SECTION ONE: AIR DISC BRAKE OVERVIEW

1.1 DESCRIPTION
Bendix® ADB22X™ and ADB22X-V™ Air Disc Brakes (ADB) use a floating caliper design to provide foundation braking on all axles of heavy commercial vehicles, buses and trailers. Bendix Air Disc Brakes provide safety and performance as well as ease of service.

The ADB22X disc brakes mount to the axle’s anchor plate (torque plate) using fasteners that are installed parallel to the axle, while the anchor-plate fasteners used for the Bendix® ADB22X-V™ air disc brakes install at right angles to the axle.

Available with or without a combination spring brake unit, these brakes may also include optional wear sensors and wear diagnostic equipment.

FIGURE 1 - BENDIX® ADB22X™ AIR DISC BRAKES

1.2 Air Disc Brake Identification
Locate the identification label near the guide pin housing. See below for information about the label fields used.

FIGURE 2 - TYPICAL PART NUMBER LABEL LOCATION

FIGURE 3 - PART NUMBER LABEL INFORMATION

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SAFE MAINTENANCE PRACTICES

WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following general precautions should be observed at all times:

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels. Always wear safety glasses. Where specifically directed, the parking brakes may have to be released, and/or spring brakes caged, and this will require that the vehicle be prevented from moving by other means for the duration of these tests/procedures.

2. Stop the engine and remove ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, EXTREME CAUTION should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically charged components.

3. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.

4. If the work is being performed on the vehicle’s air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system or a dryer reservoir module, be sure to drain the purge reservoir.

5. Following the vehicle manufacturer’s recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.

6. Never exceed manufacturer’s recommended pressures.

7. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.

8. Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.

9. Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.

10. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.

11. For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.

WARNING: Not all wheels and valve stems are compatible with Bendix Air Disc Brakes. Use only wheels and valve stems approved by the vehicle manufacturer to avoid the risk of valve stem shear and other compatibility issues.

WARNING: AVOID CREATING DUST. POSSIBLE CANCER AND LUNG DISEASE HAZARD.

While Bendix Spicer Foundation Brake LLC does not offer asbestos brake linings, the long-term affects of some non-asbestos fibers have not been determined. Current OSHA Regulations cover exposure levels to some components of non-asbestos linings, but not all. The following precautions must be used when handling these materials.

- Avoid creating dust. Compressed air or dry brushing must never be used for cleaning brake assemblies or the work area.
- Bendix recommends that workers doing brake work must take steps to minimize exposure to airborne brake lining particles. Proper procedures to reduce exposure include working in a well-ventilated area, segregation of areas where brake work is done, use of local filtered ventilation systems or use of enclosed cells with filtered vacuums. Respirators approved by the Mine Safety and Health Administration (MSHA) or National Institute for Occupational Safety and Health (NIOSH) should be worn at all times during brake servicing.
- Workers must wash before eating, drinking or smoking; shower after working, and should not wear work clothes home. Work clothes should be vacuumed and laundered separately without shaking.
- OSHA Regulations regarding testing, disposal of waste and methods of reducing exposure for asbestos are set forth in 29 Code of Federal Regulations §1910.001. These Regulations provide valuable information which can be utilized to reduce exposure to airborne particles.
- Material Safety Data Sheets on this product, as required by OSHA, are available from Bendix. Call 1-800-247-2725 and speak to the Tech Team or e-mail techteam@bendix.com
1.3 Rotor identification

See Figure 4 to help you identify which type of rotor is used on the axle being inspected. Note that the maintenance inspection procedure will depend on the type of rotor installed.

**FIGURE 4 - ROTOR IDENTIFICATION**

CAUTION: Rotors may not be mixed on a single axle: axles are only permitted to have all conventional or all splined disc rotors.

1.4 Wear Sensor Identification

See Figure 5 for the electronic wear sensor that may be present.

**FIGURE 5 - ELECTRONIC WEAR INDICATOR COMPONENTS**

Consult the instruction sheet included with wear indicator kits for installation information.

1.5 Operation

Bendix air disc brakes convert air pressure into braking force. (See Figure 6.) When the vehicle brakes are applied, air enters the service brake chamber through the supply port, applying pressure within the diaphragm. The pressure expands the diaphragm — applying force to, and moving, the pressure plate and push rod forward. The push rod acts against a cup in the internal lever which pivots on an eccentric bearing moving the bridge. Moving against a return spring, the bridge transfers the motion to two threaded tubes and tappets, which move the inner brake pad. The inner brake pad (from its normal position of having a running clearance between it and the rotor) moves into contact with the brake rotor. Further movement of the bridge forces the caliper — sliding on two stationary guide pins — away from the rotor. That, in turn, pulls the outer brake pad into the rotor. The clamping action of the brake pads on the rotor applies braking force to the wheel.

**FIGURE 6 - CROSS-SECTION VIEW SHOWING BRAKE OPERATION**

1.5.1 Brake Release and Adjustment

When the vehicle brakes are released, the air pressure in the service brake chamber is exhausted and the return springs in the chamber and the bridge return the air disc brake to a neutral, non-braked position. To maintain the running clearance gap between the rotor and the brake pads over time, the non-braked position is mechanically adjusted by a mechanism in the caliper. The adjustment mechanism operates automatically whenever the brakes are activated, to compensate for rotor and brake pad wear and to keep the running clearance constant. During pad or rotor maintenance, the technician manually sets the system’s initial non-braked position. The total running clearance (the sum of clearances on both sides of the rotor) should be between 0.024 to 0.043 in. (0.6 to 1.1 mm).
FIGURE 7 - SECTIONAL VIEWS
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- Adjuster Caps .......................... 37
- Adjuster Unit .......................... 23
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- Brass Bushing .......................... 7
- Bridge .................................. 17
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- Cap ...................................... 68
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- Chain .................................... 30
- Chain Wheel ............................ 32
- Cap ...................................... 10
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- Guide Sleeve ............................ 6
- Inner Boot .............................. 9
- Inner Seal ................................ 22
- Lever .................................... 19
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- Pad Assembly ........................... 12
- Pad Holder Spring ..................... 12/2
- Pad Retainer ............................ 11
- Pad Retainer Pin ...................... 44
- Ring ...................................... 58
- Service Actuator ....................... 18/2
- Shear Adapter ........................... 61
- Splined Disc Hardware ............... 18/1
- Splined Disc® Rotor ................. SD-1, SD-2, SD-3
- Splined Disc® Rotor (SD) ........... SD-1
- Splined Disc® Rotor Hardware SD-1, SD-2, SD-3
- 2 A Bendix® ADB22X™ Anchor Plate
- 2 B Bendix® ADB22X-V™ Carrier
- 18/1 Spring Brake Actuator ............ 18/1
- 18/2 Service Actuator ................. 18/2
- 26 Spring Clip ........................... 26
- 37 Adjuster Caps (2 styles supplied in kits)
- 4 Guide Pin .............................. 4
- 5 Guide Pin .............................. 5
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- 41 Shear Adapter .......................... 41
- 42 Pin ...................................... 42
- 61 Shear Adapter .......................... 61
- 62 Pin ...................................... 62
- See Section 5.2 for exploded view of electronic wear indicator.
**SECTION TWO: PREVENTIVE MAINTENANCE SCHEDULE AND WHEEL-ON INSPECTIONS**

### 2.0 PREVENTIVE MAINTENANCE

Regular inspection and maintenance of air disc brake components is an important part of vehicle maintenance.

The maintenance practices outlined here are recommended in addition to all standard industry practices (including daily pre-trip inspections.) Also, see the vehicle's manual for recommendations. Keep track of the results of your maintenance inspections to assist you in determining the ideal maintenance intervals for the vehicle.

**Use the table below for a guide to maintenance interval planning,** however, depending on the particular vehicle's use, more frequent checks of the components may be necessary.

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<td>2.2</td>
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</tr>
</tbody>
</table>

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#### Table 1: Inspection Period

<table>
<thead>
<tr>
<th>(4 to 5 times during the pad lifetime)</th>
<th>About every four (4) months for over-the-road applications:</th>
<th>About every three (3) months for higher-duty applications:</th>
<th>At least once every year (and at every pad replacement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>When you check the tire pressures</td>
<td>e.g. line haul, RV, open-highway coaches, etc.</td>
<td>e.g. pick-up &amp; delivery, off-highway, construction, logger, concrete mixer, dump truck, city transit bus, refuse, school buses, etc.</td>
<td>At the very least, every four (4) months</td>
</tr>
</tbody>
</table>

* * For vehicles with electronic wear indicators, use the dash indicator(s) and/or the hand-held diagnostic tool to regularly monitor the pad wear.  

See Section 5.2.

---

#### Inspections with the wheel mounted (Sections 2.1 - 2.3)

<table>
<thead>
<tr>
<th>Inspect the pad thickness by checking the mechanical wear indicators*. See Section 2.1.</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect the running clearances using the quick inspection technique. See Section 2.2.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Inspect the visible part of the rotors for cracks, etc. See Section 2.3.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

#### Inspections with wheel removed (Section 4)

<table>
<thead>
<tr>
<th>Inspect the pads and entire rotor surfaces for cracks, etc. (Bendix® splined disc® rotors: Inspect retaining hardware and check torques) See Section 2.3.</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect the running clearances and adjuster operation. See Sections 2.2 and 4.2.</td>
<td>✓</td>
</tr>
<tr>
<td>Inspect the caliper travel. See Section 4.1.</td>
<td>✓</td>
</tr>
<tr>
<td>Inspect the tappet and boot assemblies. See Section 4.6.</td>
<td>✓</td>
</tr>
<tr>
<td>Inspect all caps, hoses, and brake exterior for damage etc.</td>
<td>✓</td>
</tr>
</tbody>
</table>
2.1 BRAKE PAD AND ROTOR INSPECTIONS

Visual checks of the condition of the brake pad/rotor wear can be made without removing the wheels. Where dust guards are not used, the top of the pads and part of the rotor are visible through the opening at the top of the brake. Other visible portions of the rotor can be inspected at the same time.

Unless a vehicle has been stored for some time, the main rotor surfaces that contact the pads will always appear to be shiny. Surface rust on these surfaces would indicate a malfunctioning brake that should be inspected immediately.

Pads are 1.181 in. (30 mm.) thick when new and must be replaced when they reach 0.433 in. (11 mm.). Rotors are 1.77 in. (45 mm.) thick when new and must be replaced when they reach 1.46 in. (37 mm.). See Section 4.3 for further inspection criteria.

2.1.1 Electronic Wear Indicators

Use the dash indicator(s) and/or a hand-held diagnostic tool to regularly monitor the pad wear. (See Section 5.2.)

2.1.2 Mechanical Wear Indicators

See Figure 9 for the location of the mechanical wear indicators. There are two types (See Figure 10 for Style A and Figure 11 for Style B).

Note: These mechanical wear indicators do not constitute “out-of-service” criteria. These inspections only show when to schedule a full wheel-removed inspection of the brake pads and rotor. The thicknesses of the pad and rotor will both affect the wear indicator position at which maintenance is actually needed.
2.1.3 Rotor Quick Inspection

See Figure 12. See the various potential rotor conditions that you may find. See the criteria below for whether the rotor needs to be replaced and/or scheduled for a full inspection.

2.2 RUNNING CLEARANCE QUICK INSPECTION

CAUTION: Follow all safe maintenance practices.

On level ground, with the wheels chocked and the parking brake temporarily released, check for movement of the brake caliper. This small movement, less than 0.80” (2 mm) - approximately the thickness of a nickel - in the inboard/outboard direction indicates that the brake is moving properly on its guide pins.

If the caliper has no movement or appears to move greater than the distances noted above, a full wheel-removed inspection will be necessary (See Section 4.1).

FIGURE 12 - EXAMPLES OF ACCEPTABLE AND NON-ACCEPTABLE ROTOR CRACKS AND GROOVES

- For **standard Bendix rotors**, cracks running in a radial direction — like spokes of a wheel (see Area H) — less than 0.06 in. (1.5 mm) deep or wide are acceptable if they do not reach either edge (see G). Cracks are only acceptable if the length of the crack is less than 75% of dimension “f” (the width of the rotor contact area).

- For **Bendix Splined Disc rotors**, radial cracks are only acceptable if they are less than 0.04 in. (1.0 mm) deep or wide and if they do not reach either edge (see G). Crack lengths must be less than 75% of dimension “f” (the width of the rotor contact area).

In addition, follow the recommendations of the vehicle manufacturer.

**Note:** Axles should have either all Bendix Splined Disc (or all conventional) rotors.

FIGURE 13 - CALIPER RUNNING CLEARANCE
(FIGURE DOES NOT SHOW WHEEL)
FIGURE 14 - TROUBLESHOOTING BENDIX AIR DISC BRAKES

SECTION THREE: TROUBLESHOOTING PROCEDURE FLOWCHART

Air Disc Brake Inspection

Follow safe maintenance practices, chock wheels. Engage spring brakes and cage spring. Release spring brakes and drain air from system.

Raise axle, spin the wheel by hand.

Does the wheel turn smoothly?

NO

Is the spring brake fully/partially applied?

NO

Check running clearance (4.1) - OK?

YES

Check running clearance (4.1) - OK?

NO

Check running clearance (4.1) - OK?

YES

Check adjuster (4.2) - OK?

NO

Check adjuster (4.2) - OK?

YES

Check Pad and rotor wear (4.3-4.4) - OK?

NO

Replace components as needed with genuine Bendix parts.

YES

Disc brake OK

NO

Tightness not due to air disc brake. See vehicle manual.

Replace guide pins (5.6) OR replace caliper/carrier assembly (5.3)

Replace caliper/carrier assembly (5.3)

Drain air pressure from system. Re-start test after caging spring brakes.

Replace caliper/carrier assembly (5.3)

Check running clearance (4.1) - OK?

YES

Check running clearance (4.1) - OK?

YES

Check adjuster (4.2) - OK?

NO

Check running clearance (4.1) - OK?

NO

Check running clearance (4.1) - OK?

NO

Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

NO

Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

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Check adjuster (4.2) - OK?

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Check adjuster (4.2) - OK?

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Check running clearance (4.1) - OK?

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Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

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Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

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Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

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Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

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Check adjuster (4.2) - OK?

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Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

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Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

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Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

NO

Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

NO

Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

NO

Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?

NO

Check adjustor (4.2) - OK?

YES

Check running clearance (4.1) - OK?

NO

Check adjuster (4.2) - OK?

YES

Check running clearance (4.1) - OK?
4.0 WHEEL-OFF INSPECTIONS

CAUTION: During these inspections, follow all safe maintenance practices, including those on page two of this service manual. Also, follow the vehicle manufacturer’s recommendations. When working on foundation brakes, be sure that the vehicle is on level ground, that the vehicle is parked by other means than the foundation brakes, and that the wheels are chocked.

4.0.1 Wheel Removal and Re-Installation

Refer to the vehicle manufacturer’s recommendations for removing the wheel.

Note: When removing the wheel, inspect first to see that there is no contact between the caliper and axle, vehicle, chassis sections or carrier, etc. that may be impeding the free movement of the caliper.

WARNING: Not all wheels and valve stems are compatible with Bendix Air Disc Brakes. Use only wheels and valve stems approved by the vehicle manufacturer to avoid risk of valve stem shear and other compatibility issues. After re-installing a wheel according to the vehicle manufacturer’s recommendations, please ensure that there is sufficient clearance between the tire inflation valve stem, the caliper and the wheel rim, to avoid damage.

4.1 CALIPER MOVEMENT TEST

CAUTION: Follow all safe maintenance practices.

Remove the wheel. With the spring brakes caged, push the caliper assembly inboard on its guide pins. Using a suitable tool (for example a large flat-blade screwdriver), press the inboard pad (12) away from the tappets and check the gap between each of the tappets and the inboard pad backplate. The gap should be between 0.024 in. (0.6 mm) and 0.043 in. (1.1 mm). If the movement is within the range given, the test is complete.
4.2 ADJUSTER MECHANISM INSPECTION

CAUTION: Follow all safe maintenance practices.

Aside from the normal maintenance schedule, the adjuster mechanism inspection that follows is also carried out when the Caliper Movement Test (4.1) finds that the running clearance is too small or too large.

4.2.1 With the spring brake released (or caged), remove the adjuster cap (37) using the tab, taking care not to move the shear adapter (61). Note: One of two styles of adjuster cap (stamped metal or plastic adjuster cap) may be used.

![Adjuster Cap Location](figure17.jpg)

**FIGURE 17 - ADJUSTER CAP LOCATION**

23 Adjuster

61 Adapter

37 Cap

Tab

![Exploded View of Adjuster and Adapter](figure18.jpg)

**FIGURE 18 - EXPLODED VIEW OF ADJUSTER AND ADAPTER**

For illustration purposes, the exploded view (Figure 18) shows the adjuster (23) and shear adapter (61) separated. When using the adjuster mechanism, always have the shear adapter installed on the adjuster.

4.2.2 Using a 10 mm. six-point box wrench, turn the Shear Adapter (61) **counter-clockwise** and listen for the sound of 3 clicks as the mechanism backs-off (increases) the running clearance. Note: Do not use an open-ended wrench as this may damage the adapter. See Figure 20.

**FIGURE 20 - BACKING-OFF (INCREASING) THE RUNNING CLEARANCE**

If the shear adapter fails, you may attempt a second time with a new (unused) shear adapter.

*Note: Always double-check that the spring brake is released (where applicable) if a shear adapter fails; if this step was missed, the shear adapter will break off, and it may appear that the caliper is seized.*

In cases where a second failure of the shear adapter confirms that the adjustment mechanism is seized, the caliper must be replaced.

![Apply moderate applications of the brakes: the wrench moves clockwise as the running clearance is diminished](figure21.jpg)

**FIGURE 21 - APPLYING MODERATE APPLICATIONS OF THE BRAKES: THE WRENCH MOVES CLOCKWISE AS THE RUNNING CLEARANCE IS DIMINISHED**

4.2.3 Where the adjuster mechanism is able to be backed-off normally, position a box-end wrench on the shear adapter so that it can turn clockwise freely without coming into contact with parts of the vehicle (See Figure 21). Make five to ten moderate applications of the brakes [at about 30 psi (2 Bar)], and observe that the box-end wrench or socket should turn clockwise in small increments.

**NOTE:** As the number of applications increases, the turning movement will decrease (as the brake reaches its normal calibration point).

If the box-end wrench does not: (a) turn at all; (b) turns only with the first application; or (c) turns forward and backward with every application, the automatic adjuster has failed and the caliper/carrier assembly must be replaced.

After completing these wheel-off tests, Bendix recommends installing a new adjuster cap (lightly greased using white, lithium-based grease) when returning the brake to service. Ensure that the tab is in the position shown in Figure 19.
4.3-4.4 BRAKE PADS AND ROTORS
CAUTION: Follow all safe maintenance practices.

If electronic wear sensors are present, see Section 5.2.
If dust covers are present, see Section 5.1.

See Figure 23. While pressing down against the pad retaining bar (11), remove and retain the clip (26), washer (45) and pin (44). Remove the pad retainer bar (11). Bendix recommends that these items should be replaced with new (See available kits and parts, Section 5.0).

Follow the steps in Section 4.2 for backing-off the adjuster mechanism. Slide the caliper inboard then outboard to permit easy removal of the brake pads.

![Diagram of brake pad and rotor dimensions]

A Thickness of a new pad (1.181 in.) (30 mm.).
B Backing plate thickness (0.360 in.) (9 mm.)
C Minimum thickness of friction material (0.080 in.) (2 mm.)
D Minimum thickness of a worn pad (0.433 in.) (11 mm.); replace pads.
E Thickness of a new rotor (1.77 in.) (45 mm.). Minimum rotor thickness (1.46 in.) (37 mm.)

FIGURE 22 - PAD AND ROTOR DIMENSIONS
See Figure 22 for initial brake pad and rotor dimensions, as well as minimum acceptable dimensions.

4.3 INSPECT THE BRAKE PADS

Regular inspection of the brake pads (even for vehicles that use an electronic wear indicator) is an important part of vehicle maintenance.

4.3.1 See Figure 22. If the thickness of the friction material — dimension “C” — is less than 0.080 in. (2 mm.), the pads must be replaced.

Bendix® ADB22X™, ADB22X-V™ air disc brakes use 0.35 in. (9 mm.) backing plates, so dimension “D” (the combined pad and backing plate thickness) must be a minimum of 0.43 in. (11 mm.).

4.3.2 Check for uneven end-to-end pad wear. If the difference in wear is greater than 0.080 in. (2 mm.), replace the brake pads and also service the guide pins (See Section 5.4).

4.3.3 If the difference between the inboard and outboard pad thickness is greater than 0.138 in. (3.5 mm.), replace the brake pads and service the guide pins. (The uneven wear indicates that the caliper is not sliding freely on the guide pins.)

If the pad thickness is within the acceptable range, inspect the pad surface. (See Figure 24).

![Minor and major damage examples]

Minor damage at the edges is permitted, but replace the pads if major damage on the surface of the pad is found.

When replacing brake pads, Bendix strongly recommends that all the brake pads on an axle be replaced at one time. See Section 5.1 for the pad replacement procedure. Also see the vehicle manufacturer’s recommendations found in the operator’s manual.
Bendix air disc brakes are precision-engineered braking mechanisms. The “friction couple” braking characteristics have been carefully optimized — and the rotor design and materials have been matched with special formulation brake pads for optimal performance. In all cases, use brake pads with the type of backing plate and lining material originally supplied by the vehicle manufacturer.

CAUTION: When replacing brake pads and rotors, use only Bendix® brand replacement pads and rotors and/or those approved by the OEM. Non-approved replacement disc pads or rotors can cause excess wear to brake components, and can increase the risk of rotors cracking, etc.

4.4 INSPECT THE ROTOR

CAUTION: Follow all safe maintenance practices.

Identify if the rotor is a Bendix® Splined Disc®, or conventional rotor (See Section 1.03). Rotors should be inspected regularly (See Section 2.0 for recommended inspection schedule) and at each pad change.

4.4.1 Measure the thickness of the brake rotor at the thinnest point (Dimension “E” in Figure 22). Avoid measuring near the edge of the rotor as minor burrs may result in inaccurate measurement. Replace the rotor when the minimum thickness of 1.46 in. (37 mm.) is reached.

4.4.2 Inspect the rotor surface. See Figure 25. The type of rotor, and also the size, depth and direction of the imperfections, must all be considered.

NOTE: If surface wear conditions F through J are in the permitted range, the rotor is still usable until it reaches the minimum acceptable thickness of 1.46 in. (37 mm.).

FIGURE 25 - EXAMPLES OF ACCEPTABLE AND NON-ACCEPTABLE ROTOR CONDITIONS

- F
  No action is needed for small cracks spread over the surface (e.g. Area F)

- G
  Cracks reaching either edge of the rotor are not acceptable for either type of rotor

- H
  - For standard Bendix rotors, cracks running in a radial direction — like spokes of a wheel (see Area H) — less than 0.06 in. (1.5 mm) deep or wide are acceptable if they do not reach either edge (see G). Cracks are only acceptable if the length of the crack is less than 75% of dimension “f” (the width of the rotor contact area).
  
  - For Bendix Splined Disc rotors, radial cracks are only acceptable if they are less than 0.04 in. (1.0 mm) deep or wide and if they do not reach either edge (see G). Crack lengths must be less than 75% of dimension “f” (the width of the rotor contact area).

- J
  Circumferential grooves, as in Area J, are acceptable if less than 0.06 in. (1.5 mm) deep.

In addition, follow the recommendations of the vehicle manufacturer.

Note: Axles should have either all Bendix Splined Disc (or all conventional) rotors.
4.4.3 Machining (Grinding or Turning) Rotors

Bendix rotors are normally service-free. In the case of severe grooving of the entire friction surface, however, CONVENTIONAL ROTORS may be turned when changing pads, to increase the load-bearing surface.

MACHINING OF BENDIX® SPLINED DISC® ROTORS IS NOT PERMITTED.

CAUTION: Always maintain air disc brake pads and rotors within specifications. Excessive pad or rotor wear will degrade braking performance.

Periodic inspection of the Bendix Splined Disc attachment hardware is recommended to ensure optimum braking performance. Bendix recommends verifying the torque on the spring element fasteners whenever a brake inspection is performed.

⚠️ WARNING! AFTER MACHINING/TURNING, THE MINIMUM ROTOR THICKNESS MUST BE AT LEAST 1.535 - 1.575IN. (39 - 40MM.). ALSO, CHECK THE VEHICLE MANUFACTURER’S RECOMMENDATIONS. FAILURE TO COMPLY MAY RESULT IN BRAKE FAILURE AND IN SERIOUS INJURY OR DEATH. MACHINING OF BENDIX SPLINED DISC ROTORS IS NOT PERMITTED.

4.4.4 Rotor Replacement

An axle is permitted to have only all Bendix Splined Disc, or all conventional, rotors.

When replacing rotors, be sure to adhere to the vehicle manufacturer’s recommendations, including bolt tightening torques. It is recommended to install only Bendix® brand rotors, and also that the pads should be replaced (as an axle set) at the same time.

Non-Bendix® brand rotors. If a non-Bendix® brand rotor is used, confirm that it complies to the vehicle manufacturer’s recommendations.

CAUTION: The use of non-approved brake rotors may reduce levels of safety and invalidate the warranty.

See Section 5.7 for re-installation procedures.

4.5 GUIDE PIN BEARING INSPECTION

CAUTION: Follow all safe maintenance practices.

This guide pin inspection should be carried out if the technician cannot move the caliper during a Caliper Movement Test (Sections 2.2 and/or 4.1).

Measure the “play” (range of movement) in the guide pin bearings:

4.5.1 See Figures 28 and 29. With the wheel removed, remove the pad retainer bar (11). Temporarily replace the pads with two new pads (12). Attach a magnetic dial-gauge holder to the carrier (2) on the short bearing side of the caliper (1). Use the measuring point on the caliper (1) - see the callout in Figure 29. Press the caliper in the direction of the carrier (2) and set the dial-gauge to zero.
4.5.2 Place a suitable tool (e.g. a large flat-blade screwdriver) between carrier (2) and caliper (1) forcing them in opposite directions, and read the maximum value on the dial-gauge. See Figure 27.

If the value is greater than 0.078 in. (2.0 mm), replace the guide pin bushings (See Section 5.6) OR replace the caliper/carrier assembly (See Section 5.3).

Measure the range of travel along the guide pin bearings:

4.5.3 Remove the Pads (See Section 4.3). Using hand pressure only (no tools), the caliper (1) should slide freely along the whole length of the guide pins. This movement should be at least 0.95 inch (25 mm) when the pads are not present. If the movement is less than this amount, replace the caliper/carrier assembly.

Inspect the guide pin inner boots:

4.5.4 See Figures 28 and 29. With the pads removed, slide the carrier by hand to the inboard position (See Figure 28). By looking through the opening where the pads are installed — and also from below — inspect the inner boot (9) for each of the guide pins. INSPECT FOR DAMAGE, CUTS AND CRACKS. Replace damaged boots immediately to prevent dirt and/or moisture affecting the movement of the guide pins (See Section 5.4). Damaged or corroded guide pins will impair the operation of the brake.

In addition, during installation, the boots are compressed to minimize the amount of air trapped within them. Observe as you move the carrier back towards the outboard position; the boots should not appear to expand outwards due to trapped air — this is a sign of damaged boots. The boots should normally (due to their concertina construction) contract back into place as the caliper moves on the guide pins.

4.6 TAPPET AND BOOT ASSEMBLY INSPECTION

4.6.1 In order to inspect the tappet and boot assembly, remove the pads (12) (See Sections 4.3 or 5.2) and advance the shear adapter (61) clockwise.

CAUTION: NEVER EXTEND THE TAPPET MORE THAN 1.75 in. (44.5 mm). See Figure 29. Over-extending the tappet will result in the tappet losing engagement with the synchronizing mechanism. Since the mechanism can only be set at the manufacturing plant, the caliper/carrier assembly must be replaced if this happens.

4.6.2 INSPECT THE TAPPET AND BOOT ASSEMBLIES (13) FOR EVIDENCE OF DAMAGE, CUTS, CRACKS, AND EVIDENCE OF CORROSION, ETC. The penetration of dirt and moisture into the brake can lead to corrosion and impair the operation of the brake. When installed, the boots are compressed to minimize the amount of air trapped within them. Observe as you move the tappet back using the shear adapter; the boots should not appear to expand outwards due to trapped air — this is a sign of damaged boots. The boots should normally (due to their concertina construction) contract back into place as the tappets move. Damaged boots can lead to the penetration of dirt and moisture, and can lead to corrosion and impair the operation of the brake. Replace as necessary (See Section 5.5).

Extend LESS THAN 1.75 in. (44.5 mm.)

FIGURE 29 - PERMITTED TAPPET EXTENSION

Where the tappets and boots pass the inspection, retract the tappets using the shear adapter.

Follow the reinstallation steps for the brake pads (See Section 5.2).
SECTION FIVE: MAINTENANCE KITS AND PROCEDURES

### Section Five

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<td>5.6 Guide Pin and Boot Assemblies</td>
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<td>5.7 Bendix® Splined Disc® Hub Rotor</td>
<td>35-37</td>
</tr>
</tbody>
</table>

**FIGURE 30 - EXPLODED VIEW - BENDIX® ADB22X™ AND ADB22X-V™ AIR DISC BRAKES**
### 5.0 MAINTENANCE KITS

Below is a list of some of the available kits. See Figure 30 for an exploded view showing the components listed.

<table>
<thead>
<tr>
<th>Kit</th>
<th>See Section</th>
<th>Piece Number</th>
<th>Components Included in Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust Shields</td>
<td>Section 5.1</td>
<td>803129</td>
<td>Trailer Axle Pad &amp; Rotor Shield Kit</td>
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<td></td>
<td></td>
<td>803130</td>
<td>Drive Axle Pad &amp; Rotor Shield Kit</td>
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<td></td>
<td></td>
<td>802948</td>
<td>Steer Axle Pad Shield Kit</td>
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<tr>
<td>Pad Kit (axle set)</td>
<td>Section 5.2</td>
<td>802078</td>
<td>Pad retainer bars (5), set of four pads and holder springs (12), adjuster caps (37), pad retainer pins (44), washers (45), shear adapters (61).</td>
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<tr>
<td>Spring Clip Kit (box of 25)</td>
<td>NA</td>
<td>803151</td>
<td>Spring clips (26)</td>
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<tr>
<td>Shear Adapter (box of 10)</td>
<td>NA</td>
<td>802455</td>
<td>Shear adapters (61)</td>
</tr>
<tr>
<td>Tappet/Boot Kit (wheel end kit)</td>
<td>Section 5.5</td>
<td>802119</td>
<td>Tappet and boot assembly (13), tappet bushing (161), inner seal (22)</td>
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<td>Adjuster Cap (non-wear sensing - box of 10)</td>
<td>NA</td>
<td>802643</td>
<td>Adjuster caps (37)</td>
</tr>
<tr>
<td>Guide Pin, Seal and Boot Kit (wheel end kit)</td>
<td>Section 5.6</td>
<td>803114</td>
<td>Ring (58), inner boot (9), brass bushing (7), guide pin (5), caliper bolt (40), cap (10), guide sleeve (6), guide pin (4), caliper bolt (39), cap (68)</td>
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<tr>
<td>Guide Pin Grease</td>
<td>NA</td>
<td>1114525</td>
<td>White (5 grams)</td>
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<td></td>
<td></td>
<td>K021964</td>
<td>White (500 grams)</td>
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<td>Service Actuator</td>
<td>Section 5.4</td>
<td>K028039</td>
<td>Bendix® Type 14 Universal [Service brake actuator (18/2), actuator hardware]</td>
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<td>K028236</td>
<td>Bendix® Type 16 Universal [Service brake actuator (18/2), actuator hardware]</td>
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<td></td>
<td>K028222</td>
<td>Bendix® Type 18 Universal [Service brake actuator (18/2), actuator hardware]</td>
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<td></td>
<td>K028225</td>
<td>Bendix® Type 20 Universal [Service brake actuator (18/2), actuator hardware]</td>
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<td>Spring Brake Actuator</td>
<td>Section 5.4</td>
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<td>K025669</td>
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<td>K026451</td>
<td>Bendix® Type 18/24 Double Diaphragm Style Trailer Universal [Spring brake actuator (18/2), actuator hardware]</td>
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<td>Caliper Kit (rationalized)</td>
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<td>K019174</td>
<td>Steer and Drive Axle &quot;A&quot; [Caliper kit (1)]</td>
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<td>K019175</td>
<td>Steer and Drive Axle &quot;B&quot; [Caliper kit (1)]</td>
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<td></td>
<td>K019180</td>
<td>Trailer Axle &quot;A&quot; [Caliper kit (1)]</td>
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<td></td>
<td>K019181</td>
<td>Trailer Axle &quot;B&quot; [Caliper kit (1)]</td>
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<td>Carrier Kit</td>
<td>Sections 5.3 &amp; 5.6</td>
<td>K051853</td>
<td>Steer and Drive Axle, Axial (Ring (58), inner boot(9), caliper bolt (40), cap (10), shear adapter (61), adjuster caps (37), ADB22X carrier complete (1), caliper bolt (39), cap (68),</td>
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<td></td>
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<td>Caliper/Carrier Kit</td>
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<td>Steer and Drive Axle &quot;A&quot; (1 + 2A)</td>
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<td>802091</td>
<td>Steer and Drive Axle &quot;B&quot; (1 + 2A)</td>
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<td></td>
<td>802984</td>
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<td></td>
<td>802985</td>
<td>Trailer Axial &quot;B&quot; (1 + 2A)</td>
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<td></td>
<td>8021299</td>
<td>Steer and Drive Vertical &quot;A&quot; (1 + 2B)</td>
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<td>Steer and Drive Vertical &quot;B&quot; (1 + 2B)</td>
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<td>K020505</td>
<td>Splined Disc® Brake - Aluminum - FF Steer, LMS Bearing Package (Hub)</td>
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<td>Splined Disc® Brake - Aluminum - R Drive, Standard Bearing Package* (Hub)</td>
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<td>K045298</td>
<td>Splined Disc® - Aluminum - &quot;TN&quot; Trailer, Standard bearing package* (Hub)</td>
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<td>K045297</td>
<td>Splined Disc® - Aluminum - &quot;TP&quot; Trailer, Standard bearing package* (Hub)</td>
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<tr>
<td></td>
<td></td>
<td>See hub supplier for these items</td>
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<tr>
<td>Splined Disc® Rotor Attaching Kit</td>
<td>Section 5.7</td>
<td>K037766</td>
<td>All Splined Disc® Rotor Applications (Splined Disc Rotor hardware kit SD-1,-2, and -3)</td>
</tr>
<tr>
<td>Rotor</td>
<td>Section 5.7</td>
<td>802081</td>
<td>13mm U-shaped (Rotor, fasteners)</td>
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<tr>
<td></td>
<td></td>
<td>802082</td>
<td>150mm U-shaped (Rotor, fasteners)</td>
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<td></td>
<td>802803</td>
<td>Severe Duty Splined Disc Kit (Splined Disc Rotor (SD), and hardware kit SD-1,-2, and -3)</td>
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<td>802569</td>
<td>Heavy Duty Splined Disc Kit (Splined Disc Rotor, and hardware kit SD-1,-2, and -3)</td>
</tr>
</tbody>
</table>

* Universal Replacement with standard bearing configuration and long studs. Contact 1-800-AIR-BRAKE if identification assistance is required.
5.0.1 GENERAL INFORMATION ABOUT BENDIX® AIR DISC BRAKE MAINTENANCE

When working on Bendix® Air Disc brakes, please note the following:

- Read and follow the Safe Maintenance Practices on page two.
- Depending on the particular axle, the technician may need to remove the caliper/carrier to allow sufficient access to perform the work.
- **CAUTION:** When using a hoist to support the air disc brake, do not attempt to use the pad retainer bar as a bracing point as it is not designed to support the weight of the brake. Use instead a brace (or chain) wrapped around the entire brake to attach the hoist.

- When replacing bearings — or for any other maintenance procedure where the technician needs to remove the caliper/carrier assembly from the vehicle to perform the maintenance — replacement caliper/carrier bolts will be required. Please note that due to the high torque required, the original bolts cannot be reused. The bolts are available from the vehicle manufacturer.
- **WARNING:** Not all wheels and valve stems are compatible with Bendix Air Disc Brakes. Use only wheels and valve stems approved by the vehicle manufacturer to avoid risk of valve stem shear and other compatibility issues.

5.0.2 SERVICE DVD

Order part number BW7356 for a DVD showing the full set of maintenance procedures included in this Service Data sheet.

<table>
<thead>
<tr>
<th>Kit</th>
<th>See Section</th>
<th>Remove Brake Pads?</th>
<th>Remove Caliper/Carrier from Vehicle?</th>
<th>Remove Actuator from Caliper?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust Shields</td>
<td>Section 5.1</td>
<td>Not Typically</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Pad Kit (axle set)</td>
<td>Section 5.2</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Caliper Kit (rationalized)</td>
<td>Section 5.3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Carrier Kit</td>
<td>Section 5.3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Service Actuator</td>
<td>Section 5.4</td>
<td>No</td>
<td>Not Typically</td>
<td>Yes</td>
</tr>
<tr>
<td>Spring Brake Actuator</td>
<td>Section 5.4</td>
<td>No</td>
<td>Not Typically</td>
<td>Yes</td>
</tr>
<tr>
<td>Tappet/Boot Kit (wheel end kit)</td>
<td>Section 5.6</td>
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<td>Typically</td>
<td>Typically</td>
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<td>Yes</td>
<td>Typically</td>
<td>Typically</td>
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<td>Hubs</td>
<td>Section 5.8</td>
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<td>Yes</td>
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<td>Rotor</td>
<td>Section 5.10</td>
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**TABLE 3 - OTHER REQUIRED SECTIONS FOR MAINTENANCE KITS**
5.1 AIR DISC BRAKE SHIELD KIT

5.1.1 CAUTION: Follow all safe maintenance practices, including those listed on page two of this document. Park the vehicle (by other means than the foundation brakes) on level ground and chock the wheels.

Note: Most torque plates manufactured after January 1, 2007 have the required torque plate tabs to permit these shields to be mounted.

This shield kit includes a brake pad shield, a rotor shield and the required attaching hardware for use in Bendix® ADB22X™ and ADB22X-V™ Air Disc Brake applications where external contamination and excessive road debris is a concern. Brake pad and rotor shields can greatly reduce damage and/or premature wear of pads and rotors under these conditions.

During installation, verify that once the shield(s) are installed they will not come into contact with any vehicle components, suspension, housings, etc. through the full range of motion of the wheel. Keep in mind the particular use of the vehicle, the orientation of the brake on the axle and torque plate, the proximity of other axles, and/or the wheel/tire being used.

5.1.2 Remove and discard the spring clip and washer from the pad retainer pin. Remove and retain the retainer bar and retainer pin. Position the pad shield as shown and re-insert the retainer bar. Install the retainer pin. Use the included spring clip and washer to secure the retainer pin. Check that the pad shield is held securely in place by the retainer bar. See Figures 31 or 32.

5.1.3 Drive or Steer Axle Rotor Shields (See Figure 31). Position the rotor shield between the torque plate and the rotor. The supplied cap screws pass through the mounting tabs in the torque plate and install into the shield. Torque cap screws to 44 Ft. Lbs. (528 in. lbs.).

5.1.4 Trailer Axle Rotor Shields (See Figure 32). Position the rotor shield with the torque plate between the shield and the rotor. With one (supplied) lock washer in place on each cap screw, pass the screws through the shield before mounting onto the threaded torque plate holes. Torque the cap screws to 24 Ft. Lbs. (288 in. lbs.).

Note: The installation of air disc brake shields does not eliminate the need for periodic maintenance and inspection of the air disc brake and entire wheel end for damage and/or wear. In addition, the truck and trailer manufacturer’s specific criteria for the brake shield requirements on air disc brakes should be consulted before either installing or removing air disc brake shields from a wheel end(s).
5.2 PAD REPLACEMENT

5.2.1 CAUTION: Follow all safe maintenance practices, including those listed on page two of this document. Park the vehicle (by other means than the foundation brakes) on level ground and chock the wheels.

The Bendix DVD (BW7356) shows this procedure.

Important: If the vehicle is equipped with spring brakes, cage the spring brakes on all axles to be worked on. Consult the vehicle manufacturer's instructions as necessary.

5.2.2 Raise the complete axle to be worked on until the tires clear the ground. See the vehicle maintenance manual instructions for removing the wheels.

5.2.3 If the air disc brake is equipped with an electronic wear sensor indicator (see top of Figure 35), remove and retain the mounting hardware for the cable protection plate. The cable protection plate can then be set aside while servicing the pads. Note the position of the sensors in the brake pad channels, and carefully remove them. In most cases you do not need to release the cable connector in order to move the sensors away from the pad installation work area. Inspect the wear sensors - replace if damaged or abraded.

5.2.4 See Figure 36. Remove and discard the pin retention clip (26) and washer (5).

5.2.5 While pressing against the pad hold down bar, remove the pad retainer bar pin (11). Discard the hold down bar.

5.2.6 With the spring brake released (or caged), remove the adjuster cap (37) using the tab, taking care not to move the shear adapter (61). Note: One of two styles of adjuster cap (stamped metal or plastic adjuster cap) may be found; use the same style as a replacement in step 5.2.21.

5.2.7 Inspect the shear adapter (61). If significant corrosion and/or damage is present, remove the adjuster adapter using needle-nose pliers and replace with the adapter supplied in the kit and clean as necessary.

For illustration purposes, the exploded view (Figure 36) shows the adjuster (23) and shear adapter (61) separated. When using the adjuster mechanism, always have the shear adapter installed on the adjuster.
1. Check for uneven wear from one end of each pad to the other. If the difference in wear is greater than 0.080 in. (2 mm.), service the guide pins (See Section 5.6).

2. Compare the thickness of the inboard and outboard pads of each set. If the difference between them is greater than 0.119 in. (3 mm.), this also would show that the guide pins are ready to be serviced.

5.2.12 Inspect the Brake Rotor (See Section 4.4).

5.2.13 Inspect the guide pins (See Sections 2.2 & 4.1).

Important: To maintain optimal braking, Bendix strongly recommends that whenever brake pads are replaced, the complete axle set be replaced together. Use only pads which are permitted by the vehicle manufacturer, axle manufacturer, and/or disc brake manufacturer. Failure to comply with this may invalidate the vehicle manufacturer’s warranty.

Before installing the brake pads, use the adjuster to fully retract the tappets to provide adequate clearance.

5.2.15 Clean the surfaces that will come in contact with the brake pad.

Caution: When installing pads and retaining springs, where appropriate, use heavy duty gloves and always keep fingers away from potential pinch hazard areas.

5.2.16 Install the pad retaining springs(2) onto the brake pads(12) by inserting one end of the spring onto the lug at the top of the brake pad (See Figure 41). Carefully apply enough force to permit the second lug to fully engage, taking care to keep fingers etc. away from the spring as it seats.

5.2.17 Pull the caliper fully outward and install the outboard pad. Move the caliper fully inward and install the inboard pad.

5.2.18 To reinstall wear indicators (if used): Insert the wear sensors into position in the new brake pads. Route the sensor cable through the cable protection plate channel and secure the plate with the mounting hardware retained at disassembly. (See Section 5.2.)
5.2.19 Move the caliper to the full outboard position.

5.2.20 Using a 10 mm. six-point box wrench, turn the Shear Adapter (61) counter-clockwise and listen for the sound of 3 clicks as the mechanism backs-off (increases) the running clearance. Note: Do not use an open-ended wrench as this may damage the adapter. (See Figure 40).

5.2.21 Select the correct replacement adjuster cap from those supplied with the kit. Lightly grease adjuster cap with Renolit HLT2 white grease (part number 114525) and install the cap.

5.2.22 Push the new pad retainer bar (11) into the groove of the caliper. Press down on the pad retainer bar, and insert the pad retainer pin (44), with the pin pointing downwards, where possible. Install the supplied washer (45) and then the spring clip (26).

5.2.23 Apply and release the brakes. The hub should turn easily by hand after applying and releasing the brake.

5.2.24 Re-check the running clearance. Readjust if necessary.

5.2.25 Reinstall the wheel, following the vehicle manual instructions.

⚠️ WARNING!

The brake pads and rotor must be maintained within the recommended wear limits. Failure to monitor wear and replace the brake pads and rotor when required may result in diminished brake performance.

5.3 CALIPER/CARRIER/ACTUATOR ASSEMBLY

5.3.1 CAUTION: Follow all safe maintenance practices, including those listed on page two of this document. Park the vehicle (by other means than the foundation brakes) on level ground and chock the wheels.

The brake pads must be removed (See Section 5.2.0) and actuator disconnected (and caged if a spring brake), see Section 5.4.0.

CAUTION: When using a hoist to support the air disc brake, do not attempt to use the pad retainer bar as a bracing point. It is not designed to support the weight of the brake. Use instead a brace (or chain) wrapped around the entire brake to attach the hoist.

5.3.2 In all cases check that the current hose routing arrangement does not restrict the full travel of the caliper before beginning work on the assembly.

5.3.3 Disconnect the air hose(s) from the service or spring brake chamber.

Vertical Mounting Bolt Style

5.3.3 See Figure 41. Supporting the air disc brake by necessary means, remove the six (6) mounting bolts/washers and discard. Note: Bendix strongly recommends that during re-assembly these bolts are replaced - see your vehicle manufacturer for replacement hardware. Lift the caliper up off the anchor plate.

The vertical bolt assembly includes an alignment bushing. This bushing must be saved for re-use during re-assembly of the brake. The bushing mounts in the torque plate and maintains the correct alignment of the brake assembly relative to the rotor.
5.3.4 If the brake assembly does not separate from the anchor plate it may be helpful to install an M16X2.0 screw longer than 120 mm at the bushing locations and tap the end of the bolt with a hammer to free the brake assembly. Remove the assembly.

**Axial Mounting Bolt Style**

5.3.5 Disconnect the air hose(s) to the brake chamber. See Figure 42. Supporting the air disc brake by necessary means, remove the six bolts attaching the brake to the anchor plate and remove the caliper/carrier assembly from the vehicle.

*Note: Bendix strongly recommends that during re-assembly these bolts and washers are replaced. See your vehicle manufacturer for replacement hardware. Remove the assembly.*

5.3.6 Re-installation. Supporting the air disc brake by necessary means, attach the brake to the anchor plate using six bolts. Torque to vehicle manufacturer’s specifications. If torque values and bolts are not specified by the vehicle manufacturer, then select a replacement bolt as shown in Table 4.

<table>
<thead>
<tr>
<th>Air Disc Brake Attachment Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque Plate Manufacturer</td>
</tr>
</tbody>
</table>
| Bendix Axial Carrier Torque Plate | Fastener: M20 x 2.5 x 60 mm Class 10.9  
Washer: Requires HARDENED 3 mm (minimum thickness) for each bolt. | Use the manufacturer’s recommendations.  
If unavailable, use phosphate and oil finish fastener.  
Pre-Torque: 20-60 ft-lbf [27-81 N·m]  
Final Torque: 350-400 ft-lbf [475-542 N·m] |
| Bendix Vertical Carrier Torque Plate | Fastener: M16 x 2.0 x 110 mm, Class 10.9  
Washer: None required. | Use the manufacturer’s recommendations.  
If unavailable, use plain and oil finish fastener.  
Torque: 200-220 ft-lbf [271-298 N·m] |
| Trailer Torque Plate | Fastener: M20 x 2.5 x L Class 10.9  
Length determination:  
L = Torque Plate (TP) thickness + Carrier engagement + Washer thickness  
L_{min} = TP thickness + 24 mm + 3 mm  
L_{max} = TP thickness + 29 mm + 3 mm  
Washer: Requires HARDENED 3 mm (minimum thickness) for each bolt. | Use the manufacturer’s recommendations.  
If unavailable, use phosphate and oil finish fastener.  
Pre-Torque: 20-60 ft-lbf [27-81 N·m]  
Final Torque: 350-400 ft-lbf [475-542 N·m] |

*Table Note: 1. The washer outside diameter must be less than 1.1 in. (28.5 mm).*

**TABLE 4 - TORQUE PLATE FASTENERS AND TORQUE RECOMMENDATIONS (SEE MANUFACTURER’S RECOMMENDATIONS)**
5.4 SPRING OR SERVICE BRAKE

5.4.1 CAUTION: Follow all safe maintenance practices, including those listed on page two of this document. Park the vehicle (by other means than the foundation brakes) on level ground and chock the wheels.

5.4.2 Use the spring brake manufacturer’s recommended safety practices in all cases.

Some spring brake and vehicle manufacturers permit caging the spring brake while the spring brake is engaged.

THE FOLLOWING INSTRUCTIONS ARE FOR BENDIX® BRAND ACTUATORS.

5.4.3 With the vehicle on a level surface and the wheels properly chocked, apply air to release the spring brakes (parking brakes) by using the dash-mounted air control valve. Back out the release bolt (Figure 43, arrow “D”), using a maximum torque of 26 ft. lbs. (35 N·m) to cage the air released spring force on the push rod.

FIGURE 43 - ACTUATOR SPRING CAGING AND REMOVAL

5.4.4 Exhaust the air from the brake chambers by using the dash-mounted air control valve. With all air pressure drained from the system, disconnect the air hoses from the brake chamber. While supporting the brake chamber in position, remove and discard the brake chamber mounting nuts (Figure 45, arrows marked “B”). Remove the brake chamber.

Note: Before removing the brake pads it is strongly recommended that the air disc brake adjuster mechanism be checked for correct operation (See Section 4.2).

5.4.5 Re-installation. Before installing the brake chamber, the actuator flange (See Figure 46, arrow “C”) must be cleaned and inspected. Consult the vehicle manual. The spherical cup in the lever (19) must be greased with white grease (Part No. IT14525 or K021964). Add grease to the rubber gasket on the chamber.

CAUTION: Do not use grease containing molybdenum disulfate.

5.4.6 The seal, as well as the push rod area, must be clean and dry.

FIGURE 44 - SPRING BRAKE INSTALLATION

CAUTION: Do not use brake chambers with seals that have a thickness less than 0.12 in. (3 mm). Use only actuators which are recommended by the vehicle manufacturer.

5.4.7 Install the brake chamber using new self-locking nuts (EN ISO 10513). Alternately tighten both the nuts step by step up to a final torque of 133 ± 7 ft. lbs (180 ± 10 N·m). Bendix strongly recommends that new nuts be used.

5.4.8 Re-connect the air hose(s) and be sure that each hose is not twisted or in contact with moving vehicle components. The air hose routing must allow for full caliper travel. Note that for spring brake service chambers the ports are indicated by: “11” Service Brake Port and “12” Spring Brake Port

FIGURE 45 - PORT DESIGNATIONS

Note: Where a new spring brake chamber is being installed, note that typically drain plugs are installed (See Figure 43, arrows marked “A”). After installation, remove whichever plug is at the lowest position. Be sure that all other drain holes remain plugged. The selected drain hole must be aligned downwards (or within ±30°) when installed on the vehicle. In the case of spring brake chambers, install the pads before uncaging the spring.

5.4.9 Before returning vehicle to service, with the system pressurized, using a soap solution, check for air leakage. Minimal leakage in the area around the push rod hole is permitted (100 SCCM), and a one-inch bubble in one minute at the hose fitting is acceptable. If abnormal leakage is detected, the diaphragm must be replaced, or fitting adjusted, respectively.
5.5 TAPPET & BOOT ASSEMBLIES, AND TAPPET INNER SEAL REPLACEMENT

5.5.1 CAUTION: Follow all safe maintenance practices, including those listed on page two of this document. Park the vehicle (by other means than the foundation brakes) on level ground and chock the wheels.

In some cases, the technician will need to remove the caliper carrier assembly from the vehicle. (See Section 5.3.) Note that new bolts (available from the vehicle manufacturer) will be needed for re-installation.

Important: If the vehicle is equipped with spring brakes, cage the spring brakes on all axles requiring work. Consult the vehicle manufacturer’s instructions as necessary. This procedure may be carried out with the air disc brake installed on, or removed from, the vehicle. In cases where the caliper/carrier assembly is removed from the vehicle, NEW fasteners must be used and properly torqued during re-installation. Use only fasteners approved by the vehicle manufacturer.

Note: This maintenance procedure uses specialized tools. The full Bendix air disc brake tool kit (K029164), or Ken-Tool kit (80000), includes the complete set of tools required for all permitted maintenance procedures. Alternately, for locations where only the tappet and boot replacement procedures will be performed, the smaller Bendix tool kit (K028829), or Ken-Tool kit (80001) will suffice. The DVD (BW7356) shows this procedure.

<table>
<thead>
<tr>
<th>Bendix Number/Ken-Tool Number</th>
<th>Description</th>
<th>Typical Tool View</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 / KT01</td>
<td>Cup</td>
<td></td>
</tr>
<tr>
<td>T2 / KT02</td>
<td>Handle for KT01 cup</td>
<td></td>
</tr>
<tr>
<td>T3 / KT03</td>
<td>Swivel assembly (KT03-1 short body + KT03-2 brass disc + KT03-3 retaining spring)</td>
<td></td>
</tr>
<tr>
<td>T4 / KT04</td>
<td>Long strut</td>
<td></td>
</tr>
<tr>
<td>T9 / KT09</td>
<td>Flange</td>
<td></td>
</tr>
<tr>
<td>T15 / KT015</td>
<td>Fork</td>
<td></td>
</tr>
<tr>
<td>T24 / KT024</td>
<td>Black Nylon Disc</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 5 - TAPPET AND BOOT REPLACEMENT TOOLS

5.5.2 Pad Removal: follow Sections 5.2.1-5.2.11 for removal of the brake pads.

5.5.3 Inspect the Brake Rotor (See Section 4.4).

5.5.4 Tappet and Boot Assembly (13) Removal

CAUTION: NEVER EXTEND THE TAPPET MORE THAN 1.75 in. (44.5 mm). See Figure 47. Over-extending the tappet will result in the tappet losing engagement with the threads of the synchronizing mechanism. Since the mechanism can only be set at the manufacturing plant, the caliper/carrier assembly must be replaced if this happens.

5.5.5 See Figure 47. Extend the tappets — less than 1.75 in. (44.5 mm) — by turning the shear adapter (61) clockwise. A screwdriver (callout “B” in
Figure 47 inset) should be used to move the boot and allow the wedge fork ("A" in Figure 48) to be inserted. CAUTION: Do not insert the screw driver more than ¼ inch. Take care not to damage the inner sealing face (see arrow "X" in Figure 49). Gouges or grooves will prevent a good seal and will require that the caliper be replaced.

5.5.6 The tappet and boot assemblies (13) can then be removed from the threaded tubes (16) by using the wedge fork (T15). Be sure to orient the wedge tool with the tapered side towards the tappet.

5.5.7 Remove the old tappet bushings (161).

5.5.10 See Figure 49. Carefully remove the inner seal using one or two flat-blade screwdrivers as shown. Caution: Do not insert the screwdrivers so far that they come into contact with the threaded tubes. Damage to the threaded tubes would require that the brake be replaced.

5.5.9 Inspect the threaded tubes (16). See Figures 50 and 51. Extend the tubes, but by less than 1.75 in. (44.5 mm), by turning the shear adapter (61) clockwise. Inspect the threads for rust, corrosion, or damage etc. If there is evidence of damage to the threads; significant rust; or corrosion, the caliper/carrier assembly must be replaced.

If the technician is working with the caliper on the vehicle, the technician may place a new brake pad (12) into the outboard gap to help avoid the loss of thread engagement of the threaded tubes. See Figure 51.

If the work is being carried out at a workbench, the technician may insert a 2.76 in. (70 mm) spacer (See callout “E” in Figure 52) into the caliper (1) to help avoid the loss of thread engagement.

5.5.11 For threads that are in good condition, grease the threads with white grease (Part No. 114525 or K021964). Before installing the replacement inner seals (22), retract the threaded tubes by turning the shear adapter (61) counter-clockwise.

Note: If the shear adapter fails while you are retracting the threaded tubes, you may try again with another (new) shear adapter. If this also fails, this indicates that the adjuster mechanism is damaged and the caliper must be replaced.
To install inner seals where the caliper is on the vehicle:

5.5.12 Position the replacement inner seal (22) over the threaded tube (16). See Figures 52 and 53 for the tools and installation arrangement used. Position the L1 (T3 + T9) with the short spacer (T3) in position as shown in Figure 53. Guide the tool over the end of the threaded tube (16). Install the new inner seal (22) into position by rotating the adjuster nut on the T3 portion of the tool, using an open-ended wrench.

To install inner seals where the caliper has been removed from the vehicle:

5.5.13 Position the replacement inner seal (22) over the threaded tube (16). See Figures 54 and 55 for the tools and installation arrangement used. Position the combination tool L2 (T4 + T3 + T9) with the long spacer (T4) in position as shown in Figure 55 - typically the threaded tubes need to be partially retracted to allow the tool to set the inner seals into position. Guide the tool over the end of the threaded tube (16). Install the new inner seal (22) into position by rotating the adjuster nut on the T4 portion of the tool using an open-ended wrench.

CAUTION: To confirm that the inner seal has been correctly installed, begin to extend the threaded tubes (16) by turning the shear adapter clockwise by 4-5 turns. Watch as the threaded tube extends. Inner seals that are installed correctly WILL NOT ROTATE as the threaded tube extends.

5.5.14 Grease the threaded tubes and center posts. Retract the threaded tubes.

5.5.15 Install the new tappet bushing (161) onto the center post of each threaded tube (16) by hand. By hand, ease the tappet bushings onto the center post of the threaded tubes and they will snap into position.

5.5.16 The sealing seat in the caliper for tappet and boot assemblies (13) must be clean and free of grease. Wipe the opening with a clean shop rag. Place a tappet and boot assembly (13) in position over the center post and tappet bushing.

To install tappet and boot assemblies where the caliper is on the vehicle:

5.5.17 See Figures 56, 57 and 58. Use tool B1, comprising tools T1, T2, and T3 to press the boot into position. The tool is then reversed, and the nylon disc (T24) is inserted into the T1 “cup” (combination tool ‘B2’). Holding the T1 handle, turn the nut on the T3 tool to fully install the tappet onto the tappet bushing (161).
To install tappet and boot assemblies where the caliper is removed from the vehicle:

5.5.18 See Figures 59, 60 and 61. Retract the tappets, as needed, in order to have room to install the tappets. Use tool B3, comprising tools T1, T2, and T3 to press the boot into position. The tool is then reversed, and the nylon disc (T24) is inserted into the T1 “cup” (combination tool ‘B4’). Holding the T1 handle, turn the nut on the T3 tool to fully seat the tappet onto the tappet bushing (161).

5.5.19 Check that the tappets are firmly attached to the bushings by gripping and turning them by hand. Properly installed tappets are able to turn, but are securely held onto the tappet bushings. Using the shear adapter, extend the threaded tubes outward, and check that the boot is held in place. Retract the tappet.

5.5.20 Re-install the caliper/carrier assembly, if it was removed from the vehicle (See Section 5.3.).

5.5.21 Re-install the brake pads (See Section 5.2.).
The Bendix DVD (BW7356) shows this procedure.

5.6.1 **CAUTION:** Follow all safe maintenance practices, including those listed on page two of this document. Park the vehicle (by other means than the foundation brakes) on level ground and chock the wheels.

Important: If the vehicle is equipped with spring brakes, cage the spring brakes on all axles to be worked on. Consult the vehicle manufacturer’s instructions as necessary.

These procedures are typically carried out with the caliper/carrier removed from the vehicle (may be carried out with the air disc brake installed). In cases where the caliper/carrier assembly is removed from the vehicle, NEW fasteners must be used and properly torqued during re-installation. Use only fasteners approved by the vehicle manufacturer.

**Note:** This maintenance procedure uses specialized tools. The full Bendix air disc brake tool kit (K029164), or Ken-Tool kit (80000), includes the tools needed for the guide pin and boot installation. See Table 5.
5.6.2 Remove the wheel. Refer to the vehicle manufacturer’s recommendations.

5.6.3 In nearly all cases, the air disc brake caliper/carrier will need to be removed from the vehicle in order to complete this procedure. See Section 5.3.

5.6.3 Remove the brake pads. See Section 5.2.

5.6.4 In most cases, the actuator should be removed. See Section 5.4. In the case of spring brake actuators, they should be caged before removing the brake assembly.

5.6.5 Place the brake on a workbench and, using a vice, secure it by the carrier.

5.6.6 Use a small chisel or similar tool to punch a hole close to the center of the guide pin cap (12) of the short guide pin, taking care to only insert the chisel a small amount. Using the hole just made, pry the cap off and discard. See Figures 63-65.

5.6.7 Remove the other cap (4) that covers the long guide pin, by using a small chisel and hammer to apply light blows to the cap, with the chisel aimed away from the casting. See Figure 66. Discard both caps.
5.6.8 Using a 14 mm hex bit socket, remove and discard the two caliper bolts (3) and (11). See Figure 67. By hand, retract both guide pins slightly and then remove the caliper from the carrier.

The guide pins are now only held by the retaining rings (7).

5.6.9 Remove the boot retaining rings (7) and the guide pins (2) and (9). Use a screwdriver to pry out the inner boots (8). See Figure 68. Discard the removed items.

5.6.10 Clean the caliper upper and lower surfaces around the bushings.

5.6.11 Prepare to remove the brass bushing used in the long guide pin side. Assemble the long bolt (T13), washer, and sleeve (T12) as in Figure 70.

5.6.12 Apply grease to the bolt and — after inserting through the guide pin channel — engage the brass nut (T14). Always double-check that the brass nut is correctly in place in the bushing before beginning to extract the bushing.

5.6.13 Turning the nut at the top, draw the brass nut up, bring the brass bushing up and out of the channel. Discard the bushing.

Caution: Keep the removal tool exactly aligned with the guide pin channel to permit the bushing to be removed. See Figure 72.

5.6.14 Prepare to remove the short guide pin bushing by locating the bushing (1) tab, and using a small chisel (narrower than the tab) or similar tool, remove the tab as shown in Figure 73, by striking low on the base of the tab.

Remove the tab with a magnet and use a clean shop cloth to remove any excess debris. Note that in some cases, the tab may be in the opposite (outer) slot in the bore.

Caution: Remove the tab that holds the bushing in position.
5.6.15 Use the tool combination shown in Figure 75 (comprising T14, T20, T21, and a washer) to remove the bushing (1). Screw nut (T14) onto the assembly by hand, then tighten the bolt (T20) using a box end wrench to draw out the bushing. Discard the removed bushing, and verify that the bore is clean by wiping with a shop cloth.

5.6.18 Place the washer and thread the brass nut (T14) onto the bolt (T13) followed by the flange (T08).

5.6.19 Place a new brass bushing (10) on the dimpling tool (T16) and insert it into the caliper bore.

**FIGURE 75 - SECTIONAL VIEW: SHORT GUIDE PIN BUSHING REMOVAL**

Installation of the Fixed Guide Pin Brass Bushing

5.6.16 Clean the caliper upper and lower surfaces around the bushings.

5.6.17 Clamp the carrier in a vise so that the guide channel is vertically oriented.

5.6.20 Check that the flange (T08) is in an upright position at the top of the caliper recess as you draw the brass bushing (10) up, by turning the brass nut (T14), until the dimpling tool bottoms on the caliper. When it reaches the correct position, the brass bushing extends out of the guide pin channel 0.039 in. (1 mm.).

5.6.21 With the dimpling tool (T16) in position, tighten the screw in its base until it contacts the dimpling screw housing. The movement of this screw forces three points outwards, leaving indentations in the brass bushing. See Figure 77, view “C”.

5.6.22 Unscrew the dimpling screw out approximately 0.75 inches (20 mm.). Loosen the brass nut (T14) and rotate the dimpling tool (T16) 60 degrees. Repeat the dimpling process by tightening the brass nut (T14) and then tighten the dimpling screw until it contacts the dimpling screw housing. Back out the dimpling screw approximately 0.75 inches (20 mm.). The brass bushing (10) is now held in position by the six dimples made by the tool.

5.6.23 Remove the installation tools and check the brass bushing (10), removing any burrs, being careful not to leave any metal filings in the bushing. Coat the inside of the bushing (10) with the white grease included in the kit.

**FIGURE 77 - VIEW “A” AND “B”: DRAW THE BRASS BUSHING INTO POSITION. VIEW “C”: LOCK THE BUSHING INTO POSITION**

**Installation of the Floating Guide Pin Bushing**

5.6.24 To install the bushing (1) into the short guide pin side, first inspect the bore for corrosion, damage etc. Clean as necessary.
5.6.25 Place the new bushing (1) in position so that when drawn into position, the tab will align with the slot in the casting. With the tab aligned, place tool (T14) over the bushing and tap lightly. To position the bushing, see Figure 78.

5.6.26 Use the tool combination shown in Figure 78 to draw the bushing (1) into the caliper. See also Figure 80, to see the orientation (with tool T14 at the top). Hand tighten the nut (T14) into position. Then tighten the bolt (T20) using a box end wrench or socket to draw the bushing (1) into the caliper until the bushing (1) contacts the machined step in the bore. Remove the tool.

5.6.27 Using a punch, bend the tab into the groove by aligning the punch with the upper part of the tab and tapping the punch with a hammer.

5.6.28 Coat the inside of the bushing (6c) with a light coat of the white grease included in the kit.

5.6.29 Install the two identical inner boots (8) by first cleaning the area where the inner boots will be installed and inspect for corrosion. If the sealing surface of the caliper is damaged, replace the caliper.

5.6.30 See Figure 82. Place a boot into the installation tool (T7), making sure that the inner bellows are arranged close to the side walls of the tool and will not be damaged during installation. Also check that the outer edge of the boot rests on the front edge of the tool.

5.6.31 Using 70 in. lbs. (8 N·m) of torque maximum, tighten bolt (T10) to install the inner boot.

5.6.32 Repeat the installation procedure for the second inner boot.

5.6.33 Check that the boots are held securely in place and that no damage occurred during installation.

5.6.34 See Figure 83. To install the guide pins, first lubricate both guide pins with the white grease supplied. Insert the guide pins into their respective bores with the grooved end towards the bellows.

Fit the lip in the end of the inner boots (8) into the groove of the guide pins. Push on each ring (7) ensuring that the boot (8) is engaged onto the end of the guide pins (2 or 9).

5.6.35 With the caliper resting on a bench, slide the carrier into place with a slight rocking motion, taking care that as you do so, the inner boots and guide pins are seated in their proper place on the carrier.

5.6.36 Identify the two caliper bolts (3) and (11). With the shorter bolt placed in the floating pin bushing (2), and the longer bolt placed in the fixed pin bushing
(9), begin to tighten the bolts. With the caliper/carrier in a vice, continue installing the bolts to a torque of 133 ft. lbs. (180 N·m). Finally tighten each bolt an additional 90° (ninety degrees).

Installation of the Guide Pin Caps

5.6.37 See Figure 84. Place the caliper/carrier assembly on a bench so that the inner boots are fully compressed, check that the bores are clean and dry (e.g. free from lubrication).

Note: It is important that the inner boots are fully compressed during this procedure to ensure that the least amount of air is retained within the guide pin channel. If too much air is trapped, the bellows can potentially be damaged during the operation of the brake. It is also important that the technician double-check that the retaining rings remain in their correct position during this procedure.

5.6.38 Clean the two caps, and check that the caliper surfaces where the caps will be installed are clean and have no signs of damage.

5.6.39 Select one cap to install. Using the correct press-in tool — the smaller cap (12) uses tool (T26), and the larger cap (4) uses tool (T27) — place the cap in position, using the machined channel in the caliper to assist in centering the tool. Use a hammer to tap the cap into position. See Figure 85. Note that the tool needs to remain perpendicular to the channel to prevent damage during installation. Note that, after installation, the smaller cap (12) extends 0.08 in. (2 mm.), and the larger cap (4) extends 0.61 in. (15.5 mm.).

Repeat for the second cap.

5.6.40 Check that the guide pins move freely when the carrier is moved laterally, and that air is not trapped within the inner boots, and that the boots (8) and ring (7) are in the proper position before continuing with the installation.

5.6.41 Install the caliper/carrier (See Section 5.3).
5.6.42 Install the brake chamber (See Section 5.4).
5.6.43 Install the brake pads (See Section 5.2).
Bendix® Splined Disc® Hub Rotors are designed to assist vehicle maintenance by typically allowing the rotor to be serviced without requiring the entire hub/rotor assembly be replaced.

Periodic inspection of the Splined Disc attachment hardware is recommended to ensure optimum braking performance. Bendix recommends verifying the torque on the spring element fasteners whenever a brake inspection is performed.

Bendix Air Disc Brakes are precision-engineered braking mechanisms. The “friction couple” braking characteristics have been carefully optimized and the rotor design and materials have been matched with special formulation brake pads for optimal performance, therefore use only genuine Bendix® brand parts and brake pads.

**Rotor Replacement**

5.7.1 Before removing the brake pads it is strongly recommended that the air disc brake adjuster mechanism be checked for correct operation (See Section 4.1). When replacing brake pads, Bendix strongly recommends that the pads be replaced as an axle set.

5.7.2 Refer to the vehicle manufacturer’s recommendations and release (or cage) spring brakes and remove the wheel.

5.7.3 Remove the pads (See Section 5.2).

5.7.4 Remove the air disc brake (See Section 5.3).

**Note:** Follow the vehicle manufacturer’s guidelines for removal of the wheel hub and rotor assembly from the vehicle in lieu of these instructions, where available.

**CAUTION:** Be sure to secure both the rotor and hub before removing the retention clips.

5.7.5 Use suitable hand tools to remove the intermediate elements (spacers). Remove all the right-hand intermediate elements (spacers) of each set first and then the rotor can be turned slightly to release the remaining intermediate elements (spacers). In all cases, take care not to damage the hub and its teeth. Remove and discard the intermediate elements (spacers) and retention clips attaching the rotor. Discard the rotor.
5.7.6 Following industry standards, clean and inspect the hub before installing the rotor. Look for corrosion and/or damage to the hub and inspect the wheel speed tone ring. Where necessary, consult the hub manufacturer's guidelines for more details.

5.7.7 See Figures 87 through 91. Place the rotor into position on the hub. Install the new intermediate elements (spacers) as shown in Figure 89. With all the intermediate elements (spacers) correctly inserted into position, verify that the gap between the intermediate elements (spacers) and the wheel hub does not exceed 0.004 in (0.1 mm). If a gap is found that exceeds this maximum value, verify the installation of new intermediate elements (spacers). Replace the wheel hub if the excess gap cannot be corrected with proper installation of new rotor retaining hardware.

5.7.8 Install the new fasteners included in the kit in an evenly-distributed cross-pattern sequence. Torque to 22.1 ft. lbs. (30 N·m.)
5.7.9 Re-install the air disc brake (See Section 5.3). Supporting the air disc brake by all necessary means, attach the brake to the anchor plate using six bolts and washers as required (Bendix recommends the original bolts not be re-used). Torque to vehicle manufacturer’s specifications. If torque values and bolts are not specified by the vehicle manufacturer, then torque according to the chart below. Be sure to select bolts with the same thread pitch, length and grade as originally provided from vehicle manufacturer.

5.7.10 Reinstall the brake pads (See Section 5.2).

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**FIGURE 91 - FASTENERS INSTALLED**

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### Air Disc Brake Attachment Hardware

<table>
<thead>
<tr>
<th>Torque Plate Manufacturer</th>
<th>Fastener</th>
<th>Torque</th>
</tr>
</thead>
</table>
| Bendix Axial Carrier Torque Plate | Fastener: M20 x 2.5 x 60 mm Class 10.9  
Washer: Requires HARDENED 3 mm (minimum thickness) for each bolt.  
If the vehicle is using a Bendix manufactured Axial Anchor Plate, with a thickness of 1.14 in. (29 mm) where these bolts are assembled, then a bolt with an overall length of 2.36 in. (60 mm) will meet these requirements  
Use the manufacturer’s recommendations.  
If unavailable, use phosphate and oil finish fastener.  
Pre-Torque: 20-60 ft-lbf [27-81 N·m]  
Final Torque: 350-400 ft-lbf [475-542 N·m] |
| Bendix Vertical Carrier Torque Plate | Fastener: M16 x 2.0 x 110 mm, Class 10.9  
Washer: None required.  
Use the manufacturer’s recommendations.  
If unavailable, use plain and oil finish fastener.  
Torque: 200-220 ft-lbf [271-298 N·m] |
| Trailer Torque Plate | Fastener: M20 x 2.5 x L Class 10.9  
Length determination:  
L = Torque Plate (TP) thickness + Carrier engagement + Washer thickness  
L\(_{\min} = \) TP thickness + 24 mm + 3 mm  
L\(_{\max} = \) TP thickness + 29 mm + 3 mm  
Washer: Requires HARDENED 3 mm (minimum thickness) for each bolt.  
Use the manufacturer’s recommendations.  
If unavailable, use phosphate and oil finish fastener:  
Pre-Torque: 20-60 ft-lbf [27-81 N·m]  
Final Torque: 350-400 ft-lbf [475-542 N·m] |

**Table Note:** 1. The washer outside diameter must be less than 1.1 in. (28.5 mm).

**TABLE 7 - TORQUE PLATE FASTENERS AND TORQUE RECOMMENDATIONS (SEE MANUFACTURER’S RECOMMENDATIONS)**
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Contacting Bendix
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techeam@bendix.com.

To better serve you, please collect the following information before you call the Bendix Tech Team, or include this information in your e-mail:
- Bendix product model number, part number and configuration.
- Vehicle make and model.
- Vehicle configuration. (Number of axles, tire size, etc.)
- System performance symptoms: When do they occur?
- What troubleshooting/measurements have been performed?
- What Bendix service data literature do you have or need?