

Installation Instructions

Camshaft Enclosure Retrofit Kit

SAF Drum Brake Equipped Axles



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Introduction

This manual provides you with necessary installation, inspection and maintenance information to safely retrofit SAF drum brake equipped axles with camshaft enclosures.

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

Warranty

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

Notes, Cautions, and Warnings

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

NOTE: In the United States, work shop 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.

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

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

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

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

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

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

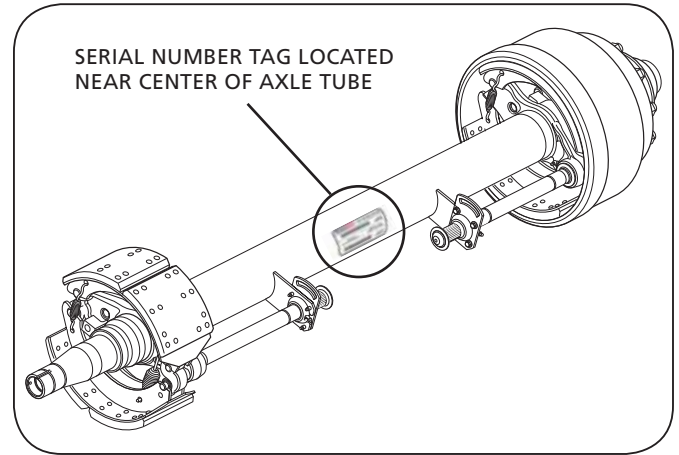
⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

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

Model Identification

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

Figure 1



Identification Tag

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

Record your tag numbers below for future quick reference.

Axle Body Part Number _____

Model Number _____

Serial Number _____

Figure 2



General Safety Instructions

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

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

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

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

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

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

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

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

2. Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.
3. Ensure that the brakes are not overheated by continuous operation.

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

4. The parking brake must not be immediately applied when the brakes are overheated, as the brake discs may be damaged by different stress fields during cooling.
5. Observe the operating recommendation of the trailer builder for off-road operation of the installed axles.

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

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

6. SAF axles require routine service, inspection and maintenance in order to maintain optimum performance, operational and road safety and to be able to recognize natural wear and defects before they become serious. Failure to replace cracked, broken, loose, or missing parts is a violation of the U.S. Department of Transportation Federal Motor Carriers Safety Administration Code Part 393.207. Refer to the Routine Service Schedule in Section 6.

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

A list of SAF-HOLLAND distributor/dealer locations to supply SAF-HOLLAND Original Parts can be found at www.safholland.us or you can contact our customer service group at 1-888-396-6501.

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

General Service / Maintenance

1. Carry out regular visual checks of the brakes, tires and all chassis components.
 - a. Inspect for secure mounting, wear, leaks, corrosion and damage.
 - b. Check for loose, broken or cracked air hoses, air system leaks, and damaged components.
 - c. Check that brake hoses and cables are properly secured.
2. Inspect brake shoes and components for wear.

NOTE: Follow SAF-HOLLAND guidelines 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" or less, or when the lining rivets have begun to contact the drum (**Figure 3**).

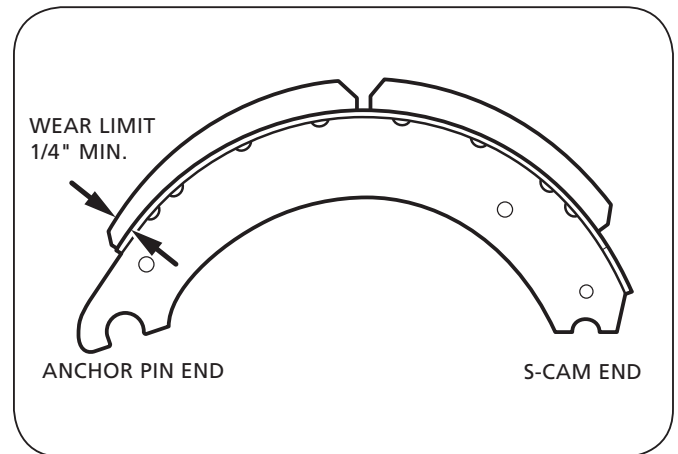
3. Inspect the spider for expanded anchor pin holes and for cracks. Brake spiders cannot be repaired and must be replaced with a new axle assembly.
4. Inspect the S-camshaft bracket for broken welds, cracks and correct alignment. Replace damaged brackets.
5. Inspect the anchor pins for corrosion and wear. Replace worn or damaged anchor pins.
6. Make sure the spring brake chambers are not caged and the dust plugs are properly installed.
7. Make sure that the vent holes in the air brake chamber are not covered with snow, ice, mud, etc.
8. Inspect the wheel bearing unit for grease leaks at every brake pad change.
9. Visually check the brake assembly (eg. shoes, drum, etc.) for oil or grease contamination.
10. Check that all dust caps and boots are present and in good condition.
11. Regularly carry out general safety checks in accordance with any applicable laws.
12. After every wheel change, the wheel nuts must be retightened to the specified torque level after the initial 100 miles of operation, and then at every regular service interval.

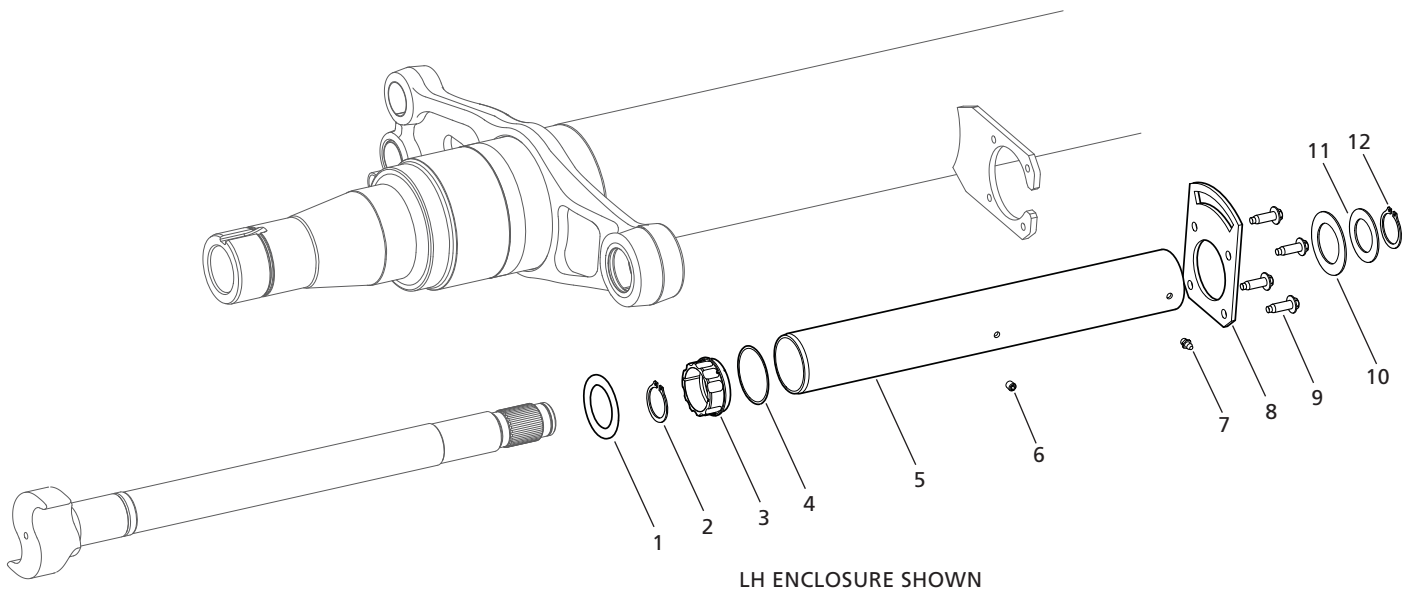
CAUTION

Failure to retighten wheel nuts at specified intervals may result in component failure which, if not avoided may result in damage to property.

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

Figure 3





ITEM	DESCRIPTION	QTY.
1	Washer, S-cam Bearing-Outboard	2
2	Retaining Ring, 1.5" I.D.	2
3	Bearing Assy, S-cam Spider Inboard	2
4	O-Ring, S-cam Enclosure Inboard	2
5	S-cam Enclosure Assembly	2
6	Pressure Plug, 1/16" NPTF	2
7	Grease Zerk	2
8	Mounting Plate, S-cam Enclosure	2
9	Screw, Thread Rolling Tapping	8
10	Washer, Shaft End	2
11	Washer, Shaft End	2
12	Retaining Ring, 1-5/32" I.D.	2

NOTE: For axle component and service kit part numbers contact SAF-HOLLAND Customer Service at 1-888-396-6501.

NOTE: This kit includes parts to rebuild both left and right sides.

1. Disassembly

1.A. Wheel and Brake Component Removal

NOTE: Before you begin any axle/brake service procedure, 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.

1. Release trailer brakes, and cage spring brakes according to spring brake manufacturer's instructions. Remove tire and wheel assembly to access hub and drum.

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

2. Remove brake drum, brake pads, and slack adjusters. Reference the drum brake service manual, XL-TA100060M-en-US, for proper disassembly procedures.

1.B. S-Camshaft And Bearing Removal

1. Remove the snap ring at the inboard side of the brake spider (**Figure 4**).
2. Remove the cam bearings located in the brake spider. This can be accomplished by sliding the camshaft forward and then pumping grease into the zerk located on the brake spider. This will force the outer bearing out of the spider bore. The inner bearing can then be removed using a screwdriver. Care must be taken not to damage the spider or cam bearing (**Figure 5-6**).

NOTE: The S-camshaft enclosure kit reuses the outer S-camshaft spider bearing. Care should be taken during the removal of the inner spider bearing not to damage the outer bearing.

CAUTION Do not use a chisel to cut the inner S-camshaft bearing. The spider shoulder can be damaged resulting in a grease leak which, if not avoided may result in wheel end and/or brake failure.

Figure 4

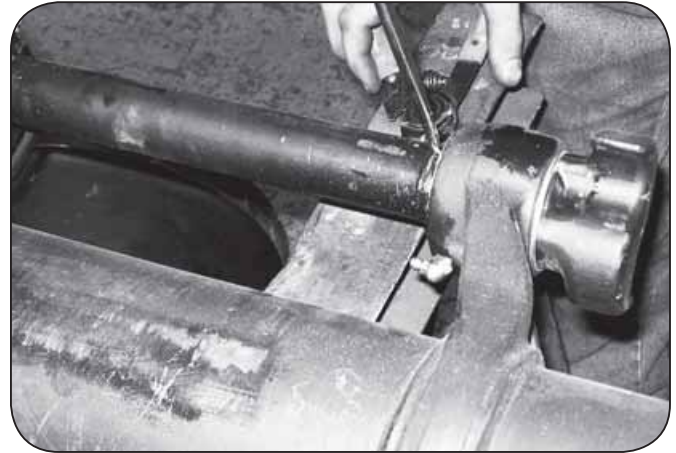
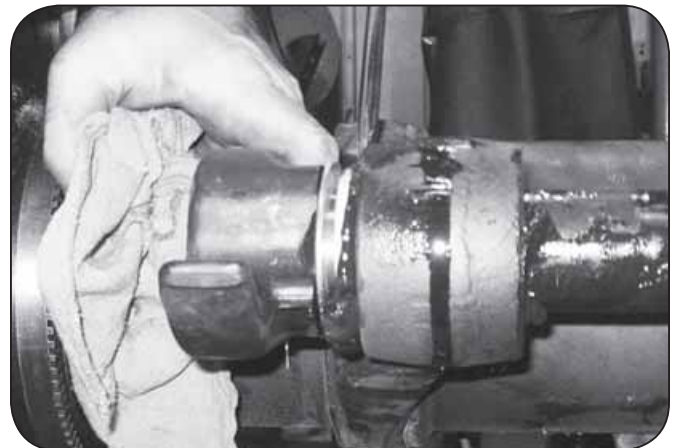


Figure 5



Figure 6



3. Once the cam bearings have been removed from the spider, the camshaft can be removed (**Figure 7 & 8**).
4. Remove the four bolts securing the S-camshaft housing to the axle bracket and discard (**Figure 9**).

Figure 7

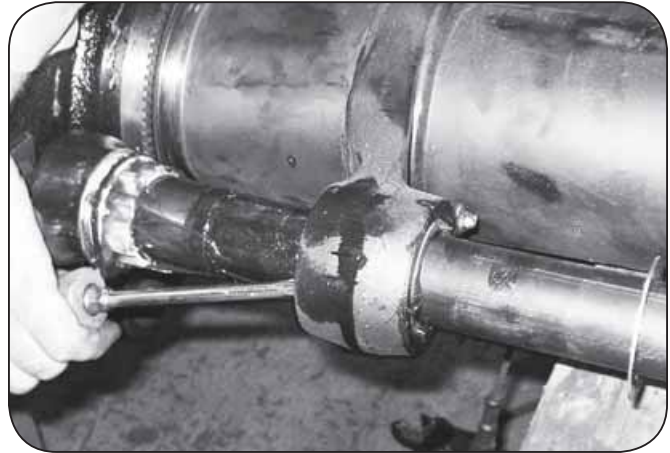


Figure 8

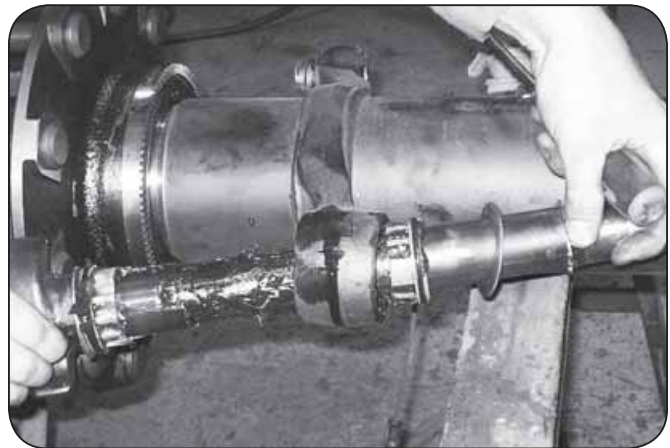
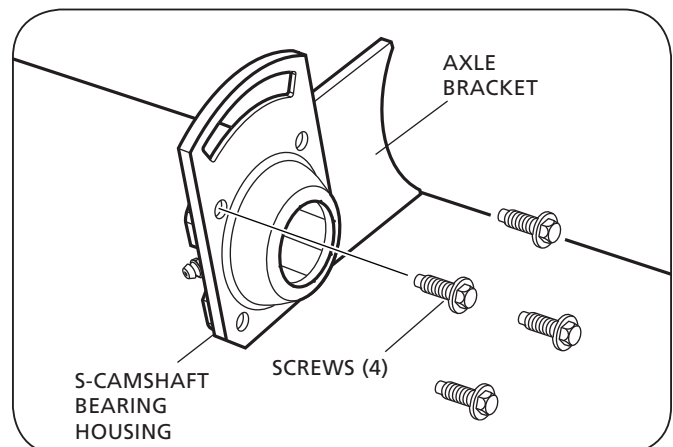


Figure 9



2. Camshaft Enclosure Installation

2.A. Camshaft Enclosure Installation

1. Thoroughly clean the brake spider bore of rust, dirt, grease or any other contaminants that could damage the camshaft bearing seals and cause it to leak.
2. Slide the outer cam bearing, removed in Step 1.D.2, onto the camshaft. Insert the camshaft through the brake spider and slide the inner camshaft bearing onto the camshaft.
3. Using a soft mallet, carefully drive the outer S-camshaft bearing, removed in Step 1.D.2., into the brake spider. When installed properly, the outer face of the S-camshaft bearing should be flush with the brake spider (**Figure 10**).
4. Using a soft mallet, carefully drive the inner S-camshaft bearing and outer o-ring provided with the retrofit kit into the brake spider. When installed properly, the outer face of the S-camshaft bearing should be flush with the brake spider (**Figure 10**).
5. Install the retaining ring on the camshaft (**Figure 11**).

Figure 10

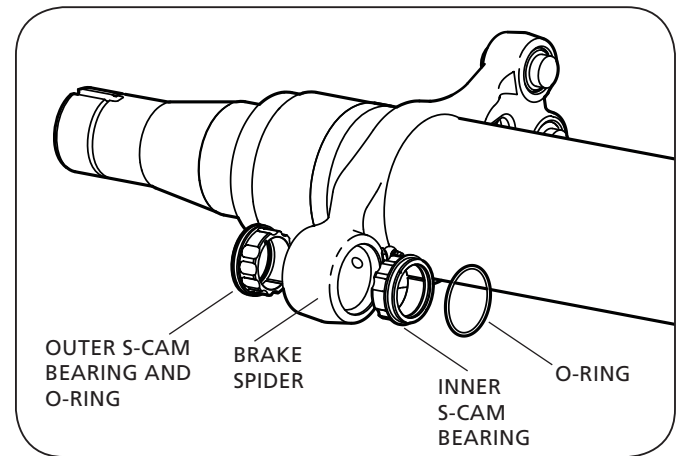
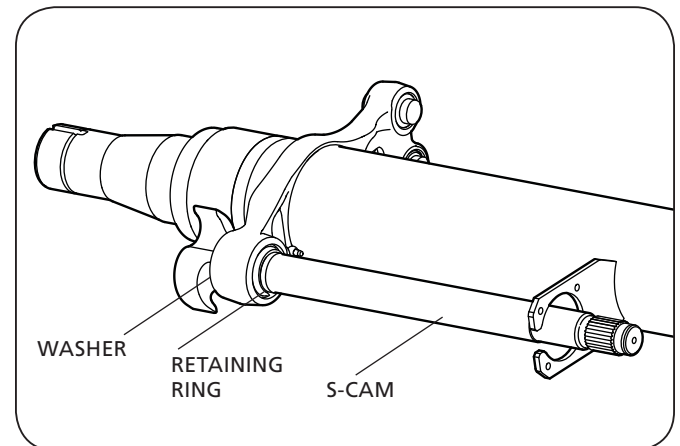


Figure 11



4. Inspect S-camshaft installation to ensure that the correct S-camshaft has been installed on the required side of the axle for proper operation (**Figure 12**).

WARNING Failure to properly orient the S-camshaft will prevent proper function of the brake system which, if not avoided, could result in death or serious injury.

5. Slide camshaft tube over camshaft, through the axle bracket, and into spider. The camshaft enclosure should be oriented so that the grease zerk and vent hole are facing away from the axle tube. Using a soft mallet, carefully drive the camshaft tube until it is fully seated against the brake spider. (**Figure 13**).

IMPORTANT: Care must be taken to ensure the o-ring is properly seated between the inner brake spider bearing and the camshaft enclosure.

CAUTION Failure to properly seat the o-ring between the inner brake spider bearing and camshaft enclosure could result in a grease leak which, if not avoided may result in wheel end and/or brake failure.

Figure 12

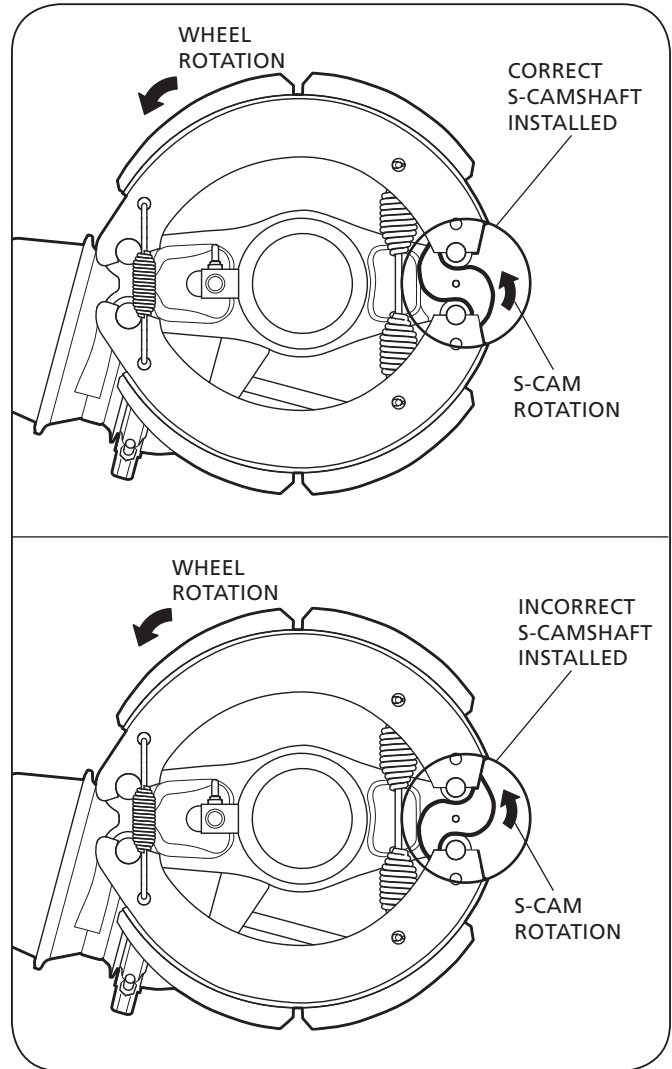
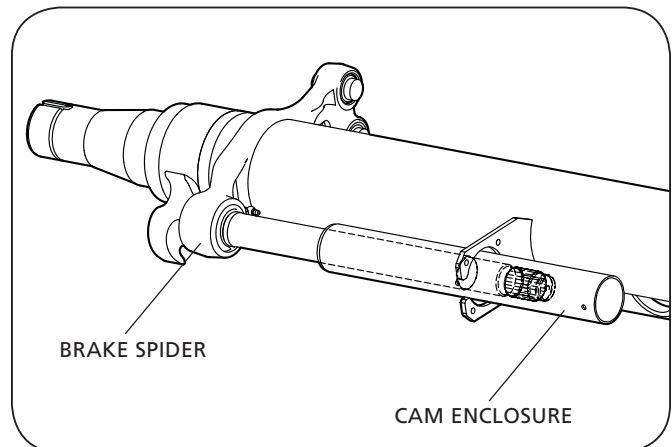


Figure 13



5. Fasten the mounting plate to the axle bracket using the four self tapping mounting screws provided in the retrofit kit. Tighten the screws to 25-30 ft-lbs (33-40 Nm) (**Figure 14**).
6. Weld the mounting plate to the camshaft enclosure as shown in (**Figure 15**).
7. Install grease zerk in cam tube (**Figure 16**).
8. Lubricate the camshaft bearings in the brake spider until grease is seen to purge from the open hole in the camshaft enclosure tube. Refer to Section 5 for approved lubricants. Lubricate the camshaft bearings on the spindle end of the camshaft until grease is seen to purge from the open hole in the camshaft enclosure tube (**Figure 16**). Wipe off excess grease.
9. Install the pipe plug into the grease purge hole on the camshaft enclosure tube.

2.B. Brake Component and Wheel Installation

1. Re-install brake pads, brake drum and slack adjusters. Reference the drum brake service manual, XL-TA10006OM-en-US, for proper assembly procedures.
2. Re-install tire and wheel assembly.

Figure 14

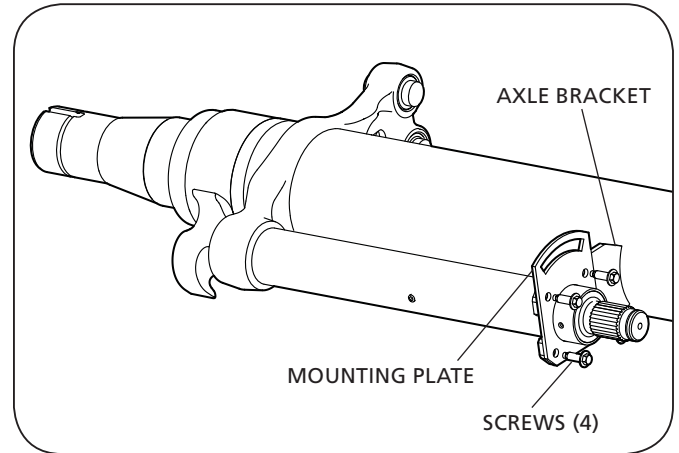


Figure 15

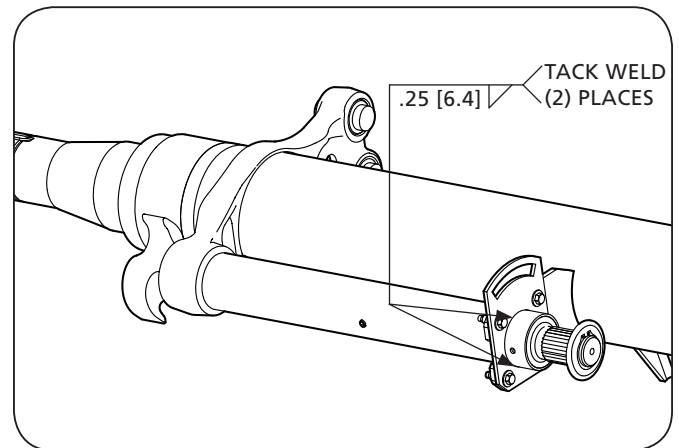
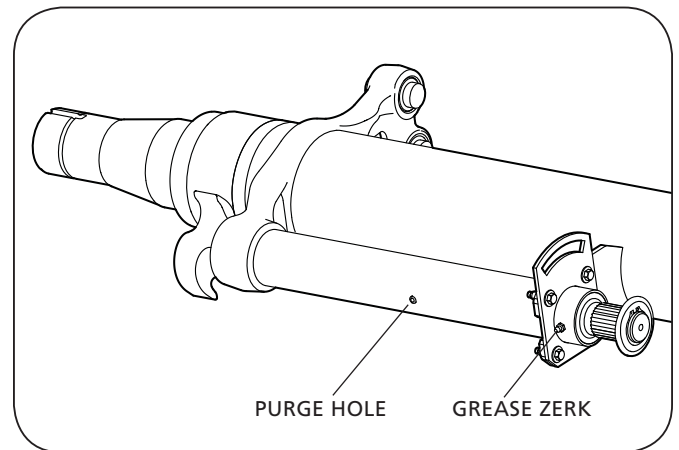


Figure 16



3. Brake Adjustment Procedure

1. Verify that spring brakes are uncaged prior to beginning adjustment procedure.
2. Adjust the slack adjuster until the brake lining contacts the brake drum, then back off 1/2 turn.
3. Apply the 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.
 - a. The optimum distance of push rod travel should be approximately 1.5" - 2.0" (**Figure 17**).
 - b. Angle between the push rod and the slack adjuster with brake applied, should be 85°- 95° (**Figure 18**).
 - c. 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 brake system and check to see that all brakes release to the normal relaxed position. If all brakes do not properly release, see Troubleshooting Guide on page 14.

CAUTION

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

Figure 17

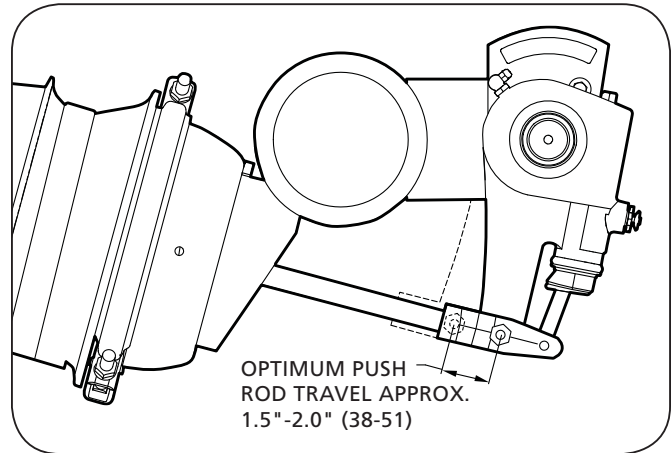
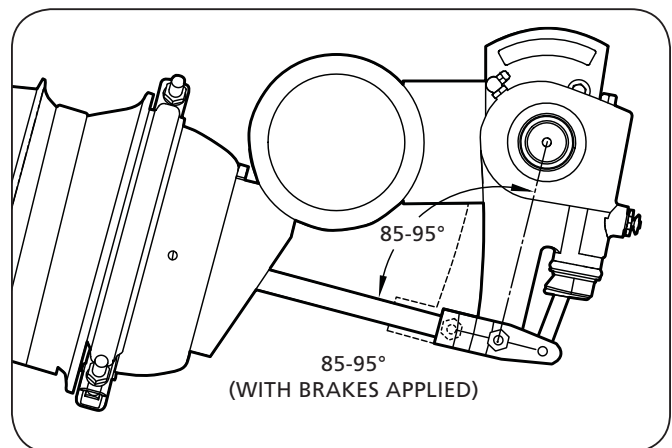


Figure 18



4. Torque Chart

COMPONENT	TORQUE VALUE
Grease Fitting, Spider	20 - 50 in-lbs (2 - 6 N•m)
Air Chamber Nuts	80 - 125 ft-lbs (108 - 169 N•m)
Self-Threading Screw	25 - 30 ft-lbs (33 - 40 N•m)

5. Lubrication Specification

COMPONENT	SURFACE TO BE LUBRICATED	TYPES OF LUBRICATION
S-camshafts	S-camshaft bearings (four grease fittings per axle)	Lithium Complex Grease
S-camshafts	S-camshaft spline	NeverSeez
Brakes	Brake Shoe Rollers Anchor Pins	NeverSeez
Brakes - Slack Adjuster	Slack Adjuster Grease Fitting	Lithium Complex Grease
Axle	Bearings and Hubs	80/90 Gear Oil or Lithium Complex Grease *

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

6. Troubleshooting Chart

PROBLEM	POSSIBLE CAUSES	POSSIBLE REMEDIES
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 compressor
	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 strighten 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	Straigten, 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
Brake dragging	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





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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