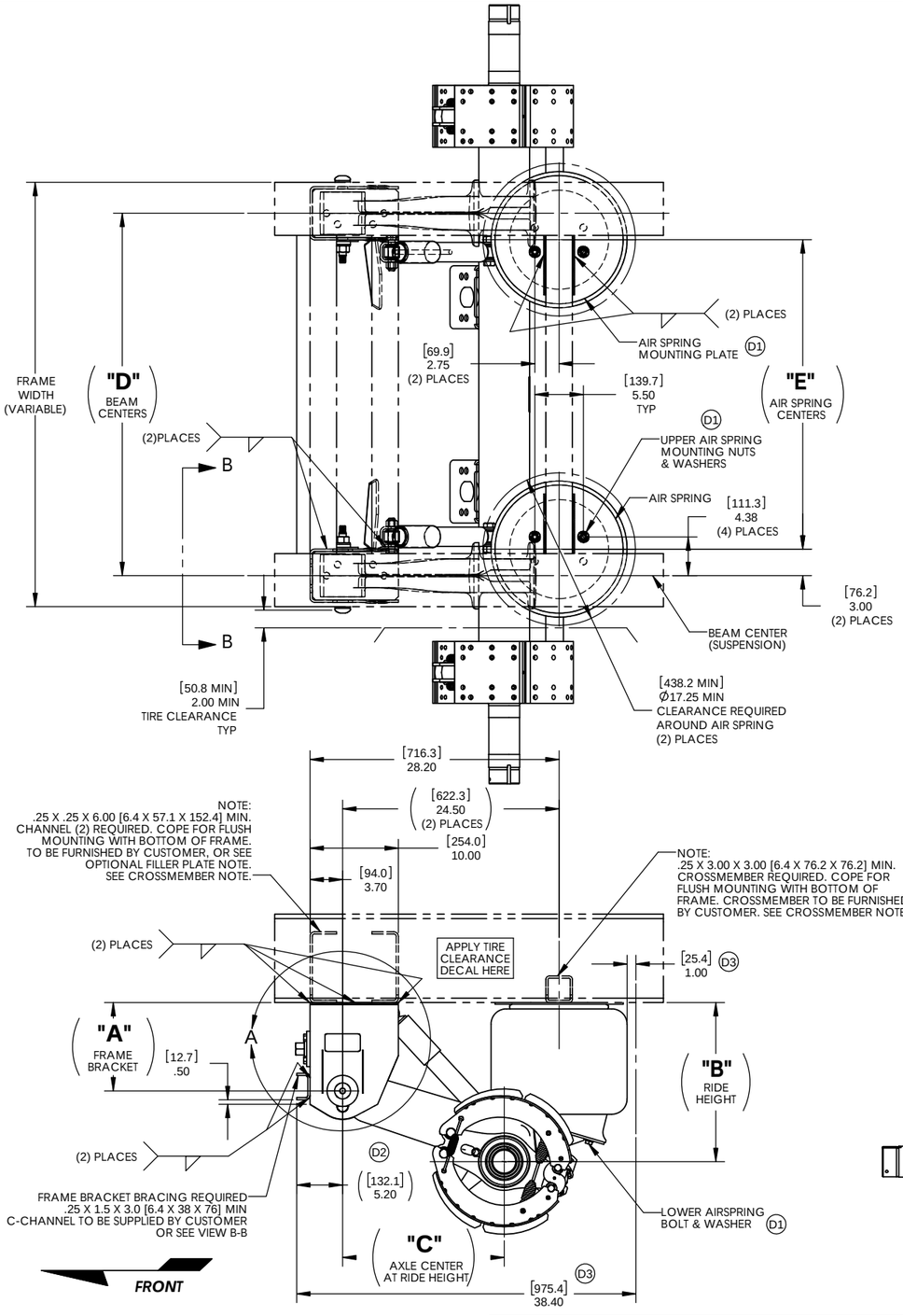
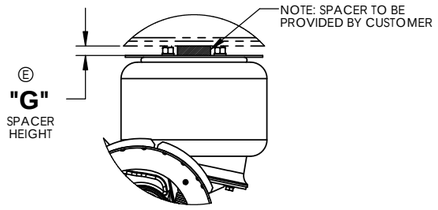
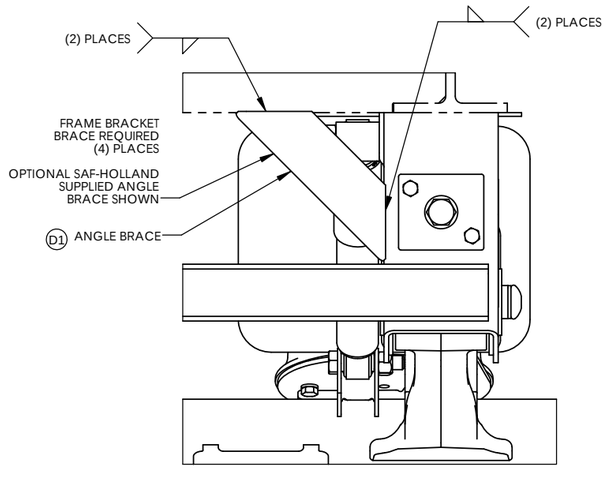
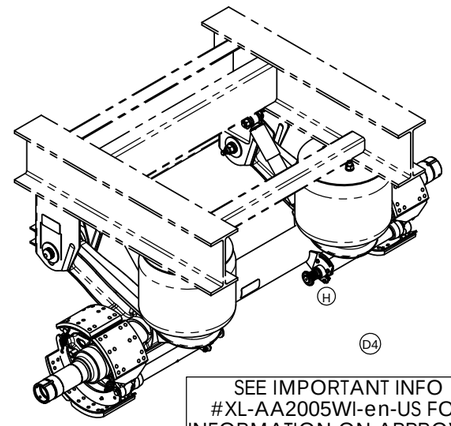
CHANGE RECORD					
LTR.	DESCRIPTION OF CHANGE	CAD	ENG	E.C.N.	DATE
A	CREATED	SEB		62438	09NOV11
B	ADDED BALLOON 20/9	RC		62692	06JAN12
C	C1-REMOVED FUSION FROM THE TITLE; C2-ADDED CBX25/30-18 W/245 & CORRESPONDING SPACER DETAIL	TWW		65969	09JUL13
D	D1- ITEM DESCRIPTIONS WERE BALLOONS; REMOVED ITEM NUMBERS FROM TORQUE SPECS; D2- ADDED DIM (5.20); D3- ADDED DIM 1.00 & 38.40; REMOVED AXLE SPACING DIM; D4-ADDED IMPORTANT INFO NOTE; D5-REFORMATTED NOTES NUMBERING & ADDED SWING ALIGN PIVOT NOTE	LL		302839	2015-05-06
F	ADDED SWING ALIGN, SHOCK AND PIVOT CONNECTION TORQUE SPECS	SH		304791	2016-05-09
H	CORRECTED CAM LENGTH	SEB		306203	2017-02-16
J	REMOVED ITEM DESCRIPTIONS THAT ARE NOT SHIPPED LOOSE & DETAIL A; UPDATED TO CURRENT STANDARDS; REMOVED SWING ALIGN NOTE; ADDED SPEC CHART	SEB	DG	309684	2019-06-03



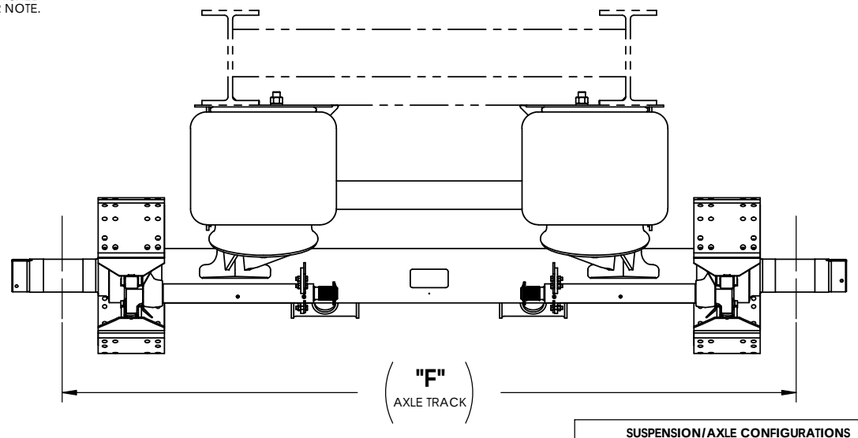






SEE IMPORTANT INFO #XL-AA2005WI-en-US FOR INFORMATION ON APPROVED OFFSETS AND DE-RATING FOR WBS TIRES

SECTION B-B
SCALE 1 : 4



TIRE CLEARANCE NOTE:

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

CROSSMEMBER NOTE:

1) ALTERNATIVE TO COPING CROSSMEMBERS CAN BE ACHIEVED BY INSTALLING A FILLER PLATE BETWEEN THE CROSSMEMBER & SUSPENSION COMPONENTS AT INBOARD EDGE OF FRAME.
2) ALL CROSSMEMBERS TO BE DETERMINED & SUPPLIED BY CUSTOMER.
3) 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.

NOTES:

1) WELD WHERE INDICATED .25 [6.4] MIN WELD SIZE, DO NOT WELD WITHIN .50 [12.7] FROM RAW EDGE OF FRAME.
D5 2) ALL WELDING PER ENGINEERING STANDARDS XL-AR353-01 UNLESS OTHERWISE SPECIFIED
3) 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.
4) ALL DIMENSIONS TO BE ±.06 [1.5] UNLESS OTHERWISE SPECIFIED.

MODEL	DIM ("A")		DIM "B" RIDE HEIGHT		DIM ("C") AXLE CENTER AT RIDE HEIGHT		DIM "G" 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	19.03	483.4	-	-	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
CBX25/30-17 W/ 245(SPECIAL)	10.00	254.0	17.00	431.8	18.69	474.7	2.00	50.8	3.5	89	4.7	119	8.2	208
CBX25/30-18 W/ 245	11.50	292.1	18.00	457.2	18.87	479.3	1.00	25.4	5.0	127	3.7	94	8.7	221
CBX25/30-19 W/ 245	12.50	3175	19.00	482.6	18.87	479.3	3.50	88.9	3.7	94	4.5	114	8.2	208

SUSPENSION/AXLE CONFIGURATIONS						
DIM ("D") BEAM CENTERS		DIM ("E") AIR SPRING CENTERS		DIM ("F") 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

.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		D1

XL-AR353-01	WELD SPEC
SPECIFICATION	DESCRIPTION

UNSPECIFIED TOLERANCES FOR DIMENSIONS
ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]
SEE NOTE 4
ANGLES ±1°
THIRD ANGLE PROJECTION

EST. WEIGHT:
SCALE: 1:8
TITLE: SUSPENSION INSTALLATION-CBX25/30 w245 C1
MATL:
MATL.#:
PART NUMBER: 10000775
REV. J

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]

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

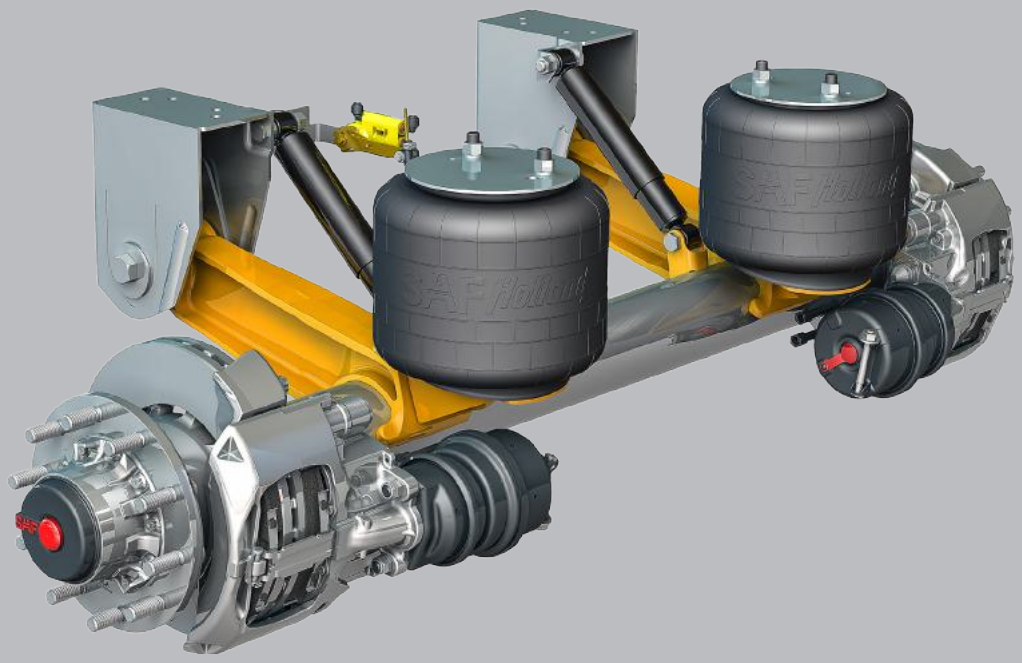
SAF-HOLLAND Group

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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 www.safholland.us XL-AR435

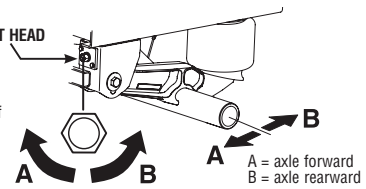

Figure 3

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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 www.safholland.us XL-AR436

Figure 4

SHEAR BOLT – FRONT PIVOT CONNECTION

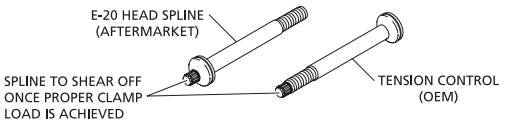
This suspension has been installed with a shear bolt front pivot connection design. This connection requires no torque check, but does REQUIRE VISUAL INSPECTION. Inspect that the spline has been sheared off and for any signs of movement:

- 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

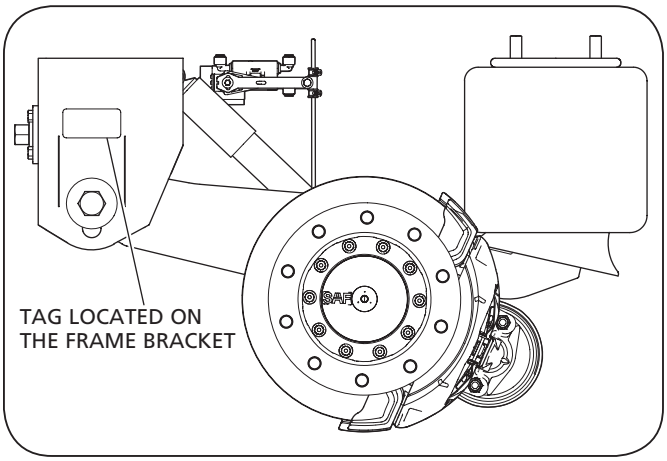


Figure 5

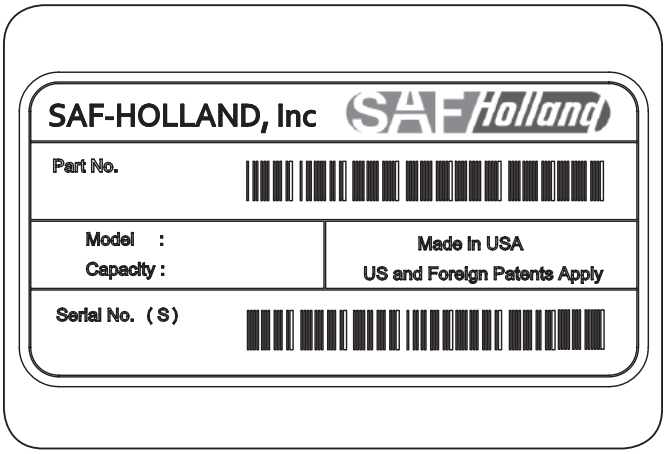
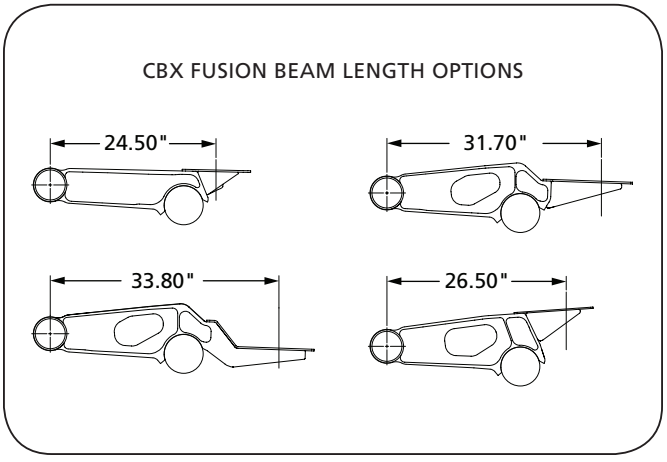


Figure 6



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

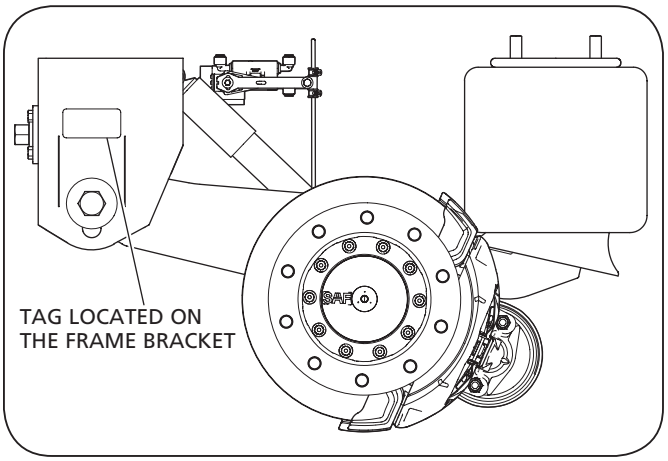


Figure 8

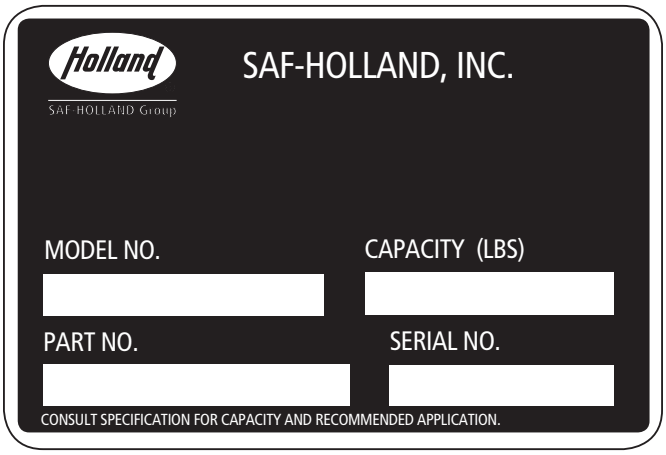
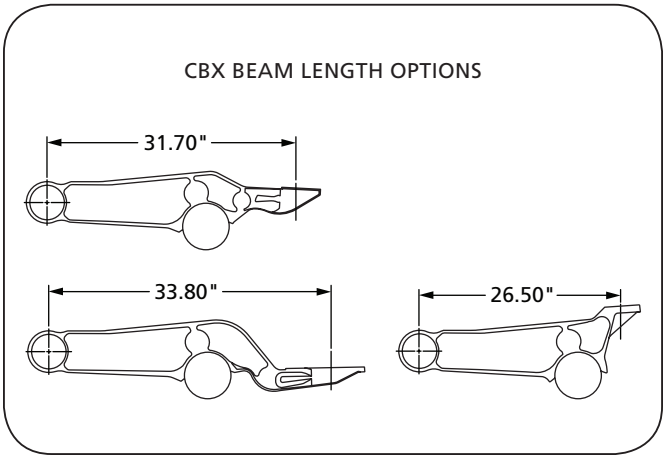


Figure 9



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

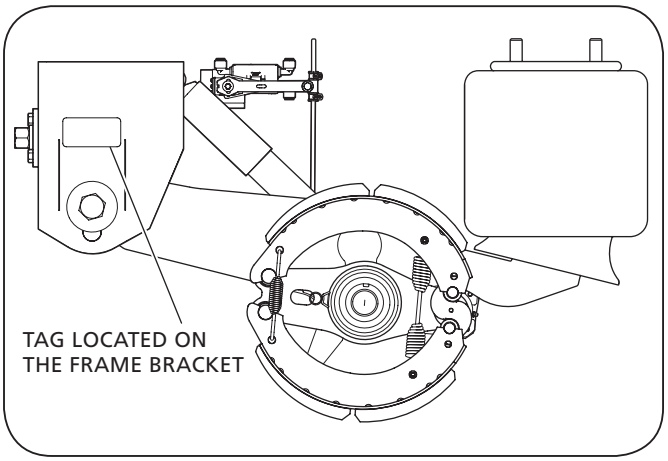
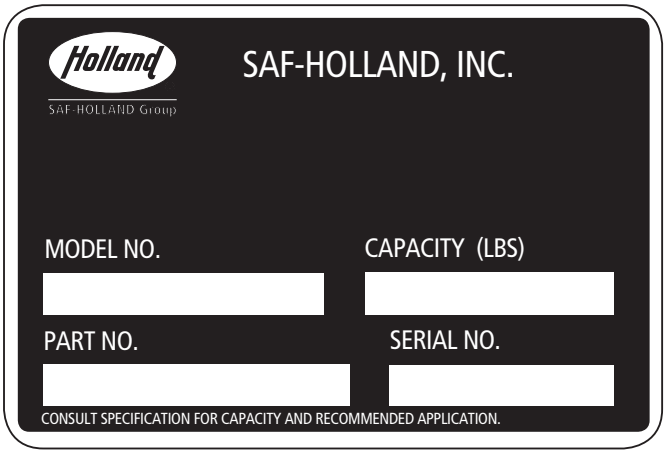


Figure 11



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.

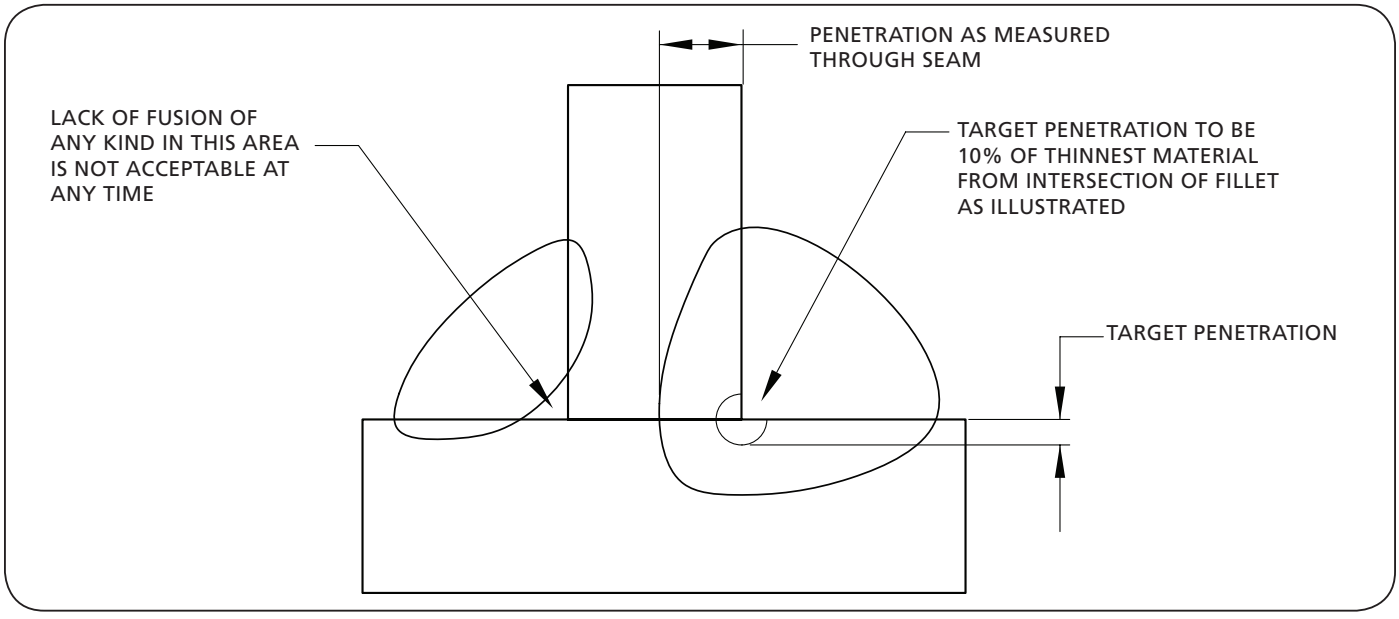
9.4 Procedures

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.

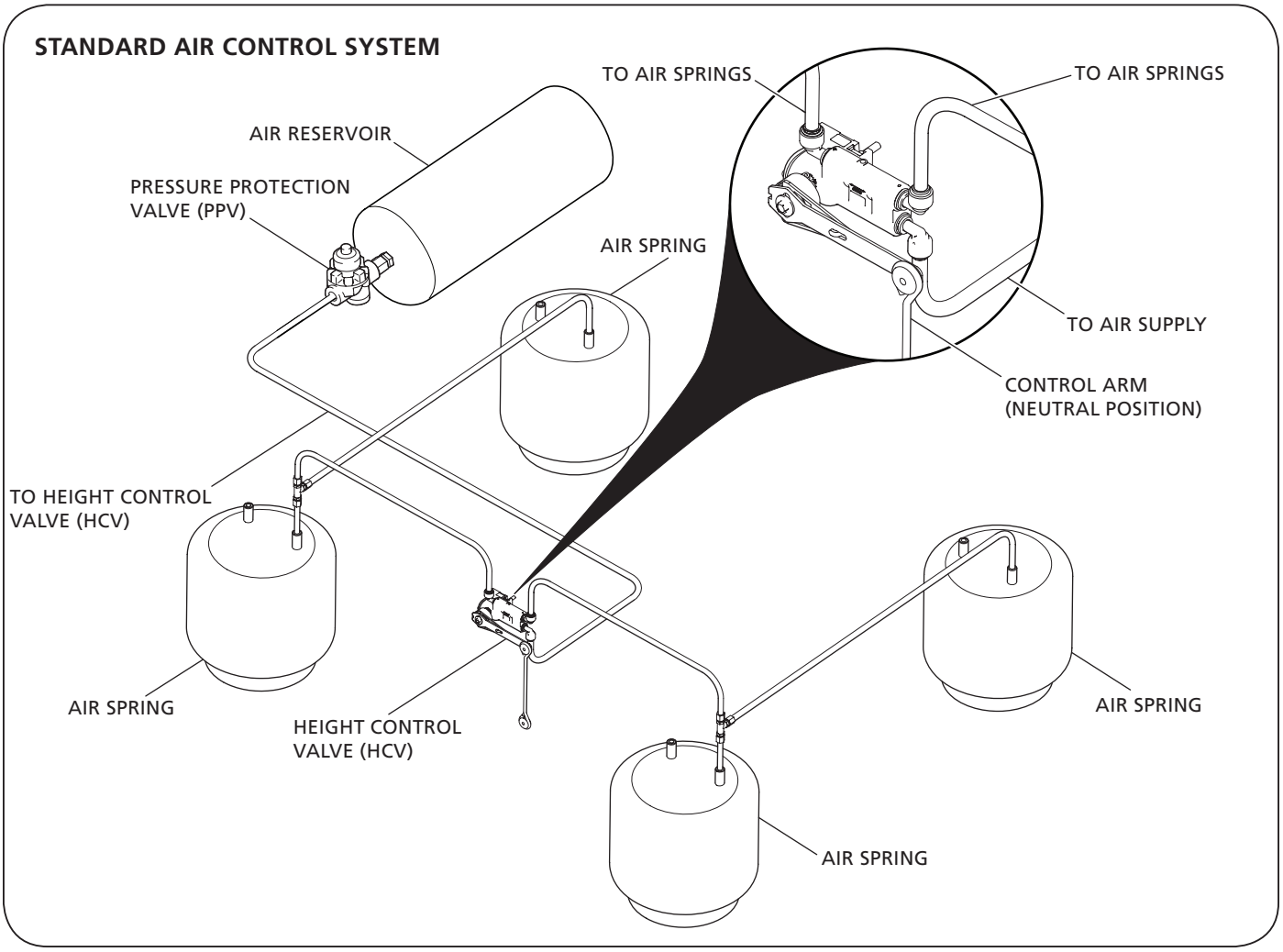
IMPORTANT: A pressure protection valve (PPV) MUST be attached to the air reservoir in order to maintain proper air pressure ***(Figure 13)***.

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

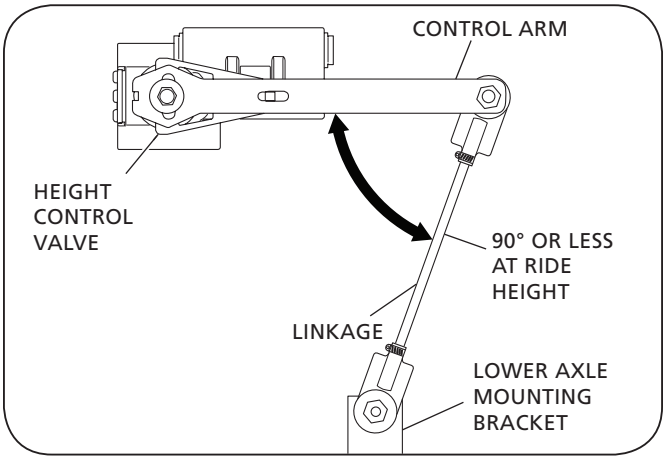
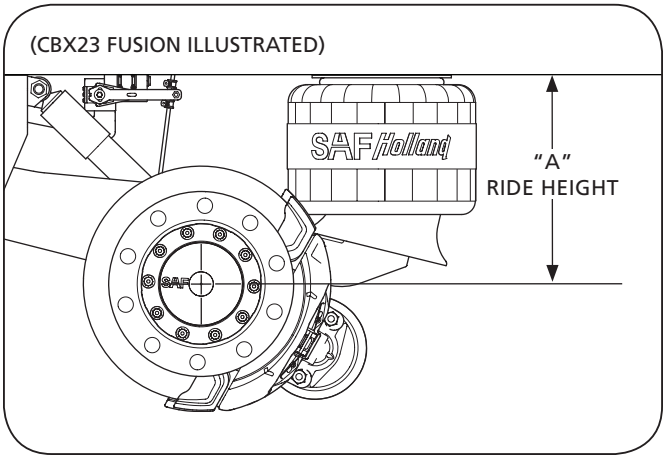


Table 1

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

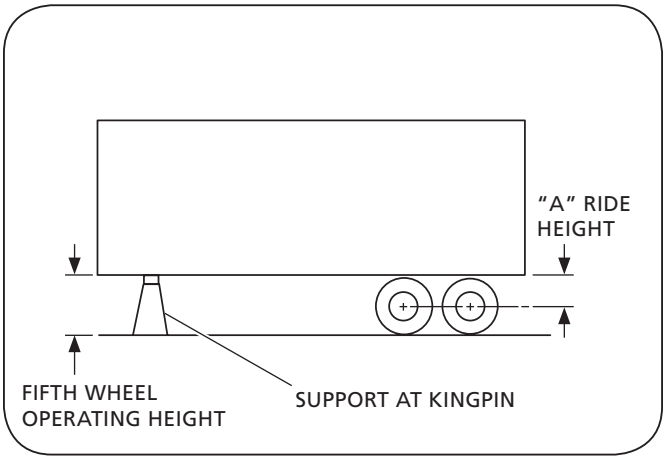


Figure 17

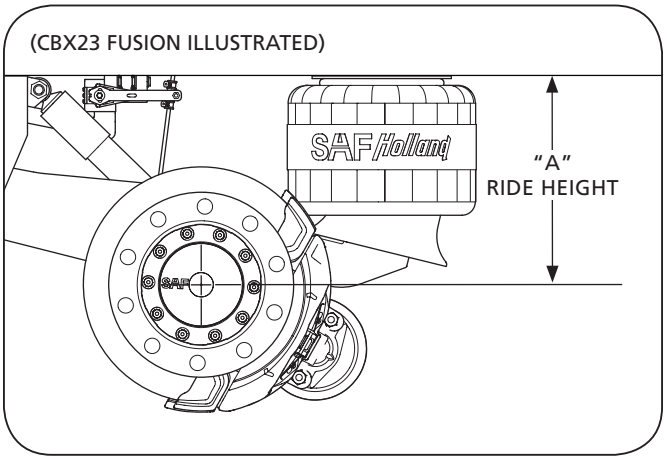
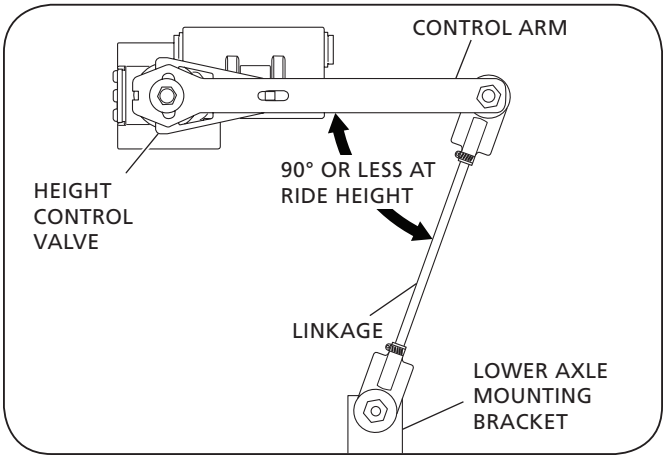


Figure 18



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.

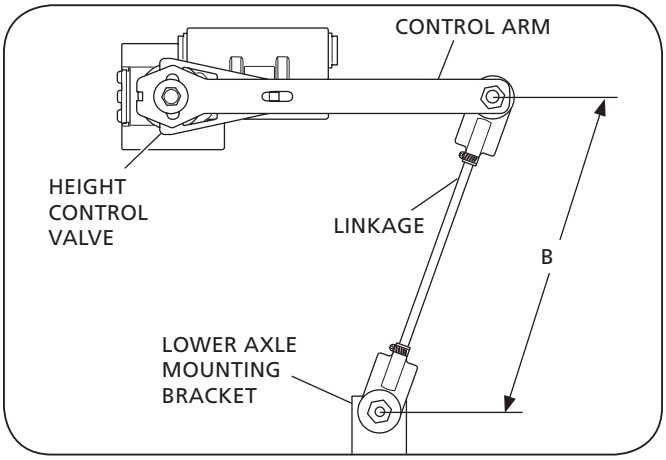
9. Raise the trailer approximately 2" (50 mm) above the ride height and remove the jack stands.
10. Slowly lower the trailer so that the trailer suspension is fully collapsed.
11. Pull the pin and apply air to the trailer allowing the suspension to return to ride height.
12. With the suspension at rest, 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

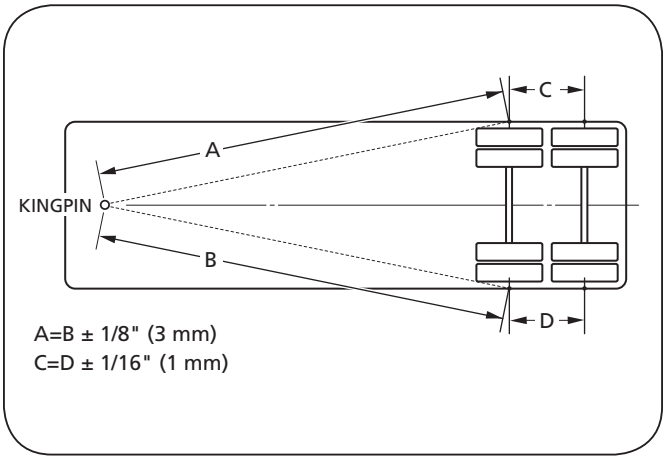


Figure 21

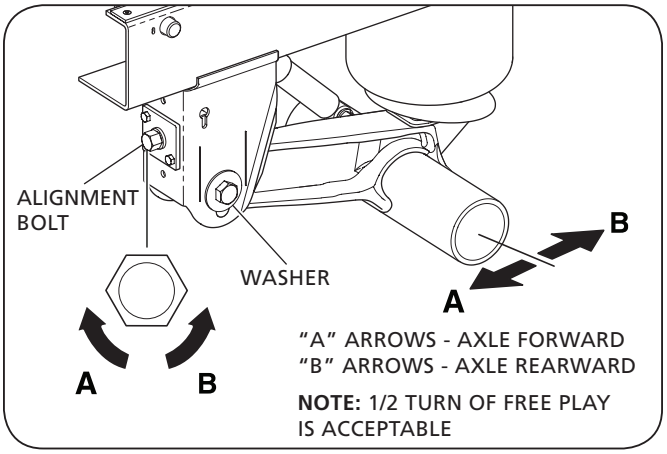
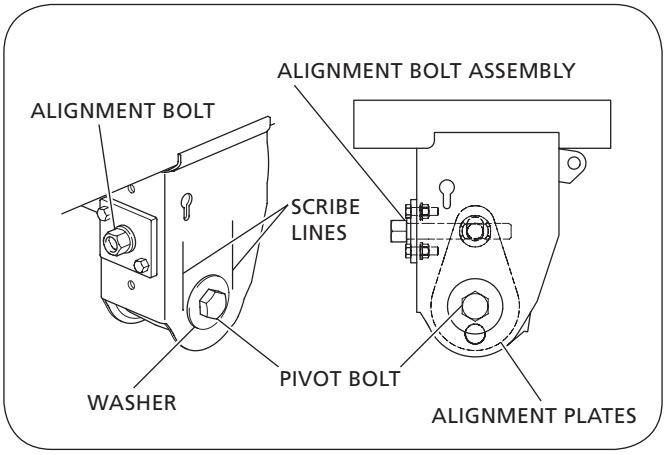


Figure 22



15. Pre-Operation

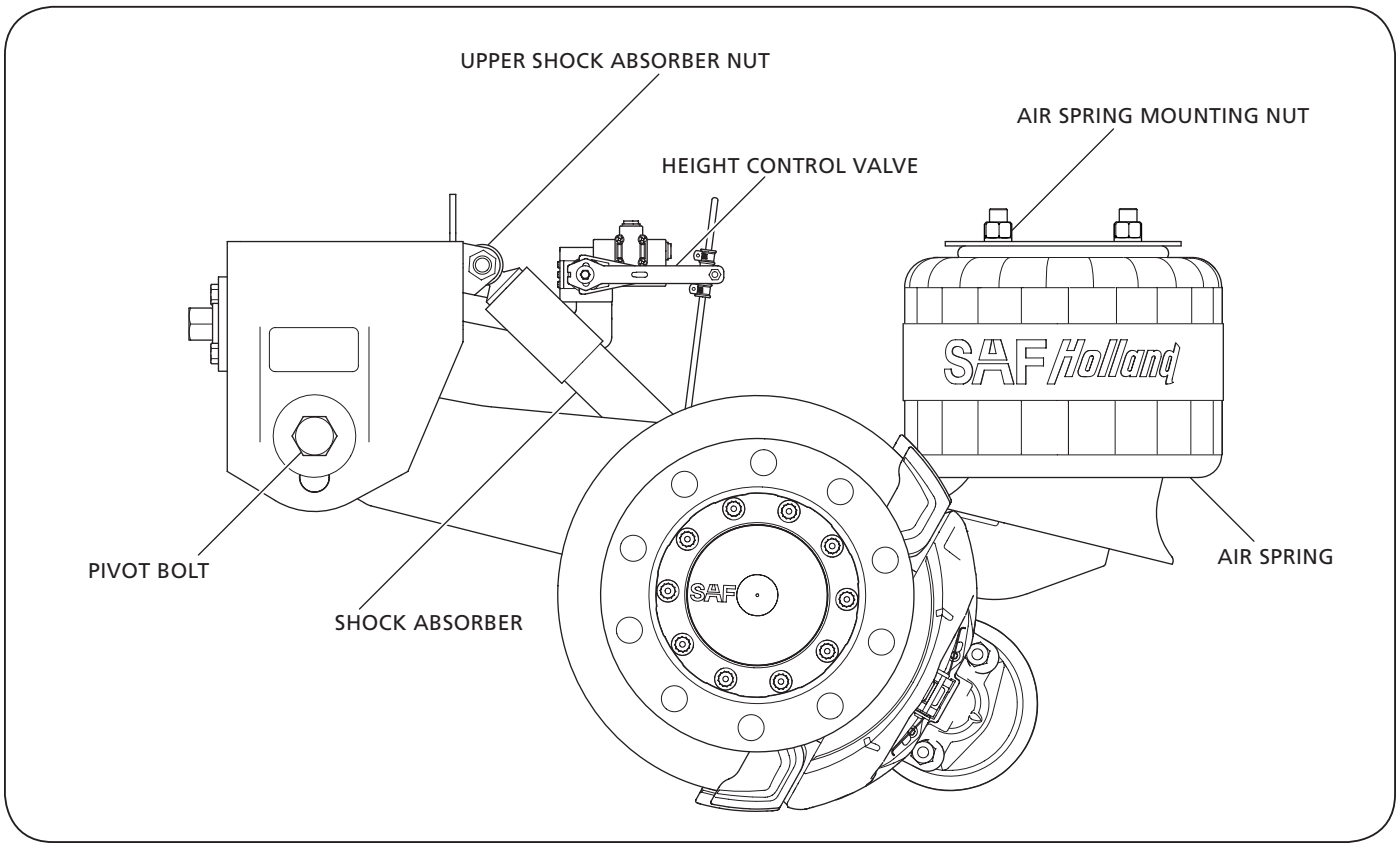
NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act. Equivalent laws may exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location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

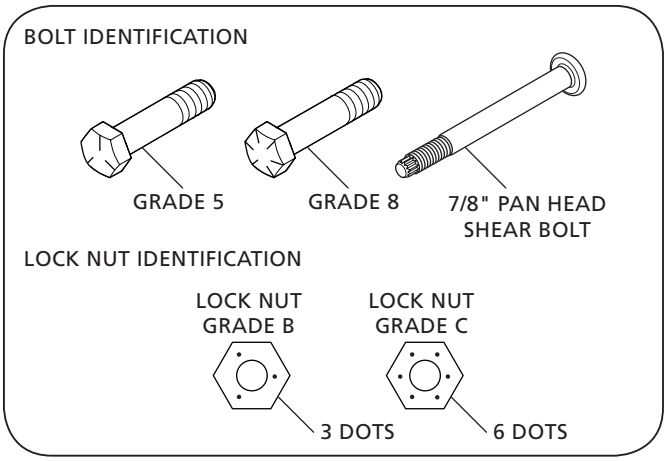
General Information

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



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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info@safholland.com

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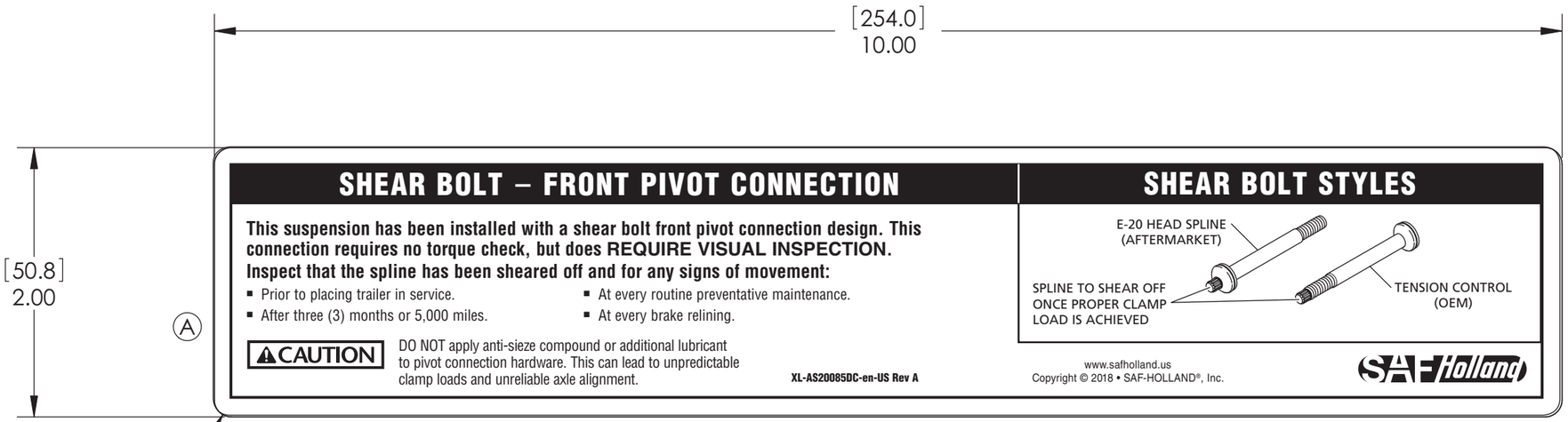
1950 Industrial Blvd., Muskegon, MI 49442
www.safholland.com

SAF-HOLLAND Engineering Your Road to Success

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.#:

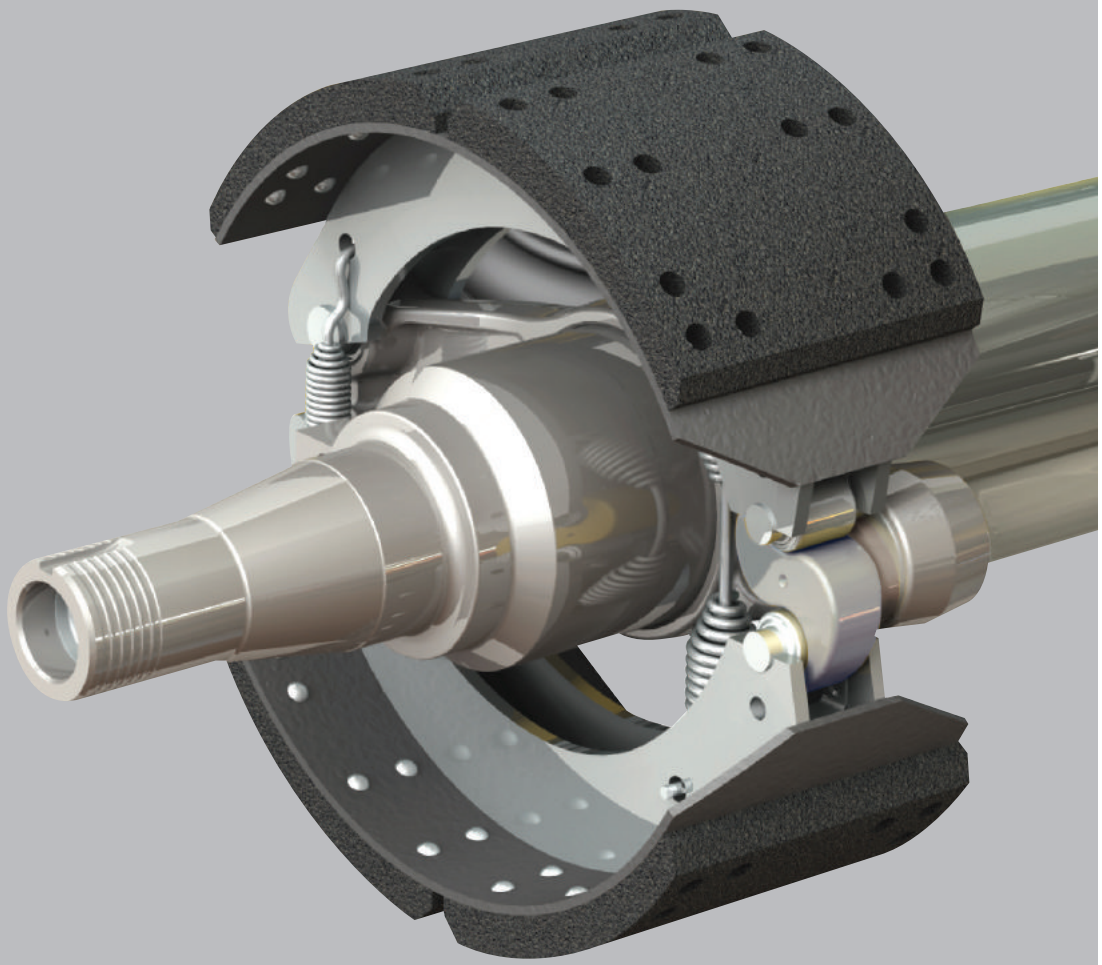
PART NUMBER: XL-AS20085DC-en-US

REV. A

SAF-HOLLAND Group

Service Manual for Drum Brake Axles

Tapered and Parallel Spindle Axles



XL-TA10006OM-en-US Rev G

SAF-HOLLAND Group

Introduction

This manual provides the necessary information for the maintenance, inspection, and safe operation of the SAF® axle/brake system.

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.

Use only SAF-HOLLAND® Original Parts to service the SAF-HOLLAND INTEGRAL™ drum brake axle. 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 installation 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.

IMPORTANT: Use only SAF-HOLLAND Original Parts to service your SAF-HOLLAND INTEGRAL drum brake axle.

⚠WARNING Failure to maintain the SAF-HOLLAND INTEGRAL drum 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.

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

⚠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.

- If possible, unload the trailer before performing any service procedures.
- After re-positioning the brake chamber, brake adjuster and/or ABS system as instructed in this manual, ALWAYS consult the manufacturer's manual for proper operation.

IMPORTANT: Key components on each axle system including but not limited to suspension, brake adjuster, brake chambers, bearings, hubs, and drums require information supplied by the original manufacturer of the components to ensure proper and safe operation of the axle system.

⚠WARNING Failure to follow the original manufacturer's instructions regarding spring brake or air pressure control could allow an uncontrolled release of energy which could result in death or serious injury.

- 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.

Operational and Road Safety Instructions

- 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.
- Before operating the 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 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, such as 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 to maintain optimum performance, operational and road safety, and to recognize natural wear and defects before they become serious. Please refer to the Service Manual for Drum Brake Axles XL-TA100006OM-en-US which can be found at www.safholland.us or contact our customer service group at 888-396-6501.

2. Model Identification

The Drum Brake Axle Serial Tag is located near the center of the axle tube ***(Figure 1).***

3. Identification Tag

The sample tag illustrated will help interpret the information on the SAF-HOLLAND USA®, Inc. serial number tag. The model number, axle body part number, axle beam rating, 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 _____

Axle Beam Rating _____

Serial Number _____

Figure 1

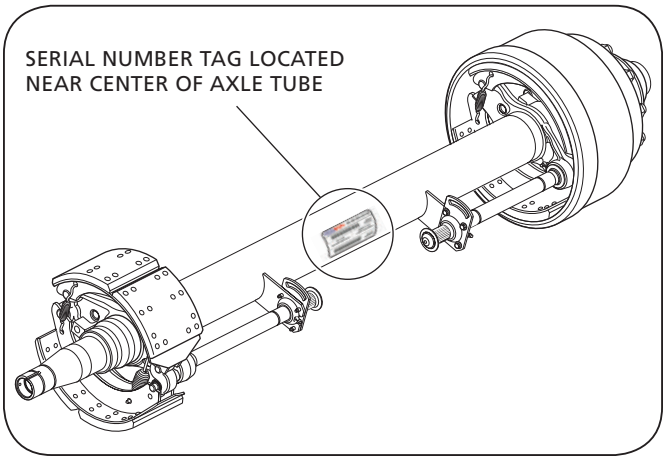
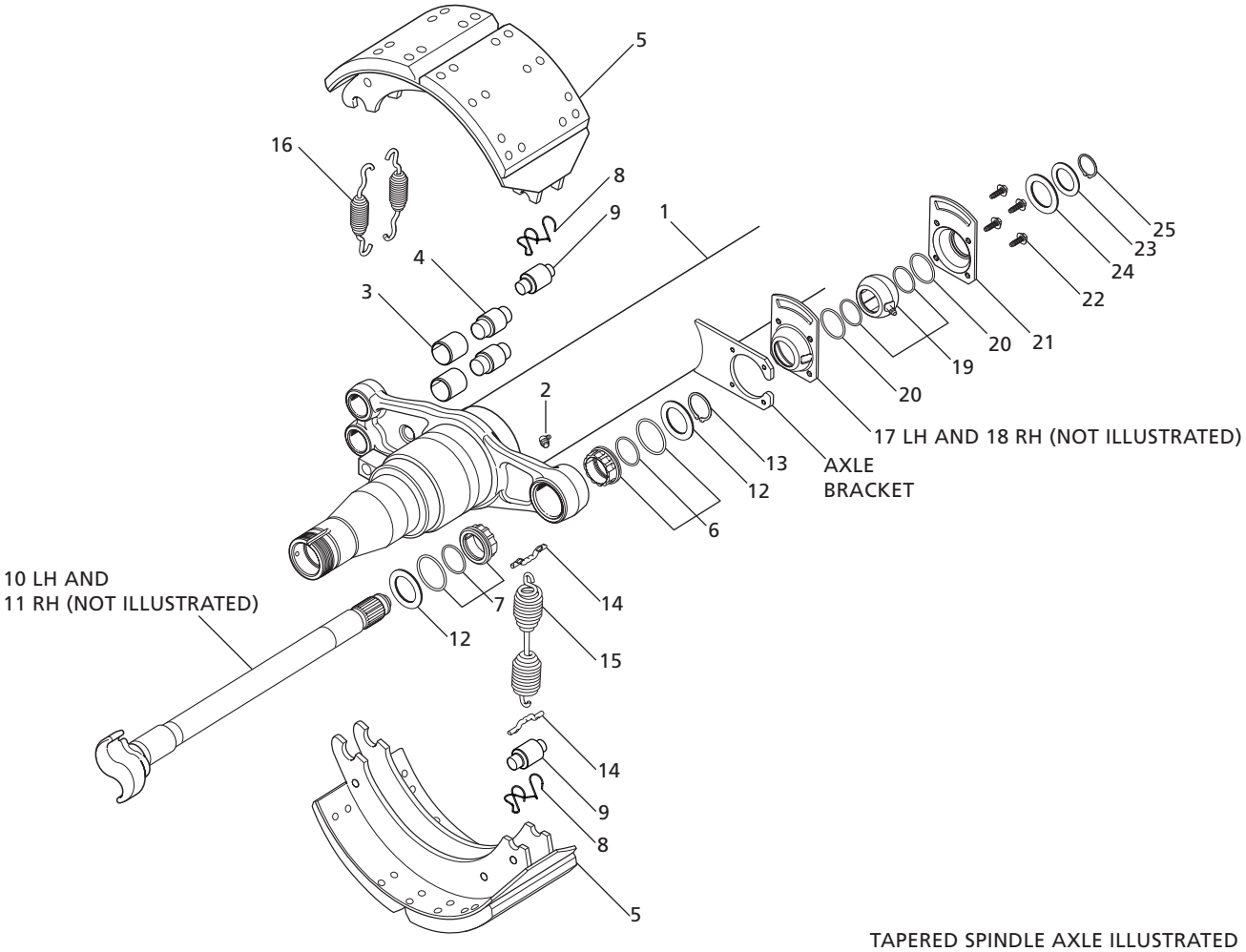


Figure 2

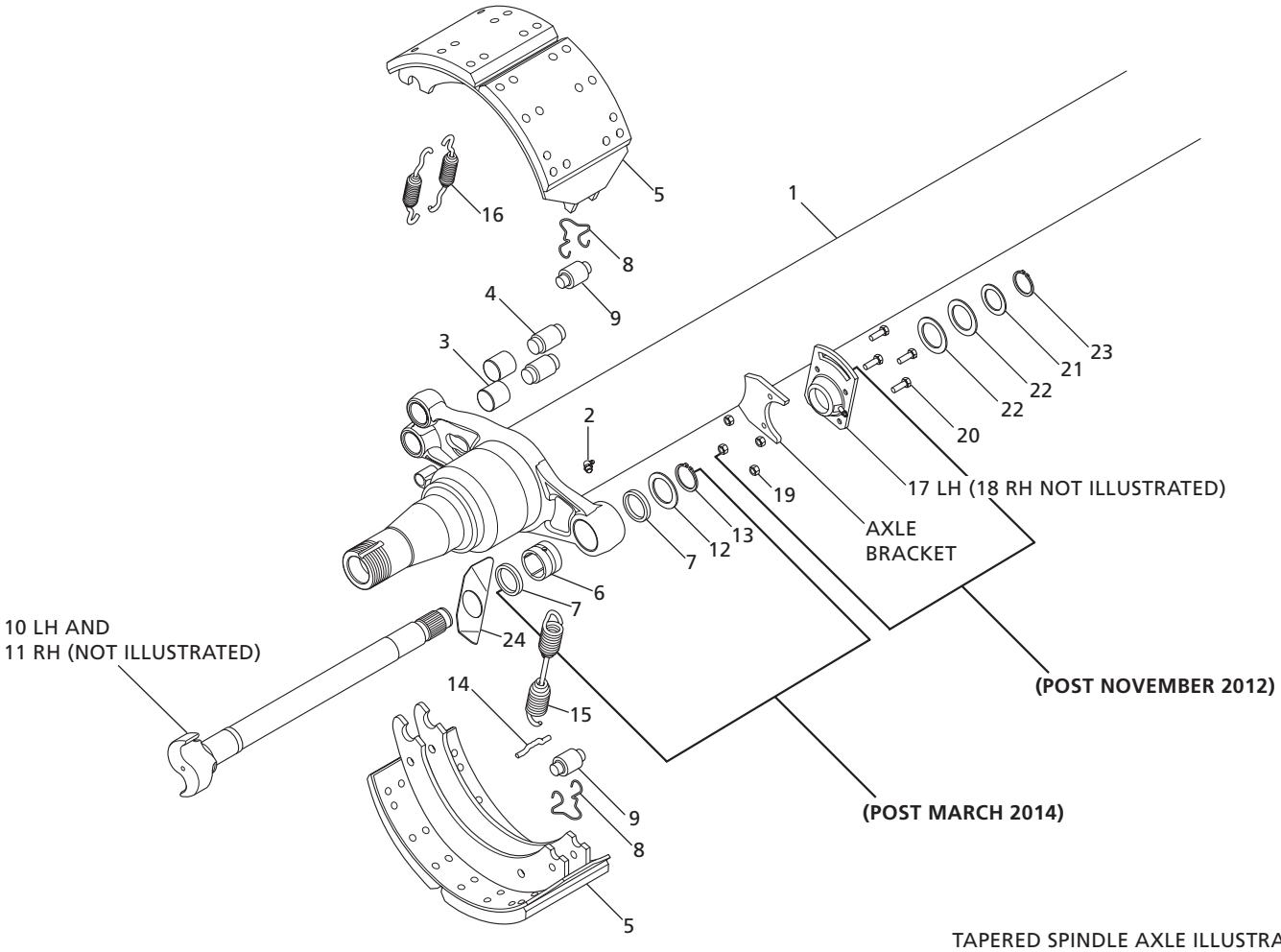


TAPERED SPINDLE AXLE ILLUSTRATED

BRAKE COMPONENTS		
ITEM	DESCRIPTION	QTY
1	Axle Body Assembly	1
2	Fitting, Lubrication	2
3	Bushing, Anchor Pin	4
4	Pin, Anchor	4
5	Brake Shoe Assembly	4
6	Bearing Assembly, S-Cam-Spider Inboard	2
7	Bearing Assembly, S-Cam-Spider Outboard	2
8	Retainer, Roller	4
9	Roller, Brake Shoe	4
10	S-Camshaft, Left-Hand	1
11	S-Camshaft, Right-Hand (not shown)	1
12	Washer, S-Cam Bearing-Outboard	4
13	Retainer Ring	2

BRAKE COMPONENTS		
ITEM	DESCRIPTION	QTY
14	Return Spring Pin	4
15	Spring, Return-Hub/Drum	2
16	Spring, Anchor Pin	4
17	Housing, S-Cam Bearing, Left-Hand Slotted	1
18	Housing, S-Cam Bearing, Right-Hand Slotted	1
19	Bearing Assembly S-Camshaft	2
20	O-Ring, S-Camshaft Bearing Seal-Inboard	4
21	Housing, S-Cam Bearing	2
22	Screw, Thread Rolling Tapping	8
23	Washer, Shaft End	2
24	Washer, Shaft End	2
25	Retaining Ring	2

NOTE: Refer to Drum Brake Axle Parts Manual XL-TA10058PM-en-US for axle component and service kit part numbers.



TAPERED SPINDLE AXLE ILLUSTRATED

BRAKE COMPONENTS		
ITEM	DESCRIPTION	QTY
1	Axle Body Assembly	1
2	Fitting, Lubrication	2
3	Bushing, Anchor Pin	4
4	Pin, Anchor	4
5	Brake Shoe Assembly	4
6	Bushing, Cam Bearing	2
7	Cam Seal, Spider	4
8	Retainer, Cam Roller	4
9	Roller, Brake Shoe	4
10	S-Camshaft, Left-Hand	1
11	S-Camshaft, Right-Hand (not shown)	1
12	Washer, S-Cam Bearing-Outboard	2

BRAKE COMPONENTS		
ITEM	DESCRIPTION	QTY
13	Retainer Ring	2
14	Return Spring Pin	4
15	Spring, Return-Hub/Drum	2
16	Spring, Anchor Pin	4
17	Cam Bearing Kit - Left-Hand	1
18	Cam Bearing Kit - Right-Hand (not shown)	1
19	Nut, Lock	8
20	Bolt, Hex Head Cap	8
21	Washer, Shaft End	2
22	Washer, Shaft End	4
23	Retaining Ring	2
24	Guide PLate, Brake Roller Shoe	2

NOTE: Refer to Drum Brake Axle Parts Manual XL-TA10058PM-en-US for axle component and service kit part numbers.

4. Hubs, Bearings and Seal Removal

NOTE: Before starting 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 axle(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 the hub and drum.
2. Remove the drum from the hub using a support device such as a drum dolly ***(Figure 3)***.

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

NOTE: It is necessary to retract the brake shoes in accordance with the brake adjuster's manufacturer manual to allow the brake drum to clear the brake shoes during brake drum removal.

3. Remove the hub cap and gasket by removing six (6) bolts ***(Figure 4)***.

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

Figure 3

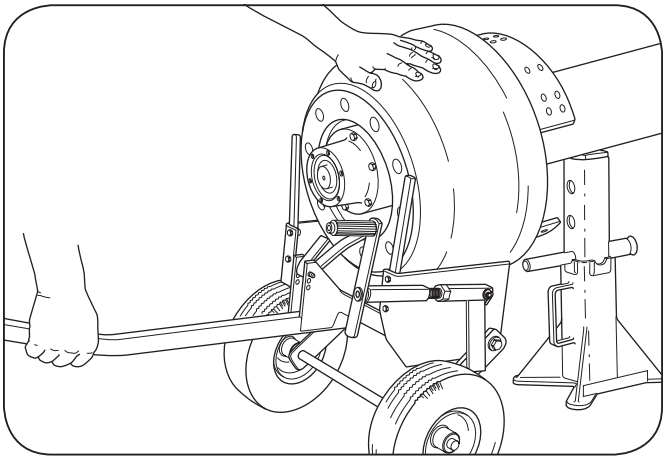
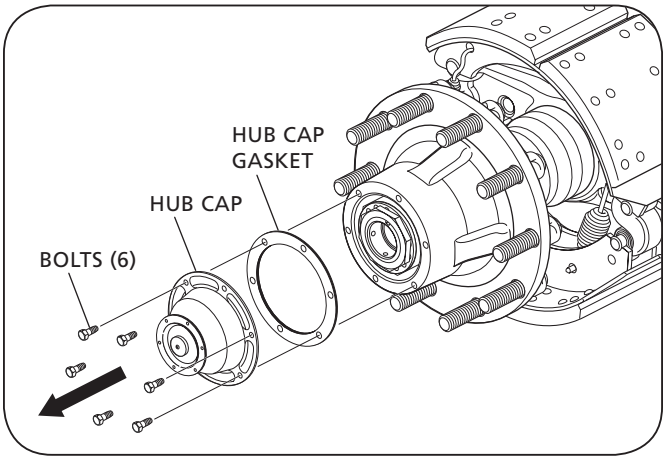


Figure 4



4. Remove the set screws ***(Figure 5)***.
5. Remove the axle nut from the spindle using a wrench with the axle nut socket. If the unit is equipped with a Pro-Torq® spindle nut, remove the nut and skip Step 5 ***(Figure 6)***.
6. Release the axle washer and the inner axle nut from the spindle ***(Figure 6)***.
7. Remove the outer hub bearing from the spindle ***(Figure 6)***.

NOTE: With the axle nut, washer, and inner 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.

8. Grasp the hub assembly with both hands and pull the hub assembly off the axle spindle ***(Figure 7)***.

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

Figure 5

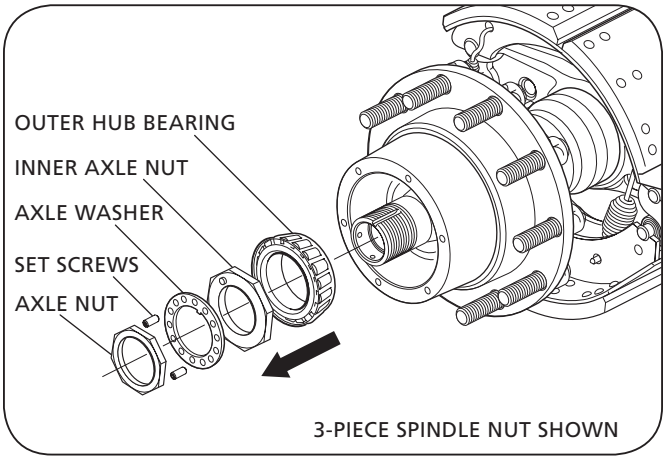


Figure 6

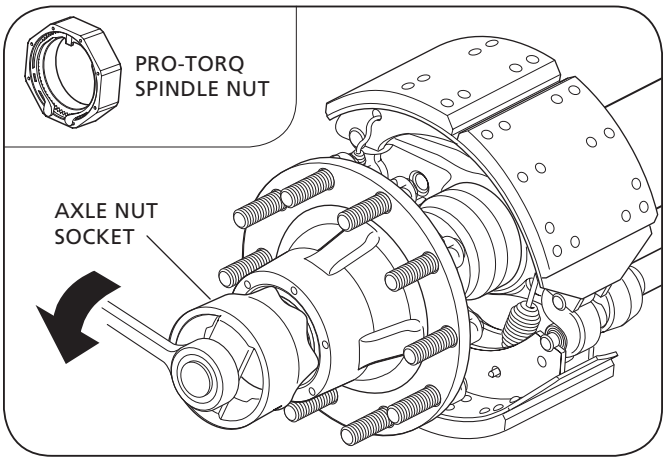
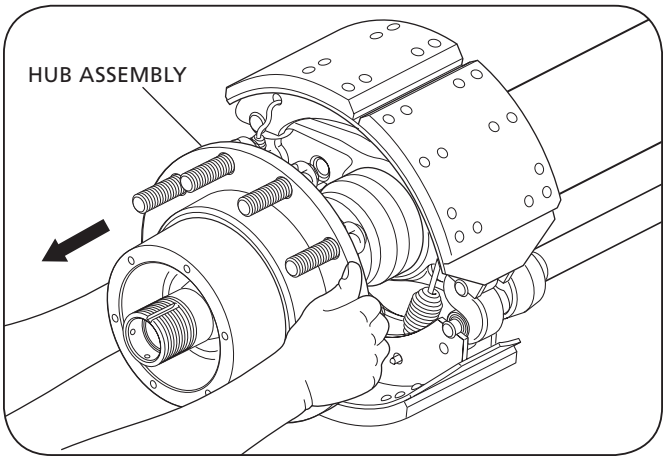


Figure 7



9. Remove the inner hub bearing from the spindle or from the inside of the hub ***(Figure 8)***.
10. Remove the hub seal from the hub bore using a pry bar. A 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. Discard the used hub seal and use a new hub seal during re-assembly being careful not to gouge the spindle shoulder ***(Figure 8)***.

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

5. Bearing Inspection

CAUTION Thoroughly clean the bearings. DO NOT mix a synthetic base grease or oil with an organic/mineral base lubricant.

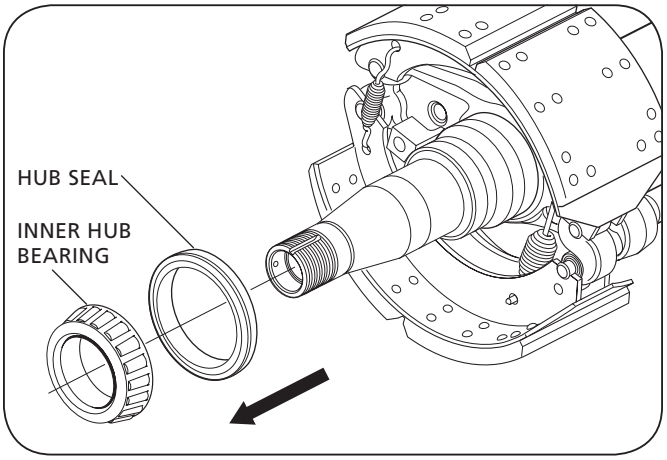
CAUTION DO NOT spin dry the hub bearings with compressed air. Bearing damage could result.

1. After removing the hub assembly, clean excess grease from the bearings.

IMPORTANT: A bearing which has been removed from a vehicle should be cleaned with solvent. When cleaning DO NOT use steam or water which will cause the bearings to rust.

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. NEVER re-assemble a tapered roller bearing in a damaged or worn housing or on damaged or worn spindles. Housings or spindles should be replaced and NOT re-machined if the bearing journal is worn.

Figure 8



6. Hubs, Bearings and Seal Installation

6.1 Spindle mounted Hub Seal Installation instructions (Refer to 6.2 for hub mounted Hub Seal instructions)

1. Before installing the hub 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 the 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 hub seal in the hub and then force it onto the axle spindle by tightening the axle nut. Damage to the seal will result.

4. The seal assembly should be placed on the spindle so the words "Oil Bearing Side" are exposed to the oil ***(Figure 9)***.
5. Drive the hub seal into place using the seal installation tool and hammer. Rotate the hub seal installation tool in 1/4-turn intervals 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 10)***.
6. Apply a thin coat of oil to the O.D. of the seal.
7. Prepare the hub. Remove the old lube and thoroughly clean the hub cavity and hub bore. Inspect the inner hub bore for roughness. If needed, use an emery cloth to remove any burrs or old bore sealant.

Figure 9

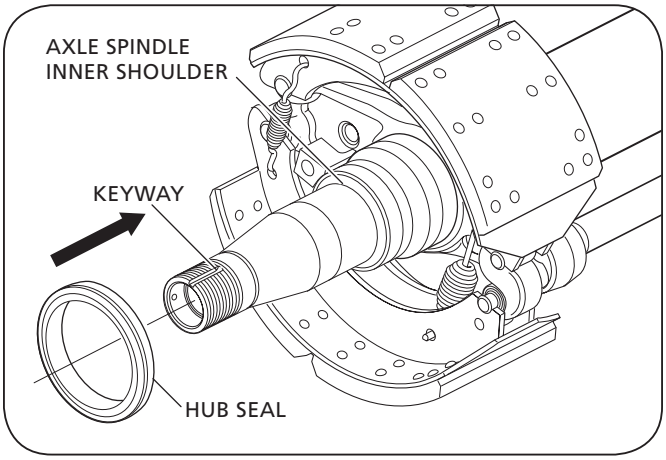
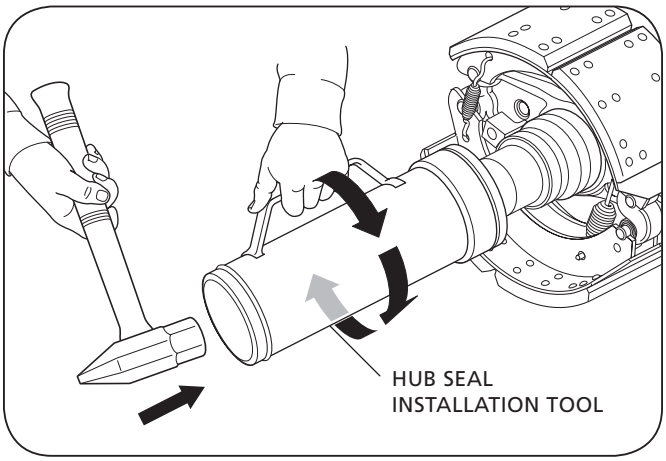


Figure 10



8. Install the inner and outer bearing cups into hub ***(Figure 11)***.
9. Pre-lube the inner bearing with the lubricant that is being retained and place it into the hub.

CAUTION Failure to lubricate the 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 the wheel end components with grease specified in the lubrication table in Section 22.

10. Push the hub onto the spindle until it contacts the seal. Pre-lube the outer bearing with the lubricant that is being retained and place it into the hub.

CAUTION Support the hub against the spindle inner shoulder until the outer bearing and adjusting nut are installed. DO NOT ram the hub into the bearing shoulder, which, if not avoided, could damage the hub seal.

6.2 Hub Mounted Hub Seal Installation Instructions

1. Remove all the burrs from the hub bore and the spindle. Thoroughly clean the hub cavity and spindle.
2. Place the hub on a smooth, hard surface in a horizontal position. Pre-lube the inner bearing with the lubricant that is being retained and place it into the hub bearing cup ***(Figure 12)***.

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

3. With the correct head on the hub seal installation tool, place the hub seal on the installation tool, so that the words "Lube Side" face the inner bearing. Place 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 the seal into the bore until complete bottoming is assured ***(Figure 13)***. Remove the Installation Tool and apply a thin layer of lubricant on the I.D. surface of the seal. Ensure the inner bearing rotates freely. Install a new seal if the seal is crooked or damaged or after installation.

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

Figure 11

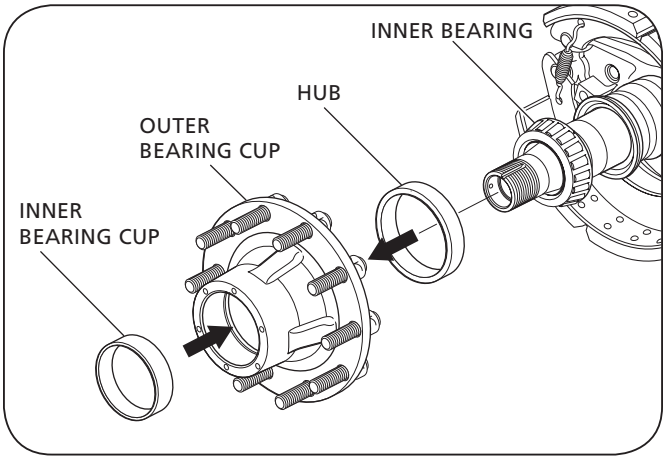


Figure 12

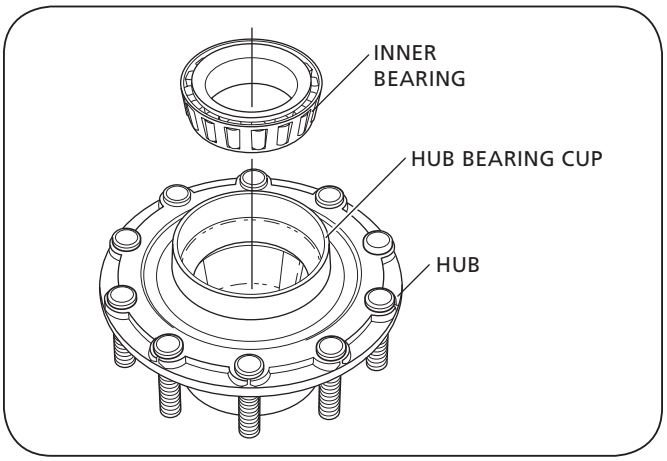
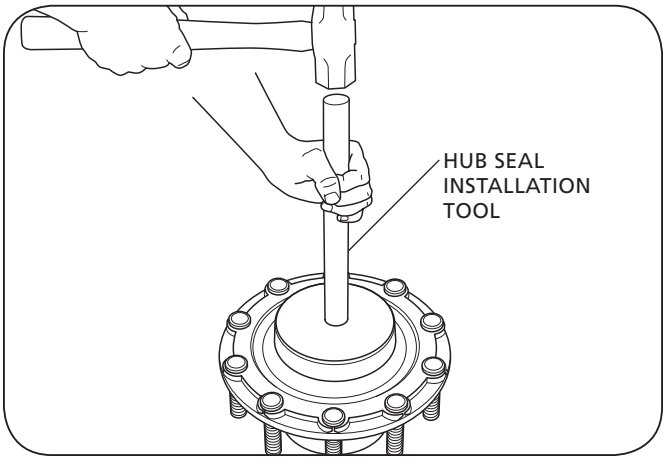


Figure 13



4. Align the hub bore to the center of spindle with mechanical supports. Gently push the hub assembly onto the spindle until the seal is seated against the bearing shoulder. Rotate the hub and lightly strike to ensure that the seal is properly seated against the bearing shoulder.
5. Pre-lube the outer bearing with the lubricant that is being retained and place into the hub.

NOTE: When using grease, pre-pack the hub cavity. The grease fill amount should be to a three (3) o'clock and nine (9) o'clock level. This is to ensure a 50% hub cavity fill. Use a template to hold the grease in place while filling the hub cavity ***(Figure 14)***.

7. Hub Bearing Adjustment

7.1 Hub Bearing Adjustment Using 3-Piece Axle Nut

1. Install the bearing inner-axle adjustment nut finger tight against the outer bearing ***(Figure 15)***.
2. While rotating the hub assembly, tighten the inner axle adjustment nut to 200 ft.-lbs. (271 N•m).
3. Back off the inner axle adjustment nut one full turn and then re-torque the nut to 50 ft.-lbs. (68 N•m) while rotating the hub assembly.
4. Back off the inner axle nut approximately 1/4 turn and install the axle lock washer ***(Figure 16)***. DO NOT include socket backlash in the 1/4 turn.
5. Install the lock washer. If the hole in the washer is NOT aligned with the pin on the inner nut, turn the washer around and re-install. If the pin and hole are still NOT aligned, slightly adjust parts as needed.
6. Install the outer axle nut finger tight against the axle lock washer ***(Figure 16)***.
7. Tighten the outer axle nut to 200-300 ft.-lbs. (271-407 N•m).

Figure 14

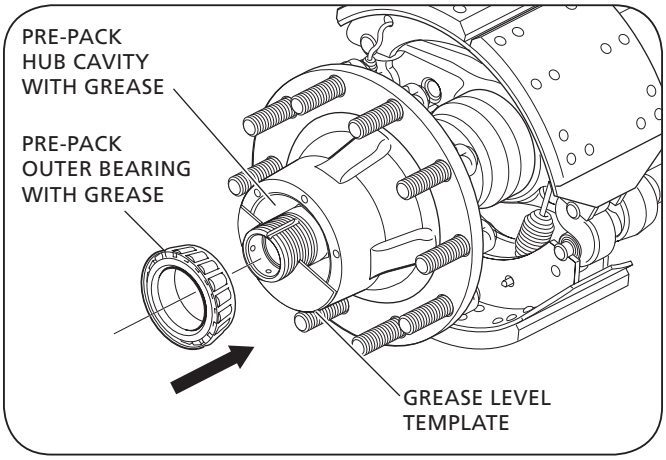


Figure 15

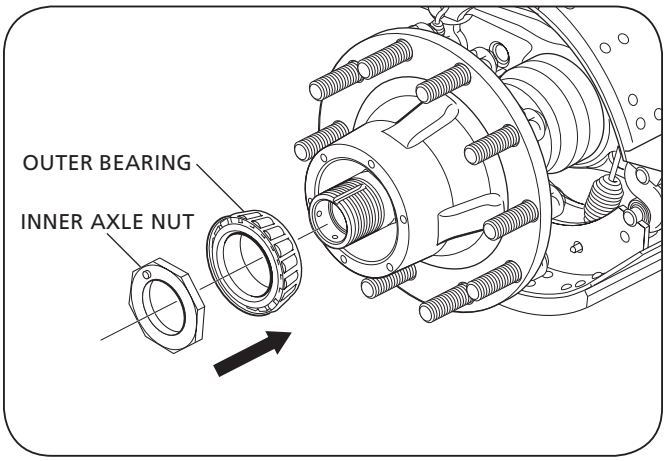
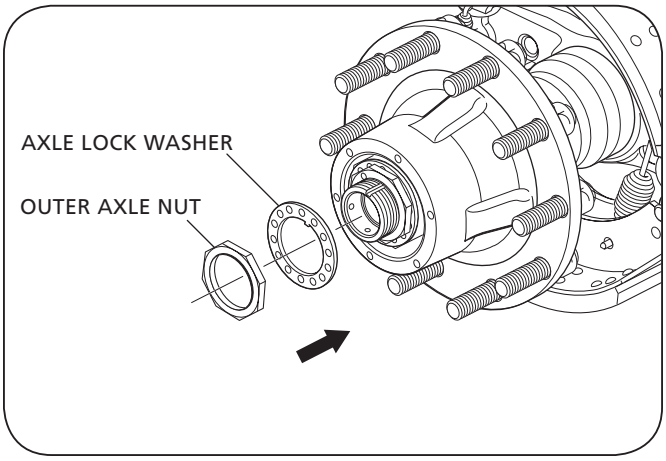


Figure 16



8. Check the wheel bearing end play as follows:
   a. Attach the magnetic base of a dial indicator to the spindle. Touch the dial indicator stem to the hubcap gasket face ***(Figure 17)***.
   b. Reading Number One – Slightly rotate the wheel-end in both directions while pushing inward until the dial indicator does not change. Set the dial indicator to zero ***(Figure 17)***.
   c. Reading Number Two – Slightly rotate the hub in both directions while pulling outward until the dial indicator does not change ***(Figure 17)***.
   d. End play is the difference between reading number one and reading number two.

IMPORTANT: Final adjustment should allow the wheel to rotate freely with 0.001" to 0.005" (0.025 mm to 0.0127 mm) end play. If the 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.

NOTE: If the wheel bearing end play needs adjustment, remove the outer nut and the lock washer. Tighten or loosen the inner nut as needed. Return to Step 6.

9. Install the set screw into an accessible threaded hole in the lock washer. Set screw MUST contact the inner adjusting nut. Tighten to 16-20 in.-lbs. (1.8-2.2 N•m) ***(Figure 19)***.

7.2. Hub Bearing Adjustment Using Pro-Torq Axle Nut

The unit could be equipped with a Pro-Torq spindle nut ***(Figure 18)***. Refer to Stemco® "Pro-Torq Installation Instructions" (Part No. 09-571-006) which can be found at www.stemco.com for more information.

Figure 17

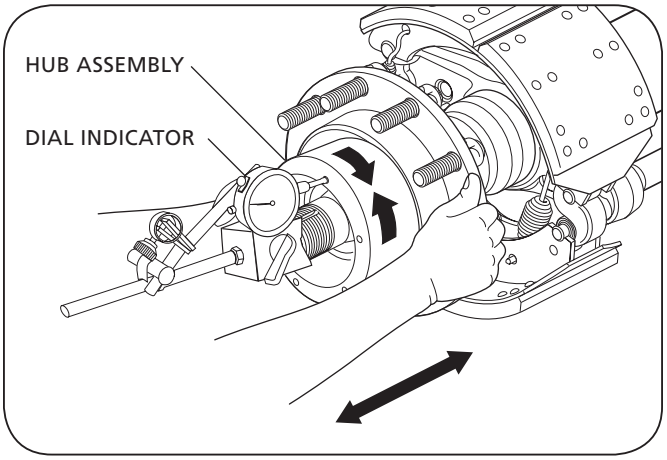


Figure 18

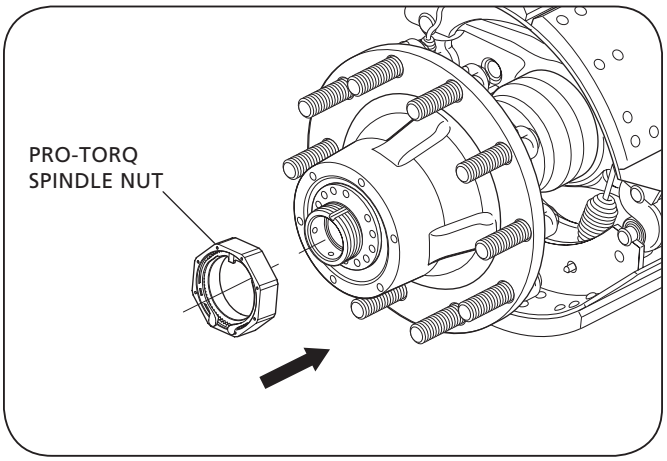
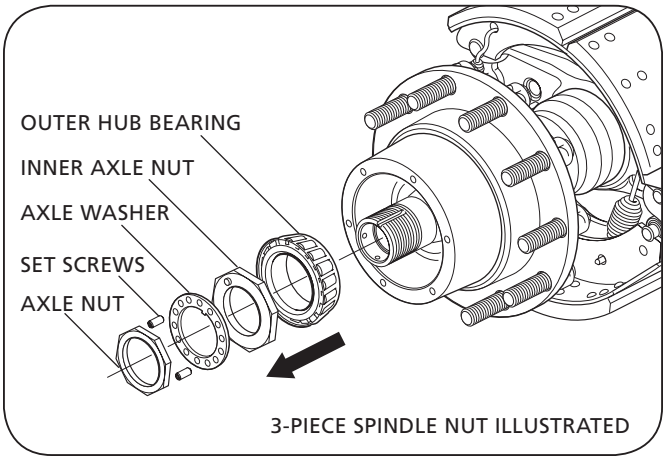


Figure 19



8. Hub Cap Installation

1. Install the hub cap assembly, making sure the hub cap gasket is in place ***(Figure 20)***.

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

CAUTION DO NOT over torque. This can crush the hub cap gasket and cause a leak.

2. Install the six (6) bolts to secure the hub cap assembly ***(Figure 18***, page 14***)***. Tighten the bolts to 12-16 ft.-lbs. (16-21 N•m).

9. Filling Hub With Lubricant (Oil Based)

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

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

1. Remove the plug and fill the hub to the FULL mark with the specified lubricant (oil), through the hole in the hub cap ***(Figure 21)***.
2. Allow the oil to flow through the bearings and level off.
3. Insert the plug into the hole in the hub cap ***(Figure 22)***.

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

Figure 20

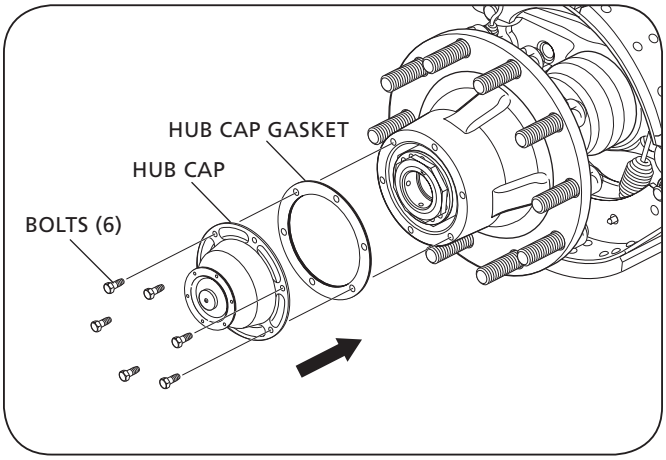


Figure 21

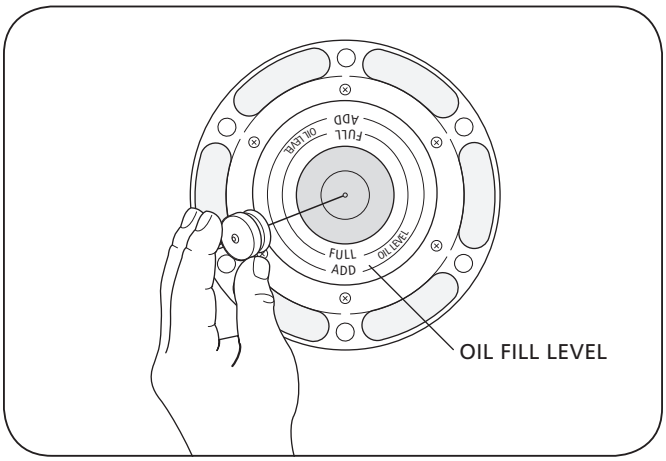
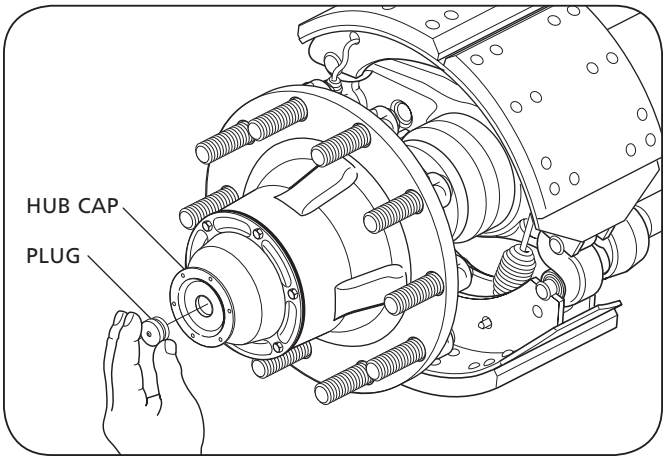


Figure 22



4. Re-install the drum on the hub using a support device such as a drum dolly jack ***(Figure 23)***.

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

CAUTION Failure to uncage the 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.

10. Retracting the Brake Shoes or Brake Adjuster Control Arm(s)

IMPORTANT: Refer to the brake adjuster's manufacturer's procedures for proper adjustment of the brake adjusters.

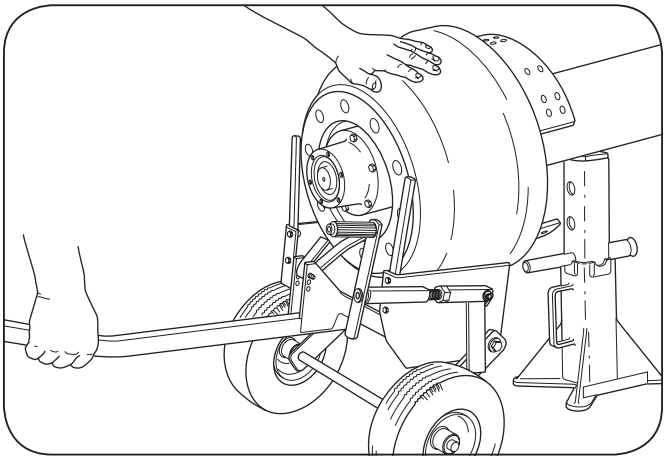
⚠WARNING Failure to operate with proper brake adjuster position could render brakes inoperable which, if not avoided, could result in death or serious injury.

NOTE: When servicing the brakes, in some instances it could be necessary to fully retract the brake shoes in order to remove the brake drum.

NOTE: When removing the S-Camshaft, it is necessary to retract the brake adjuster control arm(s) from the clevis so the brake adjuster can be removed from the S-Cam shaft.

In both of the notes above, the brake shoes or the brake adjuster control arm(s) are retracted by turning the adjusting nut manually on the automatic brake adjuster.

Figure 23



11. Brake Shoe Removal

NOTE: Before starting 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 axle(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 the hub and drum.
2. Remove the drum from the hub using a support device such as a drum dolly ***(Figure 24)***.

⚠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.

NOTE: It is necessary to retract the brake shoes in accordance with the brake adjuster's manufacturer's manual to allow the brake drum to clear the brake shoes during the brake drum removal.

3. Using the brake spring pliers, unhook both the brake retaining springs from the brake shoes ***(Figure 25)***.
4. Press down on the lower brake shoe to disengage it from the anchor pin. Move the lower shoe to the side of the anchor bracket and lift the upper and lower shoes (still connected by brake return spring) from the anchor pins ***(Figure 26)***.

IMPORTANT: The brake return spring, brake shoe rollers and roller retaining clips will remain on the brake shoes during this procedure.

Figure 24

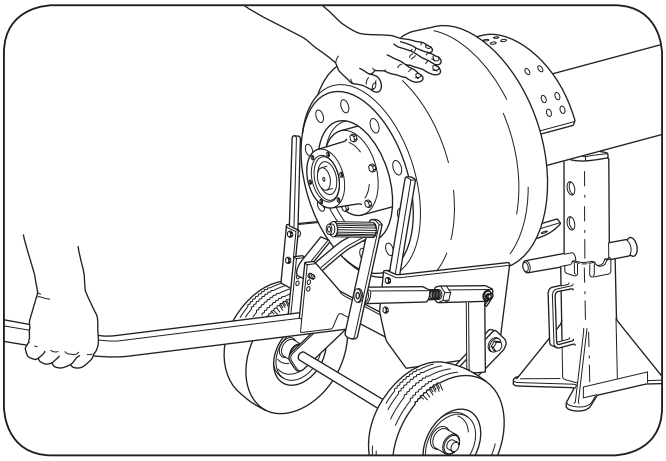


Figure 25

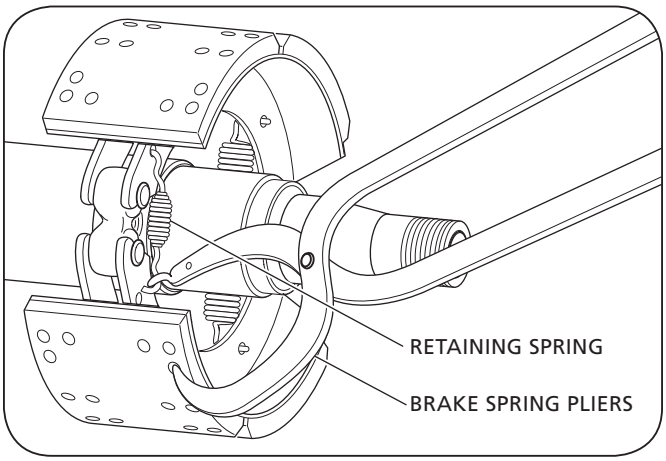
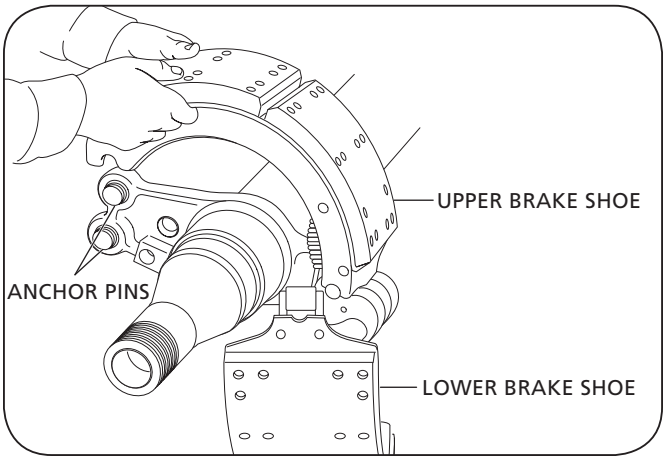


Figure 26



5. Discard the used brake hardware.

IMPORTANT: Brake hardware such as brake rollers, roller retaining clips and brake return springs experience fatigue during their normal lifespan and could not have the same performance characteristics as new components. Since most of these brake components are supplied new with the brake overhaul kit, the existing components should NOT be re-used.

6. With the brake shoes off, inspect the S-Camshaft and S-Camshaft bushings for wear. Verify that the S-Cam-to-bushing radial free play is within specification by using a dial indicator and moving the S-Camshaft back and forth ***(Figure 27)***. Rotate the S-Camshaft in all directions when checking for radial free play.

NOTE: Use a dial indicator to verify that S-Cam-to-bushing free play is 0.030" (0.76 mm) or less.

- If radial free play is less than 0.030" (0.76 mm): DO NOT replace the bushings and the seals.
- If radial free play is more than 0.030" (0.76 mm): Replace the bushings and the seals.

7. Inspect the brake shoes and components for wear:
   h. Inspect the spider for expanded anchor pin holes and for cracks. Brake spiders cannot be repaired and MUST be replaced with new axle assembly.
   i. Inspect the S-Camshaft bracket for broken welds, cracks and correct alignment. Replace the damaged brackets.
   j. Inspect the anchor pins for corrosion and wear. Replace worn or damaged anchor pins.

NOTE: Follow the brake shoe manufacturer specifications for minimum brake shoe thickness and maximum brake drum inner diameter. A general guideline for replacing brake shoes is when the lining thickness is 1/4" (6 mm) or less, or when the lining rivets have begun to contact the drum ***(Figure 28)***.

CAUTION Failure to replace the brake shoes that are excessively worn could result in damage to brake drum or other components.

   k. Inspect the brake shoes for wear, expanded rivet holes, broken welds and correct alignment. Replace the shoes as a set with any of the above conditions.

Figure 27

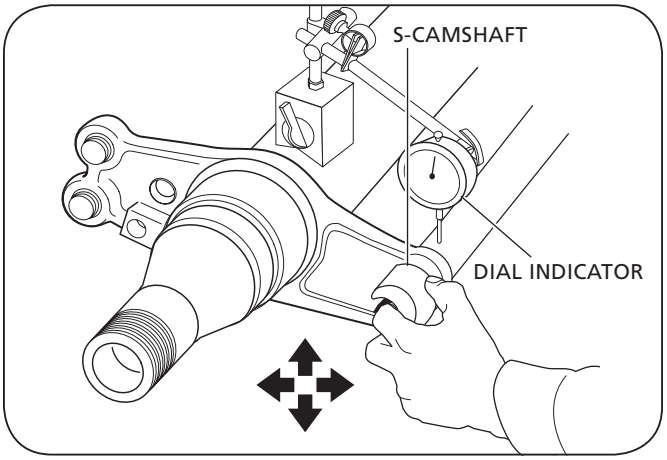
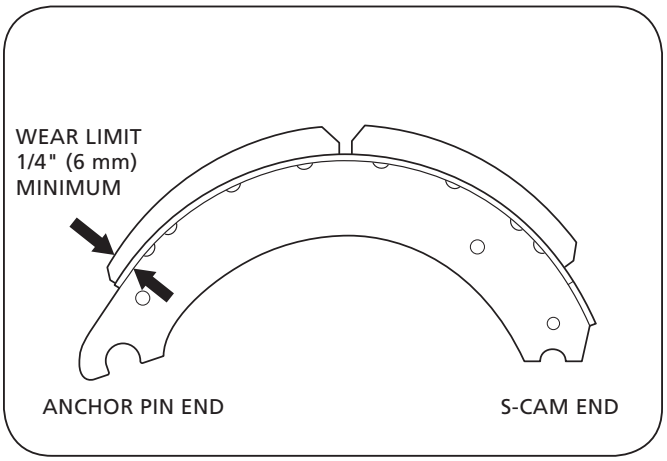


Figure 28



8. Inspect the brake drums for wear.

⚠WARNING DO NOT operate the vehicle with the brake drum worn or machined beyond the discard dimension indicated by the drum manufacturer. The brake system may not operate correctly. Damage to components, death or serious injury, could result.

CAUTION Replace the brake drum if it is out-of-round. DO NOT turn or re-bore a brake drum beyond manufacturers recommendations. Doing so could decrease the strength and capacity of the drum which, if not avoided, could result in brake component damage.

a. Inspect the brake drums for cracks, severe heat checking, heat spotting, scoring, pitting and distortion. Replace the drums as required.

b. Measure the inside diameter of the drum in several locations with a drum caliper or internal micrometer ***(Figure 29)***.

c. If brake drum is excessively worn or out of round replace the brake drum.

CAUTION Failure to replace an out of round brake drum could result in damage to the brake drum or other components.

12. Brake Shoe Installation

1. Install the brake shoe roller into the roller retainer ***(Figure 30)***.
2. Install the roller and roller retainer into the brake shoe ribs ***(Figure 30)***.
3. Coat anchor pins (ends only) completely with lubricant (Never-Seez®) and install (if removed) in the brake spider ***(Figure 31)***.

Figure 29

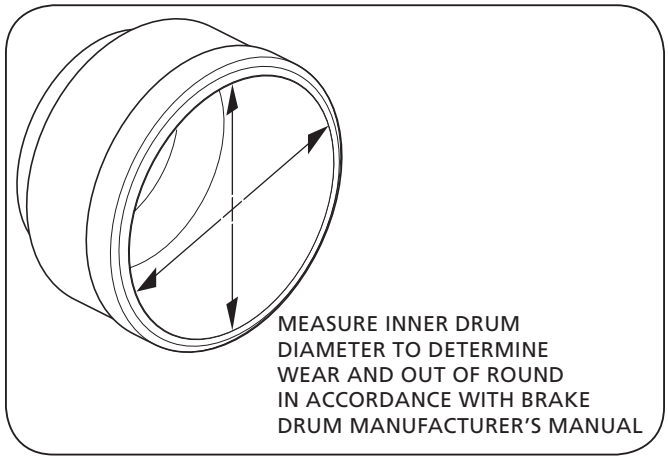


Figure 30

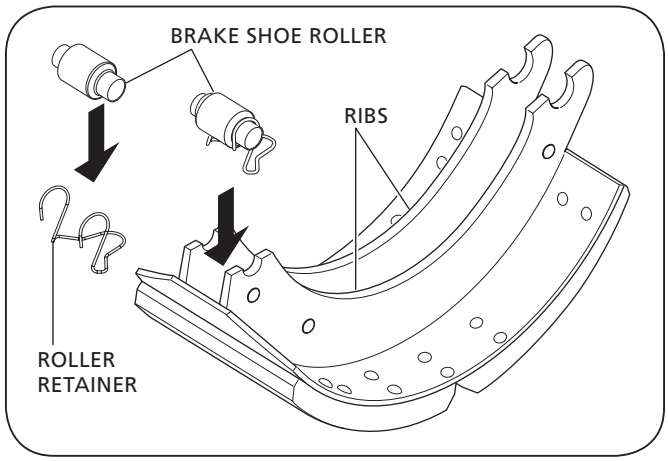
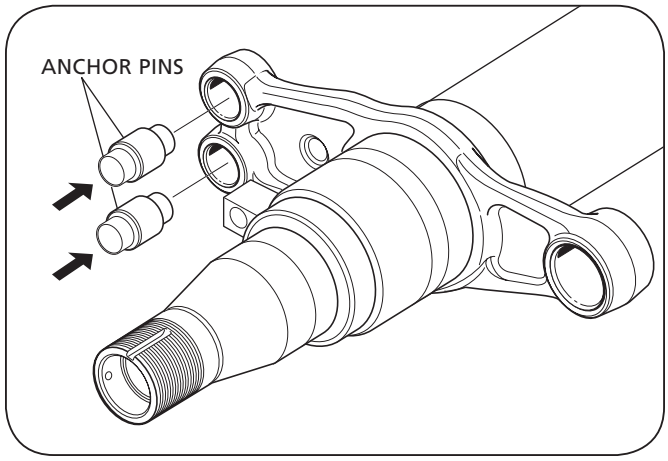


Figure 31



4. Install the return spring pin into the brake shoe ribs ***(Figure 32)***.
5. Connect the hub/drum return spring to the upper and lower brake shoes ***(Figure 33)***.
6. Position the roller of the upper brake shoe up against the S-Cam, then place the other end of the shoe against the anchor pin ***(Figure 34)***.

⚠CAUTION Failure to control spring pressure during the brake shoe installation could create a pinch hazard which, if not avoided, could result in minor to moderate injury.

Figure 32

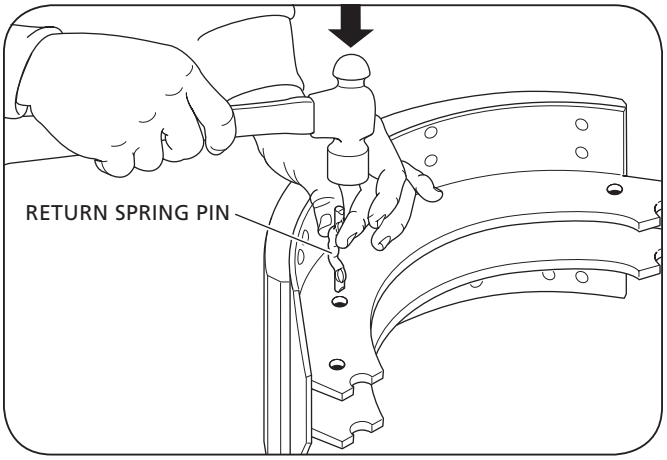


Figure 33

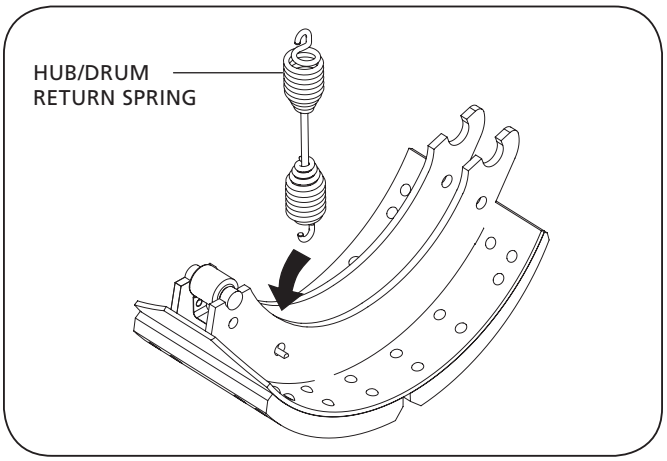
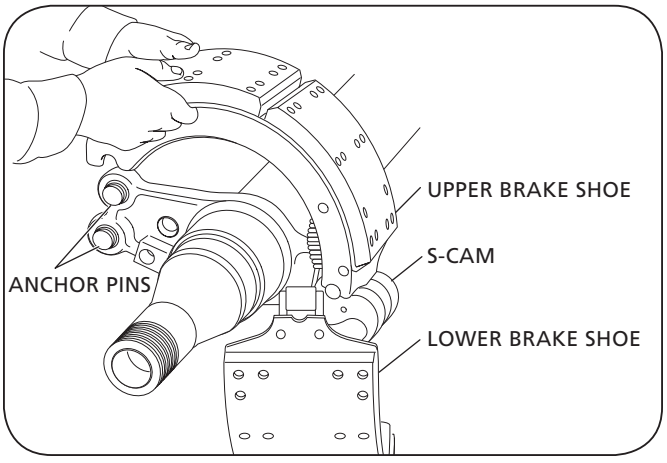


Figure 34



7. Position the roller of the lower brake shoe up against the S-Cam, then place the other end of the shoe against the anchor pin ***(Figure 35)***.
8. Install the two (2) brake anchor pin springs using the anchor pin pliers ***(Figure 36)***.
9. Make sure the brake linings are clean.
10. Re-install the drum using a support device such as a drum dolly jack ***(Figure 37)***.

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

11. Adjust the brakes as described in Section 17.

Figure 35

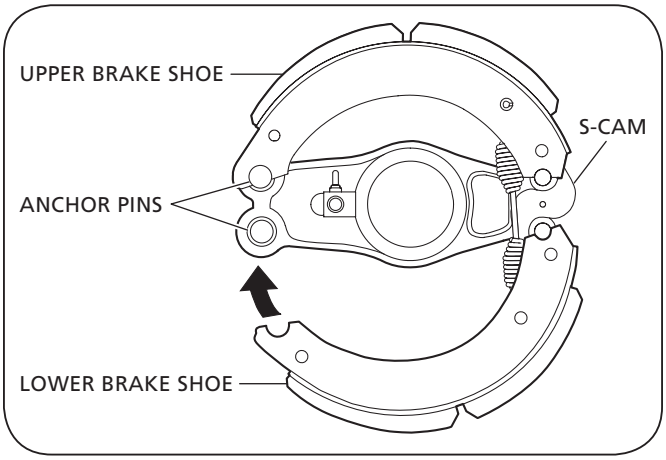


Figure 36

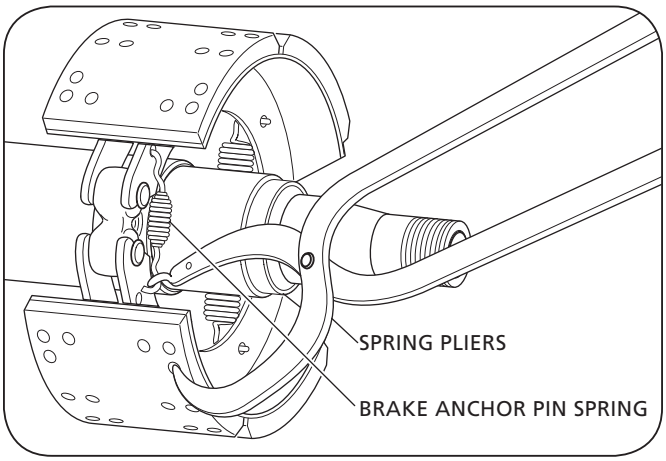
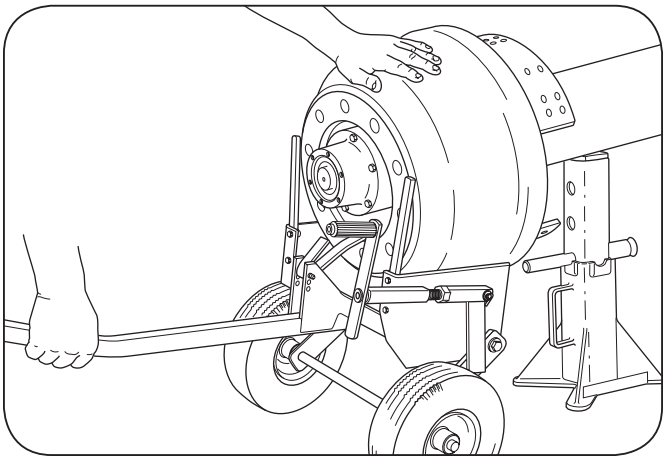


Figure 37



13. Brake Adjuster Removal

NOTE: Maintenance procedures in this section require re-positioning of the brake adjuster. Consult the manufacturer's manual for procedures to properly operate the brake adjusters.

1. Remove the cotter pins that secure the brake adjuster/ brake chamber clevis pins ***(Figure 38)***. Remove the clevis pins.
2. Remove the retaining ring and washer that secure the brake adjuster to the S-Camshaft ***(Figure 39)***.
3. Remove the self-adjusting brake adjuster from the spline end of the brake S-Camshaft.
4. Rotate the adjusting mechanism to back the brake adjuster out of the clevis in accordance with the brake adjusters manual.

14. Brake Adjuster Installation

1. Apply an even coat of anti-seize compound to splined surface of the S-Camshaft.
2. Position the spacing washers on both sides of the brake adjuster, then install the brake adjuster onto the S-Camshaft spline and secure the brake adjuster on the S-Camshaft by assembling the retaining ring ***(Figure 40)***.
3. Align the brake adjuster to the clevis and pin together using the clevis pins and the cotter pins ***(Figure 38)***.
4. Apply service and the spring brake several times. Final brake adjustment is required to ensure proper initial brake operation. The brake adjuster will then seek the proper working stroke during normal operating conditions. Refer to the brake adjuster and brake chamber manufacturers' procedures for proper adjustment.

Figure 38

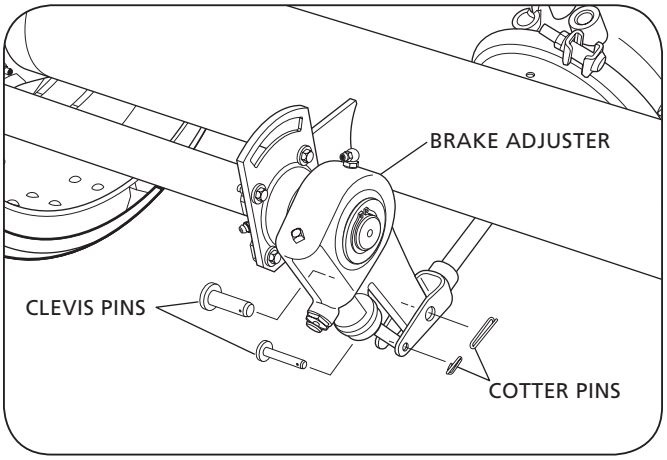


Figure 39

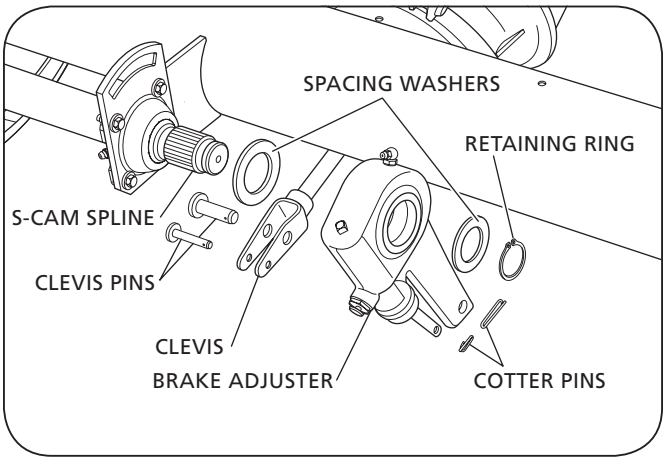
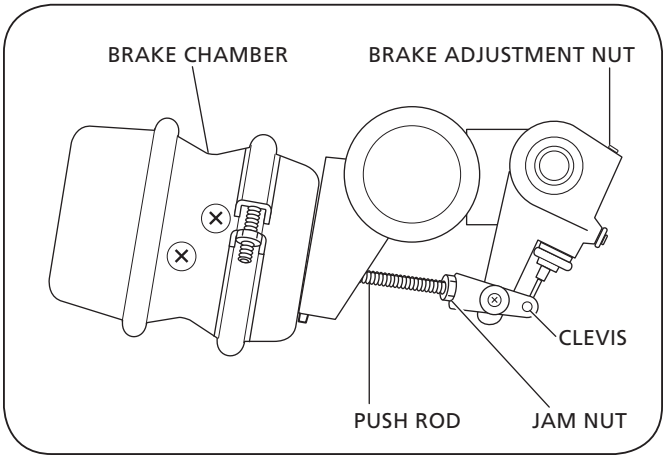


Figure 40



15. S-Camshaft and Bearing Removal Procedure

1. Remove the brake shoes and the brake adjuster as described in Section 11 and 13, respectively.
2. Remove the retaining ring from the spider end of the S-Camshaft ***(Figure 41)***.
3. Remove the S-Camshaft by sliding it out of the S-Camshaft bearing housing and bearings. It could be necessary to tap the end of the shaft with a soft mallet to release it from the bearings ***(Figure 41)***.
4. Remove the existing bolts securing the S-Camshaft bearing housing to the axle bracket ***(Figure 42)***.
5. Inspect the bearings assembly for wear and deterioration. Replace as necessary.

Figure 41

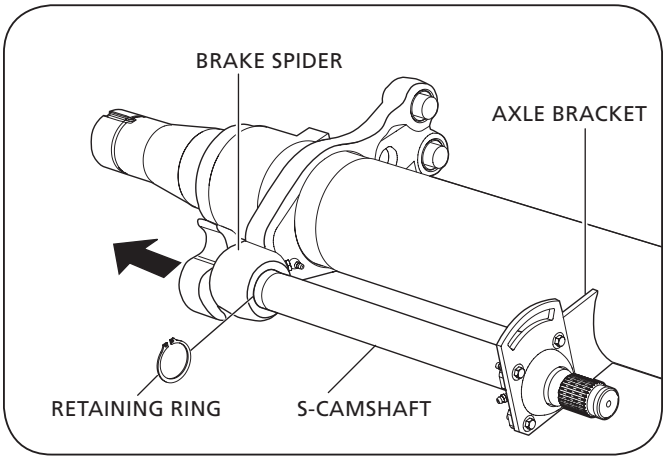
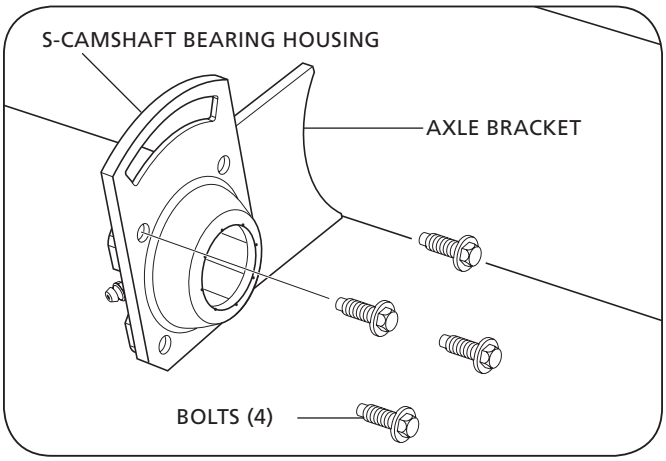


Figure 42



16. S-Camshaft and Bearing Installation

1. Attach the S-Cam bearing housing bracket to the axle bracket, securing it with the four (4) nuts and bolts ***(Figure 43)***. Tighten the nuts to 15-22 ft.-lbs. (20-30 N•m).
2. Install the S-Camshaft bearing into the brake spider, ensuring that the bearing is centered ***(Figure 44)***.
3. Install the guide plate, and cam seals on the S-Camshaft and slide the S-Camshaft and the washer assembly through the S-Camshaft bearing in the brake spider ***(Figure 44)***.

NOTE: Cam seals, refer to ***Figure 44***, MUST be installed with the metal shoulder oriented toward the wheel, and the open end oriented toward the center of the vehicle. This facilitates complete lubrication of the s-cam bearing while allowing air to purge from the s-cam bearing away from the brake shoes.

CAUTION Failure to center S-Camshaft bearing into the brake spider, and to properly orient cam seals, could not allow grease flow to bearing which, if not avoided, could result in premature bearing failure ***(Figure 45)***.

Figure 43

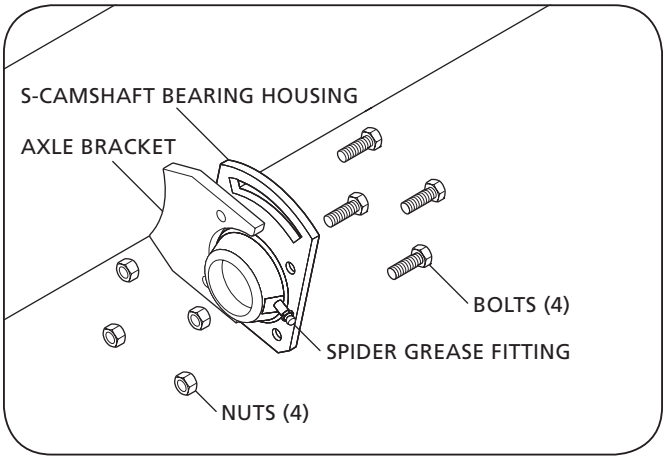


Figure 44

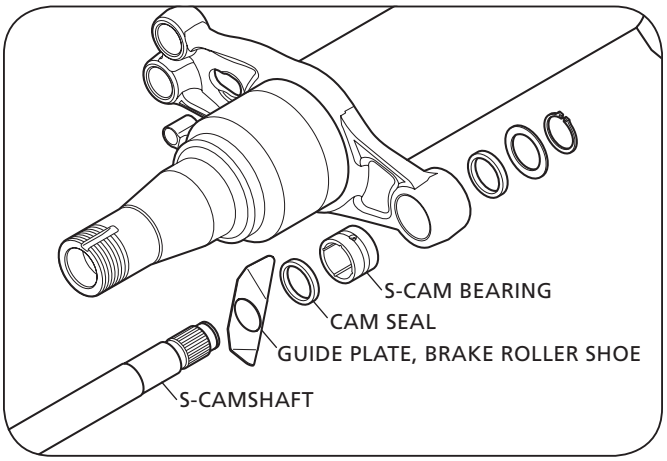
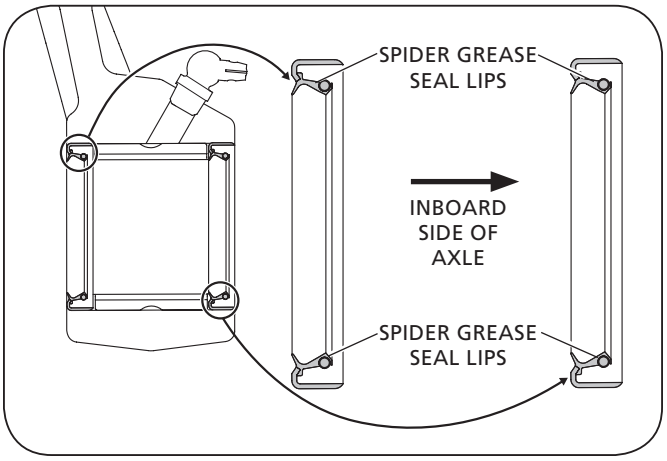


Figure 45



4. Install the cam seal washer and the retaining ring onto the S-Camshaft and slide the S-Camshaft into the S-Camshaft bearing housing bracket ***(Figure 46)***.
5. Install the brake shoes and the brake adjusters as described in Section 12 and 14, respectively.
6. Inspect the S-Camshaft installation to ensure that the correct S-Camshaft has been installed on the required side of the axle for proper operation ***(Figure 47)***.
7. Lubricate the S-Camshaft bearings with grease specified in the Lubrication Table in Section 22 ***(Figure 48***, page 26***)***.

Figure 46

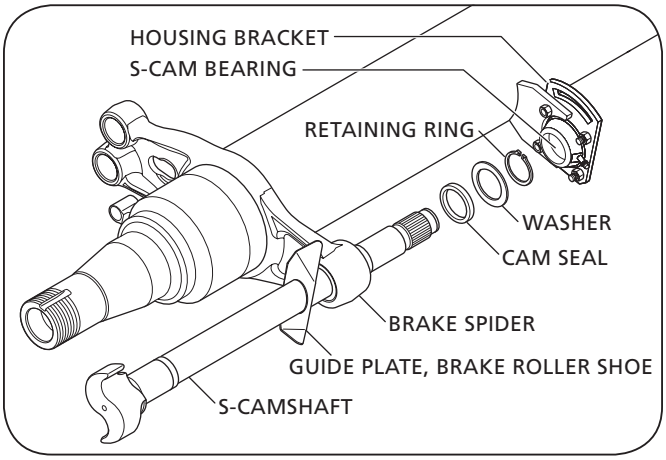
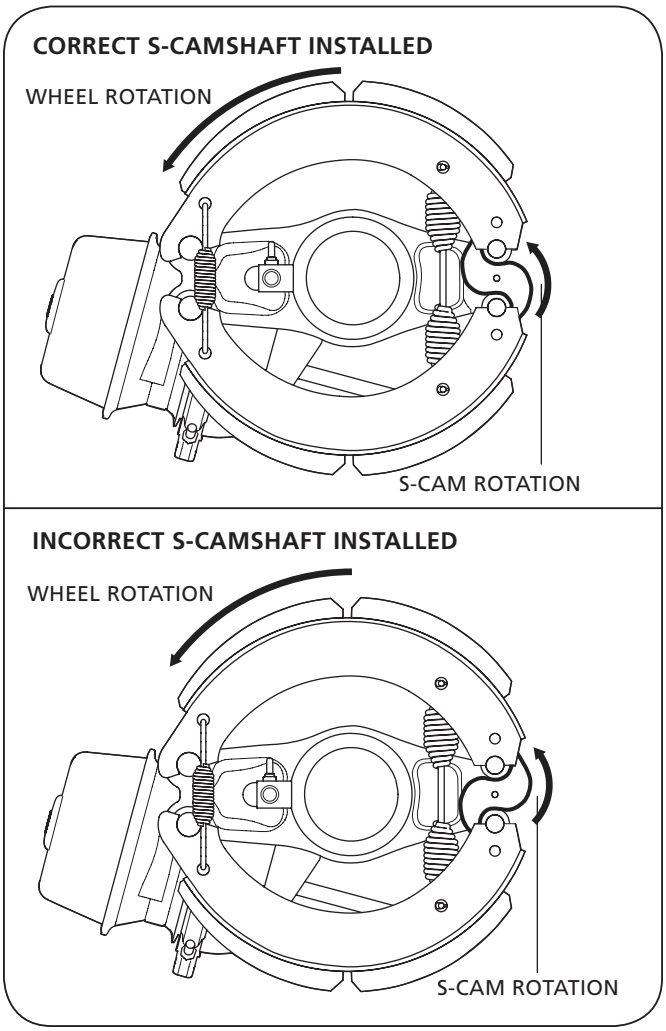


Figure 47



17. Brake Adjustment Procedure

1. Verify that the spring brakes are caged prior to beginning the adjustment procedure.
2. Adjust the brake adjuster until the brake lining contacts the brake drum, then back off 1/2 turn.
3. Apply the service brakes using normal operating pressure (average line pressure should be 90 psi, but not less than 80 psi). Check the following while brake pressure is applied.
   - The optimum distance of the push rod travel should be approximately 1.5"-1.75" (38-44 mm) ***(Figure 49)***.
   - Angle between the push rod and the brake adjuster with the brake applied, should be 95°-100° ***(Figure 50)***.
   - Brake lining to drum contact. A 0.010" feeler gauge should not fit between the lining and the drum contact area.
4. Release the air pressure from the service brake system and check to see that all brakes release to the normal relaxed position. If all the brakes do not properly release, Refer to Troubleshooting Chart in Section 23.

CAUTION Failure to adjust the brakes in accordance with manufacturer's instructions prior to placing the trailer back in service will prohibit proper brake function which, if not avoided, could result in uneven brake system component wear.

5. Uncage the spring brakes.

⚠WARNING Failure to uncage the spring brakes in accordance with manufacturers' instructions after servicing is complete will prohibit proper brake function which, if not avoided, could result in death or serious injury.

Figure 48

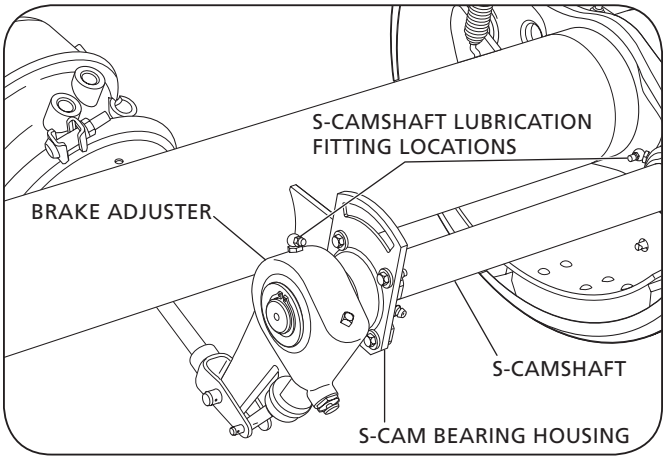


Figure 49

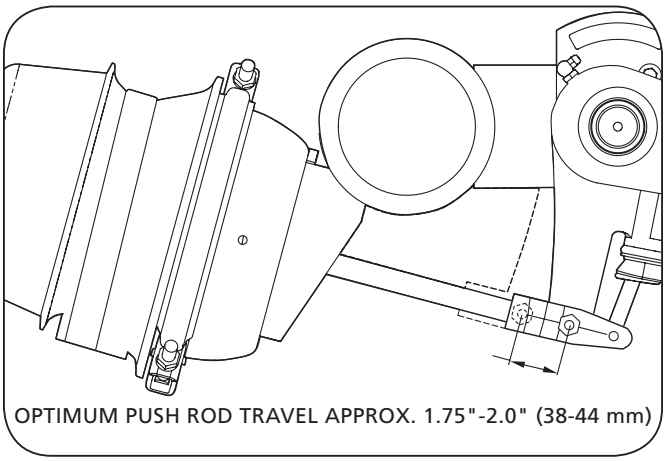
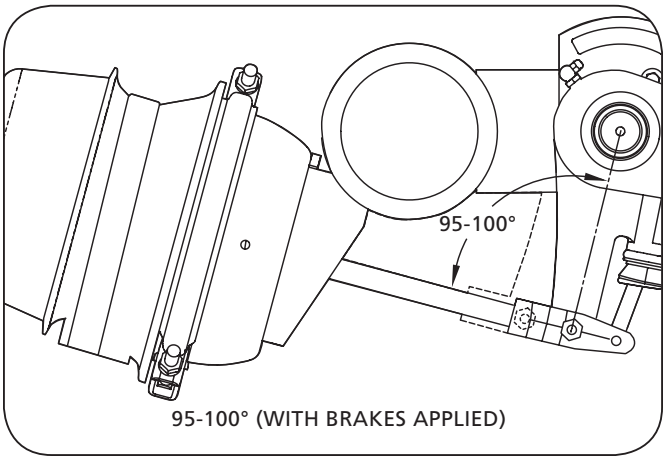


Figure 50



18. ABS Sensor Replacement Procedure

18.1 Sensor Removal

NOTE: ABS sensors MUST match the system. DO NOT mix sensors from different manufacturers.

1. Manually release the brakes.
2. Remove the brake drum assembly as described in Section 4.
3. Disconnect the ABS sensor connector and remove the sensor from the sensor holder by pulling straight out ***(Figure 51)***.
4. Remove the sensor retaining spring clip, if necessary.

18.2 Sensor Installation

NOTE: Be sure to use the correct spring clip for the sensor being installed.

1. Install the sensor retaining spring clip, if removed, into the sensor holder.
2. Install the ABS sensor into the spring clip and the sensor holder. Push the sensor in until it contacts the tone ring ***(Figure 52)***.
3. Connect the ABS sensor connector.
4. Re-install the drum using support device such as a drum dolly jack ***(Figure 37***, page 21***)***.
5. Adjust the brakes as described in Section 17.

Figure 51

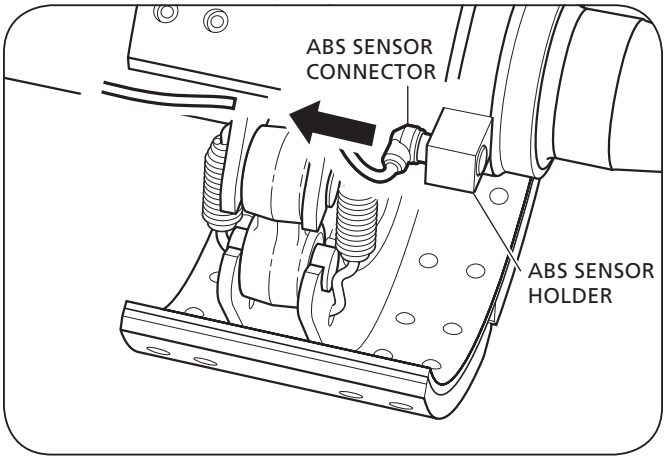
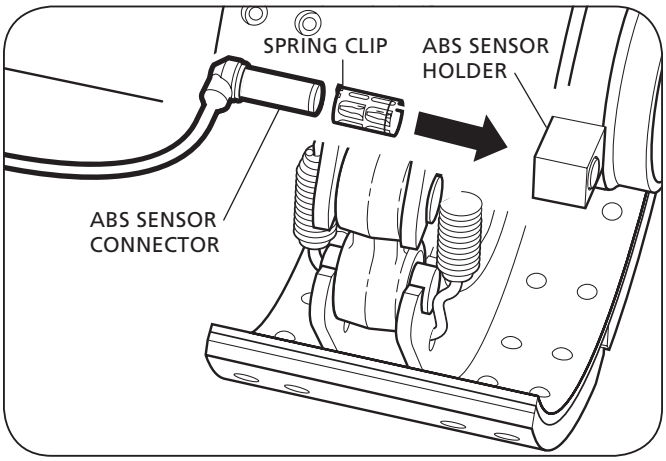


Figure 52



19. 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 53)***, tighten all wheel nuts to 50 ft.-lbs. (68 N•m) of torque.
6. Repeating sequence illustrated in ***(Figure 53)***, retighten 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.

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

20. Axle Alignment Inspection

NOTE: Alignment can be achieved using an optical device designed specifically for this purpose. Follow the instructions in the optical device operating instructions to align the axles.

1. To manually align the axles attached to the trailer, first pull the trailer in a straight line for a sufficient distance to release/clear any binds in the suspension.

NOTE: A straight, unbound suspension is the position of a suspension during normal operations.

Using the alignment procedures per the suspension manufacturer's recommendations, align the axles to the following specifications.

2. Measure the distance from the king pin to the centerline of the spindles on each side of the front axle. Dimensions A and B MUST be equal to within 1/8" (4 mm) ***(Figure 54, A and B)***.
3. Measure the distance from the centerline of the spindles of the front axle to the centerline of the spindles of each additional axle. Dimension C and D MUST be equal to within 1/16" (1 mm) ***(Figure 54, C and D)***.

Figure 53

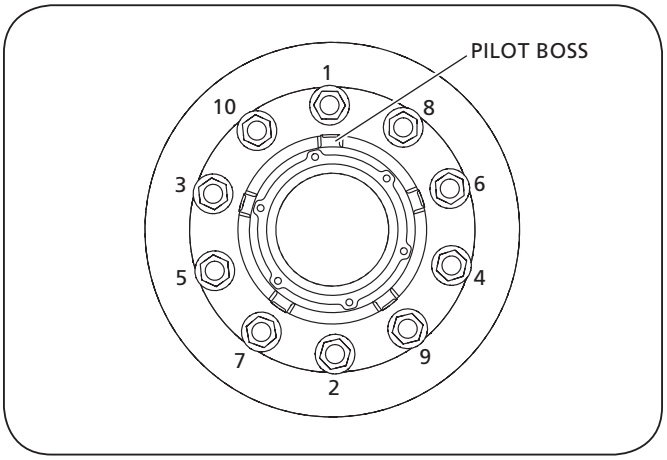
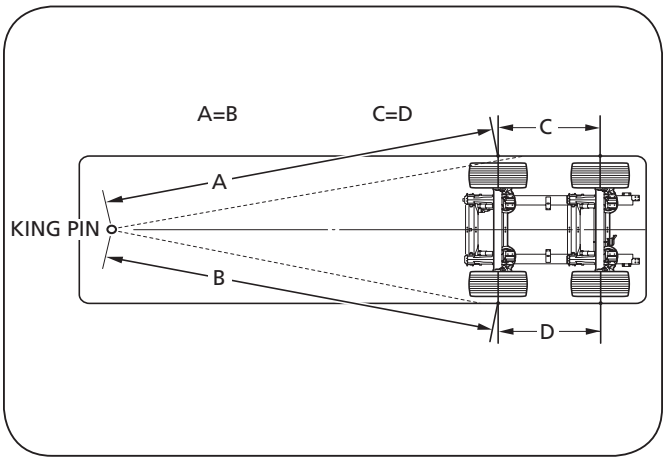


Figure 54



21. Routine Service Schedule

WHICHEVER OCCURS FIRST		PERIODIC CHECKS		
MILEAGE INTERVALS	AFTER FIRST 3,000 MILES	EVERY 10,000 MILES	EVERY 50,000 MILES	EVERY 100,000 MILES
TIME INTERVALS	AFTER FIRST MONTH	EVERY MONTH	EVERY 6 MONTHS	EVERY 12 MONTHS
VISUAL INSPECTION FOR WEAR/DAMAGE				
Check brake linings for wear.	■	■		
Check S-Camshaft for proper operation.	■	■		
Check brake adjusters for correct function.	■	■		
Check air brake system for leaks (brake applied).	■	■		
Check axle structural components for cracks or damage.	■	■		
Check hub lubrication level for excessive leakage.	■	■		
MECHANICAL CHECK				
Attention: Torque check 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 your vehicle owner's manual, whichever occurs first.	■			
Torque check all nuts and bolts to recommended setting.	■		■	
Check and adjust wheel bearing end play.	■			■
Pack hub bearings with fresh lubricant (also after every brake lining replacement, check hub bearing wear).				■
Lubricate S-Camshaft bearing bushings.	■	■		
SAFETY INSPECTION				
Check brake lining to drum clearance for correct adjustment – re-adjust clearance if necessary. Check service brake and parking brake for performance.	■	■		

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 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.

22. Torque and Lubrication Specifications

TORQUE SPECIFICATIONS	
COMPONENT	TORQUE VALUE
Grease Fitting, Spider	20-50 in-lbs (2-6 N•m)
Axle, Inner Nut	Refer to Section 7
Axle, Outer Nut	200-300 ft.-lbs. (271-407 N•m)
Air Chamber Nuts	80-125 ft.-lbs. (108-169 N•m)
Hubcap Bolts	12-16 ft.-lbs. (16-21 N•m)
Self-Threading Screw	15-22 ft.-lbs. (20-30 N•m)

LUBRICATION SPECIFICATION		
COMPONENT	SURFACE TO BE LUBRICATED	LUBRICANT
S-Camshafts	S-Camshaft Bearings (Four (4) Grease Fittings per Axle)	Lithium Complex Grease
S-Camshafts	S-Camshaft Spline	Never-Seez
Brakes	Brake Shoe Rollers anchor Pins	Never-Seez
Brakes – Brake Adjuster	Brake Adjuster Grease Fitting	Lithium Complex Grease
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.

23. Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	RESOLUTION
Brakes will not release	Brake shoes bound up at anchor pins	Lubricate brake operating parts
	Brake hoses Restricted	Replace hoses
	Brakes out of adjustment	Adjust brakes
	Damaged brake assembly	Replace or repair as required
No brakes or insufficient brakes **NOTE:** All of the possible causes would result in brake lockup.	Source of air supply shut off at tractor	Open cutout cocks at rear of tractor cab or push control valve "IN"
	Low brake line pressure	Check air pressure gauge on tractor - inoperative
	Brake lines between tractor and trailer not properly coupled	Properly couple brake lines
	Reservoir drain cock open	Close drain cock
Dog tracking	Leaf spring broken	Replace complete spring
	Bent Axle	Replace or straighten axle
	Frame or suspension out of alignment	Straighten frame or align axles
Uneven tire wear	Over or under inflation	Inflate to proper pressure
	Loose wheel stud nuts or clamps	Tighten wheel stud nuts or clamps
	Loose or tight wheel bearing adjustment	Adjust bearings
	Axle bent or out of alignment	Straighten, align or replace axle
	Tires not properly matched	Match tires
	Improper acting brakes	Correct brakes as required
	Rapid Stopping	Apply brakes slowly when approaching stop
	High-speed driving on turns	Reduce speed
Grabbing brakes	Oil, grease or foreign material on brake lining	Reline brakes
	Brakes out of alignment	Adjust brakes
	Brake drum out-of-round	Replace brake drum
	Damaged brake chamber or internal assembly	Replace brake chamber/internal assembly
	Leaky or broken hose between relay valve and brake chamber	Replace or Repair as required
Excessive heat cracks on drum	Rapid stopping or poor air flow to brakes	Replace drum
	Out of adjustment	Adjust brakes
	Binding S-Cam, anchor pins or chamber rod end pin	Lubricate and free up
	Damaged brake assembly/brake drum out-of-round	Replace or repair as required
ABS inoperable		Refer to ABS manufacturer's service literature
Slow brake application or release	Lack of lubrication	Lubricate brake operating parts
	Excessive travel in brake chamber push rod	Adjust brakes
	Restriction in hose or lines	Replace hoses
	Defective brake valve	Replace brake valve

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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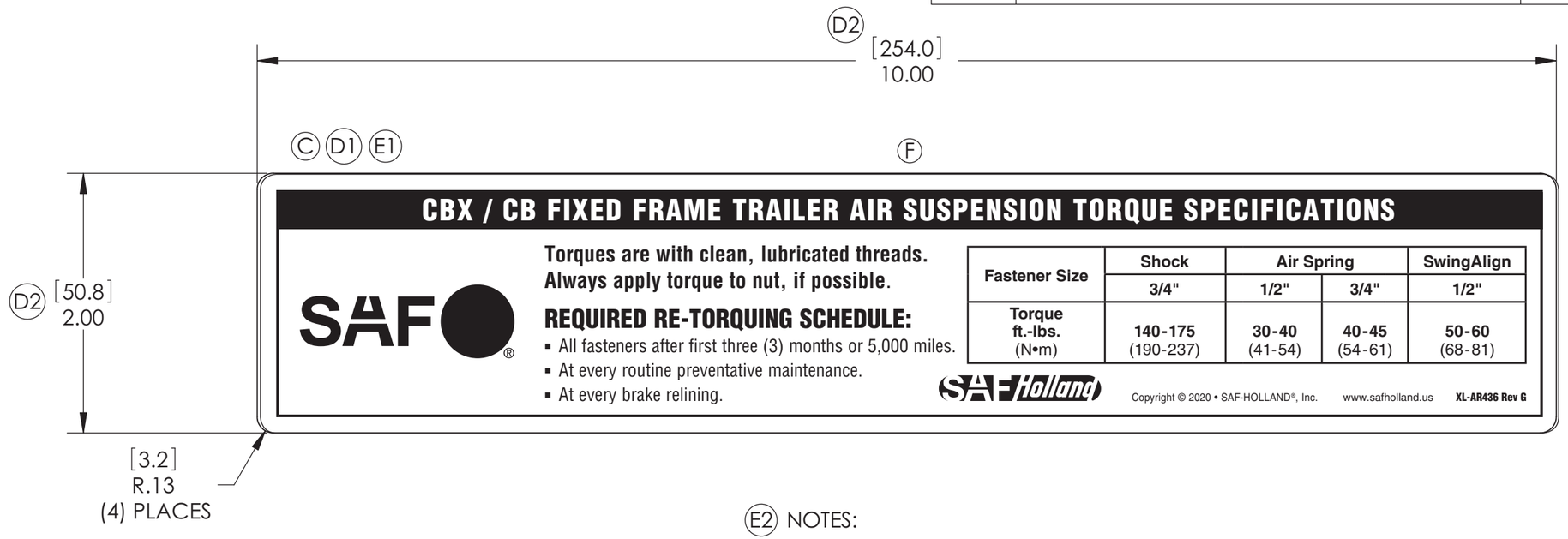
info@safholland.com

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

SAF-HOLLAND Engineering Your Road to Success

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
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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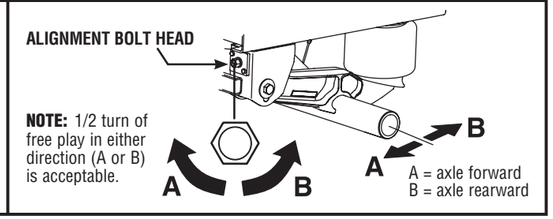
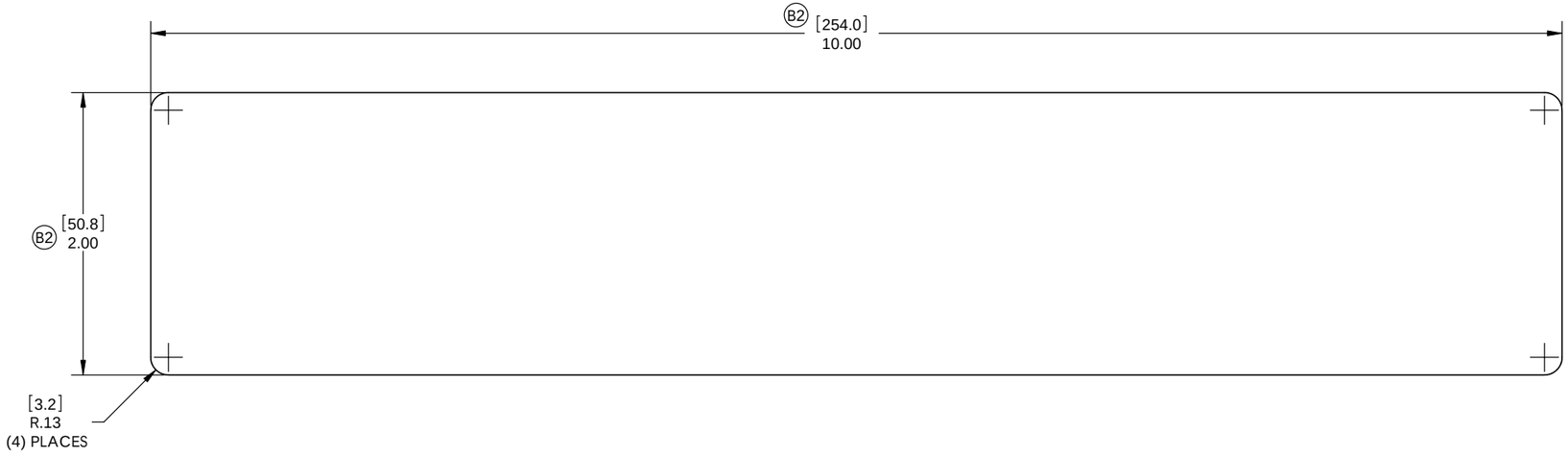
XL-AR435 Rev. B





NOTES:

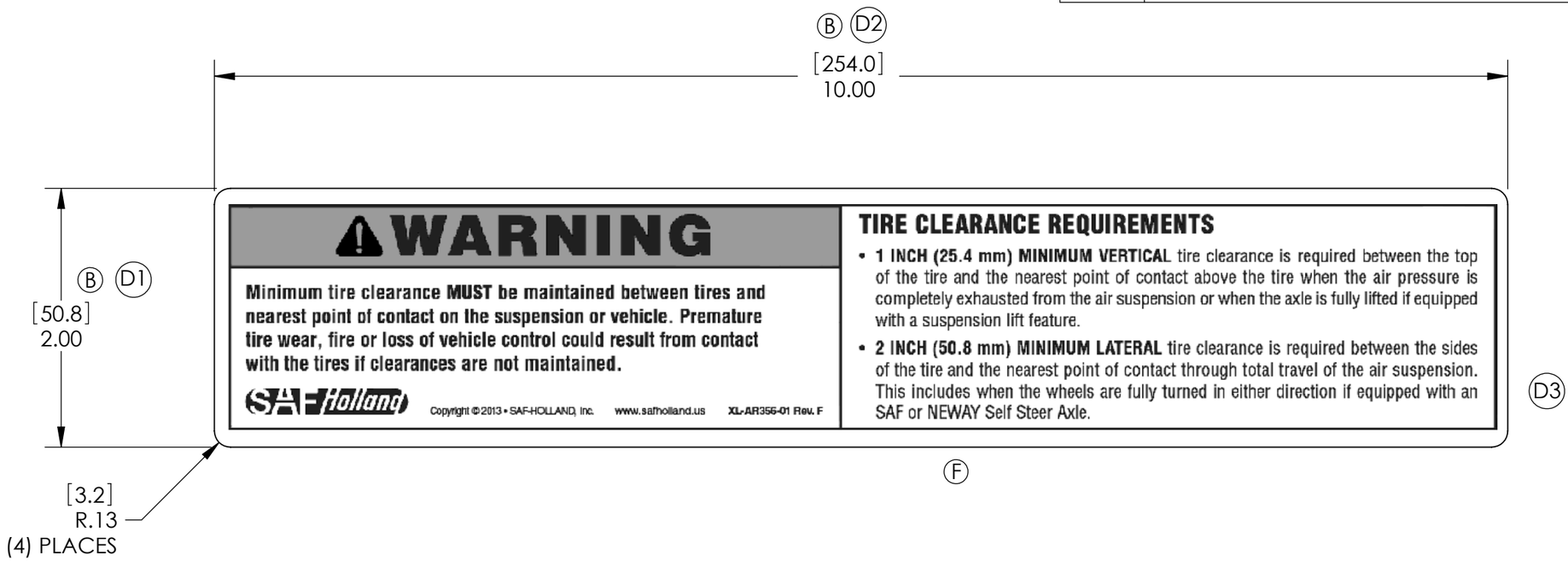
1. DECAL MATERIAL PER SPEC. NS-65-91
2. DECAL TO HAVE PREMASK MATERIAL.
3. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
4. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
5. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

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	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	307048	2017-08-07

DISC WHEEL INSTALLATION PROCEDURES

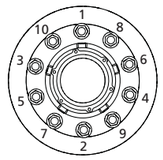
SAF-HOLLAND Group

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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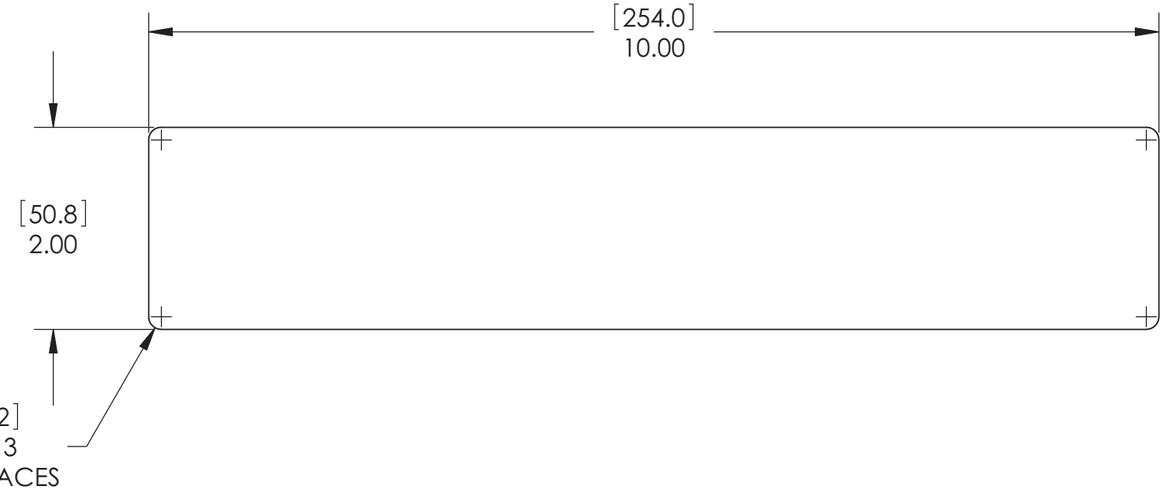
XL-SA20040DC-en-US



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: -	SAF Holland
	SCALE: 2:1	
	TITLE: DECAL, DISC WHEEL INSTALLATION	
	MATL: SEE DETAILS	MATL.#: -
	PART NUMBER: XL-SA20040DC-en-US	REV. -