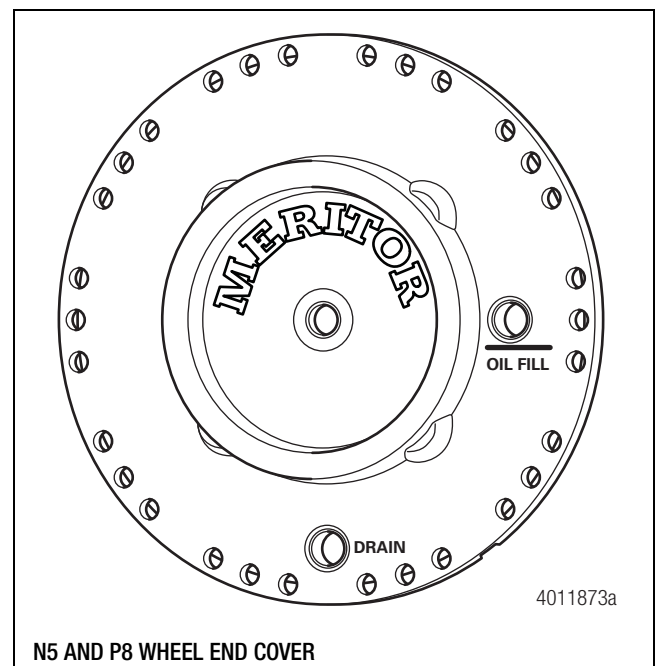


Figure 7.1

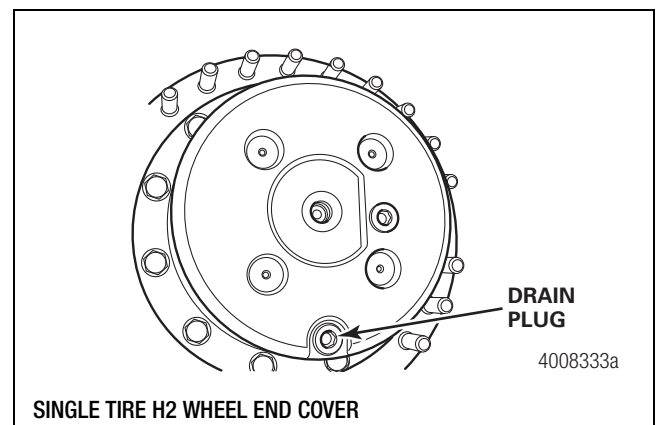


Figure 7.2

7 Maintenance

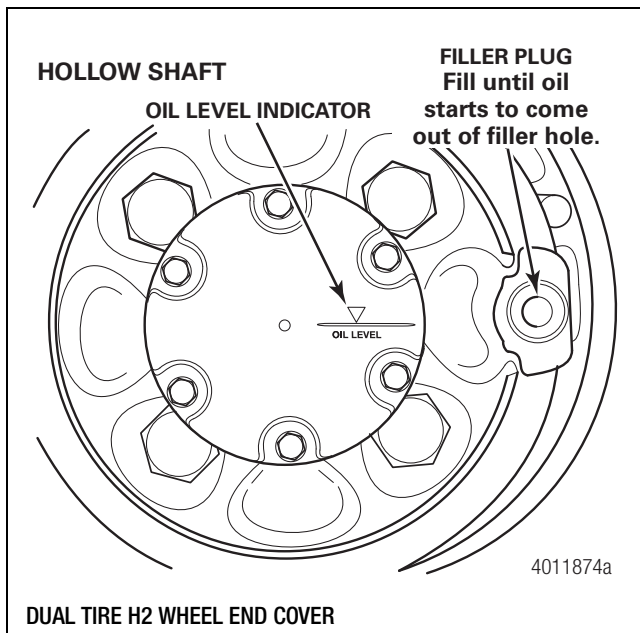


Figure 7.3

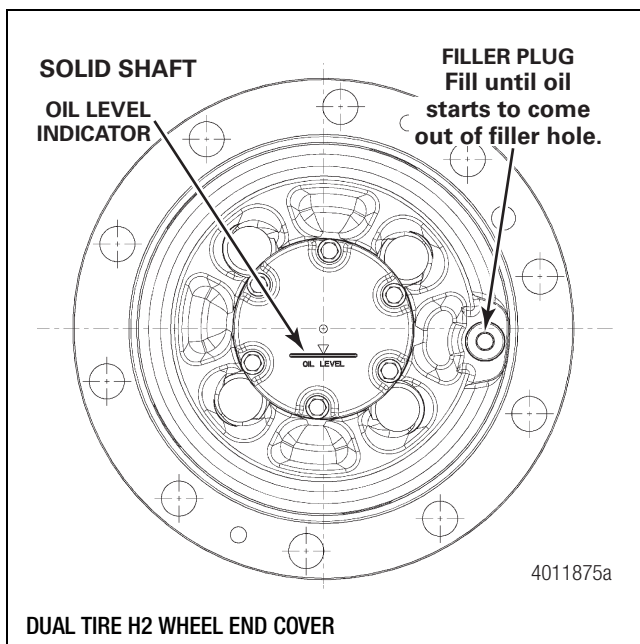


Figure 7.4

Check and Adjust the Oil Level

1. Verify that the vehicle is parked on a level surface.
2. Remove the fill plug from the axle.
3. Look at the oil level to ensure it is even with the bottom of the fill plug hole.

- If oil flows from the hole when the plug is loosened:
The oil level is high. Let the oil drain to the correct level.
- If the oil level is below the bottom of the fill plug hole:
Add the specified oil.

4. Install and tighten the fill plug to 44-74 lb-ft (60-100 N•m).

Drain and Replace the Oil

1. Verify that the vehicle is parked on a level surface.
2. Place a large container under the axle.
3. Remove the drain plug from the bottom of the axle housing and/or hub. To completely drain the oil from the wheel ends, the hubs must be orientated with the drain/fill plug to the 6 o'clock position. Drain and discard the oil correctly. Figure 7.5.

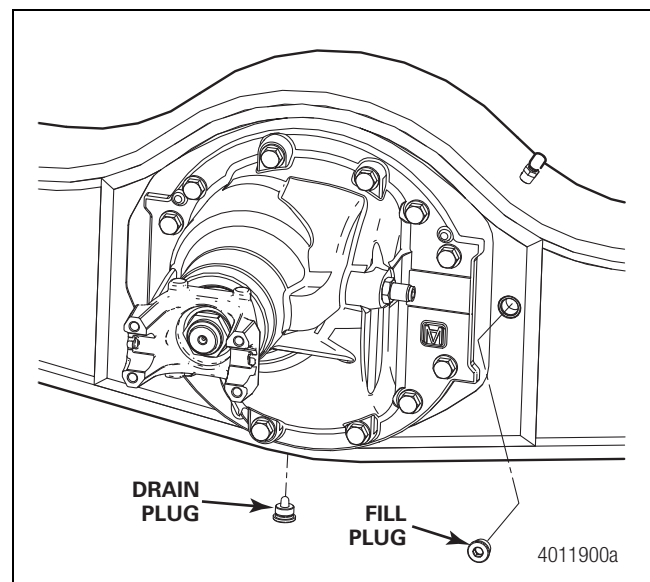


Figure 7.5

4. Clean, install and tighten the axle housing drain plug to 44-74 lb-ft (60-100 N•m).
5. Remove the fill plug from the axle. Figure 7.5.
6. Rotate the wheel ends to orientate the hub drain/fill plug to the 3 o'clock position for filling.
7. Fill the axle to the bottom of the fill plug hole with the specified oil. Allow enough time for oil to circulate through the axle assembly.
8. Install and tighten the fill plug to 44-74 lb-ft (60-100 N•m).

Lubricant Specifications and Maintenance Intervals

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

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

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

Table B: Lubricant Cross Reference, Viscosity and Temperature Chart

Meritor Lubricant Specification	Description	Cross Reference	Minimum Outside Temperature	Maximum Outside Temperature
O-76-A	Hypoid Gear Oil	GL-5, S.A.E. 85W/140	10°F (-12.2°C)	*
O-76-B	Hypoid Gear Oil	GL-5, S.A.E. 80W/140	-15°F (-26.1°C)	*
O-76-D	Hypoid Gear Oil	GL-5, S.A.E. 80W/90	-15°F (-26.1°C)	*
O-76-E	Hypoid Gear Oil	GL-5, S.A.E. 75W/90	-40°F (-40°C)	*
O-76-J	Hypoid Gear Oil	GL-5, S.A.E. 75W	-40°F (-40°C)	35°F (1.6°C)
O-76-L	Hypoid Gear Oil	GL-5, S.A.E. 75W/140	-40°F (-40°C)	*
O-617-A	Multi-Purpose Grease (NLGI Grade 1)	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.	

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

Table C: Maintenance Intervals

Component/ Operation	Maintenance Interval (Whichever Comes First)		
	Miles (km) Driven or	Months or	Hours of Operation
Check Wheel End Oil Level	1,000 (1600)	1	250
Check Axle Oil Level	5,000 (8000)		1,500
Detailed Visual Inspection of the Entire Axle	10,000 (16 000)	6	1,500
Inspect the Carrier Thrust Screw			3,000
Change Oil in Carrier and Wheel Ends (Petroleum Based)	25,000 (40 000)	12	3,000
Check Hub Endplay			1,500
Change Oil in Carrier and Wheel Ends (Synthetic Based)	50,000 (80 000)	24	3,000
Grease The S-cam and Slack Adjusters	10,000 (16 000)	6	1,000
Inspect Brake Lining Thickness	As Necessary — 0.25-inch (6.4 mm) Minimum Thickness		
Grease the Brake Pins and Rollers	As Necessary		
Inspect the Slack Adjuster	At Each Brake Reline		

8 Specifications

Torque Specifications

Dual Tire H2 Hub Reduction Single Rear Axle Assembly

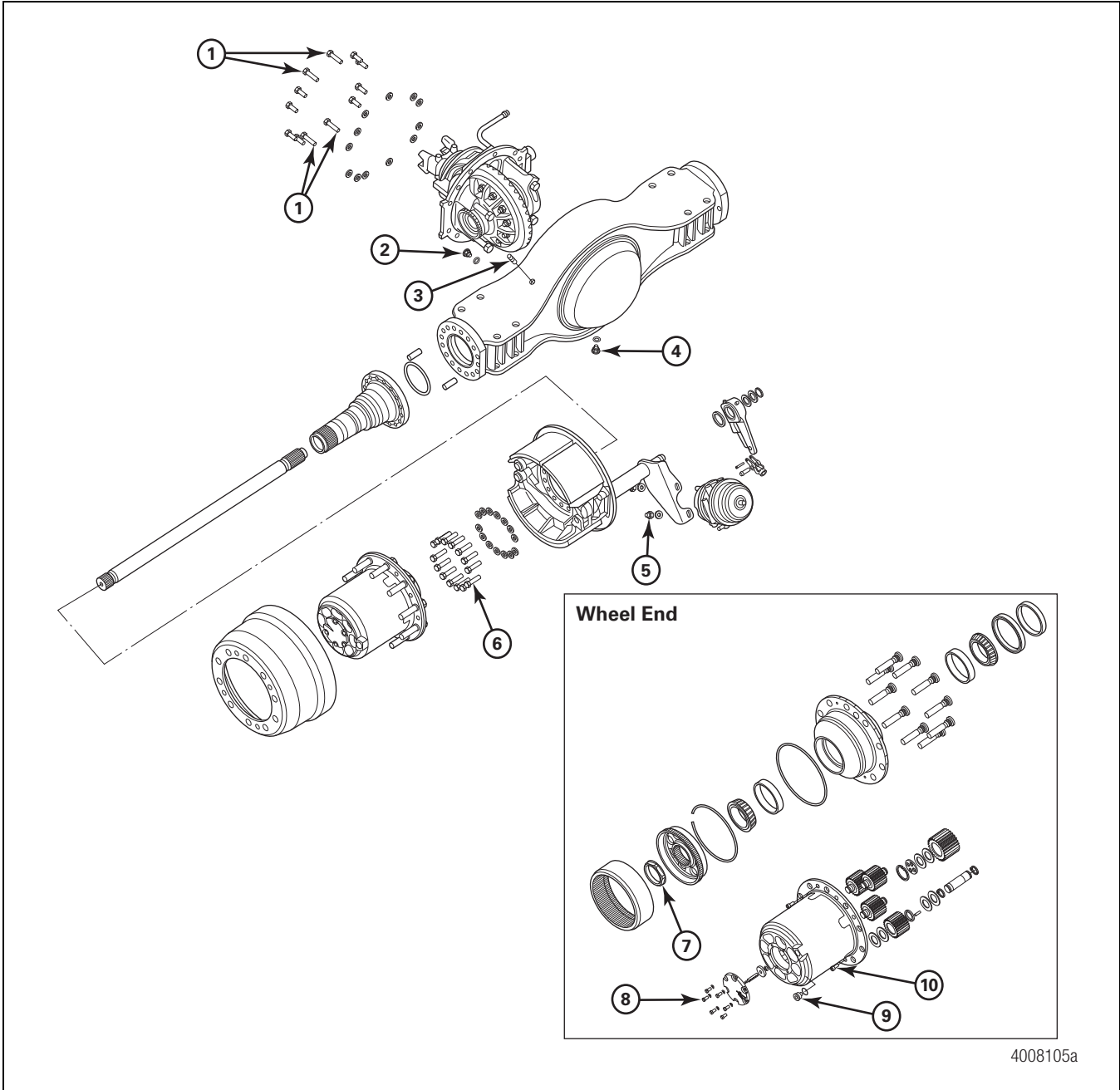


Figure 8.1

Table D: Torque Specifications

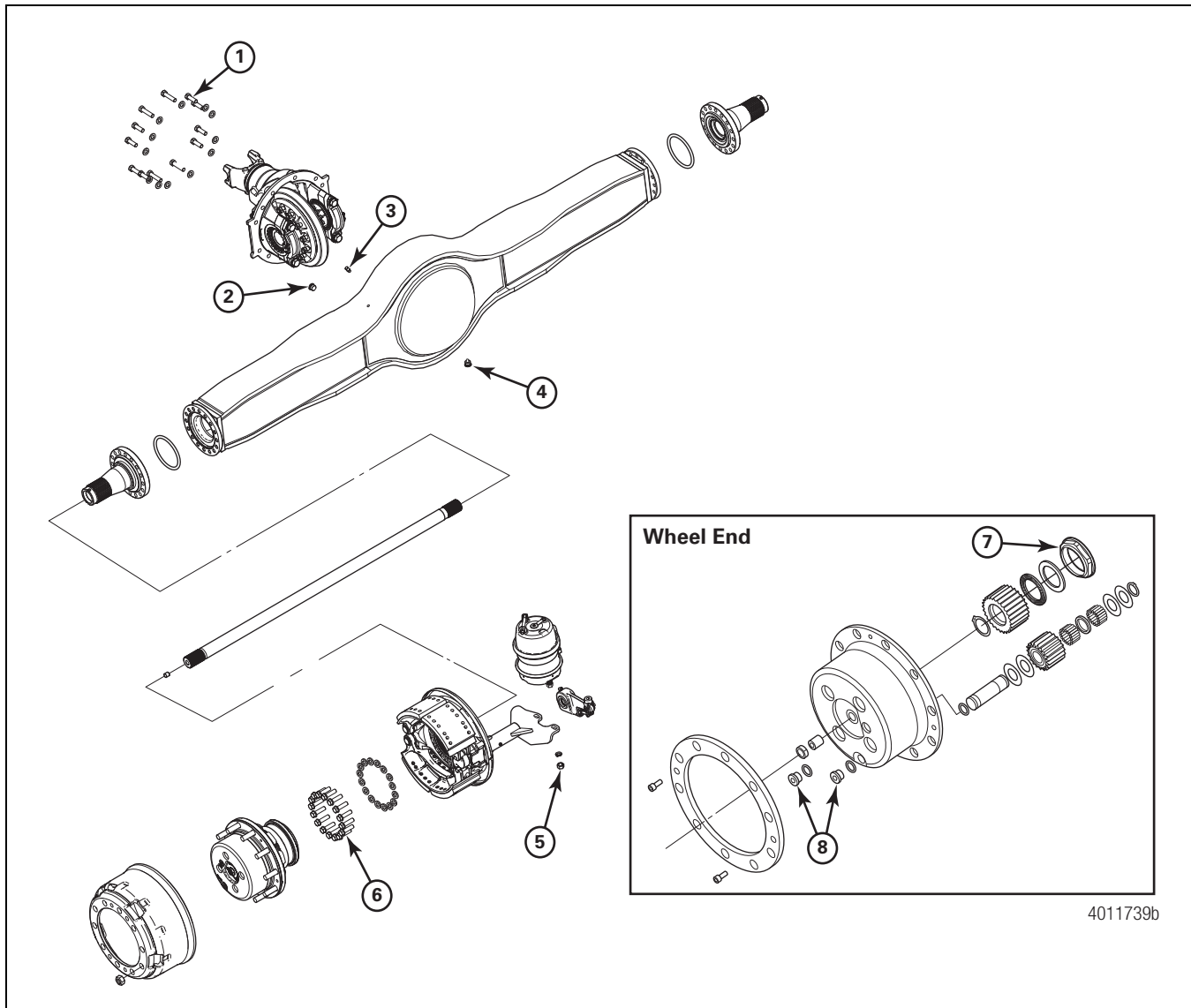
Item	Description	Thread Size	Torque Range	
			Lb-Ft	N•m
1	Carrier-to-Housing Bolts ¹	M16 x 2	225	306
2	Fill Plug (Axle Housing)	M24 x 1.5	44-74	60-100
3	Breather	3/8 x 18 NPSF	7-12	9-16
4	Drain Plug (Axle Housing)	M24 x 1.5	44-74	60-100
5	Air Chamber-to-S-cam Bracket	5/8 x 11 UNC	133-155	180-210
6	Brake Spider-to-Housing Bolts ¹	M16 x 2	192-235	260-318
		M20 x 2.5	360-481	488-652
7	Spindle Nut	M80 x 2	Refer to the procedure in Section 5.	
8	Hub Cover Bolts	M8 x 1.25	15	20
9	Fill/drain Plug (Hub)	M24 x 1.5	44-74	60-100
10	Hub Case-to-Hub Bolts ²	M10 x 1.5	30	40

¹ Apply Loctite® 277 threadlocker to the bolt threads.

² Apply Loctite® 242 threadlocker to the bolt threads.

8 Specifications

Single Tire H2 Rear Axle Assembly



4011739b

Figure 8.2

Table E: Torque Specifications

Item	Description	Thread Size	Torque Range	
			Lb-Ft	N•m
1	Carrier-to-Housing Bolts*	M16 x 2	192-235	260-318
2	Fill Plug (Axle Housing)	M24 x 1.5	44-74	60-100
3	Breather	3/8 x 18 NPSF	7-12	9-16
4	Drain Plug (Axle Housing)	M24 x 1.5	44-74	60-100
5	Air Chamber-to-S-cam Bracket Nut	5/8 x 11 UNC	133-155	180-210

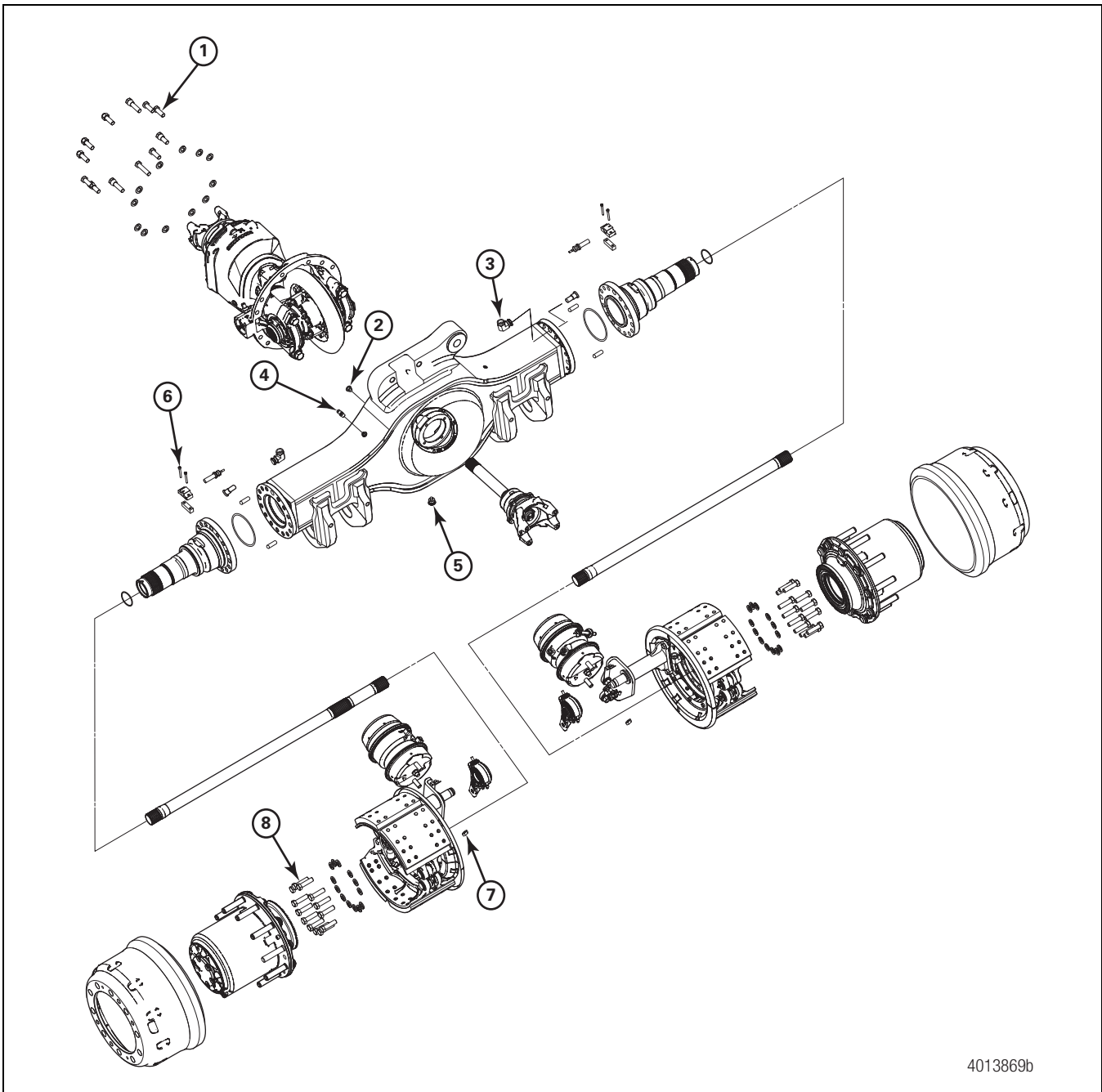
8 Specifications

Item	Description	Thread Size	Torque Range	
			Lb-Ft	N•m
6	Brake Spider-to-Housing Bolts*	M16 x 2	192-235	260-318
		M20 x 2.5	360-481	488-652
7	Spindle Nut	M80 x 2	Refer to the procedure in Section 5.	
8	Fill/drain Plug (Hub)	M24 x 1.5	44-74	60-100

*Apply Loctite® 277 threadlocker to the bolt threads.

8 Specifications

Tandem Forward-Rear Axle Assembly



4013869b

Figure 8.3

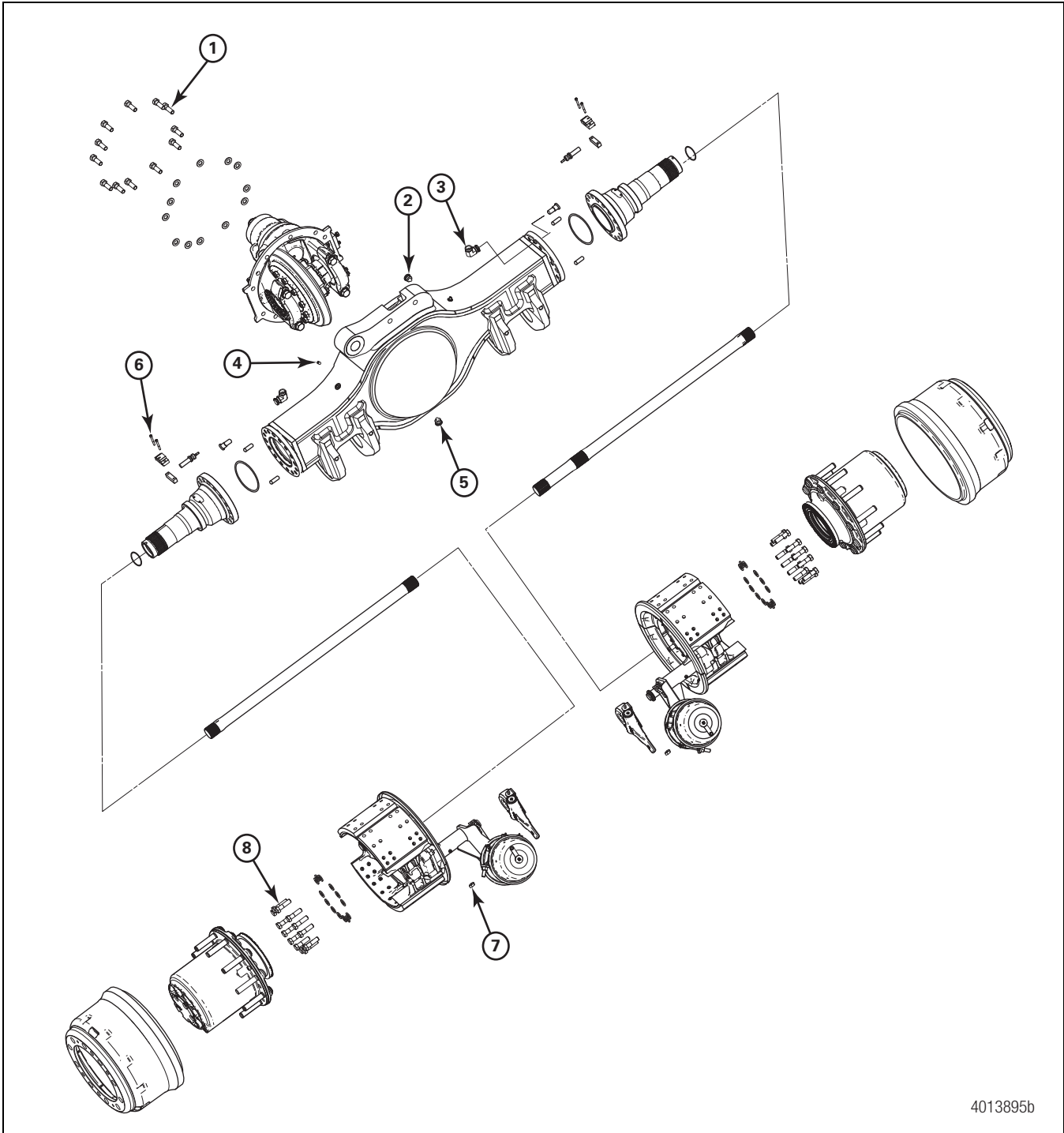
Table F: Torque Specifications

Item	Description	Thread Size	Torque Range	
			Lb-Ft	N•m
1	Carrier-to-Housing Bolts*	M16 x 2	192-235	260-318
	Stud Nut	5/8 x 18	190-230	258-312
2	Fill Plug (Axle Housing)	M24 x 1.5	44-74	60-100
3	CTIS Elbow	3/8 x 18 NPT	20	27
4	Breather	3/8 x 18 NPSF	7-12	9-16
5	Drain Plug (Axle Housing)	M24 x 1.5	44-74	60-100
6	ABS Sensor Hex Capscrew	M6 x 1.0	7-11	10-15
7	Air Chamber-to-S-cam Bracket Nut	5/8 x 11 UNC	133-155	180-210
8	Brake Spider-to-Housing Bolts*	M16 x 2	225	306
		M20 x 2.5	420	569

*Apply Loctite® 277 threadlocker to the bolt threads.

8 Specifications

Tandem Rear Axle Assembly



4013895b

Figure 8.4

Table G: Torque Specifications

Item	Description	Thread Size	Torque Range	
			Lb-Ft	N•m
1	Carrier-to-Housing Bolts*	M16 x 2	192-235	260-318
	Stud Nut	5/8 x 18	190-230	258-312
2	Fill Plug (Axle Housing)	M24 x 1.5	44-74	60-100
3	CTIS Elbow	3/8 x 18 NPT	20	27
4	Breather	3/8 x 18 NPSF	7-12	9-16
5	Drain Plug (Axle Housing)	M24 x 1.5	44-74	60-100
6	ABS Sensor Hex Capscrew	M6 x 1.0	7-11	10-15
7	Air Chamber-to-S-cam Bracket Nut	5/8 x 11 UNC	133-155	180-210
8	Brake Spider-to-Housing Bolts*	M16 x 2	192-235	260-318
		M20 x 2.5	360-481	488-652

*Apply Loctite® 277 threadlocker to the bolt threads.

Tandem Forward-Rear Thru-Shaft Assembly

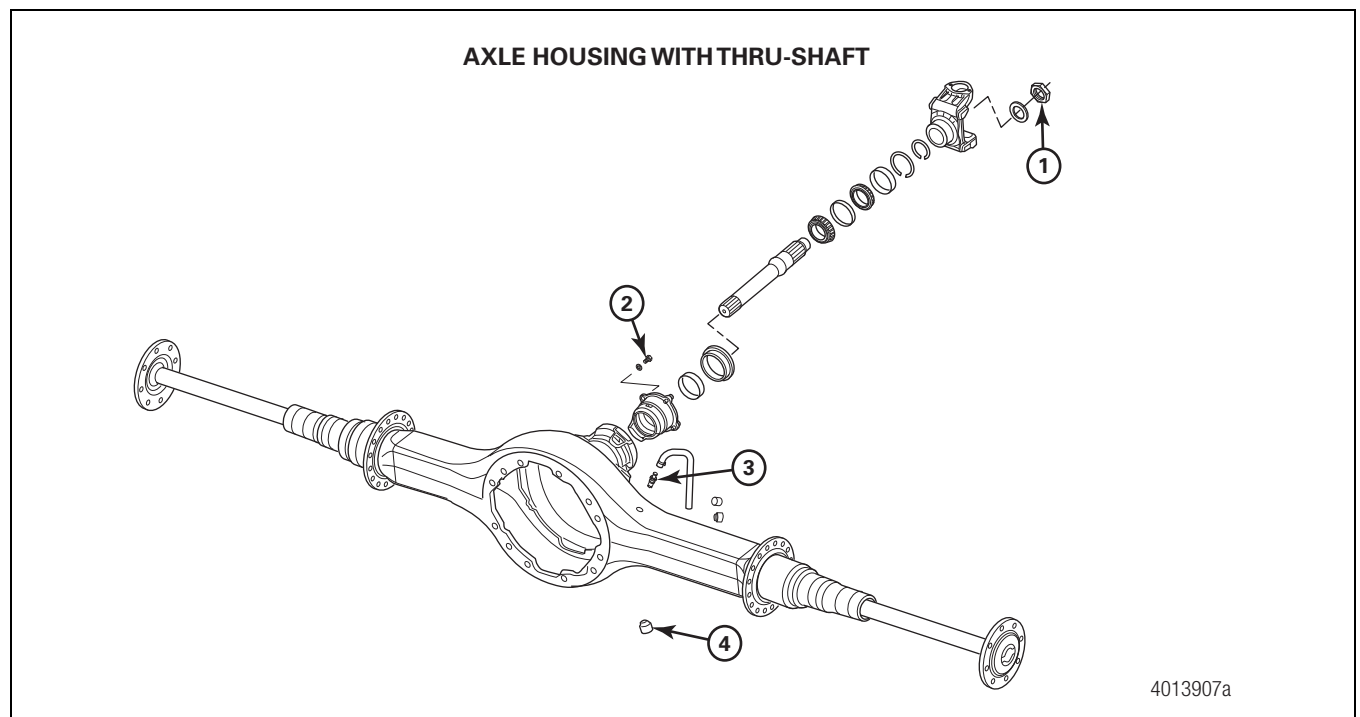


Figure 8.5

8 Specifications

Table H: Torque Specifications

Item	Description	Size	Torque	
			Lb-Ft	N•m
1	Output Shaft Nut	M39 x 1.5	665 ± 40	902 ± 54
2	Output Bearing Cage-to-Carrier Capscrew	M10 x 1.5	49-57	66-77
3	Breather	Refer to Table F.		
4	Drain and Fill Plugs	Refer to Table F.		

9 Special Tools

Carrier Input Seal Driver

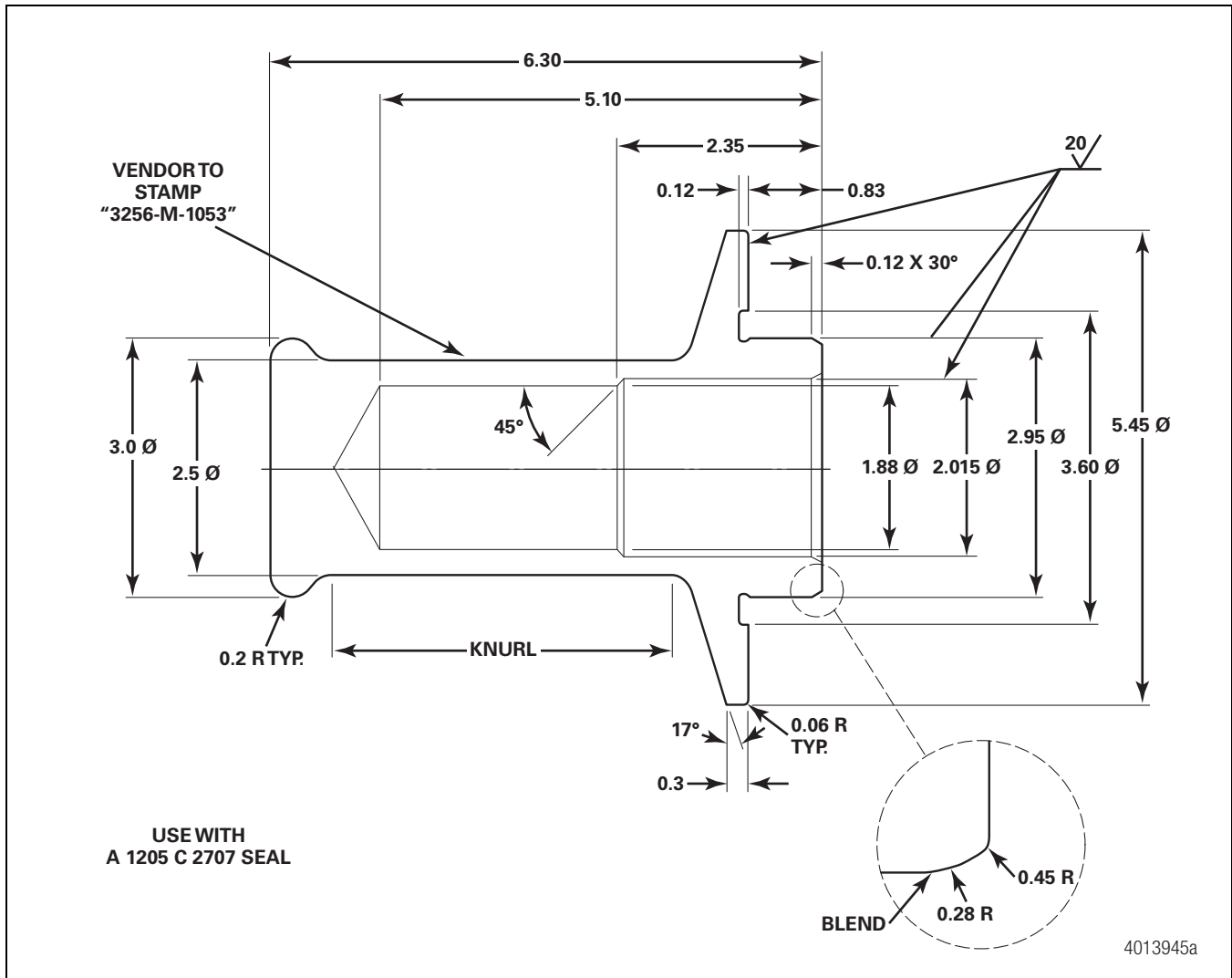


Figure 9.2

Carrier Repair Stand

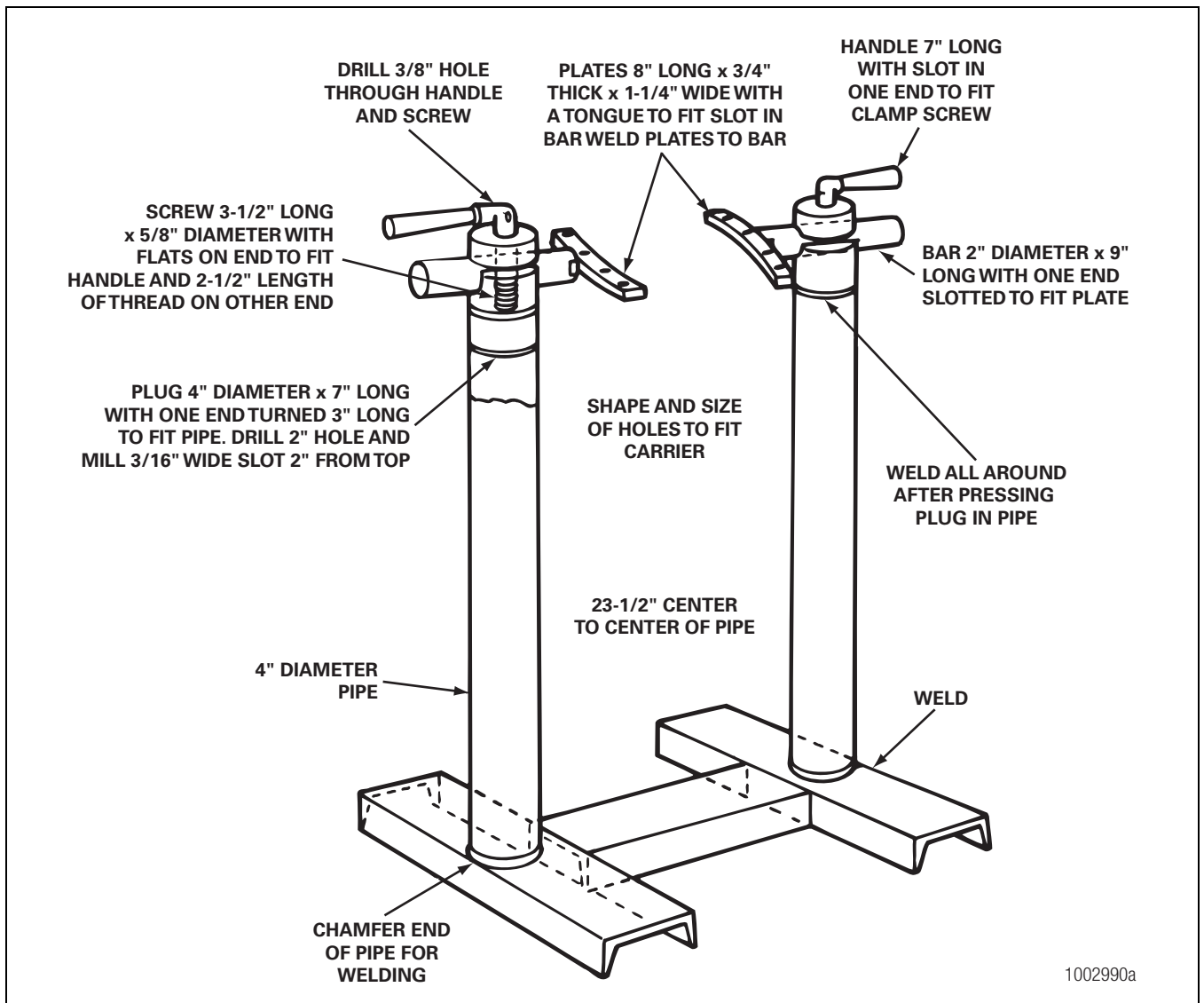


Figure 9.3

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Printed in USA

Revised 03-18
Maintenance Manual MM-09168 (16579)

