Wedge Brakes

Wedge 15" & 410 mm
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Service Notes

This service manual describes the service and repair procedures for the Heavy Duty Wedge Drum Brakes. The information contained in this manual is current at the time of publication and is subject to change without notice or liability.

Follow all company procedures when servicing or repairing equipment or components. Understand all instructions before performing any product service. 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 to equipment and components.

The instructions contained in this service manual are intended for use by skilled and experienced mechanics knowledgeable in the installation, repair, and replacement of the AxleTech product described herein.

⚠️ DANGER

Installation, maintenance, and replacement of such products requires a high degree of skill and experience. The consequences of improper installation, maintenance, or replacement (including the use of inferior or substandard components) are grave and can result in product failure and resulting loss of control of the vehicle, possible injury or death of persons, and/or possible future or additional product 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.

Updates

For the latest version of this manual, please visit the AxleTech web site at www.axletech.com. AxleTech Customer Service can be reached at 800-540-2794 or via email at service.na@axletech.com.

Notations

AxleTech International uses the following notation to warn the user of possible safety problems and to provide information that will prevent damage to equipment and components:

⚠️ DANGER

A DANGER indicates a procedure that must be followed exactly or it will cause death or serious injury.

⚠️ WARNING

A WARNING indicates a procedure that must be followed exactly or it may cause death or serious injury.

⚠️ CAUTION

A CAUTION indicates a procedure that must be followed exactly to avoid damaging equipment or components.

NOTE

A NOTE indicates an operation, procedure, or instruction that is important for proper service. A NOTE can also supply information that will help to make service quicker and easier.
Asbestos and Non-Asbestos Fibers Warning

OSHA Toxic and Hazardous Substances 29 CFR 1910.1001

Work practices and engineering controls for automotive brake and clutch inspection, disassembly, repair and assembly -- Mandatory

This mandatory appendix specifies engineering controls and work practices that must be implemented by the employer during automotive brake and clutch inspection, disassembly, repair, and assembly operations.

Proper use of these engineering controls and work practices by trained employees will reduce employees’ asbestos exposure below the permissible exposure level during clutch and brake inspection, disassembly, repair, and assembly operations. The employer shall institute engineering controls and work practices using either the method set forth in paragraph [A] or paragraph [B] of this appendix, or any other method which the employer can demonstrate to be equivalent in terms of reducing employee exposure to asbestos as defined and which meets the requirements described in paragraph [C] of this appendix, for those facilities in which no more than 5 pairs of brakes or 5 clutches are inspected, disassembled, reassembled and/or repaired per week, the method set forth in paragraph [D] of this appendix may be used:

[A] Negative Pressure Enclosure/HEPA Vacuum System Method

(1) The brake and clutch inspection, disassembly, repair, and assembly operations shall be enclosed to cover and contain the clutch or brake assembly and to prevent the release of asbestos fibers into the worker’s breathing zone.

(2) The enclosure shall be sealed tightly and thoroughly inspected for leaks before work begins on brake and clutch inspection, disassembly, repair, and assembly.

(3) The enclosure shall be such that the worker can clearly see the operation and shall provide impermeable sleeves through which the worker can handle the brake and clutch inspection, disassembly, repair and assembly. The integrity of the sleeves and ports shall be examined before work begins.

(4) A HEPA-filtered vacuum shall be employed to maintain the enclosure under negative pressure throughout the operation. Compressed-air may be used to remove asbestos fibers or particles from the enclosure.

(5) The HEPA vacuum shall be used first to loosen the asbestos containing residue from the brake and clutch parts and then to evacuate the loosened asbestos containing material from the enclosure and capture the material in the vacuum filter.

(6) The vacuum’s filter, when full, shall be first wetted with a fine mist of water, then removed and placed immediately in an impermeable container, labeled according to paragraph (j)(5) of this section and disposed of according to paragraph (k) of this section.

(7) Any spills or releases of asbestos containing waste material from inside of the enclosure or vacuum hose or vacuum filter shall be immediately cleaned up and disposed of according to paragraph (k) of this section.

[B] Low Pressure/Wet Cleaning Method

(1) A catch basin shall be placed under the brake assembly, positioned to avoid splashes and spills.

(2) The reservoir shall contain water containing an organic solvent or wetting agent. The flow of liquid shall be controlled such that the brake assembly is gently flooded to prevent the asbestos-containing brake dust from becoming airborne.

(3) The aqueous solution shall be allowed to flow between the brake drum and brake support before the drum is removed.

(4) After removing the brake drum, the wheel hub and back of the brake assembly shall be thoroughly wetted to suppress dust.
(5) The brake support plate, brake shoes and brake components used to attach the brake shoes shall be thoroughly washed before removing the old shoes.

(6) In systems using filters, the filters, when full, shall be first wetted with a fine mist of water, then removed and placed immediately in an impermeable container, labeled according to paragraph (j)(4) of this section and disposed of according to paragraph (k) of this section.

(7) Any spills of asbestos-containing aqueous solution or any asbestos-containing waste material shall be cleaned up immediately and disposed of according to paragraph (k) of this section.

(8) The use of dry brushing during low pressure/wet cleaning operations is prohibited.

[C] Equivalent Methods

An equivalent method is one which has sufficient written detail so that it can be reproduced and has been demonstrated that the exposures resulting from the equivalent method are equal to or less than the exposures which would result from the use of the method described in paragraph [A] of CFR 1910.1001. For purposes of making this comparison, the employer shall assume that exposures resulting from the use of the method described in paragraph [A] of this appendix shall not exceed 0.016 f/cc, as measured by the OSHA reference method and as averaged over at least 18 personal samples.

[D] Wet Method

(1) A spray bottle, hose nozzle, or other implement capable of delivering a fine mist of water or amended water or other delivery system capable of delivering water at low pressure, shall be used to first thoroughly wet the brake and clutch parts. Brake and clutch components shall then be wiped clean with a cloth. Any wastewater generated must be captured and properly disposed of without allowing it to dry on any surfaces.

(2) The cloth shall be placed in an impermeable container, labeled according to paragraph (j)(4) of the standard and then properly disposed of as an asbestos waste, or the cloth shall be laundered in a way to prevent the release of asbestos fibers in excess of 0.1 fiber per cubic centimeter of air.

(3) Any spills of solvent or any asbestos containing waste material shall be cleaned up immediately according to paragraph (k) of this section.

(4) The use of dry brushing during the wet method operations is prohibited.

[59 FR 40964, Aug. 10, 1994; 60 FR 33972, June 29, 1995; 77 FR 17778, March 26, 2012]

For more information, visit www.osha.gov, or call OSHA at 1-800-321-OSHA(6742), TTY 1-877-889-5627.

*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.
Service Precautions

⚠️ WARNING

FOLLOW THE SPECIFIED PROCEDURES IN THE INDICATED ORDER TO AVOID PERSONAL INJURY OR EQUIPMENT MALFUNCTION/DAMAGE.

BEFORE STARTING A VEHICLE:
- Sit in the driver’s seat
- Place shift lever in neutral
- Set the parking brake

BEFORE WORKING ON A VEHICLE OR LEAVING THE CAB WITH ENGINE RUNNING:
- Place shift lever in neutral
- Set the parking brake
- Chock the wheels

WHEN PARKING THE VEHICLE OR LEAVING THE CAB:
- Place shift lever in neutral
- Set the parking brake

⚠️ CAUTION

- DO NOT RELEASE THE PARKING BRAKE OR ATTEMPT TO SELECT A GEAR UNTIL THE AIR PRESSURE IS AT THE CORRECT LEVEL.

- TO AVOID DAMAGE TO THE TRANSMISSION DURING TOWING:
  - Place shift lever in neutral
  - Lift the drive wheels off of the ground or disconnect the driveline

- DO NOT OPERATE VEHICLE IF ALTERNATOR LAMP IS LIT OR IF GAUGES INDICATE LOW VOLTAGE.

Omissions

Every effort has been made to ensure the accuracy of all information in this manual. However, AxleTech makes no expressed or implied warranty or representation based on the enclosed information. Any errors or omissions may be reported to AxleTech, 1400 Rochester Road, Troy, Michigan, 48083 USA.
Repair Warnings

DANGER

USE OF OTHER THAN RECOMMENDED TOOLS, PARTS, AND INSTRUCTIONS LISTED IN THIS PUBLICATION MAY PLACE THE SAFETY OF THE SERVICE TECHNICIAN OR VEHICLE DRIVER IN JEOPARDY.

DO NOT WELD REPAIR, HEAT, BEND OR RECONDITION AXLE COMPONENTS. THIS WILL REDUCE COMPONENT STRENGTH, VOID AXLETECH’S WARRANTY, AND CAN RESULT IN SERIOUS PERSONAL INJURY AND DAMAGE TO COMPONENTS. ALWAYS REPLACE DAMAGED OR OUT-OF-SPECIFICATION COMPONENTS.

• When disassembling various assemblies, lay all parts on a clean bench in the same sequence as removed to simplify assembly and reduce the possibility of losing parts.
• Provide a clean work area. Make sure no dirt or foreign material enter the unit during repair and assembly.
• Disconnect the vehicle’s battery before removing or installing electronic parts.
• The location of components varies with each OEM.
• The removal and installation procedure described for each component may vary between vehicles.
• Use a rubber mallet for disassembly and assembly procedures. NEVER hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury.
• 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.

Torque Specifications

• Tightening torque specifications indicated in this manual must be adhered to at all times.
• A tightening torque weaker than indicated may lead to a shearing stress and may break the bolt.
• A stronger tightening torque may lead to yielding of the bolt or an increasing risk of cracking.
Section 1: Introduction

1.1 Operation

The Heavy Duty Wedge Drum Brakes are time-proven designs in a wide range of vocations for commercial, military, and industrial. They are available in various sizes, widths, and wedge angles.

When replacing parts, only use factory original parts and parts sets ordered from AxleTech. Any damage to parts not described in this manual must be repaired or replaced using original parts.

1.2 Technical Specifications

<table>
<thead>
<tr>
<th>Brake Size inches (mm)</th>
<th>Shoe Width inches (mm)</th>
<th>Friction Lining FMSI number</th>
<th>Nominal Torque lbf in (kN-m)</th>
<th>Minimum Wheel Size inches (mm)</th>
<th>GAWR Range x1000 lbs (Tonnes)</th>
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</thead>
<tbody>
<tr>
<td>15 (381)</td>
<td>4 (102)</td>
<td>4610</td>
<td>170,000 (19.2)*</td>
<td>19.5 (495)</td>
<td>Up to 24.0 (Up to 10.8)</td>
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<tr>
<td></td>
<td>5 (127)</td>
<td>4615</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 (152)</td>
<td>4605</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (178)</td>
<td>4602</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.1 (410)</td>
<td>7.1 (180)</td>
<td>--</td>
<td>185,000 (20.9)*</td>
<td>20 (508)</td>
<td>Up to 29.0** (Up to 13.1)</td>
</tr>
<tr>
<td></td>
<td>7.9 (200)</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Torque values for reference only; may vary depending on friction, actuator size, wedge angle, and input pressure.

** High GAWR for off-highway applications.

-- Configuration to be determined based on vehicle application.
### 1.3 Part Numbering

**W D N - 410  200 - 100**

**Type**  
W - Wedge

**Configuration**  
D - Double Actuator  
S - Single Actuator

**Actuation**  
A - Air Chamber Included  
H - Hydraulic Cylinder Included  
N - Actuator Not Included

**Specification**

**Shoe Width (mm)**
- 102 - 4.0"
- 127 - 5.0"
- 152 - 6.0"
- 178 - 7.0"
- 180 - 7.1"
- 200 - 7.9"

**Brake Diameter (mm)**
- 381 - 15.0"
- 410 - 16.1"
1.4 Exploded Views

Dual Actuated Wedge Brake (Left-Hand Shown)
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Qty</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Spider</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Wedge Assembly</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Dust Shield</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Dust Shield Plug</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Dust Shield Plug</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Capscrew</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Star Lock Washer</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Anchor Plunger</td>
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<tr>
<td>9</td>
<td>Anchor Plunger Seal</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Nut</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Lock Washer</td>
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<table>
<thead>
<tr>
<th>Item</th>
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<tr>
<td>12</td>
<td>Shoe &amp; Lining</td>
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<tr>
<td>13</td>
<td>Adjusting Bolt Assembly</td>
<td>2</td>
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<tr>
<td>14</td>
<td>Adjusting Bolt Seal</td>
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</tr>
<tr>
<td>15</td>
<td>Actuator</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>Adjusting Plunger</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>Hold Down Clip</td>
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<td>18</td>
<td>Capscrew</td>
<td>2</td>
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<tr>
<td>19</td>
<td>Metal Gasket</td>
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<td>20</td>
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<tr>
<td>21</td>
<td>Anchor Guide Assembly Screw</td>
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<td>22</td>
<td>Return Spring</td>
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Single Actuated Wedge Brake
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<th>Qty</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Spider</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Wedge Assembly</td>
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</tr>
<tr>
<td>3</td>
<td>Dust Shield</td>
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<td>5</td>
<td>Dust Shield Plug</td>
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<tr>
<td>6</td>
<td>Capscrew</td>
<td>optional</td>
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<tr>
<td>7</td>
<td>Star Lock Washer</td>
<td>optional</td>
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<td>8</td>
<td>Anchor Plunger</td>
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<tr>
<td>9</td>
<td>Anchor Plunger Seal</td>
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<tr>
<td>10</td>
<td>Nut</td>
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<td>Lock Washer</td>
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<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Qty</th>
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<td>12</td>
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<tr>
<td>13</td>
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<tr>
<td>14</td>
<td>Adjusting Bolt Seal</td>
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<tr>
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<td>Actuator</td>
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<td>Adjusting Plunger</td>
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<td>17</td>
<td>Hold Down Clip</td>
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<td>21</td>
<td>Anchor Guide Assembly Screw</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>Return Spring</td>
<td>2</td>
</tr>
</tbody>
</table>
1.5 Wedge Brake Operation

When the brake is actuated the air chamber push rod forces the wedge head between the rollers which spread apart and push the plungers outwards causing the brake shoes to open. Plungers are lifted off their abutment seats until the shoes contact the brake drum.

As the shoes contact the drum, the lining friction drags the shoes in the direction of the drum rotation, then transfers the friction force to the anchor plungers. This causes the anchor plunger to reseat on its abutment and transfer the braking torque to the brake spider.

When the brake is released, the wedge spring returns the wedge and air chamber diaphragm to the off position. The shoe and lining is pulled away from the drum by the shoe return springs and returns the plungers to their abutment seats in the brake spider.
1.6 Automatic Adjustment

Upon brake application, the adjuster bolt and sleeve assembly moves outwards. As the opposing chamfers of teeth on the adjuster sleeve and the teeth on the adjusting pawl move against each other, the pawl is lifted against the spring.

As the brake is released, and the adjuster bolt and actuator assembly is returned to the off position, the adjusting pawl rotates the actuator counter-clockwise and unscrews it from the fixed adjusting bolt. The lining-to-drum clearance is then reduced, completing one adjustment cycle. This is repeated each time the lining to drum clearance is sufficient to allow further adjustments to take place.

Figure 1.4
When the brake lining to drum clearance exceeds its predetermined limit, the travel of the adjuster bolt and sleeve is such that it allows the pawl to jump into the next tooth on the actuator.

Figure 1.5

Figure 1.6
Section 2: Disassembly

DANGER


2.1 Remove Brake Shoes

1. Remove the wheel and brake drum according to the vehicle manufacturer’s instructions. Inboard mounted brake drums on planetary wheel ends will require removal of the hub.

Note: When necessary, use an adjusting spoon to turn the adjusters and retract the shoes from the drum. AxleTech KIT1184 includes an adjusting spoon, brake spring tool, and seal driver.

2. Release the two return springs.

3. Lift the brake shoes from the brake assembly.
### 2.2 Remove Air Chamber & Wedge Assembly

1. When the brake has a spring chamber, cage the spring. Remove all air from the air brake system.

2. Label the air lines and disconnect them from the air chamber. Plug the lines and ports to keep contamination out of the system.

3. Remove any support brackets from the air chamber.

4. Use a brass drift and a hammer to loosen the air chamber collet nut.

5. Remove the air chamber.

6. Remove the wedge assembly.

### 2.3 Disassemble Brake

1. Remove the dust shield, if necessary.

2. Unscrew and remove the adjusting pawl assembly and the anchor plunger guide screw.
3. Drift the seals clear of their bores in the housing, using an appropriate tool.

4. Remove the adjusting bolt, actuator assembly, adjusting plunger, and anchor plunger.

5. Disassemble the adjusting bolt assembly and carefully clean all parts. Check for wear and damage. Replace all worn or damaged parts and ALWAYS install new seals.

**WARNING**

*WHEN REPLACING WEDGE ASSEMBLIES OR PLUNGERS, ENSURE THE REPLACEMENT PARTS HAVE THE SAME WEDGE ANGLES AS THE DISPLACED PARTS.*

![Figure 2.7](image1)

![Figure 2.8](image2)

![Figure 2.9](image3)
## Section 3: Clean & Inspect

### DANGER

- **ALWAYS WEAR PROPER EYE PROTECTION AND OTHER REQUIRED PERSONAL PROTECTIVE EQUIPMENT TO PREVENT PERSONAL INJURY WHEN PERFORMING VEHICLE SERVICE.**

- **WORK IN A WELL-VENTILATED AREA.**

- **NEVER USE GASOLINE, OR SOLVENTS CONTAINING GASOLINE. GASOLINE CAN EXPLODE.**

- **DO NOT USE HOT SOLUTION TANKS OR WATER AND ALKALINE SOLUTIONS TO CLEAN GROUND OR POLISHED PARTS. DOING SO WILL CAUSE DAMAGE TO THE PARTS.**

- **USE HOT SOLUTION TANKS OR ALKALINE SOLUTIONS CORRECTLY. READ THE MANUFACTURER’S INSTRUCTIONS BEFORE USING HOT SOLUTION TANKS AND ALKALINE SOLUTIONS. THEN CAREFULLY FOLLOW THE INSTRUCTIONS.**

- **SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS, AND CAUSE BURNS. EXAMPLES OF SOLVENT CLEANERS ARE CARBON TETRACHLORIDE, EMULSION-TYPE, AND PETROLEUM-BASED CLEANERS. READ THE MANUFACTURER’S INSTRUCTIONS BEFORE USING A SOLVENT CLEANER, THEN CAREFULLY FOLLOW THE INSTRUCTIONS. ALSO FOLLOW THE PROCEDURES BELOW.**

### 3.1 Clean

1. Use solvent cleaners to clean all metal parts that have ground or polished surfaces. Examples of ground or polished parts are the rollers, wedge, and the inner bores of the plunger housing.

2. Use a wire brush to clean the teeth and threads of the actuator components.

3. Metal parts with rough surfaces can be cleaned with solvent cleaners or with alkaline solutions.

4. Immediately after cleaning, dry all parts with clean paper, rags, or compressed air.

### 3.2 Corrosion Protection

#### DANGER

**DO NOT APPLY GREASE TO THE BRAKE LININGS OR THE BRAKE DRUM.**

Clean and dry parts. Apply a thin layer of brake grease to undamaged parts that are to be immediately assembled. See “Wedge Brake Grease Specifications” on page 21.

#### DANGER

**DO NOT APPLY ANTI-CORROSIVE MATERIAL TO THE BRAKE LININGS OR THE BRAKE DRUM.**

To store parts, apply an anti-corrosive compound or place parts inside anti-corrosive paper or other material that prevents corrosion.
3.3 Wedge Assembly

Replace wedge assembly if:
1. Wedge head or rollers are worn or pitted.
2. Cage is bent.
3. Spring is weak or damaged.

3.4 Actuator Components

**NOTE:** Actuator parts and seals are critical brake parts. Replace scored, damaged, or excessively worn parts. ALWAYS replace the seals.

1. Check the housing bores and the inner and outer diameters of the plungers for nicks, scratches, or corrosion. Replace the plunger when damage is evident.
2. Check the wedge ramps and all slots in the plungers for wear, pitting, or damage. Replace as needed.
3. Check the threads of the adjusting bolt and the actuator. Replace the parts when thread damage is evident.
4. Replace the adjusting bolt when the detent spring is loose or damaged.
5. Check the adjusting pawl and actuator teeth for wear or damage. The pawl and actuator teeth must have sharp, undamaged edges with no displaced metal anywhere on the teeth. Replace damaged or excessively worn parts.
6. Replace the adjusting pawl assembly when the spring is weak or broken.

3.5 Brake Shoes and Linings

1. Check the shoe return springs. Weak return springs can cause many brake problems. The springs must completely retract the shoes when the brakes are released. It is recommended that new return springs are installed at each reline.
2. Check the shoes for damage or distortion. The web must be straight and not twisted off line. The ends of the web that engage the plungers must not be flat or “mushroomed.” Check for cracked or broken welds between the web and table. Check for any cracks in the table or the web.
3. Always replace linings worn past the minimum thickness indicated by the groove or scallops in the lining.
4. Always replace linings that have grease or oil on them.
5. Always reline with the linings specified by the vehicle manufacturer. Vehicle brake systems must have the correct friction material. These requirements can change from vehicle to vehicle.
6. It is recommended that both wheels of a single axle, and all four wheels of a tandem axle, are relined at the same time. Always install the same linings and drums on both wheels of a single axle and on all four wheels of a tandem axle.

3.6 Shoe Hold Down Clip

Check the clips for wear, cracks, or deformation. Replace as needed.
Section 4: Assembly

In the reassembly of the brake, always ensure the adjuster bolt and sleeve assembly are positioned at the leading end of the shoe and the anchor plunger is at the trailing end (see illustrations below).

4.1 Single Actuated Brakes

4.2 Dual Actuated Brakes

Figure 2.10

Figure 2.11
4.3 Lubrication

DANGER

USE OF NON-ORIGINAL PARTS COULD SERIOUSLY AFFECT BRAKE PERFORMANCE. ONLY ORIGINAL AXLETECH SPARE PARTS SHOULD BE USED.

BREATHING THE DUST GENERATED BY FRICTION OF BRAKE LININGS AGAINST DRUM IS HAZARDOUS. ALWAYS WEAR THE ASSIGNED PROTECTIVE EQUIPMENT WHEN SERVICING BRAKE UNITS AND AVOID REMAINING IN THE AREA UNLESS IT IS NECESSARY.

1. Lubricate the locations below using AxleTech 755001105E grease or non-soap (clay base) multi-purpose grease.

   a. Shoe rest pads located on the brake spider
   b. Shoe contact surface on the plungers
   c. Internal surface of the hold-down clips
   d. All self-adjustment components
   e. Wedge assembly cavity

2. Grease inner bores of brake spider plunger housing.
4.4 Assemble Brake

1. Lightly grease the neck of the seal and carefully assemble onto the anchor plunger.

   **NOTE:** The anchor and adjuster seals are different in design. Ensure the right seal is fitted, as follows:

   Anchor plunger = short seal
   Adjuster plunger = long seal

2. Evenly coat with grease the entire cylindrical surface of the anchor plunger. Locate the anchor plunger into housing, ensuring the slot aligns correctly with the guide screw tapped hole. Install guide screw and metal gasket assembly then tighten to torque to 15-25 lbs. ft. (21-34 N·m).
3. Evenly coat with grease the entire cylindrical surface of the adjusting plunger. Locate the adjusting plunger into housing, ensuring the slot aligns correctly with the guide pawl hole. Lightly grease the guide pawl and fit, screwing it in one turn only. Check that the guide pawl moves freely through its bore and with the plunger slot.

**NOTE:** The guide pawl has a raised ridge which locates into a groove in the brake spider.

5. Grease actuator threads and screw onto the adjusting bolt (large chamfer towards bolt head).

**DANGER**

ENSURE THE ACTUATOR IS SCREWED IN THE CORRECT DIRECTION WITH THE LARGER OUTSIDE DIAMETER TOWARDS THE SEAL. CHECK THE CHAMFERS.

THREADS MUST NOT BE TIGHT AS THIS WOULD PREVENT ADJUSTMENT FROM OCCURRING CORRECTLY.

ENSURE THE ADJUSTING BOLT DOES NOT PROTRUDE THROUGH THE ACTUATOR AS THIS WOULD ALSO INHIBIT ADJUSTMENT.

4. Lightly grease the adjuster seal neck and carefully assemble onto adjusting bolt; grease bolt threads.
6. Grease the actuator teeth and outer surface. Then fit adjusting bolt and sleeve into the adjusting plunger.

7. Rotate adjusting bolt clockwise until “clicking” is felt or heard to assure that the adjusting pawl is engaged with the actuator teeth.

8. Torque adjusting pawl assembly to 15-25 lbs. ft. (21-34 N·m).

9. Seat seals using seal driver.

**NOTE:** The shoe retainer on the bolt head must align with the slot in the seal driver.
### 4.5 Assemble Wedge Assembly & Air Chamber

1. Through the wedge bore, fill the housing to the wedge seat with grease. Coat the wedge assembly with grease and fit into bore aligning the raised ridges on the wedge with the corresponding slots in the wedge bore. Press the wedge in by hand up to plunger travel starting point.

![Figure 2.23](image)

2. Thread the collet nut fully onto the air chamber tube with the tapered side of the nut toward the end of the tube. Coat the first three threads on the air chamber with non-hardening thread sealant. Tighten the air chamber until it bottoms in the housing ensuring the collet nut is still free to turn. In order to align air ports unscrew the chamber to less than one full turn, if necessary.

   Tighten the collet nut against the plunger housing by hand. Then use a brass drift and hammer to tighten the collet nut an additional 1/4–1/2 turn.

   Fit the spring brake chamber in a similar manner but ensure the spring is fully caged.

   ![Figure 2.24](image)

3. If removed, refit the dust shield and tighten screws to a torque of 15-25 lbs. ft. (21-34 N·m).

   One piece dust shields must be fitted prior to reassembling air chambers.

   Install new shoe hold down clips, as required, and tighten to 22-30 lbs. ft. (30-40 N·m) torque.

   ![Figure 2.25](image)
4.6 Assemble Brake Shoes

1. Position the shoe return springs in the upper shoe as illustrated and fit the shoes ensuring the short radius marked “Adjuster End” locates against the adjusting bolt assembly and the rolled end against the anchor plunger.

**NOTE:** New springs should be used when installing new shoe and lining assemblies.

**CAUTION**

TAKE CARE NOT TO TOUCH THE SEALS TO PREVENT SEAL DAMAGE DURING THIS OPERATION.

2. Install the return springs.

**WARNING**

SUDDEN RELEASE OF A COMPRESSED SPRING CAN CAUSE PERSONAL INJURY. INSTALL SPRINGS CAREFULLY.

3. Reinstall the brake drum, hub (if removed), and wheel according to the vehicle manufacturer’s instructions.
Section 5: Maintenance

5.1 Lubrication

⚠️ DANGER

**DO NOT APPLY GREASE TO THE BRAKE LININGS OR THE BRAKE DRUM.**

Lubricate the components shown in the following illustration every 100,000 miles (160,000 km), or once a year, or when any of the following occur:

- The seals are replaced.
- The plungers are removed.
- The brake is relined.
- The grease becomes contaminated or hardened.

Use generous amounts of grease to prevent premature wear. However, do not pack the housing with so much grease that the components cannot move freely.

**Wedge Brake Grease Specifications**

Use AxleTech 755001105E grease or non-soap (clay base) multi-purpose grease.

<table>
<thead>
<tr>
<th>Component</th>
<th>NLGI Grade</th>
<th>Grease Description</th>
<th>Outside Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All Actuating Components</td>
<td>1</td>
<td>Clay Base</td>
<td>Down to -40°F (-40°C)</td>
</tr>
<tr>
<td>• All Areas Where Shoes Contact Spider</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Anchor Plungers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Adjusting Bolts or Retainer Hardware</td>
<td>2</td>
<td>Synthetic Oil, Clay Base</td>
<td>Down to -65°F (-54°C)</td>
</tr>
</tbody>
</table>
Lubrication Locations

- Adjusting Bolt Shoe Slot & Threads
- Inside of Seal
- Entire Actuator
- Entire Adjusting Plunger
- Pawl Teeth
- Entire Plunger Below Seal Groove & Anchor Plunger Shoe Slot
- Inside of Seal
- Areas of Spider & Hardware That Contact Shoes
- Fill Housing to Wedge Seat
- Wedge Head & Rollers
- All Plunger Housing Bores
5.2 Preventative Maintenance

**DANGER**

ALWAYS WEAR PROPER EYE PROTECTION AND OTHER REQUIRED PERSONAL PROTECTIVE EQUIPMENT TO PREVENT PERSONAL INJURY WHEN PERFORMING VEHICLE SERVICE.

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. NEVER WORK UNDER A RAISED VEHICLE SUPPORTED BY ONLY A FLOOR JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH SAFETY STANDS. CHOCK THE WHEELS AND MAKE SURE THE UNIT WILL NOT ROLL BEFORE RELEASING BRAKES. A JACK CAN SLIP OR FALL OVER. SERIOUS PERSONAL INJURY CAN RESULT.

Every Two Months or 25,000 - 30,000 Miles (40,000 - 48,000 km)

Remove the plugs from the inspection holes in the dust cover. Check for lining wear and lining to drum clearance. Check for correct operation of the service and parking brake systems as follows:

1. Some linings have a groove in the edge of the lining. Some linings are scalloped at the four inner corners. When linings are worn so the groove or the scallops are not visible, replace the linings.

2. On dual actuated brakes, the linings on both shoes should wear at approximately the same rate. If one shoe wears much faster than the other, see “5.3 Troubleshooting” on page 25 to correct the problem before replacing the linings.

On single actuated brakes, it is normal for the leading shoe to wear faster than the trailing shoe. The leading shoe is the first shoe past the adjuster bolt in the direction of forward wheel rotation.

3. While someone operates the service and parking brake systems, check each brake to make sure it operates correctly. Use a ruler to measure movement at the center of each shoe to determine the lining to drum clearance. Clearance of a shoe must not exceed 0.090-inch (2.3 mm). Total clearance of the two shoes must not exceed 0.120-inch (3.05 mm). When clearance exceeds these limits, the automatic adjusters are not working correctly. See “5.3 Troubleshooting” on page 25 to correct the problem before adjusting the brake.

Once a Year or Every 100,000 Miles (160,000 km)

Remove the wheels and drums and inspect and lubricate the brake as follows:

1. Inspect the air system, brake shoes, linings, drums, spider, and dust shields as described in “Section 3: Clean & Inspect” on page 12.

2. Disassemble the plunger housings. Clean and inspect the housing bores, actuator components, and wedge assembly as described in “Section 3: Clean & Inspect” on page 12. Lubricate the components as described earlier in this section. Assemble the brake using new seals.
Adjust the Brake

⚠️ **DANGER**

THE BRAKE MUST BE MANUALLY ADJUSTED AFTER PERFORMING MAINTENANCE OR SERVICE. DO NOT DEPEND ON THE AUTOMATIC ADJUSTER TO REMOVE THE EXCESSIVE CLEARANCE CREATED WHEN BACKING OFF THE BRAKE DURING SERVICE. THE AUTOMATIC ADJUSTER ARE DESIGNED TO COMPENSATE FOR NORMAL LINING WEAR. DAMAGE TO COMPONENTS AND SERIOUS PERSONAL INJURY CAN OCCUR.

PARK THE VEHICLE ON A LEVEL SURFACE. BLOCK THE WHEELS TO PREVENT THE VEHICLE FROM MOVING. SUPPORT THE VEHICLE WITH SAFETY STANDS. DO NOT WORK UNDER A VEHICLE SUPPORTED ONLY BY JACKS. JACKS CAN SLIP AND FALL OVER. SERIOUS PERSONAL INJURY CAN RESULT.

1. Raise the vehicle so the wheel is off the ground.

⚠️ **WARNING**

SUDDEN RELEASE OF A COMPRESSED SPRING CAN CAUSE PERSONAL INJURY. INSTALL SPRINGS CAREFULLY.

2. If the brake has a spring chamber, cage the spring. Rotate the drum to verify the brake is completely released.

3. Remove the plugs from the adjustment and inspection slots on the dust shield.

4. While rotating the drum, use an adjusting spoon to turn the adjusting bolt until the linings drag heavily on the drum. Turn the adjusting bolt 10-20 teeth in the opposite direction until the lining to drum clearance is 0.020-0.040-inch (0.51-1.02 mm). Operate the brakes. Use a ruler to measure movement at the center of the shoe to determine the lining to drum clearance.

5. Repeat Step 4 for the other adjuster on the brake.

6. If the brake has a spring chamber, release the spring.

**NOTE:** Kit 1184 includes an adjusting spoon, brake spring tool, and seal driver. Tools can also be purchased individually.
## 5.3 Troubleshooting

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Causes</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brakes do not apply</td>
<td>1. Plugged or damaged air lines/valves.</td>
<td>1. Repair or replace air lines or valves.</td>
</tr>
<tr>
<td></td>
<td>2. Plungers seized in housing.</td>
<td>2. Inspect seals, lubricant, &amp; plungers. Service as necessary.</td>
</tr>
<tr>
<td></td>
<td>3. Push rod not connected to wedge.</td>
<td>3. Inspect and correct as needed.</td>
</tr>
<tr>
<td>Brakes do not have enough torque during application</td>
<td>1. Automatic adjusters not working.</td>
<td>1. See “Automatic adjusters not working” on page 27.</td>
</tr>
<tr>
<td></td>
<td>2. Linings worn below minimum thickness, damaged, or missing.</td>
<td>2. Replace linings.</td>
</tr>
<tr>
<td></td>
<td>3. Incorrect lining friction rating.</td>
<td>3. Replace with correct lining.</td>
</tr>
<tr>
<td></td>
<td>4. Air/spring chamber not threaded completely into plunger housing.</td>
<td>4. Install chamber correctly.</td>
</tr>
<tr>
<td></td>
<td>5. Plungers seized in housing.</td>
<td>5. Inspect seals, lubricant, and plungers. Service as necessary.</td>
</tr>
<tr>
<td></td>
<td>6. Grease or oil on linings.</td>
<td>6. Clean or replace linings. Check wheel seals for leaks.</td>
</tr>
<tr>
<td></td>
<td>7. Damaged diaphragm in air chamber.</td>
<td>7. Repair or replace air chamber.</td>
</tr>
<tr>
<td></td>
<td>8. Leaks in the air system.</td>
<td>8. Repair leaks.</td>
</tr>
<tr>
<td>One shoe lining wears faster than the other (Dual actuated models only)</td>
<td>1. Wedge not correctly installed in air chamber.</td>
<td>1. Install wedge and air chamber correctly.</td>
</tr>
<tr>
<td></td>
<td>2. Brake shoes installed backwards.</td>
<td>2. Install shoes correctly.</td>
</tr>
<tr>
<td></td>
<td>3. Weak/damaged shoe return springs.</td>
<td>3. Replace return springs.</td>
</tr>
<tr>
<td></td>
<td>4. Wedge and roller assembly not correctly installed in plunger ramp.</td>
<td>4. Install correctly.</td>
</tr>
<tr>
<td></td>
<td>5. Lining friction ratings do not match.</td>
<td>5. Use matched linings.</td>
</tr>
<tr>
<td></td>
<td>6. One wedge roller is out of cage.</td>
<td>6. Repair or replace wedge assembly.</td>
</tr>
<tr>
<td></td>
<td>7. Grease or dirt on linings.</td>
<td>7. Clean or replace linings. Check wheel seal for leaks.</td>
</tr>
<tr>
<td></td>
<td>8. Loose, worn or missing shoe retaining hardware.</td>
<td>8. Repair or replace retaining hardware.</td>
</tr>
<tr>
<td></td>
<td>10. Automatic adjuster not operating correctly.</td>
<td>10. See “Automatic adjusters not working” on page 27.</td>
</tr>
<tr>
<td></td>
<td>12. Unequal pressure in air chambers.</td>
<td>12. Determine cause and repair or replace as needed.</td>
</tr>
</tbody>
</table>

**NOTE:** The leading shoe lining normally wears faster on single actuated models.
## Section 5: Maintenance

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Causes</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brakes grab or vibrate during application</td>
<td>1. Low air pressure at air chamber.</td>
<td>1. Inspect and repair air delivery system.</td>
</tr>
<tr>
<td></td>
<td>2. Grease or dirt on linings.</td>
<td>2. Clean or replace linings. Check wheel seals for leaks.</td>
</tr>
<tr>
<td></td>
<td>3. Wedge and roller assembly not correctly installed in plunger ramp.</td>
<td>3. Install correctly.</td>
</tr>
<tr>
<td></td>
<td>4. Incorrect lining friction rating.</td>
<td>4. Replace with correct lining.</td>
</tr>
<tr>
<td></td>
<td>5. Linings worn below minimum thickness, damaged or missing.</td>
<td>5. Replace linings.</td>
</tr>
<tr>
<td></td>
<td>6. Shoes bind due to improper assembly or weak, worn out shoes.</td>
<td>6. Install shoes correctly or replace as needed.</td>
</tr>
<tr>
<td></td>
<td>7. Weak/damaged shoe return springs.</td>
<td>7. Replace return springs.</td>
</tr>
<tr>
<td>Brakes drag</td>
<td>1. Spring brake not completely released.</td>
<td>1. Inspect and repair air system and spring chamber.</td>
</tr>
<tr>
<td></td>
<td>2. Weak/damaged return springs.</td>
<td>2. Replace return springs.</td>
</tr>
<tr>
<td></td>
<td>3. Air lines connected to wrong ports.</td>
<td>3. Connect air lines correctly.</td>
</tr>
<tr>
<td></td>
<td>4. Leaks in the air system.</td>
<td>4. Repair leaks.</td>
</tr>
<tr>
<td></td>
<td>5. Air trapped in air chamber when brakes are released.</td>
<td>5. Repair or replace release valves.</td>
</tr>
<tr>
<td></td>
<td>7. Loose wheel bearings.</td>
<td>7. Adjust wheel bearings correctly.</td>
</tr>
<tr>
<td></td>
<td>8. Push rod not connected to wedge.</td>
<td>8. Inspect and correct as needed.</td>
</tr>
<tr>
<td></td>
<td>10. Damaged return spring or cotter pin on wedge assembly.</td>
<td>10. Replace spring or cotter pin.</td>
</tr>
<tr>
<td></td>
<td>11. Grease or dirt on linings.</td>
<td>11. Clean or replace linings. Check wheel seals for leaks.</td>
</tr>
<tr>
<td></td>
<td>12. Loose, worn or missing shoe retaining hardware.</td>
<td>12. Repair or replace retaining hardware.</td>
</tr>
</tbody>
</table>
### Section 5: Maintenance

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Causes</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Automatic adjusters not working</strong></td>
<td>1. Damaged shoe retainer/detent clip on head of adjusting bolt.</td>
<td>1. Replace adjusting bolt.</td>
</tr>
<tr>
<td></td>
<td>2. Adjusting bolt threads extend through bottom of actuator.</td>
<td>2. Install adjusting bolt so threads do not extend past bottom of actuator.</td>
</tr>
<tr>
<td></td>
<td>3. Adjusting bolt threaded too tightly.</td>
<td>3. Make sure bolt turns freely.</td>
</tr>
<tr>
<td></td>
<td>4. Brake shoes installed backwards.</td>
<td>4. Install brake shoes correctly.</td>
</tr>
<tr>
<td></td>
<td>5. Foreign material on threads of adjusting bolt or actuator.</td>
<td>5. Clean or replace adjusting bolt and actuator. Replace seals as needed.</td>
</tr>
<tr>
<td></td>
<td>6. Lack of lubrication, contamination, corrosion, damaged seals.</td>
<td>6. Replace adjuster parts and seals as needed. Lubricate at scheduled intervals.</td>
</tr>
<tr>
<td></td>
<td>7. Damaged teeth on pawl or actuator.</td>
<td>7. Replace pawl and plunger assembly.</td>
</tr>
<tr>
<td></td>
<td>9. Weak/damaged shoe return springs.</td>
<td>9. Replace return springs.</td>
</tr>
<tr>
<td></td>
<td>10. Pawl seized in its bore.</td>
<td>10. Clean and replace pawl or housing as needed.</td>
</tr>
<tr>
<td></td>
<td>11. Anchor plungers installed in wrong locations.</td>
<td>11. Install plungers in correct locations as shown in Figure 4.1.</td>
</tr>
<tr>
<td><strong>Spring brake does not hold</strong></td>
<td>1. Broken power spring.</td>
<td>1. Repair or replace assembly as described by manufacturer.</td>
</tr>
<tr>
<td></td>
<td>2. Power spring unable to expand completely (spring still caged).</td>
<td>2. Determine cause and repair or replace as described by manufacturer.</td>
</tr>
<tr>
<td></td>
<td>3. Hold-off air not being exhausted.</td>
<td>3. Determine cause and repair or replace as described by manufacturer.</td>
</tr>
<tr>
<td></td>
<td>4. Air chamber assembly not threaded completely into plunger housing.</td>
<td>4. Correctly thread air chamber into housing. Tighten collet nut to prevent loosening.</td>
</tr>
<tr>
<td></td>
<td>5. Brakes not adjusted correctly.</td>
<td>5. Adjust brakes correctly.</td>
</tr>
<tr>
<td></td>
<td>6. Grease or dirt on linings.</td>
<td>6. Clean or replace linings. Check wheel seals for leaks.</td>
</tr>
</tbody>
</table>
Appendix

Torque Specifications

Drum to Lining Clearance
0.5 - 1.0 mm

15-25 lbs. ft.
(21-34 N·m)

22-30 lbs. ft.
(30-40 N·m)

15-25 lbs. ft.
(21-34 N·m)