Planetary Axle Wheel Ends Coverless
Planetary Spider Design
Extrémités - Ponts a Réduction Planétaire
Porte Satellites Sans-Couvercle

Maintenance Manual MM9G
Manuel de maintenance MM9G

Issued 05-06
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Before You Begin

This manual provides maintenance and service procedures for AxleTech coverless planetary spider design wheel end assemblies. Before you begin procedures:

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

2. Read and observe all Caution and Warning safety alerts that precede instructions or procedures you will perform. These alerts help to avoid damage to components, serious personal injury, or both.

3. Follow your company’s maintenance and service, installation, and diagnostics guidelines.

4. Use special tools when required to help avoid serious personal injury and damage to components.

Safety Alerts, Torque Symbol and Notes

| WARNING | A Warning alerts you to an instruction or procedure that you must follow exactly to avoid serious personal injury and damage to components. |
| CAUTION | A Caution alerts you to an instruction or procedure that you must follow exactly to avoid damage to components and possible serious personal injury can also occur. |
| 🔄 | The torque symbol alerts you to tighten fasteners to a specified torque value. |
| NOTE: | A Note provides information or suggestions that help you correctly service a component. |

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 (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.

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 866-847-3987.
# AxleTech International

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(PRC 1756 W3H shown as example)  
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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. 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, on the extent to which adherence to these maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling asbestos dust. OSHA realizes 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**

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, on the extent to which 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 when cleaning brake parts or assemblies. NEVER use compressed air or dry sweeping to clean work areas. When you empty dust or debris from the brake drum or rotor, handle the used rags with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

**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. 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, on the extent to which adherence to these maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling asbestos dust. OSHA realizes 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 when cleaning brake parts or assemblies. NEVER use compressed air or dry sweeping to clean work areas. When you empty dust or debris from the brake drum or rotor, handle the used rags with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

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 grading 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, 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 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 Axletech.

**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 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, on the extent to which adherence to these maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling non-asbestos dust. OSHA realizes that the following sign be posted at the entrance to areas where exposures exceed either of the maximum allowable levels:

**DANGER: NON-ASBESTOS FIBERS WARNING**

**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 outside of the United States should consult the regulations that apply to them for further guidance.
### Coverless Planetary Wheel-End

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Planetary Spider to Hub Capscrew</td>
<td>13/13A</td>
<td>Wheel Bearing Adjusting Nut</td>
</tr>
<tr>
<td>2</td>
<td>Planetary Spider to Hub Washer</td>
<td>13B</td>
<td>Wheel Bearing Adjusting Nut</td>
</tr>
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<td>3</td>
<td>Shaft Planet Pinion Setscrew</td>
<td>14</td>
<td>Planetary Ring Gear</td>
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<td>4</td>
<td>Ring Gear Thrust Button</td>
<td>15</td>
<td>Planetary Ring Gear Hub</td>
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<td>Planet Pinion Shaft</td>
<td>16A</td>
<td>Hub Nut Lock</td>
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<td>6</td>
<td>Planet Pinion Outer Thrust Washer</td>
<td>17A</td>
<td>Capscrew</td>
</tr>
<tr>
<td>7</td>
<td>Planetary Drive Pinion</td>
<td>17B</td>
<td>Capscrew</td>
</tr>
<tr>
<td>8</td>
<td>Planet Pinion Inner Thrust Washer</td>
<td>18</td>
<td>Axle Shaft Thrust Button</td>
</tr>
<tr>
<td>9</td>
<td>Planetary Sun Gear</td>
<td>19</td>
<td>Oil Drain Plug</td>
</tr>
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<td>Sun Gear Thrust Washer</td>
<td>20</td>
<td>Needle Roller Bearing</td>
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<td>10A</td>
<td>Sun Gear Thrust Washer</td>
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<td>Needle Roller Bearing Spacer</td>
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<td>Wheel Bearing Adjusting Jam Nut</td>
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<td>Spider</td>
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<td>12</td>
<td>Wheel Bearing Adjusting Washer</td>
<td>23</td>
<td>O-Ring</td>
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## Section 1
Exploded View

**Wheel End with Outer Bearing on Spindle Journal**
(PRCE 1756 W3H shown as example)

<table>
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<tr>
<th>ITEM</th>
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<th>ITEM</th>
<th>DESCRIPTION</th>
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<td>Bearing Cone</td>
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<td>O-Ring</td>
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<td>Screw</td>
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<td>Pinion Thrust Washer</td>
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<td>3</td>
<td>O-Ring</td>
<td>17</td>
<td>Stud (Hub)</td>
<td>31</td>
<td>O-Ring Seal</td>
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<td>4</td>
<td>Spindle</td>
<td>18</td>
<td>Wheel Hub</td>
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<td>Planetary Gear Spider</td>
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<td>O-Ring</td>
<td>19</td>
<td>Bearing Cup</td>
<td>33</td>
<td>Expansion Plug</td>
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<td>Bearing Cone</td>
<td>34</td>
<td>Sun Gear Washer</td>
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<td>7</td>
<td>Hexagon Socket Head Cap Screw</td>
<td>21</td>
<td>Planetary Ring Gear Hub</td>
<td>35</td>
<td>Sun Gear</td>
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<td>Oil Seal Sleeve</td>
<td>22</td>
<td>Sleeve</td>
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<td>Face Seal</td>
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<td>Wheel Bearing Nut</td>
<td>37</td>
<td>Thrust Washer</td>
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<td>Hexagon Socket Head Cap Screw</td>
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<td>Planeary Ring Gear</td>
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<td>Brake Driver</td>
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<td>Snap Ring</td>
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<td>O-Ring</td>
<td>28</td>
<td>Planetary Gear</td>
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</tbody>
</table>

See MM-9G for further information on PRC 1756 W3H wheel-end.
## Drum Brake and Disc Brake Assemblies

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Outer Wheel Bearing Cone</td>
<td>14</td>
<td>Oil Drain Plug</td>
</tr>
<tr>
<td>2</td>
<td>Outer Wheel Bearing Cup</td>
<td>15</td>
<td>Axle Shaft Snap Ring</td>
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<tr>
<td>3</td>
<td>Wheel Stud Nut</td>
<td>16</td>
<td>Brake Disc</td>
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<td>4</td>
<td>Wheel Hub</td>
<td>17</td>
<td>Disc Mounting Nut (If Applicable)</td>
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<td>Wheel Stud</td>
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<td>Disc Mounting Washer</td>
</tr>
<tr>
<td>6</td>
<td>Inner Wheel Bearing Cup</td>
<td>19</td>
<td>Disc Mounting Cap screw</td>
</tr>
<tr>
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<td>Inner Wheel Bearing Cone</td>
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<td>Spindle</td>
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<td>Spacer</td>
<td>21</td>
<td>Caliper Mounting Adapter</td>
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<td>Hub Inner Bearing Oil Seal</td>
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<td>Spindle to Housing Nut (If Applicable)</td>
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<td>Oil Slinger</td>
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<td>Spindle to Housing Washer</td>
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<td>Drum Mounting Capscrew</td>
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Description

AxleTech coverless 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.

AxleTech 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.

Axle Models Covered in This Manual

<table>
<thead>
<tr>
<th>Rigid Axles</th>
<th>Steering Axles</th>
<th>Tandem Axles</th>
<th>Tridem Axles</th>
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</table>

Identification

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

Figure 2.1 Axle Identification Tag Location

Model No. PRC-1756-W2H-200
Customer No. ...............  
Serial No. ........... Plant .......  
Ratio ............. Date .......  

Axle Identification Tag Location
### Single Planetary Axles

**Steering Example**

\[ \text{P} \quad \text{S} \quad \text{C} \quad 1 \quad 6 \quad 1 \quad 7 \quad \text{P} \quad 1 \quad 0 \quad 0 \]

**Rigid Example**

\[ \text{P} \quad \text{R} \quad \text{C} \quad 1 \quad 7 \quad 3 \quad 5 \quad \text{W} \quad 4 \quad \text{H} \quad 2 \quad 0 \quad 0 \]

- **First Two Digits Wheel End Designation (Basic Model Number)**
- **Housing Type Designation**
  - **C** = Integral Cast
- **Last Digit – Carrier Designation for Base Model Number**
- **Exact Specification**

#### Brake Type:

- **DLH** — 17 in. (432 mm) Hydraulic Drum – (Dual Leading Hydraulic)
- **H** — Hydraulic Drum
- **HDB** — Hydraulic Dry Disc
- **M** — Mechanical Drum
- **N** — None
- **NR** — With Rotor Less Calipers
- **P** — “P” Series Cam
- **RDA** — Wedge (Dual Air Chamber)
- **RDH** — Wedge (Dual Hydraulic Cylinders)
- **RSA** — Wedge Single Air Chamber
- **RSH** — Wedge (Single Hydraulic Cylinders)
- **W2H** — Dura-Disc® 9” (224) Wet Disc
- **W3H** — Dura-Disc® 13” (330) Wet Disc or 14.2” (360) Wet Disc
- **W4H** — Dura-Disc® 17 in. (432 mm) Wet Disc
- **W4M** — Dura-Disc® 17 in. (432 mm) Wet Disc
  - Spring Applied Hydraulic Release

### Tandem and Tridem Axles

**S = Tandem**  
**E = Tridem**

**P = Planetary**  
**N = No Planetary Gears**

**R = Rigid**  
**S = Steering**

**Housing Type Designation**
- **C** = Integral Cast

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

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

**Exact Specification**
Remove and Disassemble the Planetary Wheel Ends

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

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. Support the vehicle with safety stands. Refer to the vehicle manufacturer’s maintenance manual for instructions on raising the vehicle.

Remove the Tires and Rims

Planetary axles can come equipped with dual demountable hubs or flange style hubs. **Figure 3.1.** You can service the planetary gearing on flange style hubs without removing the tire from the wheel end.

1. **For axles with dual demountable hubs:** Refer to the vehicle manufacturer’s removal instructions.

2. If the axle is equipped with an oil drain plug in the planetary spider, rotate the hub until the plug is at the bottom.

3. Remove the drain plug.

4. Drain and discard the lubricant.
Remove the Planetary Spider Assembly

1. Match mark the spider and wheel hub for correct alignment when you reassemble the unit. **Figure 3.2.**

2. Insert a pry bar into the assembly notches and separate the planetary spider assembly from the wheel hub assembly. **Figure 3.3.** Do not remove the spider assembly at this time.

   - For axles without assembly notches: Hit 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.

4. Use a lifting device to remove the planetary spider assembly from the wheel hub assembly. **Figure 3.4.**

**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.

**CAUTION**
Take care not to damage the O-Ring at the joint between the spider and hub. (PRC 1756 W3H only)
Disassemble the Planetary Spider Assembly

**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.

**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.

1. Remove the setscrew from each pinion shaft.
2. In designs with snap ring, remove snap ring. Figure 3.5.
3. 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.
4. Support the spider assembly as required.
5. 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.

6. Press each pinion shaft out of the spider and planetary gear. **Figure 3.6 and Figure 3.7.**

7. Remove the planetary gears and thrust washers from the planetary spider.

8. For planetary pinion shafts with needle roller bearings: Remove the needle roller bearings and spacer from the bore of the planetary gear.

**Remove the Ring Gear and Axle Shaft**

1. Remove the floating ring gear. If necessary, use a lifting device to remove the ring gear. **Figure 3.8.**
2. Remove the snap ring from the end of the axle shaft.
3. Remove the sun gear. **Figure 3.8.**

4. Remove the sun gear thrust washer assembly. **Figure 3.9.**

5. Remove the axle shaft.

- To remove the axle shaft from a steering axle: Remove the wheel hub and spindle before you remove the axle shaft.

**Prepare to Remove the Wheel Hub**

**Axles With Dry Disc Brakes**


**Axles With Wet Disc Brakes**

Refer to Maintenance Manual 4L, Wet Disc Brakes, for instructions on removing and servicing the wheel hub, brake driver, hub oil seal, wheel bearings and spindle.

**Axles With Hydraulic or Mechanical Brakes**


**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.

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 Adjuster for the correct adjustment procedure. To order call AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.

**Prepare to Remove the Ring Gear Hub and Wheel Hub**

**Wheel Bearings With Single Adjusting Nut and Lockplates**

1. 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

2. Remove the wheel bearing adjusting nut lock and wheel bearing nut.
Wheel Bearings With Scalloped Flange Adjusting Nut

**NOTE:** To aid in capscrew removal, it may be necessary to use a torch to apply heat to the capscrew to loosen it. Follow the torch manufacturer’s instructions.

1. Remove the locking capscrew located in the scallop of the nut. Check the capscrew for wear. Replace a worn or damaged capscrew.
2. Remove the wheel bearing nut.

Wheel Bearings With Double Adjusting Nuts

Remove the wheel bearing jam nut, washer and wheel bearing adjusting nut.

Remove the Ring Gear Hub and Wheel Hub

⚠️ CAUTION

Support the wheel hub, as shown in Figure 3.10, 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.

1. 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 3.10.

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

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

**NOTE:** Some ring gear hub assemblies include a hub and ring sleeve insert. You can not service these components separately.

3. Use a chain fall or similar device to lift the hub and drum (or brake driver, if wet brake axle) slightly to relieve the hub weight and drum-to-brake shoe drag. Figure 3.11 and Figure 3.12.

4. Remove the assembly from the hub spindle.
Remove the Hub Oil Seal and Bearings

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

2. 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 5.
   - If you must remove the rotor from the wheel hub to remove the hub oil seal, bearing cone and bearing cups: Proceed to Step 4.

3. PRC 1756 W3H axle model design is with 360 mm WDB. The brake driver does not provide enough clearance to remove the hub oil seal, bearing cone and be cup without removing the brake driver. Remove the brake driver from the wheel hub to remove the hub oil seal, bearing cone and bearing cups. Proceed to Step 4. (Make sure you mark the two pieces for alignment.

4. Remove the rotor (or brake driver, if wet brake axle) mounting capscrews and washers. Remove the rotor.

   CAUTION

Carefully remove the face seal belt from brake driver and take care not to damage O-ring between driver and hub.

5. Remove the hub oil seal with a suitable puller. Do not scratch the hub seal bore surface.

6. Remove the inner bearing cone.

7. Remove the bearing cups with a suitable puller.

Remove 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.

Remove the Brake Shoes

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

- For P series 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 SCL 35, 46 or 53 series dry disc brakes: Refer to Maintenance Manual 4Y, SCL 35, 46, 53 Dry Disc Brake Calipers.

To order call AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987. For PRC 1756 W3H brake disassembly, refer to MM-20195.

Remove 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. To aid spindle removal, install two 4-6-inch (10.16-15.24 cm) long studs with 0.875-14 UNF threads on the end that engage the steering knuckle.

13. Support the spindle and brake spider assembly.

14. Remove the remaining capscrews and washers.

15. Remove the brake spider and brake shoe assembly.

⚠️ CAUTION

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

16. Carefully remove the spindle from the steering knuckle by sliding the spindle over the outer end of the axle shaft and universal joint.

17. Remove the axle shaft and universal joint assembly.

---

Steering Axles With RSH Drum Brakes

1. Remove the hydraulic lines from the hydraulic chamber. Tag the lines to aid reassembly.

2. Match mark the hydraulic housing tube and the brake spider plunger housing to aid reassembly.

3. Remove the set screw that retains the fluid within the spider plunger housing.

4. 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.

5. Remove the hydraulic chamber assembly from the plunger housing. If necessary, use a strap wrench to remove the hydraulic chamber assembly.

6. Remove the brake shoe return springs.

7. Rotate the brake shoes to allow access to the spindle/brake spider mounting screws.

8. Match mark the brake spider and steering knuckle to aid reassembly.

9. 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.

10. To aid spindle removal, install two 4-6-inch (10.16-15.24 cm) long studs with 0.875-14 UNF threads on the end that engage the steering knuckle.

11. Support the spindle and brake spider assembly.

12. Remove the remaining capscrews and washers.

13. Remove the brake spider and brake shoe assembly.

⚠️ CAUTION

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

14. Carefully remove the spindle from the steering knuckle by sliding the spindle over the outer end of the axle shaft and universal joint.

15. 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.

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

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

Rigid Axles With P Series Cam Brakes

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.

**CAUTION**
Take care not to damage O-rings between brake piston housing and spindle and between spindle and axle housing.

PRC 1756 W3H

The PRC 1756 W3H features a WDB design. The brake piston housing and the spindle are fastened to the axle housing with the same capscrews.

1. Use straps and a lifting device to support the brake piston housing.
2. Remove the mounting capscrews and mounting O-rings under the capscrew head.
3. Remove the brake piston housing.

**CAUTION**
Take care not to damage O-rings between brake piston housing and spindle and between spindle and axle housing.

4. Use straps and a lifting device to support the spindle.
5. Remove two assembly hex socket screws.
6. Remove spindle from axle housing.

**CAUTION**
Take care not to damage O-rings between brake piston housing and spindle and between spindle and axle housing.
Clean 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.

Clean 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.

Clean 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.

Dry 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.

Prevent 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.

Inspect 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.
Inspect 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.

- 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.
Inspect 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 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 Capscrews Fastened With Liquid Adhesive

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

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

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.

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

Axletech recommends the following liquid gasket materials:

- ThreeBond 1216
- Loctite® 5699

**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.

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.

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

**Figure 4.7**

0.125" (3.18 MM) DIAMETER SILICONE GASKET MATERIAL BEAD
Install the Spindle

Install 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 (10.14 cm) 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 (3.18 mm) 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.

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.

6. Replace the brake camshaft bushings and grease seals in the spindle boss and camshaft brackets. Refer to Maintenance Manual 4, Cam Brakes. To order call AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.

7. Install the cam head thrust washer onto the camshaft. Apply STC 05-201 or -202 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.

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Table A: Spindle Mounting Capscrew Torque Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<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>
7. Prepare the mounting capscrews. Ensure every capscrew has its own new O-rings at capscrew head completely inside the radius pocket.

8. Tighten the capscrews according to the torque specifications shown in Table B.

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque (lb-ft)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;-12</td>
<td>85-115</td>
<td>115-156</td>
</tr>
<tr>
<td>9/16&quot;-18</td>
<td>130-165</td>
<td>176-224</td>
</tr>
<tr>
<td>5/8&quot;-11, -18</td>
<td>210-230</td>
<td>284-311</td>
</tr>
<tr>
<td>3/4&quot;-10</td>
<td>310-400</td>
<td>420-542</td>
</tr>
<tr>
<td>7/8&quot;-9, -14</td>
<td>575-650</td>
<td>779-880</td>
</tr>
<tr>
<td>1&quot;-12, -14</td>
<td>850-1100</td>
<td>1152-1491</td>
</tr>
<tr>
<td>M24-3</td>
<td>850-1100</td>
<td>1152-1491</td>
</tr>
</tbody>
</table>
Install the Spindle on Rigid Axles With Dry Disc Brakes

1. For axle models that use capscrews to mount the spindle: Install two 4-inch (10.14 cm) long temporary studs into the axle housing flange at the 1-and 11-o’clock positions. Figure 5.1.

2. For axle models that use a “bow-tie” caliper configuration: Use one bolt to guide the spindle onto the axle.

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

4. Align the spindle with the axle housing match marks to correctly position the brake caliper mounting bosses. Install the spindle on the axle housing.

5. 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. Figure 5.5

Table B: Spindle Mounting Capscrew and Locknut Torque Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque (lb-ft)</th>
<th>N·m</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;-12</td>
<td>85-115</td>
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<td>1&quot;-12, -14</td>
<td>850-1100</td>
<td>1152-1491</td>
</tr>
</tbody>
</table>

Install the Spindle on Steering Axles With P Series Cam Brakes

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

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

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

3. Carefully install the axle shaft assembly through the steering knuckle and axle housing until the shaft engages the differential assembly side gear. Figure 5.5.

4. 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.

5. 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.

6. Carefully install the spindle on the steering knuckle by carefully sliding it over the outer end of the axle shaft assembly.

7. Install the spindle mounting washers and nuts. Hand tighten the nuts.

8. Tighten the 3/4-inch-19 nuts or capscrews to 310-400 lb-ft (420-542 N•m).

9. If you removed the brake shoes or camshaft: Install the brake shoes or camshaft. Refer to Maintenance Manual 4P, Cam Brakes. To order call AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.

Install the Spindle on Steering Axles With RSA 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

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

3. Carefully 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 spindle is worn or damaged: Remove the oil seal and bushing and install a new bushing.

5. 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.

6. 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.

7. 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 4P, Off-Highway Heavy-Duty Brakes.

8. 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.

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

Table C: Spindle Mounting Capscrew and Locknut Torque Specifications

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


11. Install the brake shoe return spring.

12. Connect the air lines to the correct ports in the air chamber assembly. Release the spring chamber after you adjust the wheel hub.
Install the Axle Shaft in Rigid Axle Models

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.

Assemble the Ring Gear Hub Assembly

NOTE: Install the ring gear immediately before you assemble the planetary spider.

1. Install the outer wheel bearing cone on the ring gear hub journal squarely against the hub shoulder.
2. Apply the same lubricant used in the wheel end to the rollers.
3. 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.

Assemble 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

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.
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 D.

Assemble the Hub, Bearings, Oil Seal and Brake Driver (PRC 1756 W3H)

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

NOTE: This model requires installation of the inner bearing cone into the hub and the wheel hub oil seal into the bore of the brake driver.
2. Apply lubricant to the inner bearing cone rollers. Install the bearing cone into the wheel hub. **Figure 5.6.**

3. Install the hub seal into the brake driver, so that it bottoms out inside the bore.

**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.*

4. Install O-ring in hub at brake driver joint.

5. Align marks between brake driver and hub and install and tighten capscrews and washers to the torque specifications shown in **Table D.**

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

6. Carefully install a new oil seal wear sleeve on the spindle. (If necessary)

7. Lubricate the seals in the following areas only.
   - **Conventional seals:** Lubricate the oil seal lips.
   - **Face seals:** Lubricate the contact surfaces of the metal rings. Do not apply lubricant to any other part of the face seal.

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

---

**Section 5**  
**Assembly**

---

**Install 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 5.7 and Figure 5.8.** For PRC 1756 W3H, refer to Maintenance Manual Mm-20195 for care of brake seal and wet disc brake prior to mounting the hub.

   • **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 5.7**

**Figure 5.8**
2. Install the ring gear hub assembly, which includes the outer bearing cone, on the spindle.

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.

### Adjust the Wheel Bearing Preload

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

### Single Nut Design with Lockplates

1. Tighten the wheel bearing adjusting nut to the initial seating torque listed in Table E, while rotating the wheel hub. [Figure 5.9](#)

2. Continue to rotate the hub a minimum of one full revolution in both directions.

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. [Figure 5.9](#)

4. Repeat Steps 1 and 2 until the adjusting nut will not advance with the application of the initial seating nut torque. [Figure 5.9](#)

5. Loosen the adjusting nut 1/8 – 1/4 turn

6. Tighten the adjusting nut to the final adjustment nut torque listed in Table E while rotating the wheel hub. [Figure 5.9](#)

8. 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.

---

### Table E: Single Wheel Bearing Adjustment

<table>
<thead>
<tr>
<th>Rigid Axle Models</th>
<th>Steering Axle Models</th>
<th>Adjusting Nut Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Initial Seating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lb-ft</td>
</tr>
<tr>
<td>PRC594-PRC727</td>
<td>PSC594-PSC825</td>
<td>400</td>
</tr>
<tr>
<td>PRC1756</td>
<td>PSC826-PSC1617</td>
<td>400</td>
</tr>
<tr>
<td>PRLC824-PRLC1794</td>
<td>PSC1794</td>
<td>500</td>
</tr>
</tbody>
</table>
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.

9. 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).

Scalloped Flange Single Nut Design

1. Tighten the wheel bearing adjusting nut to the initial seating torque listed in Table E, while rotating the wheel hub.  
2. Continue to rotate the hub a minimum of one full revolution in both directions.
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.
4. Repeat Steps 1 and 2 until the adjusting nut will not advance with the application of the initial seating nut torque.
5. Loosen the adjusting nut 1/8 – 1/4 turn
6. Tighten the adjusting nut to the final adjustment nut torque listed in Table E while rotating the wheel hub.

CAUTION
Do not loosen the adjusting nut when you install the capscrew. Loosening the adjusting nut from the setting in Step 6 can result in an incorrect bearing preload and damage to components.

7. If necessary, tighten the adjusting nut to align a scallop with a threaded hole in the ring gear hub. Do not loosen the adjusting nut.

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.

8. Install the capscrew. Apply 2 or 3 drops of Loctite 242 or equivalent to the internal threads of the ring gear hub. Tighten the capscrew 20-30 lb-ft (27-40 N•m). Figure 5.10.

Figure 5.10

CAPSCREW
SUN GEAR
WHEEL BEARING
ADJUSTING NUT

Double Nut Design

1. Install the wheel bearing adjusting nut so that the nut lock faces OUTWARD. Installing the wheel bearing adjusting nut will seat the bearings and related components.
2. Tighten the nut to 400 lb-ft (542 N•m) while you rotate the hub in both directions.
3. Tap the hub several times with a brass or plastic hammer.
4. Tighten the nut to 400 lb-ft (542 N•m).
5. Loosen the adjusting nut to 0 lb-ft (0 N•m) to relieve the preload on the bearings.
6. Tighten the adjusting nut to 25 lb-ft (34 N•m).
7. Install the nut lock ring washer. Ensure that the washer tang fits into the slot on the spindle and that the adjusting nut engages a washer hole.
8. Install the jam nut. Tighten the jam nut to 600-800 lb-ft (813-1085 N•m).
Install 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. **Figure 5.9.**

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

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

Assemble the Planetary Spider

Meritor coverless spider planetary wheel ends come equipped with two different planetary designs.

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

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

Planetary Pinion Shaft With Needle Roller Bearings

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

1. Separate the inner thrust washers from the outer thrust washers.

   - **To differentiate between the thrust washers:** Compare the washers’ inner diameters. Outer thrust washers feature a larger inner diameter than inner thrust washers.

2. Apply approved STC 05-201 or -202, NLGI grade 1 or 2 grease to the side of the inner thrust washer opposite the tang.

3. Place the greased side of the inner thrust washer toward the planetary gear. The thrust washer tangs fit into the spider grooves.

4. Place the inner thrust washer on the end of the new planetary gear.

5. Apply approved STC 05-201 or -202, NLGI grade 1 or 2 grease to the planetary gear bore.

6. Install the needle roller bearings. Install new needle roller bearings if you replace the pinion shafts.

   - **To install the needle roller bearings:** Install a row of needle roller bearings around the pinion bore and against the inner thrust washer. Install as many needle roller bearings as will fit. The number of needle roller bearings installed in the pinion bore differs among axle models.

7. 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.

8. Apply approved STC 05-201 or -202, NLGI grade 1 or 2 grease to the side of the outer thrust washer opposite the tang.

9. Place the outer thrust washer on the end of the planetary gear. The tang must align with the tang of the opposite washer.

10. 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. Ensure that the following conditions exist before you proceed to Step 11:

    - The outer thrust washer (large bore) must be on top of the gear assembly.
    - The washer tangs must fit in the planetary spider grooves.
    - The needle roller bearings must be in place.

11. 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 5.11.**
5. Install the inner thrust washer (small bore). Place the washer tab into the spider indent and align the washer bore with the spider bore.

6. Apply a thin coat of the same gear lubricant used in the wheel end to the planetary gear bore.

7. 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.

8. Apply a thin coat of gear lube to the nylon coating on the pinion shaft.

9. Install the planetary pinion shaft in the spider and through the planetary gear and thrust washer. Figure 5.12.

10. Repeat Steps 1-9 to install the second and third sets of planetary pinion shafts, gears and washers.

11. Install the set screw into the spider to secure the pinion shaft. For PRC 1756 W3H, install the snap rings at the end of the pinion shaft.


12. Repeat Steps 1-11 to install the second and third sets of pinion shafts, gears, needle roller bearings and thrust washers.

13. 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.

14. 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.

**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. Install a new O-ring into the O-ring groove on the pinion shaft.

3. 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.

4. Place the spider in a press with the flange side UP. Support the spider as required.
Section 5
Assembly

Install the 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.

**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. For PRC 1756 W3H install new O-ring on spider pilot.

**CAUTION**
Take care not to pinch the O-ring during assembly.

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 5.13.

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.

<table>
<thead>
<tr>
<th>Table F: Planetary Spider Mounting Capscrew and Stud Torque Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>1/2&quot;-13</td>
</tr>
<tr>
<td>9/16&quot;-12</td>
</tr>
<tr>
<td>5/8&quot;-11, – 14</td>
</tr>
<tr>
<td>3/4&quot;-10</td>
</tr>
<tr>
<td>7/8&quot;-14</td>
</tr>
</tbody>
</table>

Adjust the Brakes

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

- **For P series brakes:** Refer to Maintenance Manual 4, Cam Brakes.
- **For RSA brakes:** Refer to Maintenance Manual 4P, Off-Highway Heavy Duty Brakes.

To order call AxleTech International’s Customer Service Center at 877-547-3907 or send a fax to 866-547-3987.

Install 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.

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 cover. Clean all magnetic plugs and install the oil drain plug in the spider prior to filling the wheel end with lubricant.

![Figure 5.13](image)
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 if necessary.

7. Replace and securely tighten all plugs.

**Tire Matching for Tandem and Tridem Axles**

**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. AxleTech recommends that the tires be matched to within 1/8-inch (3.18 mm) of the same rolling radius, 3/4-inch (19.05 mm) of the same rolling circumference.

**Tandem Axles**

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, AxleTech 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.

Park the vehicle on a level surface. The vehicle must carry a correctly distributed rated capacity load. All the tires must be the same size.

Measure and Adjust the Toe Setting

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

![Figure 5.14](attachment:image.png)

Y MINUS X EQUALS TOE-IN

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

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

The toe specification for AxleTech off-highway steering axles is 1/16-inch (1.60 mm) toe-in (± 1/16-inch (1.60 mm)). This specification is based on a 24-inch (60.96 cm) radius (theoretical tire with a 48-inch (121.92 cm) outside diameter).
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 Axles**

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

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.
## Lubrication Schedule

<table>
<thead>
<tr>
<th>Operation</th>
<th>Off-Highway[1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Oil Change</td>
<td>100 operating hours[1]</td>
</tr>
<tr>
<td>Check Oil Level</td>
<td>250 operating hours[1]</td>
</tr>
<tr>
<td>Petroleum Oil or Synthetic Oil Change</td>
<td>1,500 operating hours or twice a year (whichever comes first)[1]</td>
</tr>
<tr>
<td>Petroleum Oil or Semi-Synthetic Oil Change</td>
<td>3,000 operating hours or once a year (whichever comes first)</td>
</tr>
</tbody>
</table>

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

PRC 1756 is equipped with magnets in the axle housing, as a result, the initial oil change is waved.

### Outside Temperature

<table>
<thead>
<tr>
<th>AxleTech Specifications</th>
<th>Oil Description</th>
<th>°F</th>
<th>°C</th>
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<tbody>
<tr>
<td>STC 05-001, Gear Oil</td>
<td>GL-5, SAE 85W/140</td>
<td>10</td>
<td>-12</td>
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<tr>
<td>STC 05-003, Gear Oil</td>
<td>GL-5, SAE 80W/90</td>
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<td>-26</td>
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</tr>
<tr>
<td>STC 05-006, Gear Oil</td>
<td>GL-5, SAE 75W/140</td>
<td>-40</td>
<td>-40</td>
</tr>
<tr>
<td>STC 05-007, Gear Oil</td>
<td>GL-5, SAE 75W/140</td>
<td>-40</td>
<td>-40</td>
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<tr>
<td>STC 05-008, Gear Oil</td>
<td>GL-5, SAE 75W/90</td>
<td>-40</td>
<td>-40</td>
</tr>
</tbody>
</table>
Section 7
Specifications

Rigid Axle Wet Disc Brake

Rigid Axle Drum Brake
Section 7
Specifications

Rigid Axle Dry Disc Brake

Steering Axle Dry Disc Brake
NOTE: See Wet Brake Manual MM-20195 for these fastener torques.
### Planetary Axle Wheel End Torque Specifications

<table>
<thead>
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<th>Fastener Description</th>
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<th>N•m</th>
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<td>210-230</td>
<td>284-311</td>
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<td>2</td>
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<td>Wheel Bearing Adjusting Nut</td>
<td>Refer to “Adjusting the Wheel Bearing Preload” in Section 5.</td>
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<td>Wet Brake Driver Mounting Capscrew</td>
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<td>6</td>
<td>Brake Drum Mounting Capscrew</td>
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<td>7/8&quot;-14</td>
<td>575-750</td>
<td>780-1017</td>
</tr>
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<td>7</td>
<td>Brake Rotor Mounting Capscrew</td>
<td>1/2&quot;-12</td>
<td>85-115</td>
<td>115-156</td>
</tr>
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<td></td>
<td></td>
<td>9/16&quot;-18</td>
<td>130-165</td>
<td>176-224</td>
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<td></td>
<td></td>
<td>5/8&quot;-11, -18</td>
<td>210-230</td>
<td>284-311</td>
</tr>
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<td></td>
<td></td>
<td>3/4&quot;-10</td>
<td>310-400</td>
<td>420-542</td>
</tr>
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<td>7/8&quot;-9, -14</td>
<td>575-650</td>
<td>779-880</td>
</tr>
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<td></td>
<td></td>
<td>1&quot;-12, -14</td>
<td>850-1100</td>
<td>1152-1491</td>
</tr>
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<td>8</td>
<td>Spindle Mounting Capscrew</td>
<td>1/2&quot;-12</td>
<td>85-115</td>
<td>115-156</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9/16&quot;-18</td>
<td>130-165</td>
<td>176-224</td>
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<td>5/8&quot;-11, -18</td>
<td>210-230</td>
<td>284-311</td>
</tr>
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<td>3/4&quot;-10</td>
<td>310-400</td>
<td>420-542</td>
</tr>
<tr>
<td></td>
<td>(Nut on Stud)</td>
<td>7/8&quot;-9, -14</td>
<td>575-650</td>
<td>779-880</td>
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<td></td>
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<td>1&quot;-12, -14</td>
<td>850-1100</td>
<td>1152-1491</td>
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<td>M24X3</td>
<td>625-810</td>
<td>850-1100</td>
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<td>9</td>
<td>Spindle to Steer Knuckle Capscrew</td>
<td>1/2&quot;-13</td>
<td>85-115</td>
<td>115-156</td>
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<td></td>
<td>5/8&quot;-11</td>
<td>210-230</td>
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<td>130-165</td>
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<td>575-750</td>
<td>780-1017</td>
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<tr>
<td>10</td>
<td>Pinion Shaft Locknut</td>
<td>3/8&quot;-16</td>
<td>30-45</td>
<td>41-61</td>
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<td>11</td>
<td>Caliper Adapter to Spindle Bolt</td>
<td>7/8&quot;-9</td>
<td>440-580</td>
<td>597-786</td>
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<td>12</td>
<td>Caliper to Adapter Capscrew</td>
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<td>M20</td>
<td>369-479</td>
<td>500-650</td>
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<td>13</td>
<td>Wheel Rim Clamp Nut</td>
<td>Refer to OEM specifications</td>
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<td>14</td>
<td>Cap Screw</td>
<td>M16X2</td>
<td>200-258</td>
<td>270-350</td>
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<td>Oil Level/Drain Plug (Not Shown)</td>
<td>3/4&quot;-14</td>
<td>35</td>
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<td>Planetary Ring Gear Lock Capscrew (Not Shown)</td>
<td>3/8&quot;-16</td>
<td>35-50</td>
<td>47-68</td>
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<td>7/16&quot;-14</td>
<td>60-75</td>
<td>81-102</td>
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