PXRC1756
Planetary Rigid Axle Wheel Ends
XTL® Wheel End Assembly

Maintenance Manual 9P
This publication provides maintenance and service procedures for AxleTech XTL® wheel end assemblies. The information contained in this publication was current at the time of printing and is subject to revision without notice or liability.

1. You must understand all procedures and instructions before you begin maintenance and service procedures.

2. You must follow your company’s maintenance and service guidelines.

3. You must use special tools, when required, to avoid serious personal injury and damage to components.

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

**WARNING**

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

**CAUTION**

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

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

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

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.

**Additional Information**

- Wet Disc Brake Maintenance Manual MM-20195

**How to Order**

Order items from AxleTech International. Phone orders are also accepted by calling AxleTech International’s Customer Service Center at 1-877-547-3907 or send a fax to 1-866-547-3987.
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Asbestos and Non-Asbestos Fibers

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

Hazard Summary
Because some brake linings contain asbestos, workers who service brakes must understand the potential hazards of asbestos and precautions for reducing risks. Exposure to airborne asbestos dust causes chronic and possibly fatal diseases, including asbestosis (a chronic lung disease) and cancer, principally lung cancer and mesothelioma (a cancer of the lining of the chest or abdominal cavities). Some studies show that the risk of lung cancer among persons who smoke and who are exposed to asbestos is much greater than the risk for non-smokers. Symptoms of these diseases may not become apparent for 15, 20 or more years after the first exposure to asbestos.

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

Recommended Work Practices
1. Separate Work Areas. Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons. OSHA has set a maximum allowable level of exposure for asbestos of 0.1 fibers per cubic foot at 8-hour time-weighted average and 0.6 fibers per cubic meter at 5-minute period. Scientific data is, however, to what extent adherence to the maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling asbestos dust. OSHA requires that the following sign be posted at the entrance to areas where exposures exceed either of the maximum allowable levels.

DANGER ASBESTOS CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

2. Respiratory Protection. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA for use with asbestos at all times when servicing brakes, beginning with the removal of the wheel.

   - 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 remove and vacuum residue from the brake parts.
   - b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphorus, 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, the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly washed to remove 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 level associated with the employer's procedures does not exceed the levels associated with the enclosed vacuum system or brake washing equipment. Consult OSHA regulations for more details.

4. Clean-Up. When a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos when graining or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.

   - 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 corrosive solvents, flammable solvents, or solvents that can damage brake components as cleaning agents.

5. 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 containers and handle used rags, wear a respirator equipped with a HEPA filter supplied by a hepa filter approved by NIOSH or MSHA for use with asbestos. When you replace a HEPA filter, use the filter with a fine mist of water and dispose of the used filter with care.

6. 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 vacuum equipped with a HEPA filter to remove dust after they are worn. Do not wash or use compressed air to remove dust from work clothes.

7. 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.

NON-ASBESTOS FIBER 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.

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

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

Recommended Work Practices
1. Separate Work Areas. Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons.

2. Respiratory Protection. OSHA has set a maximum allowable level of exposure for silica of 0.1 mg/m3 as an 8-hour time-weighted average. Some manufacturers of non-asbestos brake linings recommend that exposures to other ingredients found in non-asbestos brake linings be kept below 0.1 mg/m3 as an 8-hour time-weighted average. Scientists disagree, however, to what extent adherence to these maximum allowable exposure levels will eliminate the risks of diseases that can result from inhaling non-asbestos dust.

Therefore, wear respiratory protection at all times during brake servicing, beginning with the removal of the wheel. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA, if the exposure levels may exceed OSHA or manufacturer's recommended maximum levels. When exposures are expected to be within the maximum allowable levels, wearing such a respirator at all times during brake servicing will help minimize exposures.

   - 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 remove and vacuum residue from the brake parts.
   - b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphorus, 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, the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly washed to remove 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 level associated with the employer's procedures does not exceed the levels associated with the enclosing vacuum system or brake washing equipment. Consult OSHA regulations for more details.

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 containers 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, use 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 vacuum equipped with a HEPA filter to remove dust after they are worn. Do not wash or use compressed air to remove dust from work clothes.

6. 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.
Figure 1.1 – Section View, PXRC1756 Planetary Rigid Axle Wheel End
Section 1
Exploded View

Figure 1.2 – Exploded View of XTL® Assembly

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Section 2
Introduction

Description
AxleTech XTL® wheel end 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 XTL® wheel hub assembly.
- 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 which drives the wheel end differential and wheel hubs.

Axle Models Covered in This Manual
PXRC1756W3H

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

Figure 2.1

Axle Identification Tag Location

AxleTech International
A GENERAL DYNAMICS COMPANY
P/N: PXRC1756W3H100
CUST:
S/N:
RATIO: DATE:

100301
## Section 2
### Introduction

### Single Planetary Axles

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

**Last Digit:**
- Carrier Designation for Exact Specification

**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 Type:**
- M = Mechanical Drum
- N = None
- NR = With Rotor Less Calipers
- PIQ = S-Cam Drum Brake
- HDB = Hydraulic Dry Disc
- RDA = Wedge (Dual Air Chamber)
- RDH = Wedge (Dual Hydraulic Cylinders)
- RSA = Wedge (Single Air Chamber)
- RSH = Wedge (Single Hydraulic Cylinder)
- W2H = Dura-Disc® 9 in. (229 mm) Wet Disc
- W3H = Dura-Disc® 13 in. (330 and 360 mm) Wet Disc
- W4H = Dura-Disc® 17 in. (432 mm) Wet Disc
- W4M = Dura-Disc® 17 in. (432 mm) Wet Disc
  - Spring Applied Hydraulic Release
- WDH330 = Dura-Disc® 13 in. (330 mm) Wet Disc
  - (Unit Mount)
- WDH432 = Dura-Disc® 17 in. (432 mm) Wet Disc
  - (Unit Mount)
- WDM = Dura-Disc® 17 in. (432 mm) Wet Disc
  - (Unit Mount) Spring Applied Hydraulic Release

**Figure 2.2**
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

XTL® planetary axles come equipped with flange-style hubs. **Figure 3.1.** You can service the planetary gearing on flange-style hubs without removing the tire from the wheel end.

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. Dispose of the lubricant properly.

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.
   - Hit the spider with a plastic or rubber mallet to separate the planetary assembly from the wheel hub assembly.
Disassemble the Planetary Spider Assembly

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

**CAUTION**

Take care not to damage the O-ring at the joint between the spider and outer case differential.

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

**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 3.5.**
7. Remove the planetary gears and thrust washers from the planetary spider.

**Remove the Ring Gear and Axle Shaft**

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### WARNING
Support the wheel hub, as shown in Figure 3.6, 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 floating ring gear. If necessary, use a lifting device to remove the ring gear. Figure 3.6.

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2. Remove the snap ring from the end of the axle shaft.
3. Remove the sun gear. Figure 3.7.
4. Remove the sun gear thrust washer.
5. Remove the axle shaft.

### Prepare to Remove the XTL® Wheel Hub Assembly

**Wheel Bearings With Scalloped Flange Adjusting Nut**

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**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. Figure 3.7.

---

2. Remove the wheel bearing nut.

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**Remove the Ring Gear Hub and XTL® Wheel Hub Assembly**

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### 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 chain fall or similar device to lift the XTL® wheel hub assembly slightly to relieve the hub weight. Figure 3.8.

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2. 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 3.8.
3. Remove the outer wheel bearing from the ring gear hub. **Figure 3.9.**

**Figure 3.9**

NOTE: The ring gear hub assemblies include a hub and ring sleeve insert. You cannot service these components separately.

4. Remove the XTL® wheel hub assembly from the spindle and position it vertically for disassembly. **Figure 3.10.**

**CAUTION**

*One-half of the duo-cone face seal comes off with the XTL® wheel hub assembly. The other half will remain in the brake disc housing.*

5. Remove the face seal half from the brake disc housing assembly.

**NOTE:** Wrap and label the face seal halves separately. Store them in a safe place to prevent damage and reassemble them later in the same positions.

6. Refer to Maintenance Manual MM-20195, Wet Disc Brakes, for instructions on removing and servicing the wet disc brake and spindle.
Remove the Outer Case Differential Half

**NOTE:** Prior to disassembly, mark each of the four differential pin locations. Place identifying marks on the differential pins along with the inner and outer case differential halves. **Figure 4.1.**

1. Remove the 24 case differential half capscrews. **Figure 4.2.**

2. Thread two ½-13 in. eye hooks into the outer case differential half and attach a lifting strap for removal. **Figure 4.3.**

**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.

**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.

Remove the Outer Wheel Hub

Remove the outer wheel hub with a lifting strap. Be aware of the location of the four differential pins and gears as the outer wheel hub is lifted. **Figure 4.4.**

**CAUTION**
The differential pins and gears may remain in the outer wheel hub. To avoid damage to the pins and gears provide a cushioned area to remove the pins and gears while the outer wheel hub is supported. Personal injury and damage to the components may result if they fall.
Figure 4.4

Remove the Differential Pin and Pinion Assembly

1. Disengage the differential pin/pinion assembly from the inner case differential half.

2. If required, tap the differential gear or pin lightly to loosen the pilot fit and overcome adhesion from the grease. Figure 4.5.

Figure 4.5

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.

NOTE: Be careful to not damage the O-ring located on the differential pin.

NOTE: Pin may be pried as shown. Figure 4.5.

Remove the Inner Wheel Hub

Remove inner wheel hub utilizing a lifting strap. It is acceptable to hit the side of the wheel hub with a plastic or rubber mallet to separate the wheel hub from the inner case differential. Figure 4.6.

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.

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.

CAUTION

The inner wheel hub seal will remain in the inner wheel hub. Do not set the inner wheel hub down on the wheel hub seal. Damage to the wheel hub seal can result.
Remove the Brake Driver Assembly

3. Position the inner differential case with the brake driver assembly facing upward. Remove the brake driver to inner differential case capscrews.

4. Take care not to damage the O-ring on the back side of the brake driver.

5. The brake driver does not allow clearance to remove the hub oil seal, bearing cone or bearing cup without removing the brake driver. Removal of the brake driver from the inner case differential is required to remove the hub oil seal, bearing cone or bearing cup. Make sure to mark the two components for alignment. **Figure 4.7.**

6. Remove the hub oil seal with a suitable puller. Do not scratch the hub seal bore surface in the brake driver.

**CAUTION**

*Do not damage the hub oil seal bore surface in the brake driver. Damage to this surface will result in oil leakage after assembly.*

7. Remove the inner bearing cone.

8. Remove the bearing cup with a suitable driver.

9. Remove the face seal half from the brake driver.

**CAUTION**

*One-half of the duo-cone face seal comes off with the XTL® wheel hub assembly. The other half will remain in the brake disc housing.*

**NOTE:** Wrap and label the face seal halves separately. Store them in a safe place to prevent damage and reassemble them later in the same positions.

---

**Figure 4.7**
Section 5
Prepare Parts for Assembly

Clean XTL® Components and Sub-Assemblies

- Wipe all components free from grease using clean cloths. Dispose of used grease properly.

Clean Ground or Polished Parts

**WARNING**
To prevent serious eye injury, always wear safe eye protection while performing 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. DO NOT 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.

Corrosion Prevention

- 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 5.1.
Section 5
Prepare Parts for Assembly

Figure 5.1

- 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 5.2.

Figure 5.2

- 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 5.3.

Figure 5.3

- Damage on rollers and on surfaces of the cup and cone inner race that touch the rollers. Figure 5.4.

Figure 5.4

- Damage on the cup and cone inner race surfaces that touch the rollers. Figure 5.5.
Section 5
Prepare Parts for Assembly

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

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

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

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

Remove Capscrews Fastened With Liquid Adhesive

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

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

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

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.

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.

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

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

Figure 5.6.
Section 5
Prepare Parts for Assembly

Figure 5.6

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 in. (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 5.7.

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.
Inspect Inner and Outer Case Differential Halves Bushing Seal Surfaces

1. Inspect the bushing surface on the case differentials. Polish burrs and nicks on the finish surfaces as required. If pitting and/or significant wear is observed on the bushing surface, replacement of the differential half is required. Figure 5.8.
   - Minimum inner case differential half bushing wear surface diameter is 19.562 in. (496.87 mm)
   - Minimum outer case differential half bushing wear surface diameter is 15.913 in. (404.19 mm)

2. Inspect the sealing surface. Discoloration of the seal surface is acceptable. If pitting or grooving is observed on the seal surface, replacement of the case differential half is required. Figure 5.8.

Inter-Wheel Hub Bushing

Inspect the nylon coating on the inter-wheel hub bushing which is pressed into the inner wheel hub. Extreme wear and grooves or absence of nylon material requires replacement. The inter-hub bushing is not available separately, it is only available as part of the inner wheel hub assembly.
Inspect Wheel End Differential Components

The differential side gears and pinion gears are a complete set. When you replace any of these components, you must replace the complete set. Damage to components can result.

1. Inspect the following differential components for wear and stress. Replace parts that are damaged. **Figure 5.9.**
   - Mating surfaces of differential halves
   - The four differential pins
   - Teeth of the side gears
   - Teeth and bore of the pinion gears

2. Inspect the differential pin dowels. Replace the pins if cracked, fractured or loose in bore. Press pin to a depth flush to 0.06 in. (1.6 mm) below differential mounting face. **Figure 5.10.**

**Figure 5.9**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Differential Case Halves (Mating Surfaces)</td>
</tr>
<tr>
<td>2</td>
<td>Side Gear (Teeth)</td>
</tr>
<tr>
<td>3</td>
<td>Pinion Gear (Teeth and Bore)</td>
</tr>
<tr>
<td>4</td>
<td>Differential Pin</td>
</tr>
</tbody>
</table>
Section 5
Prepare Parts for Assembly

Figure 5.10

3. Inspect the bronze thrust blocks for damage and wear. **Figure 5.11.**

Figure 5.11

4. If blocks are damaged or thickness of blocks measure less than 0.24 in (6.1 mm), replace the blocks. If thrust blocks were not removed at disassembly, verify that the thrust block attachment capscrews have not been damaged or loosened. If damaged, replace the capscrews and if loosened apply blue Loctite® 242 to the capscrews and torque to 22-30 lb-ft (30-41 Nm). **Figure 5.11.**

**Inspect Inner and Outer Wheel Hub Bushings**

1. Inspect the wheel hub bushings for damage or wear. A bushing that is gouged or is worn such that the yellow “waffle pattern” is not visible must be replaced. **Figure 5.12.**

2. To remove the bushing, use a pry bar along the bushing seam. **Figure 5.12.** Be careful to not damage the seal or bushing surfaces.

3. Refer to the assembly sections for assembly of the bushings into the inner and outer wheel hubs.

**Remove Inner and Outer Wheel Hub Seals**

**NOTE:** It is AxleTech’s recommendation that all XTL® seals be replaced when performing wheel end service operations.

1. Remove the seals with a suitable pry bar. Be careful not to pry on or damage the sealing surfaces or bushing surfaces in the wheel hub.

2. Refer to the assembly sections for assembly of the inner and outer wheel hub seals.
Inspect Wheel Studs

Inspect the wheel studs replacing any that are loose, deformed or show thread damage.

Figure 5.13.
Section 6
Assembly

Inner Wheel Hub Assembly

Figure 6.1

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seal Assembly-Oil</td>
</tr>
<tr>
<td>2</td>
<td>Bushing-Inter Hub</td>
</tr>
<tr>
<td>3</td>
<td>Hub-Wheel, Inner</td>
</tr>
<tr>
<td>4</td>
<td>Wheel Stud</td>
</tr>
<tr>
<td>5</td>
<td>Side Gear-Diff</td>
</tr>
<tr>
<td>6</td>
<td>Capscrew</td>
</tr>
<tr>
<td>7</td>
<td>Bushing-Hub</td>
</tr>
<tr>
<td>8</td>
<td>Seal Assembly-Oil</td>
</tr>
</tbody>
</table>

1. Clean all machined surfaces of wheel hub.
2. Apply Loctite® 277 to wheel stud threaded holes in inner wheel hub. Hand start wheel studs. Drive studs to last thread.
3. Clean the side gear mounting surface on the wheel hub.
4. Insert side gear into wheel hub bore with teeth facing down. Apply a bead of Loctite® 277 to the side gear fasteners. Install the fasteners and torque in an ‘X’ torque pattern to 74-96 lb-ft (100-130 Nm).
5. Clean the bushing bore in the wheel hub.
6. Apply a light coating of oil to the bushing bore in the wheel hub.
7. With a suitable driver, press the bushing into the wheel hub flush with step in the wheel hub bore. Figure 6.2.

⚠️ WARNING
No gap or raised edge is allowed at the bushing seam after it is installed. Figure 6.2.

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

⚠️ 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.
Inner Wheel Hub Seals

NOTE: It is AxleTech’s recommendation that all XTL® seals be replaced when performing wheel end service operations.

There are two different design wheel hubs. Refer to Figure 6.3 and Figure 6.4 to determine the design which you have and the required depth to press the wheel hub seals during assembly.

WARNING
Care must be taken to not pinch or damage the exposed wheel hub seals on both inner and outer wheel hubs during assembly.

NOTE: The wheel hub bushings must be inspected and replaced if necessary prior to assembly of the new wheel hub seals.

Inner Wheel Hub Seal Assembly

Larger Diameter Inboard Seal in Inner Wheel Hub

1. Clean the seal bore with isopropyl alcohol prior to assembly of the seal.
2. Refer to Figure 6.3 and Figure 6.4 to determine proper seal depth required.
3. Orientate the spring side of the seal inboard towards the wheel hub bushing.
4. Lubricate seal bore and OD of seal with isopropyl alcohol just prior to assembly.
5. Press the seal into the bore to the proper depth with a suitable driver.
Section 6
Assembly

**WARNING**
Care must be taken to not damage the seal excluder lip during installation.

6. Rotate wheel hub 180 degrees. Support wheel hub to prevent damage to excluder lip of seal.

**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.

**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.

**Smaller Diameter Outboard Seal in Inner Wheel Hub**

1. Clean the seal bore with isopropyl alcohol prior to assembly of the seal.
2. Refer to Figure 6.3 and Figure 6.4 to determine proper seal depth required.
3. Orientate the spring side of the seal inboard towards the inter-wheel hub bushing.
4. Lubricate seal bore and OD of seal with isopropyl alcohol just prior to assembly.
5. Press the seal into the bore to the proper depth with a suitable driver.
Outer Wheel Hub Assembly

Figure 6.5

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wheel Stud</td>
</tr>
<tr>
<td>2</td>
<td>Hub-Wheel, Outer</td>
</tr>
<tr>
<td>3</td>
<td>Side Gear-Diff</td>
</tr>
<tr>
<td>4</td>
<td>Capscrew</td>
</tr>
<tr>
<td>5</td>
<td>Bushing-Hub</td>
</tr>
<tr>
<td>6</td>
<td>Seal Assembly-Oil</td>
</tr>
</tbody>
</table>

1. Clean all machined surfaces of wheel hub.
2. Clean the side gear mounting surface on the wheel hub.
3. Insert side gear into wheel hub bore with teeth facing down. Apply a bead of Loctite® 277 to the side gear fasteners. Install the fasteners and torque in an ‘X’ torque pattern to 74-96 lb-ft (100-130 Nm).
4. Clean the bushing bore in the wheel hub.
5. Apply a light coating of oil to the busing bore in the wheel hub.
6. With a suitable driver, press the bushing into the wheel hub flush with step in the wheel hub bore. Figure 6.6.

**WARNING**

No gap or raised edge is allowed at the bushing seam after it is installed. Figure 6.6.

**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.

**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.
Outer Wheel Hub Seals

**NOTE:** It is AxleTech’s recommendation that all XTL® seals be replaced when performing wheel end service operations.

There are two different design wheel hubs. Refer to **Figure 6.7** and **Figure 6.8** to determine the design which you have and the required depth to press the wheel hub seals during assembly.

**WARNING**

*Care must be taken to not pinch or damage the exposed wheel hub seals on both inner and outer wheel hubs during assembly.*

**NOTE:** The wheel hub bushings must be inspected and replaced if necessary prior to assembly of the new wheel hub seals.

---

**Outer Wheel Hub Seal Assembly**

**Outboard Seal in Outer Wheel Hub**

1. Clean the seal bore with isopropyl alcohol prior to assembly of the seal.
2. Refer to **Figure 6.7** and **Figure 6.8** to determine proper seal depth required.
3. Orientate the spring side of the seal inboard towards the wheel hub bushing.
4. Lubricate seal bore and OD of seal with isopropyl alcohol just prior to assembly.
5. Press the seal into the bore to the proper depth with a suitable driver.

![WARNING](image)

**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.

![WARNING](image)

**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.

![CAUTION](image)

**CAUTION**

Care must be taken not to damage the seal excluder lip during installation.

### Inner Case Differential Assembly

![Figure 6.9](image)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Case-Diff, Inner</td>
</tr>
<tr>
<td>2</td>
<td>Block-Thrust</td>
</tr>
<tr>
<td>3</td>
<td>Capscrew</td>
</tr>
<tr>
<td>4</td>
<td>Dowel</td>
</tr>
</tbody>
</table>

1. Clean all machined surfaces.

2. Install the thrust blocks to the case differential. Apply Loctite® 242 to the mounting holes. Torque the capscrews to 22-30 lb-ft (30-41 Nm).

3. Tap the four dowel pins into their location until they bottom. Press pins flush to 1.6 mm (0.06 in) below differential mounting face. **Figure 6.10**

![WARNING](image)

**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.

![WARNING](image)

**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.

![WARNING](image)

**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. If Loctite® gets into your eyes, flush them with water for 15 minutes. Have your eyes checked by a doctor as soon as possible.

![Figure 6.10](image)
Brake Driver Assembly to Inner Differential Case Half

1. If the wheel hub bearing cups need to be replaced, install the new cups with a suitable driver. Apply lubricant to the inner bearing cone rollers. Install the bearing cone into the inner case differential.

**NOTE:** This model requires installation of the inner bearing cup and cone into the inner case differential prior to assembly of the brake driver.

**NOTE:** This model requires the wheel hub oil seal installation into the bore of the brake driver prior to assembly of the brake driver.

7. Install a new wheel hub seal in the brake driver, pressing the seal to a depth of 0.25 in. (6.4 mm) below the mounting face.

**Figure 6.11**

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

9. Align marks between brake driver and hub. Apply a bead of Loctite® 242 to the brake driver capscrews. Install and tighten capscrews and washers to the torque specifications shown in **Table A**.

**Figure 6.12**

**Table A: Brake Driver Mounting Capscrew Torque Specifications**

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb-ft</td>
</tr>
<tr>
<td>M16x2</td>
<td>200-258</td>
</tr>
</tbody>
</table>

**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.
**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.*

**XTL® Wheel End Final Assembly**

**Figure 6.13**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Case-Diff, Inner Assembly</td>
</tr>
<tr>
<td>2</td>
<td>Hub-Wheel, Inner Assembly</td>
</tr>
<tr>
<td>3</td>
<td>Pin, Diff</td>
</tr>
<tr>
<td>4</td>
<td>Pinion-Diff</td>
</tr>
<tr>
<td>5</td>
<td>O-Ring</td>
</tr>
<tr>
<td>6</td>
<td>Hub-Wheel, Outer Assembly</td>
</tr>
<tr>
<td>7</td>
<td>Case-Diff, Outer Assembly</td>
</tr>
<tr>
<td>8</td>
<td>Capscrew</td>
</tr>
</tbody>
</table>
Assemble Inner Wheel Hub Assembly

1. Grease pack the inner diameter surfaces of the inner wheel hub bushing. The grease must completely cover the bushing material. Apply grease to the backside of the differential side gear as shown. Figure 6.14.

2. Grease the leading edge and inner diameter surface of the large seal. Figure 6.15.

3. Apply grease to the thrust block surfaces on the inner case differential assembly.

**NOTE:** Grease pack should cover complete thrust block and space between thrust blocks.

4. Apply grease to the leading edge on the inner differential case for the bushing.

5. Apply a bead of grease to the inner corner diameter of the flange. Figure 6.16.

6. Apply tape or suitable material to the bolt holes on the inner differential case to prevent grease from getting into threaded bolt holes.

7. Utilizing a suitable lifting device, lift the inner wheel hub assembly over the inner differential case half assembly and position in place. A plastic or rubber mallet may be used to help seal wheel hub onto differential case. Figure 6.17.
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.

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.

Assemble Differential Pin and Pinion Assembly

1. Apply grease to the flange of the planetary pin. Figure 6.18.

Figure 6.17

Figure 6.18
2. Install the pinion gear on the planetary pin and assemble the O-ring onto the pin. Figure 6.19.

Figure 6.19
3. Visually inspect the O-ring for damage or cuts and insure proper seat into O-ring groove.
4. Apply a coating of grease to the O-ring.
5. Install the four planetary gear/pin assemblies onto the dowel pins aligning the gear teeth of the pinions with the gear teeth of the side gear.
6. Apply a coating of grease in the cavity above the side gear. Figure 6.20 and 6.21.
Assemble Outer Wheel Hub Assembly

1. Grease pack the inner diameter surfaces of the outer wheel hub bushing. The grease must completely cover the bushing material. Apply grease to the backside of the differential side gear as shown. Apply a bead of grease to the inner corner diameter of the outer wheel hub. Figure 6.23.

2. Use the appropriate lifting strap to lift the outer wheel hub assembly. The side gear teeth must be orientated downward. Lower the outer wheel hub assembly half way into the inner wheel hub assembly.

3. Wipe clean any grease which has purged onto the outer surfaces of the assembly.

4. Lower the outer wheel hub assembly completely onto the inner wheel hub assembly.

NOTE: The gear teeth in the outer wheel hub assembly must align with the gear teeth of the four pinion gears.

5. Grease pack the remainder of the cavity around the pinion gears. Do not allow grease on the mounting face of the inner differential case. Figure 6.24.

6. Apply a liberal amount of grease to the top side of the side gear. This is the contact surface for the thrust blocks on the outer case differential. Figure 6.24.

NOTE: Do not grease mounting face of inner differential case.

7. Insure the leading edge and inner diameter surfaces of the seal have grease applied. Figure 6.22.

Figure 6.20

Figure 6.21

Figure 6.22

Figure 6.23

Figure 6.24
7. Grease the leading edge and inner diameter surface of the large seal. Figure 6.25.

5. Use the appropriate lifting strap to lift the outer case differential into the wheel end assembly. Align the four pinion assemblies. Figure 6.27 and Figure 6.28.

**Figure 6.24**

**Assemble Outer Case Differential**

1. Remove the masking tape from the mounting holes. Visually inspect to verify no grease is in the threaded holes.

2. Apply grease to the thrust block surfaces on the outer case differential assembly.

**NOTE:** Grease pack should cover complete thrust block and space between thrust blocks.

3. Apply grease to the leading edge of the differential case.

4. Apply a bead of grease to the inner corner diameter of the flange. Figure 6.26.
Section 6
Assembly

![Image of a wheel and axle assembly](image1)

Figure 6.28

6. Install the fasteners and torque in an ‘X’
torque pattern to 130-165 lb-ft (176-224 Nm).

![Image of a wheel and axle assembly](image2)

Figure 6.29

Spindle Assembly

⚠️ **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. If Loctite® gets into your eyes, flush them with water for 15 minutes. Have your eyes checked by a doctor as soon as possible.

Install the Spindle

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

1. Install two 4-in. (10.14 cm) long temporary studs into the axle housing flange at the 1- and 11-o’clock positions. Figure 6.30.

![Image of a wheel and axle assembly](image3)

Figure 6.30

2. Use a new O-ring and mount it on spindle pilot. Take care not to pinch the O-ring and cut it.

⚠️ **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. Take care not to pinch the O-ring between the spindle and axle housing during assembly. Figure 6.31.

![Image of a wheel and axle assembly](image4)

Figure 6.31

---

1. If a sleeve is used, apply Loctite® 518 to the spindle.
2. Carefully install a new oil wear sleeve on the spindle using a suitable driver.
Section 6
Assembly

Install the XTL® Wheel Hub Assembly

⚠️ 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. Apply a thin coat of lubricant to the oil seal journal surfaces on the oil wear sleeve and spindle. Lubricate the hub oil seal lips located in the brake driver.

2. Use a lifting strap device to carefully lift and slide the wheel hub assembly over the spindle. Keep the hub assembly aligned with the spindle to avoid seal damage. Figure 6.32.

3. Refer to Maintenance Manual MM-20195 for care of the brake seal and wet disc brake prior to mounting hub assembly.

Assemble the Ring Gear Hub Assembly

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 ends to the rollers.

3. Install the ring gear hub assembly, which includes the outer bearing cone, on the spindle.

Figure 6.31

4. Install and tighten the two assembly set screws.

5. Install the O-ring between the spindle and brake piston housing. Take care not to pinch the O-ring. Align the brake piston housing and spindle marks. Install the brake piston housing. Figure 6.31.

6. Prepare the mounting capscrews. Ensure every capscrew has its own new O-ring assembled on the capscrew head completely inside the radius pocket.

7. Install and hand tighten the spindle/brake piston housing mounting capscrews and O-rings. Remove the temporary studs and replace capscrews and O-rings.

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

Table B: Spindle Mounting Capscrew Torque Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb-ft</td>
</tr>
<tr>
<td>M24x3</td>
<td>627-811</td>
</tr>
</tbody>
</table>

NOTE: Refer to Maintenance Manual MM-20195 for assembly of wet disc brake.

Figure 6.32

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. Apply a thin coat of lubricant to the oil seal journal surfaces on the oil wear sleeve and spindle. Lubricate the hub oil seal lips located in the brake driver.

2. Use a lifting strap device to carefully lift and slide the wheel hub assembly over the spindle. Keep the hub assembly aligned with the spindle to avoid seal damage. Figure 6.32.

Table B: Spindle Mounting Capscrew Torque Specifications

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb-ft</td>
</tr>
<tr>
<td>M24x3</td>
<td>627-811</td>
</tr>
</tbody>
</table>

NOTE: Refer to Maintenance Manual MM-20195 for assembly of wet disc brake.
4. Install the wheel bearing adjusting nut on the spindle.

**Scalloped Flange Single Nut Design**

1. Tighten the wheel bearing adjusting nut to the initial seating torque listed in Table C, while rotating the wheel hub.

**Table C: Single Wheel Bearing Adjustment**

<table>
<thead>
<tr>
<th>Rigid Axle Models</th>
<th>Adjusting Nut Torque</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial Seating</td>
<td>Final Adjustment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lb-ft</td>
<td>Nm</td>
<td>lb-ft</td>
</tr>
<tr>
<td>PXRC1756</td>
<td>400</td>
<td>542</td>
<td>350</td>
</tr>
</tbody>
</table>

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 C, 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 C 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. If Loctite® gets into your eyes, flush them with water for 15 minutes. Have your eyes checked by a doctor as soon as possible.*

8. Install 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 Nm).

**Figure 6.33**

**Install the Axle Shaft**

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.

**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.

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

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.

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 6.34.**

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 optional design, install the snap rings at the end of the pinion shaft.


**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. Install the 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 6.35.

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

4. Install the capscrews and washers.

5. Tighten the capscrews according to the torque specifications shown in Table D.

Table D: Planetary Spider Mounting Capscrew and Stud Torque Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque (lb-ft)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;-13</td>
<td>85-115</td>
<td>115-156</td>
</tr>
</tbody>
</table>

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.

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.

Install the Tires and Rims

1. Install the tires and rims.

2. Tighten the wheel nuts according to the vehicle manufacturer’s specifications.
Section 7
Lubrication

Lubrication Schedule

<table>
<thead>
<tr>
<th>Operation</th>
<th>Off-Highway*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Oil Change</td>
<td>100 operating hours*</td>
</tr>
<tr>
<td>Check Oil Level</td>
<td>250 operating hours*</td>
</tr>
<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.

<table>
<thead>
<tr>
<th>AxleTech Specifications</th>
<th>Oil Description</th>
<th>Outside Temperature</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>STC 05-001, Gear Oil</td>
<td>GL-5, SAE 85W/140</td>
<td>Min.</td>
<td>10</td>
<td>-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>STC 05-003, Gear Oil</td>
<td>GL-5, SAE 80W/90</td>
<td>Min.</td>
<td>-15</td>
<td>-26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>STC 05-004, Gear Oil</td>
<td>GL-5, SAE 75W/90</td>
<td>Min.</td>
<td>-40</td>
<td>-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>STC 05-006, Gear Oil</td>
<td>GL-5, SAE 75W/140</td>
<td>Min.</td>
<td>-40</td>
<td>-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>STC 05-007, Gear Oil</td>
<td>GL-5, SAE 75W/140</td>
<td>Min.</td>
<td>-40</td>
<td>-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>STC 05-008, Gear Oil</td>
<td>GL-5, SAE 75W/90</td>
<td>Min.</td>
<td>-40</td>
<td>-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max.</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Refer to Maintenance Manual MM-20195, Wet Disc Brakes, for lubrication information for the wet brake.

XTL® Wheel Hub Assembly*

<table>
<thead>
<tr>
<th>AxleTech Specification</th>
<th>Oil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STC 05-214</td>
<td>Multi-purpose, extreme pressure lithium complex with moly</td>
</tr>
</tbody>
</table>

*Lubed for life of axle (20,000 hrs.)
## Planetary Axle Wheel End Torque Specifications

![Figure 8.1](image)

<table>
<thead>
<tr>
<th>Item</th>
<th>Fastener Description</th>
<th>Size</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>lb-ft</td>
</tr>
<tr>
<td>1</td>
<td>Spindle Mounting Capscrew</td>
<td>M24X3</td>
<td>625-810</td>
</tr>
<tr>
<td>2</td>
<td>Wet Brake Driver Mounting Capscrew</td>
<td>M16X2.00</td>
<td>200-258</td>
</tr>
<tr>
<td>3</td>
<td>Thrust Block Capscrew</td>
<td>M8X1.25</td>
<td>20-30</td>
</tr>
<tr>
<td>4</td>
<td>Side Gear Capscrew</td>
<td>M12X1.75</td>
<td>74-96</td>
</tr>
<tr>
<td>5</td>
<td>Differential Case Half Mounting Capscrew</td>
<td>9/16”-12</td>
<td>130-165</td>
</tr>
<tr>
<td>6</td>
<td>Lockplate Capscrew</td>
<td>3/8”-16</td>
<td>30-45</td>
</tr>
<tr>
<td>7</td>
<td>Wheel Bearing Adjusting Nut</td>
<td>Refer to the Single Wheel Bearing Adjustment Table in Section 6.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Planetary Spider Mounting Capscrew</td>
<td>1/2”-3</td>
<td>85-115</td>
</tr>
</tbody>
</table>