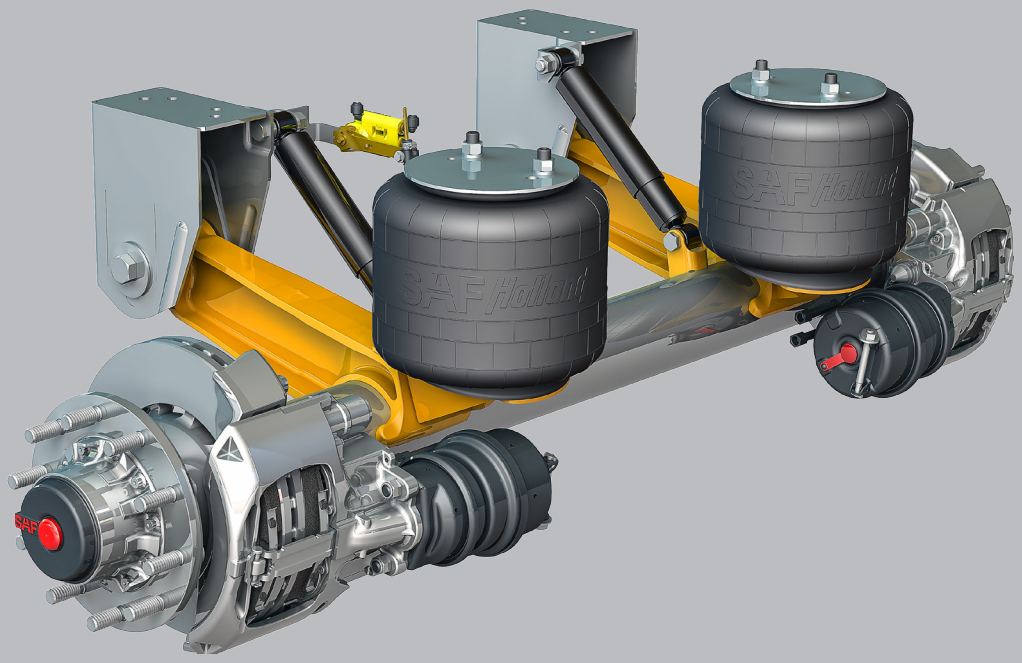
SAF-HOLLAND Group

Installation and Operation Manual

CBX/CB Series

Fixed Frame Top Mount Trailer Air Suspension

- For Disc and Drum Brake Applications



XL-AS11406OM-en-US Rev E

Introduction

This manual provides information necessary for the installation and operation of the SAF-HOLLAND® CBX/CB fixed frame top mount trailer air suspension. Although the images throughout this manual depict the CBX23 Fusion, there is no difference in fit or function between the models in the CBX/CB Series.

The CBX/CB suspensions include premium 5.75" diameter axles, the CB suspensions include 5" diameter axles. For axle end and/or brake servicing information or component replacements, refer to Drum Brake Manual XL-TA10006OM-en-US, Disc Brake Manual XL-SA10059OM-en-US or contact Customer Service at 888-396-6501.

This suspension uses air drawn from the tractor air system to pressurize the air springs. The height control valve (HCV) regulates the air pressure required for varying loads while maintaining the design ride height. This suspension can provide a cushioned ride throughout the load range, from empty to fully loaded.

The suspension also provides excellent side-to-side and axle-to-axle loading which helps equalize and control braking.

Read this manual before using or servicing this product and keep it in a safe location for future reference. Updates to this manual, which are published as necessary, are available on the internet at www.safholland.us.

When replacement parts are required, SAF-HOLLAND highly recommends the use of only SAF-HOLLAND Original Parts. A list of technical support locations that supply SAF-HOLLAND Original Parts and an Aftermarket Parts Catalog are available on the internet at www.safholland.us or contact Customer Service at 888-396-6501.

Warranty

Refer to the complete warranty for the country in which the product will be used. A copy of the written warranty is included with the product or available on the internet at www.safholland.com.

Notes, Cautions, and Warnings

Before starting any work on the unit, read and understand all the safety procedures presented in this manual. This manual contains the terms "NOTE", "IMPORTANT", "CAUTION", and "WARNING" followed by important product information. These terms are defined as follows:

NOTE: Includes additional information to enable accurate and easy performance of procedures.

IMPORTANT: Includes additional information that if not followed could lead to hindered product performance.

CAUTION — Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

⚠CAUTION — Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠WARNING — Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

1. Safety Instructions

General and Servicing Safety Instructions

- Read and observe all Warning and Caution hazard alert messages. The alerts provide information that can help prevent serious personal injury, damage to components, or both.

⚠WARNING Failure to follow the instructions and safety precautions in this manual could result in improper servicing or operation leading to component failure which, if not avoided, could result in death or serious injury.

- All maintenance should be performed by a properly trained technician using proper/special tools, and safe procedures.

NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act (OSHA). Equivalent laws may exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location where work is performed.

- Properly support and secure the vehicle from unexpected movement when servicing the unit.

⚠WARNING Failure to properly support and secure the vehicle and axles prior to commencing work could create a crush hazard which, if not avoided, could result in death or serious injury.

- If possible, unload the trailer before performing any service procedures.
- After re-positioning the brake chamber, slack adjuster and/or ABS system as instructed in this manual, always consult the manufacturer's manual for proper operation.
- Service both roadside and curbside of an axle. Worn parts should be replaced in sets. Key components on each axle's braking system, such as friction material, rotors and drums will normally wear over time.
- Follow all manufacturer's instructions on spring pressure and/or air pressure controls.

⚠WARNING Failure to follow manufacturer's instructions regarding spring pressure or air pressure control could allow unexpected release of energy which, if not avoided, could result in death or serious injury.

- DO NOT paint the wheel contact surfaces between the wheel and hub.

IMPORTANT: The wheel contact surfaces MUST be clean, smooth and free from grease.

⚠WARNING Failure to keep wheel and hub contact surfaces clean and clear of foreign material could allow wheel/hub separations which, if not avoided, could result in death or serious injury.

- Only the wheel and tire sizes approved by the trailer builder can be used.

Operational and Road Safety Instructions

- Before operating vehicle, ensure that the maximum permissible axle load is NOT exceeded and that the load is distributed equally and uniformly.
- Make sure that the brakes are NOT overheated from continuous operation.

⚠WARNING Failure to minimize the use of brakes during overheating conditions could result in deterioration of brake efficiency which, if not avoided, could result in death or serious injury.

- The parking brake MUST NOT be immediately applied when the brakes are overheated.

CAUTION If the parking brake is immediately applied to the brakes when overheated, the brake drums or discs could be damaged by different stress fields during cooling.

- Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles.

IMPORTANT: The definition of OFF-ROAD means driving on non-asphalt/non-concrete routes, e.g. gravel roads, agricultural and forestry tracks, on construction sites and in gravel pits.

IMPORTANT: Off-road operation of axles beyond the approved application design could result in damage and impair suspension system performance.

- Follow the recommended routine maintenance and inspections described in this manual. These procedures are designed so that optimum performance and operational safety are achieved.
- In the event of suspension air pressure loss, quickly reduce speed as safely as possible and remove the vehicle from traffic. If unable to remove vehicle from traffic, follow DOT safety requirements regarding emergency situations.
- Contact a qualified towing and/or service company to assist in repairing the vehicle or to move it to a qualified repair facility. DO NOT operate the vehicle in the absence of suspension air pressure; however in the event of an air system failure while in service, an internal rubber bumper built into the air spring will make it possible to temporarily operate the vehicle at reduced speed determined by road conditions.

⚠WARNING Operating the vehicle without proper air pressure can cause tire failure, fire, or loss of vehicle control which, if not avoided, could result in death or serious injury.

2. Standard Decal Requirements

The following three (3) decals MUST be properly installed on the trailer prior to putting it in service:

- Tire Clearance Warning Decal: XL-AR356-01 ***(Figure 1)***.
- SwingAlign Axle Alignment Decal: XL-AR435 ***(Figure 2)***.
- Torque Decal: XL-AR436 ***(Figure 3)***.
- Shear Bolt Decal: XL-AS20085DC-en-US ***(Figure 4)***.

It is the responsibility of the end user to periodically inspect all decals and ensure that they are clean and completely legible. If any decals are missing, loose, damaged or difficult to read, contact SAF-HOLLAND Customer Service at 888-396-6501 to order replacements immediately.

Figure 1

⚠WARNING

Minimum tire clearance MUST be maintained between tires and nearest point of contact on the suspension or vehicle. Premature tire wear, fire or loss of vehicle control could result from contact with the tires if clearances are not maintained.

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 www.safholland.us XL-AR356-01

TIRE CLEARANCE REQUIREMENTS

- **1 INCH (25.4 mm) MINIMUM VERTICAL** tire clearance is required between the top of the tire and the nearest point of contact above the tire when the air pressure is completely exhausted from the air suspension or when the axle is fully lifted if equipped with a suspension lift feature.
- **2 INCH (50.8 mm) MINIMUM LATERAL** tire clearance is required between the sides of the tire and the nearest point of contact through total travel of the air suspension. This includes when the wheels are fully turned in either direction if equipped with an SAF Self Steer Axle.

Figure 2

SWING ALIGN® NON-WELDED AXLE ALIGNMENT PROCEDURES

ALIGNMENT BOLT IS ON THE FRONT OF THE ROADSIDE FRAME BRACKET:

STEP 1. To properly align the suspension, the trailer should be pulled in a straight line for a sufficient distance to insure there are no binds in the suspension.

STEP 2. Check to verify trailer is empty and emergency brakes are **NOT** engaged.

STEP 3. Rotate bolt **CLOCKWISE** to move axle forward (A arrows); **COUNTERCLOCKWISE** to move axle rearward (B arrows).

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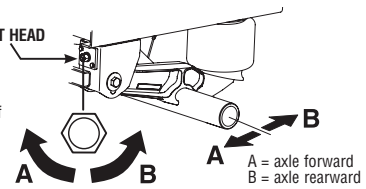

Figure 3

CBX / CB FIXED FRAME TRAILER AIR SUSPENSION TORQUE SPECIFICATIONS

Torques are with clean, lubricated threads. Always apply torque to nut, if possible.

REQUIRED RE-TORQUING SCHEDULE:

- All fasteners after first three (3) months or 5,000 miles.
- At every routine preventative maintenance.
- At every brake relining.

	Pivot Connection	Shock	Air Spring		SwingAlign
Fastener Size	1-1/8"	3/4"	1/2"	3/4"	1/2"
Torque ft.-lbs. (N•m)	550-600 (746-813)	140-175 (190-237)	30-40 (41-54)	40-45 (54-61)	50-60 (68-81)

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Figure 4

SHEAR BOLT – FRONT PIVOT CONNECTION

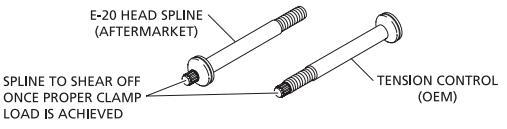
This suspension has been installed with a shear bolt front pivot connection design. This connection requires no torque check, but does REQUIRE VISUAL INSPECTION. Inspect that the spline has been sheared off and for any signs of movement:

- Prior to placing trailer in service.
- After three (3) monts or 5,000 miles.
- At every routine preventative maintenance.
- At every brake relining.

⚠CAUTION DO NOT apply anti-sieze compound or additional lubricant to pivot connection hardware. This can lead to unpredictable clamp loads and unreliable axle alignment.

XL-AS20085DC-en-US

SHEAR BOLT STYLES



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3. CBX Fusion Model Identification

The CBX Fusion suspension serial tag is located on the frame bracket ***(Figure 4)***.

NOTE: This manual applies to the suspension models listed on the front cover. However, determine the specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 5)***.

NOTE: If the suspension serial tag is NOT legible or is NOT available, it can identified by the appearance of the equalizing beam ***(Figure 6)***. The CBX Fusion model will have a cast beam with a lower air spring mounting plate welded to it mounted on a 5.75" round axle ***(Figure 6)***.

NOTE: The CBX Fusion models come in four (4) different beam lengths. Equalizing beam lengths are measured from the centerline of the pivot to the centerline of the air spring mounting plate ***(Figure 6).***

4. CBX Fusion Model Nomenclature

The sample tag illustrated will help interpret the information on the SAF-HOLLAND, Inc. serial number tag. The part number is on the first line. The model number along with the suspension capacity are on the second line. The third line contains the serial number ***(Figure 5)***.

CB X 23 - 14

- **CB** — Cast Beam Suspension
- **X** — 5.75" Diameter Premium Axle
- **23** — Axle Capacity
  - Suspension Series
  - 20 – 20,000
  - 23 – 23,000
  - 25 – 25,000
  - 25/30 – 25,000/30,000*
  - *30,000 at creep speed
- **14** — Ride Height
  - 14" (356 mm)
  - 15" (381 mm)
  - 16" (406 mm)
  - 17" (432 mm)

Figure 4

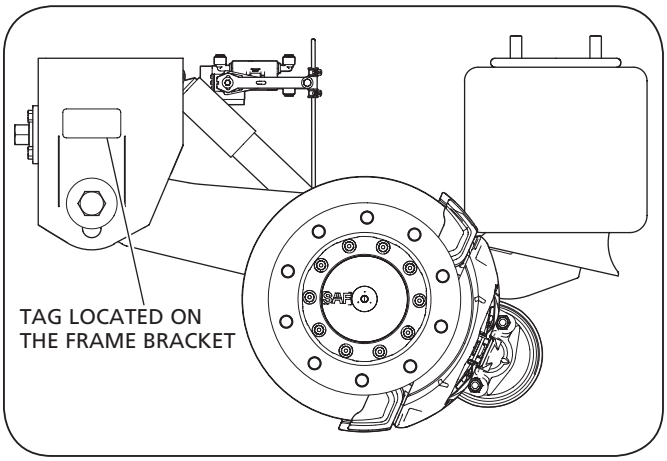


Figure 5

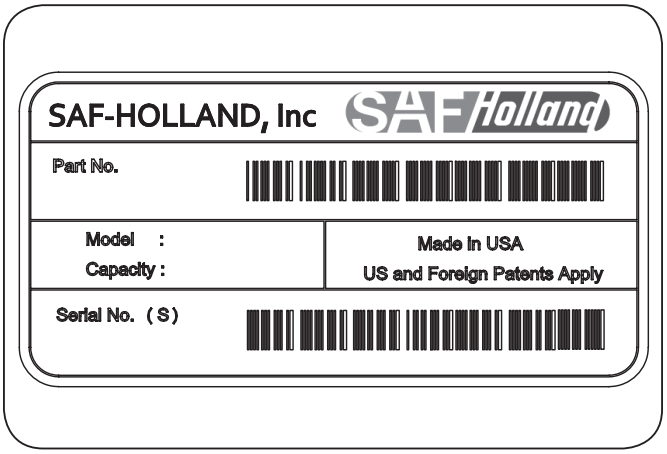
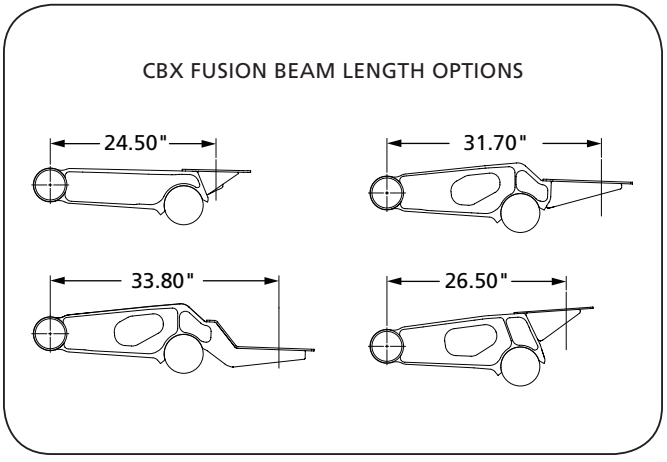


Figure 6



5. CBX Model Identification

The CBX suspension serial tag is located on the frame bracket ***(Figure 7)***.

NOTE: This manual applies to the suspension models listed on the front cover. However, we urge you to determine your specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 8)***.

NOTE: If the suspension serial tag is NOT legible or is NOT available, it can be identified by the appearance of the equalizing beam. The CBX model will have a full cast beam mounted to a 5.75" round axle ***(Figure 9)***.

NOTE: The CBX models come in three (3) different beam lengths. Equalizing beam lengths are measured from the centerline of the pivot to the centerline of the air spring mounting plate ***(Figure 9)***.

6. CBX Model Nomenclature

The sample tag illustrated will help interpret the information on the SAF-HOLLAND, Inc. serial number tag. The model number is on the first line along with the suspension capacity. The second line contains the part number and the serial number ***(Figure 8)***.

CB X 23 - 14

- 14 — Ride Height
  - 14" (356 mm)
  - 15" (381 mm)
  - 16" (406 mm)
  - 17" (432 mm)
- 23 — Axle Capacity Suspension Series
  - 20 – 20,000
  - 23 – 23,000
  - 25 – 25,000
  - 25/30 – 25,000/30,000*
  - *30,000 at creep speed
- X — 5.75" Diameter Premium Axle
- CB — Cast Beam Suspension

Figure 7

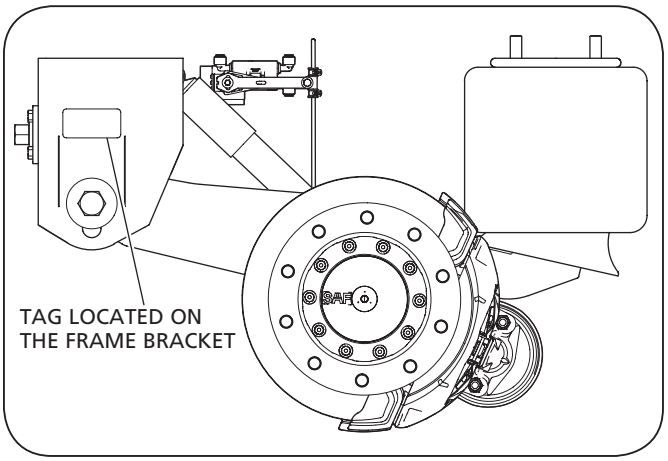


Figure 8

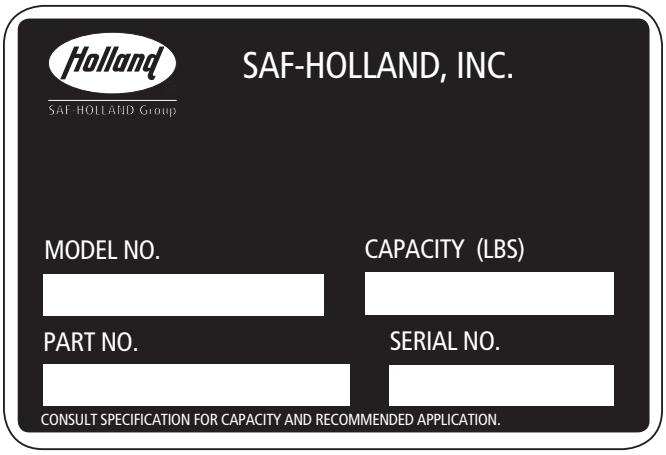
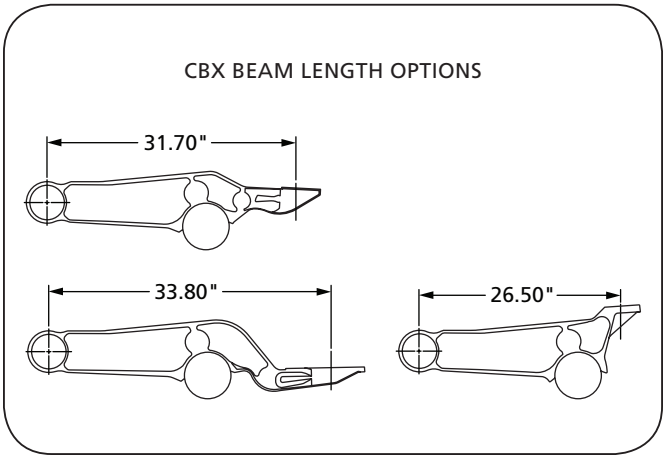


Figure 9



7. CB-2300 Model Identification

The CB-2300 suspension serial tag is located on the frame bracket ***(Figure 10)***.

NOTE: If the suspension serial tag is NOT legible or is NOT available, you can identify your suspension model by the appearance of the equalizing beam. The CB-2300 model will have a full cast beam with a 5" round axle ***(Figure 10)***.

NOTE: This manual applies to the suspension models listed on the front cover. However, determine the specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 11)***.

8. CB-2300 Model Nomenclature

The sample tag illustrated will help interpret the information on the SAF-HOLLAND, Inc. serial number tag. The model number is on the first line along with the suspension capacity. The second line contains the part number and the serial number ***(Figure 11)***.

CB 2300 - 14

- 14 — Ride Height
  - 14" (356mm)
  - 15" (381mm)
  - 16" (406mm)
  - 17" (432mm)
- 2300 — Axle Capacity Suspension Series 23,000 lbs.
- CB — Cast Beam Suspension

Figure 10

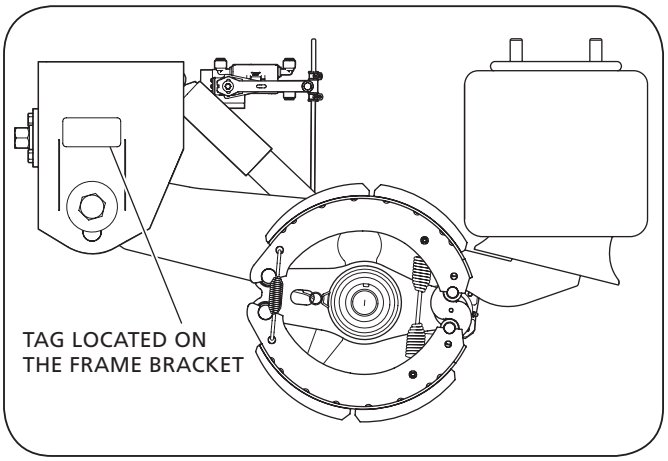
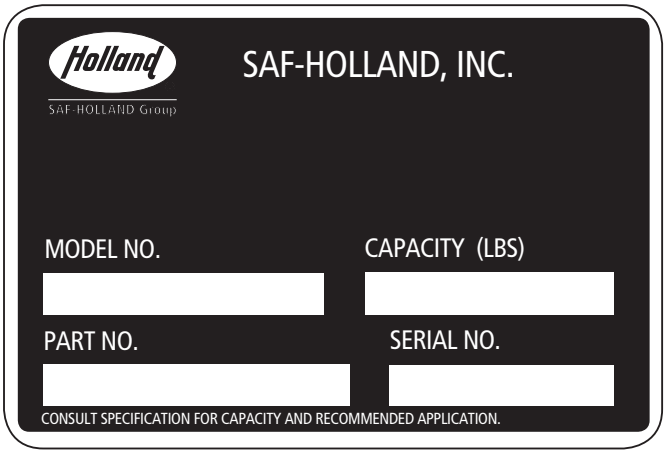


Figure 11



9. Welding Standards

9.1 Scope

When welding is required for the suspension repairs, observe the requirements below. This specification applies to all components supplied by SAF-HOLLAND, and its products. The customer assumes all responsibility for weld integrity if weld material and procedure differ from those listed below.

9.2 Workmanship

All welding on SAF-HOLLAND products MUST be performed by a welder qualified according to the appropriate AWS standard for the weld being made or an equivalent standard. It is the responsibility of the customer to provide good workmanship when welding on SAF-HOLLAND products.

9.3 Material

Items to be welded that are made from low carbon or high-strength alloy steel are to be welded with AWS filler metal specification AWS A5.18, filler metal classification ER-70S-3, ER-70S-6 or equivalent unless specified on the installation drawing.

NOTE: Any substitution for filler material from the above standard must comply, as a minimum, with the following mechanical properties:

Tensile Strength - 72k psi (496 MPa)
Yield Strength - 60k psi (414 MPa)
Charpy V Notch - 20 ft.-lbs. (27 N•m) at 0° F (-17.7° C)
% Elongation - 22%

The recommended welding gas for gas metal arc welding (GMAW) is 90% Argon / 10% CO2. If a different gas is used, welds must comply with penetration requirements illustrated ***(Figure 12)***. Where the installation drawing specifies different than above, the drawing shall prevail.

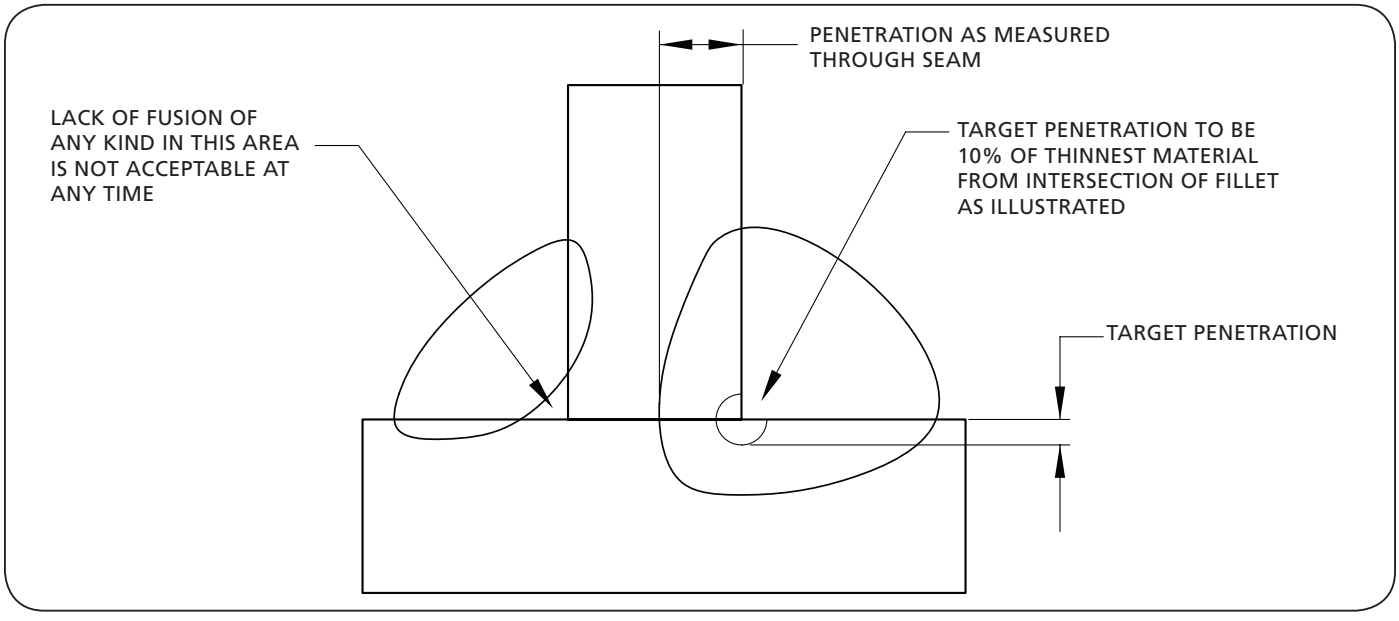
9.4 Procedures

Tack welds used for positioning components are to be located in the center of the final weld, where practical. Tack weld should be completely fused to the finish weld. DO NOT break arc at the end of the weld. Back up all finish welds at least 1/2" (12.7 mm) or a sufficient amount to prevent craters at the end of the weld. Where weld is illustrated to go around corners, it is assumed the corner represents a stress concentration area. DO NOT start or stop weld within 1" (25.4 mm) of the corner. Particular care should be taken to prevent undercutting in this area.

9.5 Weld Size

If weld size is NOT specified, the effective throat of the weld MUST be no smaller than the thinnest material being welded ***(Figure 12)***.

Figure 12



10. Standard Air Control System Installation

The following is a typical air system installation and should be plumbed as illustrated ***(Figure 13)***. Optional air control systems are available. Contact SAF-HOLLAND applications department to discuss your particular needs.

The air control system of the CBX/CB suspensions use air drawn from the tractor air system to pressurize the suspension's air springs. The suspension, working with the air control system, provides optimum suspension performance only when all air control system components are installed and operating properly.

IMPORTANT: Make certain that all air lines and valves are free from obstruction through the full operational range of the suspension.

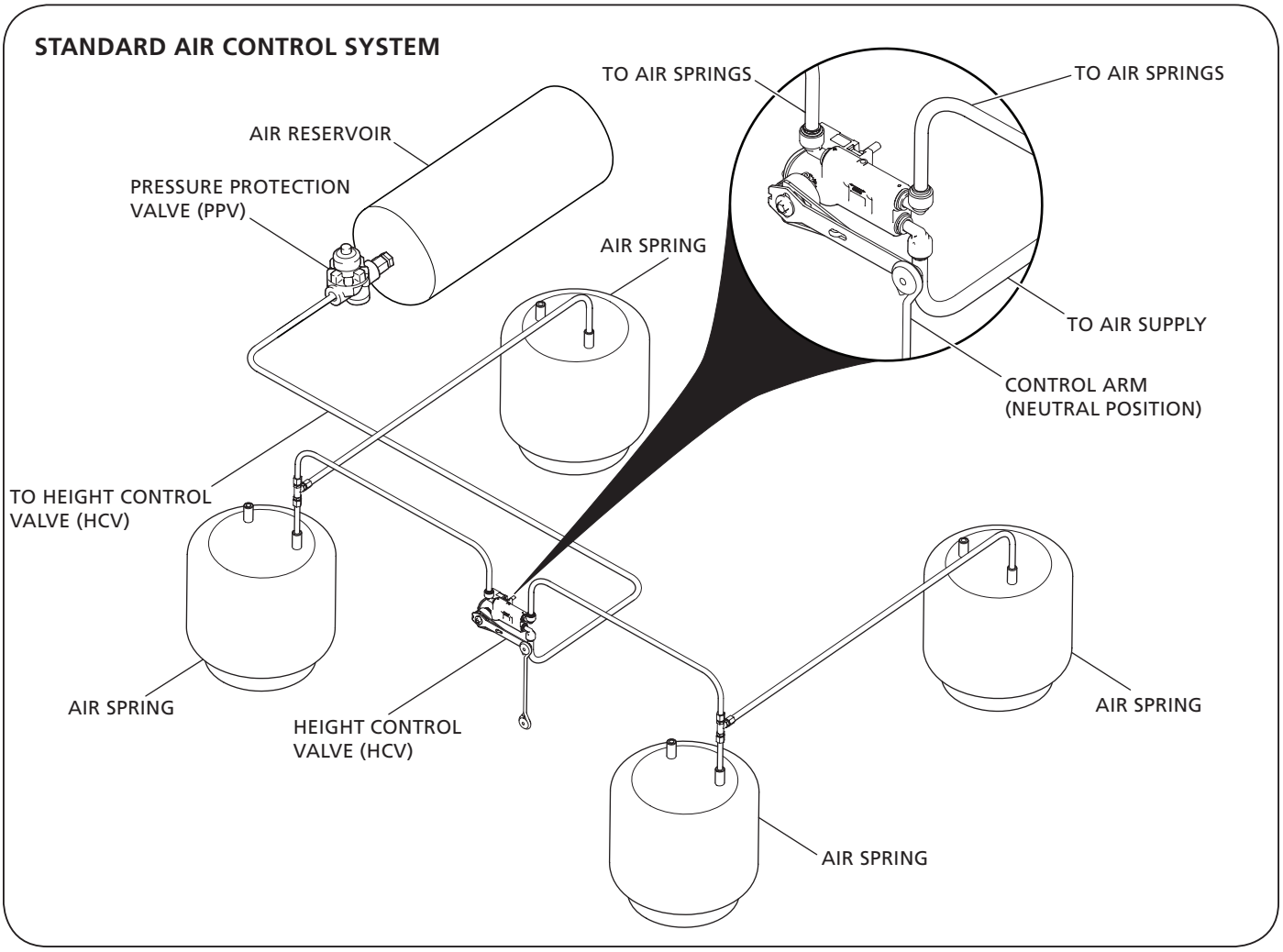
IMPORTANT: A pressure protection valve (PPV) MUST be attached to the air reservoir in order to maintain proper air pressure ***(Figure 13)***.

IMPORTANT: The air pressure protection valve maintains safe brake pressure. Approximately 85 psig (5.9 bars) opens the valve, and 65 psig (4.5 bars) closes the valve.

NOTE: When installing the pressure protection valve, use a drop of oil or Loctite® to lubricate threaded connections. DO NOT use a pipe compound or teflon tape as they may clog the valve.

A height control valve (HCV) is used to regulate the air pressure required for varying load capacities ***(Figure 13)***.

Figure 13



11. Suspension Assembly Installation

NOTE: Locate the suspension on the trailer frame. Refer to your model's specific installation drawing for the proper weld patterns and locations. To obtain a copy of your specific installation drawing, contact SAF-HOLLAND Customer Service at 888-396-6501.

1. Once the suspension is correctly positioned, weld the suspension in place as outlined in Section 9.
2. Ensure the linkage assembled to the height control valve (HCV) and suspension is installed properly ***(Figure 14)***.
3. Install the service and emergency lines to the suspension and allow the suspension to air up.
6. Measure the ride height of the suspension with a tape measure ***(Figure 15)***.
7. Compare the measured suspension ride height value to the appropriate value ***(Table 1)***. Ensure the measured ride height value is within ± 1/4" (6 mm).

IMPORTANT: If the measured ride height value is NOT within ± 1/4" (6 mm), follow the Ride Height Adjustment procedures described in Section 12.

4. Visually check all air control system fittings for air leaks by applying a soapy water solution and checking for bubbles at all air connections and fittings.

Figure 14

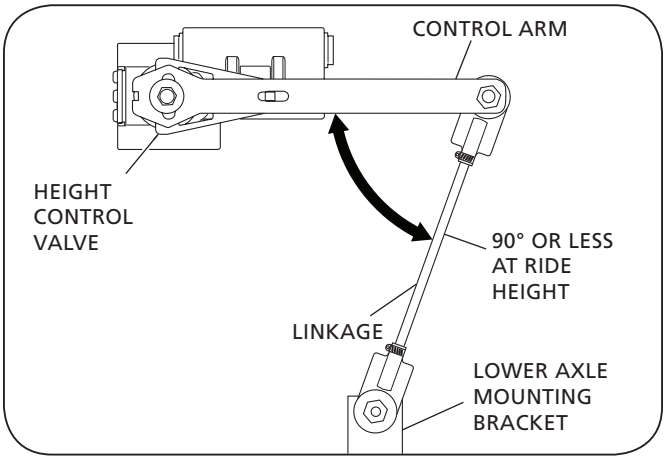
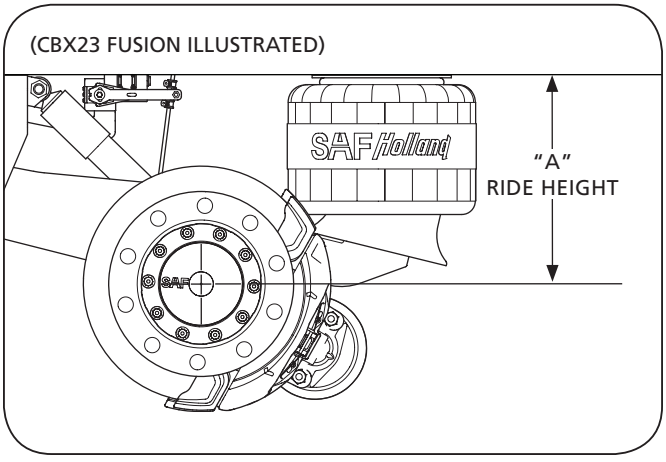


Table 1

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

Figure 15



12. Ride Height Adjustment

IMPORTANT: Trailer MUST be unloaded before beginning any service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or while coupled to a tractor ***(Figure 16)***.
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height ***(Figure 17)***.
3. Place multiple jack stands at the suspension's specified ride height ***(Table 2)*** under the vehicle frame at OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve specified ride height.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

Table 2

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

4. Exhaust all air from the suspension, set the parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

5. Disconnect the linkage from the control arm and lower the axle mounting bracket ***(Figure 18)***.
6. Pin the height control valve so that the valve arm is in the center or neutral position ***(Figure 18)***.

Figure 16

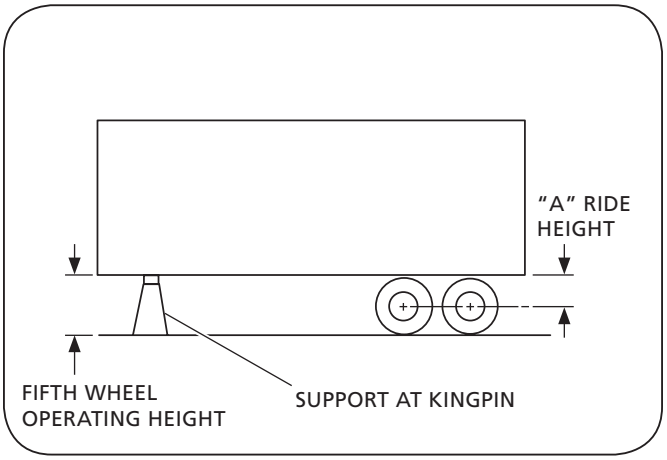


Figure 17

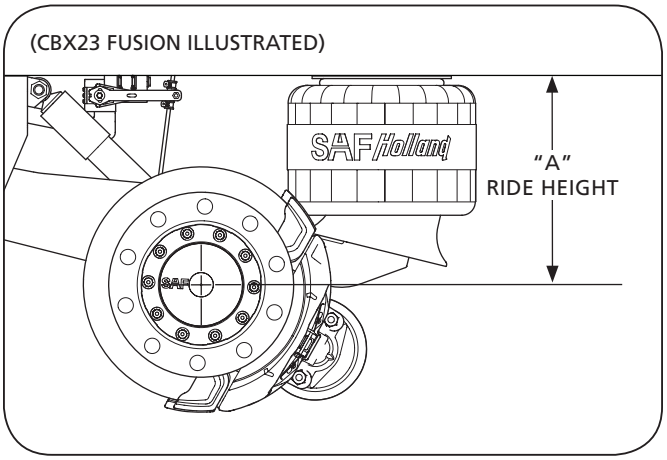
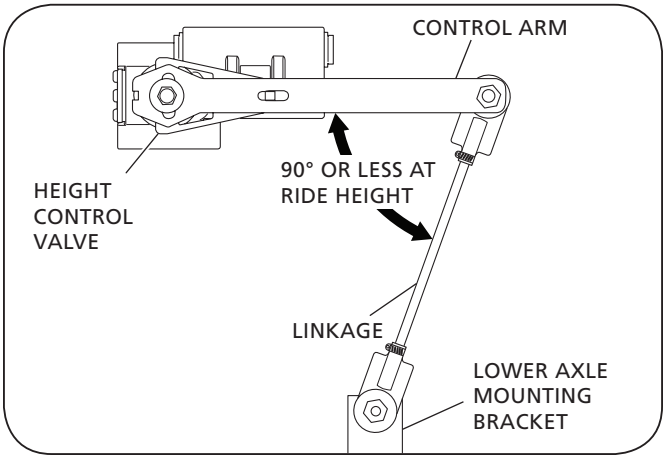


Figure 18



7. Measure distance "B" between the valve arm and mounting bracket holes to determine linkage length ***(Figure 19)***.
8. Adjust the linkage to required length and install the hardware into the upper and lower connections ***(Figure 19)***. Torque hardware to 30-40 in.-lbs. (3-5 N•m).

NOTE: It could be necessary to cut linkage rod to achieve proper length. Be sure to de-burr rod to prevent link end damage.

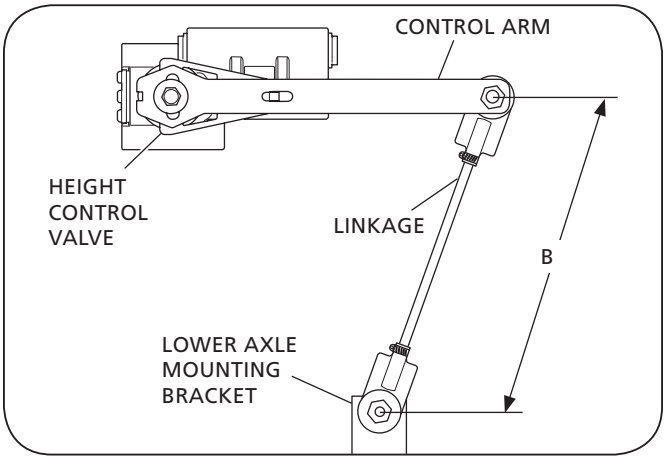
9. Raise the trailer approximately 2" (50 mm) above the ride height and remove the jack stands.
10. Slowly lower the trailer so that the trailer suspension is fully collapsed.
11. Pull the pin and apply air to the trailer allowing the suspension to return to ride height.
12. With the suspension at rest, measure the ride height. Ride height MUST be within 1/4" (6 mm) of the suspensions specified ride height.
13. Spray a soapy water mix on all air line connections to check for air leaks and verify fittings are tight.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise the suspension performance which, if not avoided, could result in component or property damage.

14. Remove the wheel chocks.

Figure 19



13. SwingAlign Axle Alignment

13.1 Alignment Preparation

1. Pull the trailer in a straight line for a sufficient distance to ensure that there are no binds in the suspension.
2. Disengage the trailer parking brakes and make sure the trailer is empty.
3. Manually measure or use an optical device specifically designed for alignment measuring to determine the following:
   a. Measure the distance from the king pin to the centerline of the front axle spindles. It is recommended that the spindle extensions be utilized.
   b. Dimensions A and B ***(Figure 20)*** MUST be equal to within 1/8" (3 mm).
   c. Measure the distance from the centerline of the front axle spindles to the centerline of the rear axle spindles.
   d. Dimensions C and D ***(Figure 20)*** MUST be equal to within 1/16" (1 mm).

13.2 Alignment Instructions

1. Using the measurements per Section 13.1 Step 3, align each axle. Align by rotating the alignment bolt head using a 1-3/8" socket wrench on the front face of the road-side frame bracket clockwise to move axle forward ***(A arrows);*** counterclockwise to move axle rearward ***(B arrows) (Figure 21)***. Approximately 250 ft.-lbs. (339 N•m) will be required.

IMPORTANT: DO NOT loosen the pivot bolts.

IMPORTANT: Two (2) scribe lines on the side of the frame bracket indicate maximum adjustment for axle alignment. If the edge of the visible washer touches either scribe line, the SwingAlign axle alignment adjustment is "out of stroke." Inspect and repair trailer components as necessary and realign ***(Figure 22)***.

IMPORTANT: The SwingAlign design maintains proper alignment without welding or without loosening of the pivot connection. DO NOT weld alignment bolt or pivot bolts ***(Figure 22)***.

14. Brake Adjustment Instructions

Brakes should be adjusted per axle and brake manufacturer's specifications.

For CBX/CB Suspensions with Drum Brake Systems refer to SAF-HOLLAND Drum Brake Service Manual, XL-TA10006OM.

For CBX Suspension with Disc Brake Systems refer to SAF-HOLLAND Disc Brake Service Manual, XL-SA10059OM.

Figure 20

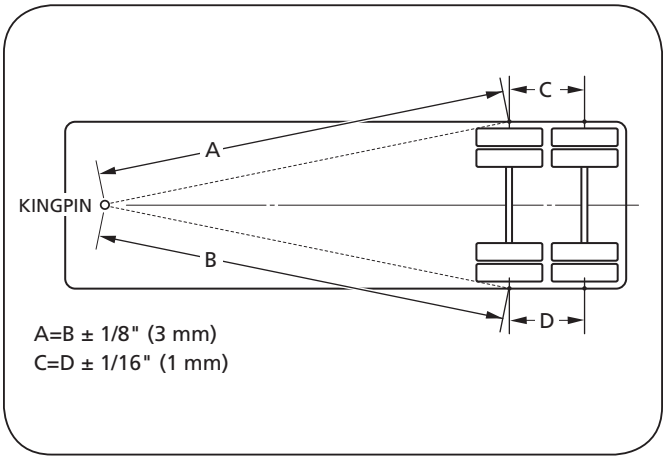


Figure 21

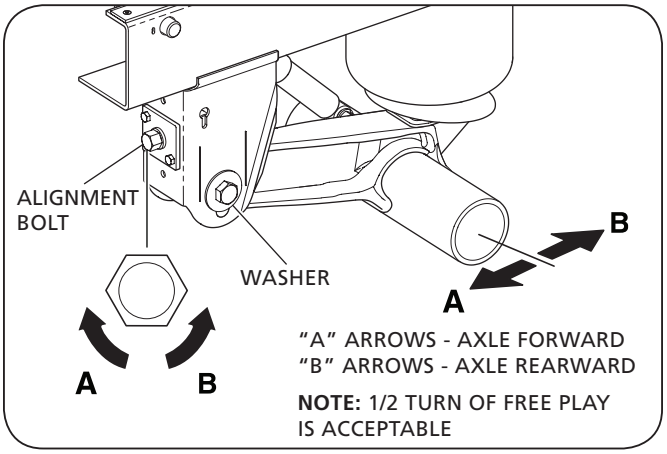
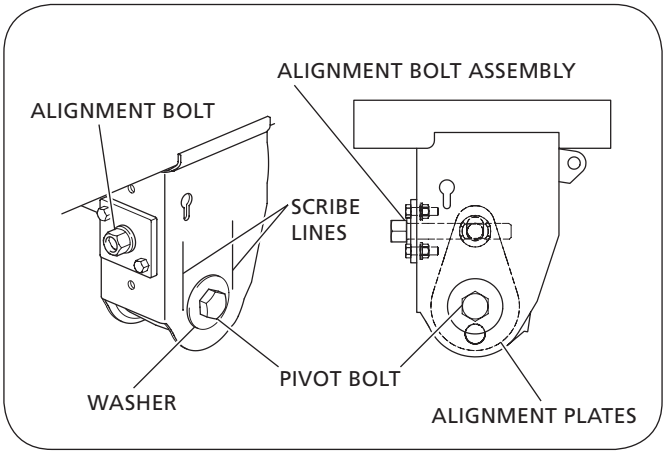


Figure 22



15. Pre-Operation

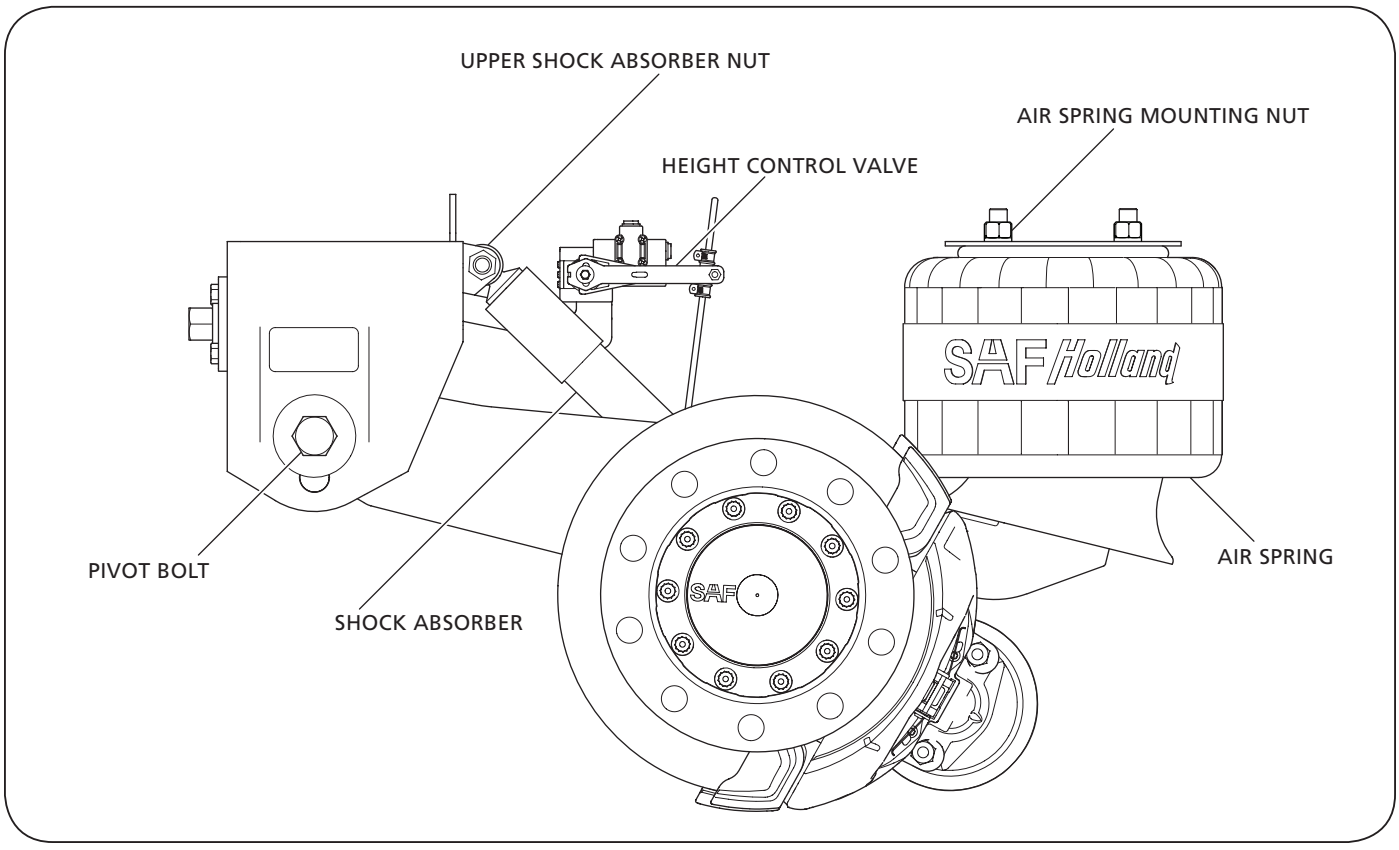
NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act. Equivalent laws may exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location where work is performed.

1. With the vehicle on a level surface, bring air system to operating pressure (above 85 psig/5.9 bars).
2. Shut off the vehicle and visually check all air control system fittings for air leaks by applying a soapy water solution and checking for bubbles at all air connections and fittings. Examine the air springs ***(Figure 23)*** for equal firmness.
3. Check the shock absorbers for proper installation and make sure that the upper and lower 3/4" shock absorber nuts are torqued to 140-175 ft.-lbs. (190-237 N•m) ***(Figure 23)***.
4. Verify that the 1/2" air spring mounting nuts are torqued to 30-40 ft.-lbs. (41-54 N•m), and the 3/4" air spring mounting nuts are torqued to 40-45 ft.-lbs. (54-61 N•m) ***(Figure 23)***.
5. With the suspension at full capacity, check that there is a 1" (25 mm) minimum clearance around the air springs.
6. The suspension's ride height should be within ±1/4" (6 mm) of the recommended design height. For proper ride height, refer to Section 12.
7. Determine which pivot bolt style is installed ***(Figure 23)***.
   - If 1-1/8" hex head bolt, verify torque on the nut is 550-600 ft.-lbs. (746-813 N•m).
   - If 7/8" pan head shear bolt, verify spline has been sheared off.

IMPORTANT: The SwingAlign design maintains proper alignment under correct torque without welding; DO NOT weld.

NOTE: SwingAlign pivot connections are on roadside and fixed alignment pivot connections are on curbside. For SwingAlign Connection Axle Alignment procedure, refer to Section 13.

Figure 23



16. Routine Maintenance and Daily Inspection

1. Daily or before each trip, check the suspension to ensure it is fully operational.
2. Inspect all decals to ensure they are clearly legible and intact. Clean with a terry cloth towel, soap and water.
3. Visually inspect air springs for sufficient inflation and that the suspension is at proper ride height. For ride height details and measurements, refer to Section 12 of this manual.

16.1 Initial Three (3) Months or 5,000 Mile (8,000 km) Service Inspection

1. Suspension ride height (underside of frame to centerline of axle) MUST be within ± 1/4" (6 mm) of recommended design height. For instructions on measuring ride height, refer to Section 11.

CAUTION An improperly set ride height could result in suspension component damage and/or poor vehicle ride performance.

2. After first three (3) months or 5,000 miles (8,000 km) of service, whichever comes first, inspect bolts and nuts at the pivot connections to ensure there are no signs of movement. Check all other nuts and bolts for proper torque, refer to the specifications listed in Section 17. Re-torque as necessary thereafter.
3. With the vehicle on a level surface and air pressure above 85 psig (5.9 bars), verify that all the air springs are of sufficient and equal firmness.

NOTE: Check all air control system fittings for air leaks, by applying a soapy water solution and checking for bubbles at all air connections and fittings.

16.2 Routine Physical Inspections

Every 100,000 Miles (160,000 km) or one (1) year, whichever comes first.

Check all other suspension components for any sign of damage, looseness, torque loss, wear or cracks. Repair, tighten or replace damaged part(s) to prevent equipment breakdown.

16.3 Visual Inspection Procedure

IMPORTANT: A schedule for physical and visual inspections should be established by the operator based on severity of operation or damage to the vehicle could occur.

IMPORTANT: During each pretrip and safety inspection of the vehicle, a visual inspection of the suspension should be done or damage to the vehicle could occur.

Visually check for:

- Loose, broken or missing fasteners. Repair or replace as needed.

⚠WARNING Loose, damaged, or missing fasteners can cause loss of vehicle control which, if not avoided, could result in death or serious injury.

- Air springs – clearances, wear damage, and proper inflation.
- Shock absorbers – leaking or damaged.
- Cracked parts or welds.

17. Torque Specifications

Table 3

COMPONENT	TORQUE VALUE	FASTENER SIZE
Shock Absorber	140-175 ft.-lbs. 190-237 N•m	3/4"
Pivot Connection, Hex Head Bolt	550-600 ft.-lbs. 746-813 N•m	1-1/8"
*Pivot Connection, Pan Head Shear Bolt	Visual Inspection	7/8"
Lower Air Spring Nut	30-40 ft.-lbs. 40-54 N•m	1/2"
Upper Air Spring Nut	40-45 ft.-lbs. 54-61 N•m	3/4"
SwingAlign Mounting Fasteners Only - NOT Pivot Bolt	50-60 ft.-lbs. 68-81 N•m	1/2"
Height Control Valve Lower Linkage	30-40 In.-lbs. 3-5 N•m	1/4"

All torque specifications are ± 5%.
Torques specified are for clean, lubricated threads.
Always Apply torque to nut if possible.
Required re-torquing at every brake re-lining.
* If equipped with 7/8" pan head shear bolt, ensure that the spline is sheared off and that there are no signs of movement.

NOTE: Torque specifications listed above are with clean lubricated / coated threads (***Table 3)***. All new SAF-HOLLAND fasteners come precoated from the factory. For bolt and lock nut grade markings refer to ***Figure 24***.

IMPORTANT: The use of special lubricants with friction modifiers, such as Anti-Seize or Never-Seez®, without written approval from SAF-HOLLAND engineering, will void warranty and could lead to over torquing of fasteners or other component issues.

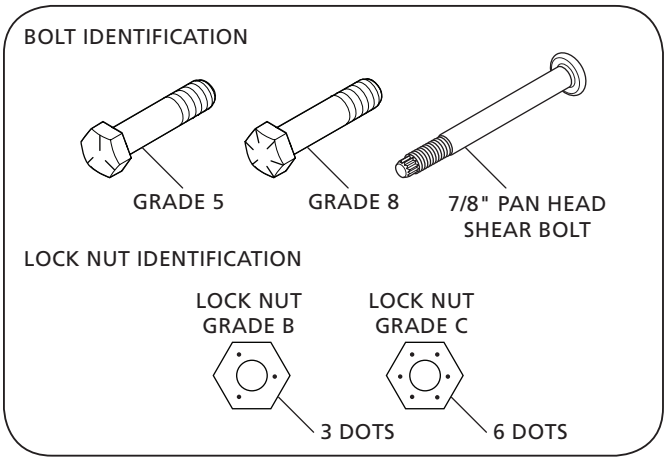
General Information

1. The torque specifications are applied to the nut and NOT the bolt.

⚠WARNING Failure to use the proper fasteners when servicing the suspension could cause component failure which, if not avoided, could result in death or serious injury.

⚠WARNING Failure to properly torque all fasteners could result in component failure which, if not avoided, could result in death or serious injury.

Figure 24



ORIGINAL PARTS™

From fifth wheel rebuild kits to suspension bushing repair kits, SAF-HOLLAND Original Parts are the same quality components used in the original component assembly.

SAF-HOLLAND Original Parts are tested and designed to provide maximum performance and durability. Will-fits, look-alikes or, worse yet, counterfeit parts will only limit the performance potential and could possibly void SAF-HOLLAND's warranty. Always be sure to spec SAF-HOLLAND Original Parts when servicing your SAF-HOLLAND product.

SAF-HOLLAND USA • 888.396.6501 • Fax 800.356.3929
www.safholland.us

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WESTERN CANADA • 604.574.7491 • Fax 604.574.0244
www.safholland.ca

SAF-HOLLAND MEXICO • 52.55.5362.8743 • Fax 52.55.5362.8743
www.safholland.com.mx

info@safholland.com

SAF-HOLLAND INC.
1950 Industrial Blvd., Muskegon, MI 49442
www.safholland.com

Engineering Your Road to Success

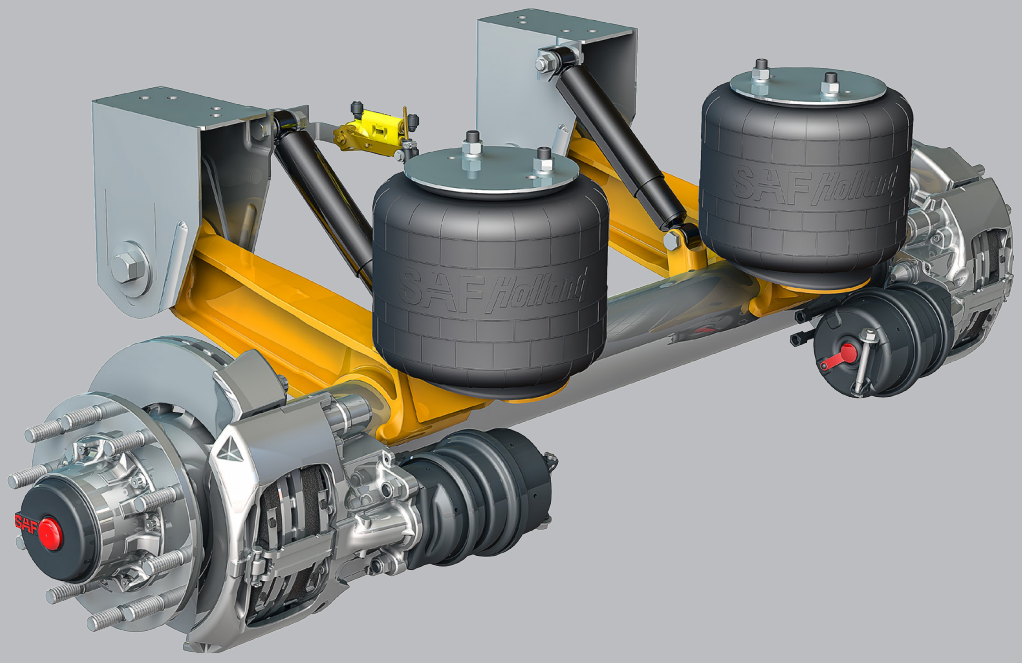
SAF-HOLLAND Group

Maintenance Manual

CBX/CB Series

Fixed Frame Top Mount Trailer Air Suspension

- For Disc and Drum Brake Applications



XL-AS11407MM-en-US Rev D

Introduction

The CBX suspensions includes a premium 5.75" diameter axles. The CB suspensions includes a standard 5.00" diameter axle. For axle end and/or brake servicing information or component replacements, contact Customer Service at 888-396-6501.

This suspension uses air drawn from the tractor air system to pressurize the air springs. The height control valve (HCV) regulates the air pressure required for varying loads while maintaining the design ride height. This suspension can provide a cushioned ride throughout the load range, from empty to fully loaded.

The suspension also provides excellent side-to-side and axle-to-axle loading which helps equalize and control braking.

Read this manual before using or servicing this product and keep it in a safe location for future reference. Updates to this manual, which are published as necessary, are available on the internet at www.safholland.us.

When replacement parts are required, SAF-HOLLAND® highly recommends the use of only SAF-HOLLAND Original Parts. A list of technical support locations that supply SAF-HOLLAND Original Parts and an Aftermarket Parts Catalog are available on the internet at www.safholland.us or contact Customer Service at 888-396-6501.

Warranty

Refer to the complete warranty for the country in which the product will be used. A copy of the written warranty is included with the product or available on the internet at www.safholland.com.

Notes, Cautions, and Warnings

Before starting any work on the unit, read and understand all the safety procedures presented in this manual. This manual contains the terms "NOTE", "IMPORTANT", "CAUTION", and "WARNING" followed by important product information. These terms are defined as follows:

NOTE: Includes additional information to enable accurate and easy performance of procedures.

IMPORTANT: Includes additional information that if not followed could lead to hindered product performance.

CAUTION Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

1. Safety Instructions

General and Servicing Safety Instructions

- Read and observe all Warning and Caution hazard alert messages. The alerts provide information that can help prevent serious personal injury, damage to components, or both.

⚠WARNING Failure to follow the instructions and safety precautions in this manual could result in improper servicing or operation leading to component failure which, if not avoided, could result in death or serious injury.

- All maintenance should be performed by a properly trained technician using proper/special tools, and safe procedures.

NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act (OSHA). Equivalent laws could exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location where work is performed.

- Properly support and secure the vehicle from unexpected movement when servicing the unit.

⚠WARNING Failure to properly support and secure the vehicle and axles prior to commencing work could create a crush hazard which, if not avoided, could result in death or serious injury.

- If possible, unload the trailer before performing any service procedures.
- After re-positioning the brake chamber, slack adjuster and/or ABS system as instructed in this manual, always consult the manufacturer's manual for proper operation.
- Service both roadside and curbside of an axle. Worn parts should be replaced in sets. Key components on each axle's braking system, such as friction material, rotors and drums will normally wear over time.
- Follow all manufacturer's instructions on spring pressure and/or air pressure controls.

⚠WARNING Failure to follow manufacturer's instructions regarding spring pressure or air pressure control could allow unexpected release of energy which, if not avoided, could result in death or serious injury.

- DO NOT paint the wheel contact surfaces between the wheel and hub.

IMPORTANT: The wheel contact surfaces MUST be clean, smooth and free from grease.

⚠WARNING Failure to keep wheel and hub contact surfaces clean and clear of foreign material could allow wheel/hub separations which, if not avoided, could result in death or serious injury.

- Only the wheel and tire sizes approved by the trailer builder can be used.

Operational and Road Safety Instructions

- Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.
- Make sure that the brakes are not overheated from continuous operation.

⚠WARNING Failure to minimize the use of brakes during overheating conditions could result in deterioration of brake efficiency which, if not avoided, could result in death or serious injury.

- The parking brake MUST NOT be immediately applied when the brakes are overheated.

CAUTION If the parking brake is immediately applied to the brakes when overheated, the brake drums or discs could be damaged by different stress fields during cooling.

- Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles.

IMPORTANT: The definition of OFF-ROAD means driving on non-asphalt/non-concrete routes, e.g. gravel roads, agricultural and forestry tracks, on construction sites and in gravel pits.

IMPORTANT: Off-road operation of axles beyond the approved application design could result in damage and impair suspension system performance.

- Follow the recommended routine maintenance and inspections described in this manual. These procedures are designed so that optimum performance and operational safety are achieved.
- In the event of suspension air pressure loss, quickly reduce speed as safely as possible and remove the vehicle from traffic. If unable to remove vehicle from traffic, follow DOT safety requirements regarding emergency situations.
- Contact a qualified towing and/or service company to assist in repairing the vehicle or to move it to a qualified repair facility. DO NOT operate the vehicle in the absence of suspension air pressure; however in the event of an air system failure while in service, an internal rubber bumper built into the air spring will make it possible to temporarily operate the vehicle at reduced speed determined by road conditions.

⚠WARNING Operating the vehicle without proper air pressure can cause tire failure, fire, or loss of vehicle control which, if not avoided, could result in death or serious injury.

2. CBX Fusion Model Identification

The CBX Fusion suspension serial tag is located on the frame bracket ***(Figure 1)***.

NOTE: If the suspension serial tag is not legible or is NOT available, it can be identified by the appearance of the equalizing beam ***(Figure 3)***. The CBX Fusion model will have a cast beam with a lower air spring mounting plate welded to it mounted on a 5.75" round axle.

NOTE: This manual applies to the suspension models listed on the front cover. However, determine the specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 2)***.

NOTE: The CBX fusion models come in four (4) different beam lengths. Equalizing beam lengths are measured from the center line of the pivot to the center line of the air spring mounting plate ***(Figure 3).***

3. CBX Fusion Model Nomenclature

The sample tag illustrated will help interpret the information on the SAF-HOLLAND, Inc. serial number tag. The part number is on the first line. The model number along with the suspension capacity are on the second line. The third line contains the serial number ***(Figure 2)***.

CB X 23 - 14

- 14 — Ride Height
  - 14" (356 mm)
  - 15" (381 mm)
  - 16" (406 mm)
  - 17" (432 mm)
- 23 — Axle Capacity Suspension Series
  - 20 – 20,000
  - 23 – 23,000
  - 25 – 25,000
  - 25/30 – 25,000/30,000*
  - *30,000 at creep speed
- X — 5.75" Diameter Premium Axle
- CB — Cast Beam Suspension

Figure 1

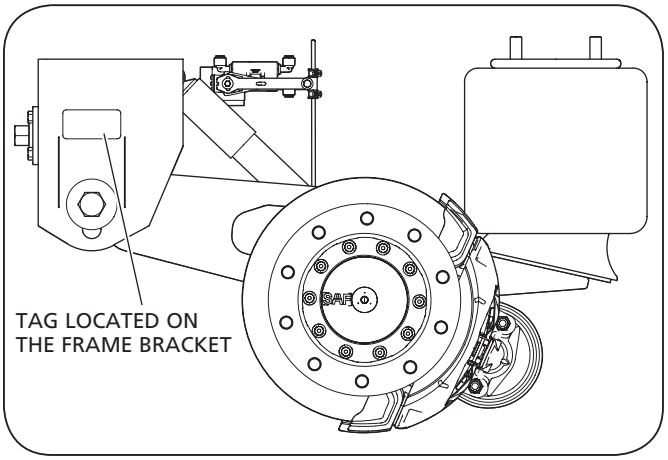


Figure 2

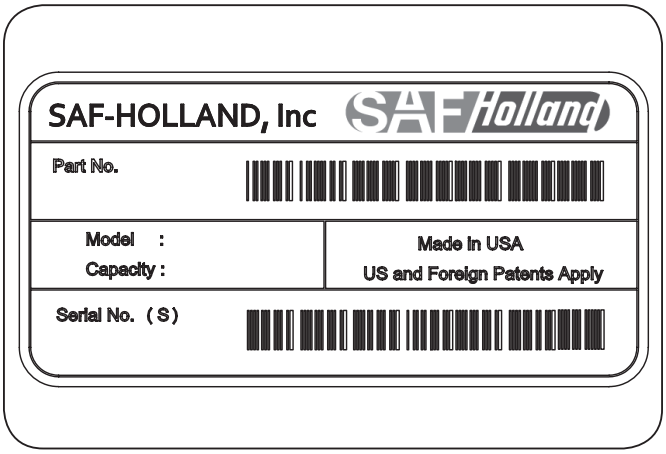
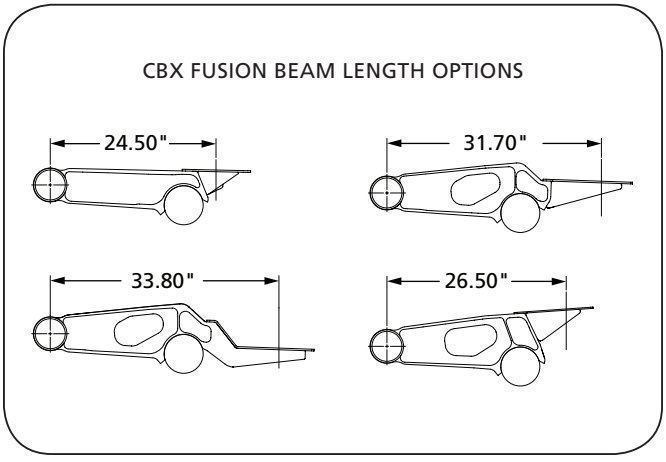


Figure 3



4. CBX Model Identification

The CBX suspension serial tag is located on the frame bracket ***(Figure 4)***.

NOTE: If the suspension serial tag is not legible or is NOT available, it can be identified by the appearance of the equalizing beam ***(Figure 6)***. The CBX model will have a cast beam with a lower air spring mounting plate welded to it mounted on a 5.75" round axle.

NOTE: This manual applies to the suspension models listed on the front cover. However, determine the specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 5)***.

NOTE: The CBX models come in three (3) different beam lengths ***(Figure 6)***. Equalizing beam lengths are measured from the centerline of the pivot to the centerline of the air spring mounting plate.

5. CBX Model Nomenclature

The sample tag illustrated will help you interpret the information on the SAF-HOLLAND, Inc. serial number tag. The model number is on the first line along with the suspension capacity. The second line contains the part number and the serial number ***(Figure 5)***.

CB X 23 - 14

- **CB** — Cast Beam Suspension
- **X** — 5.75" Diameter Premium Axle
- **23** — Axle Capacity Suspension Series
  - 20 – 20,000
  - 23 – 23,000
  - 25 – 25,000
  - 25/30 – 25,000/30,000*
  - *30,000 at creep speed
- **14** — Ride Height
  - 14" (356 mm)
  - 15" (381 mm)
  - 16" (406 mm)
  - 17" (432 mm)

Figure 4

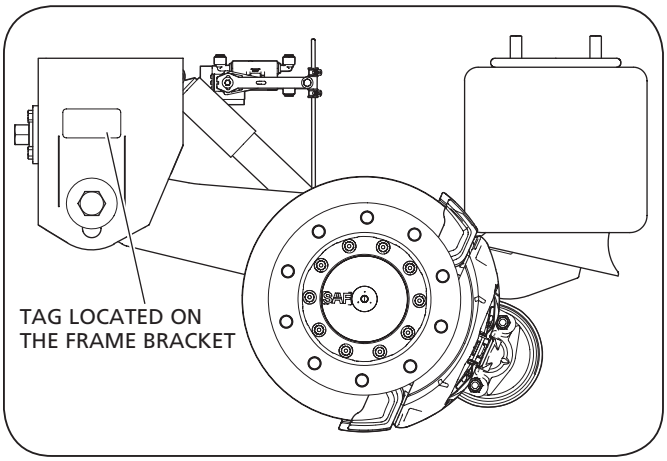


Figure 5

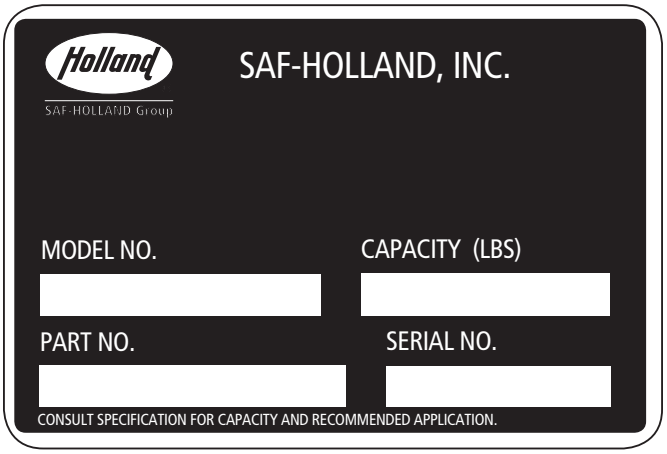
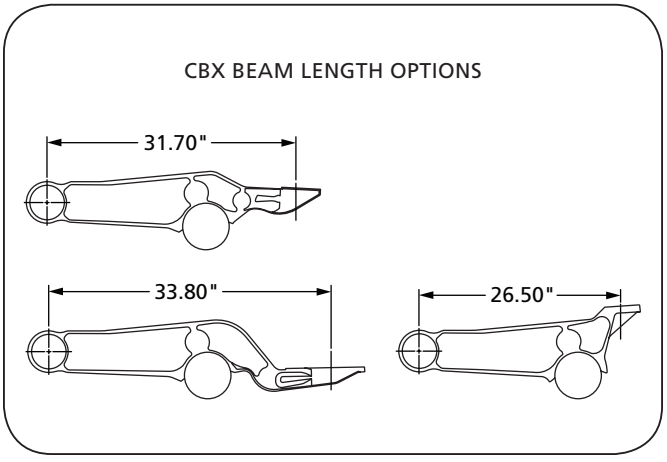


Figure 6



6. CB-2300 Model Identification

The CBX-2300 suspension serial tag is located on the frame bracket ***(Figure 7)***.

NOTE: If the suspension serial tag is NOT legible or is NOT available, it can be identified by the appearance of the equalizing beam. The CB-2300 model will have a cast beam and a 5" round axle ***(Figure 7)***.

NOTE: This manual applies to the suspension models listed on the front cover. However, determine the specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 8)***.

7. CB-2300 Model Nomenclature

The sample tag illustrated will help you interpret the information on the SAF-HOLLAND, Inc. serial number tag. The model number is on the first line along with the suspension capacity. The second line contains the part number and the serial number ***(Figure 8)***.

CB 2300 - 14

- 14 — Ride Height
  - 14" (356 mm)
  - 15" (381 mm)
  - 16" (406 mm)
  - 17" (432 mm)
- 2300 — Axle Capacity Suspension Series 23,000 lbs.
- CB — Cast Beam Suspension

Figure 7

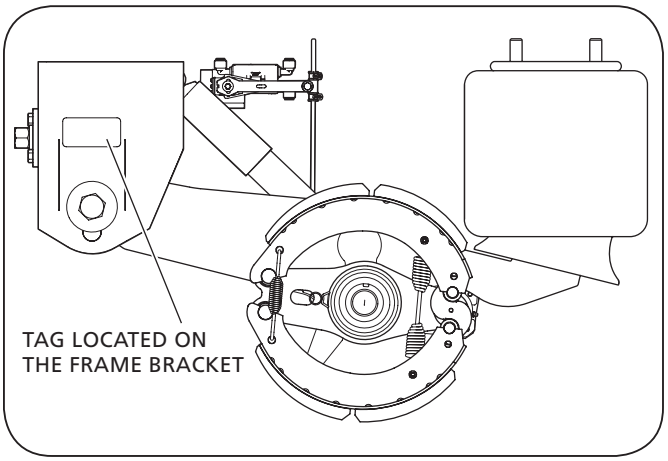
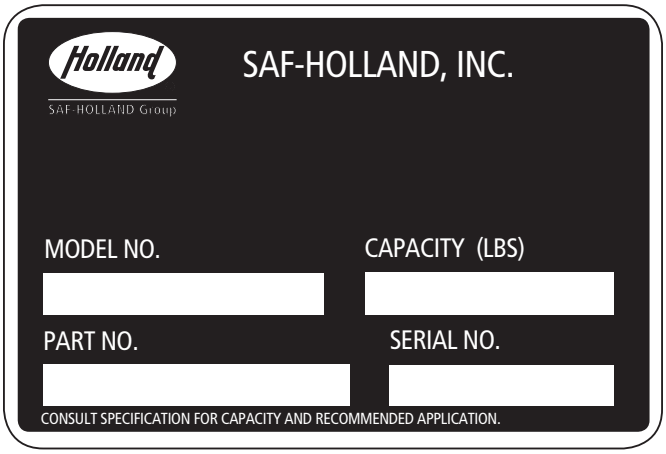


Figure 8



8. Welding Standards

8.1 Scope

When welding is required for the suspension repairs, observe the requirements below. This specification applies to all components supplied by SAF-HOLLAND, and its products. The customer assumes all responsibility for weld integrity if weld material and procedure differ from those listed below.

8.2 Workmanship

All welding on SAF-HOLLAND products MUST be performed by a welder qualified according to the appropriate AWS standard for the weld being made or an equivalent standard. It is the responsibility of the customer to provide good workmanship when welding on SAF-HOLLAND products.

8.3 Material

Items to be welded that are made from low carbon or high-strength alloy steel are to be welded with AWS filler metal specification AWS A5.18, filler metal classification ER-70S-3, ER-70S-6 or equivalent unless specified on the installation drawing.

NOTE: Any substitution for filler material from the above standard must comply, as a minimum, with the following mechanical properties:

Tensile Strength - 72k psi (496 MPa)
Yield Strength - 60k psi (414 MPa)
Charpy V Notch - 20 ft.-lbs. (27 N•m) at 0° F (-17.7° C)
% Elongation - 22%

The recommended welding gas for gas metal arc welding (GMAW) is 90% Argon / 10% CO2. If a different gas is used, welds MUST comply with penetration requirements illustrated ***(Figure 9)***. Where the installation drawing specifies different than above, the drawing shall prevail.

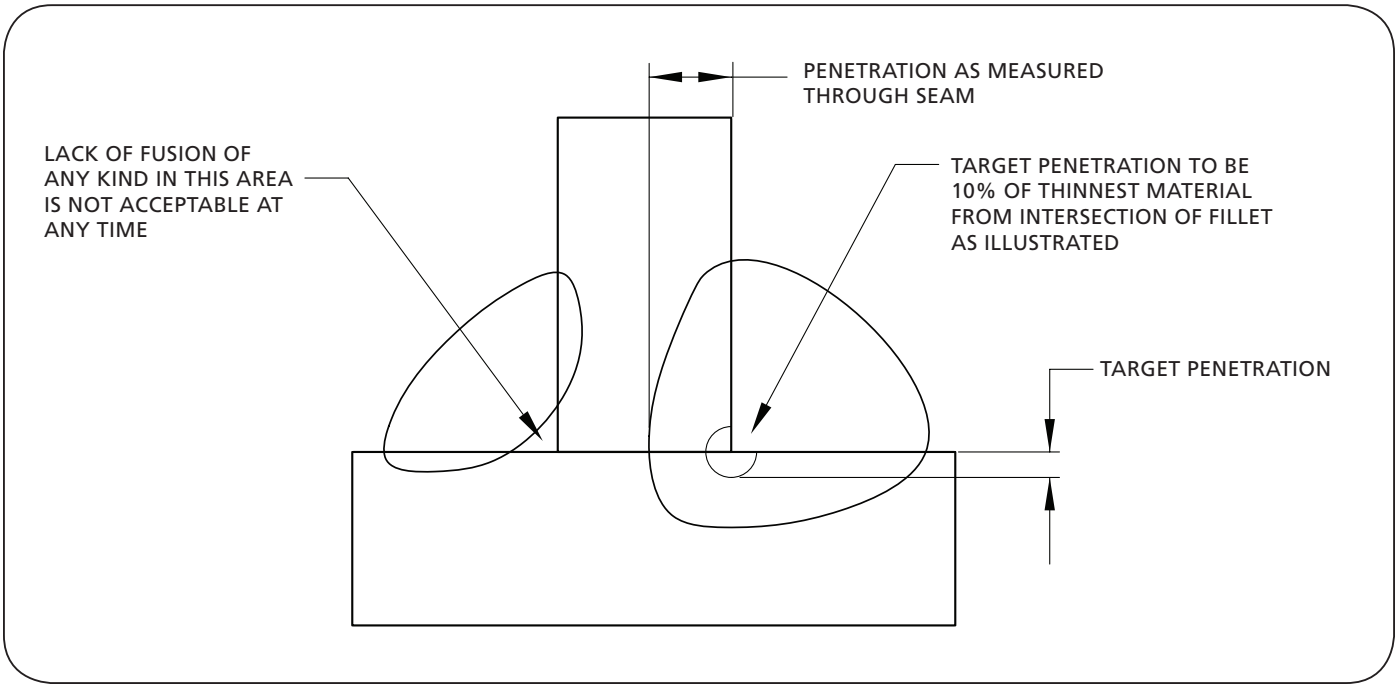
8.4 Procedures

Tack welds used for positioning components are to be located in the center of the final weld, where practical. Tack weld should be completely fused to the finish weld. DO NOT break arc at the end of the weld. Back up all finish welds at least 1/2" (12.7 mm) or a sufficient amount to prevent craters at the end of the weld. Where weld is illustrated to go around corners, it is assumed the corner represents a stress concentration area. DO NOT start or stop weld within 1" (25.4 mm) of the corner. Particular care should be taken to prevent undercutting in this area.

8.5 Weld Size

If weld size is NOT specified, the effective throat of the weld MUST be no smaller than the thinnest material being welded ***(Figure 9)***.

Figure 9



9. Ride Height Adjustment

IMPORTANT: Trailer MUST be unloaded before beginning any service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or while coupled to a tractor ***(Figure 10)***.
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height ***(Figure 11)***.
3. Place multiple jack stands at the suspension's specified ride height ***(Table 1)*** under the vehicle frame at OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve specified ride height.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

Table 1

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

4. Exhaust all air from the suspension, set parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

5. Disconnect the linkage from the control arm and lower axle mounting bracket ***(Figure 12)***.
6. Pin the height control valve so that the valve arm is in the center or neutral position ***(Figure 12)***.

Figure 10

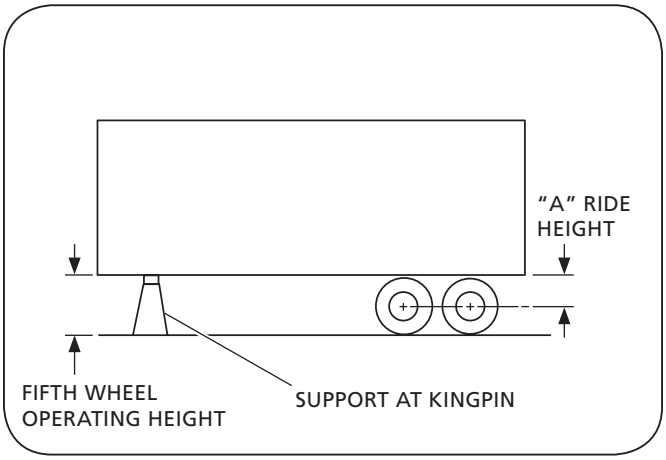


Figure 11

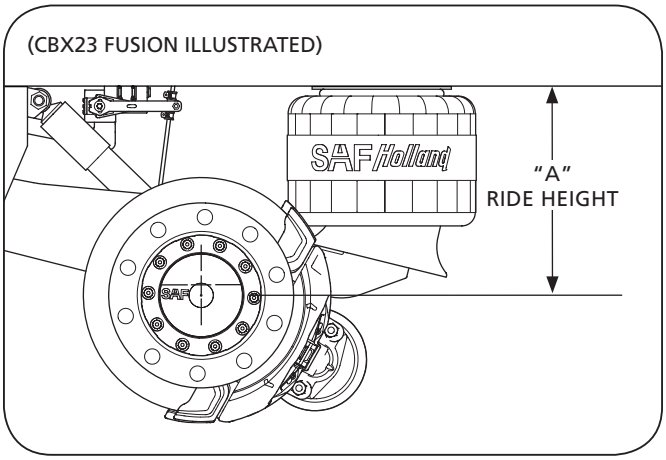
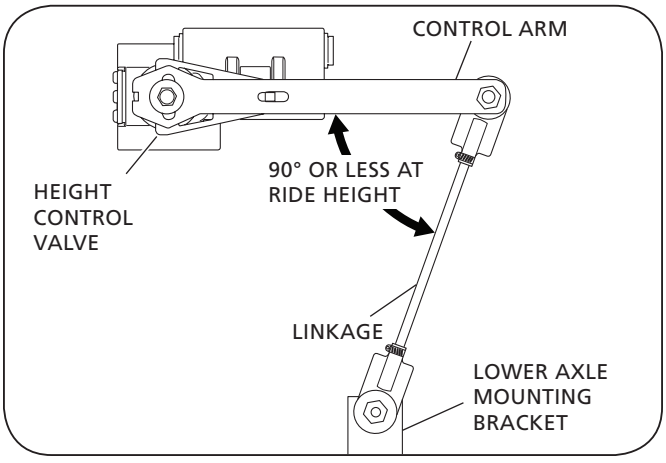


Figure 12



7. Measure distance "B" between the valve arm and mounting bracket holes to determine linkage length ***(Figure 13)***.
8. Adjust the linkage to required length and install the hardware into the upper and lower connections ***(Figure 13)***. Torque hardware to 30-40 in.-lbs. (3-5 N•m).

NOTE: It could be necessary to cut the linkage rod to achieve proper length. Be sure to de-burr the rod to prevent link end damage.

9. Raise the trailer approximately 2" (50 mm) above the ride height and remove the jack stands.
10. Slowly lower the trailer so that the trailer suspension is fully collapsed.
11. Pull pin and apply air to the trailer allowing the suspension to return to ride height.
12. With the suspension at rest, measure the ride height. Ride height must be within 1/4" (6 mm) of the suspensions specified ride height.
13. Spray a soapy water mix on all air line connections and test for air leaks and verify the fittings are tight.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise the suspension performance which, if not avoided, could result in component or property damage.

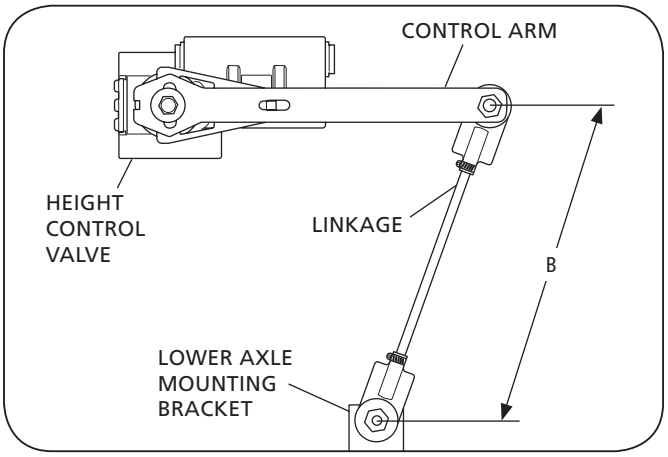
14. Remove the wheel chocks.

10. Height Control Valve Inspection

IMPORTANT: DO NOT grease height control valve.

1. Visually inspect the valve and linkage on a monthly basis for proper clearance, operation and adjustment.
2. Drain moisture from the air tank periodically. In severe cold weather an air dryer and/or an alcohol evaporator is recommended to avoid valve freezing and damage.
3. Ensure the air system is free of dirt and foreign particles as they may harm the valve.

Figure 13



11. Height Control Valve Performance Check

IMPORTANT: Proper inspection can eliminate unnecessary replacement of the height control valve.

1. Apply air system pressure in excess of 85 psig (5.9 bars).
2. Using multiple jack stands support the vehicle frame approximately 2" (51 mm) below the ride height at OEM specified locations.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

3. Disconnect the lower connection of the link assembly from the mounting bracket.
4. Move the control arm up 45° for 10-15 seconds – air should flow to air spring(s) ***(Figure 14)***.
5. Move the control arm to center (neutral) position – valve should shut off the air flow ***(Figure 14)***.
6. Move the control arm down 45° for 10-15 seconds – air should exhaust ***(Figure 14)***.
7. Move the control arm to center (neutral) position – valve should shut off the air flow.
8. The valve is good if the performance is as noted.

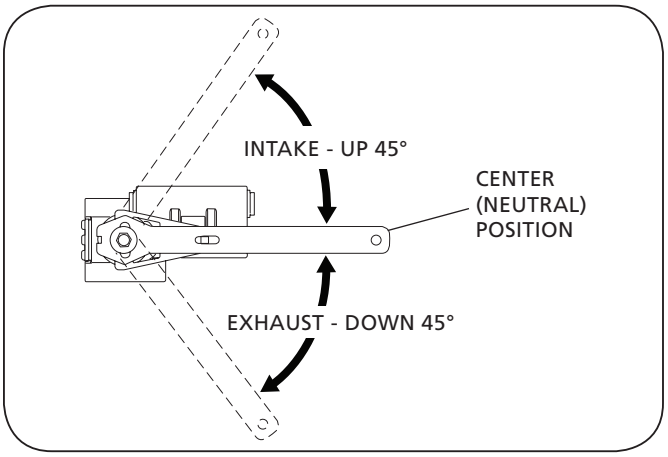
NOTE: If the valve DOES NOT perform correctly, replace the valve.

9. Reconnect the lower link assembly to the mounting bracket, and torque to 30-40 in.-lbs. (3-5 N•m).

IMPORTANT: If 85 psig (5.9 bars) air system pressure cannot be achieved, check pressure protection valve and vehicle air compressor to see if they are operating properly. Also, check the air lines for obstructions caused by dirt particles, foreign debris, ice, etc.

10. Remove the jack stands.

Figure 14



12. SwingAlign Axle Alignment

12.1 Alignment Preparation

1. Pull the trailer in a straight line for a sufficient distance to ensure there are no binds in the suspension.
2. Disengage the trailer parking brakes and make sure the trailer is empty.
3. Manually measure or use an optical device specifically designed for alignment measuring to determine the following:
   a. Measure the distance from the king pin to the center line of the front axle spindles. It is recommended that spindle extensions be utilized.
   b. Dimensions A and B ***(Figure 15)*** MUST be equal to within 1/8" (3 mm).
   c. Measure the distance from the center line of the front axle spindles to the center line of the rear axle spindles.
   d. Dimensions C and D ***(Figure 15)*** MUST be equal to within 1/16" (1 mm).

12.2 Alignment Instructions

1. Using the measurements from Step 3, align each axle. Align by rotating the alignment bolt head using a 1-3/8" socket wrench on the front face of the roadside frame bracket. Rotate clockwise to move axle forward ***(A arrows)***; counterclockwise to move axle rearward ***(B arrows) (Figure 16)***.

IMPORTANT: DO NOT loosen the pivot bolts.

IMPORTANT: Two (2) scribe lines on the side of the frame bracket indicate maximum adjustment for axle alignment. If the edge of the visible washer touches either scribe line, the SwingAlign axle alignment adjustment is "out of stroke." Inspect and repair trailer components as necessary and realign ***(Figure 17)***.

IMPORTANT: The SwingAlign design maintains proper alignment without welding or without loosening of the pivot connection. DO NOT weld alignment bolt or pivot bolts ***(Figure 17)***. If connection requires tightening, see torque chart in Section 19 of this manual.

Figure 15

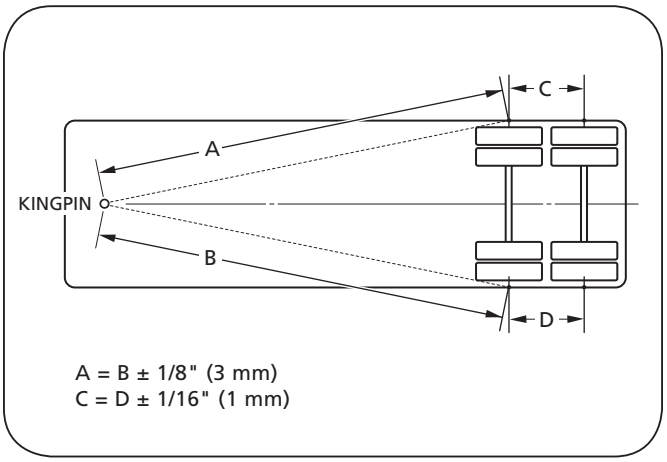


Figure 16

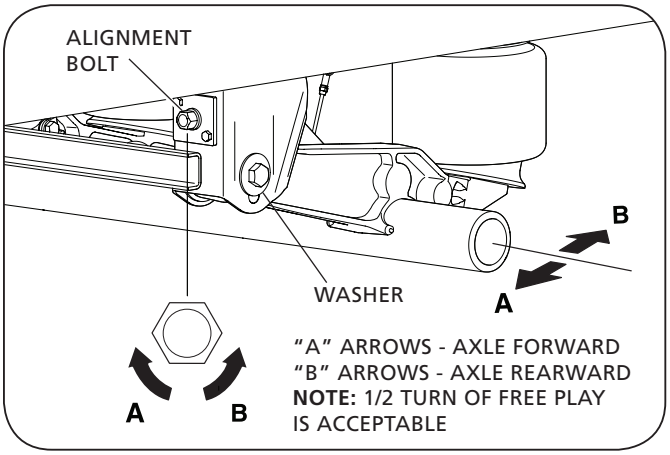
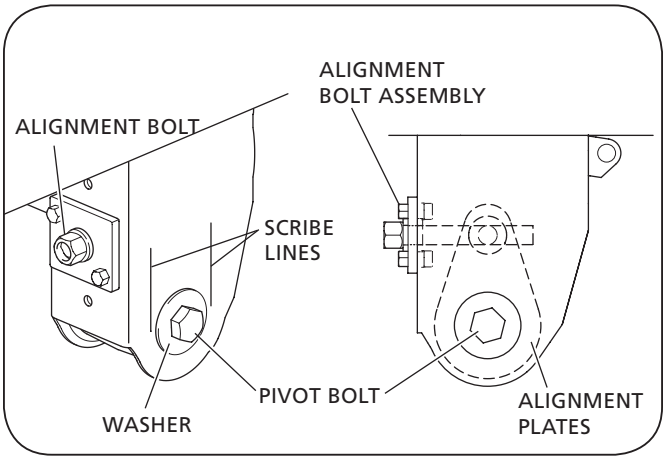


Figure 17



13. Air Spring Replacement

IMPORTANT: Air springs MUST be replaced with the proper air spring for your application. Check the flexible member and piston for the part number. If the part number cannot be found consult parts manual XL-AS11408PM-en-US.

NOTE: For further assistance with the air spring part number identification, contact SAF-HOLLAND technical assistance at 888-396-6501.

IMPORTANT: Maximum air spring static operation pressure is 100 psig (6.9 bars).

⚠WARNING Failure to observe the maximum air spring static operating pressure could cause equipment failure which, if not avoided, could result in death or serious injury.

IMPORTANT: The trailer MUST be unloaded before beginning service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or coupled to a tractor ***(Figure 18)***.
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height.
3. Place multiple jack stands at the suspension's specified ride height ***(Table 2)*** under the vehicle frame at OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve specified height.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

4. Exhaust all air from the suspension, set parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

5. Disconnect, remove, and discard the old air spring assembly ***(Figure 19).***
6. Install the new air spring assembly and torque fasteners. Refer to the Torque Specifications listed in Section 19.
7. Reconnect the air supply line.
8. Raise the trailer approximately 2" (51 mm) above the ride height and remove the jack stands.

Figure 18

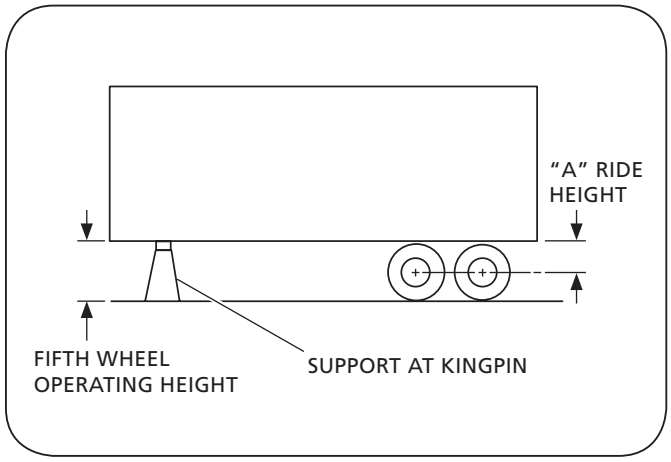
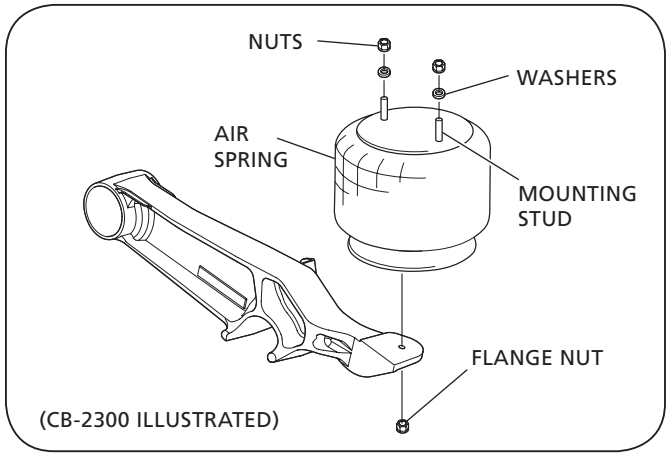


Table 2

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

Figure 19



9. Slowly lower the trailer so that trailer suspension is fully collapsed.
10. Apply air to the trailer and allow the suspension to return to ride height.
11. Verify that all the air connection fittings are tight. Check all fittings for air leaks by applying a soapy water solution and checking for bubbles at all air connections and fittings.

IMPORTANT: It is the responsibility of the air system installer to secure all the air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise suspension performance which, if not avoided, could result in component or property damage.

12. Remove the wheel chocks.

14. Shock Absorber Replacement

IMPORTANT: The shock absorber MUST be replaced with the proper shock absorber. Check the shock for part number. If the part number cannot be found, consult parts manual XL-AS11408PM-en-US.

IMPORTANT: The trailer MUST be unloaded before beginning service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or coupled to a tractor (***Figure 20***).
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height.
3. At the suspension's specified ride height ***(Table 3)***, place multiple jack stands under the vehicle's frame per OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve specified height.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

4. Exhaust all air from the suspension, set the parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

Figure 20

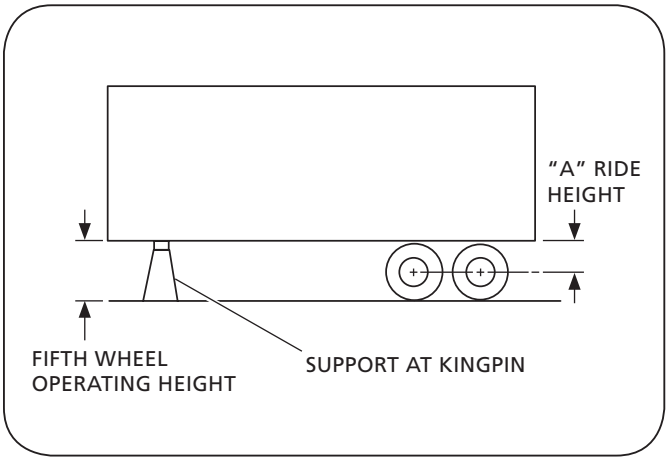


Table 3

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

6. Remove the upper and lower mounting bolts and remove the shock absorber ***(Figure 21)***.
7. Replace with the correct shock absorber and fasteners and torque the hardware per specifications listed in Section 19.
8. Raise the trailer approximately 2" (51mm) above the ride height and remove the jack stands.
9. Slowly lower the trailer so that the trailer suspension is fully collapsed.
10. Apply air to the trailer and allow the suspension to return to ride height.
11. Remove the wheel chocks.

15. Pivot Connection Bushing Replacement

NOTE: If your suspension model is equipped with PosiLift™ refer to PosiLift™ manual XL-AR462 for the proper Service Repair Kit (SRK) and special replacement instructions.

IMPORTANT: When replacing the rubber bushing at this connection be sure the proper SAF-HOLLAND Service Repair Kit (SRK) is used as they contain all necessary parts to service one axle (two (2) kits per tandem). Refer to Service Repair Kit section of parts manual XL-AS11408PM-en-US for proper SRK. It may be advantageous to service both pivot connections at the same time.

IMPORTANT: The vehicle must be unloaded before beginning service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or coupled to a tractor ***(Figure 22)***.
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height.
3. At the suspension's specified ride height ***(Table 4)***, place multiple jack stands under the vehicle's frame per OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve specified height.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

Figure 21

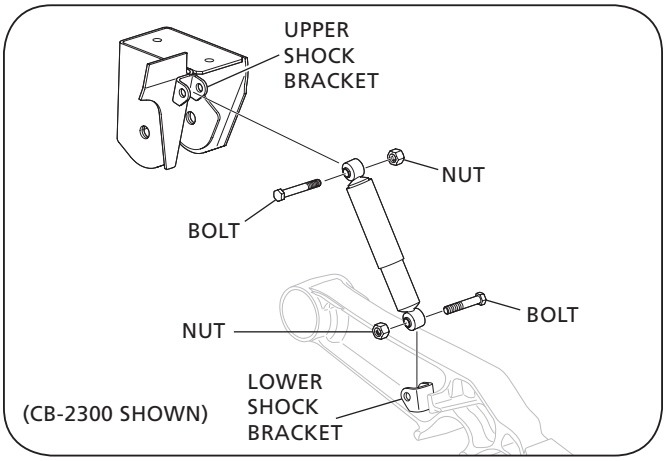


Figure 22

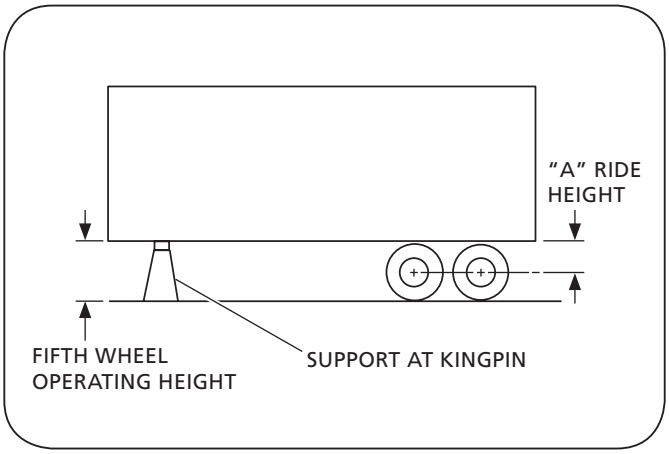


Table 4

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

4. Exhaust all air from the suspension, set the parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

5. Disconnect the air spring and shock absorber at lower connections on both roadside and curbside.
6. Disconnect the height control valve (HCV) linkage at the lower connection.

NOTE: The SAF-HOLLAND Bushing Service Tool, Part No. 50544015 is available to ease removal and replacement of bushings ***(Figure 24 A)***. Contact your SAF-HOLLAND distributor or Parts Manual for details.

7. Raise the axle approximately 2" (51 mm) and support it with jack stands and remove the wheel chocks.

⚠WARNING Failure to proper support the axle during maintenance could create a crush hazard, which, if not avoided, could result in death or serious injury.

8. Remove the tires.
9. Remove the front pivot connection hardware and discard ***(Figure 23 A or B)***.
10. Rotate the equalizing beams down. Make sure the equalizing beams are supported by the jack stands.

⚠WARNING Failure to properly support the equalizing beams could create a crush hazard which, if not avoided, could result in component damage, death or serious injury.

11. Inspect the equalizing beams for wear, cracks and failed welds at the axle. If cracks are detected anywhere on an equalizing beam, replace the beam and the axle assembly.

IMPORTANT: NEVER repair a cracked equalizing beam. DO NOT weld cracks.

⚠WARNING Failure to replace a cracked equalizing beam could cause loss of vehicle control which, if not avoided, could result in death or serious injury.

12. Press out the old bushing ***(Figure 24)*** using a SAF-HOLLAND Bushing Service Tool, Part No. 50544015 ***(Figure 24 A)***.

IMPORTANT: DO NOT use an open flame or other heat source to remove the bushings.

13. Clean out all foreign material from the bushing receptacle(s) with a wire brush or wire wheel. Lubricate the new bushing(s) with liquid dish soap and water solution.

Figure 23

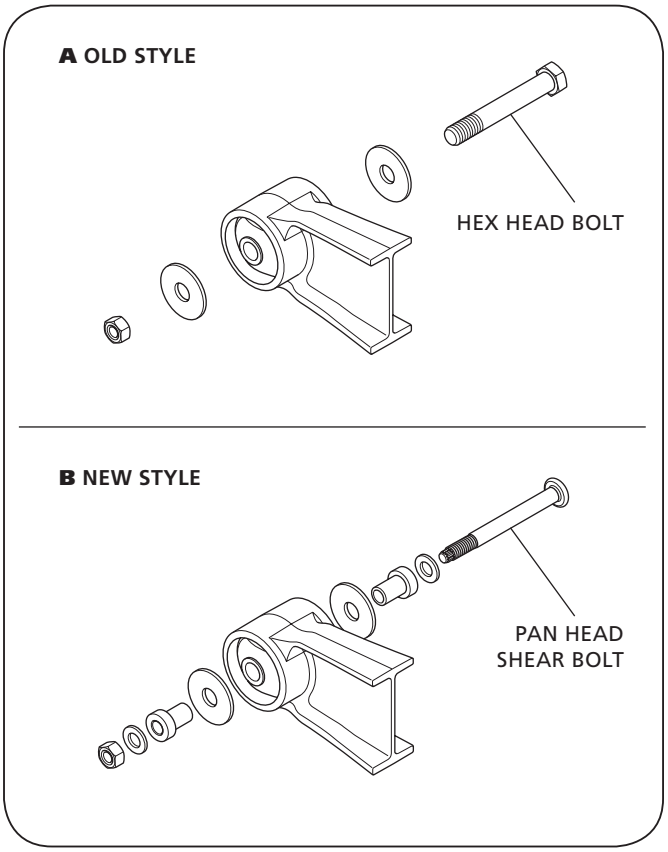
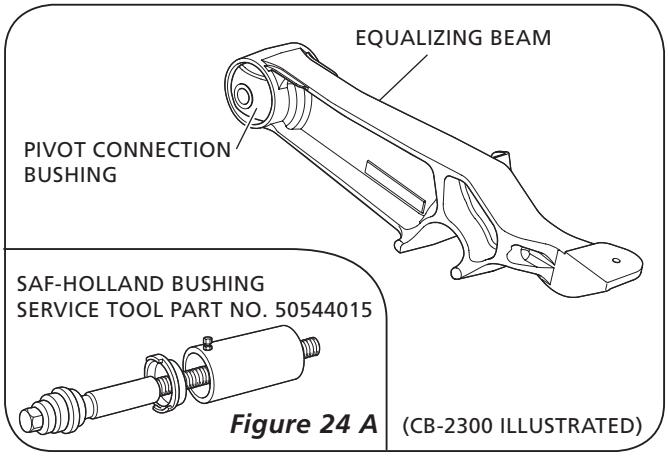


Figure 24



IMPORTANT: DO NOT use oil-based lubricant or brake fluid, as they can cause damage to the rubber.

14. Press the new bushing into the beam. The bushing MUST be oriented, aligned and centered into the beam receptacles:
    a. Orientate the bushings ***(Figure 25)***.
    b. Press the bushings into the beam receptacles and center them ***(Figure 26)***.

IMPORTANT: It could be necessary to push the bushing past center approximately 1" (25.4 mm) and then re-center the bushing to relieve the rubber ***(Figure 27)***.

    c. Inspect the bushing's alignment ***(Figure 27)***. If the alignment is bad, press out the bushing and repeat the procedure.
15. Inspect the frame brackets for excessive wear on the inside wear washers or SwingAlign alignment plates. If the wear is excessive, refer to Section 17 for replacement information.

    If only SwingAlign components need to be replaced, refer to Section 18 for replacement information.

    If only fixed frame bracket components need to be replaced refer to Section 17 for replacement information.
16. Rotate the beams up into the frame brackets and reinstall the equalizing beam with the new bolts and nuts. Position at the ride height and torque the fastening hardware according to the specifications listed in Section 19.
17. Reconnect the air springs, shock absorbers and HCV linkage. Properly torque the fastening hardware according to the specifications listed in Section 19.
18. Raise the trailer approximately 2" (51mm) above the ride height and remove the jack stands.
19. Slowly lower the trailer so that the trailer suspension is fully collapsed.
20. Apply air to the trailer and allow the suspension to return to the ride height.
21. Verify all air connection fittings are tight. Check all the fittings for air leaks by applying a soapy water solution and checking for bubbles at all air connections and fittings.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required.

⚠WARNING Failure to eliminate air leaks could compromise the suspension performance which, if not avoided, could result in component or property damage.

22. Remove the wheel chocks.

Figure 25

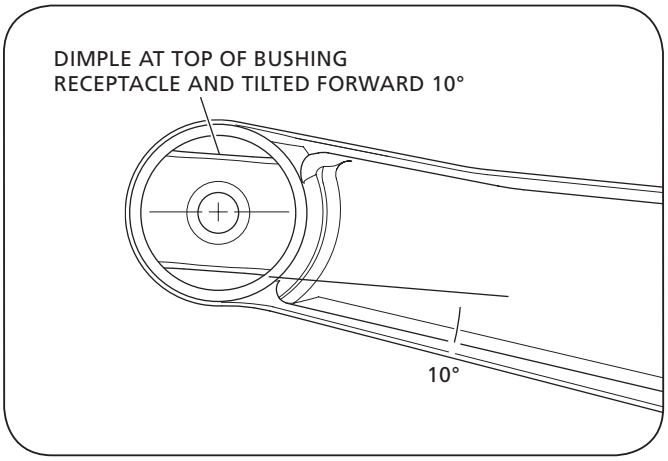


Figure 26

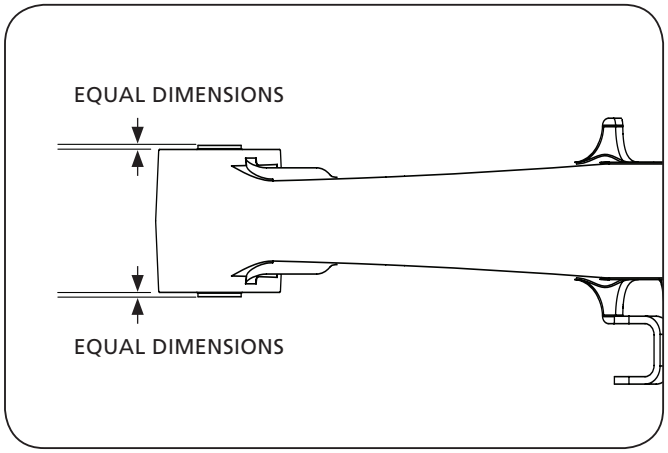
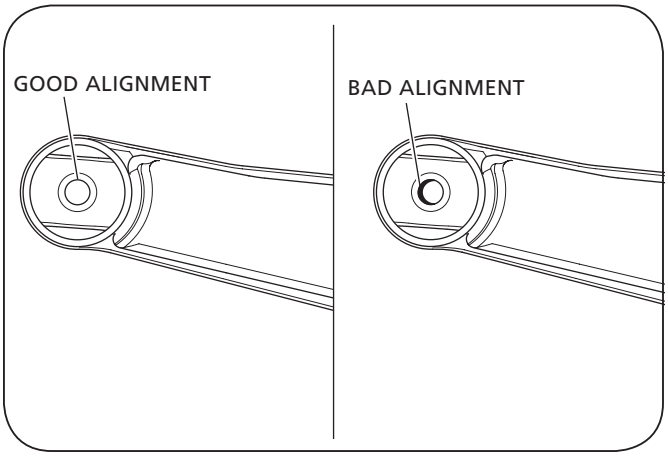


Figure 27



16. Equalizing Beam and Axle Assembly Replacement

IMPORTANT: The trailer MUST be unloaded before beginning any service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or coupled to a tractor ***(Figure 28)***.
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height.
3. At the suspension's specified ride height ***(Table 5)***, place multiple jack stands under the vehicle's frame per OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve the specified height.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

5. Exhaust all air from the suspension, set the parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

6. Raise the axle approximately 2" (51 mm) and support it with the jack stands and remove the wheel chocks.

⚠WARNING Failure to properly support axle during maintenance could create a crush hazard, which, if not avoided, could result in death or serious injury.

7. Remove the tires.
8. Disconnect the air springs, shock absorbers and height control valve (HCV) linkage at the lower connections.
9. Remove the brake equipment:
   - Drum Brakes – remove the brake chambers, slack adjusters, and wheel end assemblies. Refer to the XL-TA10006OM-en-US service manual for detailed disassembly and reassembly procedures.
   - Disc Brakes – disconnect the brake chamber air supply lines. Refer to XL-SA10059OM-en-US service manual for detailed disassembly and reassembly procedures.
   - For Non-SAF® Manufactured Axles – contact axle manufacturer for recommended disassembly and reassembly procedures.
10. Remove the front pivot hardware from the suspension and discard ***(Figure 29 A or B)***.
11. Remove the axle and equalizing beam assembly.

Figure 28

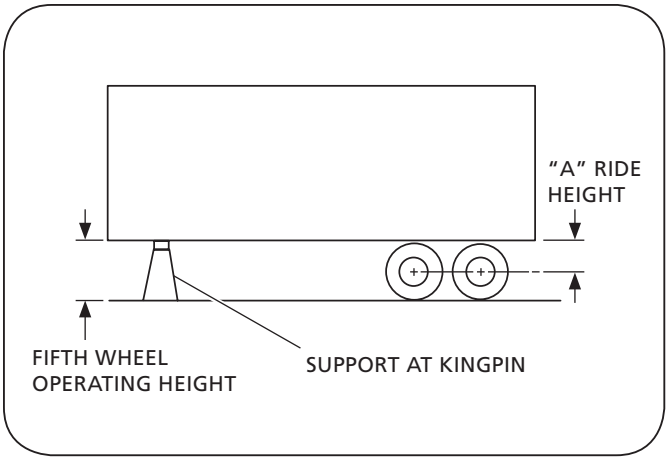
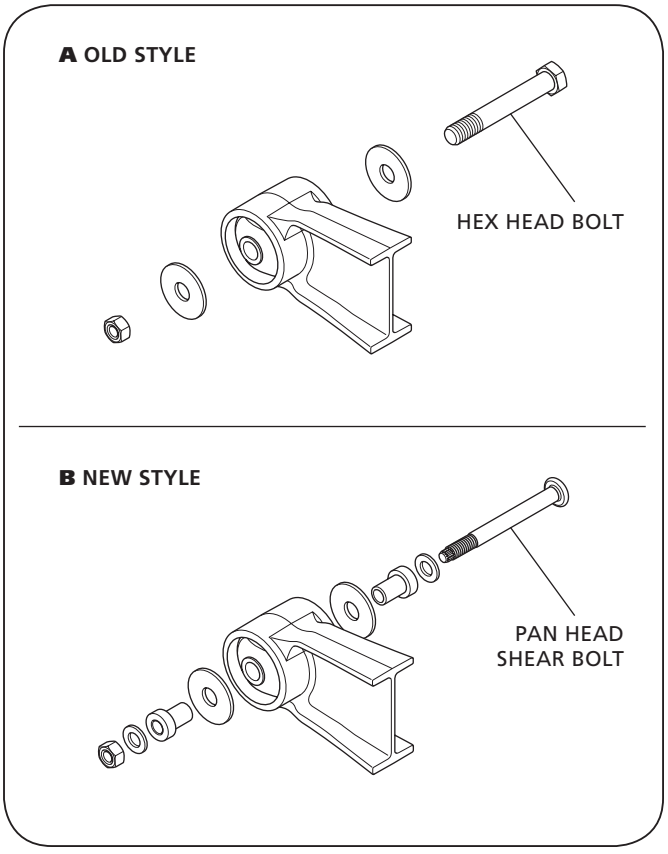


Table 5

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

Figure 29



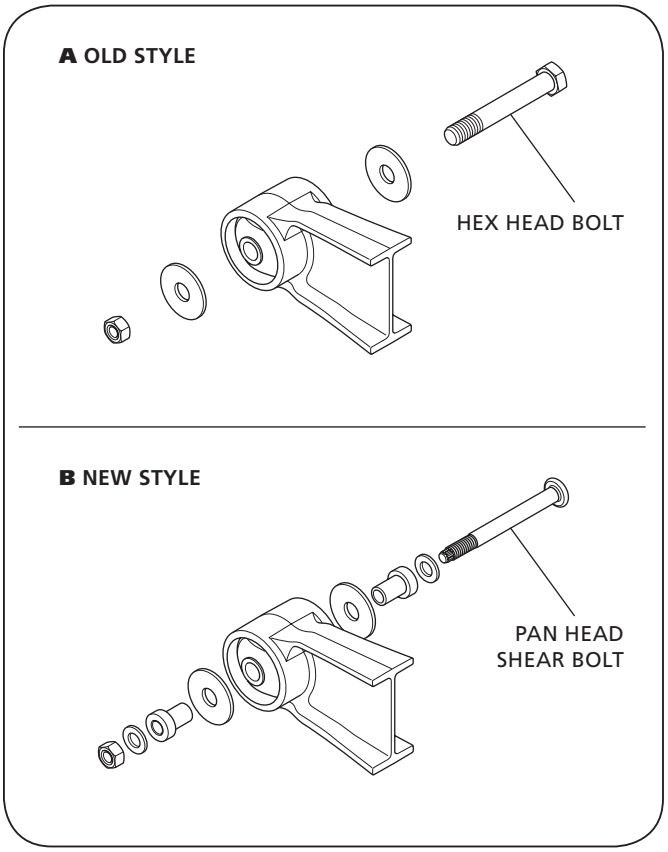
12. Install the new axle and equalizing beam assembly using the new pivot hardware ***(Figure 30).*** Position the axle at the ride height, support it with the jack stands.
13. Determine which pivot bolt style is being installed.
    - If 1-1/8" hex head bolt, verify torque on the nut is 550-600 ft.-lbs. (746-813 N•m) ***(Figure 30 A)***.
    - If 7/8" pan head shear bolt, verify spline has been sheared off ***(Figure 30 B)***.
14. Reconnect the lower connections on the air springs, shock absorbers and HCV linkage. Properly torque the hardware according to the specifications listed in Section 19.
15. Install the brake components and the wheel ends following the instructions in the appropriate manual referred to in Step 9.
16. Re-install the tires, remove the jack stands supporting the axle and equalizing beam assembly, and lower the axle.
17. Chock the wheels.
18. Raise the trailer approximately 2" (51mm) above the ride height and remove the jack stands.
19. Slowly lower the trailer so that the trailer suspension is fully collapsed.
20. Apply air to the trailer and allow the suspension to return to ride height.
21. With the suspension at rest, measure the ride height. The ride height MUST be within 1/4" (6.4 mm) of the suspensions specified ride height. Refer to Section 9 if the ride height needs to be adjusted.
22. Verify that all the air connection fittings are tight. Check all the fittings for air leaks by applying a soapy water solution and checking for bubbles at all the air connections and fittings.

IMPORTANT: It is the responsibility of the air system installer to secure all the air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate the air leaks could compromise the suspension performance which, if not avoided, could result in component or property damage.

23. Remove the wheel chocks.
24. Re-align the axles using the axle alignment procedures listed in Section 12.

Figure 30



17. Frame Bracket Replacement

NOTE: When replacing the frame bracket(s), refer to the parts manual XL-AS11408PM-en-US for the correct part number or Service Repair Kit.

IMPORTANT: If only SwingAlign frame bracket alignment plates and washers are to be replaced, refer to Section 18.

IMPORTANT: The trailer MUST be unloaded before beginning any service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or coupled to a tractor ***(Figure 31)***.
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height.
3. Place multiple jack stands at the suspension's specified ride height ***(Table 6)*** under the vehicle frame at OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve the specified height.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

5. Exhaust all air from the suspension, set the parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

6. Raise the axle approximately 2" (51 mm) and support it with jack stands and remove the wheel chocks.

⚠WARNING Failure to proper support axle during maintenance could create a crush hazard, which, if not avoided, could result in death or serious injury.

7. Remove the tires.
8. Remove the front pivot hardware and discard ***(Figure 32 A and B).*** Rotate the equalizing beams downward out of the frame brackets.
9. On the side of the frame rail, mark the mounting location of the frame bracket to be replaced.
10. Remove the old frame bracket

Figure 31

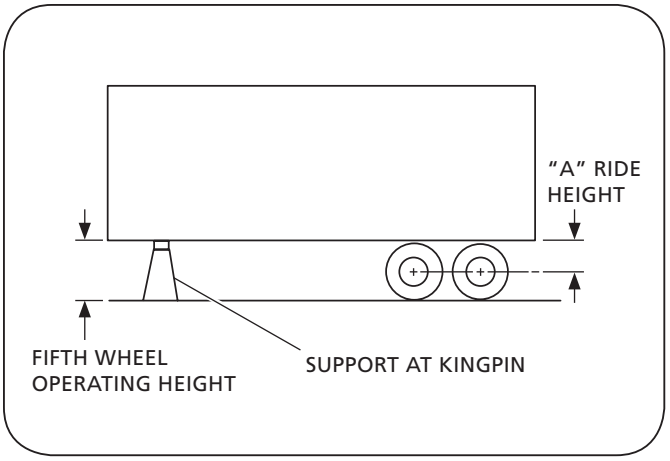
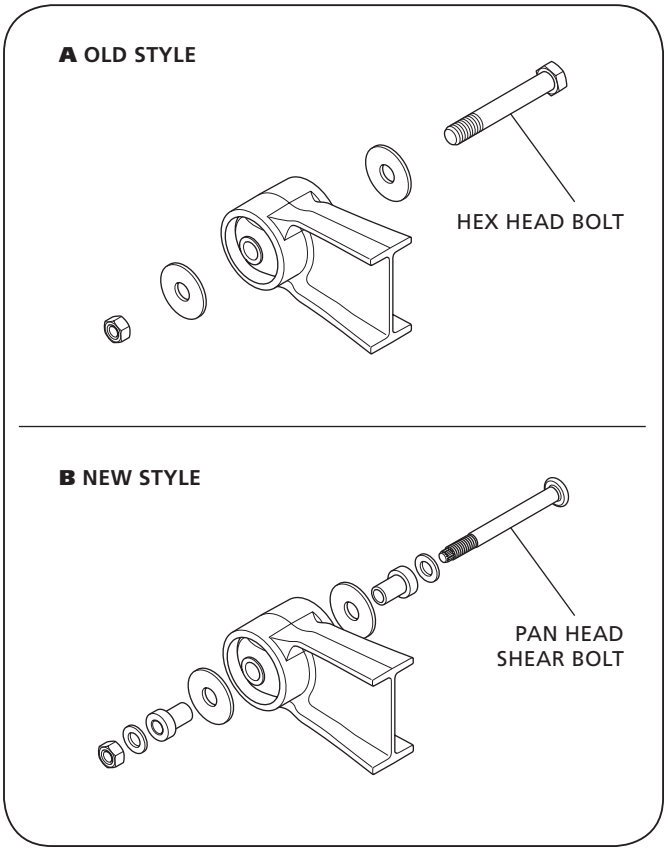


Table 6

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

Figure 32



IMPORTANT: Carefully air arc the welds connecting the frame bracket to the frame. DO NOT use the frame if the frame material is damaged. Repair the frame and then install the frame brackets.

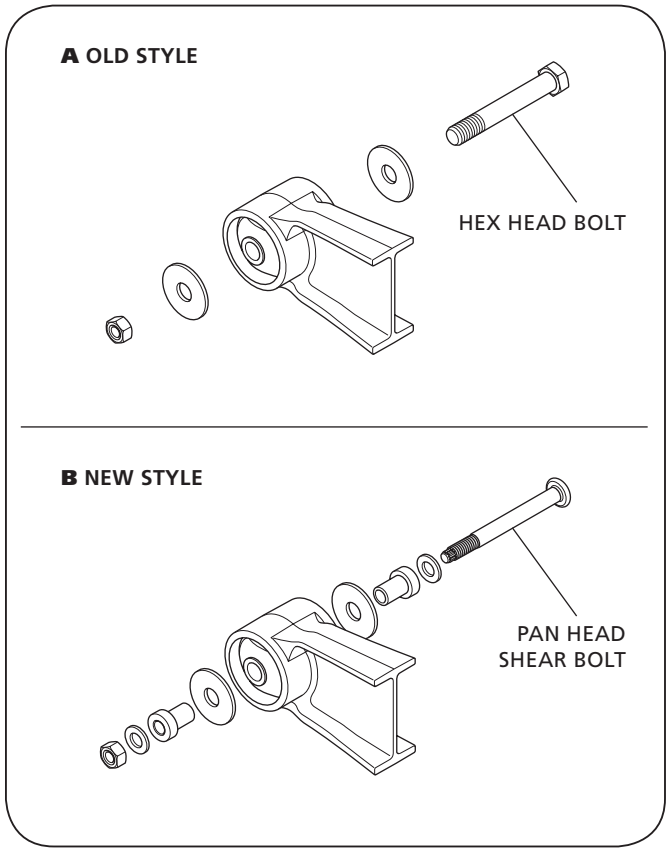
⚠WARNING Failure to repair a damaged frame could cause damage to the suspension with possible loss of vehicle control which, if not avoided, could result in death or serious injury.

11. Place the new frame bracket(s) on the frame rail per the locations marked in Step 9. Refer to your model's specific installation drawing for the proper weld patterns and locations. Weld bracket in place according to the specifications listed in Section 8.

NOTE: To obtain a copy of your specific suspensions installation drawing, contact the SAF-HOLLAND customer service department at 888-396-6501.

12. If replacing the roadside SwingAlign frame bracket, refer to Section 18 for SwingAlign hardware installation procedures.
13. Rotate the equalizing beams upward into the frame brackets and install the new pivot hardware. Position the axle at the ride height.
14. Determine which pivot bolt style is being installed.
    - If 1-1/8" hex head bolt, verify torque on the nut is 550-600 ft.-lbs. (746-813 N•m) ***(Figure 33 A)***.
    - If 7/8" pan head shear bolt, verify spline has been sheared off ***(Figure 33 B)***.
15. Re-install the tires, remove the jack stands supporting the axle and the equalizing beam assembly, and lower the axle.
16. Chock the wheels.
17. Raise the trailer approximately 2" (51mm) above the ride height and remove the jack stands.
18. Slowly lower the trailer so that the trailer suspension is fully collapsed.
19. Apply air to the trailer and allow the suspension to return to the ride height.
20. With the suspension at rest, measure the ride height. The ride height must be within 1/4" (6.4 mm) of the suspensions specified ride height. Refer to Section 10 if the ride height needs to be adjusted.
21. Verify that all the air connection fittings are tight. Check all fittings for air leaks by applying a soapy water solution and checking for bubbles at all air connections and fittings.

Figure 33



IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise the suspension performance which, if not avoided, could result in component or property damage.

22. Remove the wheel chocks.
23. Re-align the axles using the axle alignment procedures listed in Section 12.

18. SwingAlign Replacement

IMPORTANT: The trailer MUST be unloaded before beginning any service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or coupled to a tractor ***(Figure 34)***.
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height.
3. At the suspension's specified ride height ***(Table 7)***, place multiple jack stands under the vehicle's frame per OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve specified height.

⚠WARNING Failure to properly support the suspension during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

5. Exhaust all air from the suspension, set the parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

6. Raise the axle approximately 2" (51 mm) and support it with jack stands and remove the wheel chocks.

⚠WARNING Failure to proper support axle during maintenance could create a crush hazard, which, if not avoided, could result in death or serious injury.

7. Remove the tires.
8. Remove the front pivot hardware and discard ***(Figure 35 A or B)***. and rotate the equalizing beams downward out of the frame brackets.

⚠WARNING Failure to properly support the equalizing beams during maintenance could create a crush hazard, which if not avoided, could result in death or serious injury.

Figure 34

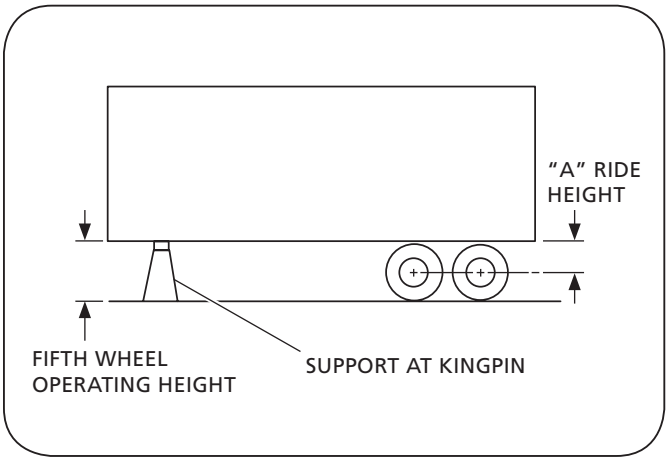
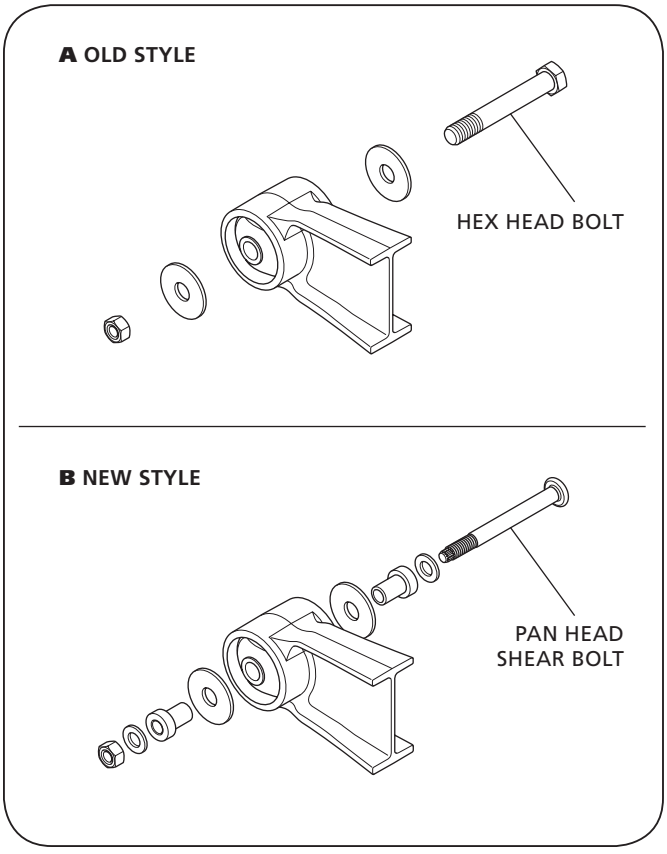


Table 7

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

Figure 35



9. Remove and discard the SwingAlign mounting fasteners and rotate the threaded rod assembly counter-clockwise (CCW) until it disengages from the SwingAlign yoke ***(Figure 36)***.
10. Remove the threaded rod assembly, alignment plates, and yoke ***(Figure 36).***
11. Assemble the new SwingAlign yoke between the two (2) new alignment plates and insert assembly into the frame bracket ***(Figure 36)***.

NOTE: Make sure the bosses on the alignment plates are fully seated into the frame bracket alignment plate holes ***(Figures 36 and 37)***.

12. From the front of the frame bracket, insert the new threaded rod assembly into SwingAlign yoke and rotate threaded rod clockwise until access to the pivot bolt hole is achieved ***(Figure 37)***.
13. Rotate the equalizing beams upward into the frame brackets. If necessary, adjust the threaded rod assembly until holes in the alignment plate are aligned with the pivot bushing holes. When assembly and hole alignment is achieved, install the new pivot fasteners.

Figure 36

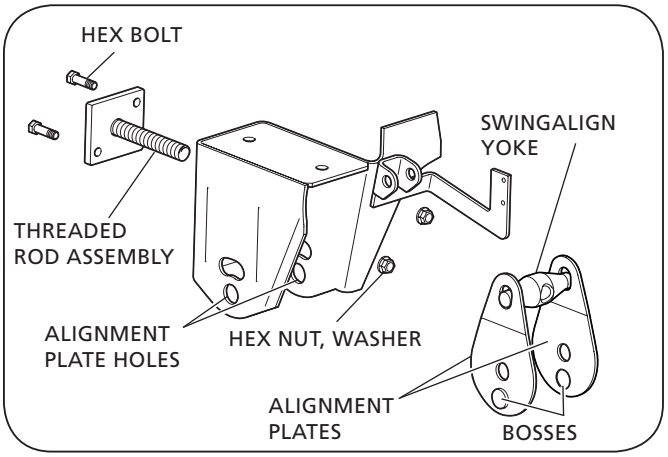
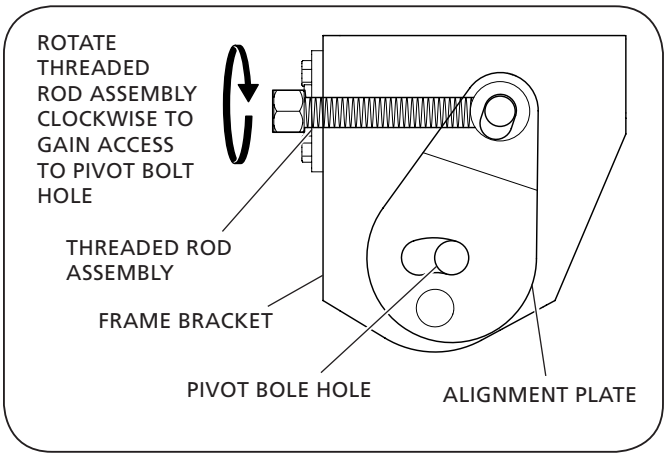


Figure 37



14. Position the axle at ride height and determine which pivot bolt style is being installed.
    - If 1-1/8" hex head bolt, verify torque on the nut is 550-600 ft.-lbs. (746-813 N•m) ***(Figure 38 A)***.
    - If 7/8" pan head shear bolt, verify spline has been sheared off ***(Figure 38 B)***.
15. Re-install the tires, remove the jack stands supporting the axle and the equalizing beam assembly, and lower the axle.
16. Chock the wheels.
17. Raise the trailer approximately 2" (51mm) above the ride height and remove the jack stands.
18. Slowly lower the trailer so that the trailer suspension is fully collapsed.
19. Apply air to the trailer and allow the suspension to return to ride height.
20. With the suspension at rest, measure the ride height. The ride height MUST be within 1/4" (6.4 mm) of the suspensions specified ride height. Refer to Section 9 if ride height needs to be adjusted.
21. Verify that all the air connection fittings are tight. Check all fittings for air leaks by applying a soapy water solution and checking for bubbles at all air connections and fittings.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise the suspension performance which, if not avoided, could result in component or property damage.

21. Remove the wheel chocks.
22. Rotate the bolt head of the threaded rod assembly clockwise (CW) until the edge of the washer reaches the forward scribe line. Then rotate the threaded rod assembly counter-clockwise (CCW) until it reaches the rearward scribe line. Then rotate the threaded rod assembly clockwise (CW) until it is centered between the scribe lines ***(Figure 39)***.
23. Determine which pivot bolt style is being installed.
    - If 1-1/8" hex head bolt, verify torque on the nut is 550-600 ft.-lbs. (746-813 N•m) ***(Figure 39 A)***.
    - If 7/8" pan head shear bolt, verify spline has been sheared off ***(Figure 38 B)***.
24. Re-align the axles using the axle alignment procedures listed in Section 12.

Figure 38

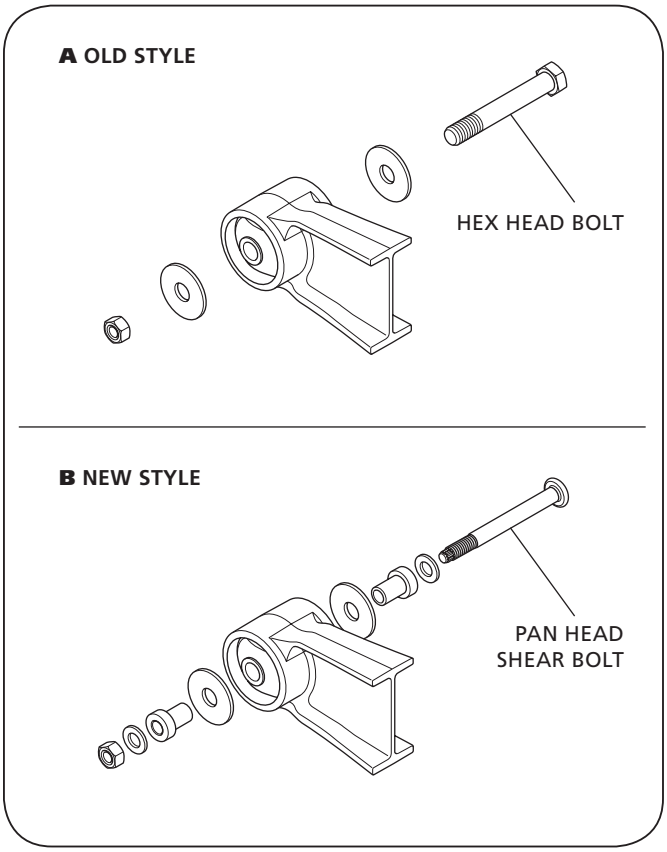
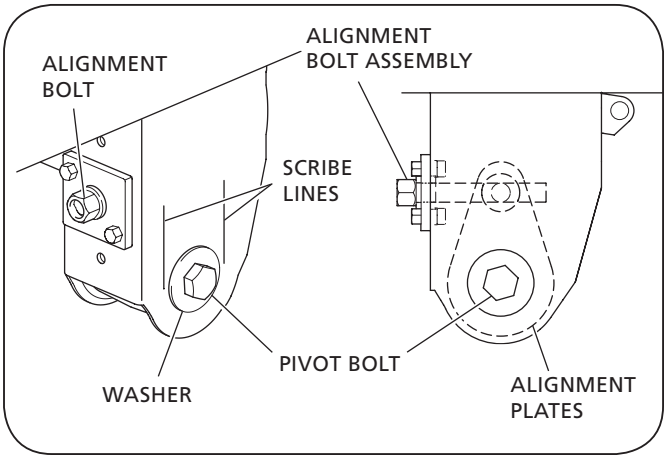


Figure 39



19. Torque Specifications

Table 8

COMPONENT	TORQUE VALUE	FASTENER SIZE
Shock Absorber	140-175 ft.-lbs. 190-237 N•m	3/4"
Pivot Connection, Hex Head Bolt	550-600 ft.-lbs. 746-813 N•m	1-1/8"
*Pivot Connection, Pan Head Shear Bolt	Visual Inspection	7/8"
Lower Air Spring Nut	30-40 ft.-lbs. 40-54 N•m	1/2"
Upper Air Spring Nut	40-45 ft.-lbs. 54-61 N•m	3/4"
SwingAlign Mounting Fasteners Only - NOT Pivot Bolt	50-60 ft.-lbs. 68-81 N•m	1/2"
Height Control Valve Lower Linkage	30-40 In.-lbs. 3-5 N•m	1/4"

All torque specifications are ± 5%.
Torques specified are for clean, lubricated threads.
Always Apply torque to nut if possible.
Required re-torquing at every brake re-lining.

* If equipped with 7/8" splined shear bolt, ensure that the spline is sheared off and that there are no signs of movement.

NOTE: Torque specifications listed above are with clean lubricated / coated threads (***Table 8)***. All new SAF-HOLLAND fasteners come precoated from the factory. For bolt and lock nut grade markings refer to ***Figure 40***.

IMPORTANT: The use of special lubricants with friction modifiers, such as Anti-Seize or Never-Seez®, without written approval from SAF-HOLLAND engineering, will void warranty and could lead to over torquing of fasteners or other component issues.

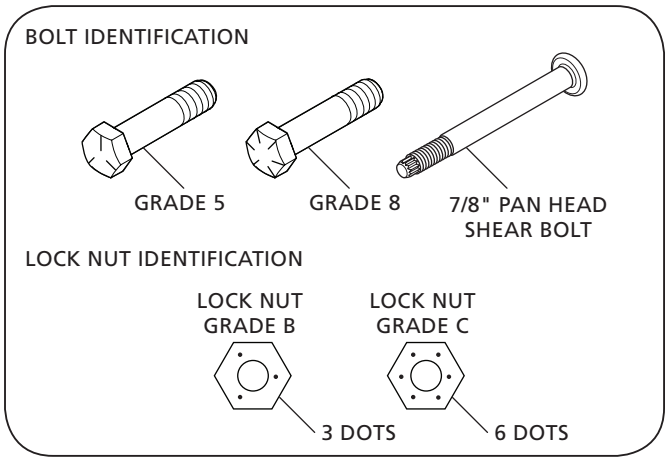
General Information

1. The torque specifications are applied to the nut and NOT the bolt.

⚠WARNING Failure to use the proper fasteners when servicing the suspension could cause component failure which, if not avoided, could result in death or serious injury.

⚠WARNING Failure to properly torque all fasteners could result in component failure which, if not avoided, could result in death or serious injury.

Figure 40



20. Routine Maintenance and Daily Inspection

1. Daily or before each trip, check the suspension ensure it is fully operational.
2. Inspect all decals to ensure they are clearly legible and intact. Clean with a terry cloth towel, soap and water.
3. Visually inspect the air springs for sufficient inflation and that the suspension is at proper ride height. For ride height details and measurements, refer to Section 9 of this manual.

20.1 Initial Three (3) Months or 5,000 Mile (8,000 km) Service Inspection

1. Suspension ride height (underside of frame to centerline of axle) MUST be within ±1/4" (6 mm) of the recommended design height. For instructions on measuring the ride height, refer to Section 11.

⚠CAUTION An improperly set ride height could result in suspension component damage and/or poor vehicle ride performance.

2. After the first three (3) months or 5,000 miles (8,000 km) of service, whichever comes first, inspect the bolts and nuts at the pivot connections to ensure they are properly torqued. Check all other nuts and bolts for proper torque or that the spline is sheared off. Refer to the specifications listed in Section 19. Re-torque as necessary thereafter.
3. With the vehicle on a level surface and air pressure above 85 psig (5.9 bars), verify that all the air springs are of sufficient and equal firmness.

NOTE: Check all air control system fittings for air leaks, by applying a soapy water solution and checking for bubbles at all the air connections and fittings.

20.2 Routine Physical Inspections

Every 100,000 Miles (160,000 km) or one (1) year, whichever comes first.

Check all other suspension components for any sign of damage, looseness, torque loss, wear or cracks. Repair, tighten or replace damaged part(s) to prevent equipment breakdown.

20.3 Visual Inspection Procedure

IMPORTANT: A schedule for physical and visual inspections should be established by the operator based on severity of operation or damage to the vehicle could occur.

IMPORTANT: During each pretrip and safety inspection of the vehicle, a visual inspection of the suspension should be done or damage to the vehicle could occur.

Visually check for:

- Loose, broken or missing fasteners. Repair or replace as needed.

⚠WARNING Loose, damaged, or missing fasteners can cause loss of vehicle control which, if not avoided, could result in death or serious injury.

- Air springs – clearances, wear damage, and proper inflation.
- Shock absorbers – leaking or damaged.
- Cracked parts or welds.

21. Troubleshooting

PROBLEM	POSSIBLE CAUSE	RESOLUTION
All air springs flat (no air).	Insufficient air pressure to suspension.	Build air pressure in excess of 85 psig (5.9 bars). Malfunctioning air pressure protection valve – test the valve using instructions in Sections 10 and 11 . Replace if necessary. Check air compressor. Height control valve NOT working – follow height control valve inspection procedures in Section 11.
	Air leakage from the suspension air system or the air brake system.	Test for air leakage due to loose fittings or damaged air lines, air springs, brake actuators or height control valve. Tighten loose fittings to stop leakage and/or replace worn or damaged parts.
Air springs deflate rapidly when vehicle is parked.	Air leakage from the suspension air system.	Test for air leakage due to loose fittings between air tank and air suspension or damaged air lines, air springs or height control valve. Apply a soapy solution to connections and air springs if necessary to check for bubbles (leaks). Tighten loose fittings to stop leakage and/or replace worn or damaged parts with new ones.
Ride height too high or too low.	Height control valve out of adjustment.	Readjust the height control valve – follow height control valve adjustment procedures in Section 9.
Air springs ruptured.	Tire, tire rim or brake component rubbing air spring.	Check inside to inside tire dimension. There must be 1" (25.4 mm) minimum clearance around air spring. If NOT, it may be necessary to reinstall suspension. Use tire rim back spacers to provide more clearance.
	Spring brake chamber rubbing air spring.	Relocate chamber or rotate clamp ring for more clearance.
Air spring failed.	Continual or repeated over-extension of the air spring.	Visually inspect for broken or loose shock absorber or shock absorber mounting bracket. Reconnect loose parts and replace any defective parts. Check the adjustment of the height control valve – refer to Section 9.
	Air spring(s) worn out.	Replace air spring(s) – refer to Section 13.
	Air leak or damaged line.	Locate and repair. Air spring punctured or leaking – replace with proper air spring. Then check for proper clearance around air spring, 1" (25.4 mm) minimum. Also check shock absorbers.
	"Temporary Operation."	If air loss occurs in the air suspension system and after attempts to repair have failed to correct the problem, it is recommended that the height control valve linkage be disconnected and all air exhausted from the system. There is an internal rubber bumper built into the air spring which makes it possible to operate the vehicle cautiously while driving at a reduced speed to the nearest repair facility.
	Restricted air lines(s) between the height control valve and the air spring(s).	Disconnect the height control valve linkage and rotate the actuating lever to the 20° down position. If the air spring(s) remain inflated, check for pinched or blocked line(s).
Front pivot connection worn and loose.	Fixed frame bracket pivot wear washers worn.	If internal wear washers are worn, replace and realign axles.
	SwingAlign pivot alignment plates worn.	If alignment plates are worn, replace and realign axles – refer to Section 18.
	Front pivot bolt loose.	Connection NOT properly tightened. Replace all worn or damaged components – refer to Section 15.
	Excessive lateral axle walk.	3/4" (19 mm) is maximum. Axle connection welds failed. Refer to Section 2 for welding specifications. Front pivot connection bushing worn – replace with proper Service Repair Kit refer to XL-AS11408PM-en-US – refer to Section 15.
Shock absorber failures.	Over-extending shock absorbers.	Suspension set at improper ride height – readjust height control valve – refer to Section 9. Suspension mounted at wrong ride height – check specification sheet, or refer to Section 9 for correct ride height and adjustment procedure. Wrong length or improper replacement shock absorber(s) replace if necessary – refer to Section 14.
Excessive tire wear.	Loose or worn bushings at pivot connection.	Inspect for damage and replace components as necessary, or if loose, tighten connection(s) to proper torque specification, refer to Section 19 for torque information. Then, check axle alignment and realign if necessary. If worn – replace with proper Service Repair Kit refer to XL-AS11408PM-en-US – refer to Section 15.
	Suspension NOT properly installed.	Contact SAF-HOLLAND Service Department and/or check Trailer manufacturer for proper suspension installation; correct where necessary.

ORIGINAL PARTS™

From fifth wheel rebuild kits to suspension bushing repair kits, SAF-HOLLAND Original Parts are the same quality components used in the original component assembly.

SAF-HOLLAND Original Parts are tested and designed to provide maximum performance and durability. Will-fits, look-alikes or, worse yet, counterfeit parts will only limit the performance potential and could possibly void SAF-HOLLAND's warranty. Always be sure to spec SAF-HOLLAND Original Parts when servicing your SAF-HOLLAND product.

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www.safholland.us

SAF-HOLLAND CANADA • 519.537.3494 • Fax 800.565.7753
WESTERN CANADA • 604.574.7491 • Fax 604.574.0244
www.safholland.ca

SAF-HOLLAND MEXICO • 52.1.55.5456.8641 • Fax 52.55.58162230
www.safholland.com.mx

info@safholland.com

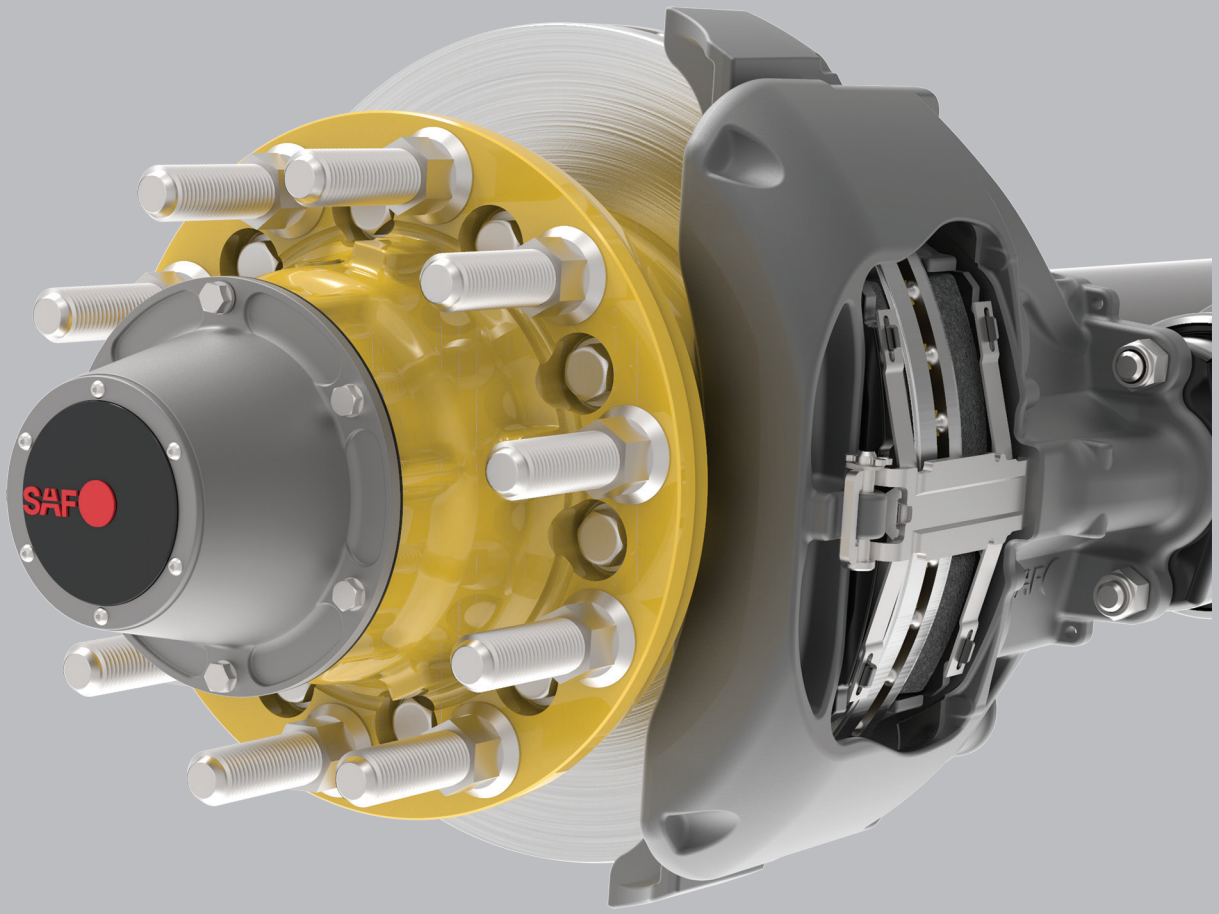
SAF-HOLLAND USA, INC.
1950 Industrial Blvd., Muskegon, MI 49443
www.safholland.com

Engineering Your Road to Success

SAF-HOLLAND Group

Service Manual

P89 Disc Brake Axles



XL-SA20018UM-en-US Rev N

SAF Holland Group

Introduction

This manual provides the necessary information for the maintenance, inspection and safe operation of the SAF® P89 disc brake. Refer to XL-SA20024UM-en-US for P89 Plus disc brake System.

Knorr® is a registered trademark of the Knorr-Bremse Group.

Zip-Torq® is a registered trademark of Stemco Products, Inc.

Read this manual before using or servicing this product and keep it in a safe location for future reference. Updates to this manual, which are published as necessary, are available on the internet at www.safholland.us.

When replacement parts are required, SAF-HOLLAND® highly recommends the use of only SAF-HOLLAND Original Parts. A list of technical support locations that supply SAF-HOLLAND Original Parts and an Aftermarket Parts Catalog are available on the internet at www.safholland.us or contact Customer Service at 888-396-6501.

Warranty

Refer to the complete warranty for the country in which the product will be used. A copy of the written warranty is included with the product or available on the internet at www.safholland.com.

Notes, Cautions, and Warnings

Before starting any work on the unit, read and understand all the safety procedures presented in this manual. This manual contains the terms "NOTE", "IMPORTANT", "CAUTION", and "WARNING" followed by important product information. These terms are defined as follows:

NOTE: Includes additional information to enable accurate and easy performance of procedures.

IMPORTANT: Includes additional information that, if not followed, could lead to hindered product performance.

CAUTION Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

1. General Safety Instructions

General and Servicing Safety Instructions

- Read and observe all Warning and Caution hazard alert messages. The alerts provide information that can help prevent serious personal injury, damage to components, or both.

⚠WARNING Failure to follow the instructions and safety precautions in this manual could result in improper servicing or operation leading to component failure which, if not avoided, could result in death or serious injury.

- All maintenance should be performed by a properly trained technician using proper/special tools, and safe procedures.

NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act (OSHA). Equivalent laws may exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location where work is performed.

- Properly support and secure the vehicle from unexpected movement when servicing the unit.

⚠WARNING Failure to properly support and secure the vehicle and axles prior to commencing work could create a crush hazard which, if not avoided, could result in death or serious injury.

- Several maintenance procedures in this manual require re-positioning of the brake chamber, brake calipers and/or ABS system. Consult the manufacturer's manual for procedures on the proper operation of brake chamber, brake calipers and/or ABS system.
- Service both roadside and curbside of an axle. Worn parts should be replaced in sets. Key components on each axle's braking system, such as friction material and rotors will normally wear over time.

IMPORTANT: Key components on each axle's braking system, including brake pads and brake rotors, are intended to wear over time. Worn parts should be replaced in sets on both the driver and curb side of an axle.

⚠WARNING Failure to follow manufacturer's instructions regarding spring pressure or air pressure control could allow uncontrolled release of energy which, if not avoided, could result in death or serious injury.

- The wheel contact surfaces between the wheel and hub MUST NOT receive additional paint.

IMPORTANT: The wheel contact surfaces must be clean, smooth and free from grease.

⚠WARNING Failure to keep wheel and hub contact surfaces clean and clear of foreign material could allow wheel/hub separations which, if not avoided, could result in death or serious injury.

- Only the wheel and tire sizes approved by the trailer builder can be used.

Operational and Road Safety Instructions

- Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.
- Make sure that the brakes are not overheated from continuous operation.

⚠WARNING Failure to minimize the use of brakes during overheating conditions could result in deterioration of brake efficiency which could result in death or serious injury.

- The parking brake must not be immediately applied when the brakes are overheated. Refer to the rotor wear inspection information in Section 6.2.

CAUTION If the parking brake is immediately applied to the brakes when overheated, the brake discs could be damaged by different stress fields during cooling.

- Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles.

IMPORTANT: The definition of OFF-ROAD means driving on non-asphalt/non-concrete routes, e.g. gravel roads, agricultural and forestry tracks, on construction sites and in gravel pits.

IMPORTANT: Off-road operation of axles beyond the approved application design could result in damage and impair suspension system performance.

- SAF axles require routine service, inspection and maintenance in order to maintain optimum performance, and operational safety as well as an opportunity to recognize natural wear and defects before they become serious. Refer to the Routine Service Schedule in Section 19.

⚠WARNING Failure to inspect and maintain the SAF-HOLLAND P89 disc brake axle as outlined in Section 19 can result in brake or wheel bearing failure which, if not avoided, could result in death or serious injury.

IMPORTANT: Use only SAF-HOLLAND Original Parts to service the SAF-HOLLAND P89 disc brake axle.

⚠WARNING Failure to maintain the SAF-HOLLAND P89 disc brake with SAF-HOLLAND Original Parts can result in brake or wheel bearing failure which, if not avoided, could result in death or serious injury.

2. General Service and Maintenance Instructions

1. Conduct regular visual checks of the brakes, tires and all chassis components. Refer to Section 19 for more information:
   - Inspect for secure mounting, wear, leaks,corrosion and damage.
   - Check for loose, broken or cracked air hoses, air system leaks, and damaged components.
   - Check that brake hoses and cables are properly secured.
   - For proper brake pad wear, check that there is enough clearance to allow the caliper full movement during normal operation.
2. Check the brake pads at regular service intervals to ensure that the brake pad hold down springs are in the correct position, and that brake pads are not worn beyond the minimum wear limits described in this manual.
3. When replacing brake pads, inspect the rotors for signs of wear, cracks, grooves, scoring or hot spots.
4. Visually check the brake caliper at regular service intervals as defined by the brake caliper manufacturer's basic inspection program. Refer to Section 5 of this manual for further information.
5. Check the spring brake chambers to make sure the parking springs are NOT caged in the released position. Be sure the dust plugs are properly installed.
6. Make sure that the vent holes in the air brake chamber are not covered with snow, ice, mud, etc.
7. Inspect the wheel bearing unit for grease leaks at every brake pad change.
8. Visually check the brake assembly (e.g. pads, rotor, etc.) for oil or grease contamination.
9. Check that all dust caps and boots are present and in good condition.
10. Regularly conduct general safety checks in accordance with any applicable laws.
11. After every wheel change, the wheel nuts MUST be re-tightened to the specified torque level after the initial 100 miles of operation, and then at every regular service interval.

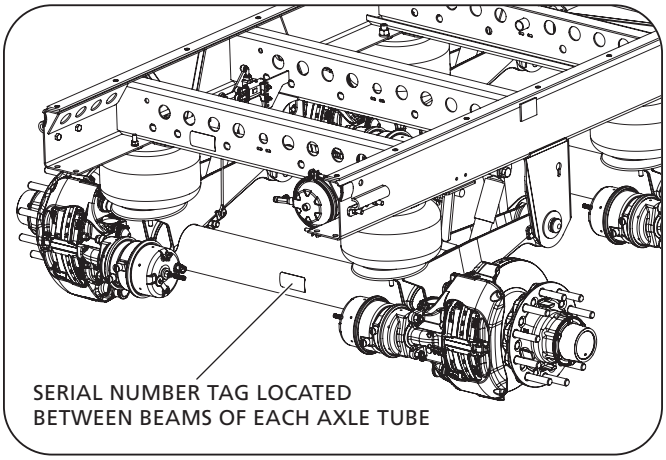
CAUTION Failure to re-tighten wheel nuts at specified intervals could result in component failure which, if not avoided, could result in damage to property.

IMPORTANT: Use only SAF-HOLLAND Original Parts to service the SAF-HOLLAND P89 disc brake axle.

3. Model Identification

The disc brake axle serial tag is located near the center of the axle tube ***(Figure 1)***.

Figure 1



4. Identification Tag

The sample tag shown will help interpret the information on the SAF-HOLLAND USA, Inc. serial number tag. The model number, axle body part number and serial number are listed on the tag ***(Figure 2)***.

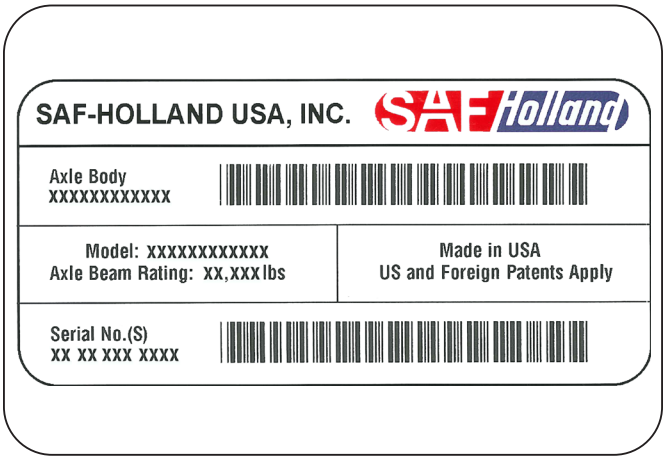
Record the tag numbers below for future quick reference.

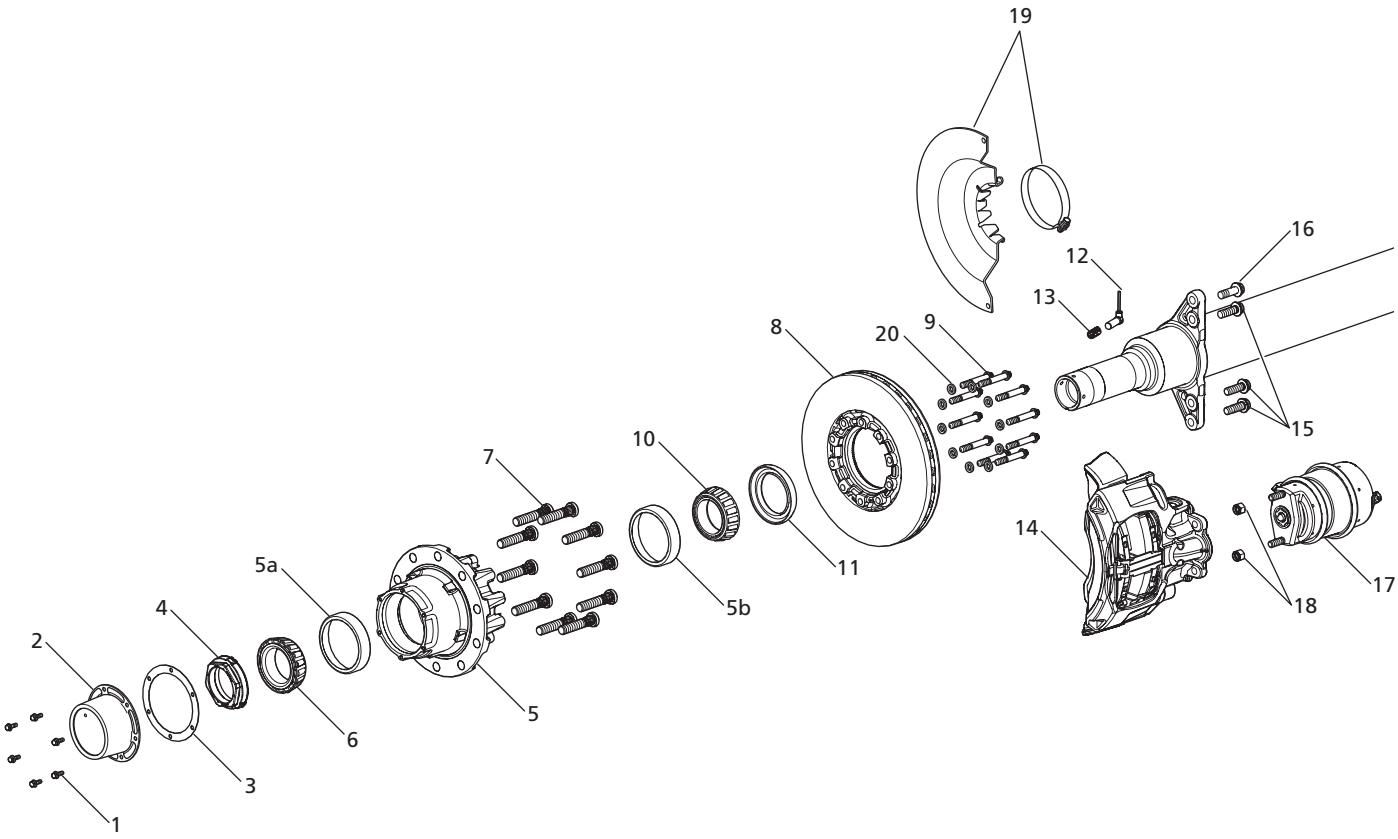
Axle Body Part Number: _____

Model Number: _____

Serial Number: _____

Figure 2

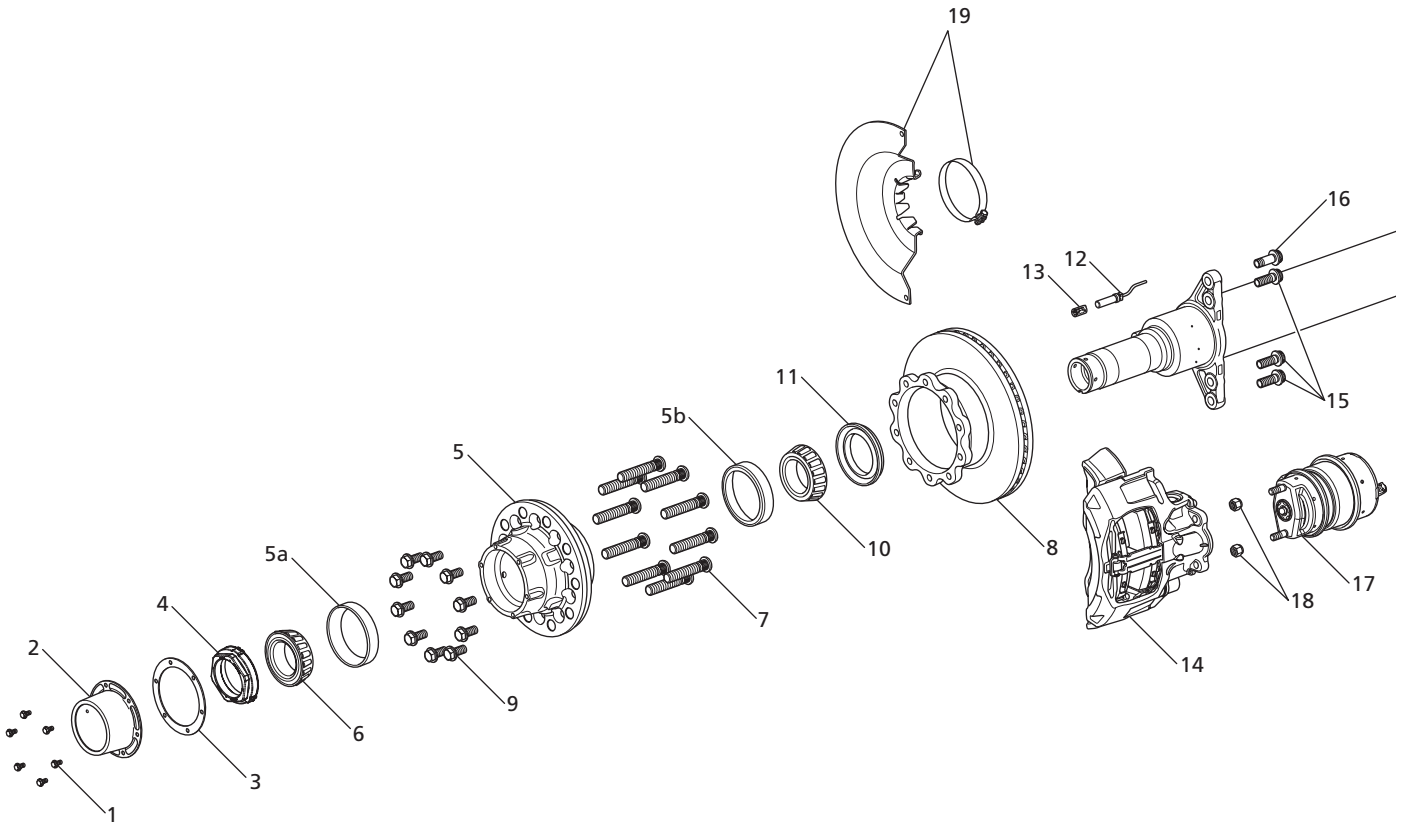




ITEM	DESCRIPTION	QTY. / AXLE
1	Bolt, Hub Cap	12
2	Hub Cap	2
3	Gasket, Hub Cap	2
4	Nut, Axle Zip-Torq®	2
5	Hub with Bearing Cups	2
5a*	Bearing Cup, Outer	2
5b*	Bearing Cup, Inner	2
6	Cone, Bearing, Outer	2
7	Wheel Studs	20
8	INTEGRAL Rotor with ABS Tone Ring	2
9	Rotor Attachment Bolts	20
10	Cone, Bearing, Inner	2

ITEM	DESCRIPTION	QTY. / AXLE
11	Seal, Hub	2
12	ABS Sensor (WABCO)	2
13	Clamping Bush	2
14	Brake Caliper Left-Hand Brake Caliper Right-Hand	1
15	M18 x 1.5" Bolt, Standard	6
16	M18 x 1.5" Bolt, Shoulder	2
17	Brake Chamber	2
18	Brake Chamber nut	4
19	Dust Shield with Clamp (optional)	2
20	Washers	20

* Included in hub, item number 5, but can be serviced.



ITEM	DESCRIPTION	QTY. / AXLE
1	Bolt, Hub Cap	12
2	Hub Cap	2
3	Gasket, Hub Cap	2
4	Nut, Axle Zip-Torq	2
5	Hub with Bearing Cups and ABS Tone Ring	2
5a*	Bearing Cup, Outer	2
5b*	Bearing Cup, Inner	2
6	Cone, Bearing, Outer	2
7	Wheel Studs	20
8	U-Shaped Rotor	2
9	Rotor Attachment Bolts	20

ITEM	DESCRIPTION	QTY. / AXLE
10	Cone, Bearing, Inner	2
11	Seal, Hub	2
12	ABS Sensor (WABCO)	2
13	Clamping Bush	2
14	Brake Caliper Left-Hand Brake Caliper Right-Hand	1
15	M18 x 1.5" Bolt, Standard	6
16	M18 x 1.5" Bolt, Shoulder	2
17	Brake Chamber	2
18	Brake Chamber nut	4
19	Dust Shield with Clamp (optional)	2

* Included in hub, item number 5, but can be serviced.

5. Caliper Identification and Inspection

SAF P89 axles are equipped with one of three disc brake calipers, SAF-HOLLAND SBS 2220 K0 Calipers, Knorr-Bremse® SK7 calipers, or SAF-HOLLAND SBS 2220 H20 calipers.

5.1 SAF-HOLLAND SBS 2220 K0 Caliper

The SAF-HOLLAND SBS 2220 K0 has a smooth forward face of the caliper and SAF logo on the rear side ***(Figure 3)***.

The inner and outer brake pads for the SBS 2220 K0 are different in shape. The inner brake pad has two "circle X's" on the back side, while the outer brake pad has a relatively smooth back. There is also a notch on the pads to keep them from being installed in the wrong position ***(Figure 4)***.

For instructions on SBS 2220 KO brake caliper inspection and repair, refer to XL-AS20032RM-en-US which can be found at www.safholland.com.

5.2 Knorr-Bremse SK7 Caliper

The Knorr-Bremse SK7 Caliper has a large indentation on the forward face and no SAF logo on the rear of the caliper ***(Figure 5)***.

The brake pads in the SK7 caliper are the same for the inner and outer side of the caliper. The back of the brake pad has the Knorr-Bremse logo and six (6) slots on the back of the brake pad ***(Figure 6)***.

For instructions on SK7 brake caliper inspection and repair, refer to Knorr-Bremse Pneumatic Disc Brake SN6-SN7-SK7 Service Manual Y006471 which can be found at www.knorr-bremsecvs.com/en/.

Figure 3

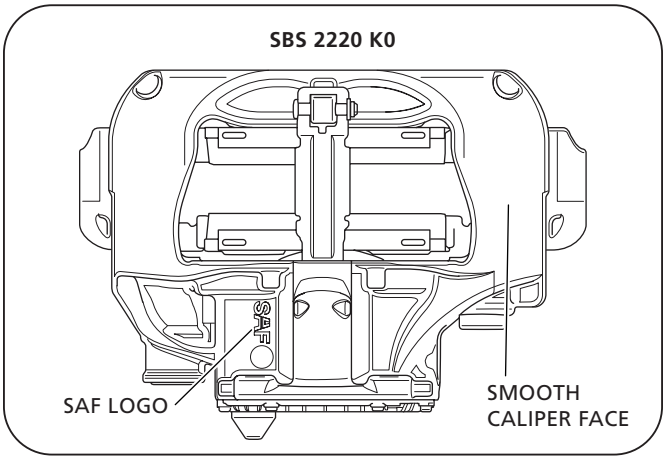


Figure 4

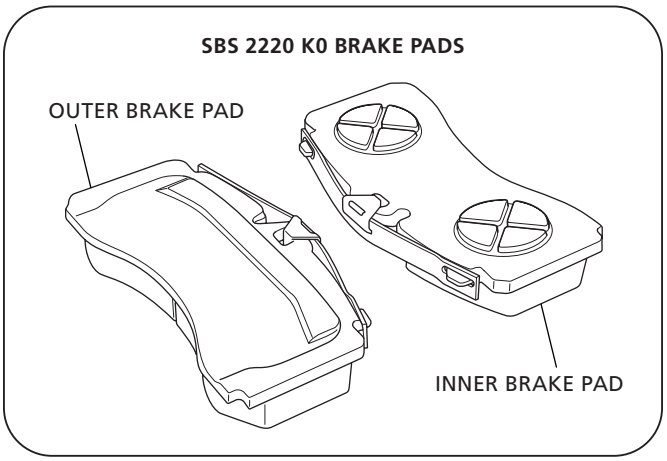


Figure 5

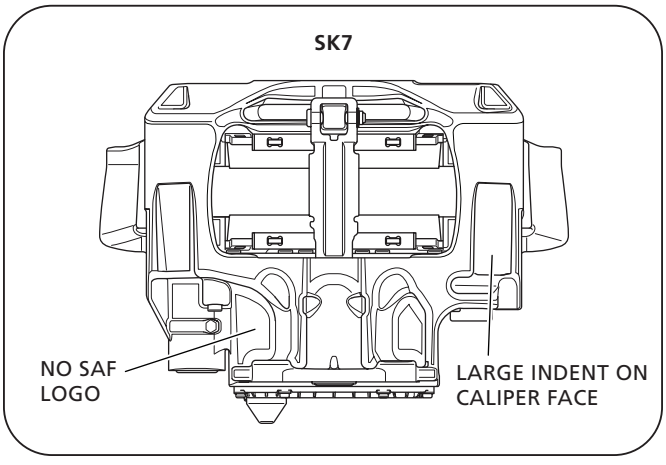
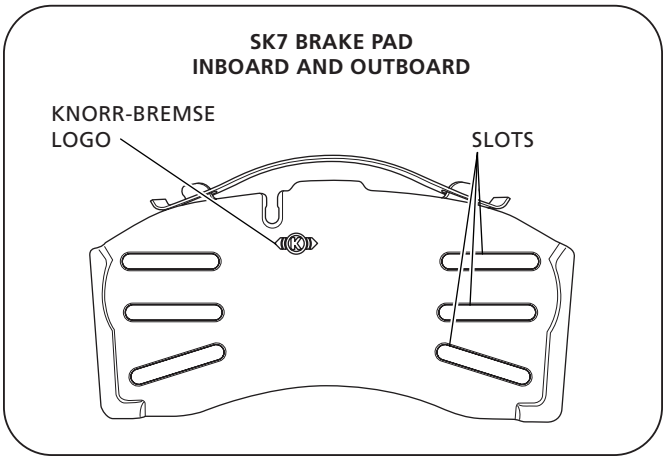


Figure 6



5.3 SAF-HOLLAND SBS 2220 H20 Caliper

The SAF-HOLLAND SBS 2220 H20 caliper has an SAF logo on the rear side ***(Figure 7)***. The calipers brake pad retainer bar is held in place by a spring clip similar to the brake pads (it has no pins or bolts).

The brake pads in the SBS 2220 H20 caliper are the same for the inner and outer side of the caliper. The back of the brake pad has the SAF logo and two (2) indentations on the back of the pad that align with the caliper piston locators ***(Figure 8)***.

For instructions on SBS 2220 H20 brake caliper inspection and repair, refer to XL-SA20057RM-en-US which can be found at www.safholland.com.

Figure 7

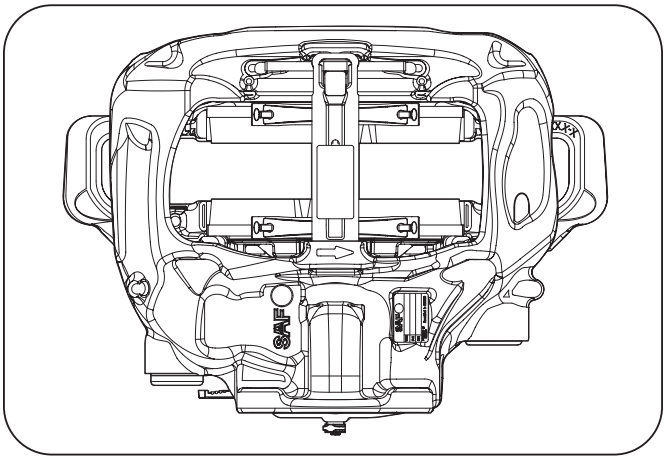


Figure 8

6. Disc Brake Inspection

IMPORTANT: During removal inspect components for wear and replace worn components.

⚠WARNING Failure to properly support axle during maintenance could allow axle to fall which, if not avoided, could result in death or serious injury.

NOTE: For further disc brake inspection information, refer to the latest version of the TMC recommended practice RP 652–Service and Inspection of Air Disc Brakes (TMC DVD supplement).

6.1 Pad Wear Inspection

Check the brake pads for proper thickness at regular service intervals based on vehicle usage. Brake pad inspections should be carried out at least every three (3) months or 20,000 miles, whichever comes first, and in accordance with any legal requirements. Refer to Routine Service Schedule in Section 19.

NOTE: Regular service intervals could be required more frequently for severe duty applications. Refer to Section 19.

A quick visual inspection of the condition of the brake pads can be performed without removing the wheel:

1. Compare the position of the caliper marking to the carrier marking located on the underside of the caliper unit ***(Figure 9)***.
   a. ***Figure 9*** - View A shows the positions of the two (2) markings when the brake pads are in good condition.
   b. ***Figure 9*** - View B shows the positions of the two (2) markings when the wheel MUST be removed for further inspection of wear to the brake pads and brake rotor.

For further inspection of the brake pads, the wheel and brake pads MUST be removed. Refer to Section 5 for caliper and service manual identification.

IMPORTANT: After inspecting the brake pads, check that the brake system is functioning properly.

IMPORTANT: When replacing worn brake pads, ALL pads on the axle MUST be replaced.

If the friction material of the brake pad is less than 0.08" (2 mm) at its thinnest area, the brake pad MUST be replaced. ***(Figure 12)***.

NOTE: Minor breakouts at the edges are permitted. Major breakouts on the surface of the brake pad are NOT permitted ***(Figure 10)***.

Figure 9

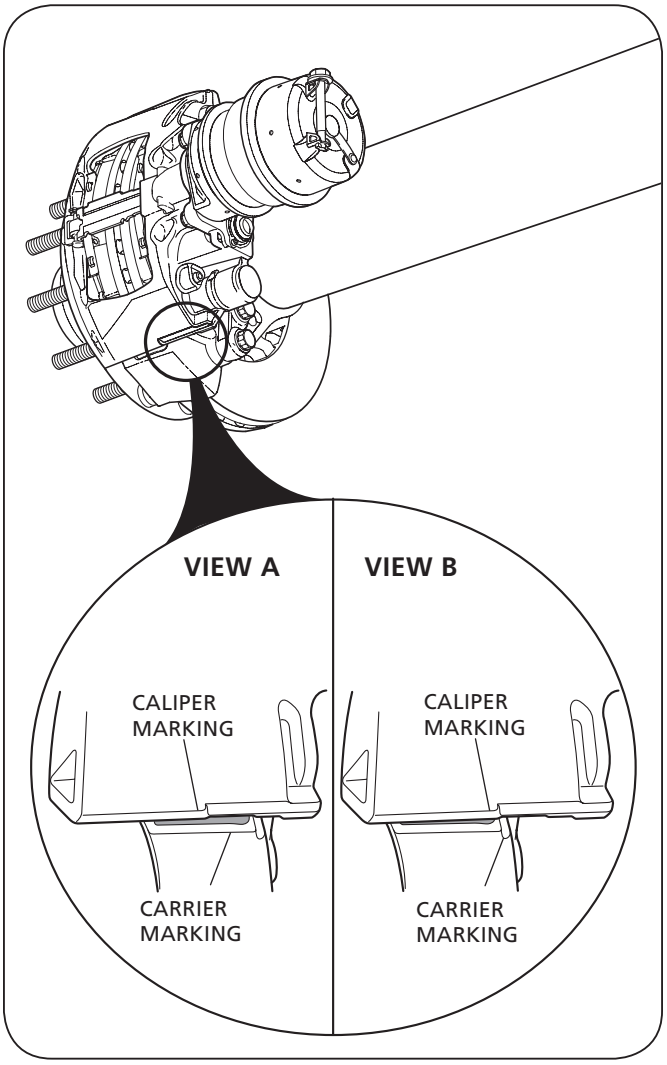
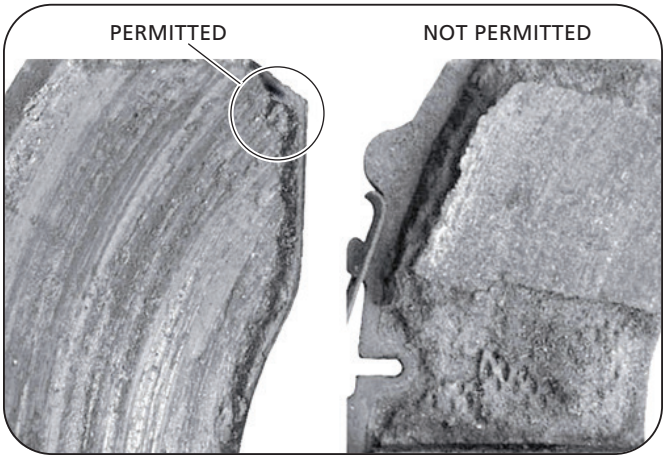


Figure 10



6.2 Rotor Wear Inspection

1. Carefully inspect both sides of the brake rotor friction surface ***(Figure 11)***.
   a. Spider web cracking is acceptable ***(Area A)***.
   b. Radial cracks less than 0.06" (1.5 mm) deep or wide with lengths less than 75% of the width of the rotor friction surface ***(Area B)*** are acceptable.
   c. Grooves in the rotor surface are acceptable only if they are less than 0.06" (1.5 mm) deep ***(Area C)***.
   d. Cracks that run completely to either edge of the hub are NOT acceptable, regardless of depth ***(Area D)***.
2. Measure the brake rotor thickness and re-surface, if necessary. For proper brake function, the minimum thickness for re-surfacing the brake rotor is defined as 1.54" (39 mm).

⚠WARNING Re-surfacing the brake rotor beyond the minimum thickness could cause component failure which, if not avoided, could result in death or serious injury.

IMPORTANT: DO NOT use high-pressure cleaners or liquid cleaners on the brake rotor.

If the overall wear limits for the brake rotor or brake pads are exceeded ***(Figure 12)***, the rotor and pads MUST be replaced. Refer to rotor replacement instructions as detailed in Section 9. For brake pad replacement, refer to caliper instruction manuals identified in Section 5.

For both the inner and outer pads, the maximum brake pad wear difference is 0.2" (5.0 mm).

BRAKE ROTOR			BRAKE PAD	
DIAMETER	"A" NEW	"B" WEAR LIMIT	"C" NEW	"D" WEAR LIMIT
430 mm	45 mm	37 mm	23 mm	2 mm
16.93"	1.77"	1.46"	1.18"	0.08"

⚠WARNING Failure to replace brake rotor and pads when minimum wear limits are reached could cause component failure which, if not avoided, could result in death or serious injury.

NOTE: When replacing the brake pads or brake rotor, use only Original SAF-HOLLAND rotors and approved brake pads.

IMPORTANT: When replacing worn brake pads, ALL pads on the axle MUST be replaced.

NOTE: During brake repairs, conduct a visual inspection of the seals on the brake caliper. Refer to Section 6.3 for more information.

Figure 11

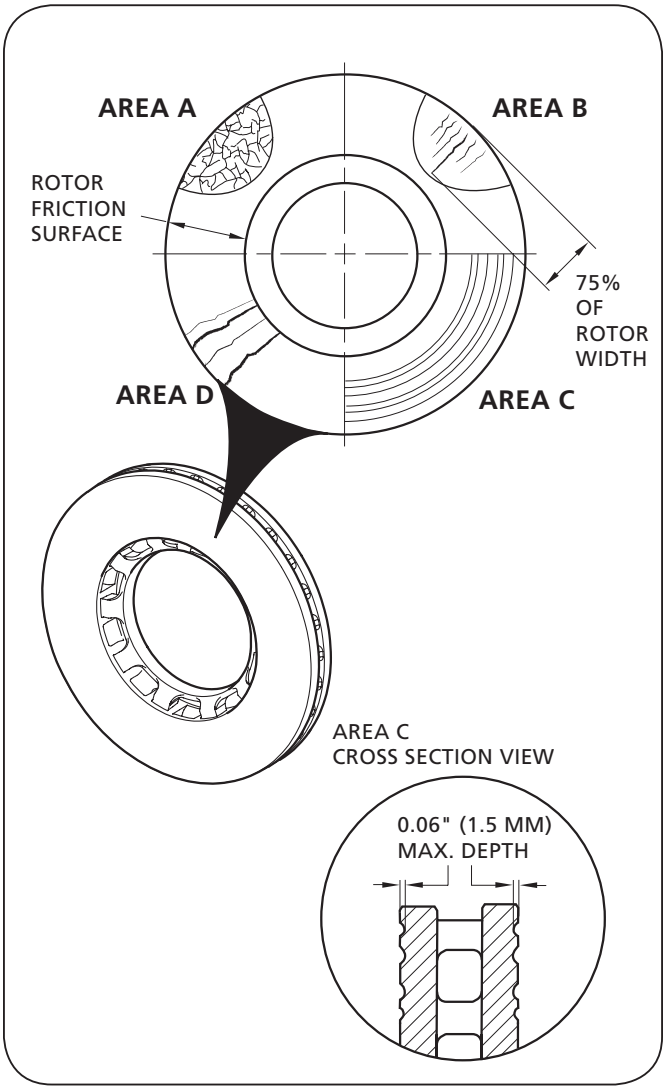
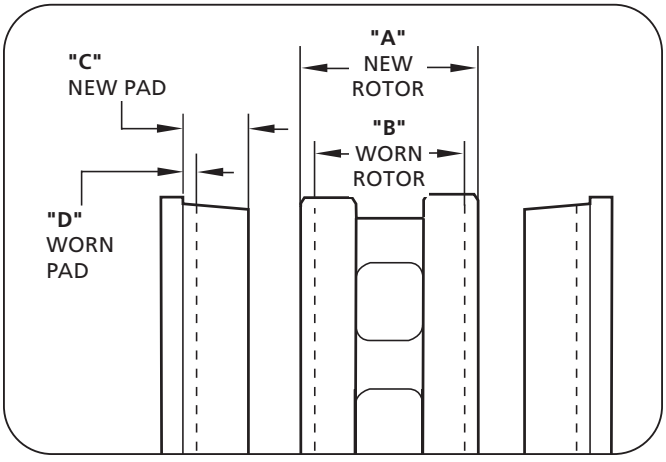


Figure 12



7. Hub, Bearing and Seal Removal

NOTE: Before beginning any axle/brake service procedures, park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle and axles(s) with safety stands. DO NOT work under a vehicle supported only by jacks. Jacks can slip or fall over. Serious personal injury and damage to components can result.

⚠WARNING Failure to properly support the vehicle and axles prior to commencing work could create a crush hazard which, if not avoided, could result in death or serious injury.

1. Release the trailer brakes, and cage the spring brakes according to the spring brake manufacturer's instructions. Remove the tire and wheel assembly to access hub and rotor.
2. Remove wheels from hub using support device such as a wheel dolly.

⚠CAUTION Failure to support weight during installation or removal of wheels could create a crush hazard which, if not avoided, could result in minor to moderate injury.

3. Remove the ABS sensor by following the instructions detailed in Section 16.1.
4. Detach the brake chamber from the brake caliper by loosening and removing the two (2) mounting nuts ***(Figure 13)***.
5. Remove the brake caliper from the brake spider by using a size 24 mm socket to loosen. Discard all four (4) brake caliper bolts ***(Figure 14)***.
6. With a 1/2" socket, remove the six (6) hub cap bolts and the hub cap ***(Figure 15)***.

NOTE: Be prepared to collect lubrication fluid when removing hub cap.

Figure 13

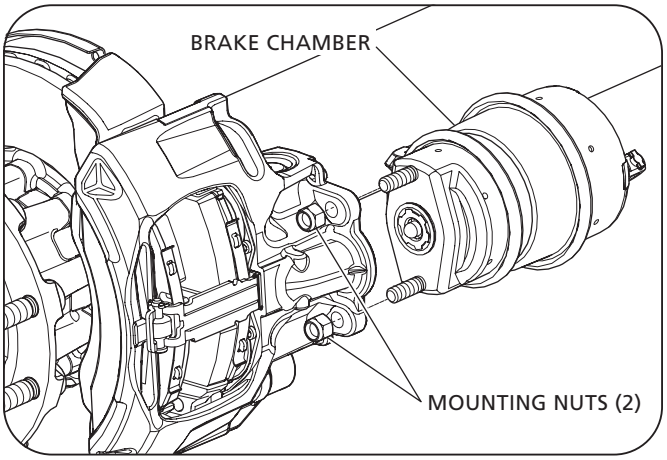


Figure 14

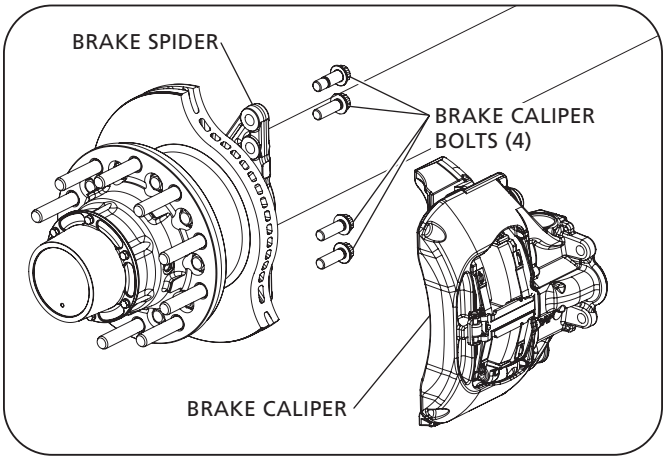
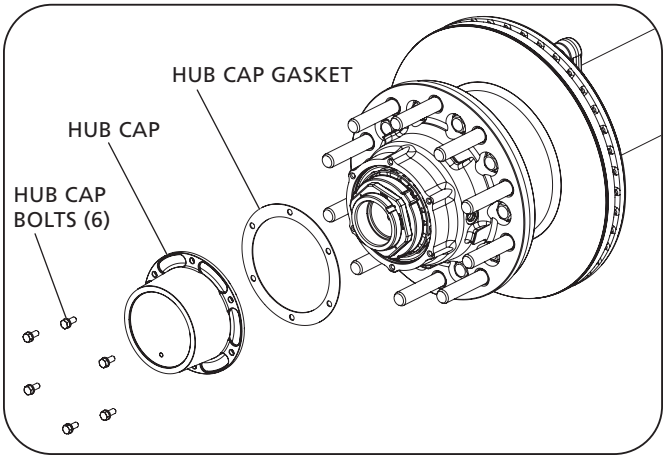


Figure 15



7. Using a standard P- or N-Spindle wheel nut socket, remove the axle spindle nut (Zip-Torq) by rotating the nut in a counter-clockwise direction ***(Figure 16)***. For PSP7 hubs remove the red locking ring, then loosen the PSP spindle nut with the snap ring in place. The snap ring will act as a hub puller as the spindle nut is loosened. If the hub will not come off the spindle with the snap ring installed, remove the snap ring and spindle nut and remove the hub with a conventional hub puller.

NOTE: Zip-Torq axle nuts on SAF-HOLLAND P89 Disc Brake Axles are right-hand threaded.

8. Remove the outer hub bearing from the spindle ***(Figure 16)***.

NOTE: With the axle nut removed, it is possible to access the outer bearing.

⚠CAUTION DO NOT hit steel parts with a steel hammer as parts could break, sending flying steel fragments in any direction creating a hazard which, if not avoided, could result in minor to moderate injury.

9. Grasp the head unit with both hands and pull the head unit off the axle spindle ***(Figure 17)***.

NOTE: Depending on type of hub seal, the hub seal and inner bearing could remain on spindle or come off with the head unit.

Figure 16

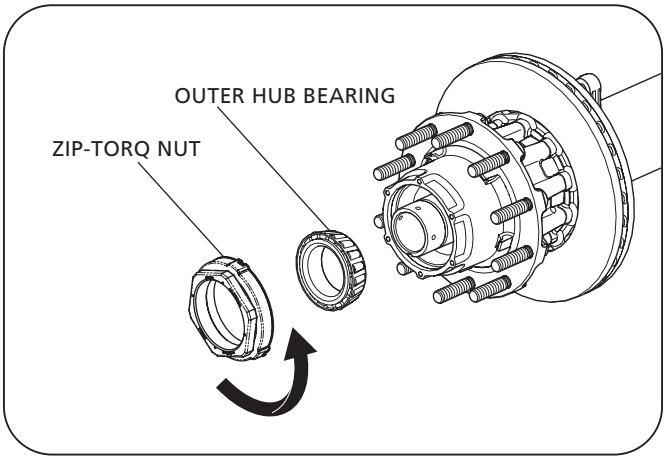
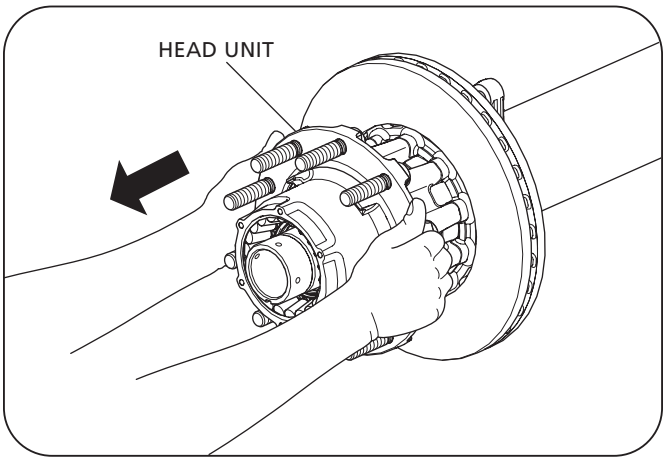


Figure 17



10. Remove the inner hub bearing from the spindle or from the inside of the hub ***(Figure 18)***.
11. The spindle mount hub seal can be driven off the spindle by striking the ring from the back side or prying off with a crow's foot bar. Be careful not to gouge the spindle shoulder. Discard the used seal. A new seal is required when re-assembled ***(Figure 18)***.

CAUTION DO NOT use a chisel to cut the seal. The shoulder can be damaged, resulting in a leak which, if not avoided, could lead to wheel end and/or brake failure.

8. Bearing Inspection

CAUTION Thoroughly clean bearings. Do not mix a synthetic base grease or oil with an organic/mineral base lubricant.

CAUTION DO NOT dry hub bearings with compressed air. Bearing damage could result.

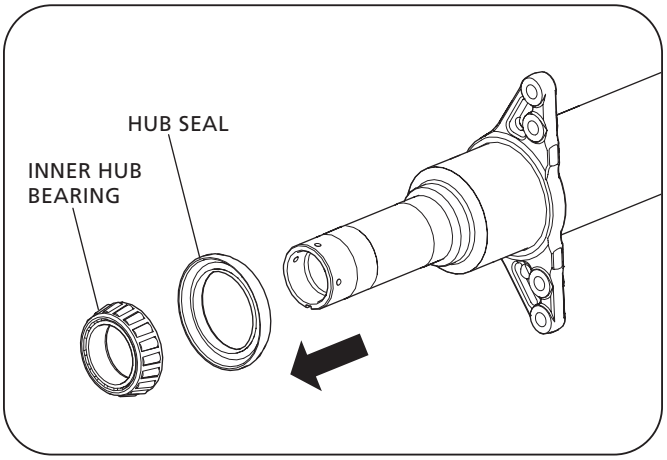
1. After removing the head unit, clean excess grease from the bearings.
2. For PSP bearings visually inspect the cups, cones and spacer for wear or damage. A raised sharp edge on the bearing spacer indicates wear and will require replacement.

IMPORTANT: A bearing which has been removed from a vehicle should be cleaned with solvent. NEVER use steam or water which will rust bearings.

IMPORTANT: Bearings that are rusted, flaked, pitted, or have damaged cages should be replaced. It is recommended to replace all questionable bearings and ALWAYS replace the cup and cone as a matched set.

IMPORTANT: NEVER re-assemble a tapered roller bearing in a damaged or worn bearing cup or spindle. Bearing cup or spindle should be replaced and NOT re-machined if damaged or worn.

Figure 18



9. Rotor Replacement

⚠WARNING Failure to follow these instructions could cause component failure which, if not avoided, could result in death or serious injury.

9.1 INTEGRAL Rotor

Refer to pages 6 and 7 for INTEGRAL and U-Shaped Identification. Refer to Section 9.2 for U-Shaped Rotor.

1. Remove the ABS sensor by following the instructions detailed in Section 16.1.
2. Remove the hub, refer to Section 6 instructions.
3. Remove the rotor from the hub using a size 15 mm socket to loosen and discard all ten (10) connection bolts ***(Figure 19)***.
4. Clean the rotor contact surface on the hub. Using compressed air, clean the tapped holes in the hub. Check to make sure the threads are undamaged.
5. Attach the new rotor to the hub using ten (10) new SAF specific INTEGRAL bolts and washers ***(Figure 19)***. Using a torque wrench, pre-torque the bolts to 40 ft.-lbs. (54 N•m). For final torque, tighten the bolts to 140 ft.-lbs. (190 N•m) using a crisscross pattern. Refer to the Torque Chart in Section 17 for more information.

IMPORTANT: When attaching a new rotor to the head unit, use only new SAF specified connection bolts. Bolts MUST be clean and free from oil and grease.

⚠WARNING Failure to use only SAF specified connection bolts could cause component failure which, if not avoided, could result in death or serious injury.

CAUTION When installing new washers, the attachment bolts can interfere with the ABS sensor block. Ensure that there is clearance provided for ABS Sensor Block ***(Figure 20)***. Failure to provide clearance can cause damage to property. Refer to service bulletin XL-SA20031SB-en-US

Figure 19

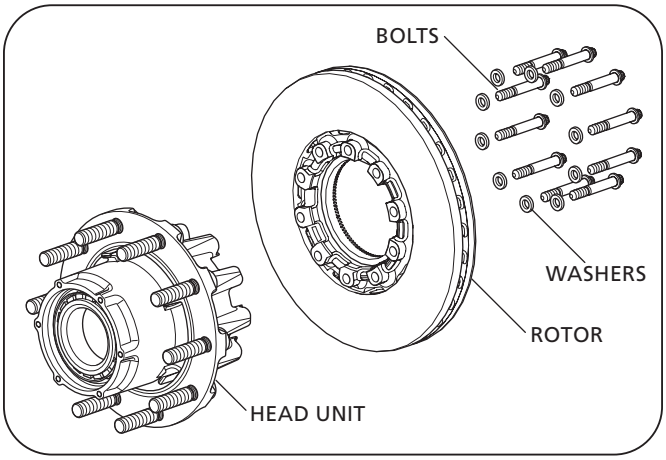
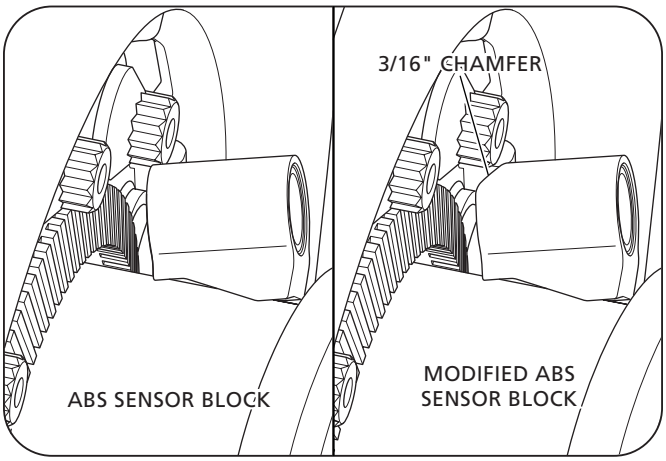


Figure 20



9.2 U-Shaped Rotor

1. Remove the ABS sensor by following the instructions detailed in Section 16.1.
2. Remove the head unit, Refer to Section 6 instructions.
3. Remove the rotor from the hub using a size 15/16" socket. Loosen and discard all ten (10) connection bolts and washers.
4. Clean the rotor contact surface on the hub. Using compressed air, clean the tapped holes in the hub. Check to make sure the threads are undamaged.
5. Attach the new rotor using ten (10) new bolts and washers supplied in the rotor kit ***(Figure 21)***. Using a torque wrench, tighten the bolts to 190 to 210 ft.-Lbs. (260-285 N•m).

IMPORTANT: When attaching a new rotor to the hub, use only SAF specified connection bolts and washers. Bolts MUST be clean and free from oil and grease.

⚠WARNING Failure to use only SAF specified connection bolts and washers could cause component failure which, if not avoided, could result in death or serious injury.

10. Hub Wheel Bolt Servicing

When replacing the wheel bolts, refer to the rotor removal instructions described in Section 9.

NOTE: NOT all bolts could need to be replaced. ONLY replace bolts that are damaged or in need of replacement.

1. Remove the wheel bolts by pressing them out of the head unit and discard ***(Figure 22).***
2. Install new wheel bolts by pressing them into the head unit.
3. For INTEGRAL rotor hub, ensure correct alignment of the bolts during installation, position the flat side of each wheel bolt head so that it is facing the center of the hub ***(Figure 23)***.

⚠CAUTION DO NOT hit steel parts with a steel hammer as parts could break, sending flying steel fragments in any direction creating a hazard which, if not avoided, could result in minor to moderate injury.

Figure 21

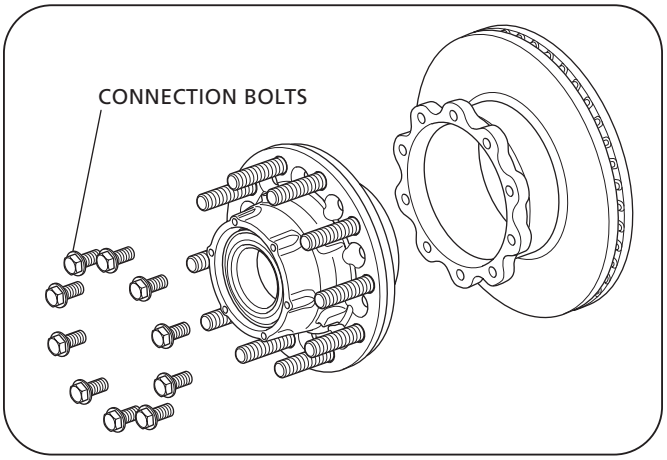


Figure 22

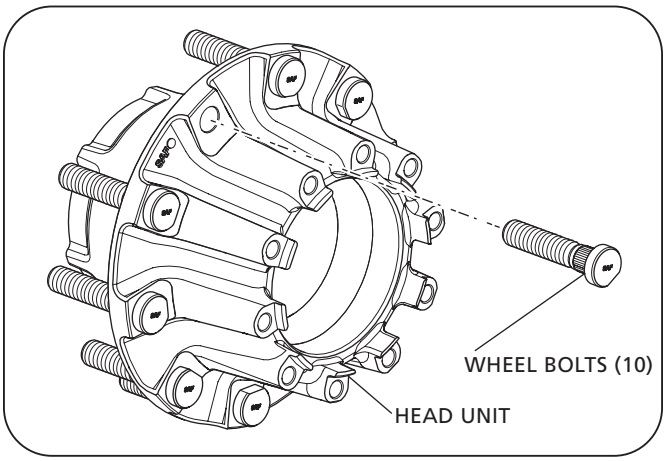
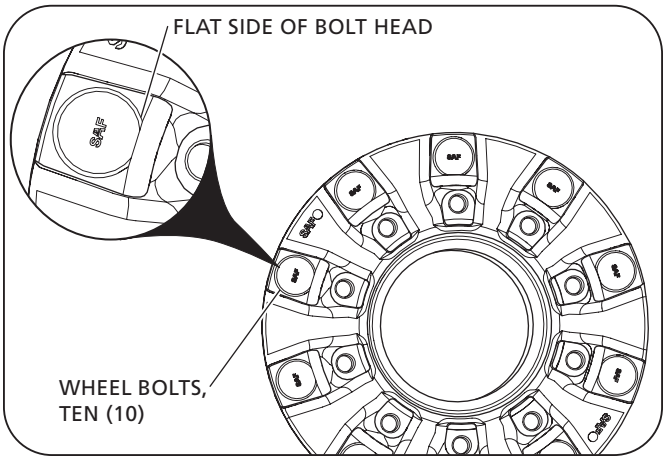


Figure 23



11. Seal, Bearing, and Hub Installation and Adjustment

IMPORTANT: DO NOT mix oil and grease wheel end lubricants. All SAF-HOLLAND P89 Disc Brake wheel ends can be serviced with oil or grease. Before servicing the SAF-HOLLAND P89 wheel end with oil, all grease MUST be cleaned with appropriate solvent from the bearings and hub.

NOTE: Although all SAF-HOLLAND P89 Disc Brake wheel ends are manufactured with spindle mounted wheel seals they can be serviced with either spindle or hub mounted seals.

11.1 Spindle mounted wheel seal Installation instructions. (Refer to 11.2 for hub mounted wheel seal instructions)

1. Before installing the wheel seal on the axle spindle, inspect the machined spindle seal surface for nicks, scratches, burrs or marks. If needed, use crocus cloth or emery cloth to repair any damaged areas.
2. Clean the threads and keyway thoroughly with a wire brush to avoid false bearing adjustments and to avoid introduction of contaminants into the lubricant cavity.
3. Thoroughly clean the spindle and spindle threads of rust, dirt, grease or any other contaminants that could damage the hub seal and cause it to leak.

CAUTION NEVER install a spindle mounted wheel seal in the hub and then force it onto the axle spindle by tightening the axle nut. Damage to seal will result.

CAUTION To avoid damaging the seal, support the hub against the spindle inner shoulder until the outer bearing and adjusting nut are installed.

4. Apply a thin layer of sealant to the O.D. of the spindle shoulder. Place the wheel seal on the spindle with the side labeled "oil-bearing side" facing out towards the end of the spindle ***(Figure 24)***.
5. Seat wheel seal into place using a hub seal installation tool and hammer. Rotate the wheel seal installation tool 1/4-turn with every hammer tap until the seal is properly seated with the metal face of the seal flush with the inner shoulder of the axle spindle ***(Figure 25)***. Clean and remove any excess sealant.

Figure 24

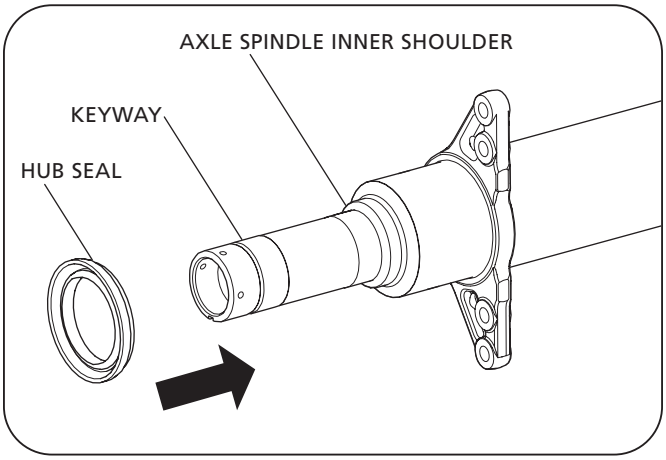
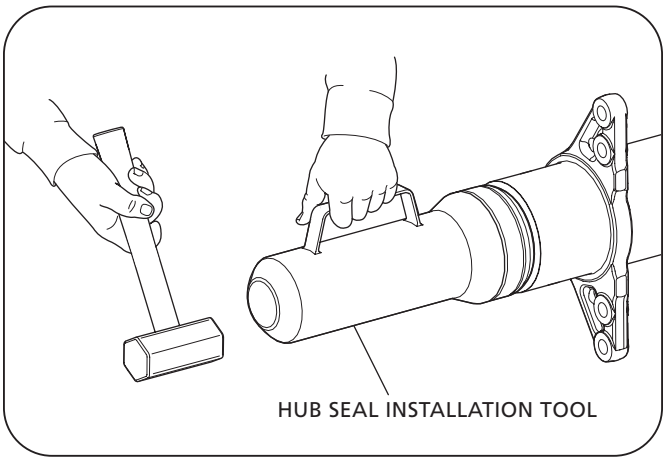


Figure 25



6. Prepare the hub. Remove the old lube and thoroughly clean the hub cavity and hub bore. If needed, use emery cloth to remove any burrs or old bore sealant. Inspect the hub bore for damage. Replace if necessary.
7. Install new inner and outer bearing cups into the hub as necessary ***(Figure 26)***.
8. Install inner bearing on spindle ***(Figure 26)***.

NOTE: If using oil for lubrication, coat bearings with oil before installation. Refer to Section 11.2 for proper wheel end oil lubrication instructions ***(Figure 28)***.

CAUTION Failure to lubricate bearing correctly and maintain proper lubrication could result in bearing damage.

NOTE: If using grease and NOT oil for hub lubrication, the inner and outer bearing, and the hub cavity MUST be pre-packed with grease before installation. Lubricate wheel end components with grease specified in Section 17.

9. Lubricate inside of hub cavity and install on spindle ***(Figure 26)***.

NOTE: Be sure wheel seals are properly installed before performing the hub bearing adjustment procedure.

11.2 Hub Mounted Wheel Seal Installation Instructions (Refer to 11.1 for spindle mounted seal installation)

1. Remove all burrs from the hub bore and spindle. Thoroughly clean hub cavity and spindle.

NOTE: DO NOT apply any sealant to the spindle shoulder.

2. Place the hub on a smooth, hard surface in a horizontal position. Pre-lube the inner bearing and place it into the hub bearing cup ***(Figure 27)***.

NOTE: When using grease, pre-pack the inner bearing before placement into the hub.

Figure 26

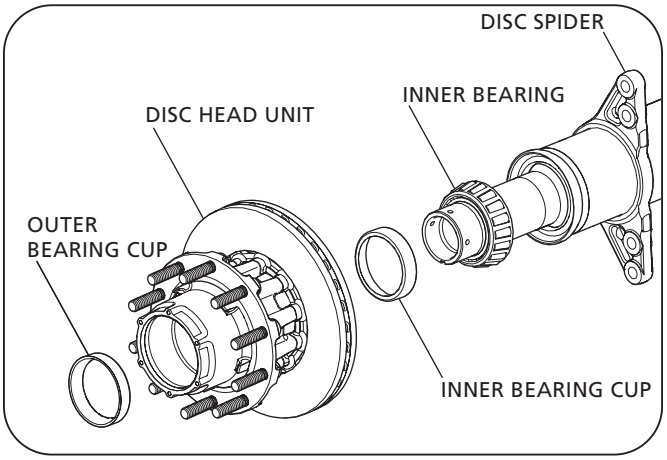
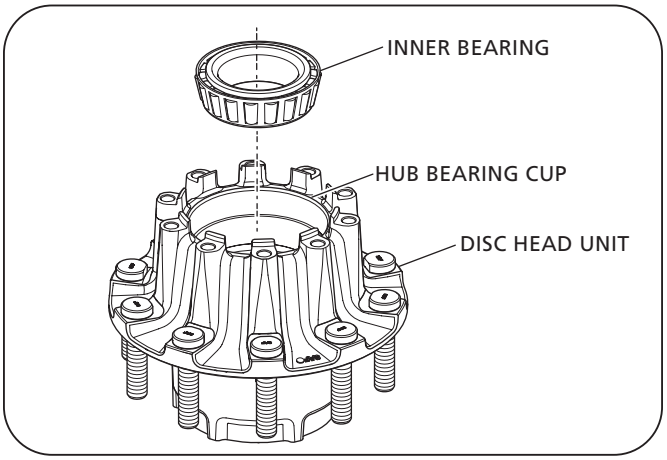


Figure 27



3. Place the wheel seal on the installation tool, make sure that the words "oil-bearing side" faces the inner bearing. Position the tool (with the seal correctly mounted in the tool head) into the hub bore. Use a three to five pound hammer to drive against the end of the tool. Drive seal into bore until complete bottoming is assured ***(Figure 28)***. Remove the installation tool and apply a thin layer of lubricant on the I.D surface of the seal.

NOTE: DO NOT apply lubricant to the O.D. of the seal.

11.3 Hub Installation and Bearing Adjustment

1. Gently push the head unit onto the spindle to the proper position. Fill the hub cavity with lubricant until it runs over the outer bearing cup.

NOTE: When using grease, pre-pack the hub cavity. The grease fill amount should be to a 3 o'clock and 9 o'clock level. This is to ensure a 50% hub cavity fill. Use a template to hold grease in place while filling the hub cavity ***(Figure 29)***.

2. Coat the outer bearing with lubricant and place the outer bearing on the spindle and into the bearing cup ***(Figure 29)***. Install outer bearing on spindle.
3. Install the Zip-Torq axle nut
   a. Seat the bearing. Using a torque wrench, tighten the nut to 200 ft.-lbs. (271 N•m) and spin the wheel at least one (1) full rotation. PERFORM THIS STEP THREE (3)TIMES.
   b. Back the nut off until it is loose.
   c. Adjust the bearing. Using a torque wrench, tighten the nut to 100 ft.-lbs. (137 N•m). Spin the wheel at least one (1) full rotation. PERFORM THIS STEP THREE (3) TIMES.
   d. Back the nut off one raised face mark (1/8 of a turn for parallel, 1/4 turn for taper) ***(Figure 30)***.

CAUTION Failure to properly tighten nut could result in bearing damage which, if not avoided, could result in bearing failure.

   e. Using a dial indicator, verify that end play reading is .001" (0.03 mm) to .003" (0.08 mm). Re-adjust bearing, if necessary, (each tooth of the Zip-Torq is a .002" (0.05mm) end play adjustment).

Figure 28

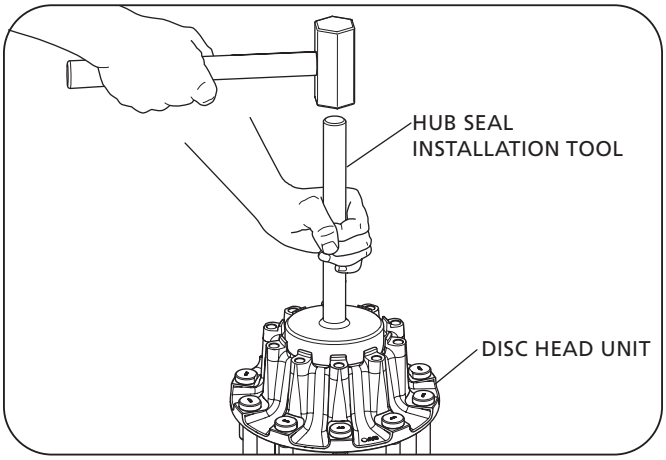


Figure 29

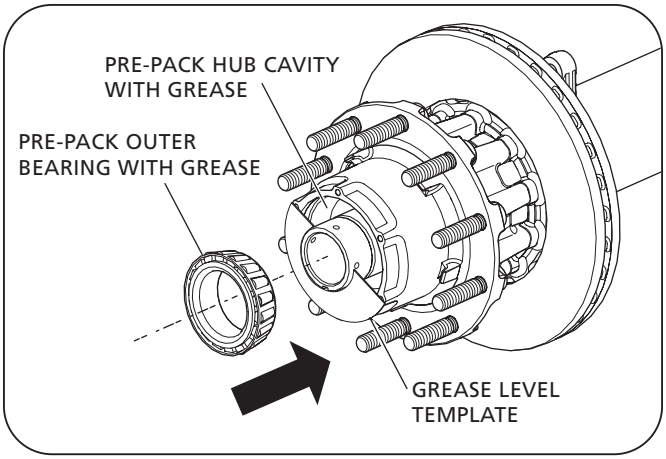
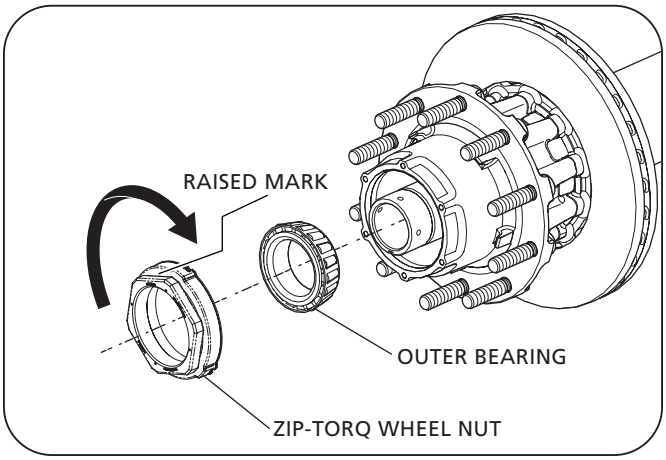


Figure 30



4. ABS sensor block must clear rotor attachment bolts. Refer to Section 9.

CAUTION When installing new washers, the attachment bolts can interfere with the ABS sensor block. Ensure that there is clearance provided for ABS Sensor Block ***(Figure 31)***. Failure to provide clearance can cause damage to property. Refer to service bulletin XL-SA20031SB-en-US for ABS Sensor Block Modification Procedure.

5. Check the wheel bearing end play as follows:
   a. Attach the magnetic base of a dial indicator to the spindle. Touch dial indicator stem to hub cap gasket face ***(Figure 32)***.
   b. Reading Number One - Slightly rotate wheel-end in both directions while pushing inward until dial indicator does not change. Set the dial indicator to zero ***(Figure 32)***.
   c. Reading Number Two - Slightly rotate hub in both directions while pulling outward until dial indicator does not change ***(Figure 32)***.
   d. End play is the difference between reading number one and reading number two.

NOTE: Final adjustment should allow the wheel to rotate freely with 0.001" - 0.003" (0.03 mm - 0.08 mm) end play. If end play is not within specification, re-adjustment of bearing is required.

IMPORTANT: If end play is not within specification, re-adjustment is required.

⚠WARNING Failure to maintain proper hub bearing adjustment could allow bearing failure and wheel-end separation which, if not avoided, could result in death or serious injury.

Figure 31

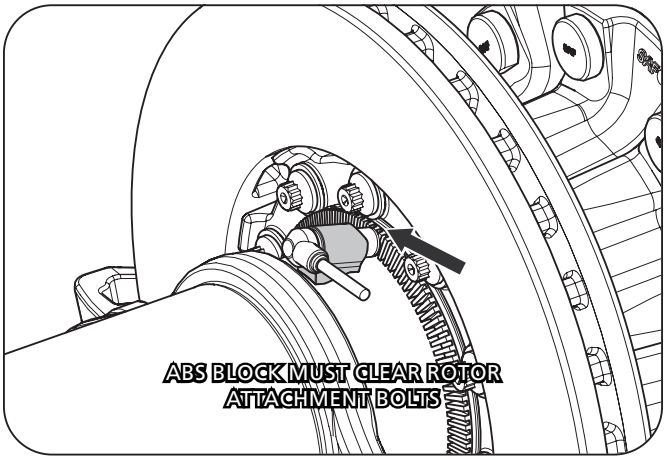
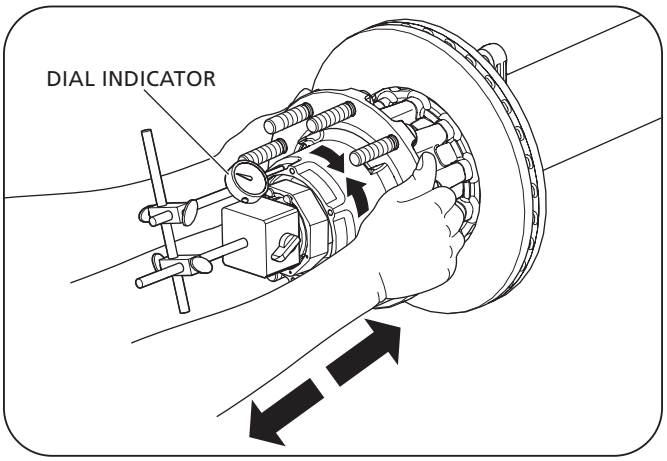


Figure 32



11.4 PSP Hub Re-Assembly & Installation

1. Follow procedure 11.2 to install a new bearing and wheel seal.
2. Turn the hub over placing the seal end down.
3. Install the bearing spacer, making sure the tapered end (if present) faces the outboard end of the hub. ***(Figure 33)***
4. Lubricate and install the outer bearing cone.
5. Seat the flat washer to the back of the spindle nut. ***(Figure 34***)
6. Position the spindle nut and washer against the outer bearing.
7. Install the spiral snap ring into the snap ring groove in the hub ***(Figure 35)***.
8. Make sure the red locking snap ring is removed from the spindle nut.
9. Verify the bearing spacer is in proper alignment.
10. Align the key or flat on the washer with the keyway on the spindle as the hub is placed onto the spindle.
11. When the threads on the nut engage the threads on the spindle, rotate the nut in a clockwise direction to fully engage the threads.
12. Torque the spindle nut to 500 ft-lbs while rotating the hub. DO NOT BACK OFF THE SPINDLE NUT.
13. Visually examine the three holes in the face of the spindle nut. One of the holes will line up with the holes in the inner washer. Install the tab of the red locking ring through the hole in the nut and washer that are aligned. Spread the locking ring, push it over the nut and into the machined grooves in the spindle nut.
14. Skip to step 13.

Figure 33

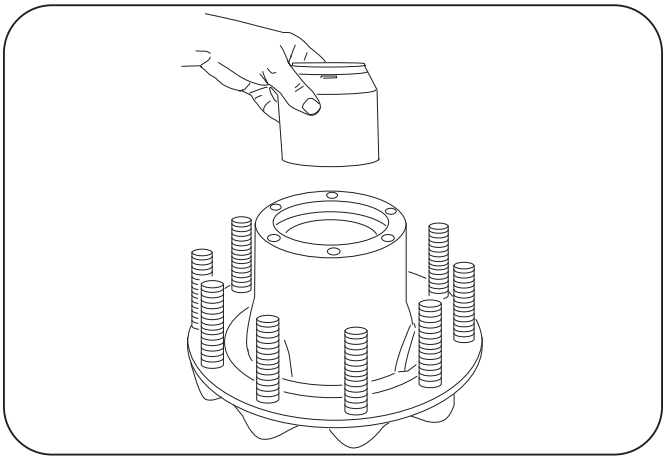


Figure 34

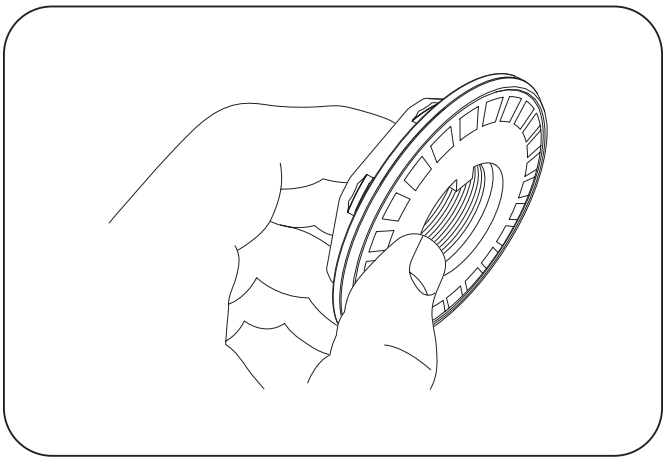
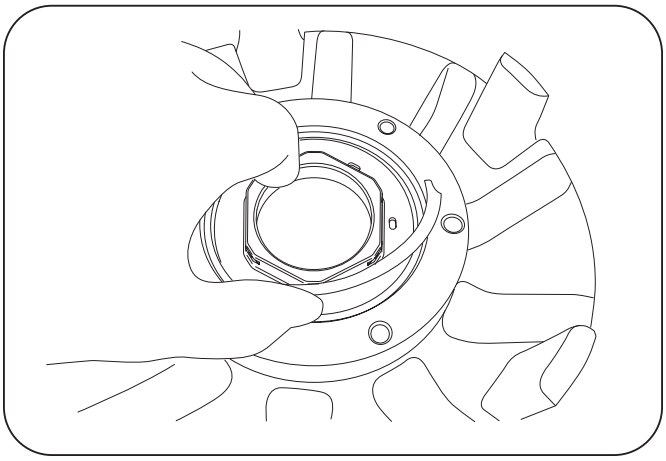


Figure 35



12. Hub Lubrication (Oil)

IMPORTANT: DO NOT mix oil with grease. If the bearing assembly has been lubricated with grease, DO NOT add oil.

⚠WARNING Failure to correctly lubricate bearings could damage bearings which, if not avoided, could result in death or serious injury.

1. Remove plug and fill the hub to the FULL mark with specified lubricant (oil), through the hole in the hub cap ***(Figure 36)***.
2. Allow the oil to flow through the bearings and level off.
3. Insert the plug into the hole in the hub cap ***(Figure 36)***.

IMPORTANT: Axles equipped with a centralized tire inflation system MUST use a vented hub cap.

4. Re-install wheel on hub using support device such as a wheel dolly jack.

⚠CAUTION Failure to support weight during installation or removal of brake drum could create a crush hazard which, if not avoided, could result in minor to moderate injury.

CAUTION Failure to uncage spring brakes in accordance with manufacturer's instructions after servicing is complete will prohibit proper brake function which could result in uneven brake system component wear.

13. Hub Cap Installation

1. Install the hub cap assembly, making sure the hub cap gasket is in place ***(Figure 37)***.

IMPORTANT: When installing hub cap, make sure the hub cap gasket is not bent or damaged.

IMPORTANT: DO NOT over torque. This can crush the hub cap gasket.

CAUTION Failure to avoid damaging the hub cap gasket could allow lubricant to lead which, if not avoided, could result in bearing failure.

2. Install the six (6) bolts to secure the hub cap assembly ***(Figure 37)***. Tighten bolts to 12-16 ft.-lbs. (16-21 N•m).

Figure 36

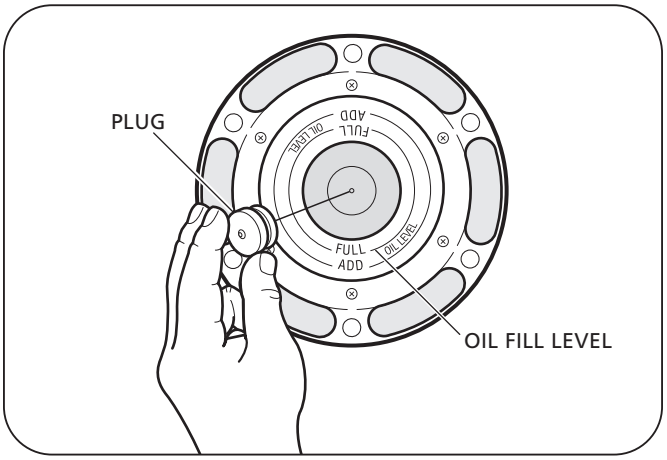
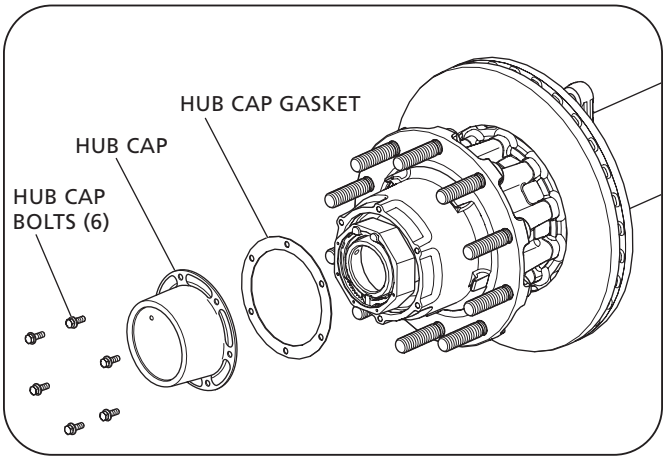


Figure 37



14. Caliper Installation

1. Re-install the caliper onto the brake spider using four (4) new SAF specific brake caliper bolts ***(Figure 38)***:

   a. Pre-torque the bolts to 88 ft.-lbs. (120 N•m) starting with the shoulder bolt and work across the spider using a size 24 mm socket.

   b. Verify the pre-torque of the bolts a second time, and if necessary re-tighten all bolts to 88 ft.-lbs. (120 N•m).

   c. Final torque to 331 ± 22 ft.-lbs. (450 ± 30 N•m), starting with the shoulder bolt and work across the spider.

NOTE: The caliper is connected to the disc brake spider using four (4) SAF specific bolts: three (3) standard bolts and one (1) shoulder bolt ***(Figures 38 and 39).*** The shoulder bolt is located at the outer mounting hole where the brake rotor rotates OUT of the caliper when turning in driving direction.

IMPORTANT: Make sure that the brake caliper is mounted on the correct side of the axle. The correct position can be identified by the lengths of the guide pins on the caliper unit. The longer guide pins should be positioned on the bottom of the caliper unit when installed rearward of the axle and on top when forward of the axle ***(Figure 39).***

CAUTION Failure to install the shoulder bolt in the proper location could result in component damage.

2. Re-install the SAF brake chamber by following the instructions in SAF Brake Chambers Installation and Service Guide XL-SA10062IM-en-US available on the internet at www.safholland.us.
3. Re-install the ABS sensor by following the instructions detailed in Section 16.1.
4. To enable the ABS sensor to function properly press the ABS sensor against the ABS toner ring at the hub unit to eliminate any clearance between these parts.

IMPORTANT: After replacing the caliper, verify that the brake system is functioning properly.

Figure 38

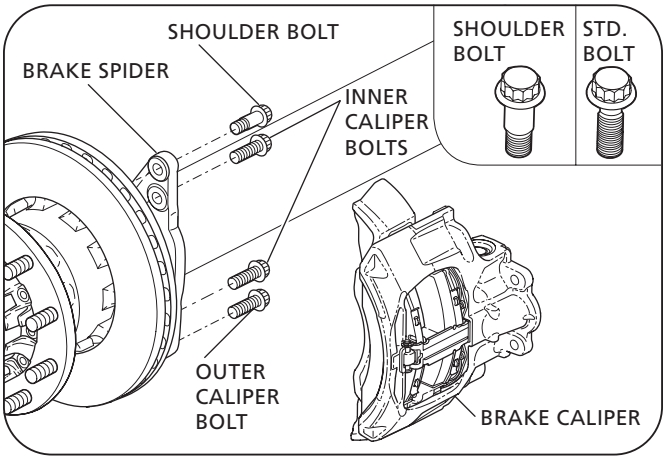
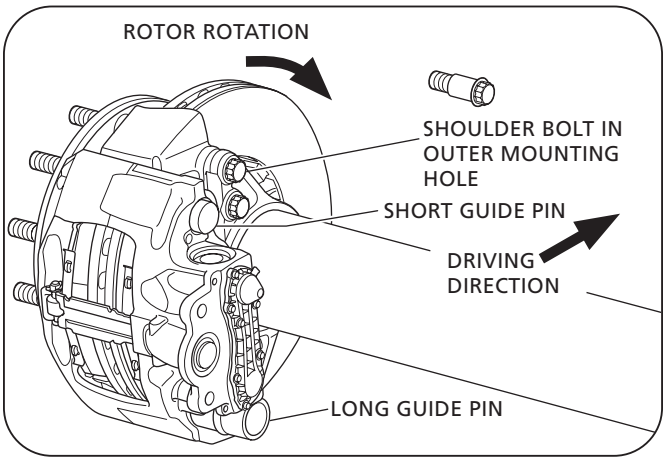


Figure 39



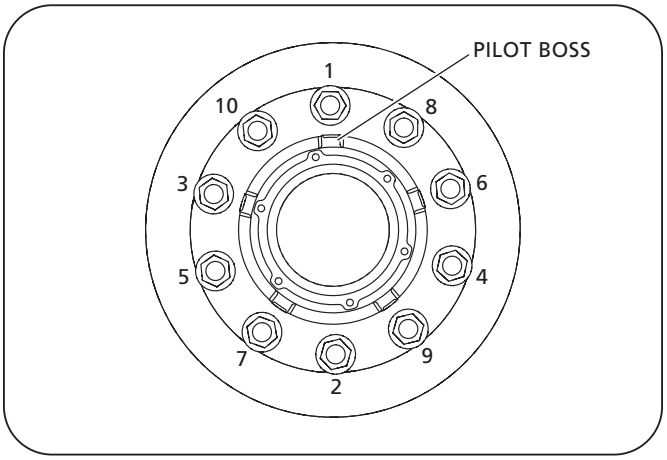
15. Wheel Installation Procedure

The following information is intended to provide basic wheel installation instructions. Refer to TMC RP222C for complete installation details.

1. Clean all mating surfaces on hub, wheels and nuts.
2. Rotate the hub so a pilot boss is at the top (12 o'clock) position.
3. Mount wheel(s) on hub. One or more of the wheel nuts can be started in order to hold wheel in position.
4. Tighten the top wheel nut first. Apply 50 ft.-lbs. (68 N•m) of torque to draw the wheel up fully against the hub.
5. Install remaining wheel nuts. Using sequence illustrated in ***(Figure 40)***, tighten all wheel nuts to 50 ft.-lbs. (68 N•m) of torque.
6. Repeating sequence illustrated in ***(Figure 40)***, re-tighten all wheel nuts to 475 ± 25 ft. lbs. (644 ± 34 N•m) of torque.
7. Check seating of wheel at the pilot bosses. Rotate wheel and check for any rotational irregularity.

Re-torque all wheel nuts after 5 to 100 miles of service on the initial "in-service" following any installation of wheel to hub assembly.

Figure 40



16. Optional Equipment

16.1 ABS Sensor

NOTE: When replacing the ABS sensor, DO NOT mix sensors from different manufacturers.

1. Disconnect the ABS sensor.
2. Remove the ABS sensor from the sensor holder by pulling it straight out from the holder and discard ***(Figure 41)***.
3. If necessary, remove the sensor retaining spring clip from the sensor holder and replace with a new clip. ***(Figure 41)***.
4. Install a new ABS sensor by pushing it directly into the sensor holder/spring clip until it contacts the ABS toner ring in the hub assembly ***(Figure 41)***.
5. Re-connect the ABS sensor.

16.2 Hubodometer

The SAF-HOLLAND P89 disc brake axle can be factory equipped or retrofitted with any hubodometer currently compatible with a North American standard six bolt hub cap. For information on specific hubodometer availability, contact SAF-HOLLAND Customer Service at 888-396-6501.

16.3 Tire Inflation System

SAF-HOLLAND offers only the Tire Pilot Plus system as it's complete tire management system and it is compatible with all SAF-HOLLAND wheel end packages. SAF-HOLLAND does offer axle prep for PSI tire inflation, but nothing more. For information and availability of the SAF-HOLLAND Tire Pilot Plus tire inflation system, contact SAF-HOLLAND Customer Service at 888-396-6501.

16.4 Dust Shield

The SAF-HOLLAND P89 disc brake can be factory equipped or retrofitted with a disc dust shield.

1. Route any ABS sensor wires through one of the two rubber grommets on the dust shield and position the dust shield on the axle.***(Figure 42)***.
2. Wrap the clamp band around the axle and dust shield and loosely install the clamp band bolt.
3. Slide the dust shield and clamp band toward the disc brake until the dust shield is about 1/2" (12mm) from the brake rotor, pulling the ABS wire through the rubber grommet as necessary.
4. Torque the clamp band bolt to 20-25 ft.-lbs. (27-34 N•m).
5. Use a pry bar and/or a rubber mallet to ensure that there is clearance between the dust shield and the rotor.
6. Plug the ABS sensor into the ABS system wire.

Figure 41

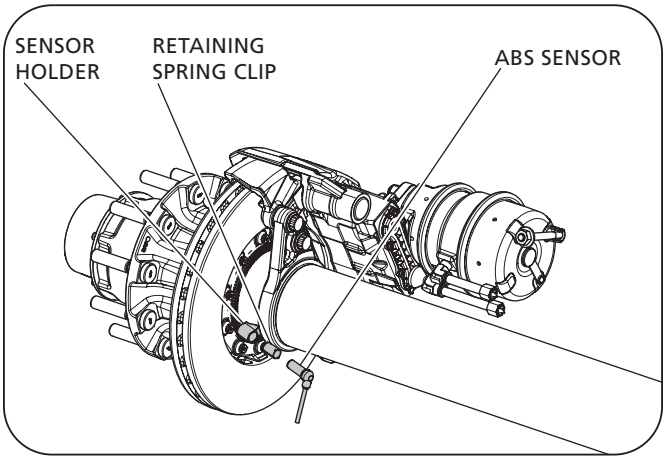
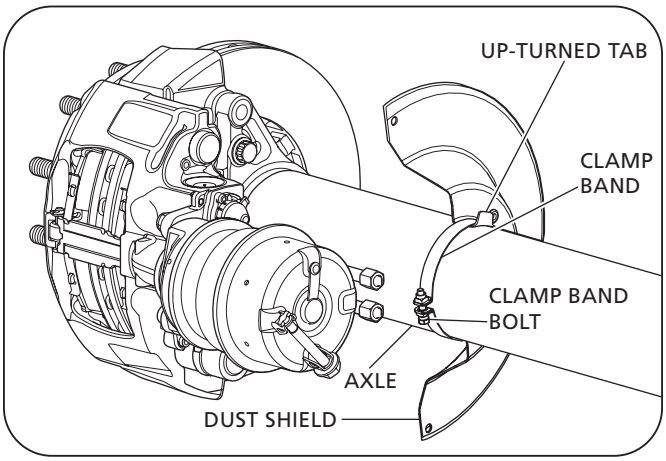


Figure 42



17. Lubrication and Torque Specifications

LUBRICATION SPECIFICATION		
COMPONENT	SURFACE TO BE LUBRICATED	LUBRICANT
Axle	Bearings and Hubs	NLGI 00 Semi-Fluid Grease (Standard) 75W-90 Synthetic Oil (Optional)*

* Oil lubed bearings and hubs should remain lubricated with oil, grease lubed bearings and hubs should remain lubricated with grease.

NOTE: Intervals are based upon normal operations. Reduce intervals to compensate for abnormal operations or severe conditions. During inactive periods, sufficient lubrication MUST be performed for equipment preservation.

PART	APPLICATION	TORQUE SPECIFICATIONS
Zip-Torq Axle Spindle Nut	Head Unit – Axle	Refer to Section 11.3, Zip-Torq Axle Nut procedures.
SAF Specific INTEGRAL Bolt M14 x 1.5"	Rotor – Hub	Torque all ten (10) bolts in a criss-cross pattern. 1. Pre-torque to 40 ft.-lbs. (54 N•m). 2. For final torque tighten to 140 ft.-lbs. (190 N•m).
SAF Specific Caliper Bolt M18 x 1.5"	Caliper – Spider	Torque bolts from inner bolts to outer bolts. 1. Pre-torque to 88 ft.-lbs. (120 N•m). 2. Verify the pre-torque of the bolts a second time, and, if necessary re-tighten all bolts to 88 ft.-lbs. (120 N•m). 3. Final torque from inner bolts to outer bolts to 331 ± 22 ft.-lbs. (450 ± 30 N•m).
SAF Specific Brake Chamber Nut 5/8"-11 UNC Nylock or M16 x 1.5"	Brake Chamber	1. Pre-torque both chamber nuts to 60-75 ft.-lbs. (80-100 N•m). 2. For final torque tighten both chamber nuts to 130-155 ft.-lbs. (180-210 N•m)
5/16"-18 Bolt	Hub Cap	12-16 ft.-lbs. (16-22 N•m)
M8 x 1.25 Bolt	Dust Shield Clamp	20-25 ft.-lbs. (27-34 N•m)
SAF U-Shaped Rotor Bolt	Rotor – Hub	Torque all ten (10) bolts in a criss-cross pattern to 190-210 ft.-lbs. (260-285 N•m)

18. Troubleshooting Chart (SAF-HOLLAND suspensions equipped with disc brake axles)

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Brakes will not release	Disc brake caliper bound up	Lubricate or replace brake caliper
	Brake hoses restricted	Replace hoses
	Brake control valve restricted/inoperable	Repair/replace control valve
	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly
	Supply air interrupted	Open glad hand cut-out cock or push brake control valve in
	Supply line improperly coupled	Properly couple supply air line
	Brake pads frozen to rotor in cold weather	Warm brakes
No brakes or insufficient brake performance	Service air interrupted	Open glad hand cut-out cock
	Service air line improperly coupled	Properly couple service air line
	Brake hoses restricted	Relieve restriction or obstruction or replace hoses
	Brake control valve restricted/inoperable	Repair/replace control valve
	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly
Dragging Brakes/Slow brake application or release timing	Brake hoses restricted	Relieve restriction or obstruction or replace hoses
	Brake control valve restricted/inoperable	Repair/replace control valve
	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly
Dog Tracking	Axle not properly aligned	Align axle
	Slider assembly racked or not aligned properly	Repair or replace slider assembly
	Frame bent or not aligned properly	Repair or align frame
	Damaged suspension component	Repair or replace suspension component
	Bent axle	Replace axle
Uneven tire wear	Improper tire inflation	Inflate tire to proper pressure
	Loose wheel stud nuts	Inspect for and repair any resultant wheel end damage and tighten properly
	Improper wheel bearing adjustment	Inspect for and repair any resultant wheel end damage and adjust properly
	Axle not properly aligned	Align axle
	Slider assembly racked or not aligned properly	Repair or replace slider assembly
	Frame bent or not aligned properly	Repair or align frame
	Damaged suspension component	Repair or replace suspension component
	Bent axle	Replace axle
	Mismatched tire sizes	Properly match tire sizes
	Unequal brake balance or timing	Repair brakes as necessary
	Overly aggressive braking	Instruct/train driver in proper brake use
	High speed turns	Instruct/train driver in proper vehicle speeds
	High level of side scrub	Instruct/train driver in proper vehicle maneuvering
	Anti-Lock Brake System malfunction	Refer to ABS manufacturer's service literature

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Grabbing brakes	Contaminants on brake lining	Replace brake pads
	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Warped brake rotor	Machine or replace brake rotor
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly
	Unequal brake balance or timing	Repair brakes as necessary
	Anti-Lock Brake System malfunction	Refer to ABS manufacturer's service literature
Excessive heat cracks in rotor	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Overly aggressive braking	Instruct/train driver in proper brake use
	Unequal brake balance or timing	Repair brakes as necessary
	Anti-Lock Brake System malfunction	Refer to ABS manufacturer's service literature
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly

19. Routine Service Schedule

⚠WARNING Failure to inspect and maintain the SAF-HOLLAND P89 disc brake axle as outlined in this section can result in brake or wheel bearing failure which, if not avoided, could result in death or serious injury.

IMPORTANT: Use only SAF-HOLLAND Original Parts to service the SAF-HOLLAND P89 disc brake axle.

⚠WARNING Failure to maintain the SAF-HOLLAND P89 disc brake with SAF-HOLLAND Original Parts can result in brake or wheel bearing failure which, if not avoided, could result in death or serious injury.

NOTE: Service intervals are based upon normal operations. Reduce intervals to compensate for abnormal operations or severe conditions. During inactive periods, sufficient lubrication MUST be performed for equipment preservation.

WHICHEVER OCCURS FIRST		PERIODIC CHECKS		
MILEAGE INTERVALS	After First 3,000 Miles	Every 20,000 Miles	Every 50,000 Miles	Every 100,000 Miles
TIME INTERVALS	After First Month	Every 3 Months	Every 6 Months	Every 12 Months
VISUAL AND SAFETY INSPECTION				
Head Unit – Check for grease leaks.			■	
Inspect the brake caliper guide system. Check for free movement and sliding action. Refer to Section 5. For caliper and caliper service manual identification.			■	
Check rubber dust covers for cracks and damage. Check adjuster cap for correct seating. Refer to Section 5. For caliper and caliper service manual identification.			■	
Inspect brake pad thickness regularly. Refer to Section 6.		■		
Inspect brake rotors for cracks. Refer to Section 6.			■	
Perform general service/maintenance inspection. Refer to Section 2.	■			
Perform disc brake/head unit inspection. Refer to Section 5.	■		■	

MECHANICAL CHECK				
Attention: Check torque of wheel nuts after the first 5-100 miles (8-160 km) from date vehicle was placed into service and after every wheel removal. Continually check wheel torque every 10,000 miles (16,000 km), or at the intervals indicated in the vehicle owner's manual, whichever occurs first.				
Check and adjust wheel bearing end play.	■		■	
Pack hub bearings with fresh lubricant (also after every brake lining replacement, check hub bearing wear).				■

SPECIAL SERVICE CONDITIONS	
Vehicles with long standing periods.	Service at specified time intervals, e.g. Trailer used for storage or frequently left standing for several days at a time.
Vehicles used under severe duty and extreme conditions.	Service at suitably reduced intervals, e.g. Trailer operating in continuous multi-shifts or in off-road construction sites.

SAF-HOLLAND ORIGINAL PARTS™

From fifth wheel rebuild kits to suspension bushing repair kits, SAF-HOLLAND Original Parts are the same quality components used in the original component assembly.

SAF-HOLLAND Original Parts are tested and designed to provide maximum performance and durability. Will-fits, look-alikes or, worse yet, counterfeit parts will only limit the performance potential and could possibly void SAF-HOLLAND's warranty. Always be sure to spec SAF-HOLLAND Original Parts when servicing your SAF-HOLLAND product.

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www.safholland.us

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www.safholland.ca

SAF-HOLLAND MEXICO • 52.55.5362.8743 • Fax 52.55.5362.8743
www.safholland.com.mx

info@safholland.com

SAF-HOLLAND, INC.
1950 Industrial Blvd., Muskegon, MI 49442
www.safholland.com

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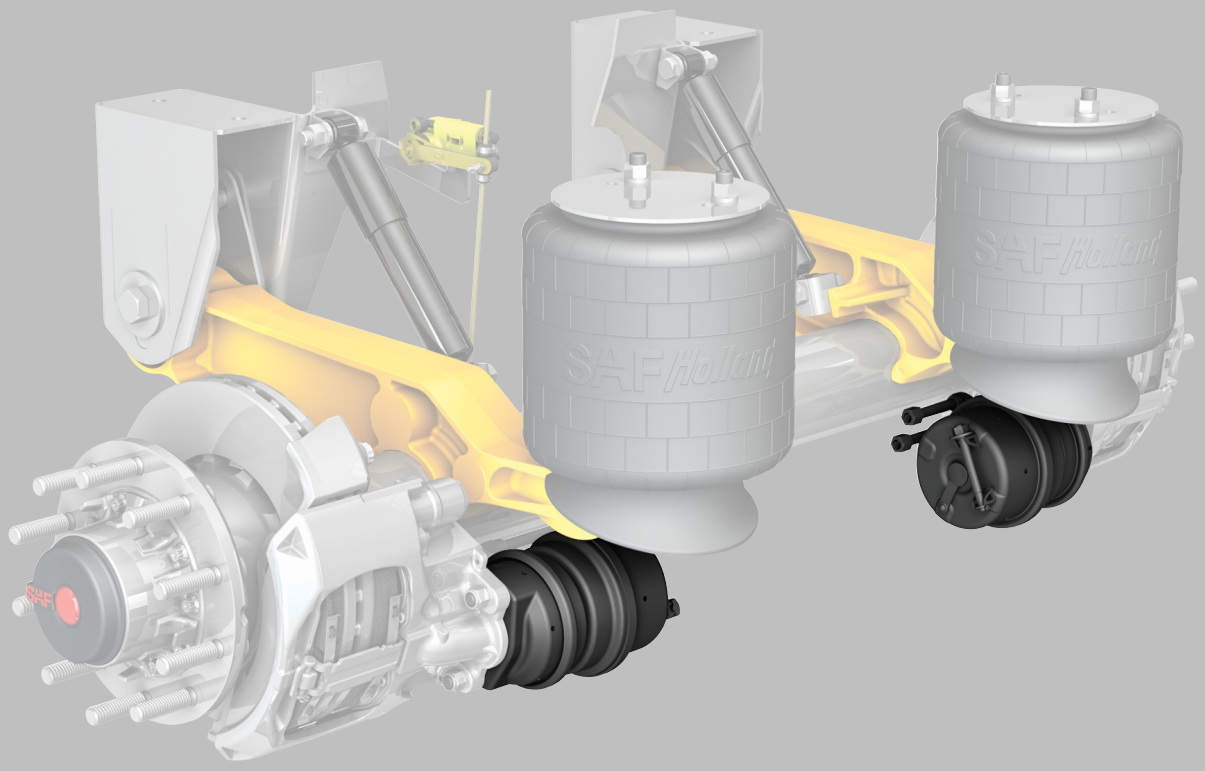
Installation and Service Guide

Brake Chambers

For INTEGRAL ™ Disc Brakes



XL-SA10062IM-en-US Rev B

Introduction

This manual provides you with information necessary for the installation, inspection, maintenance, and safe operation of the SAF brake chambers. SAF brake chambers are designed and engineered to provide trouble-free service.

NOTE: For axle end/brake components replacement contact SAF-HOLLAND Customer Service 1-888-396-6501.

Warranty

Refer to the complete warranty for the country in which the product will be used. A copy of the written warranty is included with the product and can be found on the SAF-HOLLAND Web Site (www.safholland.us).

Notes, Cautions, and Warnings

You must read and understand all of the safety procedures presented in this manual before starting any work on the suspension/axle.

Proper tools must be used to perform the maintenance and repair procedures described in this manual. Many of these procedures require special tools.

NOTE: In the United States, work shop safety requirements are defined by federal and/or state Occupational Safety and Health Act. Equivalent laws may exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location where work is performed.

IMPORTANT: Read this manual before using this product. Keep this manual in a safe location for future reference.

⚠WARNING Failure to follow the instructions and safety precautions in this manual can result in death or serious injury

Throughout this manual, you will notice the terms “NOTE”, “IMPORTANT”, “CAUTION”, and “WARNING” followed by important product information. So that you may better understand the manual, those terms are as follows:

NOTE: Includes additional information to enable accurate and easy performance of procedures.

IMPORTANT: Includes additional information that if not followed could lead to hindered product performance.

CAUTION Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided may result in property damage.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided may result in minor or moderate injury.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided could result in death or serious injury.

1. General Safety Instructions

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

⚠WARNING Failure to properly support the vehicle and axles prior to commencing work could create a crush hazard which, if not avoided could result in serious injury or death.

NOTE: Several maintenance procedures in this manual require re-positioning of the slack adjuster and/or ABS system. Consult the manufacturer's manual for procedures on the proper operation of slack adjuster and/or ABS system.

IMPORTANT: Key components on each axle's braking system, including friction material, rotors and drums, are intended to wear over time. Worn parts should be replaced in sets on both the driver and curb side of an axle.

⚠WARNING Failure to follow manufacturer's instructions regarding spring pressure or air pressure control may allow uncontrolled release of energy which, if not avoided, could result in serious injury or death.

Please observe the following safety instructions in order to maintain the operational and road safety of your SAF-HOLLAND suspension:

1. The brake chamber internal components are under a spring preload of approximately 2,200 lbs. (1,000 kg). The brake chamber should never be opened or mishandled.

⚠WARNING Opening or mishandling the brake chamber may result in the release of internal spring pressure which, if not avoided could result in death or serious injury

2. Should the brake chambers show signs of material damage, significant corrosion, or other damage, the brake chambers must be immediately replaced.

3. If, during installation of the double diaphragm brake chamber, the parking brake section is not released using the release tool bolt, the plunger of the brake chamber may not fully engage in the lever arm of the disc brake. This can result in a limited function of the brake and/or damage to the internal components of the brake chamber.

⚠WARNING Failure to release the parking brake section of a double diaphragm brake chamber could result in limited brake function which, if not avoided could result in serious injury or death.

Note: The release tool bolt must always be removed and stored in the bracket provided on the brake chamber housing. The release tool bolt serves only for the manual caging of the parking brake with the trailer in the pressure-free state.

4. The wheel contact surfaces between the wheel and hub must not be additionally painted. The contact surfaces must be clean, smooth and free from grease.

⚠WARNING Failure to keep wheel and hub contact surfaces clean and clear of foreign material could allow wheel/hub separations which, if not avoided could result in serious injury or death.

5. Only the wheel and tire sizes approved by the trailer builder may be used.

⚠CAUTION Failure to maintain tire clearance between tires and the nearest point of contact on the suspension or vehicle could cause fire or loss of vehicle control which, if not avoided may result in minor to moderate injury.

6. Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.

7. Ensure that the brakes are not overheated by continuous operation.

⚠WARNING Failure to minimize the use of brakes during overheating conditions could result in deterioration of brake efficiency which, if not avoided could result in serious injury or death.

8. The parking brake must not be immediately applied when the brakes are overheated, as the brake drums or discs may be damaged by different stress fields during cooling.

9. Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles.

We highly recommend the use of only SAF-HOLLAND Original Parts.

A list of SAF-HOLLAND technical support locations to supply SAF-HOLLAND Original Parts can be found at www.safholland.us or you can contact SAF-HOLLAND Customer Service at 1-888-396-6501

Updates to this manual will be published as necessary online at www.safholland.us

2. Brake Chamber Installation

SAF Brake chambers are supplied ready for installation. Double diaphragm chambers with parking brake section are supplied with a release tool bolt for manual caging.

2.A. Single Diaphragm Brake Chamber

1. Check that all drain vent holes ***(1)*** are open (***Figure 1***). If necessary, completely remove the dust plug.

CAUTION Failure to keep bottom moisture drain vents open could result in damage to the brake chamber which, if not avoided may result in component or property damage.

Note: SAF accepts no liability for damage caused by the bottom moisture drain vents being closed.

2. The sealing surface on the brake caliper **(2)** must be free from dirt and corrosion ***(Figure 2)***.
3. Prior to installation, grease the spherical cap **(3)** in the brake lever ***(Figure 2)***.
4. Inspect the flange surface on the brake caliper **(4)** for flatness and cleanliness. Clean or replace if necessary ***(Figure 2)***.
5. Inspect the plungers, seals, and flange surface of the brake chamber for debris or damage. Clean or replace if necessary.
6. Move the brake chamber into the same orientation as the original chamber, ensuring that the plunger of the brake chamber engages in the spherical cap of the brake lever.
7. If the plunger is not in the correct position, it can be corrected as follows:

   Pressurize the service brake section of the brake chamber with compressed air five times and then relieve the pressure again. If the connecting rod has not moved into the desired position or if no compressed air is available, carefully maneuver the connecting rod into place manually.

Figure 1

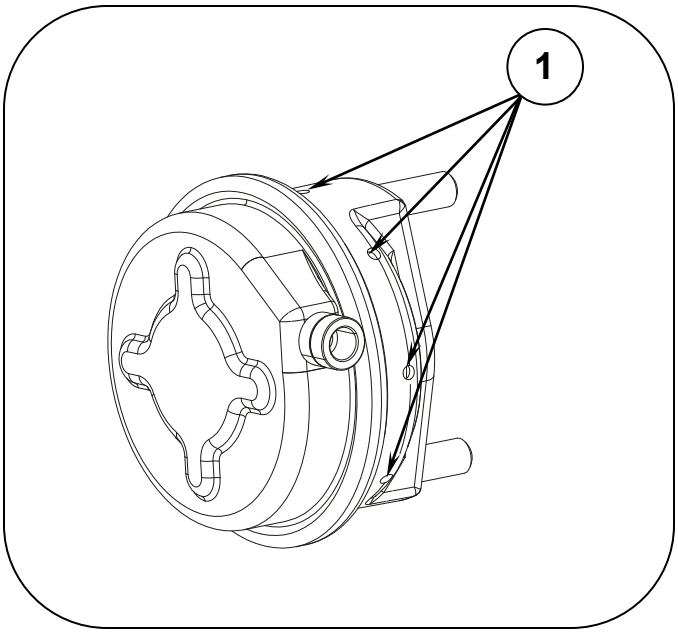
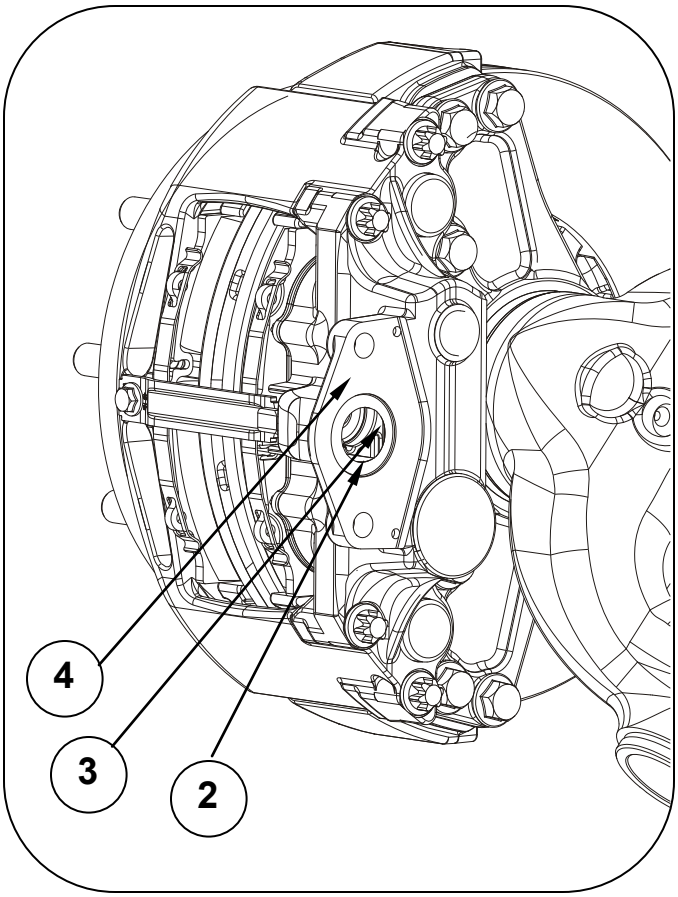


Figure 2



8. Install brake chamber nuts **(5)** until the brake chamber is in full contact with the mounting bracket ***(Figure 3)***. Pre-torque both nuts to 60-75 ft. lbs (80-100 Nm) and then torque to 130-155 ft. lbs (180-210 Nm).
9. Install air lines to the brake chamber (**6**) ***(Figure 3)***. Be sure to follow the installation instructions from trailer manufacture.
10. Spray a soapy water mix on all air line connections and test for air leaks, verify fittings are tight.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise the brake system performance which, if not avoided may result in component or property damage.

11. After installation, be sure to check the brake system for proper function.

2.B. Double Diaphragm Brake Chamber

1. Check that all drain vent holes ***(1)*** are open (***Figure 4***). If necessary, completely remove the dust plug.

CAUTION Failure to keep bottom moisture drain vents open could result in damage to the brake chamber which, if not avoided may result in component or property damage.

Note: SAF accepts no liability for damage caused by the bottom moisture drain vents being closed.

2. The sealing surface on the brake caliper **(2)** must be free from dirt and corrosion ***(Figure 5)***.
3. Prior to installation, grease the spherical cap **(3)** in the brake lever ***(Figure 5)***.
4. Inspect the flange surface on the brake caliper **(4)** for flatness and cleanliness. Clean or replace if necessary ***(Figure 5)***.
5. Inspect the plungers, seals, and flange surface of the brake chamber for debris or damage. Clean or replace if necessary.
6. Confirm that the parking brake is released and the release bolt is installed. If the parking brake is not released, refer to Section 3 for manual caging instructions.

Figure 3

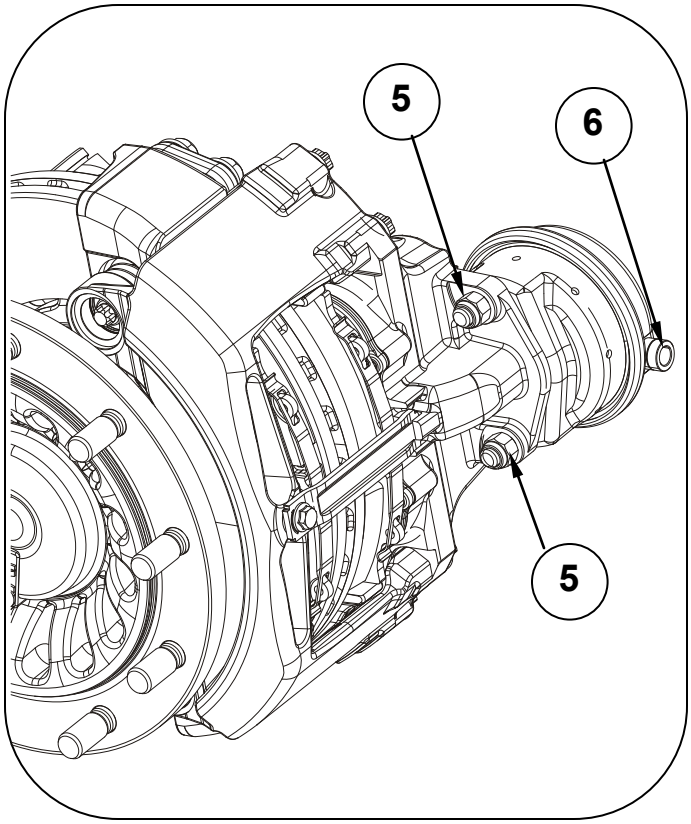
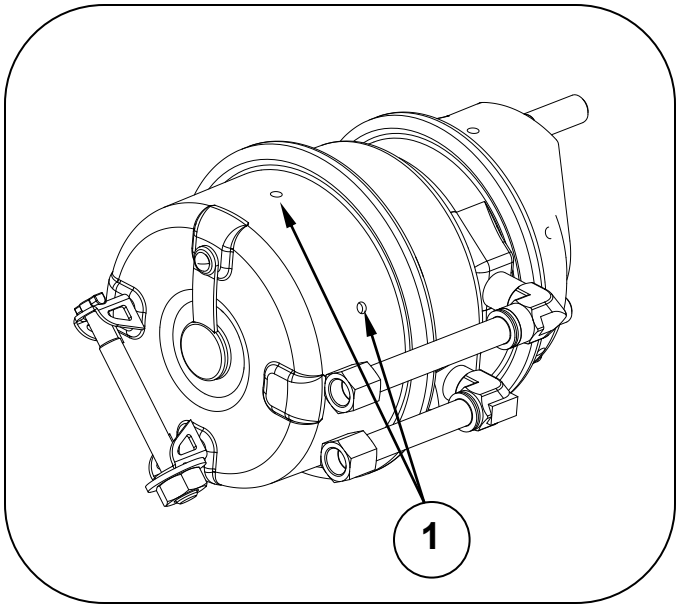


Figure 4



7. Move the brake chamber into the same orientation as the original chamber, ensuring that the plunger of the brake chamber engages in the spherical cap of the brake lever.

8. If the plunger is not in the correct position, it can be corrected as follows:

   Pressurize the service brake section of the brake chamber with compressed air five times and then relieve the pressure again. If the connecting rod has not moved into the desired position or if no compressed air is available, carefully maneuver the connecting rod into place manually.

10. Install brake chamber nuts **(5)** until the brake chamber is in full contact with the mounting bracket ***(Figure 6)***. Pre-torque both nuts to 60-75 ft. lbs (80-100 Nm) and then torque to 130-155 ft. lbs (180-210 Nm).

11. Install air lines to the brake chamber (**6 - 7**) ***(Figure (6)***. Be sure to follow the installation instructions from the trailer manufacture.

    Air line connections:
    Emergency brake port **(6)**
    Service brake port **(7)**

10. Spray a soapy water mix on all air line connections and test for air leaks, verify fittings are tight.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise brake system performance which, if not avoided may result in component or property damage.

13. After installation, be sure to check the brake system for proper function.

Figure 5

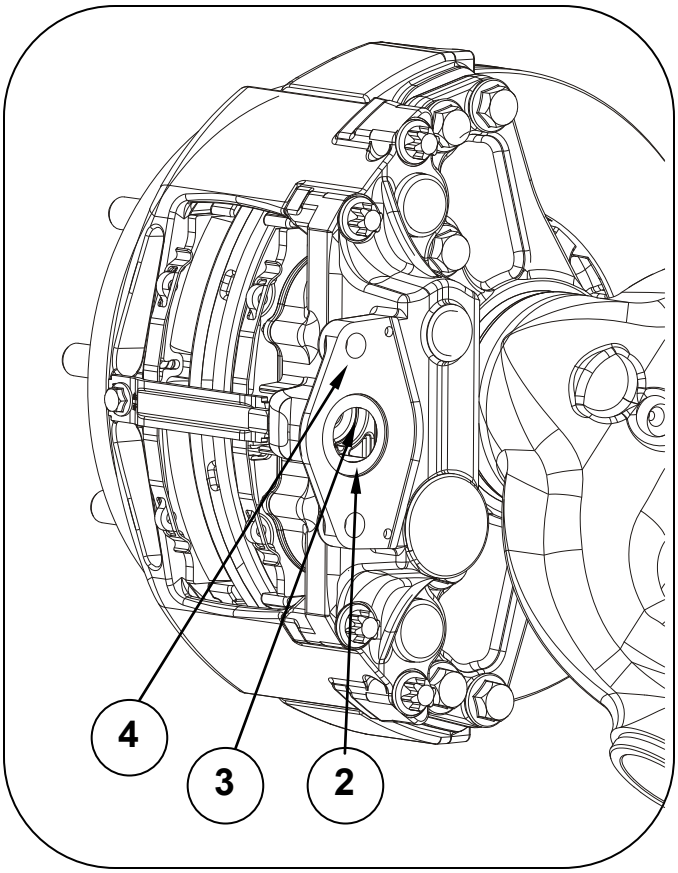
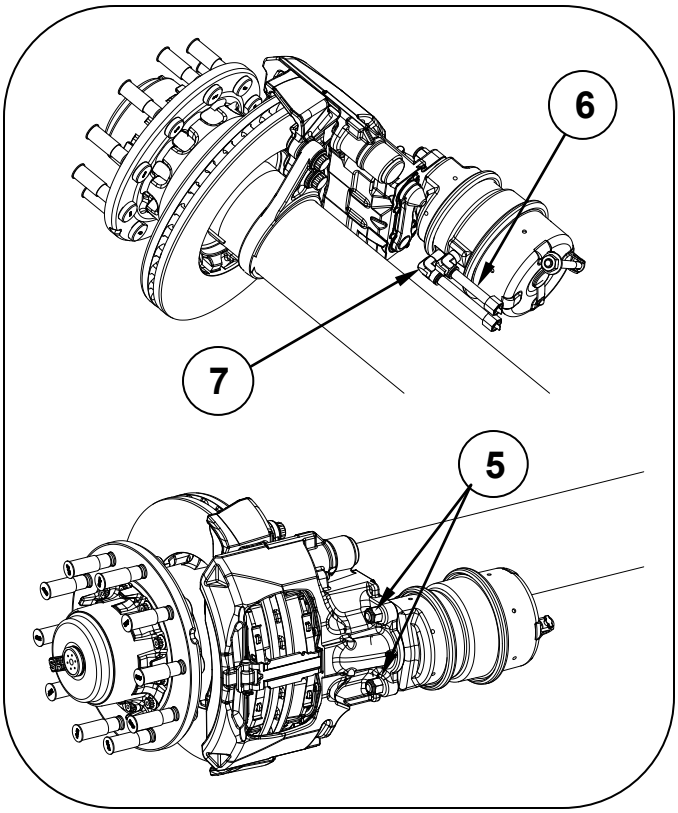


Figure 6



3. Manually Caging Brake Chambers

SAF brake chambers should preferably be caged using compressed air. If no compressed air is available, the parking brake can be caged using the release tool bolt supplied with the brake chamber.

3.A. Caging the Parking Brake using Release Tool Bolt and Compressed Air

1. Remove the dust plug **(8)** from the release bolt access hole in the middle of the brake chamber housing ***(Figure 7)***.
2. Remove the release bolt **(9)**, washer **(10)**, and nut **(11)** from the mounting bracket **(12)** on the back of the brake chamber ***(Figure 7)***.
3. Apply air to the trailer and release the parking brake. Apply and release the brakes three times.
4. Insert the release tool bolt **(9)** through the access hole provided until it engages with the pressure plate inside the brake chamber ***(Figure 8)***.
5. Ensure that the release tool bolt is correctly engaged with the pressure plate by turning the bolt clockwise and pulling the bolt outward at the same time. If the bolt is correctly engaged in the pressure plate it cannot be turned more than 1/4 turn and cannot be pulled out by more than 0.75" (19mm).
6. Install the washer **(10)** and nut **(11)** onto the release bolt and finger tighten ***(Figure 8)***.

IMPORTANT: Do not torque the nut to more than 35 ft. lbs [47 Nm]. Over-tightening the bolt can cause damage to the pressure plate, washer, and brake chamber housing.

⚠WARNING Over-tightening the release bolt could cause the main spring to suddenly release which, if not avoided could result in death or serious injury.

7. The parking brake is now caged and the air pressure can be removed.

Figure 7

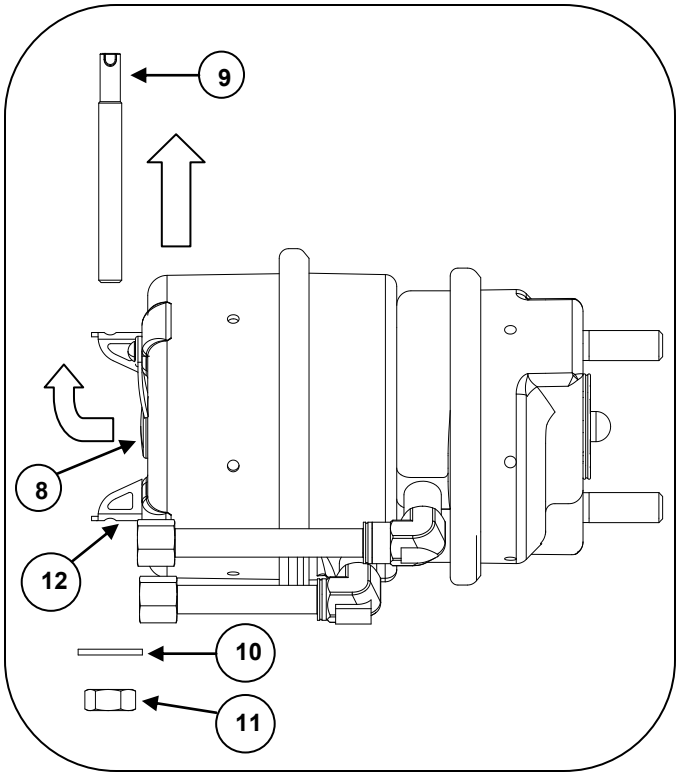
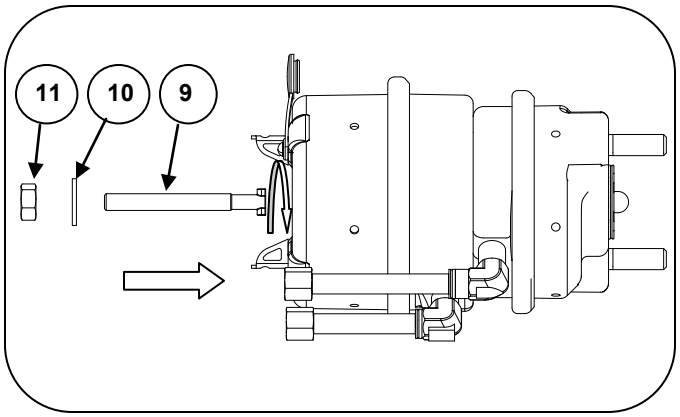


Figure 8



3.B. Caging the Parking Brake using Release Tool Bolt without Compressed Air

This method should only be used if not compressed air is available. The preferred method of caging is by using compressed air. Use this method only if the brake chambers are not pressurized.

1. Remove the dust plug **(8)** from the release bolt access hole in the middle of the brake chamber housing ***(Figure 9)***.
2. Remove the release bolt **(9)**, washer **(10)**, and nut **(11)** from the mounting bracket **(12)** on the back of the brake chamber ***(Figure 9)***.
3. Ensure that the pressure plate is between 2-1/2" - 3" [63-76mm] from the housing.
4. Insert the release tool bolt **(9)** through the access hole provided until it engages with the pressure plate inside the brake chamber ***(Figure 10)***.
5. Ensure that the release tool bolt is correctly engaged with the pressure plate by turning the bolt clockwise and pulling the bolt outward at the same time. If the bolt is correctly engaged in the pressure plate it cannot be turned more than 1/4 turn and cannot be pulled out by more than 0.75" (19mm).
6. Install the washer **(10)** and nut **(11)** onto the release bolt and tighten ***(Figure 10)***. While tighten the nut, the actuating plunger of the brake chamber must be pulled back into the housing. Stop tightening the nut when the plunger can no longer be pulled back into the housing. Do not exceed 35 ft. lbs [47 Nm].

IMPORTANT: Do not torque the nut to more than 35 ft. lbs [47 Nm]. Over-tightening the bolt can cause damage to the pressure plate, washer, and brake chamber housing.

⚠WARNING Over-tightening the release bolt could cause the main spring to suddenly release which, if not avoided could result in death or serious injury.

7. The parking brake is now caged and the air pressure can be removed.

Figure 9

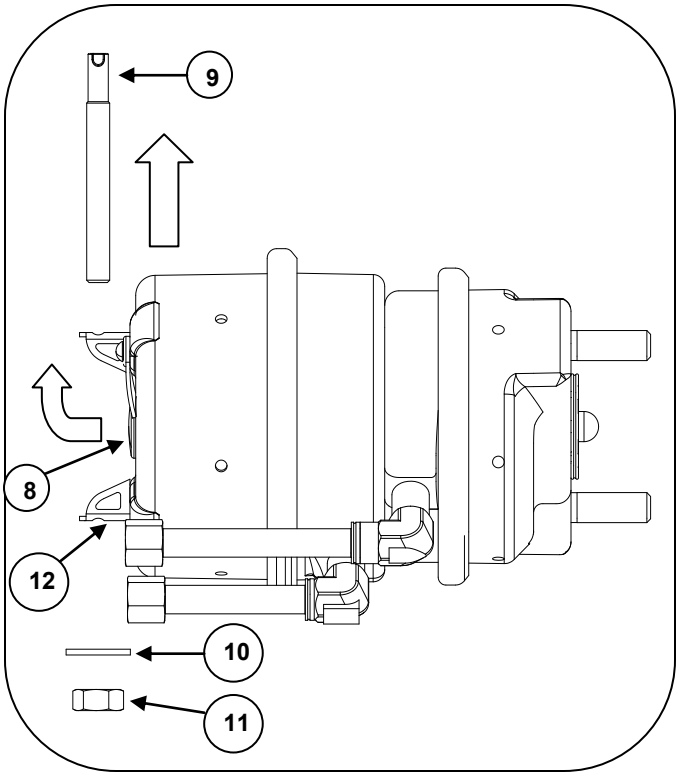
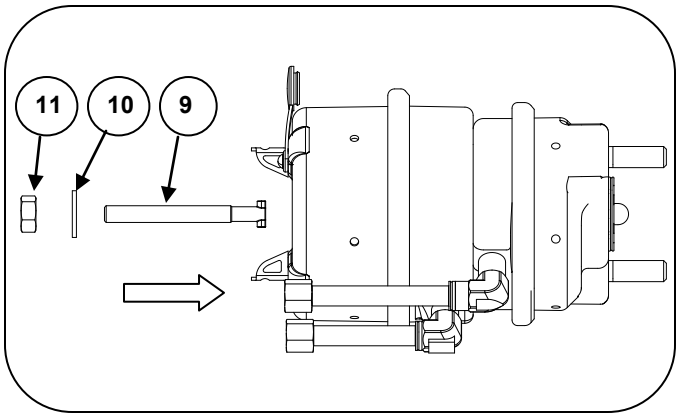


Figure 10



4. Uncaging Brake Chamber

1. Apply air to the trailer and set the parking brake.
2. Remove the nut (**11**) and washer (**10**) from the release bolt (**9**) and remove the release bolt from the brake chamber (***Figure 11***).
3. Insert the release tool bolt, washer, and nut into the mounting bracket on the back of the brake chamber (***Figure 12***). Torque the nut to 60 - 130 in. lbs (7-15 Nm).
4. Reinstall the dust plug (**8**) (***Figure 12***).
5. After uncaging the brake chamber, be sure to check the brake system for proper function.

Figure 11

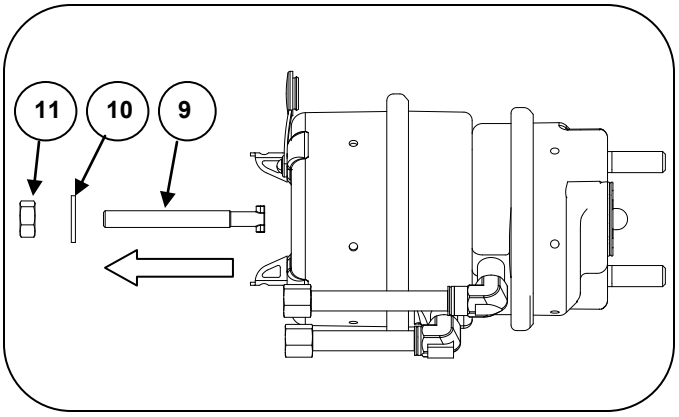
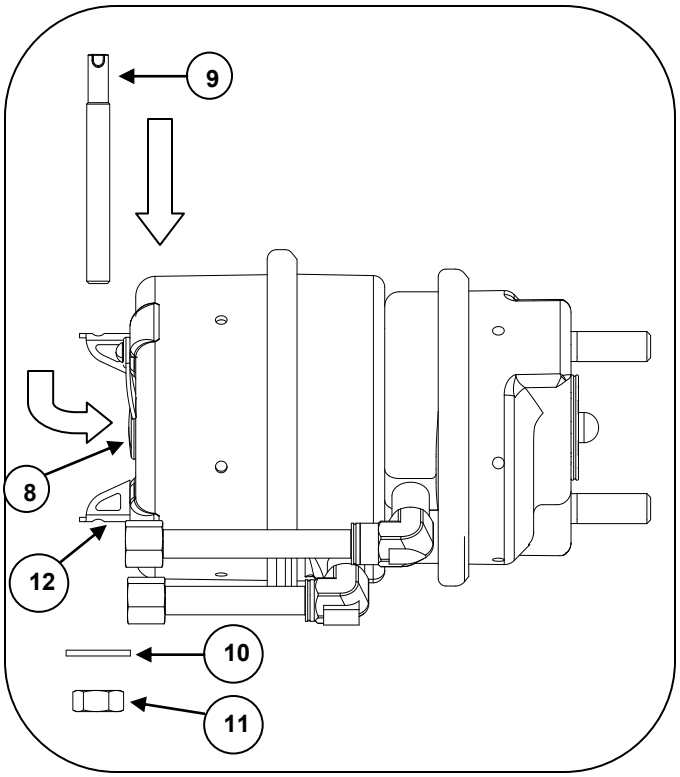


Figure 12



5. Routine Service Procedure

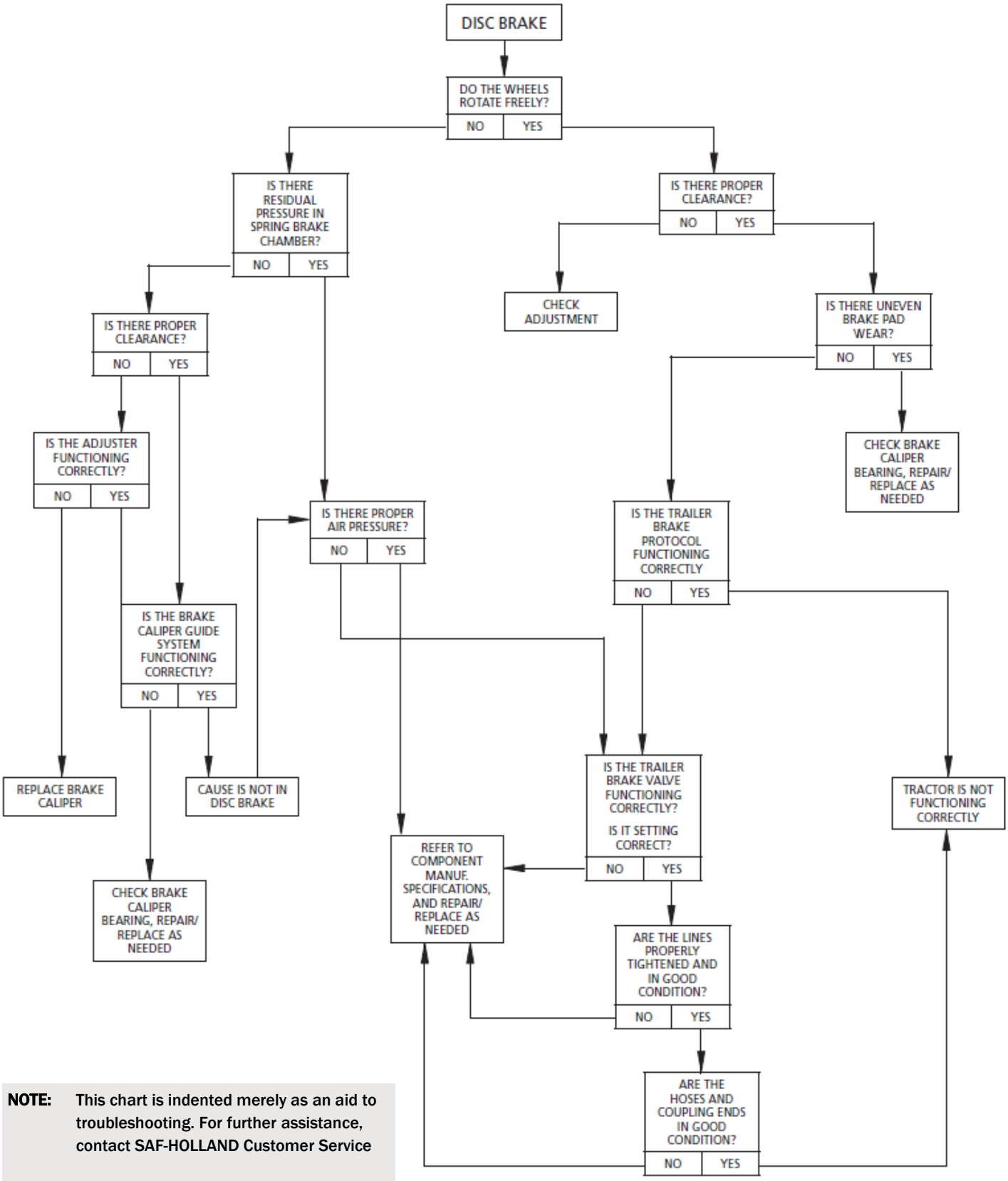
WHICHEVER OCCURS FIRST			PERIODIC CHECKS		
	MILEAGE INTERVALS	After First 3,000 Miles	Every 20,000 Miles	Every 50,000 Miles	Every 100,000 Miles
	TIME INTERVALS	After First Month	Every 3 Months	Every 6 Months	Every 12 Months
VISUAL & SAFETY INSPECTION					
Hub Unit Maintenance Free Check for grease leaks					●
Inspect the brake calliper guide system Check for free movement and sliding action					●
Check rubber dust covers for cracks and damage Check adjuster cap for correct seating					●
Inspect brake pad thickness regularly			●		
Inspect brake rotors for cracks					●
Perform general annual inspection (axle, brakes and suspension components, etc.)					●
Perform general annual safety check		●			●
Perform wheel rock and wheel noise tests					●
MECHANICAL CHECK					
Attention: Torque check wheel nuts after the first 30 miles (50 km) and 100 miles (150 km) (repeat also after every wheel removal).		●			

SPECIAL SERVICE CONDITIONS	
Vehicles with long standing periods	Service at specified time intervals. e.g. Trailer operating in continuous multi-shifts or in off-road construction sites.
Vehicles used under severe duty and extreme conditions	Service at suitably reduced intervals. e.g. Trailer operating in continuous multi-shifts or in off-road construction sites.

Warranty claims will only be accepted as long as the operation and maintenance instructions have been complied with and if SAF-HOLLAND approved spare parts have been fitted.

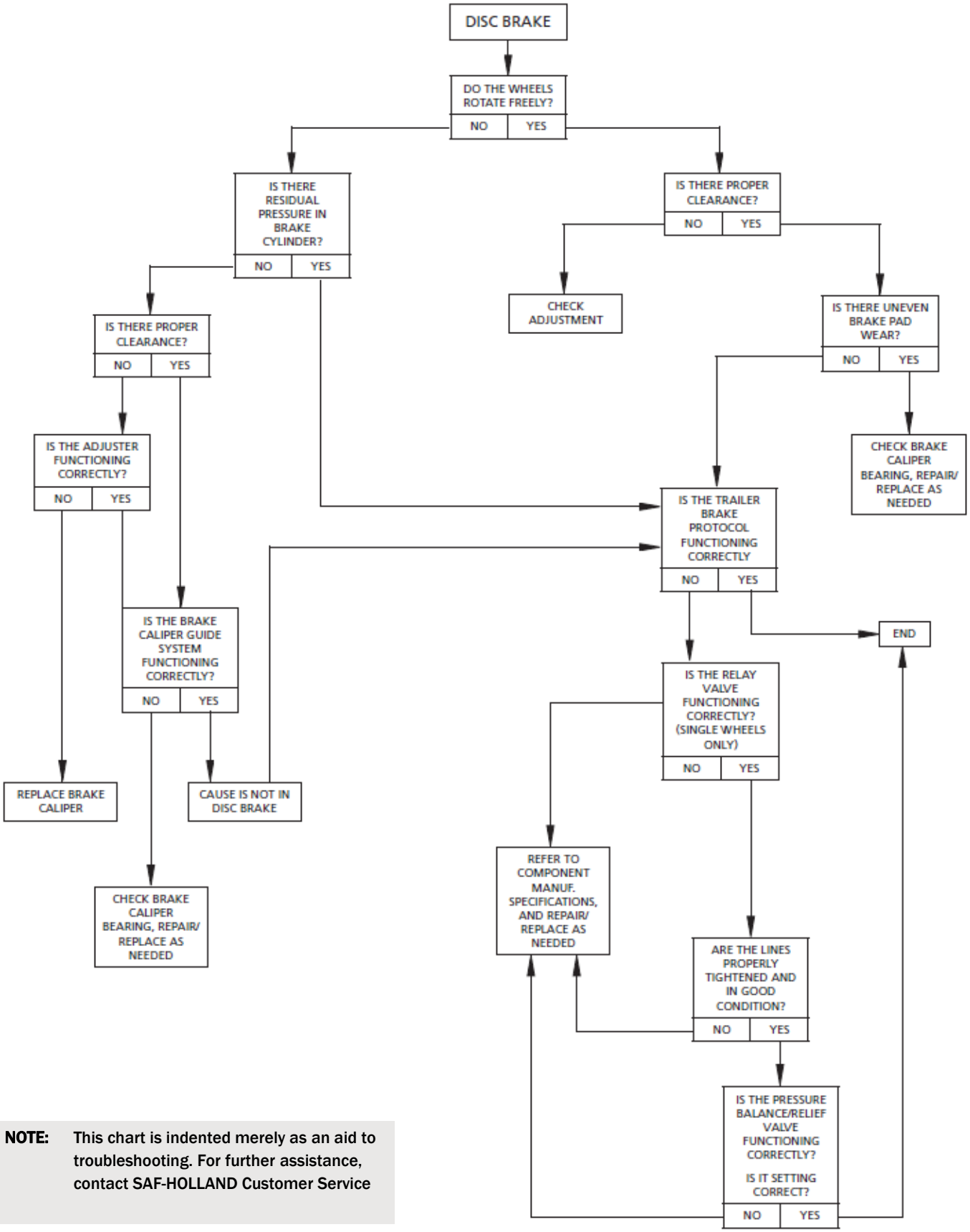
NOTE: If the seal mark on the hub nut is broken before the end of the stated warranty period this will invalidate all warranty coverage unless the repair works have been carried out in an SAF-HOLLAND authorized workshop.

6. Troubleshooting Chart for ALL WHEELS



NOTE: This chart is indented merely as an aid to troubleshooting. For further assistance, contact SAF-HOLLAND Customer Service

6. Troubleshooting Chart for INDIVIDUAL WHEELS



NOTE: This chart is indented merely as an aid to troubleshooting. For further assistance, contact SAF-HOLLAND Customer Service

ORIGINAL PARTS™

From fifth wheel rebuild kits to suspension bushing repair kits, SAF-HOLLAND Original Parts are the same quality components used in the original component assembly.

SAF-HOLLAND Original Parts are tested and designed to provide maximum performance and durability. Will-fits, look-alikes or, worse yet, counterfeit parts will only limit the performance potential and could possibly void SAF-HOLLAND's warranty. Always be sure to spec SAF-HOLLAND Original Parts when servicing your SAF-HOLLAND product.

SAF-HOLLAND USA • 888.396.6501 • Fax 800.356.3929
www.safholland.us

SAF-HOLLAND CANADA • 519.537.3494 • Fax 800.565.7753
WESTERN CANADA • 604.574.7491 • Fax 604.574.0244
www.safholland.ca

SAF-HOLLAND MEXICO • 52.1.55.545668641 • Fax 52.55.58162230
www.safholland.com.mx

info@safholland.com

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SAF-HOLLAND USA, INC.
1950 Industrial Blvd, Muskegon, MI 49443
www.safholland.com

Engineering Your Road to Success

SAF CBX and CBXA Fixed Frame Series Air Ride Suspension and Axle System

US and Canada Commercial Warranty

SAF-HOLLAND Group

SAF-HOLLAND's Commitment

We warrant each SAF® CBXAN23, CBXAS23, CBX23u, CBX23y, CBXAS25, CBX25u, CBX25y, CBXAS30, CBX23, CBX25, CBX25/30, CBXSSA, CBX25/30u and CBX25/30y Air Ride Suspension and Axle System manufactured after June 1, 2016, when properly installed on your vehicle, and maintained and operated in accordance with our requirements.

SAF-HOLLAND® will, at its option repair, replace or reimburse due to defects in material or workmanship. Parts reimbursement is limited to the parts acquisition cost, not to exceed the suggested list price. The cost of labor covered by this warranty includes any reasonable labor expense. Labor reimbursement is based on a published flat rate schedule in conjunction with local labor rates.

Your Responsibilities

You are responsible for proper installation, operation, and maintenance as specified in our applicable publications on SAF CBX Systems and for using the product in recommended applications within rated capacities. Please reference the SAF Trailer Air Suspension Selection Guide (XL-MP20033SG-en-US) for additional details.

Claims

You are required to obtain prior authorization from an authorized SAF-HOLLAND customer service representative before replacing or returning any part. You are required to retain the product or part claimed to be covered by this warranty and return it to SAF-HOLLAND upon request. You must submit a valid Service Report to have your warranty request considered. The Service Report form is available under the Service section of our website at www.safholland.us or by calling 1.888.396.6501.

Coverage Periods

Coverage extends from date in service of trailer or the date of installation, for the time period limits listed on page 2.

Exclusions and Limitations

This warranty does not cover coatings and any SAF axle or component that is altered without written permission, or fails, malfunctions or is damaged as a result of accident, abuse, or improper installation, maintenance or use. Warranty excludes normal wear.

THIS WARRANTY IS OUR SOLE WARRANTY IN REGARDS TO THE COVERED SAF AIR RIDE SUSPENSION AND AXLE SYSTEM. WE MAKE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL WE BE RESPONSIBLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING, BUT NOT LIMITED TO TOWING, DOWNTIME, LOST PRODUCTIVITY, CARGO DAMAGE, TAXES, OR ANY OTHER LOSSES OR COST RESULTING FROM A DEFECTIVE COVERED COMPONENT.

Application Limitations

Standard Duty:

- Less than 95,000 lb. [43,000 kg] Gross Combination Weight (GCW)
- Less than 10% Off-Highway
- Single Trailer: Tandem Axle Max
  - "A" Trains: Three Axles Only (Trailers + Dolly Converter)
  - "B" Trains: Maximum Three Axles Only (Lead + Pup Trailers)
- Does not include repetitive short haul applications (e.g. city pick-up delivery or intercity fuel haul)

Moderate Duty:

- Less than 115,000 lb. [52,000 kg] Gross Combination Weight (GCW)
- Less than 10% Off-Highway
- Single Trailer: Tandem and Tri-Axle Only
  - "A" Trains: Maximum Four Axles Only (Trailers + Dolly Converter)
  - "B" Trains: Maximum Four Axles Only (Lead + Pup Trailers)

continued on back

Severe Duty On-Highway:

- More than 115,000 lb. [52,000 kg] Gross Combination Weight (GCW)
- Less than 10% Off-Highway
- Single Trailer: Any Number of Axles
  "A" Trains: No Maximum Number of Axles
  "B" Trains: No Maximum Number of Axles

Severe Duty Off-Highway:

- More than 115,000 lb. [52,000 kg] Gross Combination Weight (GCW)
- More than 10% Off-Highway
- Single Trailer: Any Number of Axles
  "A" Trains: No Maximum Number of Axles
  "B" Trains: No Maximum Number of Axles

Notes:

On-Highway is defined as maintained concrete, asphalt roads, or smoothly graded surfaces.

Off-Highway is defined as terrain that is unpaved and rough, or ungraded.Typically any terrain not considered to be part of the public road system will be considered off-road.

Should either the GCW or the number of axles be exceeded, or one or more of the other criteria be surpassed, the next level of duty classification must be used. **Under no circumstances should the axle capacities be exceeded.**

Coverage Periods

SUSPENSION COMPONENTS		On-Highway	Off-Highway Severe Duty
Frame Brackets and Frame Bracket Assemblies	Parts/Labor	5 Years/3 Years	3 Years/1 Year
Air Controls	Parts/Labor	Valve Manufacturers Warranty Applies	
Air Springs	Parts/Labor	2 Years/1 Year	1 Year/1 Year
Shock Absorbers	Parts/Labor	2 Years/2 Years	1 Year/1 Year
Bushings	Parts/Labor	7 Years/5 Years	3 Years/1 Year
SAF-HOLLAND Supplied Trailing Arm, Axle Beam, Welded Bracketry & Axle Connection	Parts/Labor	7 Years/5 Years	3 Years/1 Year
Tire Pilot™ Inflation Systems SAF-HOLLAND supplied (See Tire Pilot warranty for details)	Parts/Labor	5 Years/5 Years	1 Year/1 Year
3rd Party Tire Inflation Systems (only covers SAF-HOLLAND installation)[4]	Parts/Labor	1 Year/1 Year	1 Year/1 Year
Other Components	Parts/Labor	2 Years/1 Year	2 Years/1 Year
Self-Steer Axle Components (Damper, Kingpins, Tie-Rod Ends, Etc.)	Parts/Labor	2 Years/1 Year	2 Years/1 Year

[1] Excludes heat cracks and corrosion perforation of the rotor - PSP7 Only.
[1] Heat cracks and corrosion perforation of the rotor covered for 3 years - P89+ Only.
[2] Excludes wear items such as slide pins, bushings, and rubber boots. These items are warranted to be free from material and workmanship defects.
[3] Excludes normal wear. Pads are warranted to be free from material and workmanship defects.
[4] See 3rd party suppliers warranty for details regarding complete system.
[5] SAF-HOLLAND does not provide warranty coverage for other tire inflation systems and/or components not installed by SAF-HOLLAND and any consequential damages incurred due to these components. Tire Pilot Plus is the only complete tire management system offered by SAF-HOLLAND and is compatible with all SAF-HOLLAND wheel end packages.

BRAKED AXLE		On-Highway	Off-Highway Severe Duty
Brake Linings and Hardware	Parts/Labor	1 Year/1 Year	1 Year/1 Year
Camshafts	Parts/Labor	3 Years/1 Year	2 Years/1 Year
Cam Enclosures	Parts/Labor	3 Years/1 Year	3 Years/1 Year

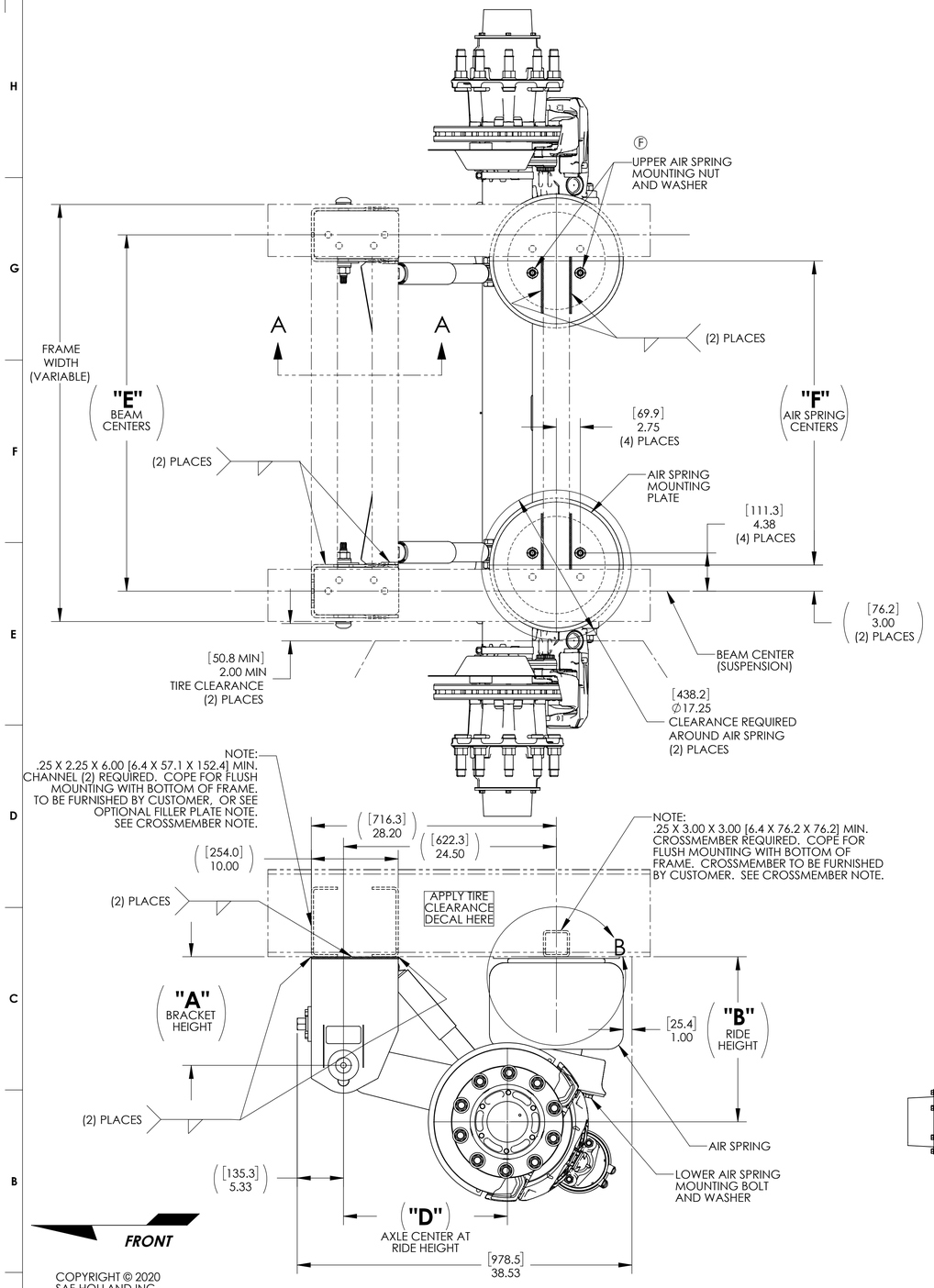
DRUM BRAKE WHEEL END PACKAGE		On-Highway	Off-Highway Severe Duty
SC5	Parts/Labor	5 Years/5 Years	1 Year/1 Year
SC7	Parts/Labor	7 Years/7 Years	1 Year/1 Year

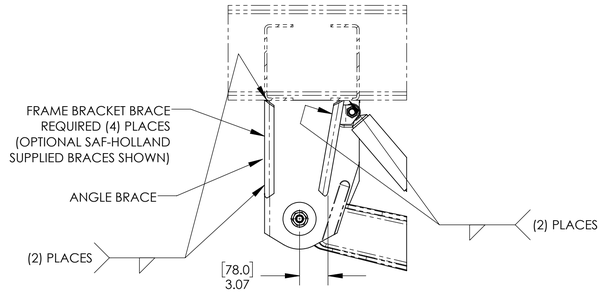
Included components: Brake Drums, Brake Actuators, Auto Slack Adjusters, Hub Assembly, Hub Caps and Gaskets, Oil Seals, Wheel Bearings, Axle Nuts and Others

DISC BRAKE WHEEL END PACKAGE		On-Highway	Off-Highway Severe Duty
P89	Parts/Labor	5 Years/5 Years	1 Year/1 Year
P89+	Parts/Labor	7 Years/7 Years	1 Year/1 Year
PSP7	Parts/Labor	7 Years/7 Years	1 Year/1 Year

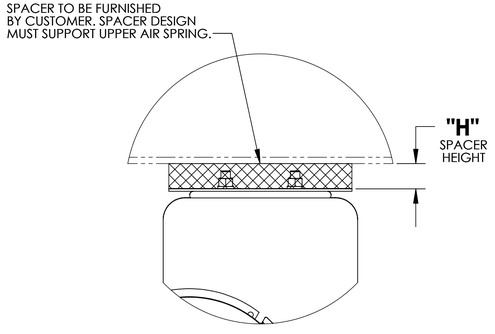
Included components: Brake Chamber, Hub, Hub Caps, Wheel Seals, Bearings, Axle Nuts, Others, Caliper[3], Brake Pads[4], Rotor[1]

CHANGE RECORD					
LTR.	DESCRIPTION OF CHANGE	CAD	ENG	E.C.N.	DATE
D	UPDATED OFFSET/DERATING NOTE	GD		303513	2015-10-02
E	E1 - ADDED DETAIL VIEW D; E2 - ADDED SWING ALIGN PIVOT CONNECTION NOTE; E3 - ADDED SHOCK, PIVOT CONNECTION & SWING ALIGN TORQUE SPECS	SH		305580	2016-10-12
F	ADDED CBX25/30-20 W/ 245 TO TABLE	RD		305964	2016-12-21
G	G1 - REMOVED PIVOT CONNECTION TORQUE FROM CHART G2 - ADDED NOTES TO DETAIL D G3 - ADDED SECTION A-A G4 - REVISED SWING ALIGN NOTE	RD		308581	2018-07-26
H	UPDATED TO TC BOLTS; REPLACED SECTION A-A, REMOVED SECTION C-C AND DETAIL D; REMOVED SWING ALIGN NOTES	AC	CS	310735	2020-04-07

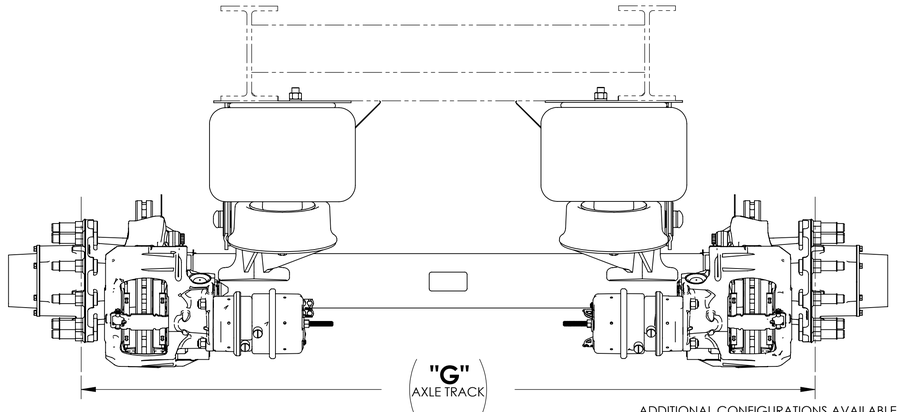




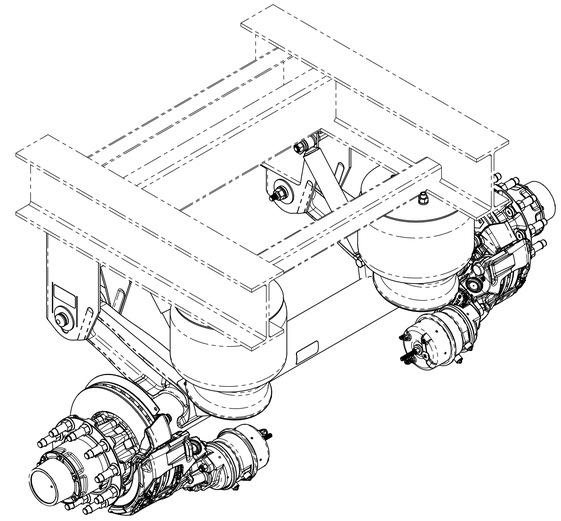
SECTION A-A
SCALE 1:8 Ⓗ



DETAIL B
SCALE 1 : 6



ADDITIONAL CONFIGURATIONS AVAILABLE UPON REQUEST



USE ONLY APPROVED WHEELS AS SHOWN ON IMPORTANT INFO #XL-SA10070WI-en-US

SEE IMPORTANT INFO #XL-AA20005WI-en-US FOR INFORMATION ON APPROVED OFFSETS AND DE-RATING FOR WBS TIRES

1. TIRE CLEARANCE NOTE:

   PROVIDE 1.00 [25.4] OF TIRE CLEARANCE ABOVE TOP OF TIRE WHEN SUSPENSION IS IN FULL UP TRAVEL POSITION.

2. CROSSMEMBER NOTE:

   A) ALTERNATIVE TO COPING CROSSMEMBERS CAN BE ACHIEVED BY INSTALLING A FILLER PLATE BETWEEN THE CROSSMEMBER & SUSPENSION COMPONENTS AT INBOARD EDGE OF FRAME.

   B) ALL CROSSMEMBERS TO BE DETERMINED & SUPPLIED BY CUSTOMER.

   C) ALL CUSTOMER SUPPLIED CROSSMEMBERS MUST PROVIDE BACK UP TO SUSPENSION COMPONENTS AS WELL AS SUPPORT TO FRAME. SIZES SHOWN ARE MINIMUM SIZES REQUIRED FOR SUSPENSION COMPONENTS.

3. WELD WHERE INDICATED .25 [6.4] MIN WELD SIZE, DO NOT WELD WITHIN .50 [12.7] FROM RAW EDGE OF FRAME.

4. ALL WELDING PER ENGINEERING STANDARDS XL-AR353-01 UNLESS OTHERWISE SPECIFIED

5. FOR AIR CONTROL KIT W/O INTEGRAL DUMP USE VALVE KIT 90560137 AND INSTALLATION DRAWING 42210004. FOR AIR CONTROL KIT W/ INTEGRAL DUMP USE VALVE KIT 90560138 AND INSTALLATION DRAWING 42210003.

6. ALL DIMENSIONS TO BE ±.06 [1.5] UNLESS OTHERWISE SPECIFIED.

.50-13	SWING ALIGN	50-60 FT-LB [68-81 Nm]
.75-10	SHOCK	140-175 FT-LB [190-237 Nm]
.75-16	UPPER AIR SPRING	40-45 FT-LB [54-61 Nm]
.50-13	LOWER AIR SPRING	30-40 FT-LB [41-54 Nm]
SIZE	LOCATION	LUBRICATED TORQUE

TORQUE SPECS

ITEMS ASSEMBLED BY SAF-HOLLAND ARE PRE-TORQUED

G1
E3

MODEL	DIM ("A") BRACKET HEIGHT		DIM ("B") RIDE HEIGHT		("D") AXLE CENTER @ RIDE HEIGHT		DIM ("H") SPACER HEIGHT		AXLE TRAVEL					
									UP		DOWN		TOTAL	
	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM
CBX25/30-14 W/ 245	7.25	184.2	14.00	355.6	18.78	477.0	-	-	3.3	84	3.9	99	7.2	183
CBX25/30-15 W/ 245	8.25	209.6	15.00	381.0	18.78	477.0	-	-	4.1	104	3.5	89	7.6	193
CBX25/30-16 W/ 245	10.00	254.0	16.00	406.4	19.04	483.6	-	-	4.0	102	4.2	107	8.2	208
CBX25/30-17 W/ 245	10.00	254.0	17.00	431.8	18.69	474.7	-	-	5.0	127	3.2	81	8.2	208
CBX25/30-18 W/ 245	11.50	292.1	18.00	457.2	18.28	464.3	1.00	25.4	5.0	127	3.7	94	8.7	221
CBX25/30-19 W/ 245	12.50	317.5	19.00	482.6	18.28	464.3	3.50	88.9	3.7	94	4.5	114	8.2	208
CBX25/30-20 W/ 245	12.50	317.5	20.00	508.0	18.51	470.2	4.00	101.6	4.3	109	3.5	89	7.8	198

STANDARD SUSPENSION/AXLE CONFIGURATIONS

("E") BEAM CENTERS		("F") AIR SPRING CENTERS		("G") AXLE TRACK	
INCH	MM	INCH	MM	INCH	MM
35.00	889.0	29.00	736.6	71.50	1816.1
				75.50	1917.7
36.00	914.4	30.00	762.0	71.50	1816.1
				75.50	1917.7
41.00	1041.4	35.00	889.0	77.50	1968.5
				81.50	2070.1
42.00	1066.8	36.00	914.4	77.50	1968.5
				81.50	2070.1
47.00	1193.8	41.00	1041.3	83.50	2120.9

UNSPECIFIED TOLERANCES FOR DIMENSIONS
ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]
SEE NOTE 6
ANGLES ±1°
THIRD ANGLE PROJECTION

EST. WEIGHT: -
SCALE: 1:8

SAF-HOLLAND

TITLE: SUSPENSION INSTALLATION-CBX25/30 w245
MATL: -
MATL.#: -
PART NUMBER: 10100002
REV. H

Important Info – January 2019

SAF-HOLLAND Group

SAF® Trailer Suspension Axle Systems Equipped with Disc Brakes

Approved Wheel Part Numbers for use with SAF CBX and ULX Trailer Suspension Axle Systems Equipped with SAF Disc Brakes

Please Note:

When specifying wheels to be used with SAF CBX and ULX trailer suspension axle systems equipped with SAF Disc Brakes, please pay special attention to the approved list of wheel profiles listed on the provided table. Specification or installation of non-approved wheel profiles may lead to wheel and caliper interference.

Important:

- Dual steel wheels are not approved for SAF Disc Brake suspension systems produced prior to June 2012 with Version 1 head units. See XL-SA10071WI-en-US for identification of Version 1 head units.
- 2" offsets are NOT allowed in combination with the C88 bearing package.

Approved Wheel Profile Numbers for use with Knorr SK7 & SAF SBS 2220 K0 Calipers configured with C88 & P89 Bearing Packages

Wheel Manufacturer	Wheel Profile No.	C88	P89	Approved Valve Stem	Wheel Material	Wheel Size	Wheel Offset (+) Outset (-) Inset	Wheel Configuration
Accuride	41644	■	■	TR545D	Aluminum	22.5" x 8.25"	Dual	
	50487	■	■	TR572-E22	Steel			
	50408	■	■					
	28409	■	■	TR573	Steel	24.5" x 8.25"		
	28641	■	■					
	28827	■	■					
	41362	■	■	TR545D	Aluminum			
	50172	■	■	TR543E	Steel	22.5" x 14"	0.00	Wide Base Single
	29627	N/A	■	TR573			+2.00	
	41016	■	■	TR543E	Aluminum		+0.50	
	41140	■	■					
	41660	N/A	■				+2.00	
	42142	N/A	■					
Arconic	88367x	■	■	TR554D	Aluminum	22.5" x 8.25"	Dual	
	88567x	■	■					
	98367x	■	■	TR555D		24.5" x 8.25"		
	82262x	■	■	TR553E		22.5" x 12.25"	+.056	Wide Base Single
	84062x	N/A	■			22.5" x 14"	+2.00	
	84060x	■	■				0.00	
	84060x	N/A	■	TR555E			+1.00	
Maxion	90262	■	■	TR572-E22	Steel	22.5" x 8.25"	Dual	
	90541	■	■					
	90542	■	■	TR573		24.5" x 8.25"		
	90263	■	■					
	90261	■	■					
	10031	■	■	TR575		22.5" x 14"	0.00	Wide Base Single
	10084	N/A	■	TR500			+2.00	
KIC	WH22501	■	■	TR572-E27	Steel	22.5" x 8.25"	Dual	
TCC	2269E	■	■	TR572-F19	Steel	22.5" x 8.25"	Dual	
	2271E	■	■					

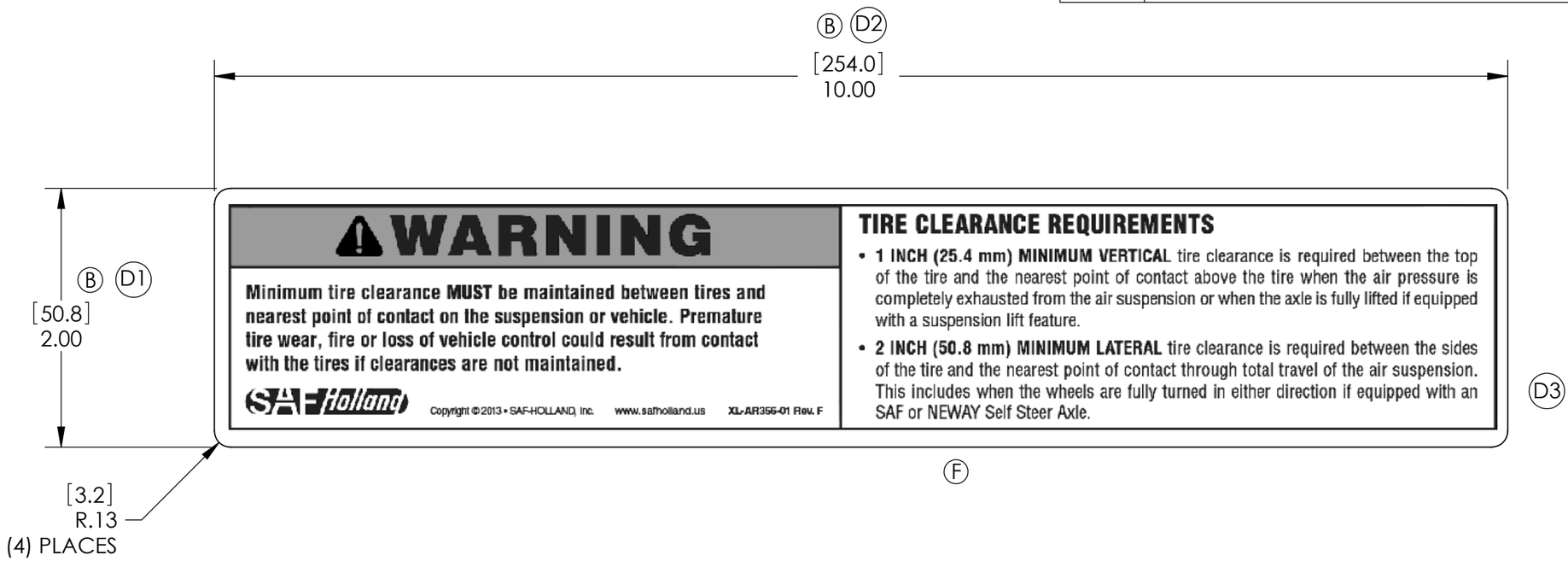
Note: For specification of wheels not listed in the table, please contact SAF-HOLLAND trailer suspension application engineering.

SAF-HOLLAND, INC.
1950 Industrial Blvd, Muskegon, MI 49442
www.safholland.com

SAF Holland

CHANGE RECORD

LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
-	CREATED	MB	4479	
A	SKIPPED PER NEW REVISION POLICY	CR	26094	
B	UPDATED DECAL PER HOLLAND ART WORK; DIM 6.00 WAS 5.00; DIM 4.00 WAS 3.00; ADDED NOTES; ADDED XL-AR356-01; REDRAWN IN SOLIDWORKS	CR	26094	21JAN04
C	UPDATED DWG & LABEL WITH UPDATED SAF-HOLLAND LOGO	EH	38512	25AUG09
D	D1-2.00 WAS 4.00; D2-10.00 WAS 6.00; D3-REVISED DECAL IMAGE & REMOVED LETTERING NOTES; D4-DESCRIPTION 'DECAL, TIRE CLEARANCE' WAS 'LITERATURE LABEL'	CN	61500	30JUN11
E	REMOVED NOTE 2: PREMASK MATERIAL	SEB	62340	26OCT11
F	ADDED "NEWAY" TO LATERAL CLEARANCE REQUIREMENTS	MRJ	66235	31JULY13

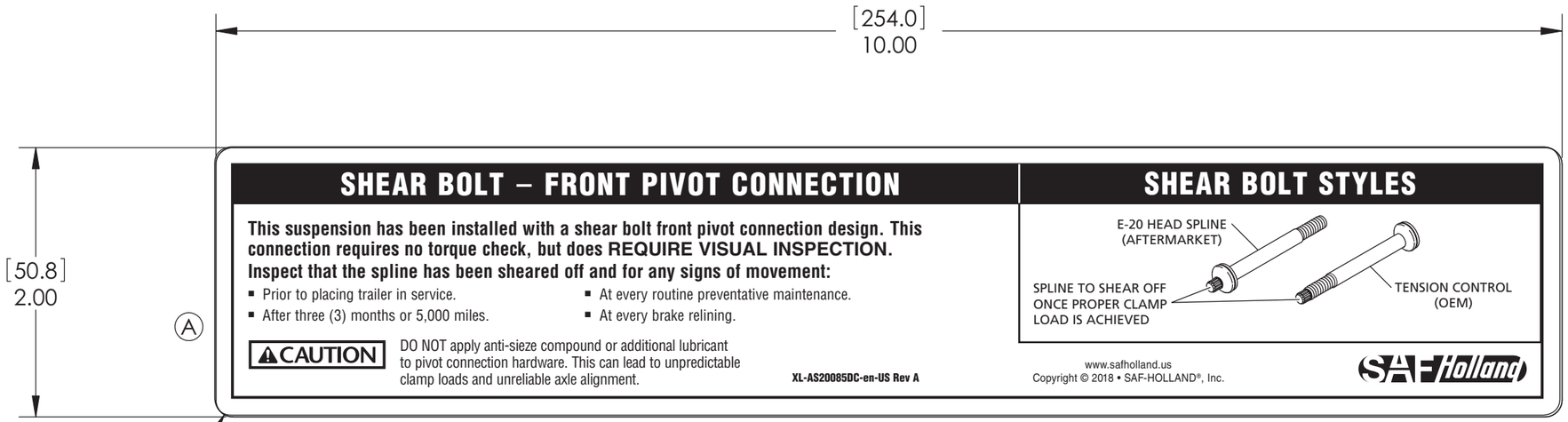


E B NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ] X[X] =±.125[3.18] .X[X] =±.060[1.52] .XX[X.X] =±.030[0.76] .XXX[X.XX] =±.010[0.25] ANGLES ±1° THIRD ANGLE PROJECTION	WEIGHT: 0.02# SCALE: 1:1	SAF-HOLLAND
	TITLE: DECAL,TIRE CLEARANCE D4	
	MATL:	MATL.#: -
	PART NUMBER: XL-AR356-01	REV. F

CHANGE RECORD				
LTR.	**DESCRIPTION OF CHANGE**	**BY**	**E.C.N.**	**DATE**
-	CREATED	AC	307837	2018-03-02
A	UPDATED DECAL TO CORRECT TYPO	RC	308085	2018-04-06



NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS

ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]

X[X] =±.125[3.18]

.X[X] =±.060[1.52]

.XX[X.X] =±.030[0.76]

.XXX[X.XX] =±.010[0.25]

ANGLES ±1°

THIRD ANGLE PROJECTION

EST. WEIGHT: 0.20#

SCALE: 1:1

SAF-Holland

TITLE: TORQUE SPECIFICATION DECAL

MATL: SEE NOTES

MATL.#:

PART NUMBER: XL-AS20085DC-en-US

REV. A

CHANGE RECORD				
LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
A	CREATED	CJS	30870	21MAR06
B	B1-REPLACED DECAL; B2- 2.00 WAS 4.00, 10.00 WAS 6.00; B3-WT. 0.17 WAS 0.20	RC	61501	11JUL11

B1

SWING ALIGN® NON-WELDED AXLE ALIGNMENT PROCEDURES

ALIGNMENT BOLT IS ON THE FRONT OF THE ROADSIDE FRAME BRACKET:

STEP 1. To properly align the suspension, the trailer should be pulled in a straight line for a sufficient distance to insure there are no binds in the suspension.

STEP 2. Check to verify trailer is empty and emergency brakes are **NOT** engaged.

STEP 3. Rotate bolt **CLOCKWISE** to move axle forward (A arrows); **COUNTERCLOCKWISE** to move axle rearward (B arrows).

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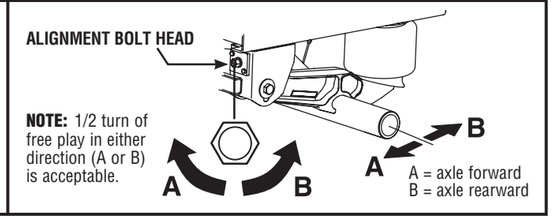
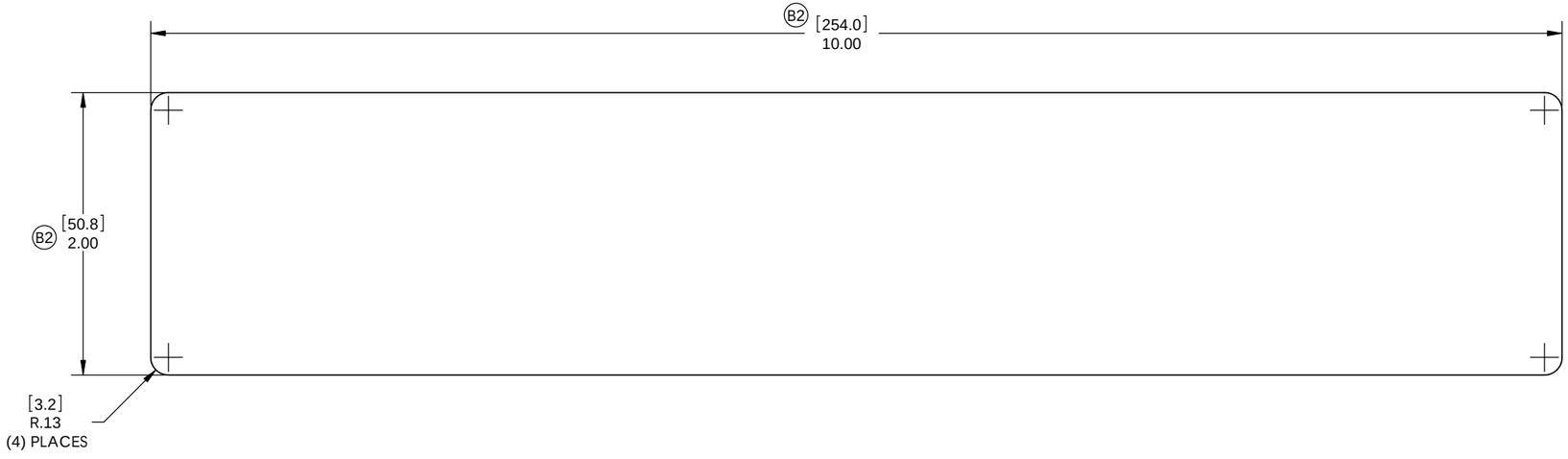
XL-AR435 Rev. B





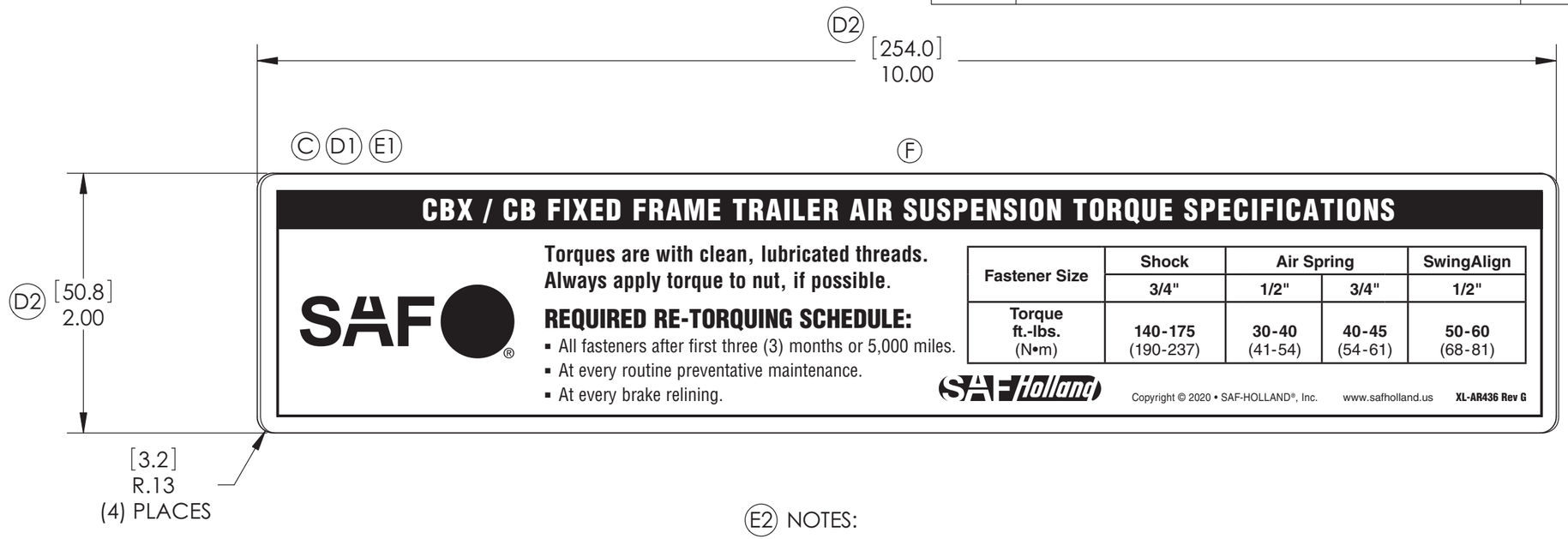
NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. DECAL TO HAVE PREMASK MATERIAL.
3. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
4. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
5. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS
ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]
X[X] = ±.125[3.18]
.X[X] = ±.060[1.52]
.XX[X.X] = ±.030[0.76]
.XXX[X.XX] = ±.010[0.25]
ANGLES ±1°
THIRD ANGLE PROJECTION

WEIGHT: 0.17# B3
SCALE: 3:2
TITLE: SWING ALIGN DECAL
MATL: SEE NOTES
MATL.#: -
PART NUMBER: XL-AR435
REV.: B

CHANGE RECORD					
LTR.	DESCRIPTION OF CHANGE	CAD	ENG	E.C.N.	DATE
A	CREATED	CJS		30870	21MAR06
F	PIVOT CONNECTION TORQUE 550-600 WAS 450-500.	TM		66811	23JAN14
G	G1- REMOVED 1-1/8" PIVOT BOLT TORQUE COLUMN; G2- ADDED SPEC CHART	SEB	CS	311228	2020-10-19



E2 NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

G2

NS-65-91	MATERIAL SPEC
SPECIFICATION	**DESCRIPTION**

UNSPECIFIED TOLERANCES FOR DIMENSIONS

ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]

X[X] =±.125[3.18]

.X[X] =±.060[1.52]

.XX[X.X] =±.030[0.76]

.XXX[X.XX] =±.010[0.25]

ANGLES ±1°

THIRD ANGLE PROJECTION

EST. WEIGHT: 0.20# D3

SCALE: 1:1

SAF Holland

TITLE: TORQUE SPECIFICATION DECAL

MATL: SEE NOTES

MATL.#:

PART NUMBER: XL-AR436

REV. G

CHANGE RECORD				
LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
-	CREATED	AC	307048	2017-08-07

DISC WHEEL INSTALLATION PROCEDURES

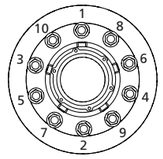
SAF-HOLLAND Group

MAINTENANCE PRECAUTIONS

- Use only SAF® approved replacement parts.
- After the first 50-100 miles, retorque all nuts to 450-500 ft.-lbs.
- DO NOT get lubricant on the face of the hub, or wheel.
- See service manual for more details.

HUB PILOT WHEEL MOUNTING SYSTEM (22mm Wheel Studs)

- Clean all mating surfaces.
- Position a pilot boss at the top (12 o'clock) position.
- Place the wheel(s) into position.
- Tighten top wheel nut first to 50 ft.-lbs. of torque to draw the wheel(s) fully against the hub
- Install the remaining wheel nuts using the sequence shown to 50 ft.-lbs. of torque.
- Repeating the sequence shown, retighten all wheel nuts to 450-500 ft.-lbs. of torque.



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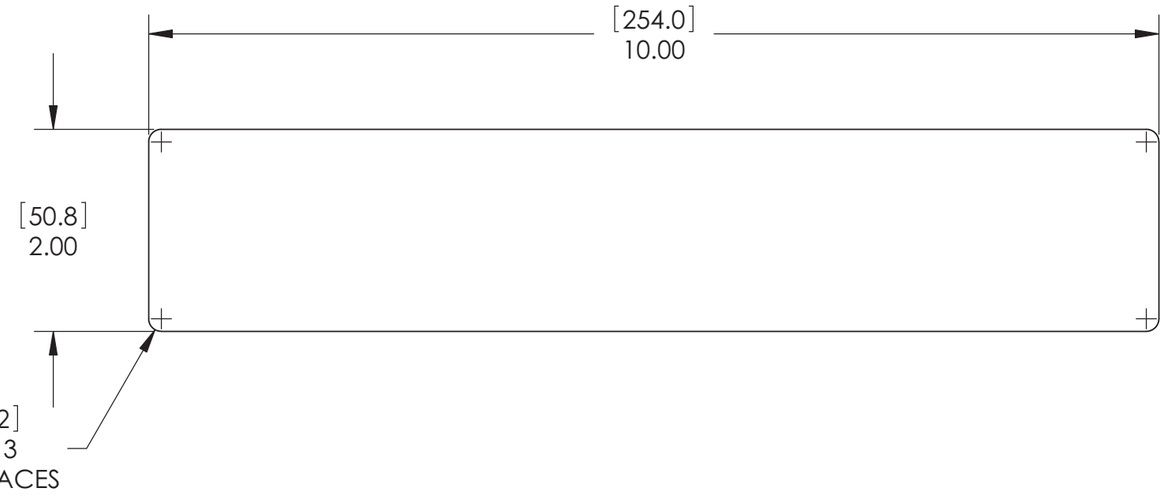
XL-SA20040DC-en-US



NOTES:

1. DECAL MATERIAL PER SPEC. ESM-027
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.
5. PREP MOUNTING SURFACE AREA WITH ISOPROPANOL ALCOHOL OR EQUIVALENT AND APPLY DECAL USING A WYPALL X60 TERI REINFORCED WIPER OR EQUIVALENT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ] X[X] =±.125[3.18] .X[X] =±.060[1.52] .XX[X.X] =±.030[0.76] .XXX[X.XX] =±.010[0.25] ANGLES ±1° THIRD ANGLE PROJECTION	WEIGHT: -	SAFHolland
	SCALE: 2:1	
	TITLE: DECAL, DISC WHEEL INSTALLATION	
	MATL: SEE DETAILS	MATL.#: -
	PART NUMBER: XL-SA20040DC-en-US	REV. -