Planetary Rigid and Steering Axle Wheel Ends
Cantilever-Mounted Planetary Pinion Shaft Design

Maintenance Manual 9C
This maintenance manual describes the correct service and repair procedures for AxleTech’s planetary rigid and steer axle wheel ends with cantilever-mounted planetary pinion shafts. The information contained in this manual was current at time of printing and is subject to change without notice or liability.

You must follow your company procedures when you service or repair equipment or components. You must understand all procedures and instructions before you begin to work on a unit. Some procedures require the use of special tools for safe and correct service. Failure to use special tools when required can cause serious personal injury to service personnel, as well as damage equipment and components.

The instructions contained in this Field Maintenance Manual are intended for use by skilled and experienced mechanics knowledgeable in the installation, repair and replacement of the AxleTech product described herein. Installation, maintenance and replacement of such products require a high degree of skill and experience. The consequences of improper installation, maintenance or replacement (including the use of inferior or substandard components) are grave and can result in product failure and resulting loss of control of the vehicle, possible injury to or death of persons and/or possible future or additional axle damage. AxleTech does not authorize anyone other than highly skilled and experienced individuals to attempt to utilize the instructions contained in this Manual for the installation, maintenance or replacement of the product described herein, and AxleTech shall have no liability of any kind for damages arising out of (or in connection with) any other use of the information contained in this Manual.

AxleTech International uses the following notations to warn the user of possible safety problems and to provide information that will 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. |
| ![ ] | This symbol indicates that fasteners must be tightened to a specific torque. |
| NOTE: | A NOTE indicates an operation, procedure or instruction that is important for proper service. A NOTE can also supply information that will help to make service quicker and easier. |

**How to Order**

Order items from AxleTech International.

Phone orders are also accepted by calling AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.
# Table of Contents

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## Asbestos and Non-Asbestos Fiber Warnings

Section 1: Exploded Views
- Nut/Pin Lock Style .................................................................2
- Bow Tie Nut Lock Style
- PRC 184 Style........................................................................3

Section 2: Introduction
- Description..............................................................................4
- Identification

Section 3: Disassembly
- Removal ..................................................................................6
- Remove the Planetary Wheel End
- Remove the Planetary Spider Assembly
- Remove the Planetary Assembly ..............................................7
- Remove the Thrust Button.........................................................8
- Cleaning ....................................................................................9
- Remove the Sun Gear and Axle Shaft ......................................10
- Ring Gear and Wheel Hub
- Prepare to Remove the Wheel Hub
- Prepare to Remove the Ring Gear Hub .................................11
- Remove the Ring Gear Hub and Wheel Hub
- Remove the Hub Oil Seal and Bearings .................................12
- Remove the Brake Drum or Disc Brake Rotor
- Remove the Brake Shoes or Other Brake Components ..........13
- Remove the Spindle

Section 4: Prepare Parts for Assembly
- Clean, Dry and Inspect Parts .................................................14
- Clean Parts
- Dry and Inspect Parts
- Repair or Replace Parts .........................................................16
- Capscrews
- How to Clean Capscrews .....................................................17
- Dri-Loc Fasteners and Liquid Adhesive
- How to Use
- How to Reuse
- Fasteners Secured with Dri-Lock or Loctite® No. 277 that Do Not Require Removal ........................18
- How to Apply Silicone Gasket Material
- Flush Lube From the Axle
Table of Contents

Section 5: Assembly
  Installation....................................................................................................................................................19
  Spindle on Rigid Axles With Dry Disc Brakes
  Spindle on Steering Axles With H and DLH Drum Brakes
  Spindle on Steering Axles With HDB Dry Disc Brakes .................................................................20
  Axle Shaft in Rigid Axle Models ........................................................................................................21
  Hub, Bearings, Oil Seal and Drum or Rotor
  Wheel Hub....................................................................................................................................................23
  Adjust the Wheel Bearing Preload For All Axles Except PRC 184 .........................................................24
  Lock the Adjusting Nut
  Sun Gear ......................................................................................................................................................26
  Thrust Button
  Planetary Spider .......................................................................................................................................28
  Planetary Spider Assembly
  Install and Adjust the Brakes .................................................................................................................29
  Tire and Rim .............................................................................................................................................30
  Fill the Wheel Ends with Lubricant
  Measure and Adjust the Toe Setting

Section 6: Lubrication
  Lubrication Schedule .............................................................................................................................31
  Lubrication Specifications

Section 7: Specifications
  Planetary Axle Wheel End Torque Specifications ..................................................................................32
  Planetary Pin/Spider Press Dimensions Specifications...........................................................................35
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 1.0 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

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 1.0 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.

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.

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.


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.

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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.

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, clothes 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.
## Nut/Pin Lock Style

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<td>4</td>
<td>Planet Pinion Shaft</td>
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<td>5</td>
<td>Planetary Drive Pinion</td>
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<td>7</td>
<td>Planetary Sun Gear</td>
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<tr>
<td>8</td>
<td>Sun Gear Thrust Washer</td>
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<td>9</td>
<td>Wheel Bearing Adjusting Nut Dowel</td>
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<td>Wheel Bearing Adjusting Nut</td>
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<td>Shaft Planet Pinion Setscrew</td>
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<td>Planetary Spider to Hub Washer</td>
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<td>Planetary Spider to Hub Capscrew</td>
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## Bow Tie Nut Lock Style

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<td>3</td>
<td>Planetary Spider to Hub Washer</td>
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<td>Planetary Sun Gear</td>
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<td>13</td>
<td>Sun Gear Thrust Washer</td>
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<td>14</td>
<td>Wheel Bearing Adjusting Nut</td>
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<td>16</td>
<td>Wheel Bearing Adjusting Nut Lock</td>
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<td>Hub Nut Lock Capscrew</td>
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### PRC 184 Style

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<td>Planetary Spider</td>
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<td>4</td>
<td>Axle Shaft Thrust Button</td>
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<td>Wheel Bearing Cone – Outer</td>
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<td>5</td>
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<td>Wheel Bearing Cup – Outer</td>
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<td>Wheel Hub Assembly</td>
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<td>7</td>
<td>Retainer – Wheel Bearing Nut</td>
<td>22</td>
<td>Wheel Bearing Cup – Inner</td>
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<td>8</td>
<td>Wheel Bearing Nut</td>
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<td>Wheel Bearing Cone – Inner</td>
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<td>Planetary Spider to Wheel Hub Stud</td>
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<td>Planetary Pinion Shaft</td>
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Description

AxleTech cantilever mounted planetary axles incorporate a single or double reduction carrier with hypoid or spiral bevel gearing mounted in the axle center. Final gearing reduction occurs in the wheel hubs by planetary spur gears.

AxleTech planetary axles permit the carrier 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. Figure 2.1 and Figure 2.2.

![Axle Identification Tag Location](image)
**Figure 2.2**

<table>
<thead>
<tr>
<th>P</th>
<th>S</th>
<th>O</th>
<th>C</th>
<th>2 0 5</th>
<th>H D B</th>
<th>2 0 6</th>
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<td>Rigid</td>
<td>Steer</td>
<td>Planetary</td>
<td>Non-Drive</td>
<td></td>
<td>Exact Specification</td>
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</table>

**Last Digit – Carrier Designation for Base Model Number**

**First Two Digits Wheel End Designation (Basic Model Number)**

**Housing Type Designation**
- C = Integral Cast
- S = Stamped
- A = Pot or Split Carrier

Only If Applicable:
- T = Transmission on Carrier
- O = Oscillating or Pin Mount
- L = Mounting Other Than Pad with Drilling

**Brake Designations:**
- H – Hydraulic 16.5" x 5.5" (419.1 x 139.7 mm)
- N – None
- NR – With rotor less calipers 18.1" x .51" (459.7 x 13 mm)
- P – S cam air 16.5" x 5" (419.1 x 127 mm)
- RDH – Meritor dual hydraulic
- RHD – Meritor hydraulic disc 18.0" x .62" (457.2 x 15.75 mm)
- FSH – Floating shoe hydraulic 12.5" (317.5 mm)
- HDB – Hydraulic dry disc* 18.0" x .63" (457.2 x 16 mm)
- W2H – 9" (229 mm) wet disc Dura Disc
- W2M – 9" (229 mm) wet disc brake SA/HR**
- W3H – 13" (330 mm) Wet Disc Brake
- DSH – 12.5" (318 mm) Hydraulic Drum (Duo-Servo-Hydraulic)
- DLH – 17" x 4" (431.8 x 101.6 mm)

*With calipers
**Spring Applied/Hydraulic Release
Section 3 Disassembly

**WARNING**

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

**Removal**

**Remove the Planetary Wheel End**

1. Park the vehicle on a level surface.

**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.*

2. Block the wheels that will not be raised to prevent the vehicle from moving.

3. Raise the vehicle, so that the area you will service is off of the ground. Refer to the vehicle manufacturer’s instructions to correctly raise the vehicle.

4. Support the vehicle with safety stands.

5. Remove the nuts, washers, and wheel rim clamps. Remove the tire, rim and spacer.

6. Rotate the hub assembly until the oil drain plug in the planetary spider is at the bottom.

7. Remove the oil drain plug. Drain and discard the lubricant. This plug is magnetic and will need to be cleaned of any metallic particles.

**Remove 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 and washers.

3. Separate the planetary spider assembly from the wheel hub. To separate the spider assembly from the hub, refer to one of the following procedures.

   - Install and tighten the capscrews into the three tapped puller holes in the spider flange. The spider assembly will separate from the hub.
   - Place a pry bar in the notches of the spider flange and pry the spider assembly from the hub. Do not pull spider out of wheel hub more than 1.5 inches.
WARNING

To avoid serious personal injury and possible damage to components, be very careful when using lifting devices during service and maintenance procedures.

- Inspect to make sure that neither lifting strap is damaged.
- Do not subject lifting straps to any shock or drop loading.

4. Use a lifting device to remove the planetary spider assembly from the wheel hub assembly. Figure 3.2.

Remove the Planetary Assembly

NOTE: During disassembly, mark or tag the planetary spider parts you plan to replace. Marking and tagging these parts will aid correct installation during assembly.

1. Remove the snap ring and thrust washer from the end of the planetary pinion shaft.
2. Remove the planetary pinions.
3. Inspect the condition of the pinion shafts.
   - If the nylon coating is worn or cut: Replace the pinion shafts.

NOTE: In Figure 3.3, there are several spider/pinion design styles shown as typical.

4. Prior to any shaft disassembly, measure Dimension “X” and record press dimension to assure correct reassembly. Figure 3.3.

5. If you must replace the pinion shafts before you service other wheel end components, remove the setscrew from each spider pinion boss.

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.

6. Place the spider assembly on a press with the pinion shafts facing DOWN. Support the spider as required.
   - If a press is not available: Use a brass drift and mallet to drive the pinion shafts out of the spider.

7. Press each pinion shaft out of the spider.

8. Remove the thrust button.
Remove the Thrust Button

NOTE: The thrust button removal procedure is to be followed in **only** servicing the planetary thrust button. If the thrust button does not need to be changed, proceed to Cleaning Section, page 8.

- **If removing the thrust button in normal axle service:** Follow items 8, 9 and 10 only.

1. Drain oil from the wheel end.
2. Clean the exterior planetary spider and wheel hub surfaces.
3. Matchmark the planetary spider and wheel hub. **Figure 3.4.**
4. Remove the planetary spider capscrews and washers.
5. Loosen the planetary spider assembly from wheel hub by inserting a pry bar into cast notches. **Figure 3.5.**
6. Insert a lifting bolt through the upper spider to the wheel hub hole. Attach a lifting strap to the lifting bolt. Attach the strap to the appropriate hoist or crane. **Figure 3.6.**
WARNING
To avoid serious personal injury and possible damage to components, be very careful when using lifting devices during service and maintenance procedures.

• Inspect to make sure that neither lifting strap is damaged.
• Do not subject lifting straps to any shock or drop loading.

7. Use a hoist or crane to remove the spider assembly from the wheel hub.
8. Place the spider assembly with the wheel hub mounting face down on a clean surface.
9. Using an appropriate drift or punch, drive the existing thrust button from its bore. Figure 3.7.
10. Flip the spider assembly over such that the wheel hub mounting face is facing up.

Cleaning

WARNING
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.

1. Using a gasket scraper and/or appropriate solvent, remove excess gasket compound from the spider and wheel hub mounting face.
2. Using a small gasket scraper and/or appropriate solvent, remove excess gasket compound from the thrust button thrust face and bore in the planetary spider. Take care to not scratch the thrust face or bore while cleaning. If scratches or gouges deeper than 0.005 inch are visible, replace the planetary spider.
Remove the Sun Gear and Axle Shaft

1. Remove the snap ring from the end of the axle shaft.
2. Remove the sun gear and sun gear thrust washer. Figures 3.8, 3.9 and 3.10 are different lock nut options. Figure 3.10 applies to PRC 184 only.
3. Remove the sun gear thrust washer. Figure 3.11.

4. On rigid axle models: Remove the axle shaft.

5. To remove the axle shaft from a steering axle: Remove the wheel hub and spindle before you remove the axle shaft through steer knuckle.

Ring Gear Hub and Wheel Hub

Prepare to Remove the Wheel Hub

Remove the Axles with H, DLH, DSH and FSH Series Drum Brakes

Retract the brake shoe adjustment before you remove the wheel hub and drum assemblies. Refer to Meritor Maintenance Manual 4H, *Hydraulic and Mechanical Drum Brakes*. Call Meritor’s Customer Service Center at 800-535-5560 to order this publication.

• **For axles with outboard mounted brake drums:** Remove the temporary retaining screws before you remove the brake drum.
Remove the Axles with HDB Series Dry Disc Brakes

NOTE: To order the publications specified below, call Meritor’s Customer Service Center at 800-535-5560.

Remove the brake caliper. Refer to Maintenance Manual 4S, SCL 2 Series Dry Disc Brake Calipers.

Remove the Axles with Wet Disc Brakes

Remove and service the wheel hub, brake driver, hub oil seal, wheel bearings and spindle. Refer to AxleTech Maintenance Manual 4L, Wet Disc Brakes. To order this publication, call AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.

Remove the Axles with P Series 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.

NOTE: For maintenance and service information on P series drum brakes, refer to Maintenance Manual 4, Cam Brakes.

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

2. Turn the slack adjuster manual adjusting nut until the brake shoes fully retract and the drum clears the lining. If Meritor automatic slack adjusters are used, refer to Meritor Maintenance Manual 4B, Automatic Slack Adjusters, for the correct adjustment procedure. To order this manual, call Meritor’s Customer Service Center at 800-535-5560.

Prepare to Remove the Ring Gear Hub

Remove the Wheel Bearings with Single Adjusting Nuts

Remove the capscrews from the adjusting nut lock. The adjusting nut 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.

Remove the Axles with HDB Series Dry Disc Brakes

NOTE: To order the publications specified below, call Meritor’s Customer Service Center at 800-535-5560.

Remove the brake caliper. Refer to Maintenance Manual 4S, SCL 2 Series Dry Disc Brake Calipers.

Remove the Axles with Wet Disc Brakes

Remove and service the wheel hub, brake driver, hub oil seal, wheel bearings and spindle. Refer to AxleTech Maintenance Manual 4L, Wet Disc Brakes. To order this publication, call AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.

Remove the Axles with P Series 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.

NOTE: For maintenance and service information on P series drum brakes, refer to Maintenance Manual 4, Cam Brakes.

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

2. Turn the slack adjuster manual adjusting nut until the brake shoes fully retract and the drum clears the lining. If Meritor automatic slack adjusters are used, refer to Meritor Maintenance Manual 4B, Automatic Slack Adjusters, for the correct adjustment procedure. To order this manual, call Meritor’s Customer Service Center at 800-535-5560.

Prepare to Remove the Ring Gear Hub

Remove the Wheel Bearings with Single Adjusting Nuts

Remove the capscrews from the adjusting nut lock. The adjusting nut 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.

Remove the Ring Gear Hub and Wheel Hub

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.

WARNING

To avoid serious personal injury and possible damage to components, be very careful when using lifting devices during service and maintenance procedures.

• Inspect to make sure that neither lifting strap is damaged.

• Do not subject lifting straps to any shock or drop loading.

Remove the ring gear hub and wheel hub by using one of the following appropriate methods:

Remove All Axles Except PRC-184-N

1. Remove the ring gear.

2. Remove the wheel bearing adjusting nut.

3. Attach a lifting device to the wheel hub. Figure 3.12.
Section 3
Disassembly

4. Partially remove the wheel hub assembly. Remove the outer wheel bearing cone. Adjust straps or similar device to balance the hub assembly to prevent falling.

5. Complete the removal of the wheel hub and drum or rotor assembly. Take care not to damage the hub face seals during disassembly. Figure 3.12.

Remove the PRC 184 Axle Models

1. Remove the axle shaft/sun gear/thrust washer assembly.
2. Using a suitable tool, pry the two half moon locks from spindle end.
3. Remove the spindle nut.
4. Support the hub with a suitable strap.

NOTE: Removing the ring gear hub support ring that is pressed into the ring gear hub bore should not be necessary.

5. Remove the ring gear and ring gear hub assembly, including the ring gear hub support ring. This assembly could also be removed with the wheel hub if desired.
6. Place the planetary ring gear hub/ring gear assembly face down on a work bench.
7. If service is required to separate the planetary ring gear from the ring gear hub, remove the eight 5/16-18 UNC capscrews (20-30 lb-ft) and four lockplates that hold the two components together.

Remove All Other Axle Models

1. Remove the capscrews and washers from the wheel bearing adjusting nut lockplate.
2. Remove the wheel bearing adjusting nut.
3. Support the one-piece wheel hub/brake drum assembly with lifting device straps.

CAUTION

The wheel bearing cone will remain on the ring gear hub when you remove the planetary ring gear assembly. Do not drop the wheel bearing cone. Damage to components can result.

4. Remove the planetary ring gear assembly. The outer wheel bearing cone will remain on the ring gear hub.

WARNING

To avoid serious personal injury and possible damage to components, be very careful when using lifting devices during service and maintenance procedures.

• Inspect to make sure that neither lifting strap is damaged.
• Do not subject lifting straps to any shock or drop loading.

5. Use a lifting device to remove the one-piece wheel hub/brake drum assembly.

Remove the Hub Oil Seal and Bearings

1. Position the wheel hub with the brake end UP.
2. Remove the hub oil seal with a suitable puller. Do not scratch the hub seal bore surface.
3. Remove the inner bearing cone.
4. If you did not previously remove the bearing cups: Use a suitable puller to remove the bearing cups.

Remove the Brake Drum or Disc Brake Rotor

1. Match mark the drum or rotor and hub.
2. Remove the capscrews and washers from the brake drum or rotor joint.
3. Remove the brake drum or rotor from the wheel hub.
4. If used, remove the oil slinger.
Remove the Brake Shoes or Other Brake Components

To remove the brake shoes or other brake components, refer to the correct maintenance manual. To order the publications specified below, call Meritor’s Customer Service Center at 800-535-5560.

- **For P series drum brakes:** Refer to Maintenance Manual 4, *Cam Brakes*.
- **For SCL 2 series dry disc brakes:** Refer to Maintenance Manual 4S, *SCL 2 Series Dry Disc Brake Calipers*.
- **For H, DLH, FSH and DSH series brakes:** Refer to Maintenance Manual 4H, *Hydraulic and Mechanical Drum Brakes*.

Remove the Spindle

Remove the Rigid Axles With Dry Disc Brakes

1. Matchmark the spindle and housing flange.

**WARNING**

To avoid serious personal injury and possible damage to components, be very careful when using lifting devices during service and maintenance procedures.

- **Inspect to make sure that neither lifting strap is damaged.**
- **Do not subject lifting straps to any shock or drop loading.**

2. Use straps and a lifting device to support the spindle.
3. Remove the spindle mounting bolts, nuts and washers.
4. Remove the caliper mounting adapters.
5. Remove the spindle from the axle housing.

Remove All Steering Axles With H, DLH and HDB Series Brakes

1. Matchmark the brake backing plate, spindle, and steer knuckle.
2. **For axles with DLH brakes:** Support the spindle and brake assembly.
3. Remove the mounting capscrews and washers.
4. To aid spindle removal and brake assembly, install temporary studs at the eleven- and one-o’clock positions. Refer below for stud specifications.
   - **PSC-205 axle models:** Use 2 1/2-inch 9/16-12 UNC studs.
   - **PSC-353 axle models:** Use 3-inch 5/8-11 UNC studs.

**CAUTION**

Care must be taken when removing spindle from axle assembly. The spindle must be removed over the axle shaft/sun gear splines. The axle shaft splines could damage or tear the seal lips. Damaged or torn seal lips could cause the seal to leak.

5. Remove the spindle from the knuckle by sliding the spindle over the outer end of the axle shaft assembly.
6. Record the oil seal depth dimension “Y” prior to disassembly. Measure from the machined surface to the oil seal case for later use in installation. **Figure 3.13.**
7. Remove the axle shaft and universal joint assembly.

**Figure 3.13**

![Figure 3.13](image-url)
Section 4
Prepare Parts for Assembly

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

Clean, Dry and Inspect Parts

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. Carefully follow the manufacturer’s instructions.

Clean, dry and inspect parts as follows.

Clean Parts

Ground or Polished Metal Parts

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

Use a cleaning solvent, kerosene or diesel fuel to clean ground or metal parts or surface.

- Do not use gasoline.
- Do not clean ground or polished metal parts in a hot solution tank, or use water, steam or alkaline solutions.

Parts With Rough Metal Finishes

Use a cleaning solvent or a weak alkaline solution in a hot solution tank to clean rough metal parts. If you use a hot solution tank, follow the instructions below.

1. Leave the rough parts in the tank until they are completely cleaned and heated.
2. Remove the rough parts from the tank.
3. Wash the parts with water until you remove the alkaline solution.

Axle Assembly

You can steam clean the outside of an axle assembly to remove dirt.

- Before you steam clean an axle assembly: Close – or put a cover over – all openings in the axle assembly. Examples of openings are breathers or air chamber vents.

Dry and Inspect Parts

1. Use soft, clean paper or cloth rags, or compressed air to completely dry parts immediately after you clean them.
2. Carefully inspect all parts for wear or damage before you assemble them.
3. Repair or replace worn or damaged parts.

Bearings

⚠️ CAUTION
Use soft, clean paper or cloth rags to dry bearings. Do not use compressed air, which will rotate bearings. Damage to parts can result.

Use soft, clean paper or cloth rags to dry bearings.

- Do not use compressed air, which can damage parts.
Apply Corrosion Protection

1. Apply a thin layer of brake grease to cleaned, dried parts. Be careful that you do not apply the grease to the linings or rotor.

2. If you will store the parts, apply a special material, which prevents corrosion and rust, to all surfaces. Store parts inside special paper or other material that prevents rust and corrosion.

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

1. Inspect for damage on the cup and cone inner race surfaces that touch the rollers. Figure 4.5.

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

Do Not Repair Weld a Drive Axle Assembly

⚠️ WARNING
Do not bend, weld or heat a drive axle assembly to repair it. These procedures will reduce axle strength, which will affect performance and vehicle operation, and void AxleTech’s warranty. Serious personal injury and damage to components can result.

Do not bend, weld or heat a drive axle to repair it. These procedures will reduce axle strength, particularly in heat-treated parts, and void AxleTech’s warranty.

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.

Repair or Replace 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 damaged washers.
- Replace gaskets, oil seals or grease seals at the time of axle repair.
- When the axle is assembled, clean parts and apply new liquid gasket material where required.

Capscrews

Removal

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

Use a brass or leather mallet to tap out capscrews.

Capscrews Fastened With Liquid Adhesive

Use regular removal procedures.

If removal is difficult because of a worn head or high breakaway torque: Slowly heat the capscrew’s threads to approximately 300°F (150°C). Heat slowly to avoid thermal stresses in components.
How to Clean Capscrews

⚠️ WARNING

Do not allow trichloroethylene to contact your skin or use this substance near flames, welding operations or hot surfaces exceeding 900°F (482°C). Do not smoke when you use trichloroethylene. Only use trichloroethylene in a well-vented room. Avoid inhaling trichloroethylene vapors. You must follow these instructions to avoid serious personal injury.

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

2. Follow these instructions when you use trichloroethylene:
   - Do not allow trichloroethylene to contact your skin or use this substance near flames, welding operations or hot surfaces exceeding 900°F (482°C).
   - Do not smoke when you use trichloroethylene.
   - Only use trichloroethylene in a well-vented room. Avoid inhaling trichloroethylene vapors.

Dri-Loc Fasteners and Liquid Adhesive

How to Use

NOTE: Do not apply liquid adhesive or any other type of fastener retainer material, sealant or adhesive on Dri-Loc fasteners or in the threaded holes. No cure time is required for Dri-Loc fasteners.

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.

How to Reuse

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.

⚠️ WARNING

Take care when you use Loctite® to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.

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.

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

**WARNING**

*Take care when you use Loctite® to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.*

**NOTE:** No cure time is required for Loctite® No. 277.

Tighten all fasteners to the minimum specified torque to ensure that they are secure.

- **If a fastener does not rotate when you tighten it:** The fastener is tightened to the correct torque.
- **If the fastener rotates, even slightly, when you tighten it:** Remove the fastener from the component. Apply liquid adhesive to the threaded hole.

**How to Apply Silicone Gasket Material**

**WARNING**

*Take care when you use silicone gasket materials to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.*

**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.*

AxleTech recommends the following liquid gasket materials:

- ThreeBond 1216
- Loctite® 5699

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.

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.

**Flush Lube From the Axle**

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.

1. If the housing bowl has magnets, remove all metallic debris from the magnets including magnetic plugs in planetary wheel ends.
2. Flush lubricant from the entire axle, including the wheel ends and housing bowl, before you assemble the axle.
Installation

Spindle on Steering Axles With H and DLH Drum Brakes

1. Install the differential carrier assembly and the steering knuckles on the steering axle.

2. 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

3. Install the axle shaft assembly through the steering knuckle and axle housing until the shaft engages the differential assembly side gear.

4. If the original shaft support bushing in the bore of the housing is worn or damaged:
   - Remove the oil seal and bushing and install a new bushing. Use a suitable puller and care not to damage the bushing bore in the axle housing.

5. Install a new oil seal in the bore. Apply a thin coat of NLGI grade 1 or 2 grease to the seal lips and bushing bore.

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

Installation

Spindle on Rigid Axles With Dry Disc Brakes

WARNING
Take care when you use silicone gasket materials to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.

1. Apply a 0.125-inch (3.18 mm) diameter continuous bead of liquid gasket material around the flange mounting face of the axle housing.

2. Align the spindle with the axle housing match marks.

3. Install the spindle on the axle housing.

4. Install and hand tighten the short spindle mounting capscrews, washers and nuts.

5. Install the caliper mounting adapter on the backside of the housing flange.

6. Install and hand tighten the long spindle mounting capscrews, washers and nuts.

7. Tighten the locknuts to the correct torque specified in Table A.

Table A: Locknut Torque Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb-ft</td>
</tr>
<tr>
<td>1/2&quot;-12</td>
<td>85-115</td>
</tr>
<tr>
<td>9/16&quot;-18</td>
<td>130-165</td>
</tr>
<tr>
<td>5/8&quot;-11, -18</td>
<td>210-230</td>
</tr>
<tr>
<td>3/4&quot;-10</td>
<td>310-400</td>
</tr>
<tr>
<td>7/8&quot;-9, -14</td>
<td>575-650</td>
</tr>
<tr>
<td>1&quot;-12, -14</td>
<td>850-1100</td>
</tr>
</tbody>
</table>

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

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

1. Apply a 0.125-inch (3.18 mm) diameter continuous bead of liquid gasket material around the flange mounting face of the axle housing.

2. Align the spindle with the axle housing match marks.

3. Install the spindle on the axle housing.

4. Install and hand tighten the short spindle mounting capscrews, washers and nuts.

5. Install the caliper mounting adapter on the backside of the housing flange.

6. Install and hand tighten the long spindle mounting capscrews, washers and nuts.

7. Tighten the locknuts to the correct torque specified in Table A.
5. Install a new oil seal in the bore using a suitable driver tool. Use dimension “Y” of the oil seal taken during disassembly and match measurements during assembly. Figure 5.2.

6. Install the spindle on the steering knuckle by carefully sliding it over the outer end of the axle shaft assembly. A correctly installed spindle will engage the two temporary studs you installed during disassembly.

7. Align the brake assembly with the matchmarks you previously made on the spindle.

8. Install the brake assembly on the spindle over the temporary studs. Assemble the temporary capscrew and snug-up assembly.

9. Remove the temporary studs and install the capscrews and washers.

10. Tighten the capscrews to the correct torque specified in Table B.

Table B: Capscrew Torque Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque (lb-ft/N-m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;-12</td>
<td>85-115/115-156</td>
</tr>
<tr>
<td>9/16&quot;-18</td>
<td>130-165/176-224</td>
</tr>
<tr>
<td>5/8&quot;-11, -18</td>
<td>210-230/284-311</td>
</tr>
<tr>
<td>3/4&quot;-10</td>
<td>310-400/420-542</td>
</tr>
<tr>
<td>7/8&quot;-9, -14</td>
<td>575-650/779-880</td>
</tr>
<tr>
<td>1&quot;-12, -14</td>
<td>850-1100/1152-1491</td>
</tr>
</tbody>
</table>


Spindle on Steering Axles With HDB Dry Disc Brakes

Install the Spindle on Steering Axles Without Brakes

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
6. Install and hand tighten the spindle mounting capscrews and washers.

7. Tighten the capscrews according to the torque specifications shown in Table C.

Table C: Capscrew Torque Specifications

| Size     | Torque
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb-ft</td>
</tr>
<tr>
<td>1/2&quot;-12</td>
<td>85-115</td>
</tr>
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</tr>
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<td>3/4&quot;-10</td>
<td>310-400</td>
</tr>
<tr>
<td>7/8&quot;-9, -14</td>
<td>575-650</td>
</tr>
<tr>
<td>1&quot;-12, -14</td>
<td>850-1100</td>
</tr>
</tbody>
</table>

Axle Shaft in Rigid Axle Models

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

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 that installation of the inner bearing cone before you install the wheel hub oil seal into the wheel hub bore.

2. Apply coating of lubricant to all of the inner bearing cone rollers. Install the bearing cone into the wheel hub.

3. Position the new wheel hub oil seal so that the spring lip of the seal faces inwards.

4. Use a suitable seal driver to drive the seal into the same location as the original wheel hub oil seal. Refer to the following possible seal installation locations:
   - At the bottom of the hub bore.
   - Press-in against the guard washer. Install the guard washer in the spindle bore until it bottoms out. Prick punch the guard washer in three places for retention.
   - Flush with the end face of the hub.

---

![Figure 5.3](image_url)

**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.

- 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. Use a suitable puller and care not to damage the bushing bore.

3. Apply a thin coat of NLGI grade 1 or 2 grease to the seal lips and bushing bore.

4. Install a new oil seal in the bore using a suitable driver tool. Use dimension “Y” of oil seal taken during disassembly and match measurements during assembly. Figure 5.2.

**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.
Section 5
Assembly

Installing a Metal Face Seal in a PRC-184 Axle

**WARNING**

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. Carefully follow the manufacturer’s instructions.

1. Install a metal face seal in a PRC-184 axle by performing the following steps:
   
   A. Clean surfaces with an alcohol type solvent to assure the parts are clean and degreased.
   
   B. Install the seal with a suitable driver.
   
   C. Apply a thin coat of non-hardening sealant to the hub bore.
   
   D. Install the seal seat in the wheel hub bore.
   
   E. Press the seal seat into the wheel hub bore, until it contacts the bottom of the hub bore.
   
   F. Install a new clean rubber toric and metal seal ring in the seal seat. Ensure that the toric and all surfaces the toric contacts remain clean and dry. **Figure 5.4.**
   
   G. Apply a light coat of oil to the metal ring faces.

2. If a sleeve is used, carefully install a new oil seal wear sleeve on the spindle.

3. Lubricate the seals in the following areas shown in **Table D** only.

4. Apply a thin coat of lubricant to the oil seal journal surface of the spindle.

**Table D: Seal Lubrication Areas**

<table>
<thead>
<tr>
<th>Seal Type</th>
<th>Seal Area to Lubricate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>Oil seal lips</td>
</tr>
<tr>
<td>Unitized</td>
<td>Inside diameter</td>
</tr>
<tr>
<td>Metal Face</td>
<td>Face seal steel ring only – not rubber parts. Contact every other.</td>
</tr>
</tbody>
</table>
For All Axle Models Except PRC-184

A. Install the outer wheel bearing cone on the planetary ring gear hub.

B. Install the ring gear hub and bearing assembly on the spindle.

C. Install the wheel bearing adjusting nut on the spindle.

For PRC-184 Axle Models Only

NOTE: For PRC-184 models only, the planetary ring gear hub is only available for service with the ring gear hub support ring pressed into the subassembly.

A. Install the planetary ring gear on the ring gear hub.

Table E: Brake Rotor and Drum Mounting Capscrew Torque Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque</th>
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<tbody>
<tr>
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<td>1&quot;-12, -14</td>
<td>850-1100</td>
</tr>
</tbody>
</table>

Wheel Hub

WARNING

Take care when you use lifting devices. When you use a lifting device, 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.

Figure 5.5

For PRC-184 Axle Models Only

NOTE: For PRC-184 models only, the planetary ring gear hub is only available for service with the ring gear hub support ring pressed into the subassembly.

A. Install the planetary ring gear on the ring gear hub.

WARNING

Take care when you use Loctite® to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.

B. Apply two or three drops of thread locking agent to the internal threaded holes of the ring gear.

C. Install the ring gear lock plates and capscrews.

D. Tighten the capscrews to 20-30 lb-ft (27-41 N·m).
Section 5
Assembly

E. Install the outer wheel bearing cone or planetary ring gear hub.
F. Install the planetary ring gear and bearing assembly on the spindle.
G. Install the wheel bearing adjusting nut on the spindle.

4. Install the outer wheel bearing cone.

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

5. Apply approximately 400 lb-ft (542 N•m) to the spindle nut and rotate the hub in both directions several times and tap with a brass or leather mallet to seat the wheel bearing. Repeat procedure until the wheel bearings are completely seated.

6. Decrease the torque to the values listed in Table F. Install the half moon locks into the spindle end slots by tapping with an appropriate tool.

7. Assemble the axle shaft/sun gear/thrust washer assembly.

Table F: Wheel Bearing Adjustment

<table>
<thead>
<tr>
<th>Axle Type</th>
<th>Axle Models</th>
<th>Adjusting Nut Torque</th>
</tr>
</thead>
</table>
| Rigid Axles | 130-265 | Initial Seating:
|            | TA 268 | 400 (542) |
|            | 515 | 400 (542) |
| Steering Axles | PSC 204-205 | Final Adjustment:
|            | 353-454 | 100 (136) |
|            | 353-454 | 200 (271) |

Adjust the Wheel Bearing Preload for all Axles Except PRC 184

For wheel bearing adjustment procedures for axles equipped with wet disc brakes, refer to AxleTech Maintenance Manual 4L, Wet Disc Brakes. To order this publication, call AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.

NOTE: To adjust the wheel bearing preload, the bearings must be seated and the rollers in proper alignment.

1. Install the wheel bearing adjusting nut. Tighten the nut 400 lb-ft (542 N•m).

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

2. Rotate the hub in both directions. At the same time, tap the hub several times with a brass or plastic mallet.

3. Tighten the nut to 400 lb-ft (542 N•m) again.

4. Back off the nut approximately 1/4 turn to relieve the preload produced in Step 3.

5. Tighten to the appropriate spindle nut torque per spindle nut size in Table F.

Lock the Adjusting Nut

CAUTION
Do not loosen the adjusting nut when you install the adjusting nut lockplate. Loosening the adjusting nut from the setting can result in an incorrect bearing preload and damage to components.

Lock the adjusting nut lockplate by using one of the following appropriate methods:
For All Axle Models Utilizing Nut with Roll Pin Behind Ring Gear

1. Inspect the back face of the planetary ring gear for orientation of the blind hole for the nut locking pin with respect to a tooth of the internal spline. Figure 5.6.

2. If necessary, advance the wheel bearing adjusting nut to align the locking pin with the spindle spline. Advancing the nut will allow the locking pin to engage the ring gear hole. Do not loosen the adjusting nut to align the pin.

3. Slide the planetary ring gear on the spindle until the planetary ring gear “bottoms” on the adjusting nut. The nut lock pin must engage the ring gear hole.

For PRC-184 Axle Models Only

1. If necessary, advance the wheel bearing adjusting nut to align the slots in the nut with the slots in the spindle end. Do not loosen the adjusting nut to align the slots. Figure 5.7.

2. Install the two formed nut locks with the flat ends engaging the slots in both spindles and the adjusting nut.
For All Other Axle Models

1. Use one of the following procedures to install the adjusting nut lockplate. Figure 5.7.
   A. Place the flat side of the lockplate against a flat surface of the nut.
   B. Place the lockplate notch over a corner of the adjusting nut.

2. 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 to align the holes.

**WARNING**

*Take care when you use Loctite® to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.*

3. Install new lockplate capscrews with pre-applied locking agent on the threads. If you use the original capscrews, apply 2-3 drops of Loctite 277 or equivalent to the internal threads of the ring gear hub.

4. Tighten the capscrews to 60-75 lb-ft (81-102 N•m).

**Sun Gear**

1. Apply grease to the inner face of the sun gear thrust washer (the side with the 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. Figure 5.8.

   ![Figure 5.8](image)

3. Install the snap ring into the axle shaft groove.

4. Install the planetary ring gear onto the ring gear hub.

**Thrust Button**

**WARNING**

*Take care when you use silicone gasket materials to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.*

1. Apply a 1/8 inch bead of gasket compound to the thrust button thrust face and bore in the planetary spider. Press a new thrust button into the bore. Make certain the thrust button is seated completely.

2. Flip the spider assembly over such that the wheel hub mounting face is facing down.

3. Mix a small quantity of 2 part epoxy resin per epoxy manufacturer’s recommendation in a small cup.
4. Pour resin in the thrust button bore, filling the bore flush with the cast surface. Let the epoxy harden for one hour minimum. Figure 5.9.

5. Flip the spider assembly over such that the wheel hub mounting face is facing up.

**WARNING**

Take care when you use silicone gasket materials to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.

6. Apply a 1/8 inch bead of silicone (RTV) gasket sealer to the planetary spider wheel hub mounting face. Apply as shown. Figure 5.10.

7. Insert a lifting bolt through the upper spider to the wheel hub hole. Attach a lifting strap to the lifting bolt. Attach the strap to the appropriate hoist or crane. Figure 5.11.

8. Use a hoist or crane to insert the spider assembly into the wheel hub. Align the matchmarkings. Press the spider assembly firmly against the wheel hub.

9. Insert the capscrews and washers. Tighten to table values. Table G.

10. Refill the wheel end with proper lubricant to fill level hole.

### Table G. Capscrews Torque Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb-ft</td>
<td>N·m</td>
</tr>
<tr>
<td>1/2&quot;-13</td>
<td>85-115</td>
<td>115-156</td>
</tr>
<tr>
<td>9/16&quot;-12</td>
<td>130-165</td>
<td>176-224</td>
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<tr>
<td>3/4&quot;-10</td>
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<td>420-542</td>
</tr>
<tr>
<td>7/8&quot;-14</td>
<td>575-750</td>
<td>780-1017</td>
</tr>
</tbody>
</table>
Planetary Spider Assembly

6. Drill a 0.313-inch (7.95 mm) diameter hole in the planet pins 0.13-0.25-inch (3.3-6.35 mm) deep. Avoid damaging the internal threads in the spider when you drill the holes.

**WARNING**
*Take care when you use Loctite® to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.*

7. Install the setscrews with a pre-applied locking agent. If you use old setscrews, apply 2-3 drops of threaded locking agent to the internal threads in the spider.

8. Tighten the setscrews 25-35 lb-ft (34-47 N•m). Apply a light coat of clear sealant (shellac) to the outside surface of the spider around the pin shaft end to seal for oil leakage.

9. Coat the nylon planet pin surface with axle lubricant.

10. Coat the planet gear bore with axle lubricant.

- If you reuse the planet gears: Inspect the gears for wear or damage. Replace worn or damaged gears.

11. Install the planet gears on the planet pinion shafts.

12. Install the thrust washer and snap ring on each planet pinion.

---

**Planetary Spider Assembly**

**WARNING**
*Take care when you use silicone gasket materials to avoid serious personal injury. Follow the manufacturer’s instructions to prevent irritation to the eyes and skin.*

- If you reuse the planet gears: Inspect the gears for wear or damage. Replace worn or damaged gears.

---

**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 “Applying Silicone Gasket Material” in Section 4.
Install and Adjust the Brakes

Install and adjust the brakes by using one of the following appropriate methods:

Axles With HDB Series Dry Disc Brakes

1. Install the dry disc brake calipers.
   - **For rigid axles**: Install the calipers to the adapter plates.
   - **For steering axles**: Install the calipers to the steering knuckle.

2. Install the caliper mounting capscrews and washers.

3. Tighten the capscrews to the correct torque specified in Table J.

4. Using a lifting device, 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 previously marked at disassembly. Figure 5.13.

5. Correctly align the spider mounting holes with the wheel hub holes or studs. Push the spider assembly against the hub.

6. Install the nuts and washers or capscrews and washers.
   - **To install studs with integral hex and washers on PRC-184 axle models**: Use a 1.63-inch (41.4 mm) internal depth, extra deep socket.

7. Tighten the wheel studs, capscrews or nuts to the correct torque specified in Table H.

---

**Table H: Planetary Spider Mounting Capscrew and Stud Torque Specifications**

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb-ft</td>
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<tr>
<td>1/2*-12</td>
<td>85-115</td>
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<tr>
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<td>3/4*-10</td>
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<tr>
<td>7/8*-9, -14</td>
<td>575-650</td>
</tr>
<tr>
<td>1*-12, -14</td>
<td>850-1100</td>
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</tbody>
</table>

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**Table J: Caliper Mounting Capscrew Torque Specifications**

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<thead>
<tr>
<th>Size</th>
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</thead>
<tbody>
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<td></td>
<td>lb-ft</td>
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<tr>
<td>1/2*-12</td>
<td>85-115</td>
</tr>
<tr>
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<td>130-165</td>
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<td>7/8*-9, -14</td>
<td>575-650</td>
</tr>
<tr>
<td>1*-12, -14</td>
<td>850-1100</td>
</tr>
</tbody>
</table>

**Axles with Wet Disc Brakes**
Install the wheel hub, brake driver, hub oil seal, wheel bearings and spindle. Refer to Maintenance Manual 4L, *Wet Disc Brakes*.

**Axles with P Series Drum Brakes**
Adjust the brakes. Refer to Maintenance Manual 4, *Cam Brakes*.

**Axles with DLH, H FSH and DSH Series Drum Brakes**

**Tire and Rim**
1. Install the tires and rims. Secure them with nuts and washers.
2. Tighten the wheel nuts according to the vehicle manufacturer’s specifications.

**Fill 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 spider. 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. Fill each wheel end and the axle housing bowl to the bottom of the fill/level plug hole with the specified oil. Do not fill oil through the bowl only.

5. Wait for the oil to evenly flow through the axle.
6. Check the oil level. Add oil per Lubrication Specification in Section 6, if necessary.
7. Replace and securely tighten all plugs.

**Measure and Adjust Toe Setting**
Toe is the difference in distance between the front of the front tires and the rear of the front tires. *Figure 5.14.*

![Figure 5.14](image)

**Toe Specification**
The toe specification for AxleTech off-highway steering axles is 1/16-inch (1.6 mm) toe-in (± 1/16-inch) (± 1.6 mm). This specification is based on a 24-inch (610 mm) radius (theoretical tire with a 48-inch (12.9 mm) outside diameter).
Lubrication Schedule

<table>
<thead>
<tr>
<th>Operation</th>
<th>Off-Highway*</th>
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<tr>
<td>Initial Oil Change</td>
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<tr>
<td>Check Oil Level</td>
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<tr>
<td>Petroleum Oil Change</td>
<td>1,500 operating hours or twice a year (whichever comes first)*</td>
</tr>
<tr>
<td>Synthetic Oil or Semi-Synthetic Oil Change</td>
<td>3,000 operating hours or once a year (whichever comes first)</td>
</tr>
</tbody>
</table>

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

Lubrication Specifications

<table>
<thead>
<tr>
<th>AxleTech Specifications</th>
<th>Military Specification Approval</th>
<th>Oil Description</th>
<th>Outside Temperature</th>
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<tbody>
<tr>
<td>O-76A, Gear Oil</td>
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<td>GL-5, SAE 85W/140</td>
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<td>O-76M, Gear Oil</td>
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<td>O-76N, Gear Oil</td>
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<td>GL-5, SAE 75W/140</td>
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### Planetary Axle Wheel End Torque Specifications

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<tr>
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<td></td>
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<td>lb-ft</td>
<td>N·m</td>
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<td>115-156</td>
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<tr>
<td></td>
<td></td>
<td>9/16&quot;-12</td>
<td>130-165</td>
<td>176-224</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3/4&quot;-10</td>
<td>310-400</td>
<td>420-542</td>
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<td>Lockplate Capscrew</td>
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<td>81-102</td>
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<td>Wheel Bearing Adjusting Nut</td>
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<td>4</td>
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<td>Brake Rotor Mounting Capscrew</td>
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<td>420-542</td>
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<td>176-224</td>
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<td></td>
<td>5/8-11</td>
<td>150-190</td>
<td>204-258</td>
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<td></td>
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<td>310-400</td>
<td>420-542</td>
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<td>7</td>
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Planetary Pin/Spider Press Dimensions Specifications

### Planetary Steer Axles

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<th>Model</th>
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<th>Planetary Pin P/N</th>
<th>Press Dimen. in.</th>
<th>Press Dimension (mm)</th>
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<td>G-222</td>
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<td>45.1/45</td>
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<td>Y-77</td>
<td>D-30</td>
<td>1.775/1.770</td>
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<td>454</td>
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### Planetary Rigid Axles

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<th>Press Dimension (mm)</th>
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</table>

The above chart covers the multitude of pin/spider “press dimensions” throughout the models in this manual. Should components being serviced be missing part numbers indicated, please contact AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.