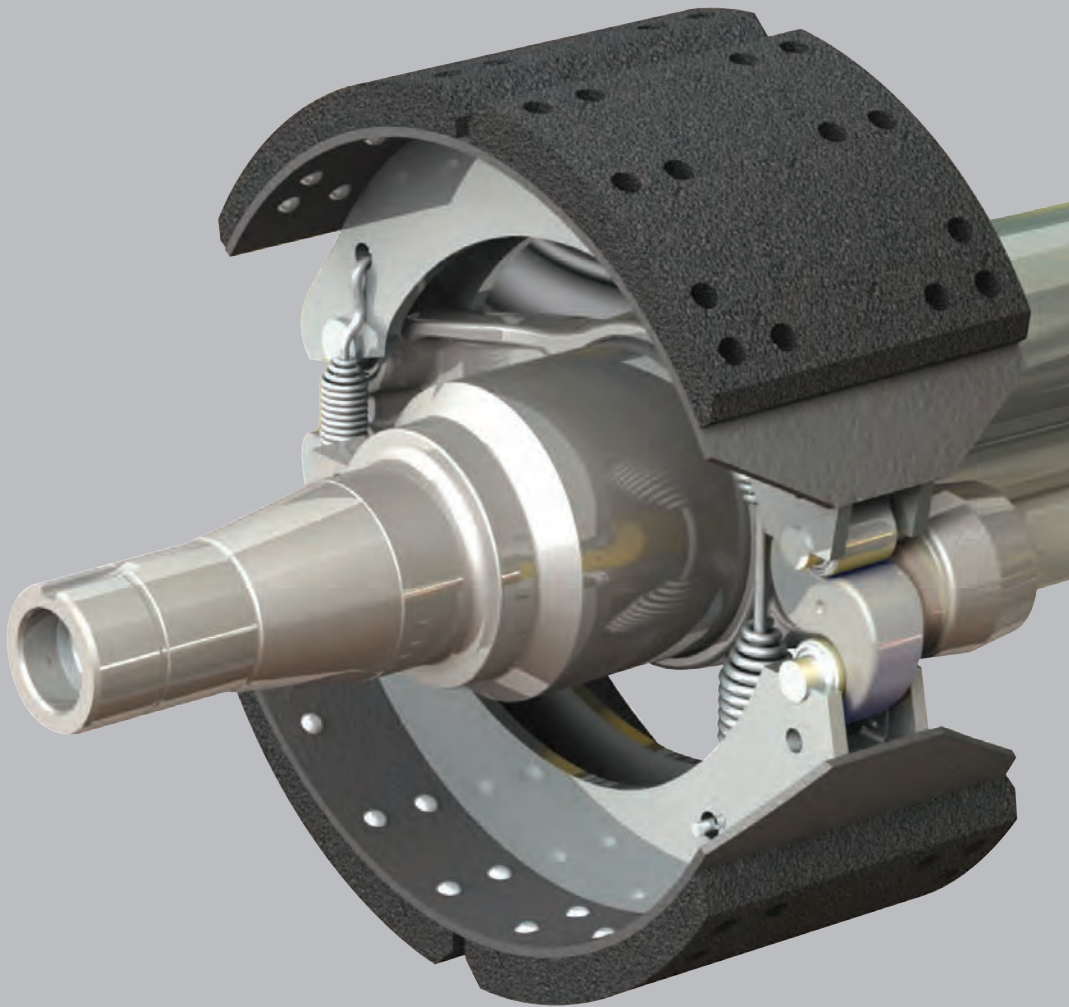


Service Manual for Drum Brake Axles

Tapered & Parallel Spindle Axles



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Introduction

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

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

SAF axles are designed and engineered to provide trouble-free service.

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. 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.


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

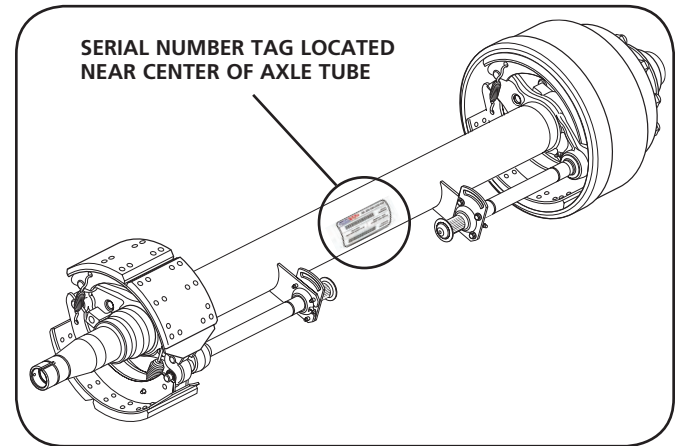
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
- WARNING

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

1. Model Identification

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

Figure 1



2. Identification Tag

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

Record your tag numbers below for future quick reference.

Axle Body Part Number _____

Model Number _____

Serial Number _____

Figure 2

SAF-HOLLAND USA, INC. 	
Axle Body 02500528600Z	
Model: 14710995090 Axle Beam Rating: 20,000 lbs	Made in USA US and Foreign Patents Apply
Serial No.(S) 51 09 058 0037	

3. 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 pre-positioning of the brake chamber, 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 wheel contact surfaces between the wheel and hub must not be additionally painted. The contact surfaces must be clean, smooth and free from grease.

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

2. Only the wheel and tire sizes approved by the trailer builder may be used.
3. Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.

4. 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.

5. The parking brake must not be immediately applied when the brakes are overheated, as the brake drums may be damaged by different stress fields during cooling.
6. 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.

7. 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. See section 22, page 30 for Routine Service Schedule.

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

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

Updates to this manual will be published as necessary on the Internet under www.safholland.us.

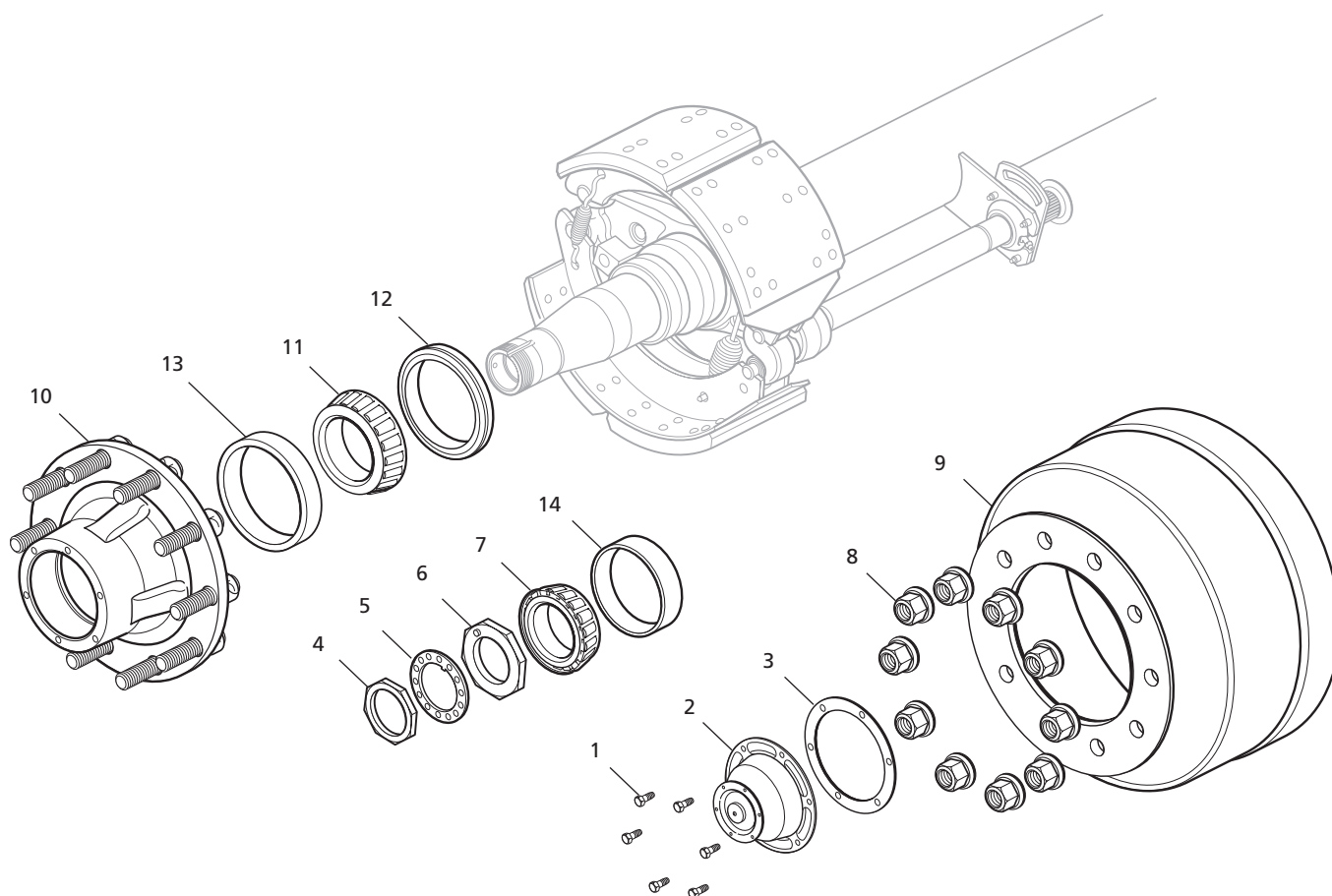
4. General Maintenance Instructions

Routine maintenance checks should be performed in accordance with the routine service schedules shown on pages 30 and 31 of this manual, and in accordance with other manuals for brake chambers, slack adjusters and/or ABS system installed with your axle.

- Carry out a general safety check in accordance with the statutory provisions.
- For optimized performance of your SAF suspension axle system, always service with SAF-HOLLAND Original Parts.

5. Recommended Inspection Schedule

Regular equipment inspections should be performed in accordance with the inspection schedules shown on pages 30 and 31 of this manual, and in accordance with other manuals for brake chambers, slack adjusters and/or ABS system installed with your axle.

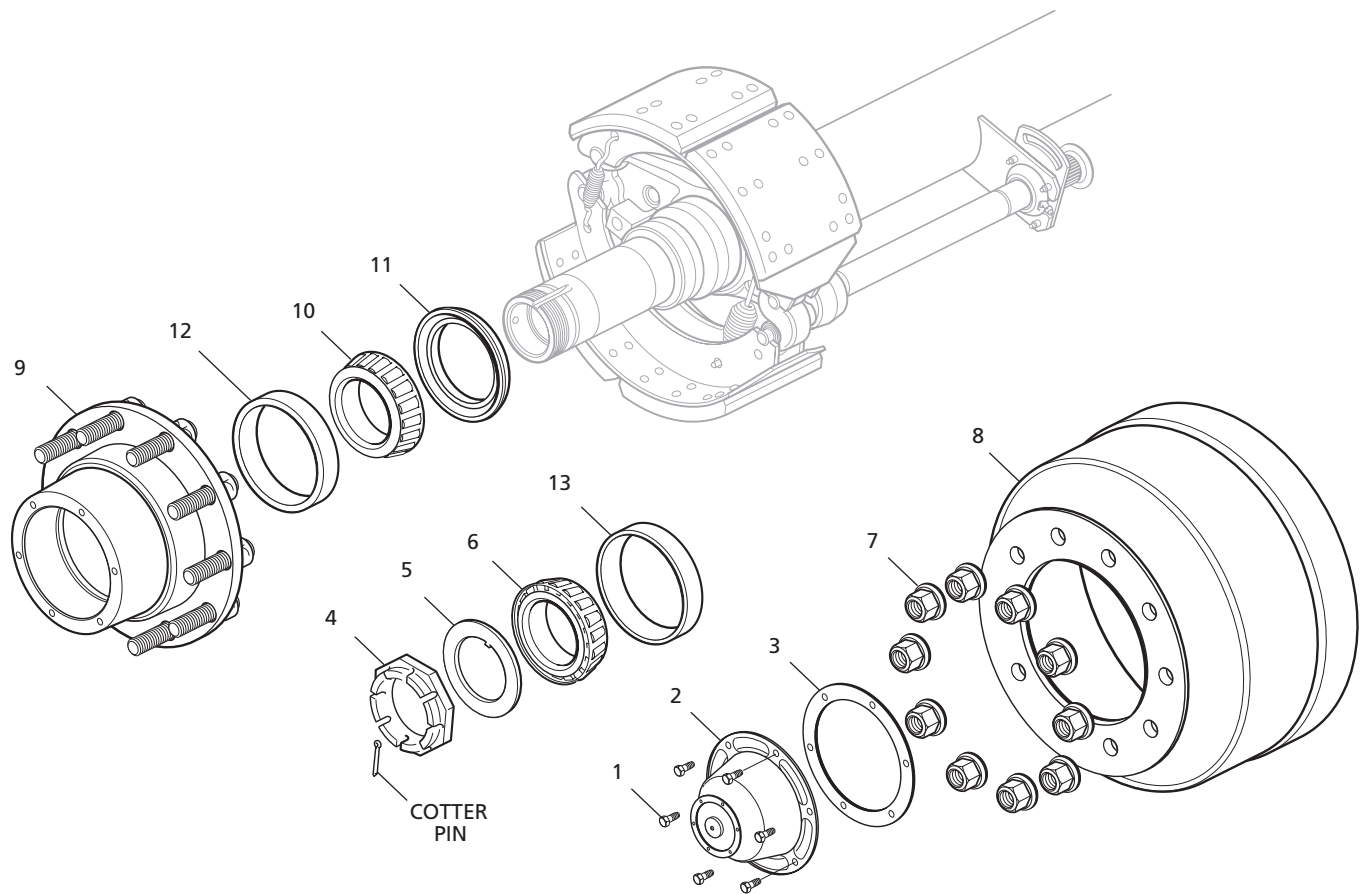


Note:

Refer to aftermarket parts list document XL-TA10058PL-en-US - SAF Drum Brake Axle Parts List Manual for axle component and service kit part numbers.

Tapered Spindle Components

ITEM NO.	DESCRIPTION	QTY.	ITEM NO.	DESCRIPTION	QTY.
1	Bolt, Hub Cap	12	8	Nut, Flange	20
2	Hub Cap Assy, Aluminum	2	9	Brake Drum	2
3	Gasket, Hub Cap	2	10	Hub Assy	2
4	Nut, Axle-Outer	2	11	Cone, Bearing-Inner	2
5	Washer, Axle Lock	2	12	Seal, Hub	2
6	Nut, Axle-Inner	2	13	Bearing Cup, Inner	2
7	Cone, Bearing-Outer	2	14	Bearing Cup, Outer	2



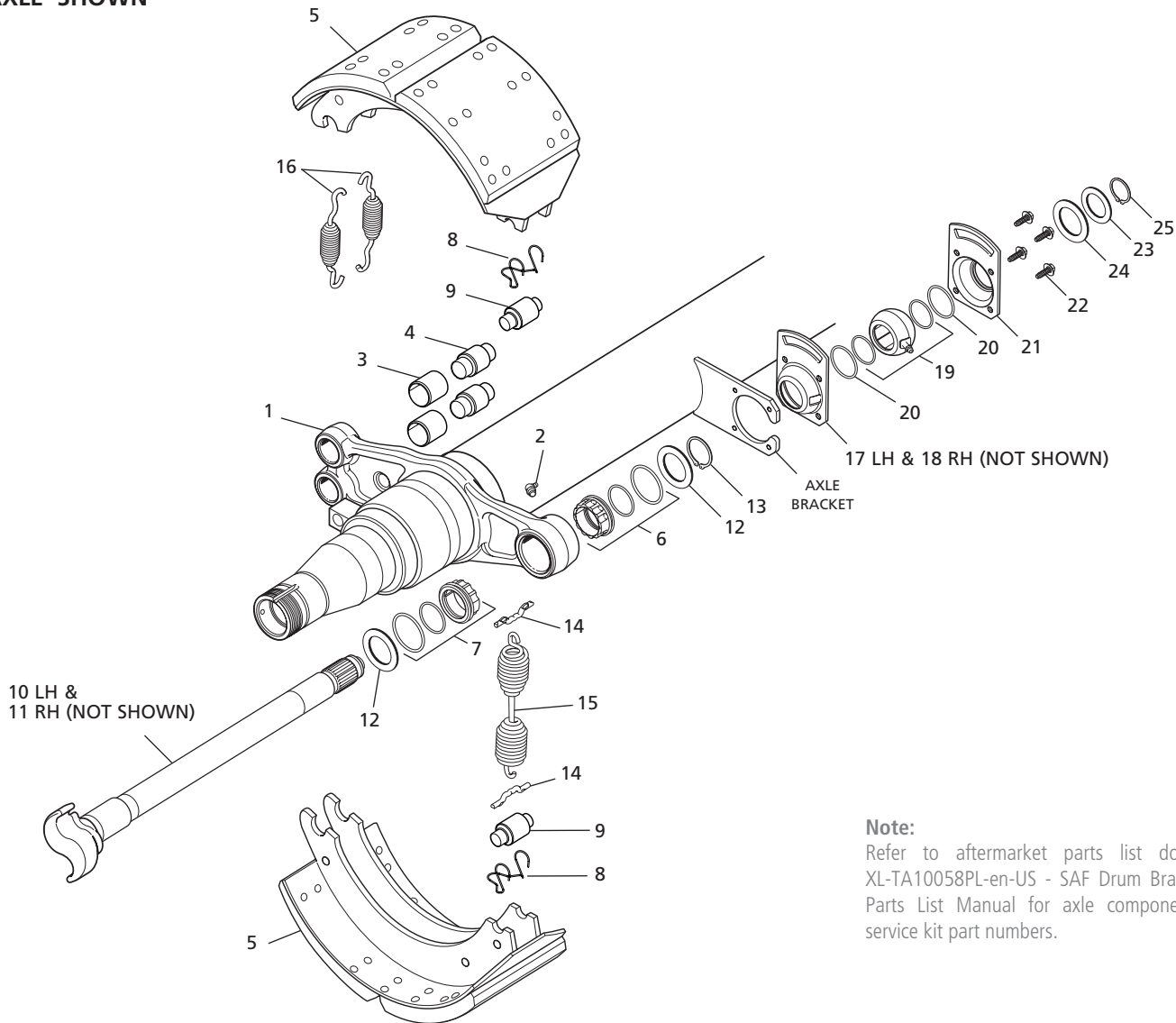
Note:

Refer to aftermarket parts list document XL-TA10058PL-en-US - SAF Drum Brake Axle Parts List Manual for axle component and service kit part numbers.

Parallel Spindle Components

ITEM NO.	DESCRIPTION	QTY.	ITEM NO.	DESCRIPTION	QTY.
1	Bolt, Hub Cap	12	8	Brake Drum	2
2	Hub Cap Assy, Aluminum	2	9	Hub Assy	2
3	Gasket, Hub Cap	2	10	Cone, Bearing-Inner	2
4	Nut, Axle	2	11	Seal, Hub	2
5	Washer, Axle Lock	2	12	Bearing Cup, Inner	2
6	Cone, Bearing-Outer	2	13	Bearing Cup, Outer	2
7	Nut, Flange	20			

TAPERED SPINDLE AXLE SHOWN



Brake Components

ITEM NO.	DESCRIPTION	QTY.	ITEM NO.	DESCRIPTION	QTY.
1	Axle Body Assembly	1	14	Return Spring Pin	4
2	Fitting, Lubrication	2	15	Spring, Return-Hub/Drum	2
3	Bushing, Anchor Pin	4	16	Spring, Anchor Pin	4
4	Pin, Anchor	4	17	Housing, S-cam Bearing, LH Slotted	1
5	Brake Shoe Assembly	4	18	Housing, S-cam Bearing, RH Slotted	1
6	Bearing Assy, S-cam-Spider Inboard	2	19	Bearing Assy - S-camshaft	2
7	Bearing Assy, S-cam-Spider Outboard	2	20	O-Ring, S-camshaft Bearing Seal-Inboard	4
8	Retainer, Roller	4	21	Housing, S-cam Bearing	2
9	Roller, Brake Shoe	4	22	Screw, Thread Rolling Tapping	8
10	S-camshaft, LH	1	23	Washer, Shaft End	2
11	S-camshaft, RH (not shown)	1	24	Washer, Shaft End	2
12	Washer, S-cam Bearing-Outboard	4	25	Retaining Ring	2
13	Retaining Ring	2			

6. Hubs, Bearings and Seal Removal

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

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

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.
2. Remove drum from hub using support device such as a drum dolly (**Figure 3**).

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

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

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

NOTE: Some Parallel spindle configurations require removal of cotter pin from castellated axle nut (**Figure 5**).

Figure 3

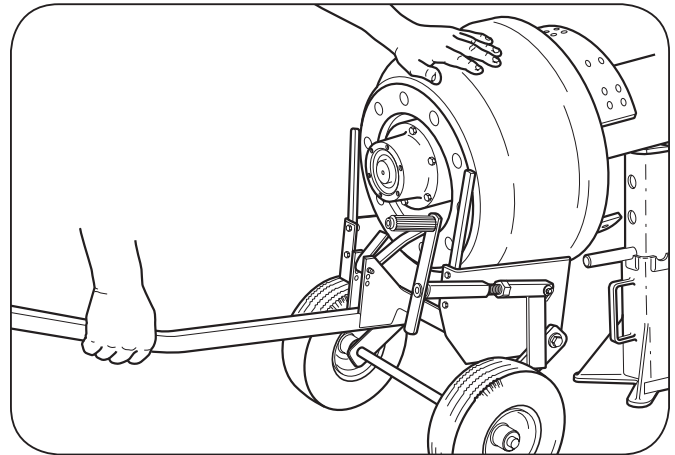


Figure 4

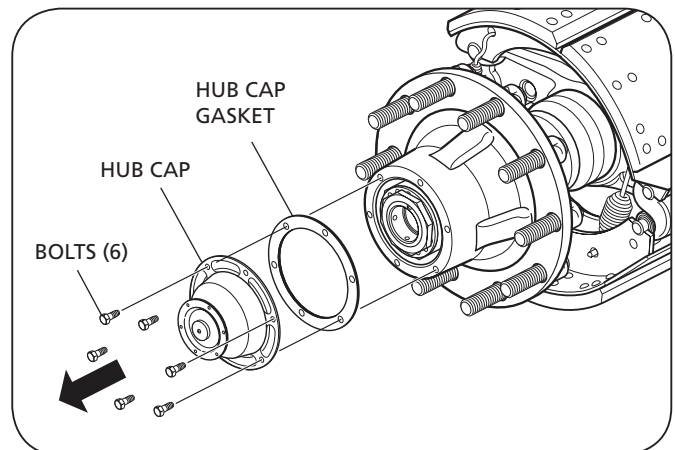
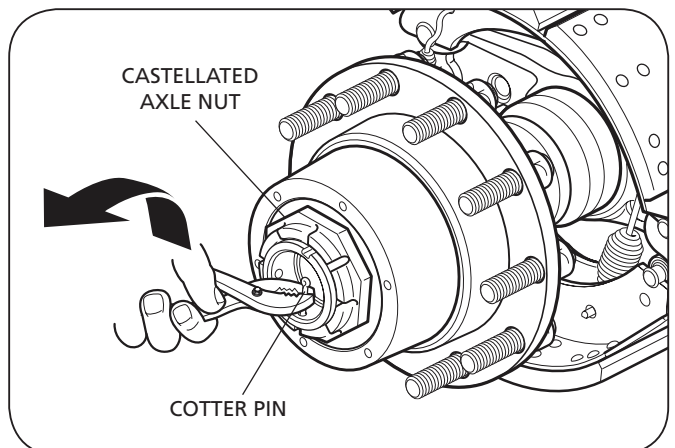


Figure 5



4. Remove axle nut from the spindle using wrench with axle nut socket (**Figure 6**).
5. Release the axle washer and inner axle nut from the spindle (**Figure 7**).
6. Remove the outer hub bearing from the spindle (**Figure 7**).

NOTE: With 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, may result in minor to moderate injury.

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

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

Figure 6

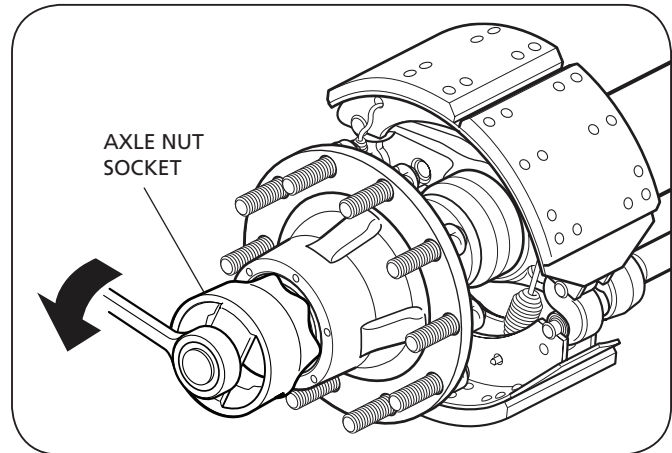


Figure 7

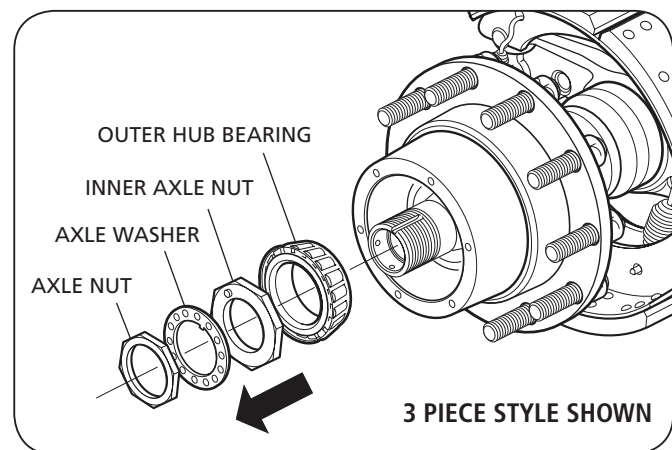
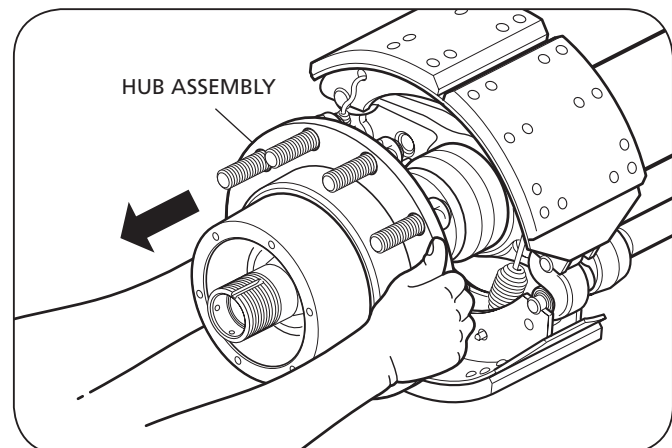


Figure 8



8. Remove the inner hub bearing from the spindle or from the inside of the hub (**Figure 9**).
9. 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 one during reassembly being careful not to gouge the spindle shoulder (**Figure 9**).

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.

7. Bearing Inspection

CAUTION

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

CAUTION

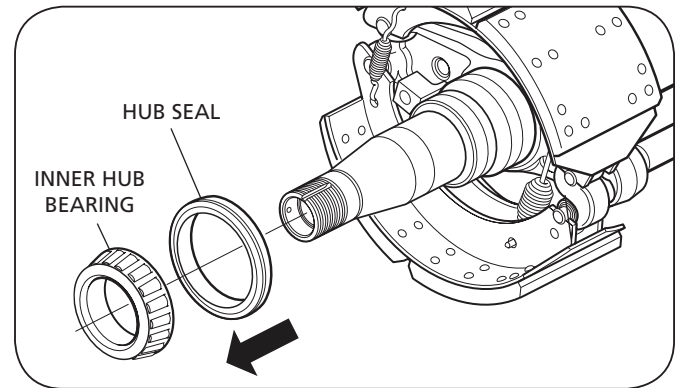
Do not spin dry hub bearings with compressed air. Bearing damage may result.

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. Steam or water will rust bearings and should never be used.

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 reassemble a tapered roller bearing in a damaged or worn housing or on damaged or worn spindles. Housings or spindles should be replaced and not remachined if the bearing journal is worn.

Figure 9



8. Hubs, Bearings and Seal Installation

8.A. Spindle mounted Hub Seal Installation instructions. (see 8.B. 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 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 seal will result.

CAUTION

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

4. Apply a thin layer of sealant to the O.D. of the spindle shoulder. Place hub seal on spindle with printed side facing out towards the end of the spindle. (**Figure 10**).
5. Drive hub seal into place using 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 11**). Wipe away excess sealant.
6. 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 emery cloth to remove any burrs or old bore sealant.

Figure 10

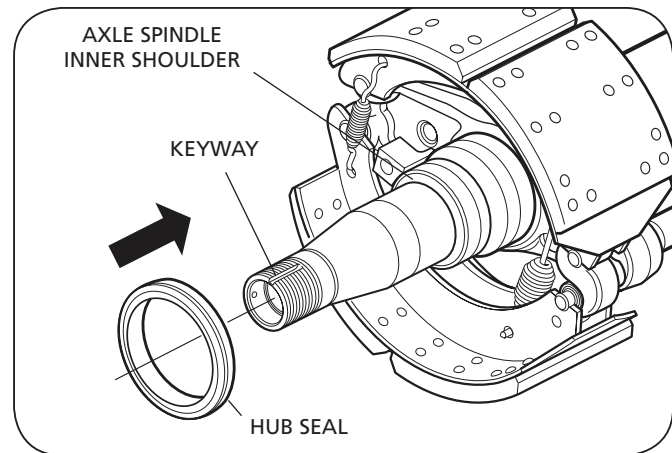
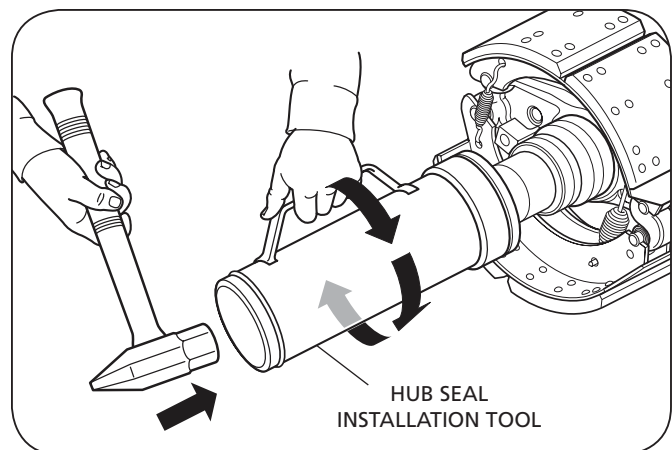


Figure 11



8. Hubs, Bearings and Hub Seal Installation *continued*

7. Install inner and outer bearing cups into hub (**Figure 12**).
8. Install inner bearing on spindle (**Figure 12**).

NOTE: If using oil for lubrication, coat bearings with oil before installation. See Section 11 for proper wheel end oil lubrication instructions. (**Figure 12**).

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

NOTE: If using grease and not oil for hub lubrication, the inner and outer bearing, and the hub cavity must be pre-packed with grease before installation. Lubricate wheel end components with grease specified in lubrication table on page 32 of this manual.

9. Lubricate inside of hub cavity and install on spindle (**Figure 12**).

CAUTION Hub seals should be installed before performing the hub bearing adjustment procedure.

8.B. Hub Mounted Hub Seal Installation Instructions

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

NOTE: Do not apply any sealant to the spindle shoulder.

2. Place the hub on a smooth, hard surface in a horizontal position. Pre-lube the inner bearing and place it into the hub bearing cup (**Figure 13**).

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 3 to 5 pound hammer to drive against the end of the tool. Drive seal into bore until complete bottoming is assured (**Figure 14**). Remove Installation Tool and apply a thin layer of lubricant on the I.D surface of the seal.

NOTE: Do not apply lubricant to the O.D. of the seal.

Figure 12

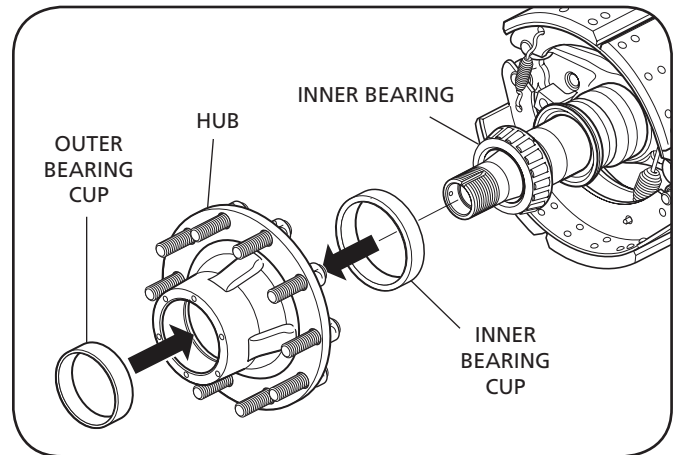


Figure 13

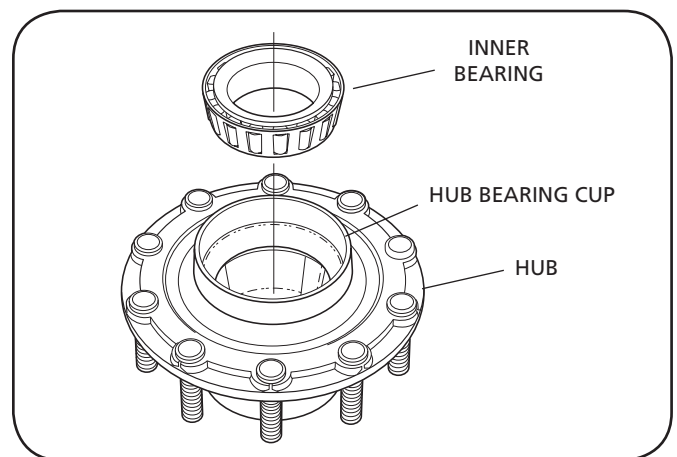
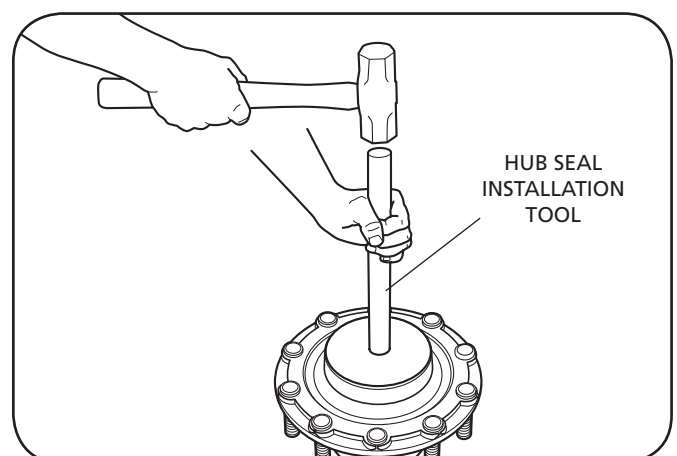


Figure 14



4. Gently push the hub assembly onto the spindle to the proper position. Fill the hub cavity with lubricant until it runs over the outer bearing cup. Coat the outer bearing with lubricant and place it on the spindle and into the bearing cup. (**Figure 15**)

NOTE: When using grease, pre-pack the hub cavity. The grease fill amount should be to a 3 o'clock and 9 o'clock level. This is to ensure a 50% hub cavity fill. Use a template to hold grease in place while filling the hub cavity. (**Figure 15**)

9. Hub Bearing Adjustment

1. Install outer bearing on spindle (**Figure 16**).

CAUTION Do not ram the hub into the spindle bearing shoulder. This could damage the hub seal.

2. Install bearing inner-axle adjustment nut finger tight against the outer bearing (**Figure 16**).
3. While rotating the hub assembly—tighten the inner axle adjustment nut to 200 ft-lbs (271 N•m).
4. Back off the inner axle adjustment nut one full turn and then retorque nut to 50 ft-lbs (68 N•m) while rotating the hub assembly.
5. Back off inner axle nut approximately 1/4 turn and install axle lock washer (**Figure 17**).
6. Install the outer axle nut finger tight against the axle lock washer (**Figure 17**).

NOTE: Some parallel spindle axles use a castellated nut; if applicable align to nearest hole and install cotter pin. See Page 9, Figure 5

7. Tighten the outer axle nut to 300-400 ft-lbs (406 - 541 N•m).

NOTE: 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 end play is not within specification, readjustment is required.

IMPORTANT: If end play is not within specification, readjustment is required.

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

continued

Figure 15

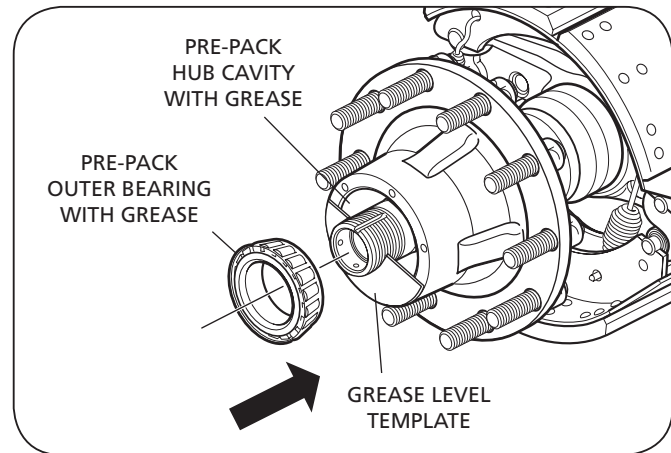


Figure 16

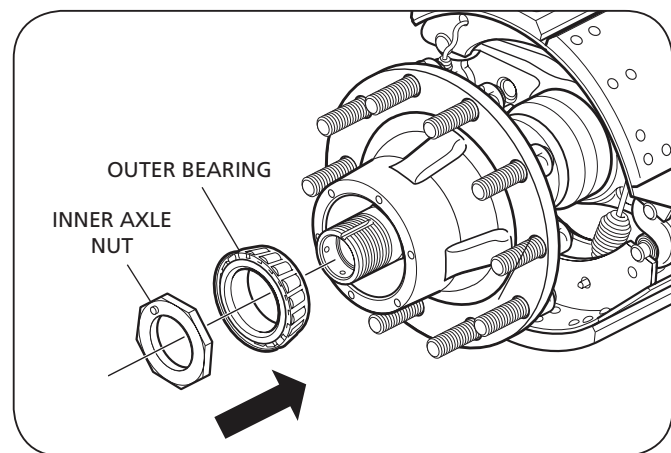
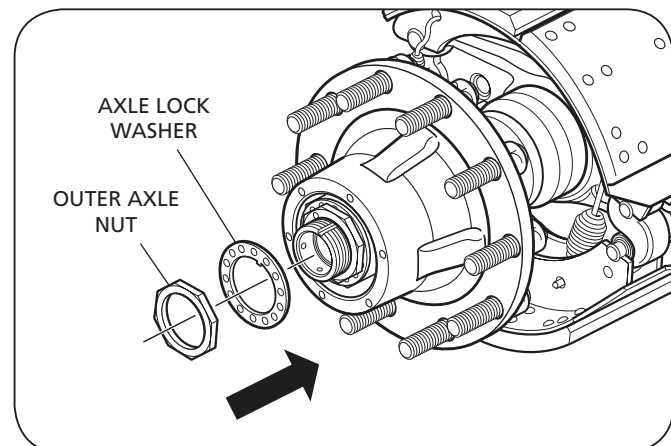


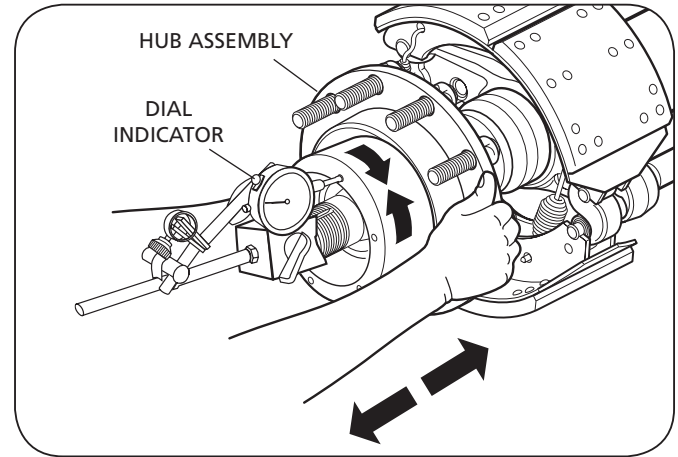
Figure 17



9. Hub Bearing Adjustment *continued*

8. Check the wheel bearing end play as follows:
 - a. Attach the magnetic base of a dial indicator to spindle. Touch dial indicator stem to hubcap gasket face (**Figure 18**).
 - b. Reading Number One - Slightly rotate wheel-end in both directions while pushing inward until dial indicator does not change. Set the dial indicator to zero (**Figure 18**).
 - c. Reading Number Two - Slightly rotate hub in both directions while pulling outward until dial indicator does not change (**Figure 18**).
 - d. End play is the difference between reading number one and reading number two.

Figure 18



10. Hub Cap Installation

1. Install the hub cap assembly, making sure the hub cap gasket is in place (**Figure 19**).

CAUTION

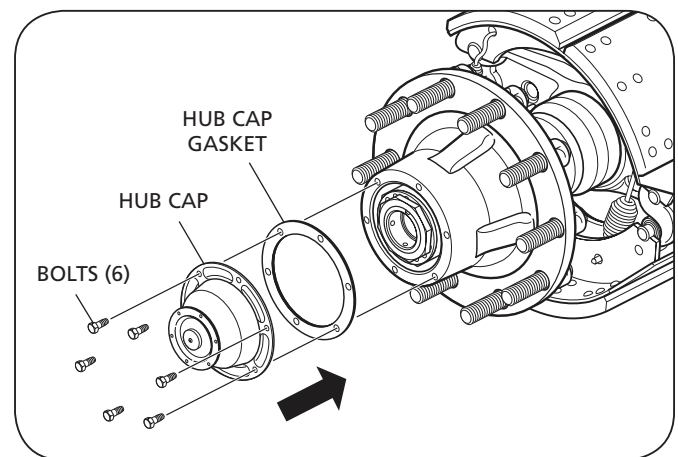
When installing hub cap, make sure the hub cap gasket is not bent or damaged.

CAUTION

Do not overtorque. This can crush the hub cap gasket and cause a leak.

2. Install the six bolts to secure the hub cap assembly (**Figure 19**). Tighten bolts to 12-16 ft-lbs (16-21 N•m).

Figure 19



11. Filling Hub With Lubricant (Oil Based)

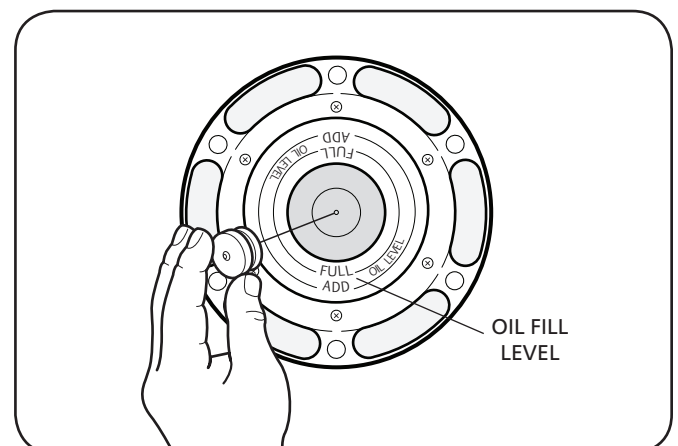
IMPORTANT: DO NOT mix oil lubricant with grease lubricant. If your bearing assembly has been lubricated with grease DO NOT add oil.

⚠ WARNING

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

1. Remove plug and fill the hub to the FULL mark with the specified lubricant (oil), through the hole in the hub cap (**Figure 20**).
2. Allow the oil to flow through the bearings and level off.

Figure 20



continued

11. Filling Hub With Lubricant *continued*

3. Insert the plug into the hole in the hub cap (*Figure 21*).

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

4. Reinstall drum on hub using support device such as a drum dolly jack (*Figure 22*).

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

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

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

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

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

NOTE: When servicing the brakes, in some instances it may 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 slack adjuster control arm(s) from the clevis so the slack adjuster can be removed from the S-cam shaft.

In each of these cases, the brake shoes or the slack adjuster control arm(s) are retracted by turning the adjusting nut manually on the automatic slack adjuster.

Figure 21

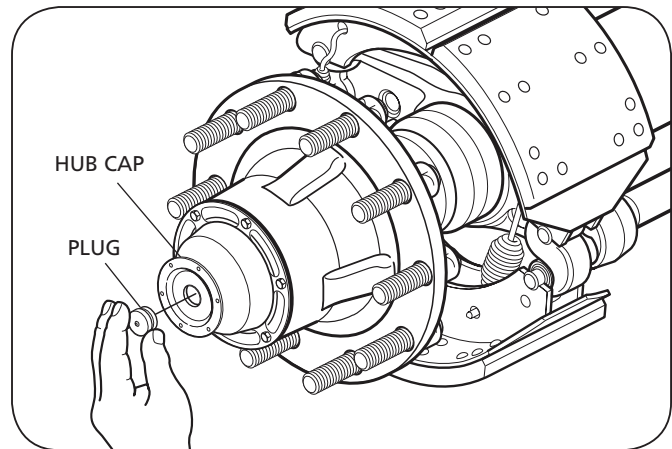
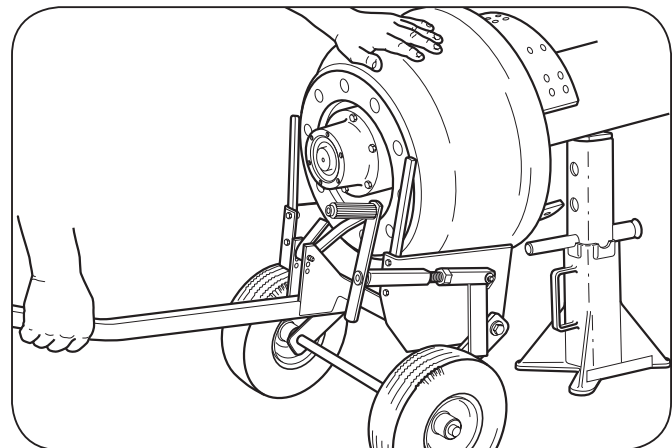


Figure 22



13. Brake Shoe Removal

NOTE: Removal of hub assembly is not required for to gain access to brake shoes for removal.

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.
2. Remove drum from hub using support device such as a drum dolly (**Figure 23**).

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

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

3. Using the brake spring pliers, unhook both brake retaining springs from the brake shoes (**Figure 24**).
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 25**).

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

Figure 23

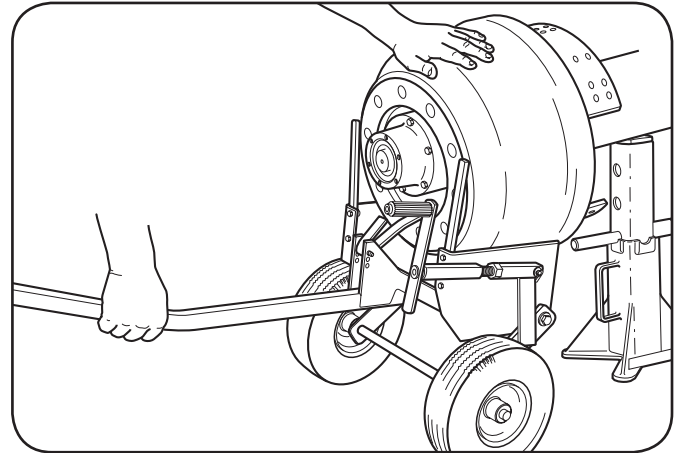
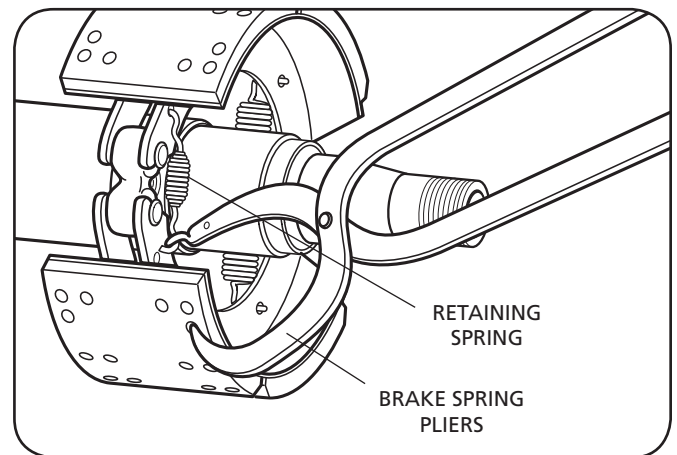
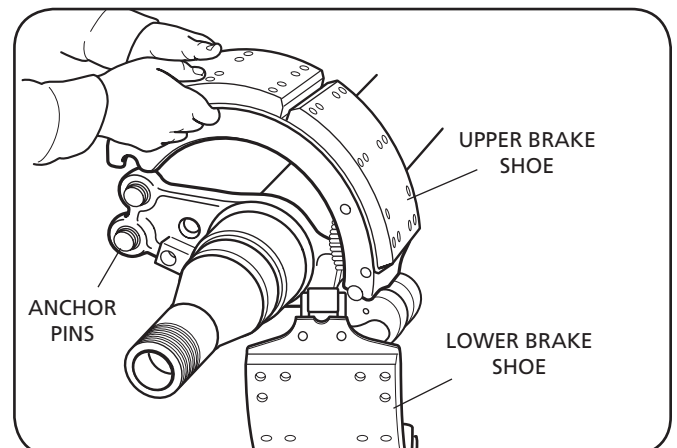


Figure 24



continued

Figure 25



13. Brake Shoe Removal *continued*

5. Discard the used brake hardware.

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

6. With the brake shoes off, inspect the S-camshaft and S-camshaft bushings for wear. Verify that S-cam-to-bushing radial free play is within specification by using a dial indicator and moving S-camshaft back and forth. (**Figure 26**) Rotate the S-camshaft in all directions when you check for radial free play.

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

- If radial free play is less than 0.030-inch (0.76mm): Do not replace the bushings and seals.
- If radial free play is more than 0.030-inch (0.76 mm): Replace the bushings and seals.

7. Inspect brake shoes and components for wear.
 - a. Inspect the spider for expanded anchor pin holes and for cracks. Brake spiders cannot be repaired and must be replaced with new axle assembly.
 - b. Inspect the S-camshaft bracket for broken welds, cracks and correct alignment. Replace damaged brackets.
 - c. Inspect the anchor pins for corrosion and wear. Replace worn or damaged anchor pins.

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 27**).

CAUTION

Failure to replace brake shoes that are excessively worn may result in damage to brake drum or other components

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

continued

Figure 26

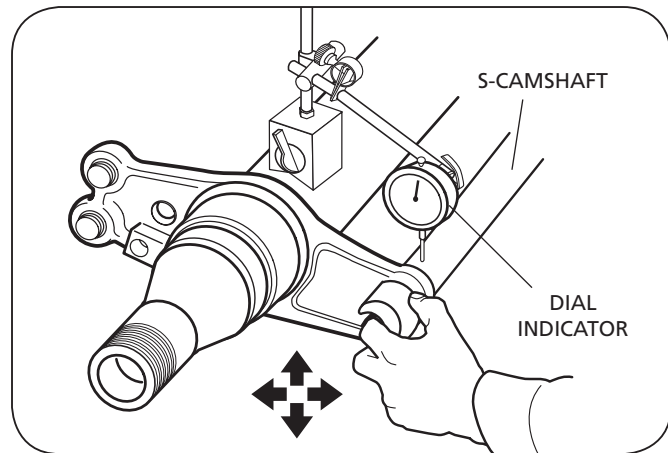
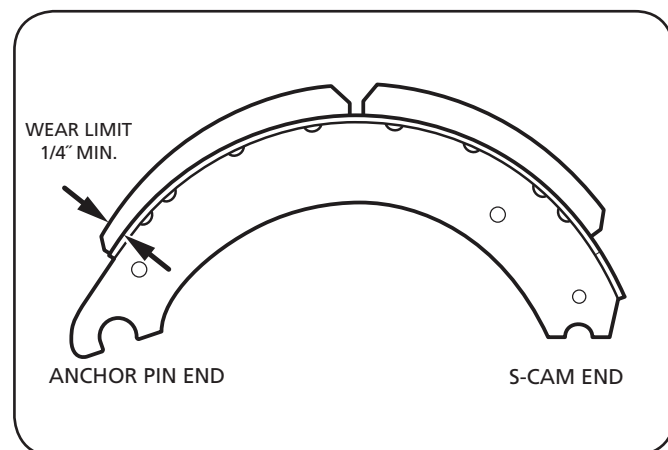


Figure 27



13. Brake Shoe Removal *continued*

8. Inspect 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 and serious personal injury, can result.

CAUTION Replace the brake drum if it is out-of-round. Do not turn or rebore a brake drum, which decreases the strength and capacity of the drum. Damage to brake components can result.

- Inspect the brake drums for cracks, severe heat checking, heat spotting, scoring, pitting and distortion. Replace drums as required.
- Measure the inside diameter of the drum in several locations with a drum caliper or internal micrometer (*Figure 28*).
- If brake drum is excessively worn or out of round replace brake drum.

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

14. Brake Shoe Installation

- Install the brake shoe roller into the roller retainer (*Figure 29*).
- Install the roller and roller retainer into the brake shoe ribs (*Figure 29*).
- Coat anchor pins (ends only) completely with lubricant (Never-Seez) and install (if removed) in the brake spider (*Figure 30*).

continued

Figure 28

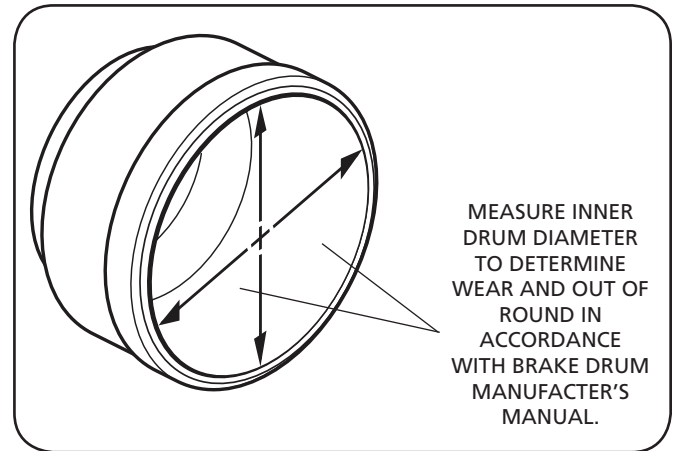


Figure 29

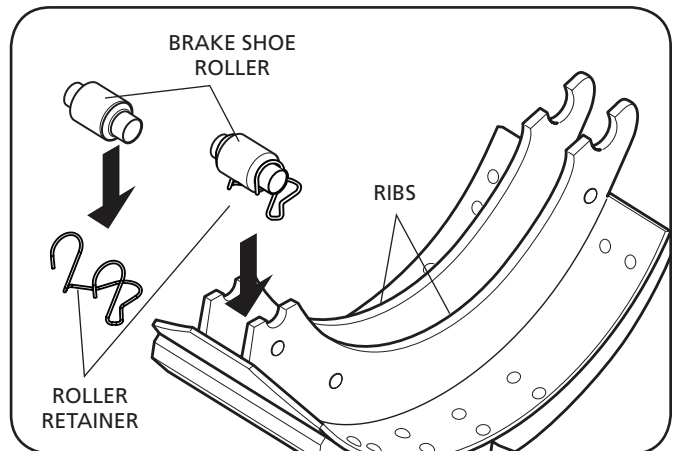
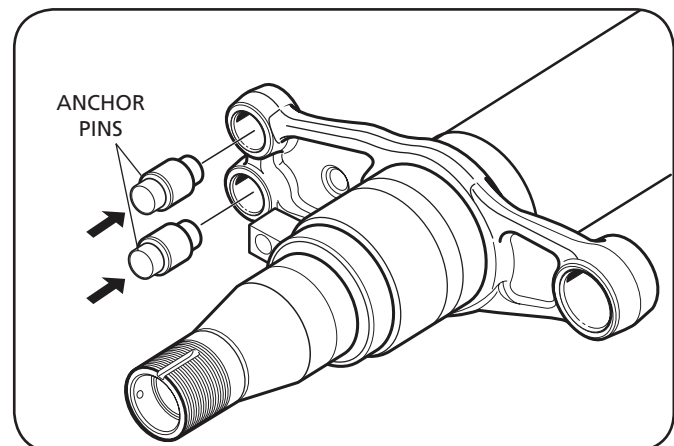


Figure 30



14. Brake Shoe Installation *continued*

4. Install return spring pin into brake shoe ribs (**Figure 31**).
5. Connect the hub/drum return spring to the upper end lower brake shoes (**Figure 32**).
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 33**).

CAUTION

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

continued

Figure 31

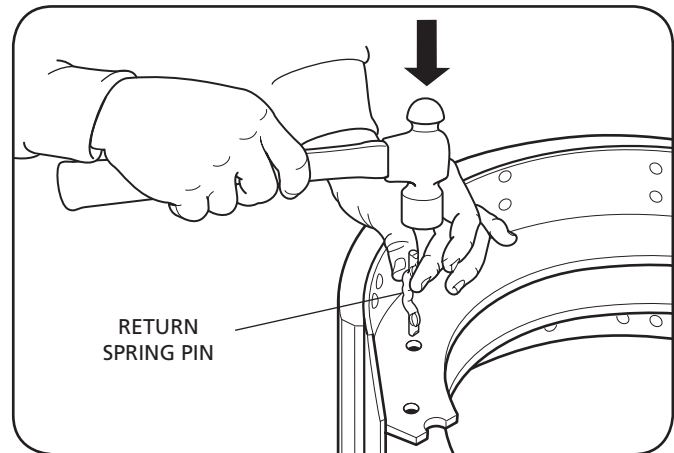


Figure 32

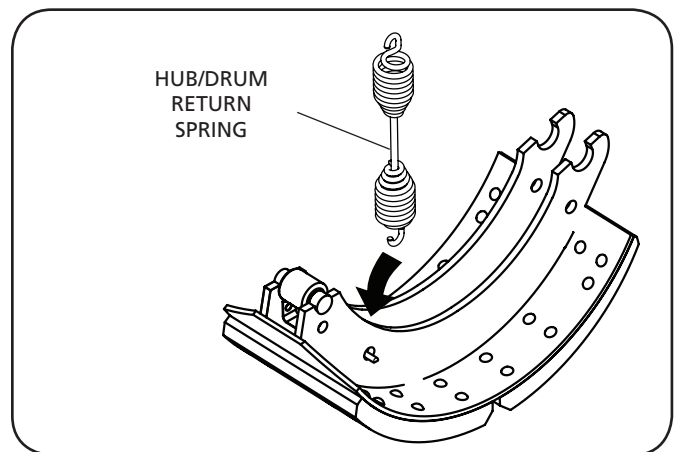
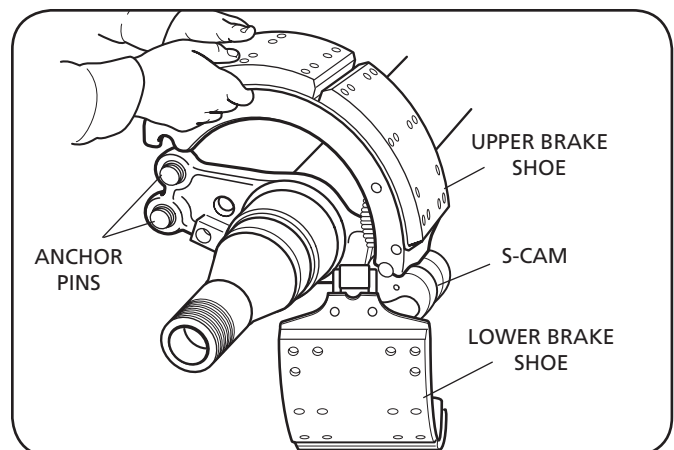


Figure 33



14. Brake Shoe Installation *continued*

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 34**).
8. Install the two brake anchor pin springs using the anchor pin pliers (**Figure 35**).
9. Make sure the brake linings are clean.
10. Reinstall drum using support device such as a drum dolly jack (**Figure 36**).

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

11. Adjust the brakes as described in this manual.

Figure 34

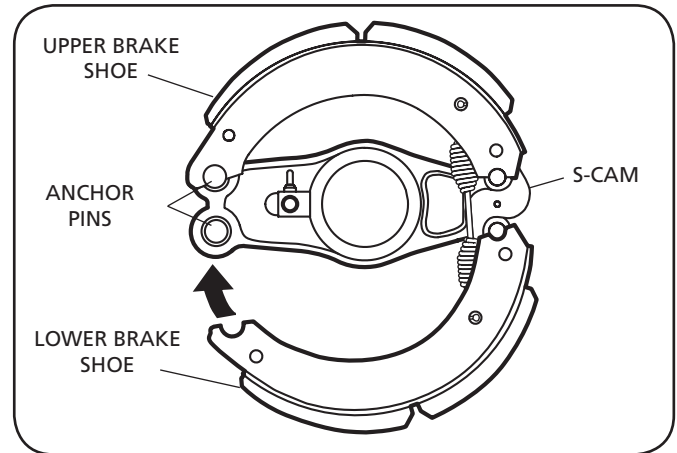


Figure 35

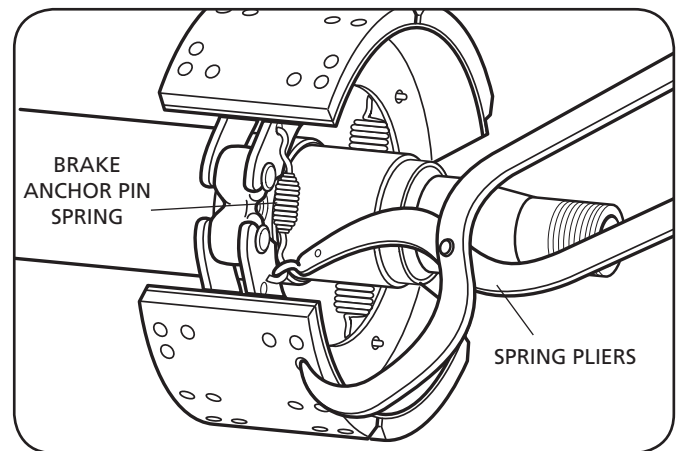
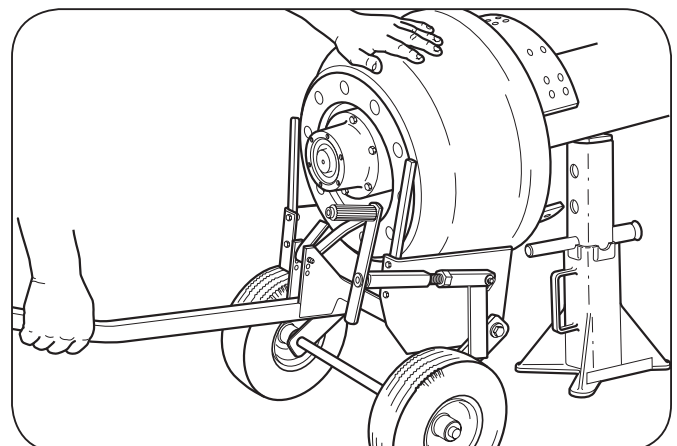


Figure 36



15. Slack Adjuster Removal

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

1. Remove the cotter pins that secure the slack adjuster/brake chamber clevis pins (**Figure 37**). Remove the clevis pins.
2. Remove the retaining ring and washer that secure the slack adjuster to the S-camshaft (**Figure 38**).
3. Remove the self-adjusting slack adjuster from the spline end of the brake S-camshaft
4. Rotate adjusting mechanism to back the slack adjuster out of the clevis in accordance with slack adjusters manual.

16. Slack Adjuster Installation

1. Apply an even coat of anti-seize compound to splined surface of S-camshaft.
2. Position spacing washers on both sides of slack adjuster, then install slack adjuster onto S-camshaft spline and secure the slack adjuster on the S-camshaft by assembling the retaining ring (**Figure 38**).
3. Align the slack adjuster to clevis and pin together using clevis pins and cotter pins (**Figure 37**).
4. Apply service and spring brake several times. Final brake adjustment is required to ensure proper initial brake operation. The slack adjuster will then seek the proper working stroke during normal operating conditions. Refer to slack adjuster and brake chamber manufacturer's procedures for proper adjustment.

Figure 37

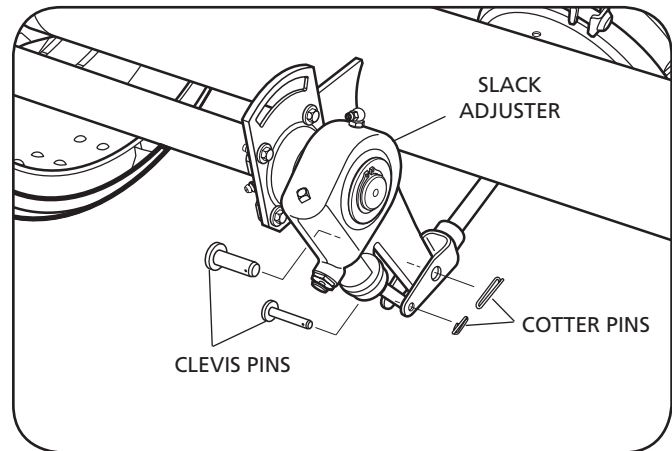


Figure 38

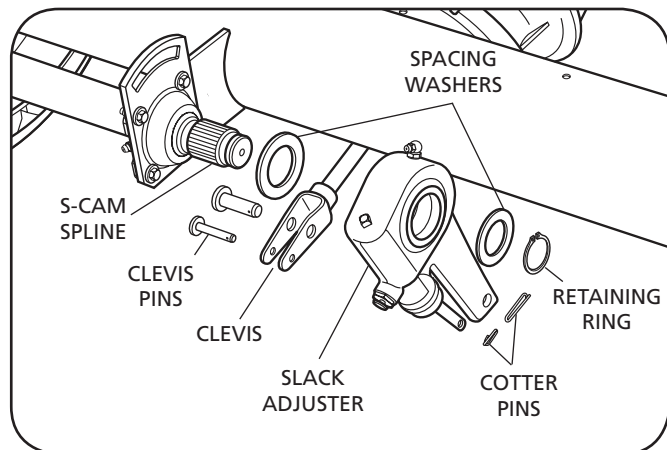
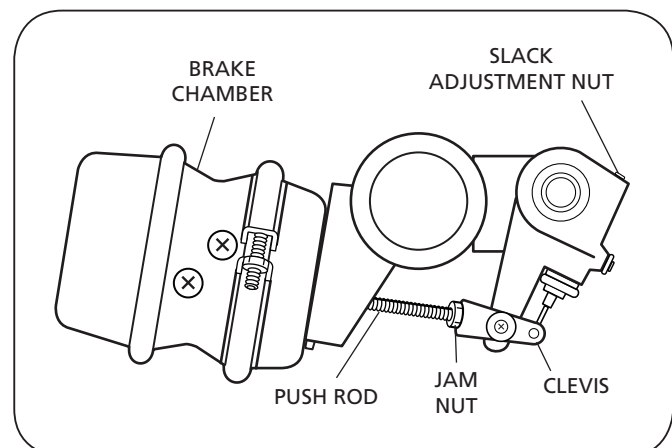


Figure 39



17. S-camshaft And Bearing Removal Procedure

1. Remove the brake shoes and slack adjuster as described previously in this manual.
2. Remove the retaining ring from the spider end of the S-camshaft (**Figure 40**).
3. Remove the S-camshaft by sliding it out of the S-camshaft bearing housing and bearings. It may be necessary to tap the end of the shaft with a soft mallet to release it from the bearings (**Figure 40**).
4. Remove the four bolts securing the S-camshaft bearing housing to the axle bracket (**Figure 41**).
5. Remove the S-camshaft bearing housing and remove the bearing and seals from the housing (**Figure 42**).
6. Inspect bearings and seals for wear and deterioration. Replace as necessary.

Figure 40

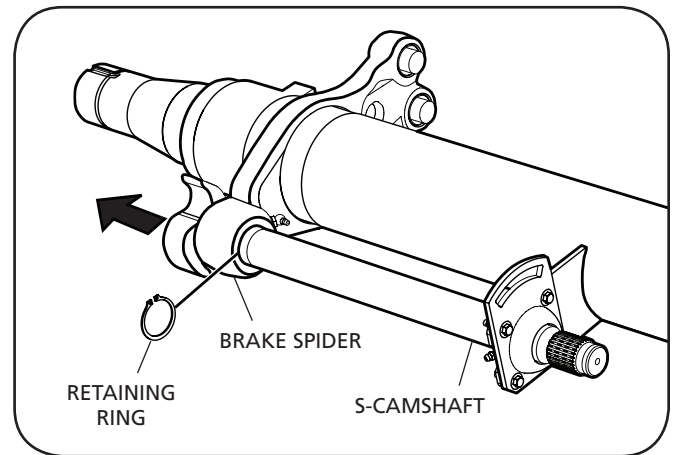


Figure 41

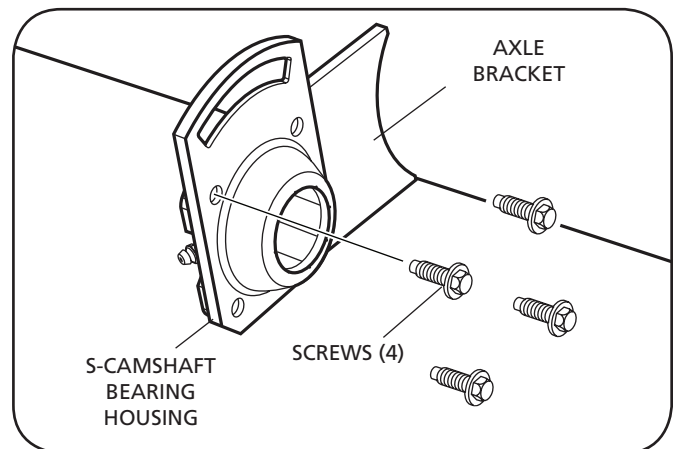
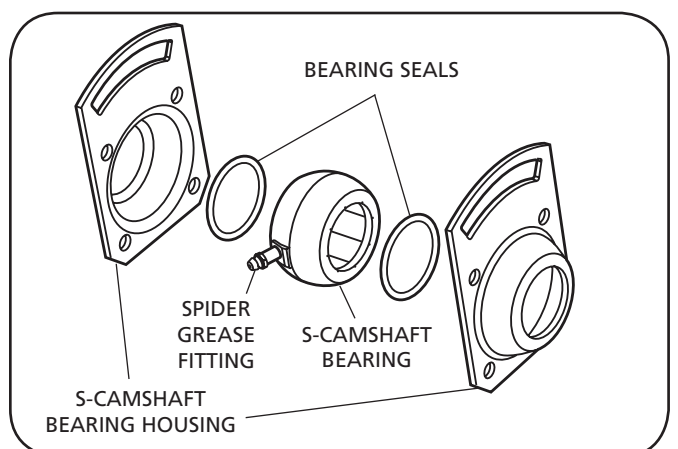


Figure 42



18. S-camshaft And Bearing Installation

1. Clean the faces of the S-camshaft bearing housing and assemble bearing O-rings and S-camshaft bearing into the S-camshaft bearing housing (**Figure 43**).
2. Attach the S-cam bearing housing bracket to the axle bracket, securing it with the four screws (**Figure 44**). Tighten the bolts to 25-30 ft-lbs (33-40 N•m).
3. Install the S-camshaft bearing and bearing O-rings into brake spider (**Figure 45**).
4. Install the washer on the S-camshaft and slide S-camshaft and washer assembly through the S-camshaft bearing in the brake spider (**Figure 45**).

CAUTION

Failure to align the bushing lubrication hole with the spider grease fitting may allow grease to flow from the S-camshaft bearing housing which, if not avoided, may result in premature bushing failure (**Figure 43 & 44**).

continued

Figure 43

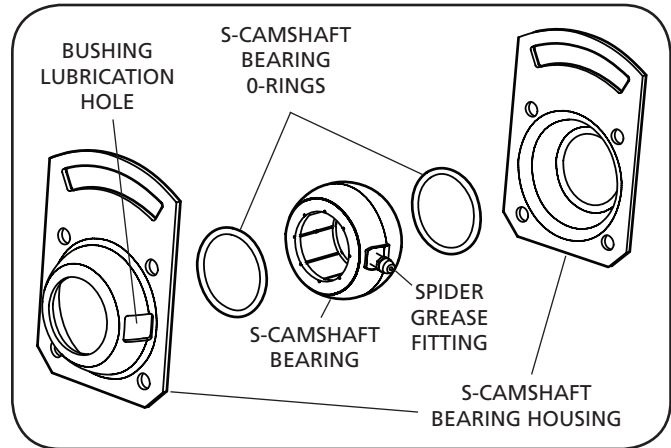


Figure 44

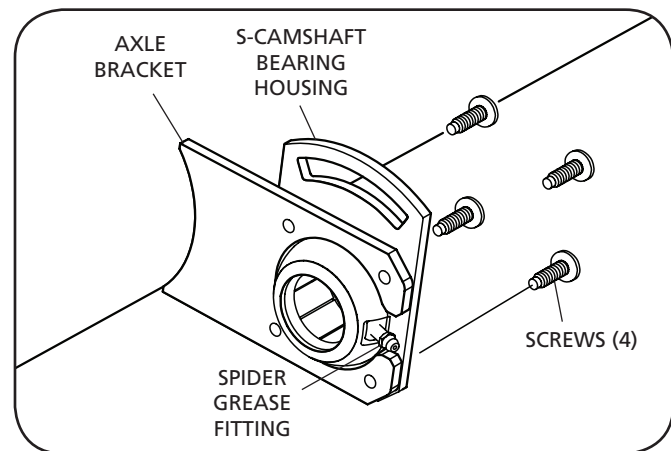
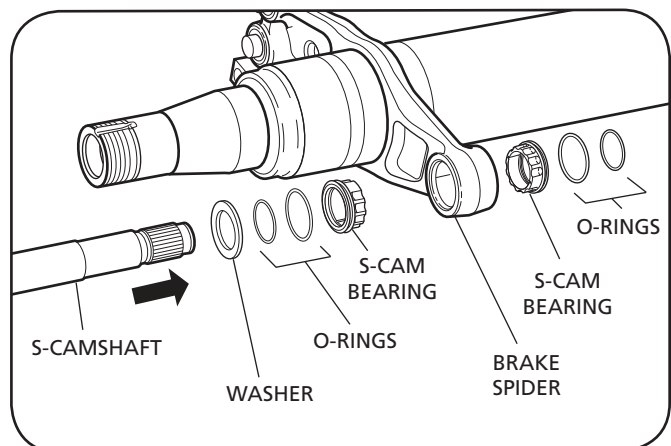


Figure 45



18 S-camshaft And Bearing Installation Procedure *continued*

5. Install washer and retaining ring onto S-camshaft and slide S-camshaft into the S-camshaft bearing housing bracket. (**Figure 46**)
6. Install the brake shoes and slack adjusters as previously described in this manual.
7. 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 47**).

continued

Figure 46

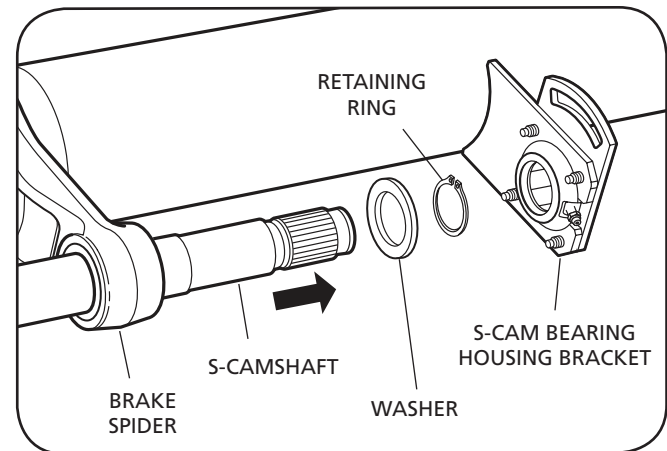
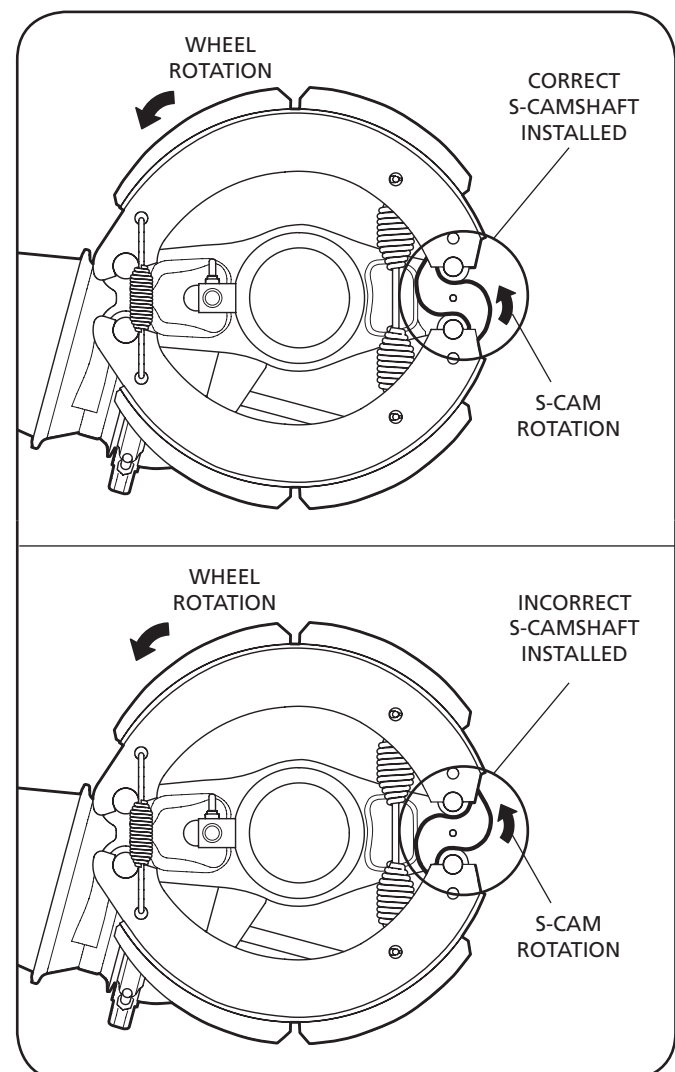


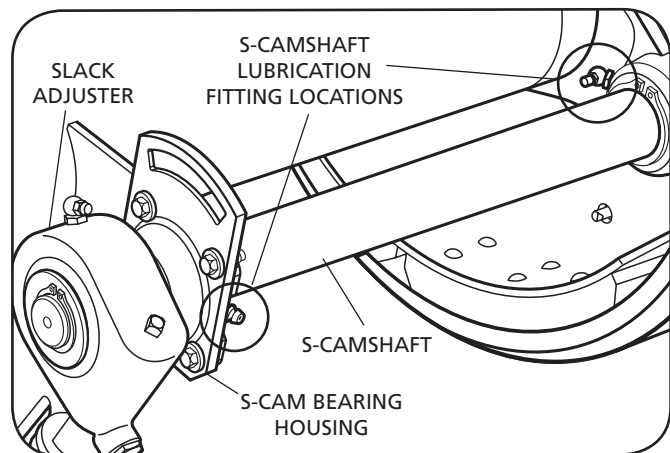
Figure 47



18. S-camshaft And Bearing Installation Procedure *continued*

8. Lubricate the S-camshaft bearings with grease specified in the lubrication table on page 32 (**Figure 48**).

Figure 48



19. 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.
 - The optimum distance of push rod travel should be approximately 1.5" - 2.0" (**Figure 49**).
 - Angle between the push rod and the slack adjuster with brake applied, should be 85° - 95° (**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 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 33.

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.

CAUTION

Figure 49

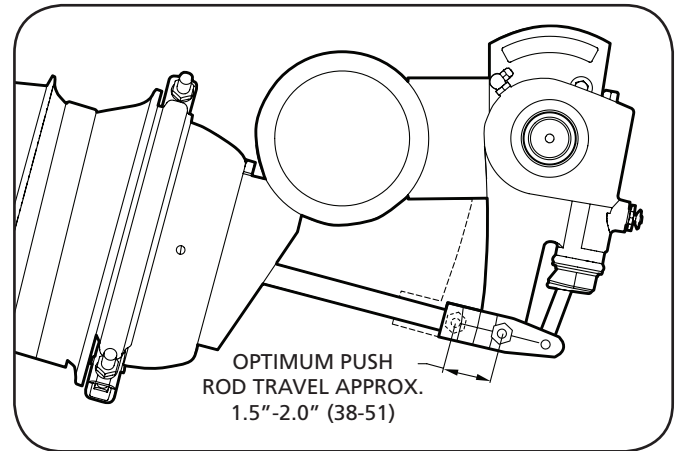
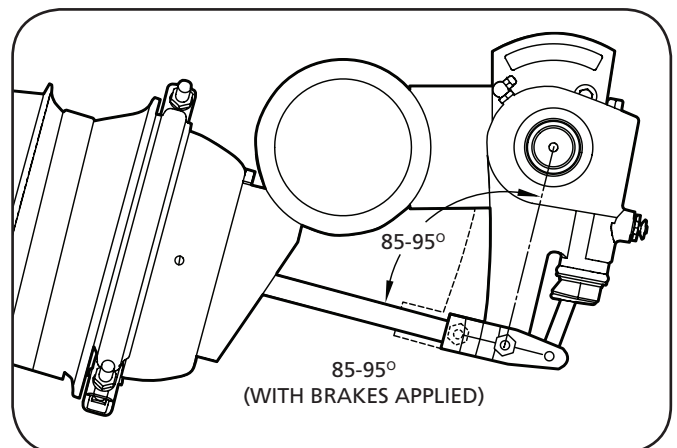


Figure 50



20. ABS Sensor Replacement Procedure

20.1 Sensor Removal

NOTE: ABS sensors must match the system. Do not mix sensors from different manufacturers.

1. Manually release the brakes.
2. Remove brake drum assembly as previously described in this manual.
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.

20.2 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 sensor holder. Push the sensor in until it contacts the tooth wheel (**Figure 52**).
3. Connect the ABS sensor connector.
4. Install Brake Drum assembly as previously described in this manual.
5. Adjust brakes as described in this manual.

Figure 51

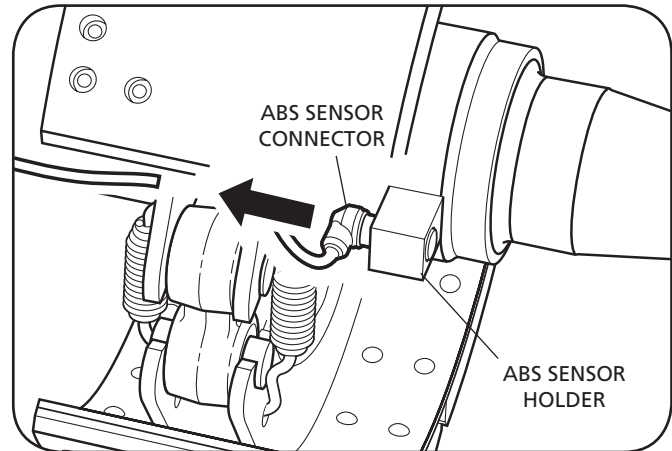
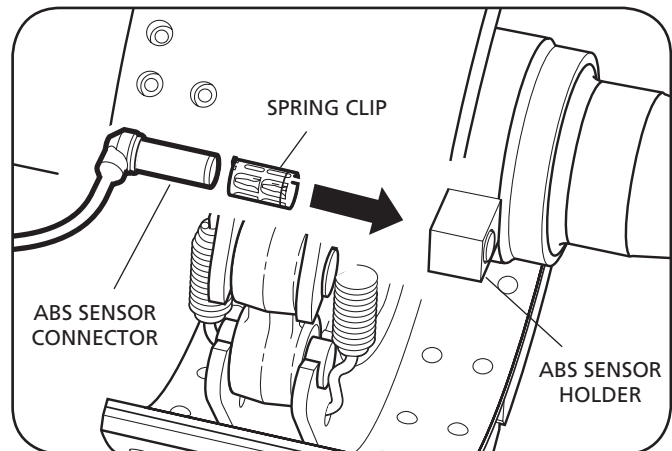


Figure 52



21. Axle Alignment Inspection

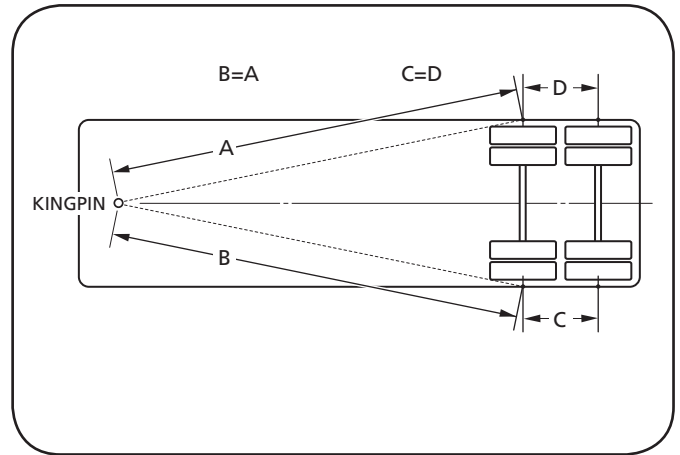
NOTE: Alignment can be achieved using an optical device designed specifically for this purpose. Follow the instructions in the optical device operating instructions to align the axles

1. To manually align the axles attached to your 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.

2. Measure the distance from the king pin to the centerline of the spindles on each side of the front axle. Dimensions A & B must be equal to within 1/8" (**Figure 53 A & 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 & D must be equal to within 1/16" (**Figure 53 C & D**).

Figure 53



22. Routine Service Schedule

Service Schedule, Mechanical Check, Visual Inspection, Safety Inspection, and Special Service Conditions

Service Schedule

		PERIODIC CHECKS			
WHICHEVER OCCURS FIRST	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 slack adjusters for correct function.		●	●		
Check air brake system for leaks (brake applied).		●	●		
Check axle structural components for cracks or damage.		●	●		
Check hub lubrication level or excessive leakage		●	●		
MECHANICAL CHECK					
Attention: Torque check wheel nuts after the first 30 miles (50 km) and 100 miles (150 km) (repeat also after every wheel removal).		●			
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.		●	●		

Service Schedule

			PERIODIC CHECKS		
WHICHEVER OCCURS FIRST	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
TIME INTERVALS		First Month	Every Month	Every 6 months	Every 12 months
SAFETY INSPECTION					
Check brake lining to drum clearance for correct adjustment – readjust 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 operating in continuous multi-shifts or in off-road construction sites.
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.

Torque Chart

COMPONENT	TORQUE VALUE
Grease Fitting, Spider	20 - 50 in-lbs (2 - 6 N•m)
Axle, Inner Nut	See section 9, page 14
Axle, Outer Nut	300 - 400 ft-lbs (406 - 542 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	25 - 30 ft-lbs (33 - 40 N•m)

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.

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.

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 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.
Grabbing brakes.	High-speed driving on turns.	Reduce speed.
	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.