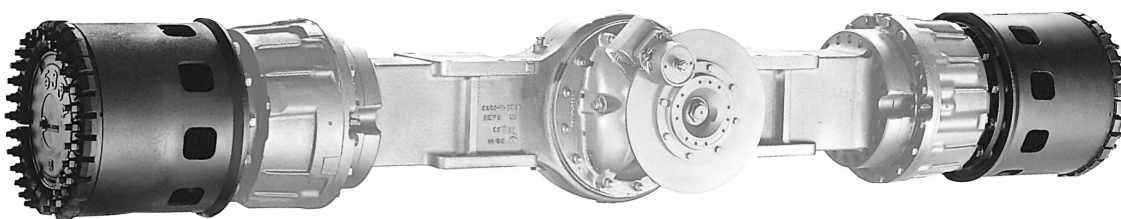


Planetary Axle Wheel Ends

Covered Planetary Spider Design

Maintenance Manual No. 9E



Rigid Axle		Tandem and Tridem Axles		Steering Axle
PRLC 1925	PRC 4805	SPRC 1926	EPRC 4806	PSC 1875
PRLC 1927	PRLC 4805	EPRC 1927	SPRC 4806	PSC 1876
PRC 1935	PRC 4807	SPRC 1927	EPRC 4808	PSC 4564
PRLC 1935	PRC 5324	SPRC 4026	SPRC 4808	PSC 4565
PRC 3795	PRC 5814			
PRC 3805	PRLC 7314			
PRLC 4026	PRC 7534			

Service Notes



This publication provides maintenance and service procedures for Meritor covered planetary spider design wheel end assemblies. The information contained in this publication was current at the time of printing and is subject to revision without notice or liability.

1. You must understand all procedures and instructions before you begin maintenance and service procedures.
2. You must follow your company's maintenance and service guidelines.
3. You must use special tools, when required, to avoid serious personal injury and damage to components.

Meritor uses the following notations to alert the user of possible safety issues and to provide information that will help to prevent damage to equipment and components.



WARNING

A WARNING indicates a procedure that you must follow exactly to avoid serious personal injury.



CAUTION

A CAUTION indicates a procedure that you must follow exactly to avoid damaging equipment or components. Serious personal injury can also occur.

NOTE: A NOTE indicates an operation, procedure or instruction that is important for proper service. A NOTE can also supply information that can help to make service quicker and easier.



This symbol indicates that fasteners must be tightened to a specific torque value.

Visit Our Web Site

Visit the Technical Library section of **www.meritorauto.com** for additional product and service information on Meritor's Heavy Vehicle Systems component lineup.

How to Order

Call Meritor's Customer Service Center at 800-535-5560.

Drivetrain Plus™ Technical Electronic Library (TEL) on CD


The CD includes product and service information on Meritor's Drivetrain Plus™ component lineup. \$20. Order TP-9853.

Additional Publications

- *Cam-Master® Cam Brakes*
Maintenance Manual No. 4
- *Wet Disc Brakes*
Maintenance Manual No. 4L
- *Stopmaster® Off-Highway Heavy-Duty Brakes*
Maintenance Manual No. 4P
- *SCL 2 Series Dry Disc Brake Calipers*
Maintenance Manual No. 4S
- *SCL 35, 46, 53 Dry Disc Brake Calipers*
Maintenance Manual No. 4Y



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ASBESTOS FIBER 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 potential 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 exposures levels may exceed OSHA or manufacturer's 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

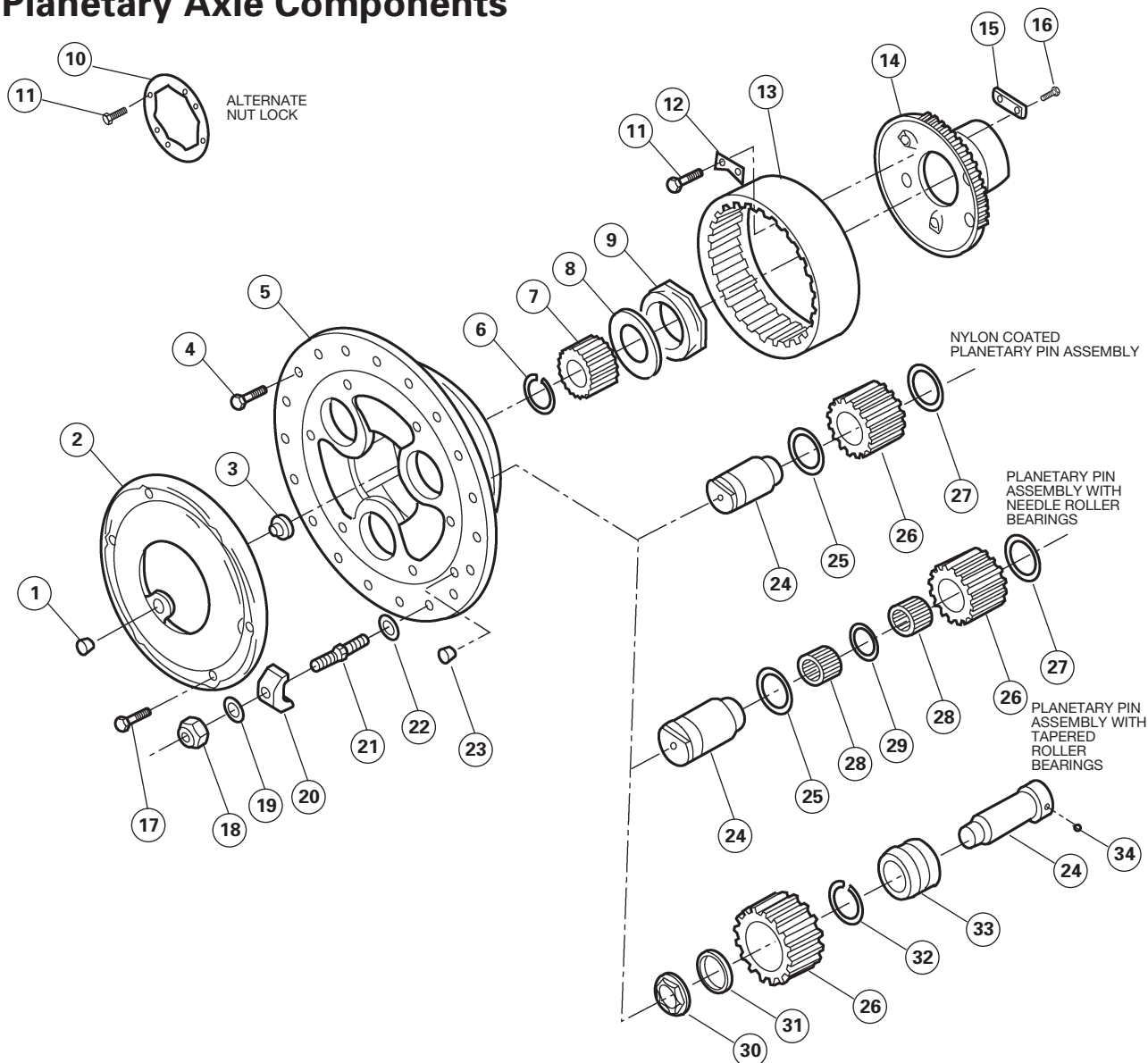
References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them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

Section 1

Exploded View

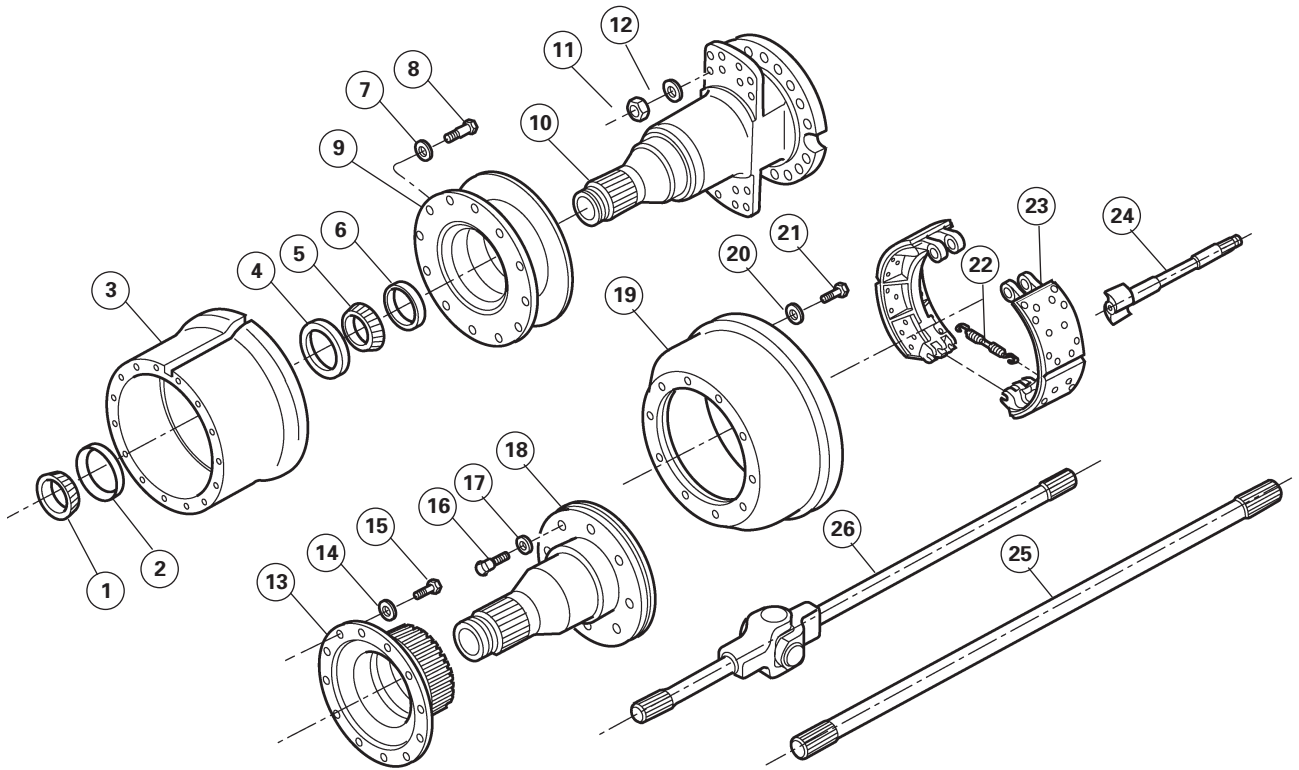


Planetary Axle Components



Item	Description	Item	Description	Item	Description
1	Plug - oil level / fill	13	Gear - planetary ring	26	Pinion - planetary drive
2	Cover - planetary spider	14	Hub - planetary ring gear	27	Washer - planet pinion inner thrust
3	Thrust button - axle shaft	15	Lock - planetary ring gear	28	Needle Roller Bearings
4	Capscrew - planetary spider mount	16	Capscrew - planetary ring gear lock	29	Spacer - needle roller bearing
5	Planetary spider	17	Capscrew - planetary spider cover	30	Locknut - planetary pinion shaft
6	Snap Ring - axle shaft	18	Nut - wheel stud	31	Spacer - planetary pinion bearing
7	Sun Gear - planetary	19	Washer - wheel stud nut	32	Snap Ring - tapered bearing assembly
8	Washer - sun gear thrust	20	Clamp - wheel rim	33	Tapered Roller Bearing Assembly
9	Nut - wheel bearing adjusting	21	Wheel Stud	34	Ball - pinion shaft lock
10	Lock - wheel bearing adjusting nut	22	Washer - wheel stud		
11	Capscrew - hub nut lock	23	Plug - oil drain		
12	Lock - wheel bearing adjusting nut	24	Shaft - planet pinion		
		25	Washer - planet pinion outer thrust		

Wheel End Components



Item	Description	Item	Description
1	Cone – outer wheel bearing	14	Washer – brake driver mount
2	Cup – outer wheel bearing	15	Capscrew – brake driver mount
3	Wheel Hub	16	Capscrew – spindle mount
4	Cup – inner wheel bearing	17	Washer – spindle mount
5	Cone – inner wheel bearing	18	Spindle (typical wet or drum brake)
6	Oil Seal – hub inner bearing	19	Brake Drum
7	Washer – brake disc to hub	20	Washer – drum mount
8	Capscrew – brake disc to hub	21	Capscrew – drum mount
9	Disc – Brake	22	Return Spring – brake shoe
10	Spindle (Dry Disc Version shown)	23	Brake Shoe & Lining Assembly
11	Locknut – brake caliper mount	24	Camshaft – air actuated brake
12	Washer – brake caliper mount	25	Axle Shaft (for rigid axle)
13	Brake Driver – wet disc brake	26	Axle Shaft Universal Joint Assembly

Section 2 Introduction



Description

Meritor covered spider design planetary axles incorporate a single or double reduction carrier with hypoid gearing mounted in the axle center. Final gearing reduction occurs in the wheel hubs by planetary design spur gears.

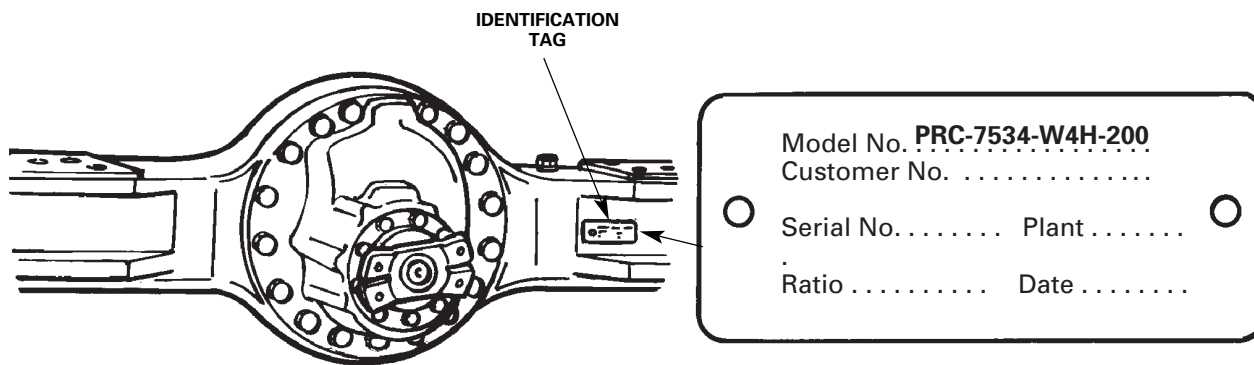
Meritor planetary axles permit the carrier hypoid gearing and axle shafts to carry only nominal torsional loads. At the same time, the planetary axles also provide the highest practical numerical gear reduction at the wheels.

- Power is transmitted by the hypoid gear set in the carrier to the axle shafts and the sun gear of the final reduction, through the revolving planetary gears and into the planetary spider which drives the wheel hub.
- The floating sun gear teeth mesh with teeth of the planetary spur gears.
- The planetary gears rotate on planetary shafts mounted on the spider. The planetary gear teeth, in turn, mesh with the fixed or floating ring gear teeth.

Identification

To determine the exact axle model specification, refer to the identification tag located on the axle. **Figures 2.1, 2.2 and Figure 2.3.**

Figure 2.1



Axle Identification Tag Location

Figure 2.2

TANDEM AND TRIDEM AXLES

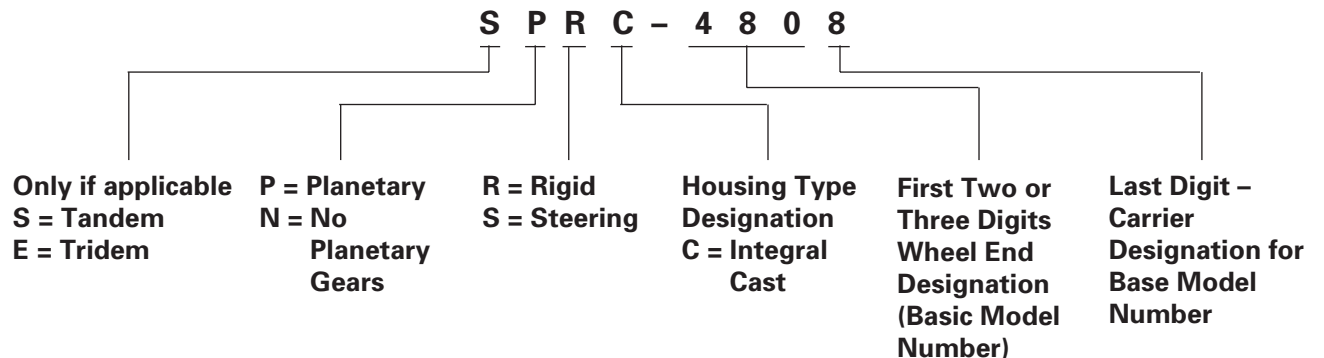
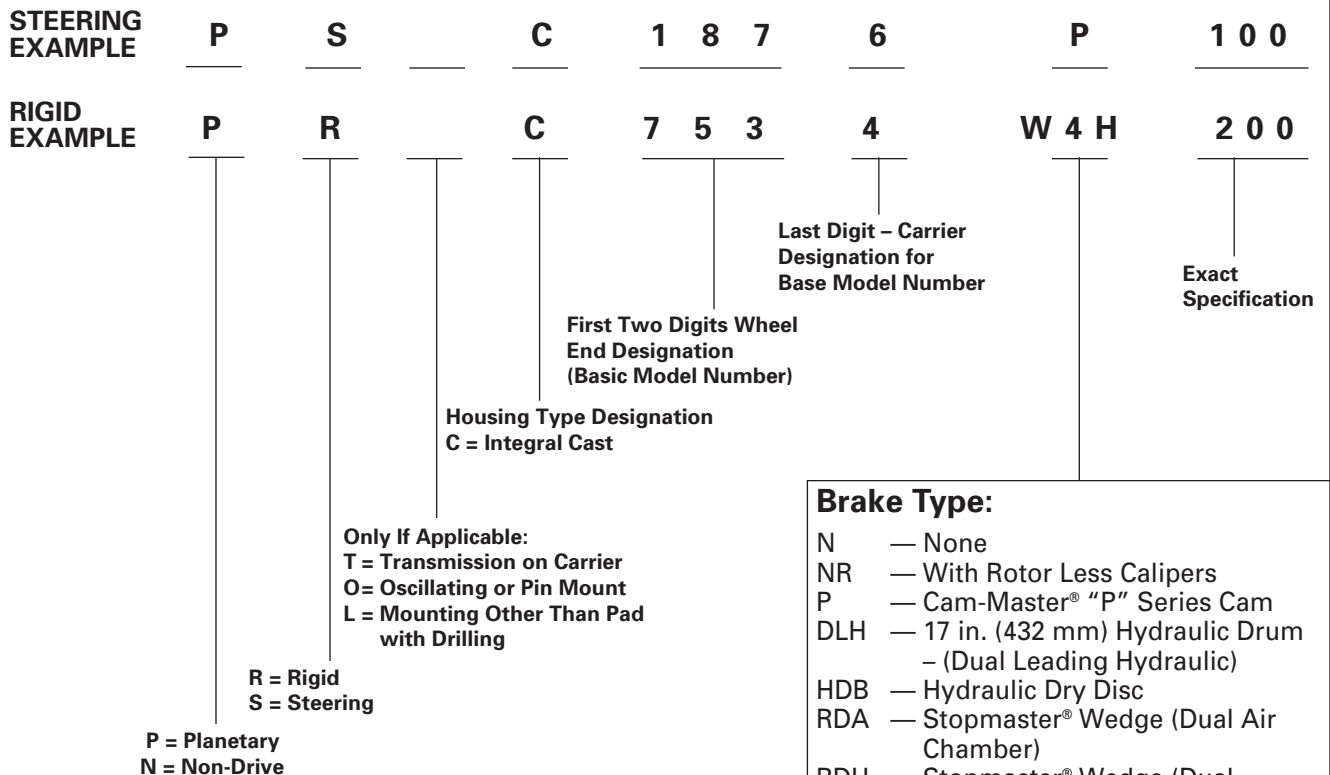


Figure 2.3

SINGLE PLANETARY AXLE



Brake Type:

- N — None
- NR — With Rotor Less Calipers
- P — Cam-Master® "P" Series Cam
- DLH — 17 in. (432 mm) Hydraulic Drum - (Dual Leading Hydraulic)
- HDB — Hydraulic Dry Disc
- RDA — Stopmaster® Wedge (Dual Air Chamber)
- RDH — Stopmaster® Wedge (Dual Hydraulic Cylinders)
- RSA — Stopmaster® Wedge Single Air Chamber
- RSH — Stopmaster® Wedge (Single Hydraulic Cylinders)
- W4H — Dura-Disc® 17 in. (432 mm) Wet Disc
- W4M — Dura-Disc® 17 in. (432 mm) Wet Disc Spring Applied Hydraulic Release
- WDH432 — Dura-Disc® 17 in. (432 mm) Wet Disc (Unit Mount)

Section 3 Disassembly



Removing and Disassembling the Planetary Wheel Ends



WARNING

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



WARNING

Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle that is supported only by jacks. Jacks can slip or fall over and cause serious personal injury.

1. Park the vehicle on a level surface.
2. Block the wheels that will not be raised to keep the vehicle from moving.
3. Raise the vehicle, so that the area you will service is off of the ground. Support the vehicle with safety stands. Refer to the vehicle maintenance manual for instructions on raising the vehicle.

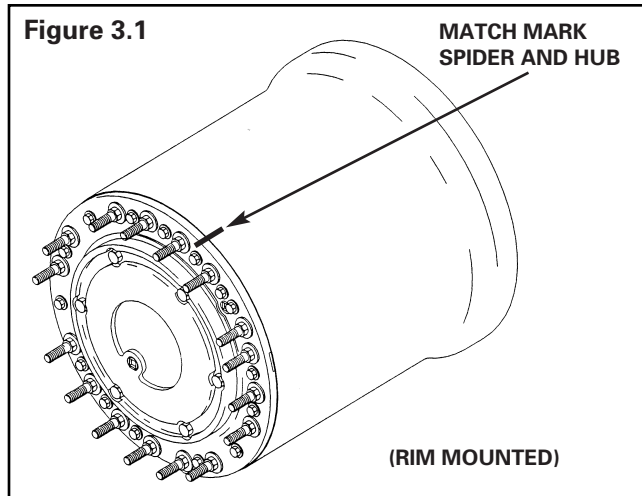
Removing the Tires and Rims

NOTE: You can service the planetary gearing on flange mounted hubs without removing the tire from the planetary wheel end.

1. Remove the nuts, washers and wheel rim clamps. Remove the tire, rim and spacer.
2. Rotate the hub assembly until the oil drain plug in the planetary spider is at the bottom.
3. Remove the oil drain plug. Drain and discard the lubricant.

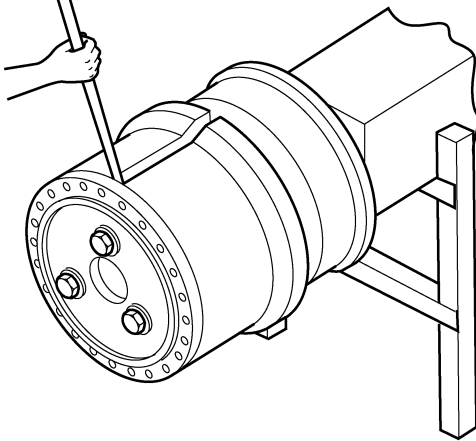
Removing the Planetary Spider Assembly

1. Match mark the spider and wheel hub for correct alignment when you reassemble the unit. **Figure 3.1.**



2. Remove the planetary spider cover capscrews. Remove the planetary spider cover.
3. Remove the spider-to-hub capscrews and washers or nuts and washers.
 - **To remove studs with integral hex and washers:** Use a 3.25-inch internal depth, extra deep socket.
4. Insert a pry bar into the assembly notches and separate the planetary spider assembly from the wheel hub assembly. **Figure 3.2.** Do not remove the spider assembly at this time.
 - **For axles without assembly notches:** Strike the spider with a plastic or rubber mallet to separate the planetary assembly from the wheel hub assembly. Do not remove the spider assembly at this time.

Figure 3.2

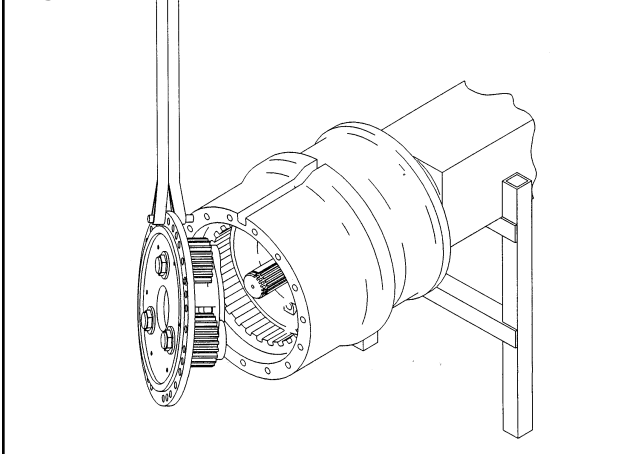


WARNING

Take care when you use lifting devices. When you use a lifting strap, inspect the strap for damage before you use it. Do not use a lifting strap to shock load or drop load a component. Serious personal injury and damage to components can result.

5. Use a lifting device to remove the planetary spider assembly from the wheel hub assembly. **Figure 3.3.**

Figure 3.3



Identifying the Planetary Spider Assembly

Meritor planetary wheel ends come equipped with different planetary designs:

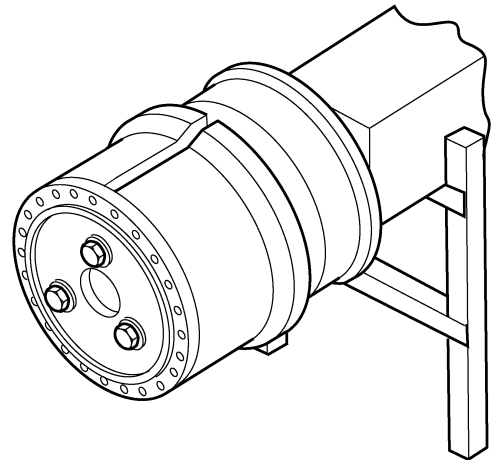
- Planetary pinion shafts with tapered roller bearings
- Planetary pinion shafts with needle roller bearings
- Planetary pinion shafts with nylon coating

To identify the design you are servicing, inspect the outside planetary spider flange.

Planetary spider assemblies with a locknut on the outside flange: This type of planetary design includes planetary pinion shafts with tapered roller bearings. **Figure 3.4.**

Figure 3.4

Planetary spider assembly with locknuts on the outside flange

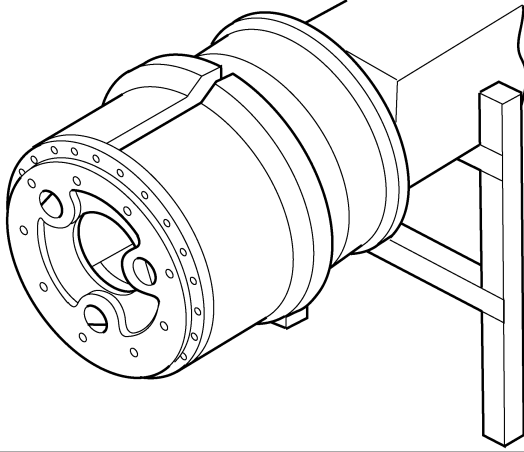


Planetary spider assemblies without a locknut on the outside flange: This type of planetary design can include planetary pinion shafts with needle roller bearings or planetary pinion shafts with nylon coating. **Figure 3.5.**

Section 3 Disassembly



Figure 3.5 Planetary spider assembly without locknuts on the outside flange



Disassembling the Planetary Spider Assembly

NOTE: During disassembly, mark or tag the planetary spider parts you do not plan to replace. Marking and tagging these parts, will aid correct installation during assembly.

Follow the correct disassembly procedure for the type of planetary design you are servicing.

Planetary Pinion Shaft With Tapered Roller Bearings

CAUTION

Carefully remove the planetary pinion shafts. A ball in the large end of each planetary pinion shaft, prevents the pinion shaft from rotating and can become lost as it disengages from the spider.

NOTE: DO NOT mix bearing components from one bearing set with those of other bearing sets. A matched bearing set consists of two cups, two cones, a cone spacer and a cup spacer.

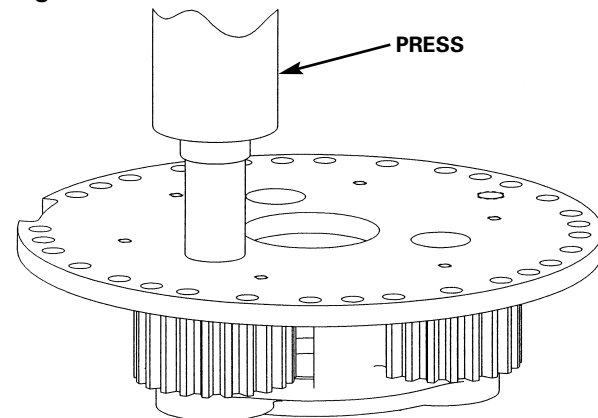
1. Remove the planetary pinion shaft lock nuts.

WARNING

Observe all WARNINGS and CAUTIONS provided by the press manufacturer concerning press operation to avoid serious personal injury and possible damage to components during assembly and installation procedures.

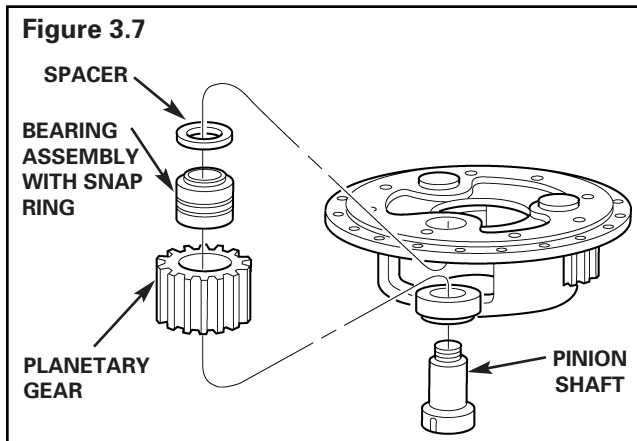
2. Place the spider assembly in a press, flange side **UP**.
 - **If a press is not available:** Use a brass drift and a mallet to remove the pinion shafts.
3. Support the spider assembly as required.
4. Place a container of cushioning material under the press to catch the planetary pinion shafts as they are pressed out of the spider and planetary pinion gears. **Figure 3.6.**
5. Press a planetary pinion shaft out of the spider. **Figure 3.6.**

Figure 3.6



NOTE: Mark the bearings to aid correct installation during assembly.

6. Remove the bearing cones and bearing cone spacer from the planetary pinion gear.
Figure 3.7.



NOTE: The bearing cups are positioned in the planetary pinion gears with a snap ring between them. **DO NOT** press both cups out from one end of the planetary pinion gear at the same time. If the bearing cups do not need to be replaced, do not remove them from the planetary pinion gears.

7. Inspect the bearing cups and bearing cones for wear and damage.
 - **If the bearing cups and bearing cones are free of wear and damage:** Clean and lubricate the components.
 - **If the bearing cups and bearing cones are worn or damaged:** Remove and replace the two bearing cups and spacer. Avoid damaging the internal diameter of the gear when you remove the bearing cups.
8. Remove the snap ring and spacer.
9. Press-out the remaining bearing cup.

Planetary Pinion Shaft With Needle Roller Bearings

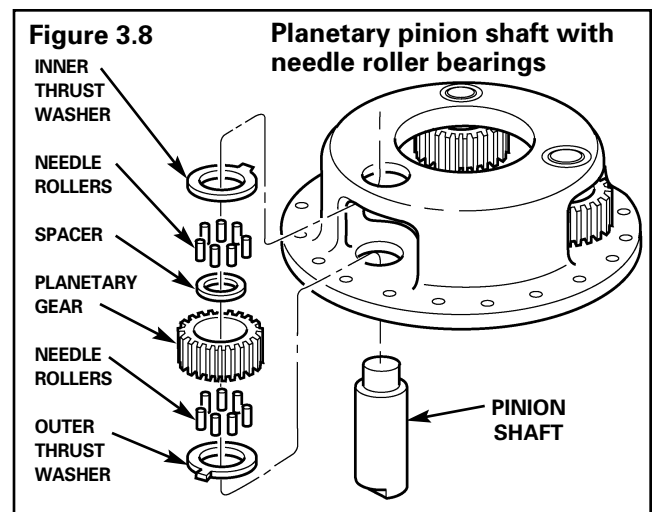
Planetary Pinion Shaft With Nylon Coating



WARNING

*Observe all **WARNINGS** and **CAUTIONS** provided by the press manufacturer concerning press operation to avoid serious personal injury and possible damage to components during assembly and installation procedures.*

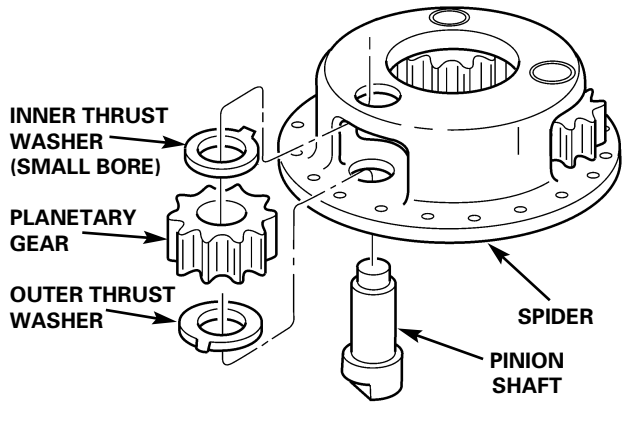
1. Place the spider assembly in a press with the flange side **DOWN**.
 - **If a press is not available:** Use a brass drift and mallet to remove the pinion shafts.
2. Support the spider assembly as required.
3. Place a container of cushioning material under the press to catch the planetary pinion shafts as you press them out of the spider and planetary pinion gears.
4. Press each pinion shaft out of the spider and planetary gear. **Figure 3.8 and Figure 3.9.**
 - **For bolted cover designs:** You may be able to remove the planetary pinion shaft by hand. Use a press to remove the planetary shaft only when necessary.



Section 3 Disassembly



Figure 3.9 Planetary pinion shaft with nylon coating

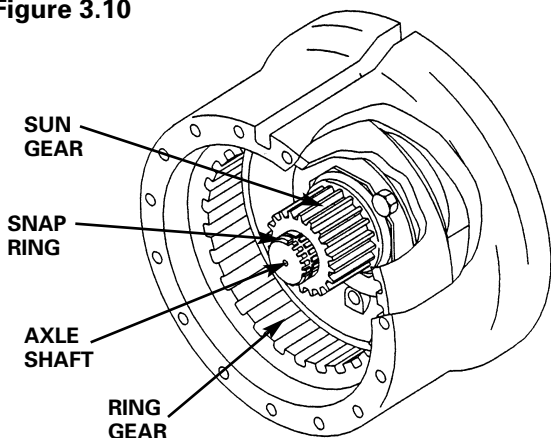


5. Remove the planetary gears and thrust washers from the planetary spider.
6. **For planetary pinion shafts with needle roller bearings:** Remove the needle roller bearings and spacer from the bore of the planetary gear.

Removing the Ring Gear and Axle Shaft

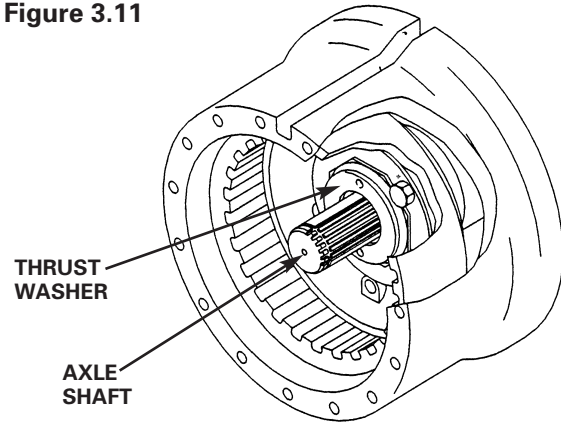
1. For models where the ring gear is not secured to the ring gear hub, remove the floating ring gear. If necessary, use a lifting device to remove the ring gear. **Figure 3.10.**
2. Remove the snap ring from the end of the axle shaft.
3. Remove the sun gear. **Figure 3.10.**
 - **On rigid axles with integral axle shaft and sun gear:** Remove the complete axle shaft.

Figure 3.10



4. Remove the sun gear thrust washer assembly. **Figure 3.11.**

Figure 3.11



5. **On rigid axle models without integral sun gear:** Remove the axle shaft.
6. **To remove the axle shaft from a steering axle:** Remove the wheel hub and spindle before you remove the axle shaft.

Preparing to Remove the Wheel Hub

Axles With Dry Disc Brakes

Remove the brake caliper and adapter assembly. Refer to Maintenance Manuals No. 4S, *SCL 2 Series Dry Disc Brake Calipers* and Maintenance Manual No. 4Y, *SCL 35, 46, 53 Dry Disc Brake Calipers*. To order these publications, call Meritor's Customer Service Center at 800-535-5560.

Axles With Wet Disc Brakes

Refer to Maintenance Manual No. 4L, *Wet Disc Brakes*, for instructions on removing and servicing the wheel hub, brake driver, hub oil seal, wheel bearings and spindle. To order this manual, call Meritor's Customer Service Center at 800-535-5560.

Axles With P Series or RSA Drum Brakes

WARNING

When you work on a spring chamber, carefully follow the service instructions of the chamber manufacturer. Sudden release of a compressed spring can cause serious personal injury.

1. If the brake has spring chambers, manually compress and lock the springs to release the brakes.

NOTE: If Meritor automatic slack adjusters are used, refer to Meritor Maintenance Manual No. 4B, *PayMaster® Automatic Slack Adjuster* for the correct adjustment procedure. To order this publication, call Meritor's Customer Service Center at 800-535-5560.

2. Turn the slack adjuster manual adjusting nut until the brake shoes fully retract and the drum clears the lining.

Removing the Ring Gear Hub and Wheel Hub

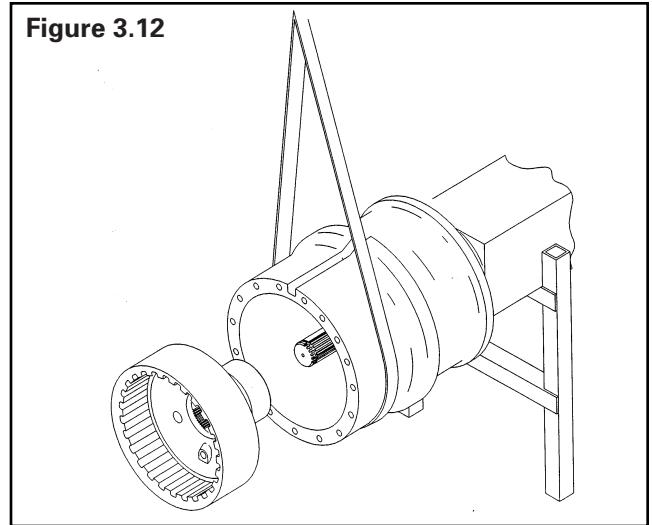
1. Remove the capscrews from the adjusting nut lock. The adjusting nut lock features one of the following designs:
 - A ring that secures all corners of the nut
 - One or two bow ties that secure one or two corners of the adjusting nut or the flat of the nut
2. Remove the wheel bearing adjusting nut lock and wheel bearing nut.

CAUTION

Support the wheel hub, as shown in Figure 3.12, before you remove the ring gear and the ring gear hub assembly. Do not remove the ring gear and the ring gear hub assembly without supporting the wheel hub. Serious personal injury and damage to components can result.

3. Remove the ring gear hub by pulling it straight out of the wheel hub and off of the spindle. To avoid dropping and possibly damaging the outer wheel bearing cone, ensure that the outer wheel bearing cone remains in place as you remove the ring gear hub. **Figure 3.12.**

Figure 3.12

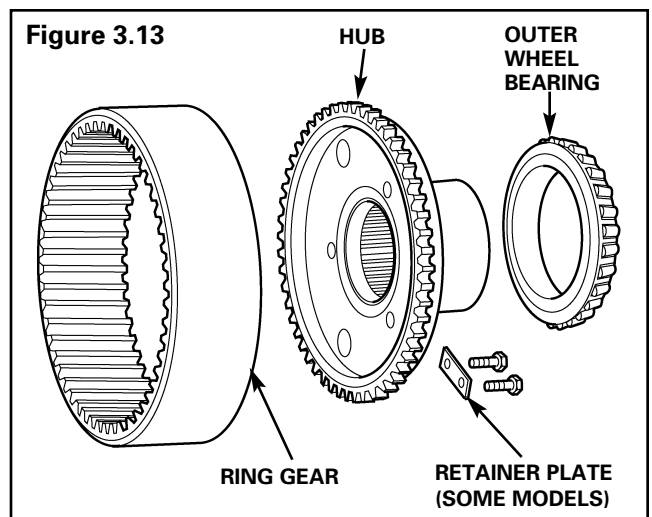


- **If you cannot remove the ring gear hub by hand:** Install capscrews into the puller screw holes in the ring gear hub flange (0.625-11 UNC thread). Tighten each capscrew the same amount to separate the ring gear hub assembly from the spindle and the wheel hub.

NOTE: On models without a floating ring gear, the ring gear is secured to the ring gear hub with capscrews and retainer plates on the back side of the assembly.

4. Remove the retainer plate capscrews to remove the ring gear from the ring gear hub. **Figure 3.13.**

Figure 3.13



5. Remove the outer wheel bearing from the ring gear hub.

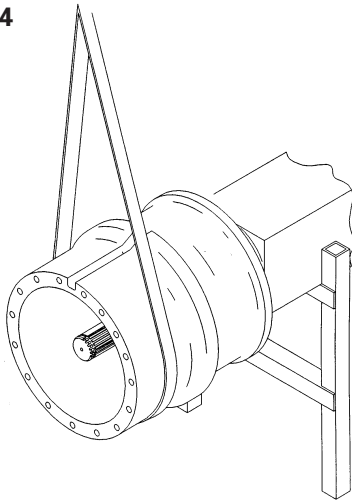
Section 3 Disassembly



NOTE: The ring gear hub assembly includes the hub and ring sleeve insert. You can not service these components separately.

6. Use a chain fall or similar device to lift the hub and drum slightly to relieve the hub weight and drum-to-brake shoe drag. Remove the assembly from the hub spindle. **Figure 3.14.**

Figure 3.14



Removing the Hub Oil Seal and Bearings

1. Position the wheel hub with the brake end **UPWARD**.

NOTE: Some axle model designs with dry disc brakes provide enough clearance to remove the hub oil seal, bearing cone and bearing cups without removing the rotor.

- **If you can remove the hub oil seal, bearing cone and bearing cups from the axle without removing the rotor:** Proceed to Step 3.
 - **If you must remove the rotor from the wheel hub to remove the hub oil seal, bearing cone and bearing cups:** Proceed to Step 2.
2. Remove the rotor mounting capscrews and washers. Remove the rotor.
 3. Remove the hub oil seal with a suitable puller. Do not scratch the hub seal bore surface.
 4. Remove the inner bearing cone.
 5. Remove the bearing cups with a suitable puller.

Removing the Brake Drum or Disc Brake Rotor

1. Match mark the drum and hub.
2. Remove the capscrews and washers from the brake drum or rotor joint.



WARNING

Take care when you use lifting devices. When you use a lifting strap, inspect the strap for damage before you use it. Do not use a lifting strap to shock load or drop load a component. Serious personal injury and damage to components can result.

3. Remove the brake drum or rotor from the wheel hub. If necessary, use a lifting device to remove the brake drum or rotor.

Removing the Brake Shoes

To remove the brake shoes, refer to the correct maintenance manual.

- **For P series brakes:** Refer to Maintenance Manual No. 4, *Cam-Master® Cam Brakes*.
- **For RSA drum brakes:** Refer to Maintenance Manual No. 4P, *Stopmaster® Off-Highway Heavy-Duty Brakes*.
- **For SCL 2 series dry disc brakes:** Refer to Maintenance Manual No. 4S, *SCL 2 Series Dry Disc Brake Calipers*.
- **For SCL 35, 46 or 53 series dry disc brakes:** Refer to Maintenance Manual No. 4Y, *SCL 35, 46, 53 Dry Disc Brake Calipers*.

To order these publications, call Meritor's Customer Service Center at 800-535-5560.

Removing the Spindle

Axles With Dry Disc Brakes

1. Match mark the spindle and housing flange.
2. Use straps and a lifting device to support the spindle.
3. Remove the spindle mounting capscrews and washers.
4. Remove the spindle from the axle housing or steer knuckle.

Steering Axles With RSA Drum Brakes

1. Remove all air from the air system.
2. Remove the air lines from the air chamber. Tag the lines and ports to aid reassembly.

WARNING

When you work on a spring chamber, carefully follow the service instructions of the chamber manufacturer. Sudden release of a compressed spring can cause serious personal injury.

3. If the brake has spring chambers, manually compress and lock the springs to release the brakes.
4. Match mark the air chamber housing tube and the brake spider plunger housing to aid reassembly.
5. Remove the set-screw that retains the air chamber assembly in the spider plunger housing.
6. **If there is a collet nut on the threads of the chamber housing tube:** Use a hammer and a brass drift to loosen the collet nut.
7. Remove the air chamber assembly from the plunger housing. If necessary, use a strap wrench to remove the air chamber assembly.
8. Remove the brake shoe return springs.
9. Rotate the brake shoes to allow access to the spindle/brake spider mounting capscrews.

10. Match mark the brake spider and steering knuckle to aid correct installation at assembly.
 11. Remove the two capscrews and washers that mount the brake spider and spindle to the steering knuckle at the 11 and 1 o'clock positions.
 12. Install two studs 4-6 inches long with 0.875-14 UNF threads on the end that engages the steering knuckle to aid spindle removal.
 13. Support the spindle and brake spider assembly.
 14. Remove the remaining capscrews and washers.
 15. Remove the brake spider and brake shoe assembly.
- NOTE:** The oil seal in the bore of the spindle large end may be damaged during spindle removal.
16. Remove the spindle from the steering knuckle by sliding the spindle over the outer end of the axle shaft and universal joint assembly.
 17. Remove the axle shaft and universal joint assembly.

Steering Axles With P Series Cam Brakes

1. Remove the brake shoe return springs.
2. Rotate the brake shoes until enough clearance exists to remove the spindle mounting nuts and washers with a wrench.
3. Remove the spindle mounting nuts and washers.

NOTE: The oil seal in the bore of the spindle large end may be damaged during spindle removal.

4. Remove the spindle from the steer knuckle by sliding the spindle over the outer end of the axle shaft assembly.
5. Remove the axle shaft and universal joint assembly.

Section 3

Disassembly



Rigid Axles With P Series Cam Brakes

NOTE: Some rigid axles feature a two-piece camshaft and coupling which allows you to remove the camshaft without removing the slack adjuster. When servicing an axle with a two-piece camshaft and coupling, proceed to Step 6.

1. Remove the brake shoe return springs.
2. Rotate the brake shoes to allow access to the brake camshaft and the spindle mounting capscrews.
3. Remove the slack adjuster clevis pin that connects the air chamber push rod.
4. Remove the snap ring and washers that connect the slack adjuster to the brake camshaft. Stack the washers and separate them from other parts.
5. Remove the slack adjuster and washers. Separate the washers from other parts and prevent them from mixing with the washers you previously removed.
6. Remove the snap rings that retain the camshaft in the spindle support boss.
7. Remove the brake camshaft from the spindle. Separate the washers you removed from the face of the spindle boss. Prevent the washers from mixing with the washers you previously removed.

WARNING

Take care when you use lifting devices. When you use a lifting strap, inspect the strap for damage before you use it. Do not use a lifting strap to shock load or drop load a component. Serious personal injury and damage to components can result.

8. Use straps and a lifting device to support the spindle and brake shoe assembly.
9. Match mark the housing and spindle flange.
10. Remove the mounting capscrews and washers.
11. Remove the spindle from the axle housing.

Cleaning Ground or Polished Parts



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, emulsion-type cleaners and petroleum-based cleaners. To avoid serious personal injury when you use solvent cleaners, you must carefully follow the manufacturer's product instructions and these procedures:

- *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. Follow the manufacturer's instructions carefully.*
- Use a cleaning solvent to clean ground or polished parts or surfaces. Kerosene or diesel fuel oil can be used for this purpose. **NEVER USE GASOLINE.**
- Remove gasket material from parts. Be careful not to damage ground surfaces.
- **DO NOT** clean ground or polished parts in a hot solution tank, water, steam or alkaline solution.

Cleaning Parts With Rough Finishes

- Parts with a rough finish can be cleaned with cleaning solvent or in a hot solution tank with a weak alkaline solution.
- Parts must remain in hot solution tanks until completely cleaned and heated.
- Parts must be washed with water until the alkaline solution is removed.

Cleaning Axle Assemblies

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

Drying Cleaned Parts

- Dry the parts immediately after cleaning and washing.
- Dry the parts with soft clean paper or rags.



CAUTION

Damage to bearings can be caused if dried by rotating with compressed air.

- Except for bearings, parts can be dried with compressed air.

Preventing Corrosion

- Apply a light lubricant to cleaned and dried parts that are not damaged and are to be assembled.
- Apply a special material that prevents corrosion to all surfaces. If parts are to be stored, wrap the parts in special paper that prevents corrosion.

Inspecting Parts

It is very important to inspect all parts carefully and completely before the axle or carrier is assembled. Check all parts for wear and replace damaged parts. Replacement of damaged or worn parts will prevent breakdown of assembly later.

Section 4

Prepare Parts for Assembly

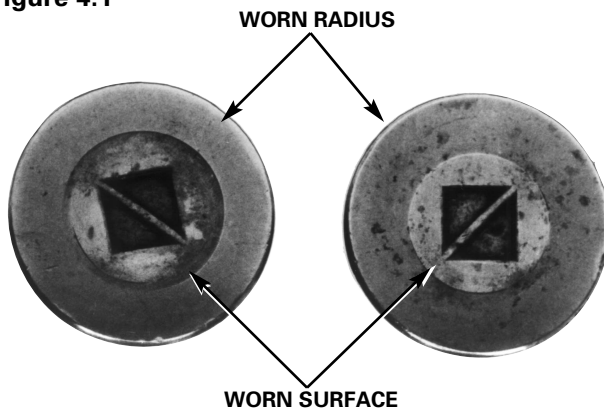


Inspecting Tapered Roller Bearings

Inspect the cup, cone, rollers and cage of all tapered roller bearings in the assembly. If any of the following conditions exist, the bearing must be replaced:

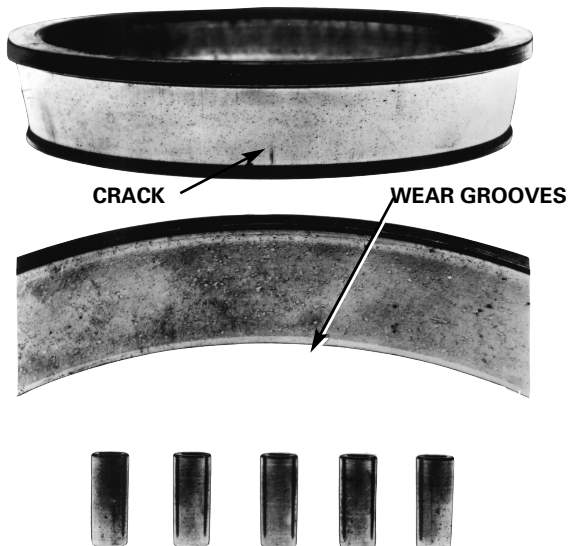
- The center of the large diameter end of the rollers are worn level with, or below the surface.
- The center of the large diameter end of the rollers are worn to a sharp edge. **Figure 4.1.**

Figure 4.1



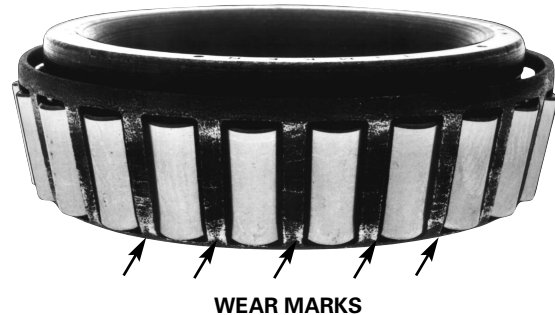
- A visible roller groove in the cup or cone inner race surfaces. The groove can be seen at the small or large diameter end of both parts. **Figure 4.2.**

Figure 4.2



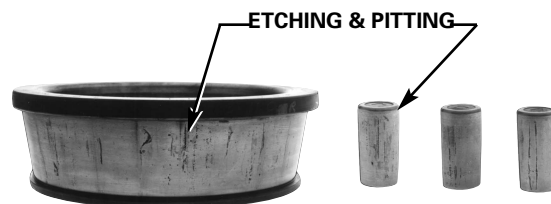
- Deep cracks or breaks in the cup, cone inner race or roller surfaces.
- Bright wear marks on the outer surface of the roller cage. **Figure 4.3.**

Figure 4.3

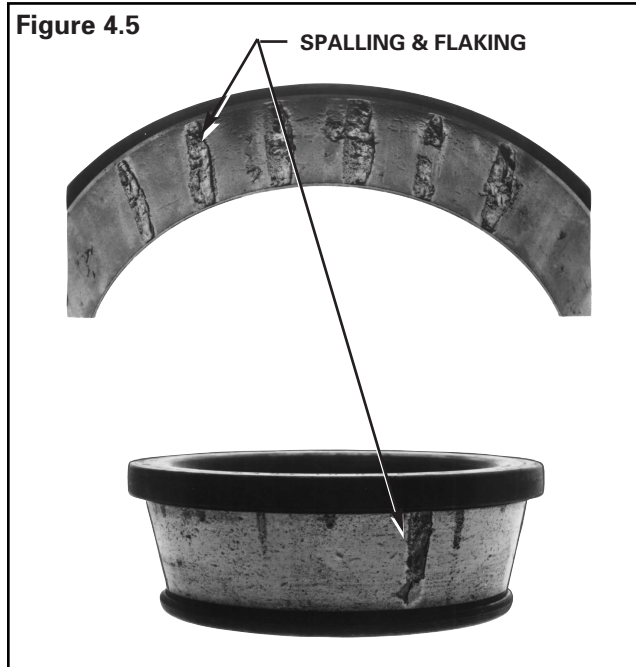


- Damage on rollers and on surfaces of the cup and cone inner race that touch the rollers. **Figure 4.4.**

Figure 4.4



- Damage on the cup and cone inner race surfaces that touch the rollers. **Figure 4.5.**



Inspecting Planetary Wheel End Components

Inspect the planetary reduction, planetary gears, sun gear and ring gear assembly for wear or damage. Replace gears, shafts or thrust washers that are scored, pitted, ridged, chipped or worn.

Repairing or Replacing Parts

Replace worn or damaged parts of an axle assembly. The following are some examples to check for repair and possible replacement:

- Replace any fastener if corners of the head are worn.
- Replace washers if damaged.
- Replace gaskets, oil seals or grease seals at the time of axle repair.
- Clean parts and apply new liquid gasket material where required when axle is assembled.

- Remove nicks, marks and burrs from parts having machined or ground surfaces. Use a fine file, India stone, emery cloth or crocus cloth for this purpose.
- Clean and repair threads of fasteners and holes. Use a die or tap of the correct size or a fine file for this purpose.

CAUTION

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

- Tighten all fasteners to correct torque values.

WARNING

Do not repair axle housings by bending or straightening. Repair of axle housings by bending or straightening can cause poor performance and possible unsafe operation of the axle. This can cause serious personal injury.

Repair Welding

Do not repair weld drive axle assemblies. Repair welding can detract from the structural integrity of a component, particularly to heat treated parts where the benefit of heat treatment can be nullified by welding.

Removing Capscrews Fastened With Liquid Adhesive

CAUTION

Do not use impact wrenches or strike components with a hammer.

To remove capscrews fastened with liquid adhesive, use the regular mechanical disassembly procedure.

If the removal of a capscrew, for example, becomes difficult due to a worn head or unusually high breakaway torque, the locking strength can be reduced by heating the threaded area to approximately 300°F (150°C). Heat slowly to avoid thermal stresses in components.

Section 4

Prepare Parts for Assembly



Cleaning

WARNING

To avoid serious personal injury, trichloroethylene must not come in contact with your skin. Do not smoke and avoid breathing vapors in closed rooms without ventilation. Do not use trichloroethylene near flames, welding operations or hot surfaces exceeding 900°F (482°C).

Clean the capscrew, nut or bolt tapped hole and fastener thread carefully. Use a cleaning solvent such as trichloroethylene or equivalent to remove dirt, oil, grease or moisture.

Using Dri-Loc Fasteners and Meritor Liquid Adhesive

NOTE: Do not apply Meritor liquid adhesive or any other type of fastener retainer material, sealant or adhesive on Dri-Loc fasteners or in the threaded holes.

NOTE: No cure time is required for Dri-Loc fasteners before rebuilding the axle and returning it to service.

1. Wipe excess oil residue from the threaded holes of all components that use Dri-Loc fasteners.
2. Assemble the components that use Dri-Loc fasteners.
3. Tighten the Dri-Loc fasteners to the specified torque value.

Reusing Dri-Loc Fasteners and Loctite® No. 277

WARNING

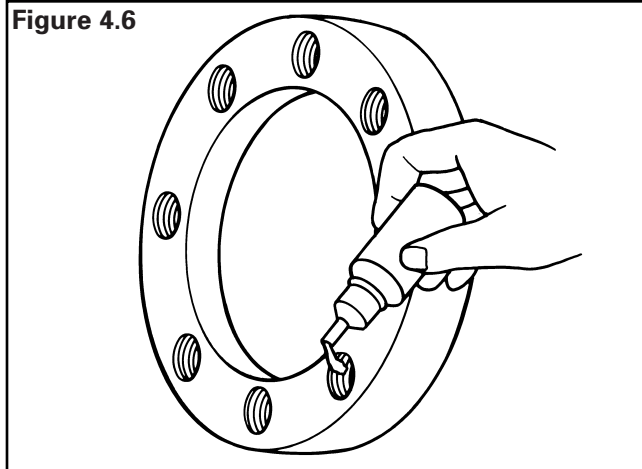
Take care when using Loctite® to avoid serious personal injury. Follow the manufacturer's instructions to prevent irritation to the eyes and skin. If Loctite® gets into your eyes, flush them with water for 15 minutes. Have your eyes checked by a doctor as soon as possible.

1. Wipe excess oil residue from the Dri-Loc fasteners and threaded holes.

NOTE: Do not apply liquid adhesive to the fastener. Trapped air in the threaded hole will create back pressure and “blow out” the adhesive as the fastener advances.

2. Apply Loctite® No. 277 adhesive to the threaded holes only. Before threading in the fasteners, visually check to make sure that the adhesive contacts the threads. **Figure 4.6.**

Figure 4.6



3. Tighten the fasteners to the specific torque value recommended for the fastener. Loctite® No. 277 will not alter the torque requirement.

NOTE: No cure time is required for Loctite® No. 277 before rebuilding the axle and returning it to service.

4. **When servicing drive units assembled with Dri-Loc fasteners or with Loctite® No. 277 in threaded holes where the fasteners do not require removal:** Check each fastener for tightness by tightening the fastener to the minimum specified torque.
 - If the fastener does not rotate, the fastener is tightened to the correct torque.
 - If the fastener rotates to any degree, remove it from the component and apply liquid adhesive to the threaded hole.

Applying Silicone Gasket Material

Meritor recommends the following liquid gasket materials:

- ThreeBond 1216
- Loctite® 5699

WARNING

When you apply some silicone gasket materials, small amounts of acid vapor are present. To prevent possible serious injury, the work area must be well-ventilated. If the silicone gasket material gets into your eyes, flush them with water for 15 minutes. Have your eyes checked by a doctor as soon as possible.

CAUTION

The amount of liquid gasket material applied must not exceed a 0.125 in. (3.18 mm) diameter bead. Too much gasket material can block lubrication passages and result in damage to components.

1. Remove all old gasket material from both surfaces.
2. Clean the surfaces where liquid gasket material will be applied. Remove all oil, grease, dirt and moisture.
3. Thoroughly dry both surfaces.
4. Apply approximately a 0.125 inch (3.18 mm) diameter continuous bead of liquid gasket material around one surface.

Also apply gasket material around the edge of all fastener holes on that surface. **Figure 4.7.**

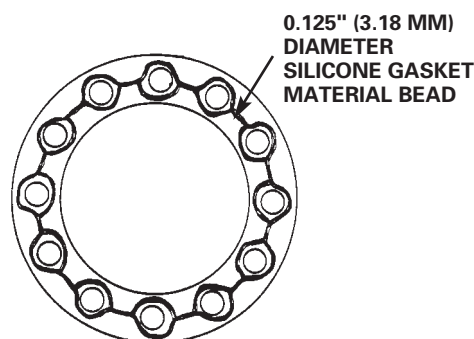
5. Assemble the components quickly to permit the gasket material to compress evenly between parts.
6. Tighten the fasteners with the required torque.

Flushing Lube From the Axle

NOTE: The rigid axle wheel end and housing bowl share the same oil. Lubricant contamination of the wheel end or housing bowl can spread to all areas of the axle.

Flush lubricant from the entire axle, including the wheel ends and housing bowl, before you assemble the axle.

Figure 4.7



Section 5 Assembly



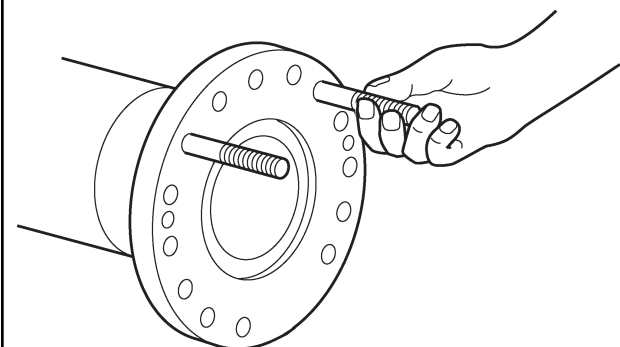
Installing the Spindle on Rigid Axles With P Series Cam Brakes

⚠ WARNING

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

1. Install two 4-inch long temporary studs into the axle housing flange at the 1 and 11 o'clock positions. **Figure 5.1.**

Figure 5.1



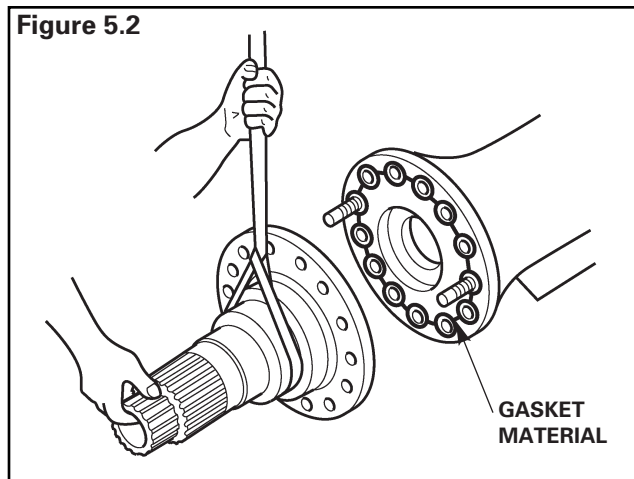
2. Apply a 0.125-inch diameter continuous bead of liquid gasket material around the flange mounting face of the axle housing.

⚠ WARNING

Take care when you use lifting devices. When you use a lifting strap, inspect the strap for damage before you use it. Do not use a lifting strap to shock load or drop load a component. Serious personal injury and damage to components can result.

3. Align the spindle and axle housing match marks. Install the spindle on the axle housing. If necessary, use an overhead crane to lift and support large spindles. **Figure 5.2.**

Figure 5.2



4. Install and hand tighten the spindle mounting capscrews and washers. Remove the temporary studs and replace them with capscrews and washers.
5. Tighten the capscrews according to the torque specifications shown in **Table A.** **ⓘ**

Table A: Spindle Mounting Capscrew Torque Specifications

Size	Torque	
	lb-ft	N·m
3/4"-10	310-400	420-542
7/8"-9 & 14	575-650	780-881
1"-12 & 14	850-1100	1152-1491
1-1/4"-12	1700-2200	2305-2983
1"-8 (Nut on stud)	650-875	881-1186

6. Replace the brake camshaft bushings and grease seals in the spindle boss and camshaft brackets. Refer to Maintenance Manual No. 4, *Cam-Master® Cam Brakes*. To order this publication, call Meritor's Customer Service Center at 800-535-5560.
7. Install the cam head thrust washer onto the camshaft. Apply O-617-A or O-617-B chassis grease to the camshaft bushings and journals.
8. Install the camshaft through the spindle bushings. Install the washers and slide the camshaft through the air chamber support bracket.
 - **For two-piece camshaft designs:**
Engage the coupling when you install the camshafts.

9. Install the slack adjuster, washers, and snap ring. Connect the slack adjuster to the air chamber push rod yoke. Check that the snap ring is installed to the camshaft at the inner face of the spindle boss.

Installing the Spindle on Rigid Axles With Dry Disc Brakes


1. **For axle models that use capscrews to mount the spindle:** Install two 4-inch long temporary studs into the axle housing flange at the 1 and 11 o'clock positions. **Figure 5.1.**
2. Apply a 0.125-inch diameter continuous bead of liquid gasket material around the flange mounting face of the axle housing.
3. Align the spindle with the axle housing match marks to correctly position the brake caliper mounting bosses. Install the spindle on the axle housing.
4. Install and hand tighten the spindle mounting capscrews and washers. Remove the temporary studs and replace them with capscrews and washers.
 - **For models with studs in the axle housing:** Install washers and locknuts.
5. Tighten the capscrews or locknuts according to the torque specifications shown in **Table B.** 

Table B: Spindle Mounting Capscrew and Locknut Torque Specifications

Size	Torque	
	lb-ft	N•m
3/4"-10	310-400	420-542
7/8"-9 & 14	575-650	780-881
1"-12 & 14	850-1100	1152-1491
1-1/4"-12	1700-2200	2305-2983
1"-8 (Nut on stud)	650-875	881-1186

Installing the Spindle on Steering Axles With P Series Cam Brakes

NOTE: Install the differential carrier assembly and the steering knuckles on the steering axles before performing the following procedure.

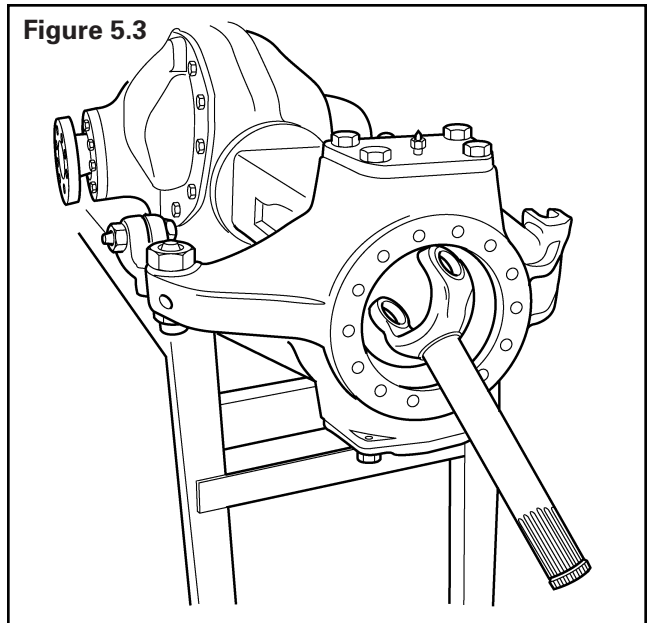
1. Apply a thin coat of NLGI grade 1 or 2 grease to the following areas:
 - Oil seal lips and bushing bore in the end of the axle housing
 - Axle shaft assembly seal and bushing journals

CAUTION

Avoid damaging the housing oil seal when you install the shaft assembly. Lubricant loss and damage to components can result.

2. Install the axle shaft assembly through the steering knuckle and axle housing until the shaft engages the differential assembly side gear. **Figure 5.3.**

Figure 5.3




3. **If the original shaft support bushing in the bore of the spindle is worn or damaged:** Remove the oil seal and bushing and install a new bushing.
4. Install a new oil seal in the spindle bore. Apply a thin coat of NLGI grade 1 or 2 grease to the seal lips and bushing bore.

Section 5 Assembly



CAUTION

Avoid damaging the oil seal in the spindle when you install the spindle. Lubricant loss and damage to components can result.

5. Install the spindle on the steering knuckle by carefully sliding it over the outer end of the axle shaft assembly.
6. Install the spindle mounting washers and nuts. Hand tighten the nuts.
7. Tighten the 3/4-inch-19 nuts to 310-400 lb-ft (420-542 N•m). 
8. **If you removed the brake shoes or camshaft:** Install the brake shoes or camshaft. Refer to Maintenance Manual No. 4, *Cam-Master® Cam Brakes*. To order this publication, call Meritor's Customer Service Center at 800-535-5560.

Installing the Spindle on Steering Axles With RSA Drum Brakes

NOTE: Install the differential carrier assembly and the steering knuckles on the steering axle before performing the following procedure.

1. Apply a thin coating of NLGI grade 1 or 2 grease to the following areas:
 - Oil seal lips and bushing bore in the end of the axle housing
 - Axle shaft assembly seal and bushing journals


CAUTION

Avoid damaging the housing oil seal when you install the shaft assembly. Lubricant loss and damage to components can result.

2. Install the axle shaft assembly through the steering knuckle and axle housing until the shaft engages the differential assembly side gear.
3. **If the original shaft support bushing in the bore of the spindle is worn or damaged:** Remove the oil seal and bushing and install a new bushing.
4. Install a new oil seal in the spindle bore. Apply a thin coat of NLGI grade 1 or 2 grease to the seal lips and bushing bore.

CAUTION

Avoid damaging the oil seal in the spindle when you install the spindle. Lubricant loss and damage to components can result.

5. Use a lifting device to install the spindle onto the steering knuckle. Carefully slide the spindle over the outer end of the axle shaft assembly and engage the two temporary guide studs.
6. Align the brake spider and brake shoe assembly with the spindle match marks. Install the brake spider and brake shoe assembly on the spindle. Refer to Maintenance Manual No. 4P, *Stopmaster Off-Highway Heavy-Duty Brakes*.
7. Install the spindle and brake spider mounting capscrews and washers. Remove the two temporary studs you installed during disassembly. Replace the temporary studs with capscrews and washers.
8. Tighten the 7/8-inch-14 capscrews and washers to 575-650 lb-ft (780-881 N•m). 
9. Install the air chamber assembly into the brake spider. Refer to Maintenance Manual No. 4P, *Stopmaster Off-Highway Heavy-Duty Brakes*.
10. Install the brake shoe return spring.

NOTE: Release the spring chamber after you finish adjusting the wheel hub.

11. Connect the air lines to the correct ports in the air chamber assembly.

Installing the Axle Shaft in Rigid Axle Models

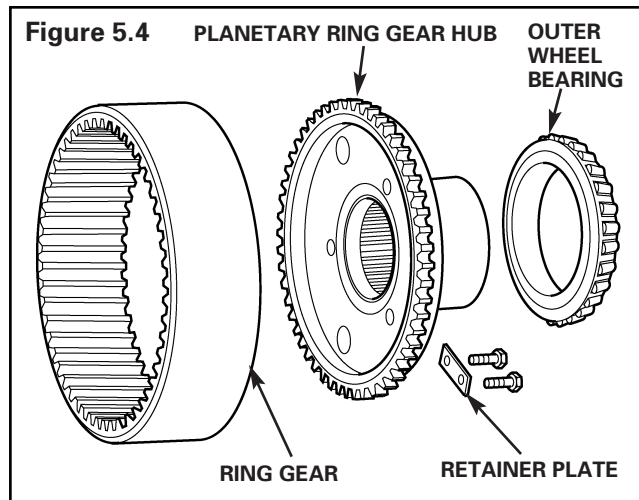
NOTE: If the axle uses a one piece shaft/sun gear, install the shaft/sun gear after adjusting the wheel bearings.

Install the axle shaft through the spindle bore and housing until it engages the differential side gear. The shaft end with the snap ring groove must extend beyond the outer end of the spindle.

Assembling the Ring Gear Hub Assembly

NOTE: When servicing an axle model with a floating ring gear, install the ring gear immediately before you assemble the planetary spider.

1. For axle models that include a planetary ring gear with tapped holes, lock plates and capscrews: Assemble the ring gear to the ring gear hub. **Figure 5.4.**



2. Install the outer wheel bearing cone on the ring gear hub journal squarely against the hub shoulder. Apply the same lubricant used in the wheel ends to the rollers. Slip fit the bearing cone over the ring gear hub journal. Do not install the ring gear hub assembly on the spindle at this time.

Assembling the Hub, Bearings, Oil Seal and Drum or Rotor

1. If the hub bearing cups need to be replaced, install the new cups with a suitable driver.

NOTE: Most models require installation of the inner bearing cone prior to installation of the wheel hub oil seal into the bore of the wheel hub.

2. Apply lubricant to the inner bearing cone rollers. Install the bearing cone into the wheel hub.
3. If used, install the oil seal guard washer.
4. Position the new wheel hub oil seal so that the spring lip of the seal faces the wheel bearing. Use a suitable seal driver to drive the seal into the same location as the original wheel hub oil seal. Refer to the following list for three possible seal installation locations:
 - Bottom of the hub bore
 - Pushed-in until it contacts the guard washer
 - Flush with the end face of the hub

CAUTION

Use extreme care to avoid nicking the oil seal wear sleeve end when you install the oil seal wear sleeve. A nicked oil seal wear sleeve end can damage the seal lip when you install the wheel hub. Lubricant loss and damage to components can result.

5. If a sleeve is used, carefully install a new oil seal wear sleeve on the spindle.
6. Lubricate the seals in the following areas only.
 - **Conventional seals:** Lubricate the oil seal lips.
 - **Unitized seals:** Lubricate the inside diameter of the seal.
 - **Face seals:** Lubricate the contact surfaces of the metal rings. Do not apply lubricant to any other part of the face seal.
7. Apply a thin coat of lubricant to the oil seal journal surface of the spindle.

Section 5 Assembly



8. Install the brake rotor or drum and oil slinger.
 - **If the slinger fits loosely between the hub and drum:** Apply a bead of liquid gasket material to prevent rattling.
9. Install the drum or rotor mounting capscrews and washers.
 - **For dual tire models:** Align the air valve stem clearance notch in the drum outside diameter with the wheel hub notch.
10. Tighten the capscrews according to the torque specifications shown in **Table C**. **T**

Table C: Brake Rotor Mounting Capscrew Torque Specifications

Size	Torque	
	lb-ft	N·m
3/4"-10	310-400	420-542
1"-12	850-1100	1152-1491
7/8"-14	575-750	780-1017

Installing the Wheel Hub

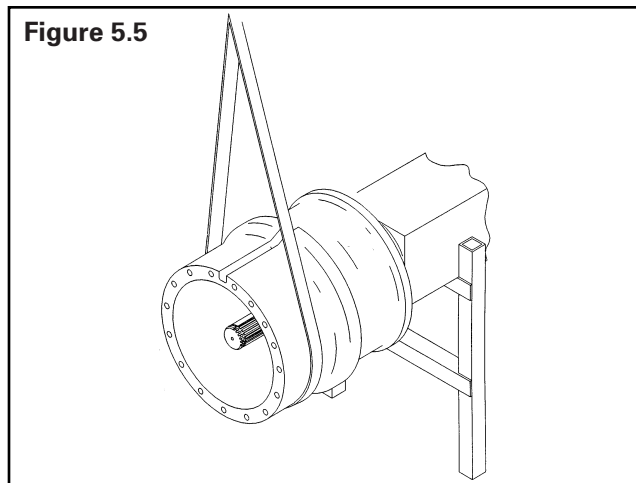


WARNING

Take care when you use lifting devices. When you use a lifting strap, inspect the strap for damage before you use it. Do not use a lifting strap to shock load or drop load a component. Serious personal injury and damage to components can result.

1. Use a lifting device to carefully lift and slide the wheel hub assembly over the spindle. Keep the wheel hub assembly aligned with the spindle to avoid oil seal damage. **Figure 5.5**.
 - **For axle models with three threaded holes (5/8 inch-11 UNC) in the boss area near the outer wheel bearing:** You can temporarily attach the planetary ring gear hub assembly to the wheel hub prior to installation on the spindle.

Figure 5.5



2. Install the ring gear hub assembly, which includes the outer bearing cone, on the spindle. **Figure 5.4**.
3. Install the wheel bearing adjusting nut on the spindle.
 - **If you temporarily attached the planetary ring gear hub assembly to the wheel hub in Step 1:** Remove the temporary capscrews from the ring gear hub.

Adjusting the Wheel Bearing Preload

NOTE: For wheel bearing adjustment procedures for axles equipped with wet disc brakes, refer to Meritor Maintenance Manual No. 4L, *Wet Disc Brakes*. To order this publication, call Meritor's Customer Service Center at 800-535-5560.

1. Tighten the wheel bearing adjusting nut to the initial seating torque listed in **Table D**, while rotating the wheel hub. **T**
2. Continue to rotate the hub a minimum of one full revolution in both directions.

Table D: Wheel Bearing Adjustment

Rigid Axle Models	Steering Axle Models	Adjusting Nut Torque			
		Initial Seating		Final Adjustment	
		lb.-ft.	N·m	lb.-ft.	N·m
PRC-1925 through 4807 SPRC & EPRC-1926 through 4808	PSC-1875 through 4564	500	678	400	542
PRC-5324 through 7314		600	813	500	678
PRC-7534 (wet brake)		700	949	550	746

3. Tighten the wheel bearing adjusting nut again to the initial seating torque listed in **Table E**, while rotating the wheel hub in both directions. **T**
4. Repeat Steps 1 and 2 until the adjusting nut will not advance with the application of the initial seating nut torque. **T**
5. Loosen the adjusting nut 1/8 to 1/4 turn.
6. Tighten the adjusting nut to the final adjustment nut torque listed in **Table E** while rotating the wheel hub. **T**

NOTE: Do not loosen the adjusting nut from the setting in Step 6 when you install the adjusting nut lockplate. Loosening the adjusting nut can result in an incorrect bearing preload.

7. Use one of the following procedures to install the adjusting nut lockplate:
 - Place the flat side of the lockplate against a flat surface of the nut.
 - or
 - Place the lockplate notch over a corner of the adjusting nut.

If necessary, tighten the adjusting nut to align the lockplate holes with the threaded holes in the ring gear hub. Do not loosen the adjusting nut.

! WARNING

Take care when using Loctite® to avoid serious personal injury. Follow the manufacturer's instructions to prevent irritation to the eyes and skin. If Loctite gets into your eyes, flush them with water for 15 minutes. Have your eyes checked by a doctor as soon as possible.

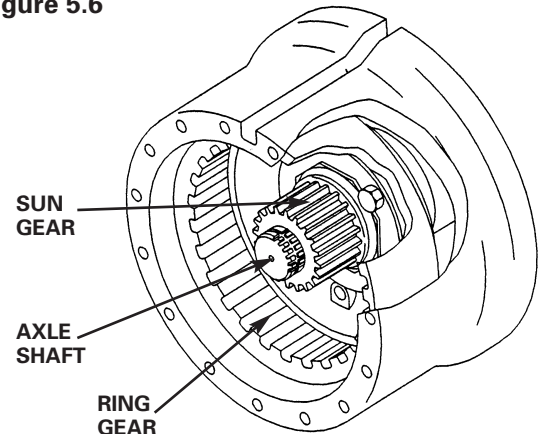
8. Install new lockplate capscrews with pre-applied locking agent on the threads. If you use the original capscrews, apply 2 or 3 drops of Loctite 277 or equivalent to the internal threads of the ring gear hub. Tighten the capscrews 60-75 lb-ft (81-102 N•m). **T**

Installing the Planetary Ring Gear and Sun Gear

1. Apply grease to the inner face of the sun gear thrust washer (the side with tangs or dowel pins). Install the thrust washer so that the tangs or dowels engage the slots or holes in the wheel bearing adjusting nut.

2. Install the sun gear on the axle shaft and against the thrust washer.
 - **For a one piece axle shaft/sun gear:** Install the axle shaft/sun gear by engaging the differential side gear until the sun gear is against the thrust washer. **Figure 5.6.**

Figure 5.6



3. Install the snap ring into the axle shaft groove.
4. **For axle models with a floating ring gear:** Install the planetary ring gear onto the ring gear hub.

Assembling the Planetary Spider

Meritor's planetary wheel ends come equipped with three different planetary designs:

- Planetary pinion shaft with tapered roller bearings
- Planetary pinion shaft with needle roller bearings
- Nylon coated planetary pinion shafts

Follow the correct assembly procedure for the type of planetary design you are servicing.

Section 5 Assembly



Planetary Pinion Shaft With Tapered Roller Bearings

1. Carefully inspect the planetary gears, pinion shafts and planetary gear tapered roller bearings. Replace damaged or worn parts.
2. If you removed the bearing cups, install new bearing cups with a suitable driver. To install the new bearing cups, refer to the following procedure:
 - a. Install a snap ring into the groove on the inside diameter of the planetary gear.
 - b. Press one bearing cup into the planetary gear bore until it seats against the snap ring. You must install the bearing cup into the side of the gear closest to the snap ring. Use care to avoid pressing the cup through the snap ring.
 - c. Install the cup spacer against the snap ring in the other planetary gear end.
 - d. Press the other bearing cup into the planetary gear bore until it seats against the cup spacer.
3. Install the bearing cones and bearing cone spacer in the planetary gear bore.
 - **If you reuse the bearing cup and bearing cone:** Assemble the bearing cup and bearing cone in the original position.

WARNING

Observe all WARNINGS and CAUTIONS provided by the press manufacturer concerning press operation to avoid serious personal injury and possible damage to components during assembly and installation procedures.

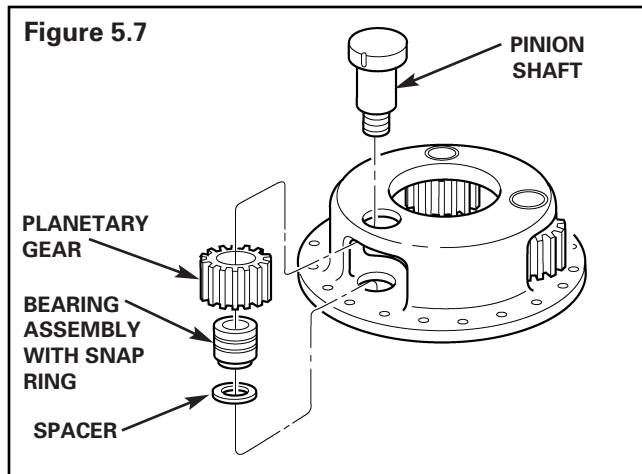
4. Support the planetary spider in a press, flange side **DOWN**. Install the planetary gear and bearing assembly with the gear spacer toward the small hole in the spider. Look through the hole in the spider to check that the bearings and spacer align with the spider bores.


NOTE: You must place the spacer at the correct end of the planetary gear for correct gear alignment.

5. Place the ball in the hole on the large outside diameter of the planetary pinion shaft. Carefully align the ball with the slot in the planetary spider. Use grease to retain the ball in the hole during assembly.

6. Install the planetary pinion shaft by hand. **Figure 5.7.**

- **If you cannot install the planetary pinion shaft by hand:** Use a press to press-in the planetary pinion shaft through the planetary gear assembly until the shoulder of the pin bottoms-out. When a press is not available, use a brass drift and mallet to tap the pinion shafts through the spider and planetary gear assembly.



7. Install the planetary pinion shaft locknut and tighten to 485-600 lb-ft (658-813 N•m). 
8. Repeat Steps 1-7 for the remaining shaft, gear, and bearing assemblies.

Planetary Pinion Shaft With Needle Roller Bearings

NOTE: For maximum planetary gear life, change the pinion shafts and needle roller bearings on both wheel ends at the same time.

NOTE: The inner diameter of the inner thrust washer is smaller than the outer thrust washer.

1. Apply approved O-617-A or B, NLGI grade 1 or 2 grease to the side of the inner thrust washer opposite the tang. Place the greased side of the thrust washer toward the planetary gear. The thrust washer tangs fit into the spider grooves.

NOTE: Replace the needle roller bearings and planetary gears when you replace the pinion shafts.

2. Place the thrust washer on the end of the new planetary gear.
3. Apply approved O-617-A or B, NLGI grade 1 or 2 grease to the bore of the planetary gear.

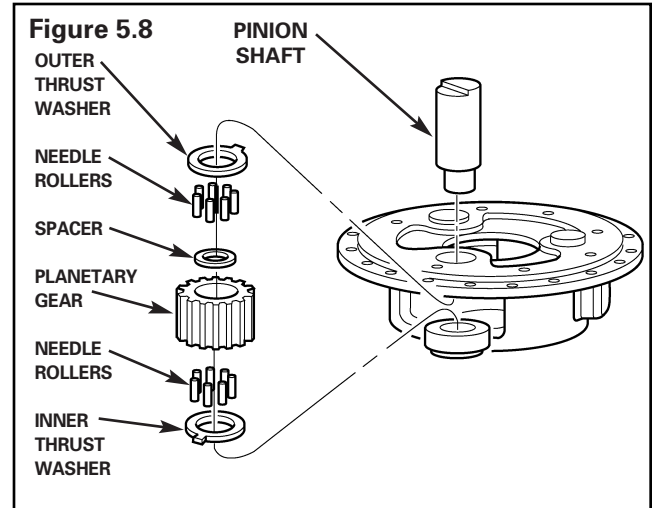
NOTE: Replace the needle roller bearings and planetary gears when you replace the pinion shafts.

NOTE: The number of needle roller bearings used in the pinion bore differs for each axle model.

4. Install a row of needle rollers around the bore in the pinion and against the inner thrust washer. Install as many rollers as will fit.
5. Place the spacer into the bore of the gear on top of the needle rollers. Install another row of needle rollers on top of the spacer.
6. Apply approved O-617-A or B, NLGI grade 1 or 2 grease to the side of the outer thrust washer opposite the tang.
7. Place the outer thrust washer on the end of the planetary gear. The tang must align with the tang of the opposite washer.
8. Set the planetary spider on a level surface with the flange side facing **UP**. Carefully slide the loaded planetary gear assembly into the planetary spider. Check that the following conditions exist before you proceed to Step 9:
 - The outer thrust washer (large bore) must be on top of the gear assembly.
 - The washer tangs must be in the planetary spider grooves.
 - The needle roller bearings must be in place.

NOTE: You must align the pinion shaft so that the flat surface on the large end faces the outside of the spider. This alignment provides clearance for the spider cover and prevents the shaft from rotating when you install the spider cover.

9. Install the pinion shaft through the spider, the planetary gear and the thrust washers. Allow the pinion shaft to extend out from spider. Do not press the pinion shaft into the spider at this time. **Figure 5.8.**



10. Repeat Steps 1-9 to install the second and third sets of pinion shafts, gears, needle rollers and thrust washers.
11. Check the alignment of the pinion shafts.
 - Place the spider cover over the shaft ends. When necessary, rotate the shafts so that spider cover fits over the flats. After you align the shafts, remove the cover.



WARNING

Observe all WARNINGS and CAUTIONS provided by the press manufacturer concerning press operation to avoid serious personal injury and possible damage to components during assembly and installation procedures.

12. Install each pinion shaft into the spider gear assembly by hand.
 - **If you cannot install a pinion shaft into the spider gear assembly by hand:** Use a press to install the pinion shaft into the spider assembly until the shoulder of the shaft bottoms against the inner (bottom) thrust washer. When a press is not available, use a brass drift and mallet to install the pinion shafts.

Section 5 Assembly



Nylon Coated Planetary Pinion Shaft

1. Inspect the large bore chamfers. The chamfers must be smooth to prevent damage to the nylon coating on the planetary pinion shaft during installation.
 - **If the large bore chamfers are not smooth:**
Use an emery cloth to clean the chamfer surface.
2. Inspect the planetary gear bores. Do not use planetary gears with rough bore surfaces.

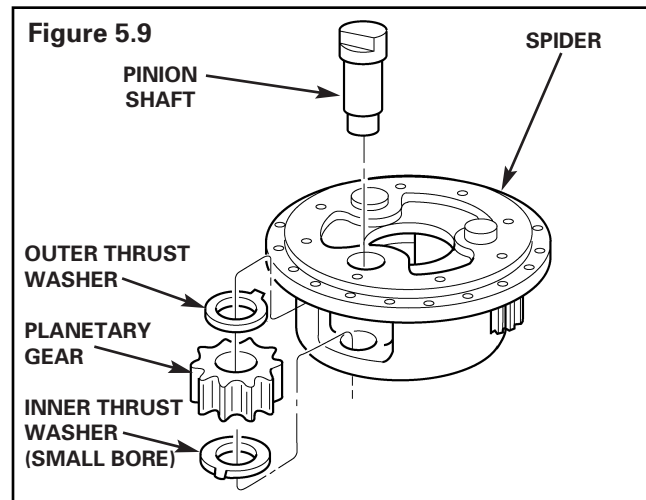
WARNING

Observe all WARNINGS and CAUTIONS provided by the press manufacturer concerning press operation to avoid serious personal injury and possible damage to components during assembly and installation procedures.

3. Place the spider in a press with the flange side **UP**. Support the spider as required.
4. Install the inner thrust washer (small bore). Place the washer tab into the spider indent and align the washer bore with the spider bore.
5. Apply a thin coat of the same gear lubricant used in the wheel end to the planetary gear bore.
6. Slide the planetary gear and the outer thrust washer into the spider. Align the bores of the parts and place the outer thrust washer tab into the spider indent.
7. Apply a thin coat of gear lube to the nylon coating on the pinion shaft.

NOTE: You must align the pinion shaft so that the flat surface on the large end faces the outside of the hub circle. This alignment provides clearance for the spider cover and prevents the shaft from rotating when you install the spider cover.

8. Install the planetary pinion shaft in the spider and through the planetary gear and thrust washer. Allow the large end of the shaft to extend from the spider. **Figure 5.9.**



9. Repeat Steps 1-8 to install the second and third sets of planetary pinion shafts, gears and washers.
10. Check the alignment of the pinion shafts by placing the spider cover over the shaft ends. When necessary, rotate the shafts so that the spider cover fits over the flats. After you align the shafts, remove the cover.
11. Install each pinion shaft into the spider gear assembly by hand.
 - **If you cannot install a pinion shaft into the spider gear assembly by hand:** Use a press to install the pinion shaft into the spider assembly until the shoulder of the shaft bottoms against the inner (bottom) thrust washer. When a press is not available, use a brass drift and a mallet to install the pinion shafts.

Installing the Planetary Spider Assembly

⚠ WARNING

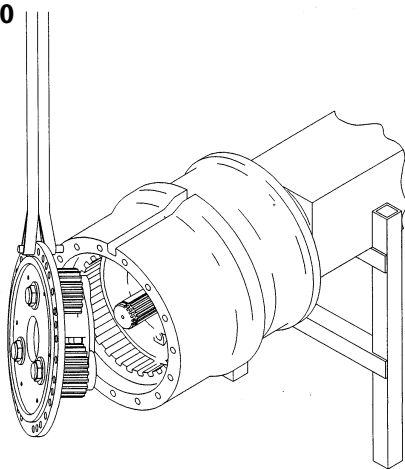
Small amounts of acid vapor are present when applying some silicone gasket materials. To prevent possible serious personal injury, make sure there is good ventilation in the work area. If the silicone gasket material gets in your eyes, flush your eyes with water for 15 minutes. Have your eyes checked by a doctor.

⚠ CAUTION

Use only the correct gasket material. Do not use non-approved gasket material. Lubricant loss and damage to components can result.

1. Apply silicone (RTV) gasket material to the spider flange at the hub mounting face. Refer to "Silicone (RTV) Gasket Material Application" in Section 3.
2. Install the spider and pinion assembly in the wheel hub. Align the planetary gear teeth with the sun gear and ring gear teeth. Align the spider flange and wheel hub match marks you previously marked at disassembly. **Figure 5.10.**

Figure 5.10



3. Correctly align the spider mounting holes with the wheel hub holes or studs. Push the spider assembly against the hub.
4. Install the nuts and washers or capscrews and washers.
 - **To install studs with integral hex and washers:** Use a 3.25-inch internal depth, extra deep socket.
5. Tighten the wheel studs, capscrews or nuts according to the torque specifications shown in **Table F.** **T**

Table F: Planetary Spider Mounting Capscrew and Stud Torque Specifications

Size	Torque	
	lb-ft	N•m
1/2"-13	85-115	115-156
9/16"-12	130-165	176-224
3/4"-10	310-400	420-542
7/8"-14	575-750	780-1017

Installing the Planetary Spider Cover

1. Apply silicone (RTV) gasket material to the cover flange at the spider mounting face. Refer to "Applying Silicone Gasket Material" in Section 4.
2. Align the drain arrow on the spider cover with the drain plug. Install the spider cover and capscrews.
3. Tighten the cover capscrews to 85-115 lb-ft (115-156 N•m). **T**

Adjusting the Brakes

Adjust the brakes for axles with P series and RSA drum brakes only.

- **For P series brakes:** Refer to Maintenance Manual No. 4, *Cam-Master® Cam Brakes*.
- **For RSA brakes:** Refer to Maintenance Manual No. 4P, *Stopmaster® Off-Highway Heavy Duty Brakes*.

To order these publications, call Meritor's Customer Service Center at 800-535-5560.

Section 5 Assembly



Installing the Tires and Rims

1. Install the tires and rims. Secure them with wheel rim clamps, nuts and washers.
2. Tighten the wheel nuts according to the vehicle manufacturer's specifications.

Filling the Wheel Ends With Lubricant

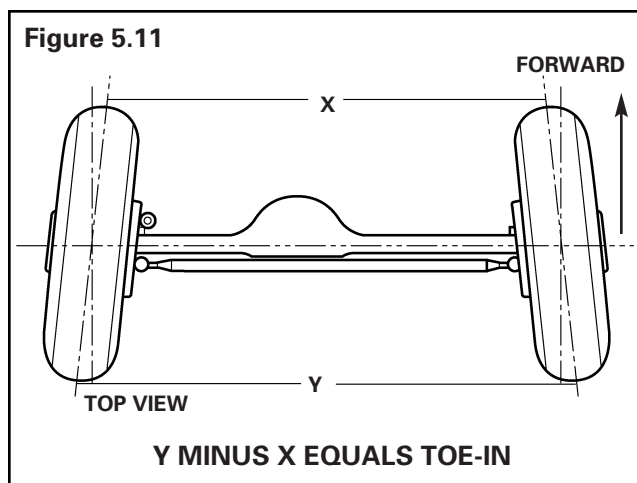
1. Rotate the wheel end until the oil fill line and oil level line are parallel to the ground.
2. Lower the vehicle to the ground.
3. Remove the oil fill plug from the cover. Clean all magnetic plugs and install the oil drain plug in the spider prior to filling the wheel end with lubricant.

NOTE: The rigid axle wheel end and housing bowl share the same oil and oil level.

4. Add oil to each wheel end and then to the bowl. Refer to Section 6 for lubrication specifications. Do not add oil through the bowl only. Wait for the oil to evenly distribute throughout the axle. Check the oil level and add oil if necessary.
5. Replace and securely tighten all plugs.

Measuring and Adjusting the Toe Setting

Toe is the difference in distance between the front of the front tires and the rear of the front tires. **Figure 5.11.**



Check and adjust the toe setting after you install any of the following components:

- a front steering axle
- a new steering knuckle
- a tie rod component

Meritor performs the toe adjustment with the axle in an unloaded condition.

The toe specification for Meritor off-highway steering axles is 1/16-inch toe-in ($\pm 1/16$ -inch). This specification is based on a 24-inch radius (theoretical tire with a 48-inch outside diameter).

Tandem and Tridem Axle Tire Matching

CAUTION

Unmatched tires on both tandem drive units and tridem drive units will cause tire wear and scuffing and possible damage to the drive units. Meritor recommends that the tires be matched to within 1/8 inch of the same rolling radius, 3/4 inch of the same rolling circumference.

Tandem Units

The four largest tires should never be installed on one driving axle or the four smallest tires on the other driving axle. Such tire mounting will cause an interaxle “fight,” unusually high axle lubricant temperatures that result in premature lubricant breakdown and possible costly axle service.

In addition to matching individual tire rolling radii or rolling circumference, Meritor recommends matching, as nearly as possible, the total tire circumference of one driving axle to the total tire circumference of the other driving axle. This will usually result in satisfactory tandem axle lubricant temperatures that lengthen drive unit service with higher tire mileage.

Tridem Units

When three driving axles are “hooked” together in a Tridem Series, unmatched tires will compound the problems described in the preceding paragraphs. Meritor recommends matching, as nearly as possible, the total tire circumference of each of the three driving axles.

How to Match Tires

Tandem Units

Park the vehicle on a level floor. The vehicle must carry a correctly distributed rated capacity load. All the tires must be the same size. Measure new tires to verify that they will be correctly matched.

1. Inflate all tires to the same pressure.
2. Carefully measure the rolling circumference of each tire with a steel tape.
3. Mark the size on each tire with chalk and arrange the tires in order of size, largest to smallest.

4. Mount the two largest tires on one side of one axle and mount the two smallest on the opposite side of the same axle.
5. Mount the four other tires on the other axle in the same manner.
6. Test run the vehicle to gather accurate rear axle lubricant temperature readings on the two axle lubricant temperature gauges.
7. Vary tire air pressure within the tire manufacturer's recommended range so the lubricant temperature of both axles is within 30°F (-1°C) of each other and not in excess of 200°F (93°C). This will usually result in uniform tire loading and good tire life.

Tridem Units

To match tires on Tridem Units, follow the same procedure used for Tandem Units.

Arrange the tires in order of size:

- The two largest and two smallest go on one axle.
- The next two largest and smallest go on the second axle.
- The remaining four tires go on the third axle.

Section 6 Lubrication



NOTE: Do not fill only through the axle housing bowl. For axles with a common level, fill the axle at each wheel end and the axle housing bowl to the bottom of the fill/level plug hole with the specified oil. Wait and allow the oil to flow through the axle. Check the oil level again and fill to the specified level if necessary.

NOTE: Refer to Meritor Maintenance Manual No. 1, *Lubrication*, for further lubrication information. To order this publication, call Meritor's Customer Service Center at 800-535-5560.

Lubrication Schedule

Operation	Off-Highway ^①
Initial Oil Change	250 operating hours ^①
Check Oil Level	250 operating hours ^①
Petroleum Oil Change	1,500 operating hours or twice a year (whichever comes first) ^①
Synthetic Oil or Semi-Synthetic Oil Change	3,000 operating hours or once a year (whichever comes first)

^① The interval depends on the individual operating conditions, speeds and loads. Severe operating conditions may require more frequent intervals.

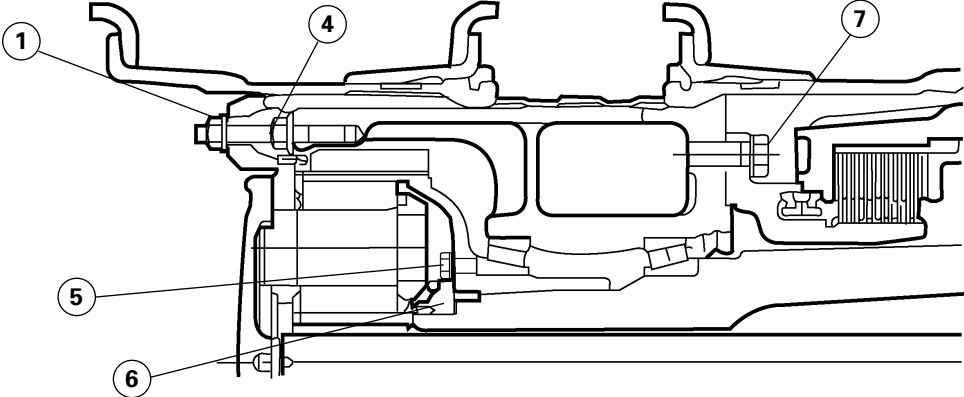
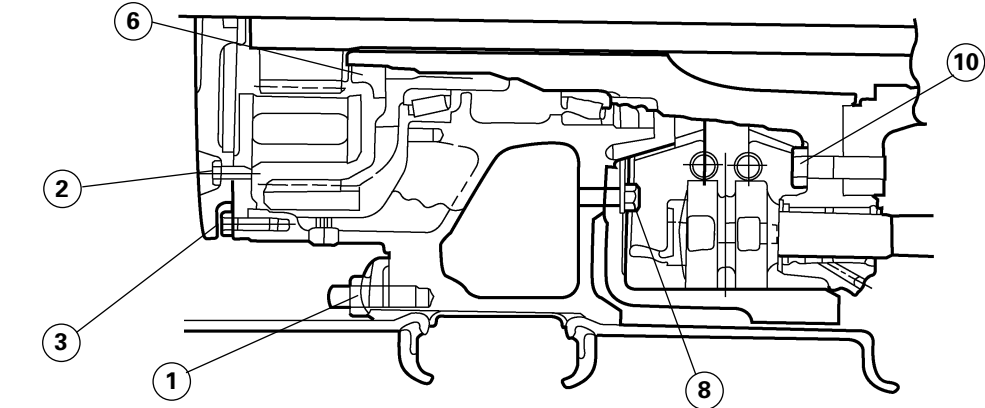
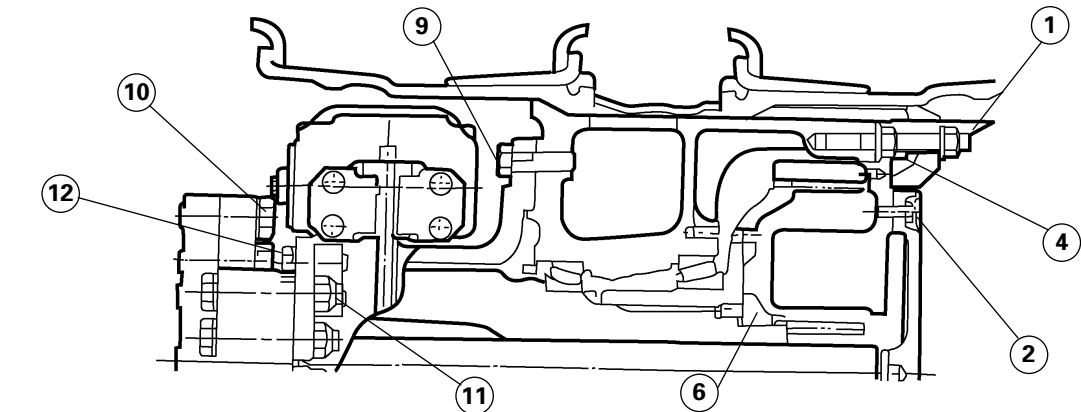
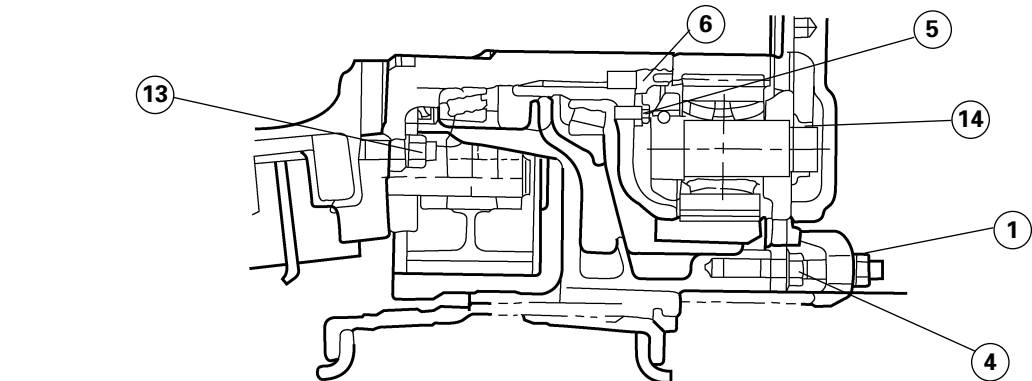
Lubrication Specifications

Meritor Specifications	Military Specification Approval	Oil Description	Outside Temperature			
			°F		°C	
			Min.	Max.	Min.	Max.
O-76A, Gear Oil	MIL-L-2105D or MIL-PRF-2105-E	GL-5, SAE 85W/140	10	None	-12	None
O-76D, Gear Oil		GL-5, SAE 80W/90	-15	None	-26	None
O-76E, Gear Oil		GL-5, SAE 75W/90	-40	None	-40	None
O-76L, Gear Oil		GL-5, SAE 75W/140	-40	None	-40	None
O-76M, Gear Oil		GL-5, SAE 75W/140	-40	None	-40	None
O-76N, Gear Oil		GL-5, SAE 75W/140	-40	None	-40	None

Planetary Axle Wheel End Torque Specifications

Item	Fastener Description	Size	Torque	
			lb.-ft.	N•m
1	Wheel Rim Clamp Nut		Refer to OEM specifications	
2	Planetary Spider Cover Capscrew	1/2"-13	85-115	115-156
3	Planetary Spider Mounting Capscrew	1/2"-13	85-115	115-156
		9/16"-12	130-165	176-224
		3/4"-10	310-400	420-542
4	Planetary Spider Mounting Stud	3/4"-10	310-400	420-542
		7/8"-14	575-750	780-1017
5	Lockplate Capscrew	7/16"-14	60-75	81-102
6	Wheel Bearing Adjusting Nut	Refer to "Adjusting the Wheel Bearing Preload" in Section 5.		
7	Wet Brake Driver Mounting Capscrew	7/8"-14	575-750	780-1017
		1"-12	850-1100	1152-1491
8	Brake Drum Mounting Capscrew	3/4"-10	310-400	420-542
		7/8"-14	575-750	780-1017
		1"-12	850-1100	1152-1491
9	Brake Rotor Mounting Capscrew	3/4"-10	310-400	420-542
		1"-12	850-1100	1152-1491
10	Spindle Mounting Capscrew (Nut on stud)	3/4"-10	310-400	420-542
		7/8"-9 & 14	575-650	780-881
		1"-12 & 14	850-1100	1152-1491
		1-1/4"-12	1700-2200	2305-2983
		1"-8	650-875	881-1186
11	Caliper Adapter to Spindle Bolt	7/8"-9	440-580	597-786
12	Caliper to Adapter Capscrew	3/4"-10	310-400	420-542
		M20	369-479	500-650
13	Spindle to Steer Knuckle Stud Nut	3/4"-16	310-400	420-542
	Spindle to Steer Knuckle Capscrew	7/8"-14	575-750	780-1017
14	Pinion Shaft Locknut	1-3/4"-12	485-600	658-813
	Oil Level/Drain Plug	3/4"-14	35	47
	Planetary Ring Gear Lock Capscrew (Not Shown)	3/8"-16	35-50	47-68
		7/16"-14	60-75	81-102

Section 7 Specifications

<p>Rigid Axle Wet Brake</p>	
<p>Rigid Axle Drum Brake</p>	
<p>Rigid Axle Dry Disc Brake</p>	
<p>Steer Axle Drum Brake</p>	



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