

Volvo Chassis - Equipped With Bendix Or Meritor Drum Brakes - Steer Axle Brake Noise



> Internal Content

Bendix Brakes

Prior to proceeding with the steps below, FSB 514-001 Brake S-Cam, Replacement should be reviewed and followed, and the problem verified to still exist.

- FSB 514-001 can be found under the Service tab in [Impact](#)
- Select the model from the drop-down menu, make sure "Title" is selected under the Additional Search Values field, and enter "514-001" into the search field as shown below.

Related links and attachments

[Air Pressure Balance Test](#)

[Meritor Burnish Process](#)

The screenshot shows a search interface with the following elements:

- Search** header with a refresh icon.
- Input fields for **Chassis series** and **Chassis No.**
- VIN** input field.
- Model** dropdown menu with a red arrow pointing to it.
- Function group** dropdown menu with a search icon.
- Info type** dropdown menu set to **All Service Information**.
- Clear** and **Search** buttons.
- Additional search values** dropdown menu.
- Search by:** dropdown menu with **Titles** selected (circled in red).
- Search input field containing **514-001** (circled in red).

1. Create an eService case titled "**Recurring Brake Noise Bendix Brakes**". Add the SR# of the prior eService case where FSB 514-001 was completed if available. Add results of all the steps listed below into the eService case.

2. Verify and record video or audio brake noise by heat cycling the brakes as explained below. Add a video or audio recording into the eService case. This step needs to be done on all new shoes and drums.

NOTE: Most Bendix brake noise complaints can be duplicated after the brakes are heat cycled and then test-driven using 15-25 psi brake applications.

2.1. To verify the Bendix brake noise, the truck may need to be test driven to heat cycle the brakes:

2.2.1. Heat the front steer axle brakes to 300° F (150 °C).

2.2.2. Let the brakes cool to 150° Fahrenheit (65 °C).

3. Verify and record the slack stroke measurement.

4. Check and record brake camshaft endplay.

- Max endplay of 0.045 in (1.15 mm) is the allowable tolerance.

5. Perform a steer axle air brake balance pressure test. see attached Air Pressure Balance Test for reference.

6. **If there was nothing found to be wrong in steps 3-5:** Remove the steer axle shoes and drums and take pictures (look at example photos for reference). Attach the pictures to the eService case.





Meritor Brakes

Prior to proceeding with the steps below, the Meritor Brake Burnishing Process must be completed and the problem verified to still exist.



1. Create a new eService case titled "**Recurring Brake Noise Meritor Brakes**" Add the SR# of the eService case where the **Meritor Burnish Process** was completed if available. Add the results of all the steps listed below into the eService case.
2. Verify and record video or audio of brake noise add to eService case.

3. Verify and record stroke measurement in eService case. .
4. Check and record brake camshaft endplay.
 - Max endplay of 0.045 in (1.15 mm) is the allowable tolerance.
5. Verify and record steer axle air pressure balance test. See attached Air Pressure Balance Test for reference.
6. **If there was nothing found to be wrong in steps 3-5:** Remove the steer axle shoes and drums and take pictures (look at example photos for reference). Attach the pictures to the eService case.





 Tags

[STEER AXLE BRAKE SQUEAL](#) [BRAKE NOISE](#)

[BRAKE SQUEAL](#) [BENDIX BRAKES](#)

[MERITOR BRAKES](#)



Feedback

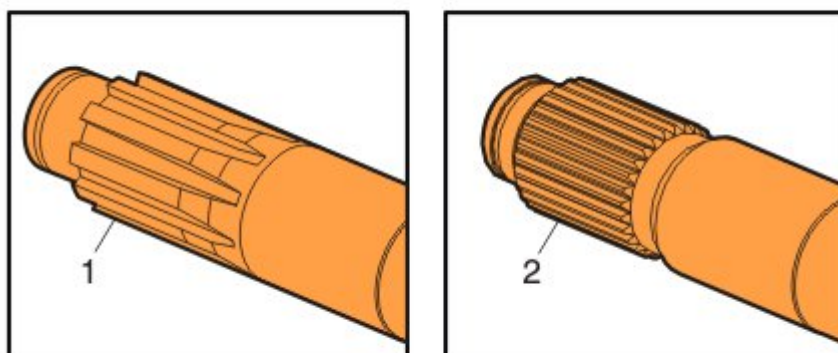
[Give feedback](#) to help improve the content of this article

(June 2018)

Some VOLVO VN trucks built after 05/13/2013, equipped with Bendix Brake S-Cams on the steer axle may require replacement to reduce or eliminate brake noise during braking. The replacement procedure includes installation of a new tuned brake S-Cam shaft, spring & roller kit, and seal & shim kit. Follow the S-Cam replacement procedure outlined in this Field Service Bulletin (FSB).

Note: For replacement, use the 10 spline Brake S-Cam shaft for trucks built from 05/13/2013 to 07/09/2017. See reference image of 10 spline brake S-Cam (1) in figure below.

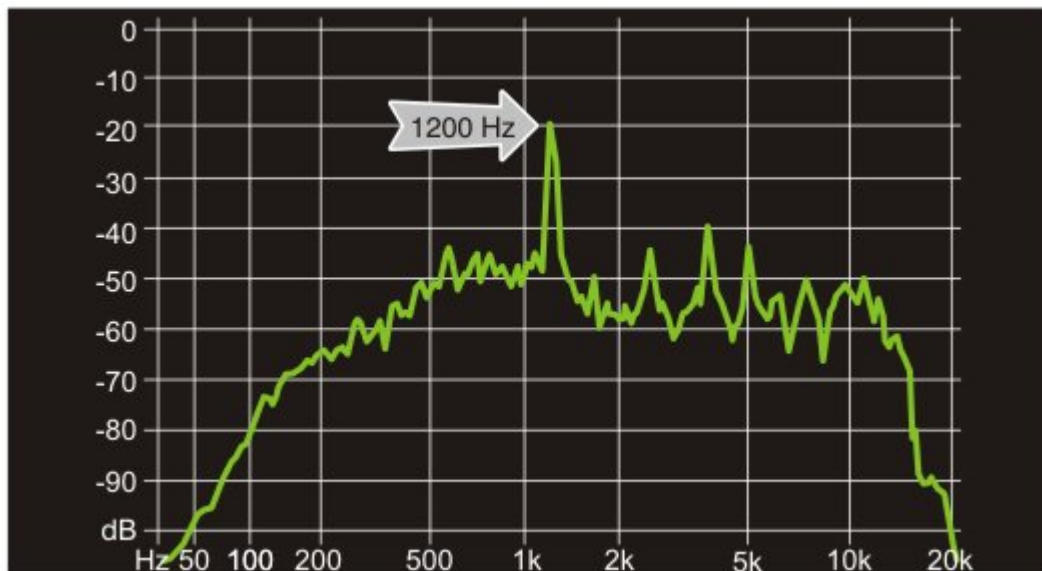
Note: For replacement, use the 28 spline Brake S-Cam shaft for trucks built from 07/10/2017. See reference image of 28 spline brake S-Cam (2) in figure below.



Bendix Tuned S-Cam Description

*Note: The Bendix Tuned S-Cam shaft is **“Only”** designed to reduce/or eliminate brake noise heard within the 1200 to 1500 Hertz frequency range. Submission of a video or audio file with the tech support case will assist in the diagnosis of any brake noise concern.*

The Bendix Tuned S-Cam is designed to reduce and/or eliminate brake noise heard within the 1200-1500 Hertz frequency range. Although the tuned S-Cam may help reduce brake noise heard in other frequency ranges, it is only designed to effectively reduce the noise range between 1200-1500 Hz. Proper installation and clearance of the Bendix tuned S-Cam is very important. To ensure the best results in noise reduction follow all steps within this FSB. Below is an example Hertz graph of the Bendix brake noise.



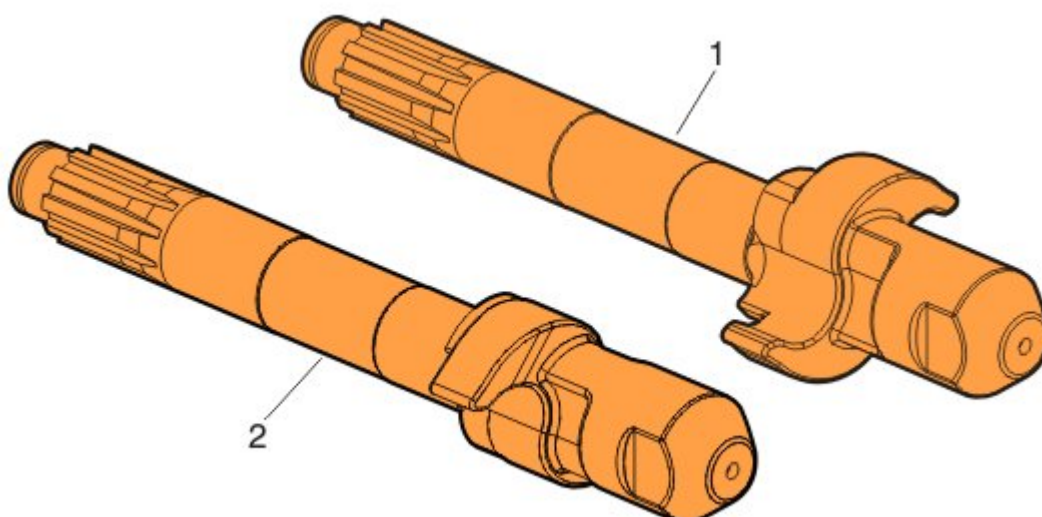
Verifying Noise

A Tech Support/E-Service case will need to be submitted to verify that the Bendix brake noise is within the Frequency Range that the new tuned S-Cam is designed to correct. To verify the Bendix brake noise the truck may need to be test driven and the front steer axle brakes heated up to 300° Fahrenheit then let cool to 150° Fahrenheit. Most Bendix brake noise complaints can be duplicated after brakes are heat cycled and then test driven using 15-25 psi brake applications. Tech Support may ask that a video or sound file be taken and uploaded to the case for verification. A valid Tech Support/E-Service case number will be needed when ordering parts.

Parts Ordering

To schedule parts orders and repairs, please call (877) 986-5862 with a valid Tech Support/E-Service case number and VIN number of the vehicle in need of this repair.

Note: Example Tech Support/E-Service Case Number (1-XXXXXXXXXX).

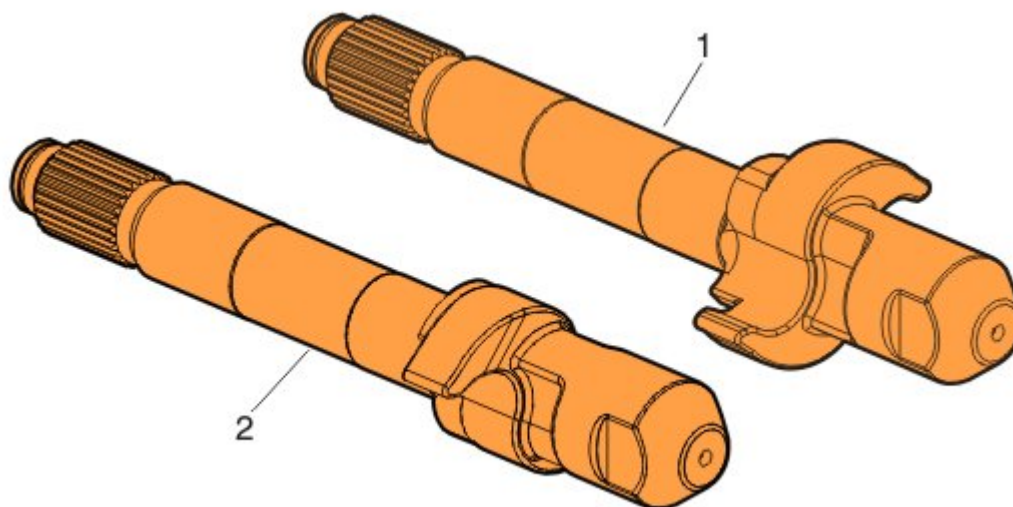


10-Spline Camshaft (For Trucks Built From 05/13 /2013 to 07/09/2017)			
Item	Description	Part Number	Qty
1	Camshaft, Tuned Mass,	85150135	1

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	CW, 10SPLINE		
2	Camshaft, Tuned Mass, CCW , 10SPLINE	85150134	1
3	Spring Kit	85153537	2
4	Hardware Module Kit	85153464	1



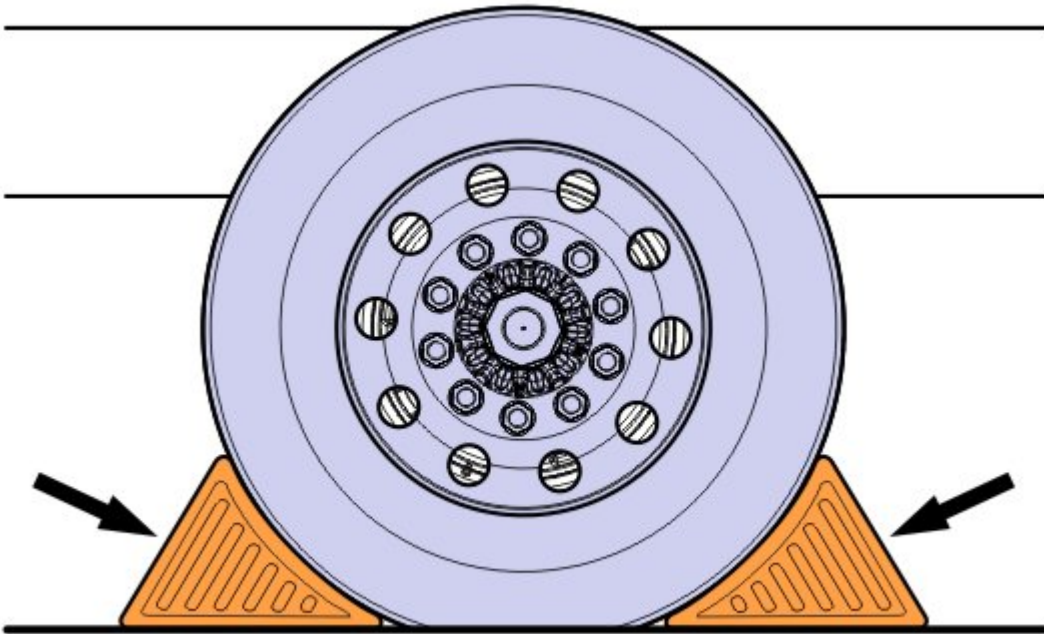
28-Spline Camshaft (For Trucks Built From 07/10 /2017)			
Item	Description	Part Number	Qty
1	Camshaft, Tuned Mass, CW, 28SPLINE	22880282	1
2	Camshaft, Tuned Mass, CCW , 28SPLINE	22880283	1
3	Spring Kit	85153537	2
4	Hardware Module Kit	85153464	1

Decommissioning the Truck for Repair

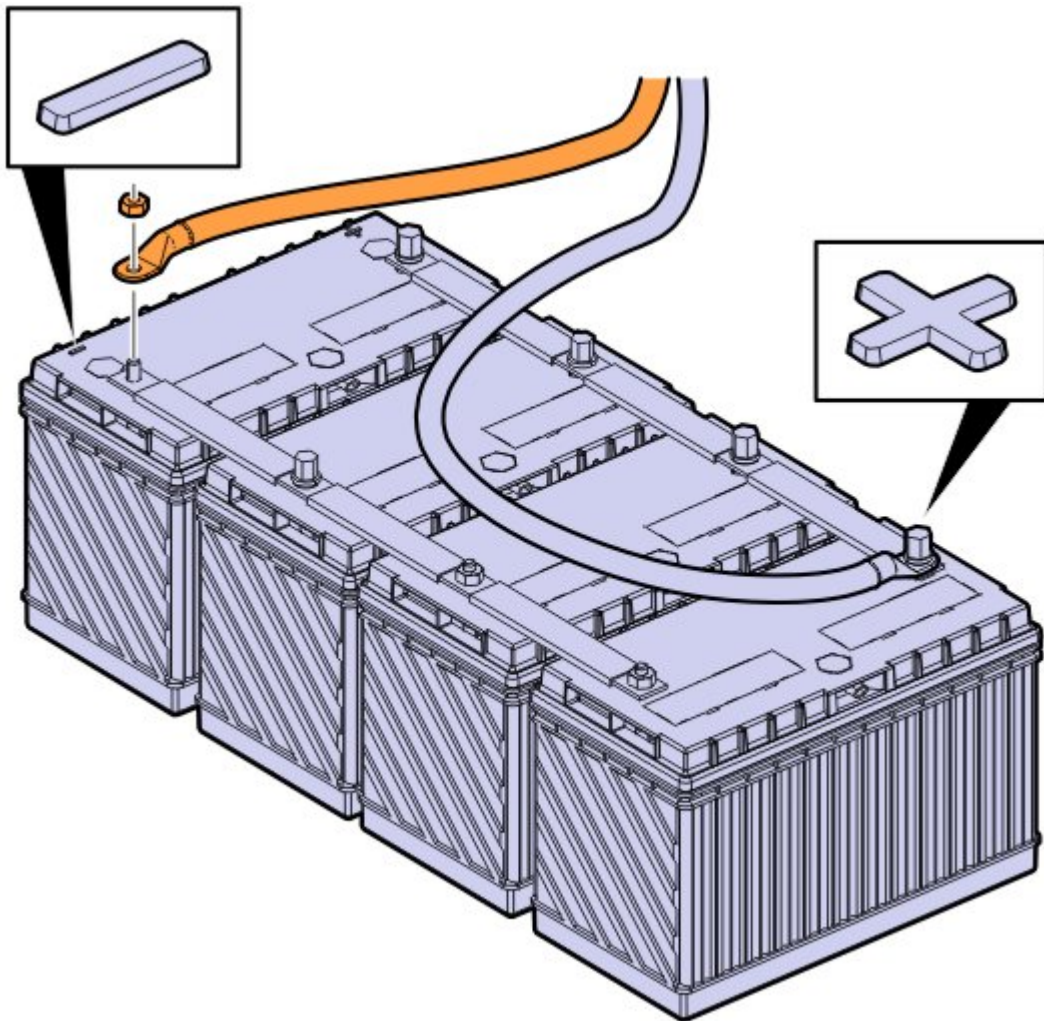
You must read and understand the precautions and guidelines in Service Information, group 50, "General Safety Practices, Brakes" before performing this procedure. If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

NOTE: Information is subject to change without notice. Illustrations are used for reference only and can differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

- . Park the vehicle on a flat and level surface.
- . Apply the parking brake.
- . Place the transmission in neutral or park.
- . Install the wheel chocks.



. Disconnect the cable from the battery's negative terminal.

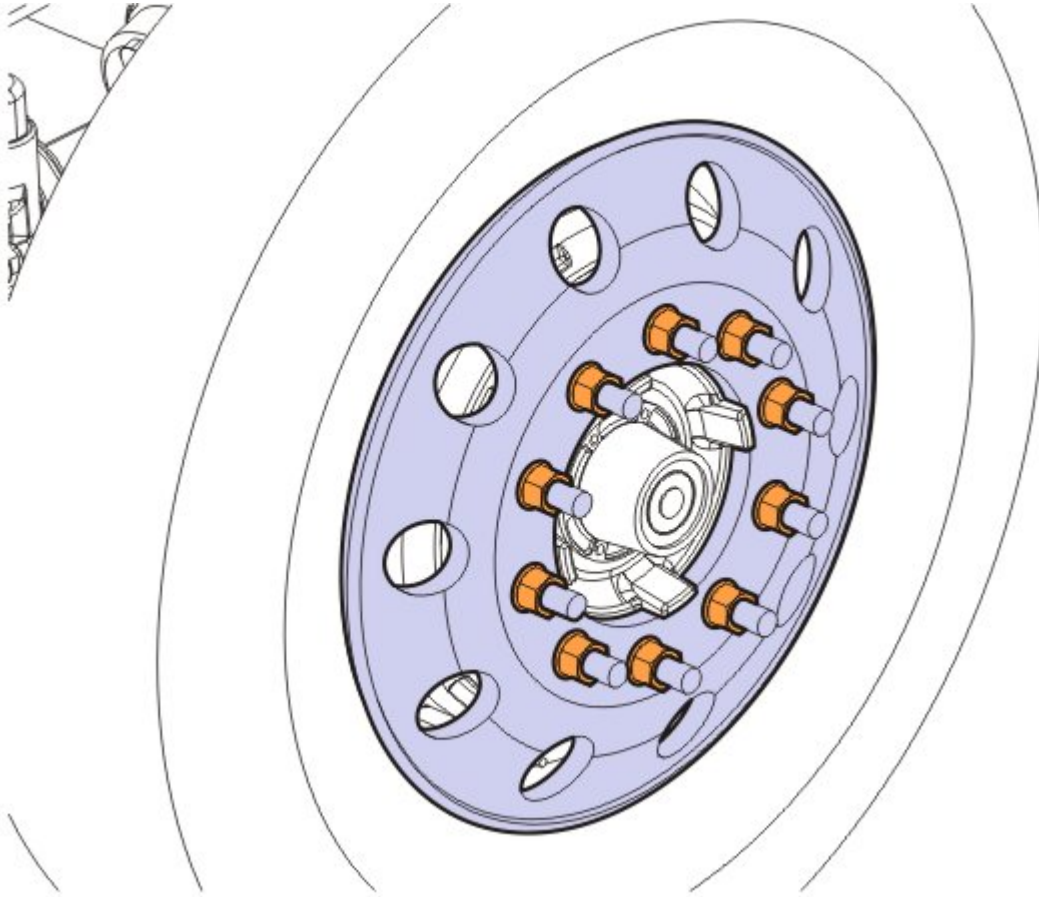


Brake S-Cam Removal

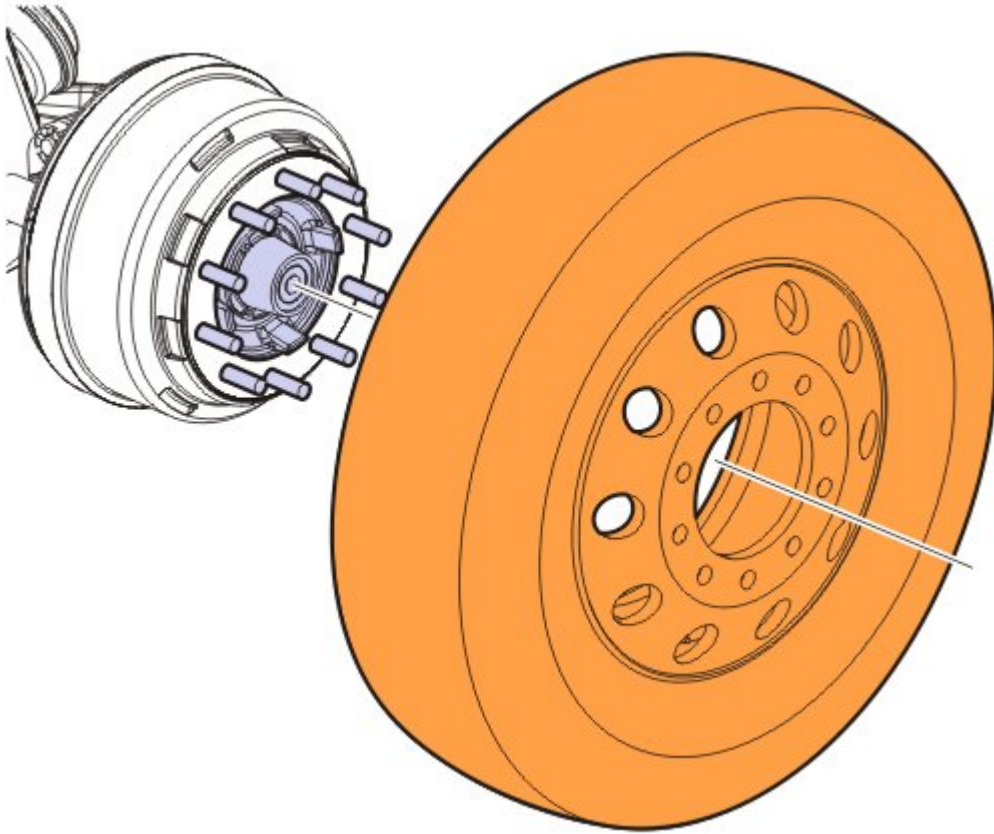
Note: The left side is shown for instructional purposes.

- . Lift the steer axle with a jack, place the truck on jack stands, and remove the jack.
- . Remove the wheel nuts.

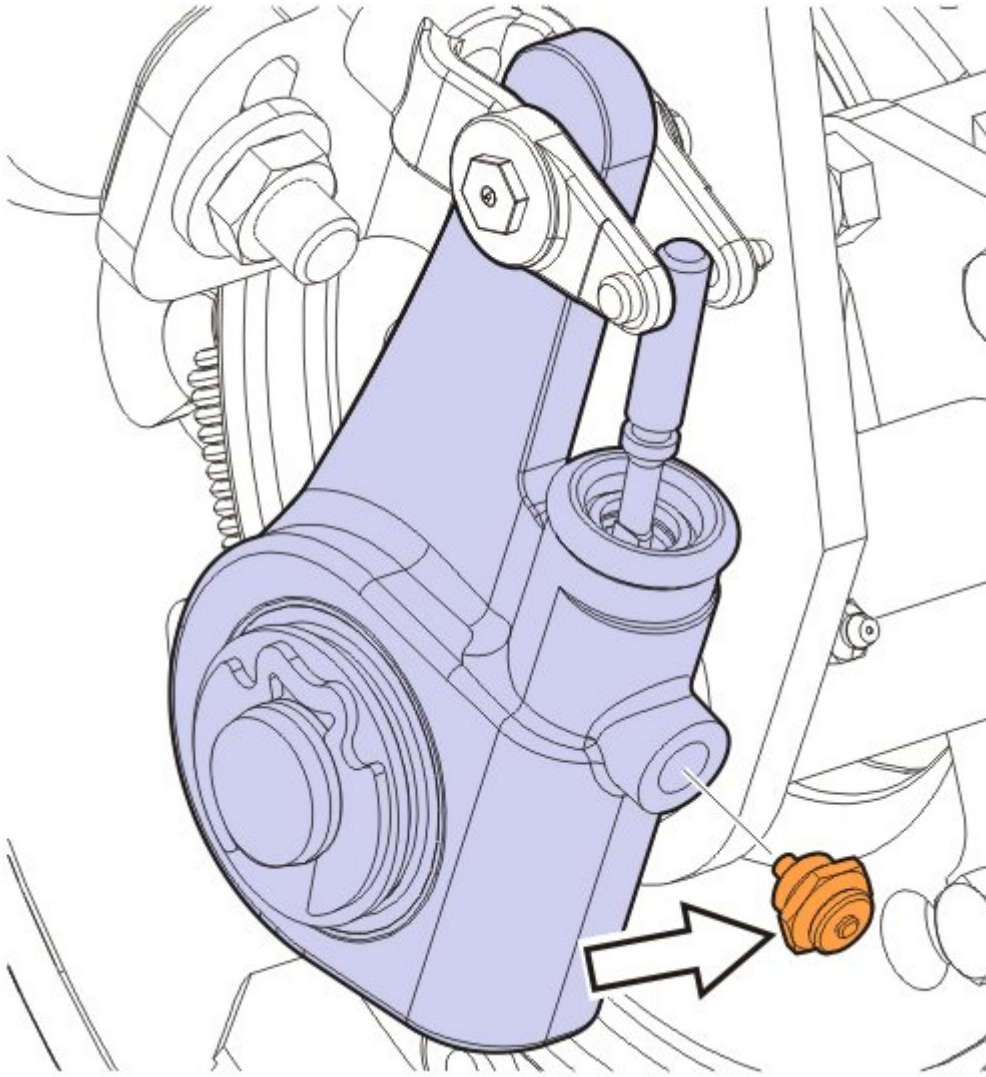
Note: Before removing the wheel, mark the end of one wheel stud with a paint marker and mark the wheel at the stud to ensure the wheel is reinstalled in the same position.



- . Remove the wheel.

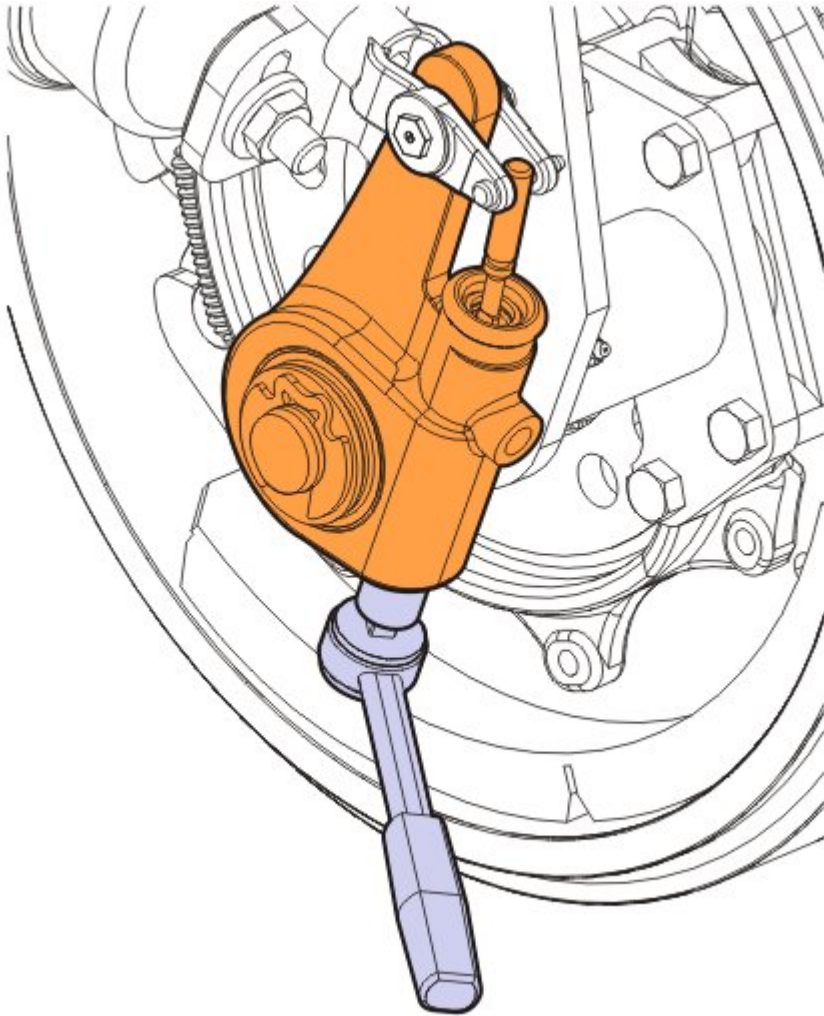


- . With the wheel removed, match mark the drum to the wheel stud to ensure the drum can be reinstalled in the same position.
- . Mark the brake shoes to ensure they can be reinstalled in the same position (top or bottom).
- . If applicable, remove the slack adjuster pawl.



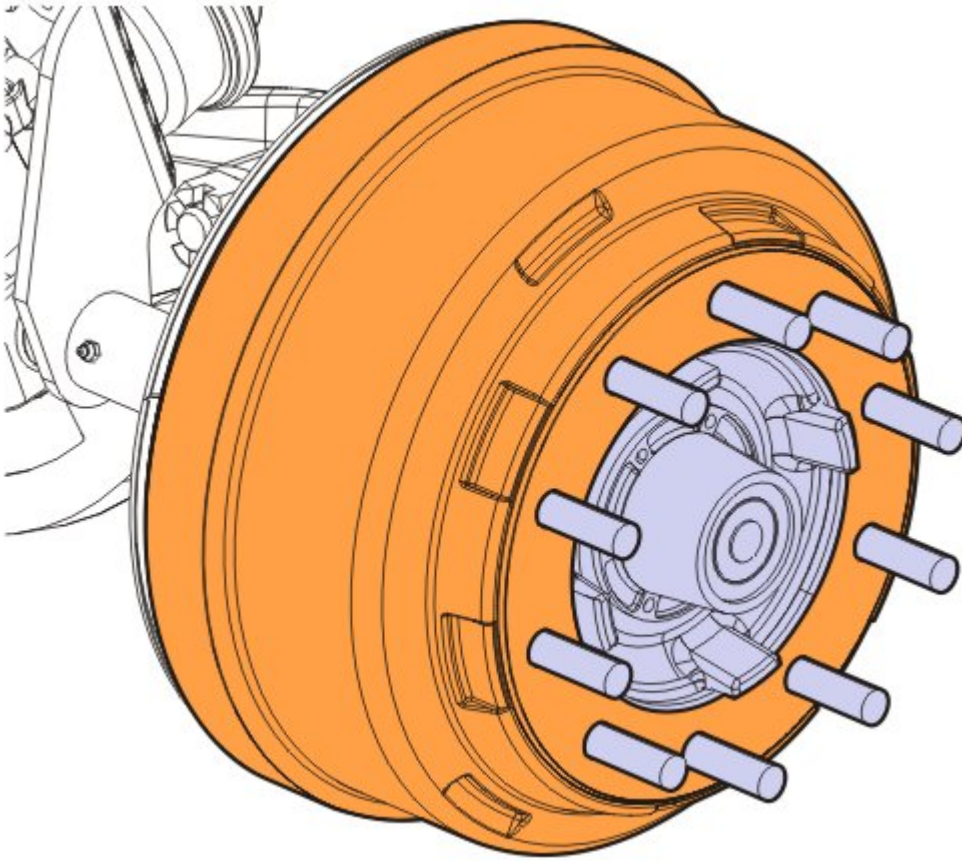
- . Back off of the brake (slack adjuster).

Note: The Meritor slack adjuster is shown in this procedure for backing off the brakes. However, this procedure is similar for other brands.



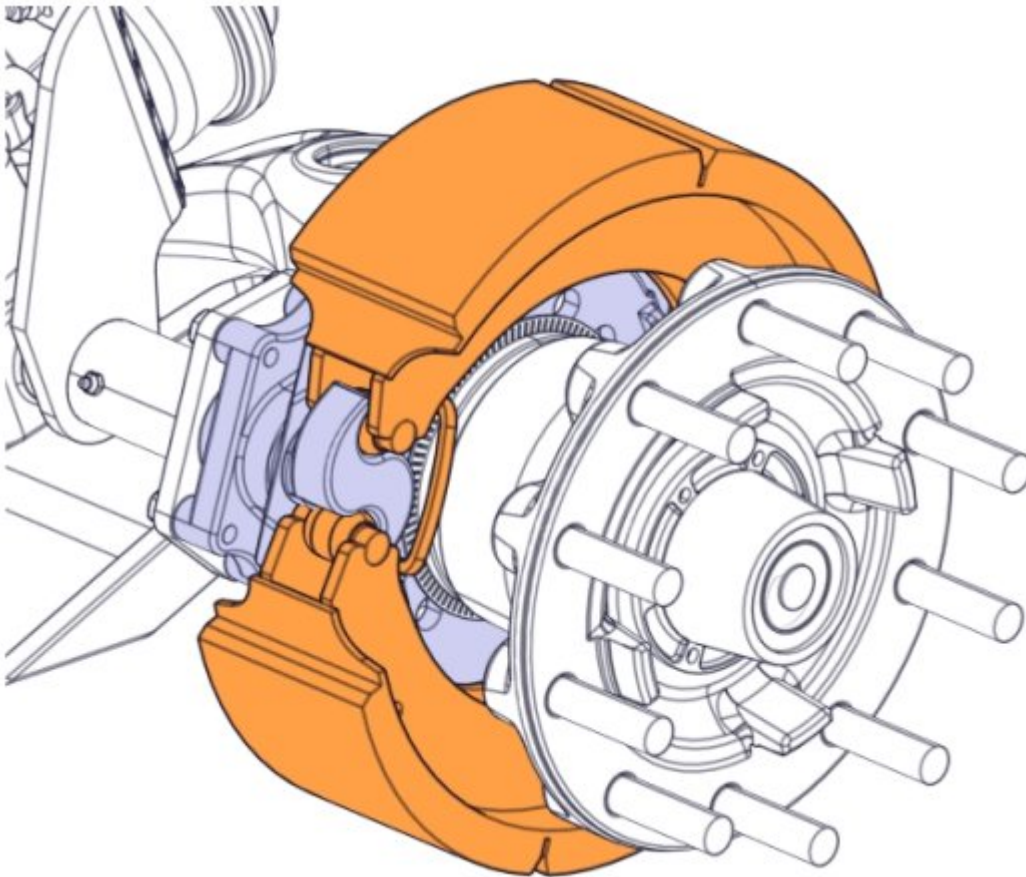
Remove the brake drum.

Note: Clean the brake drum of any dust or debris and store for installation.



- Remove the brake shoes, brake springs, and rollers.

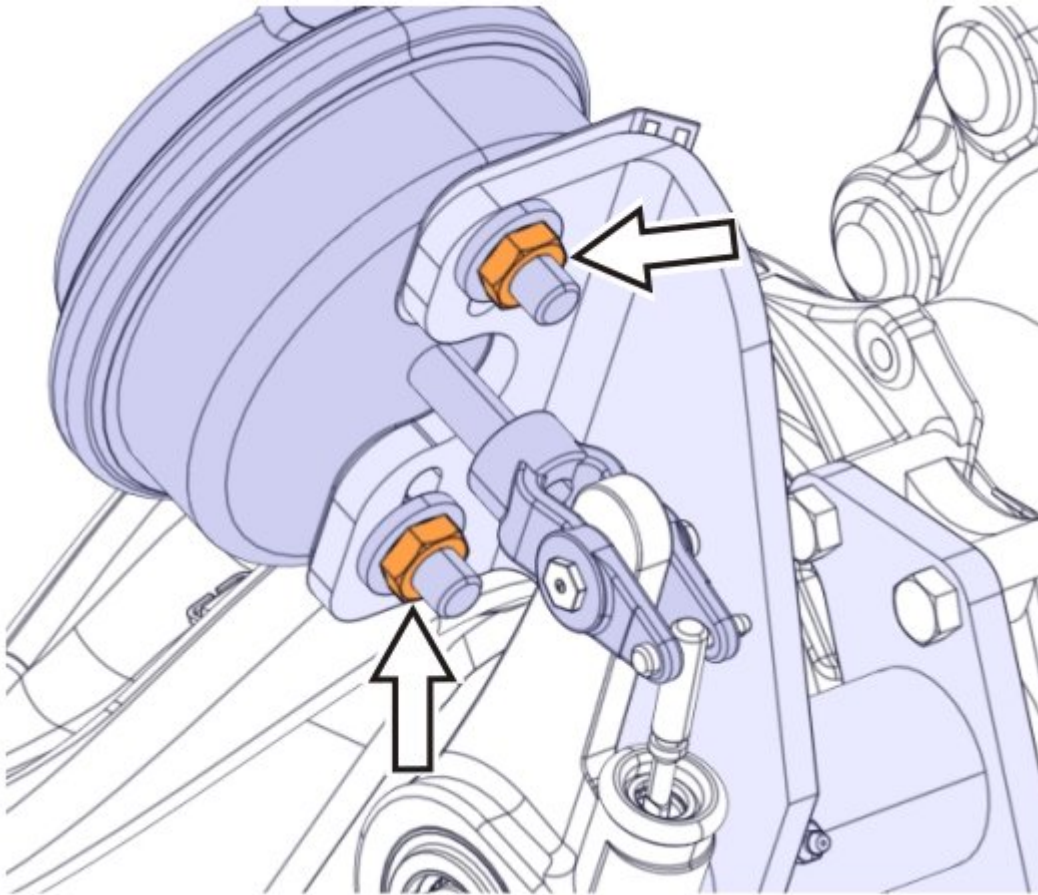
Note: Clean the brake shoes of any dust or debris and store for installation.



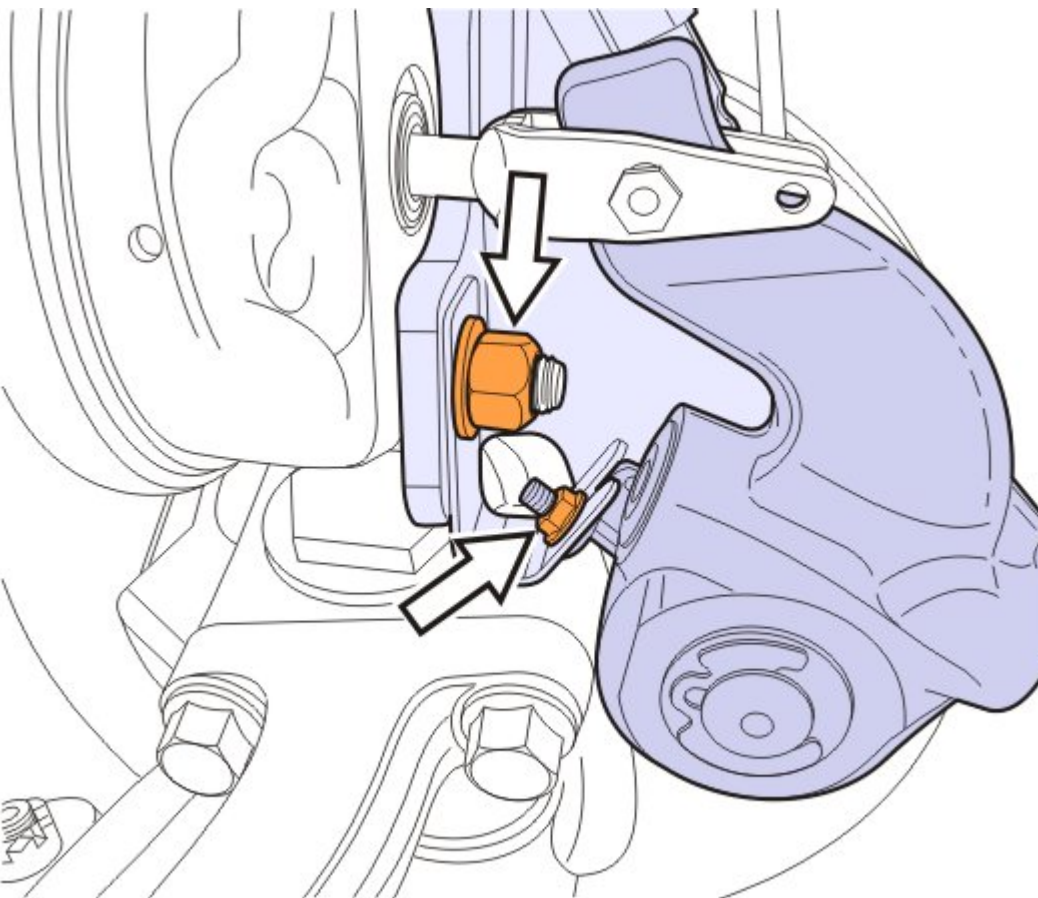
- Loosen the two nuts securing the brake chamber to the cam tube mounting bracket.

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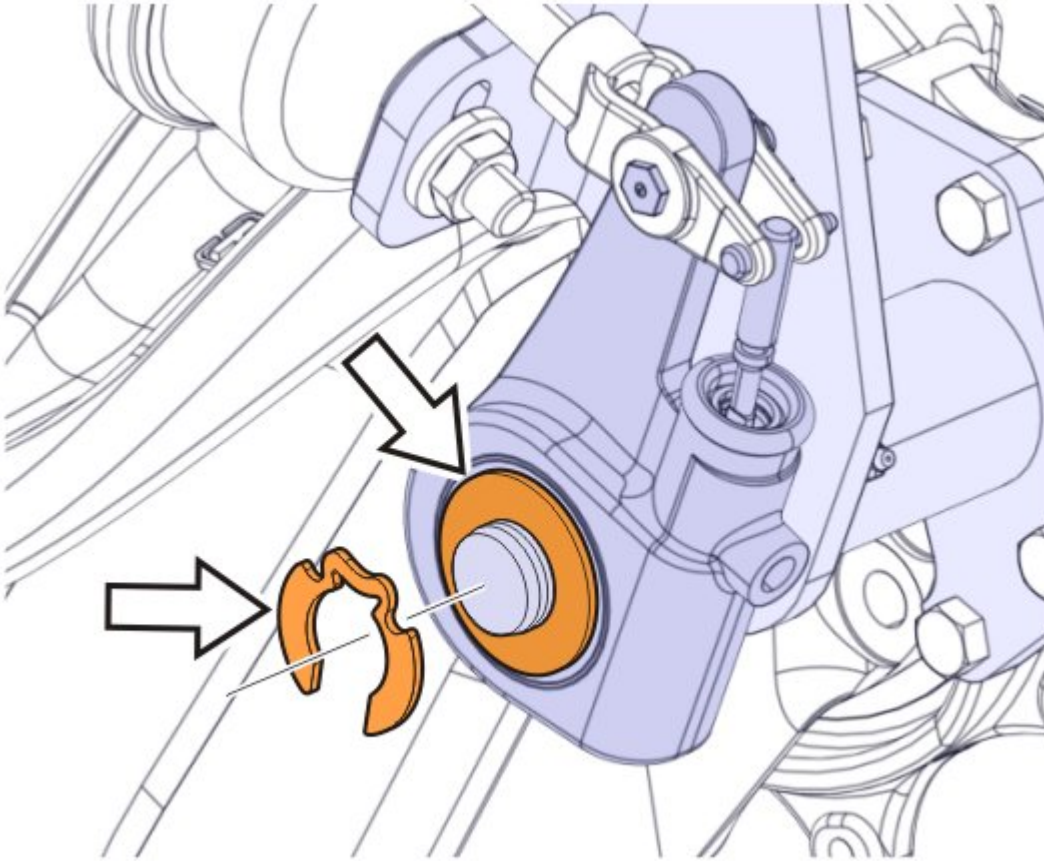
- For Haldex slack adjusters, remove the fasteners securing the slack adjuster to the cam tube mounting bracket.



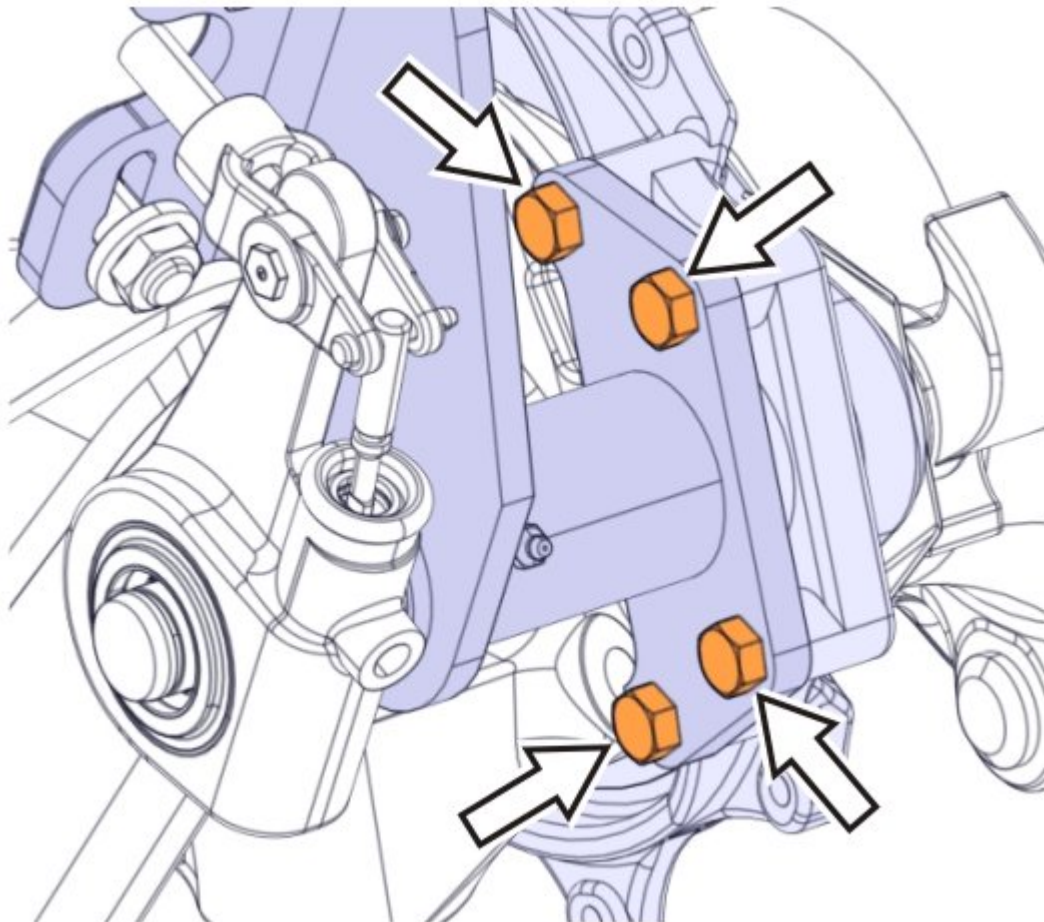
- Remove the snap ring and washers securing the slack adjuster to the brake S-Cam.

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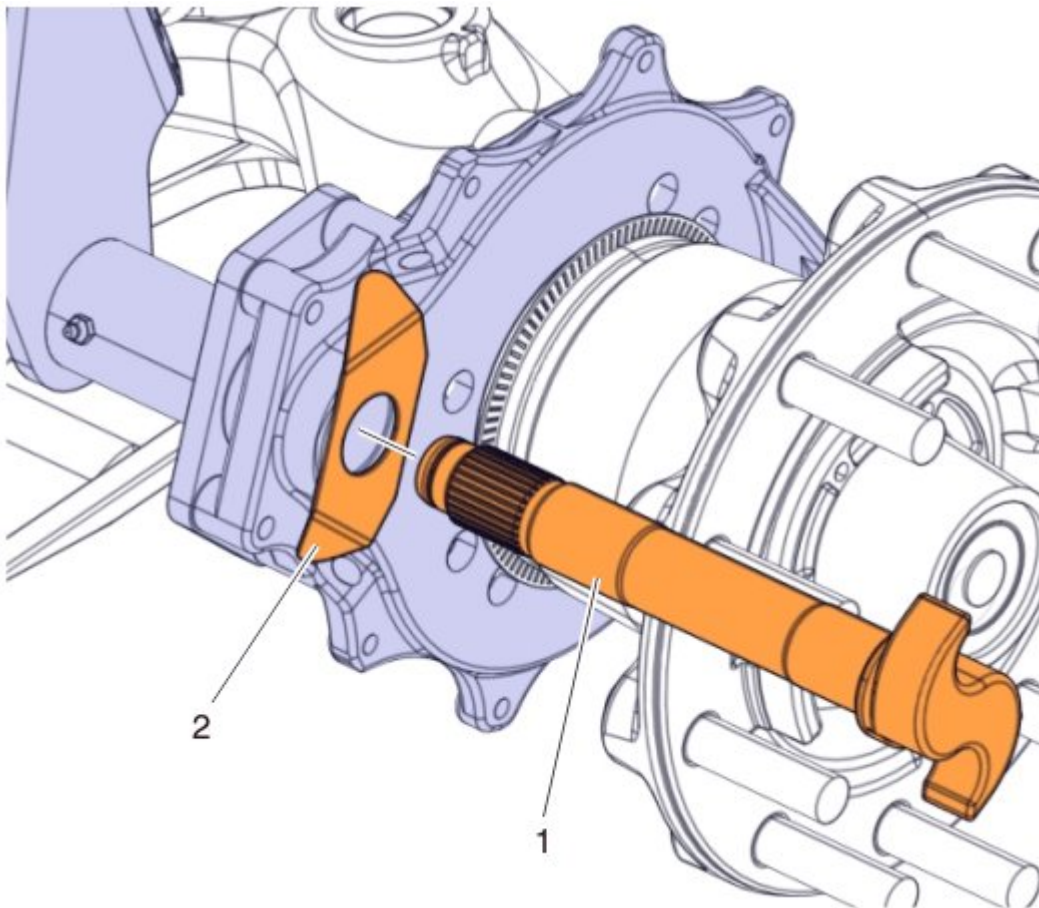


- Remove the four nuts and washers securing the cam tube to the brake spider.



- Remove the brake S-Cam by pulling the S-Cam clear of the cam tube and brake spider.

Note: Remove brake S-Cam head washer (2) from the removed S-Cam (1). Clean the head washer and store it for reuse.



- . Follow steps 2 through 14 for the right side of the truck.

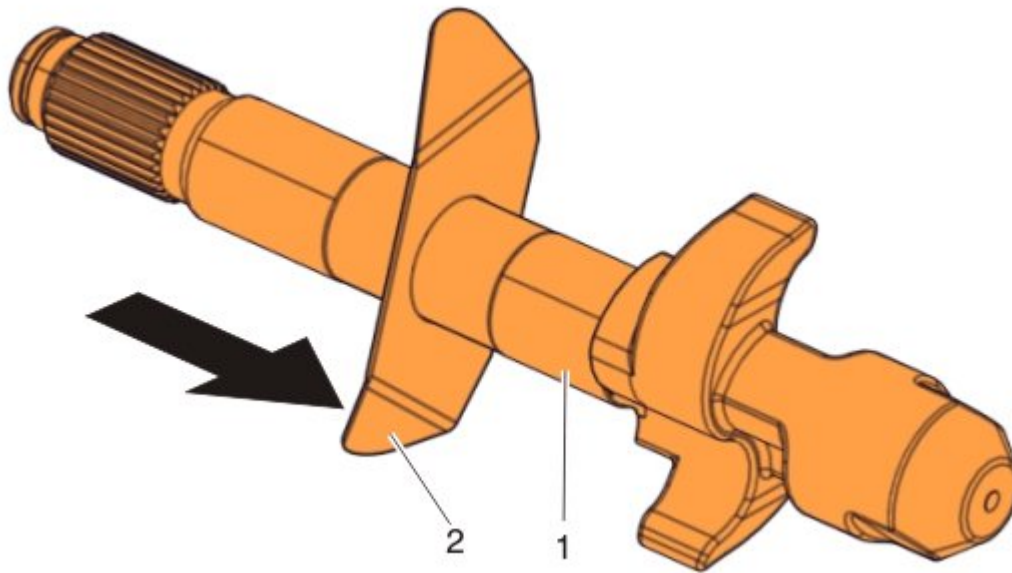
Brake S-Cam Installation

Note: The left side is shown for instructional purposes.

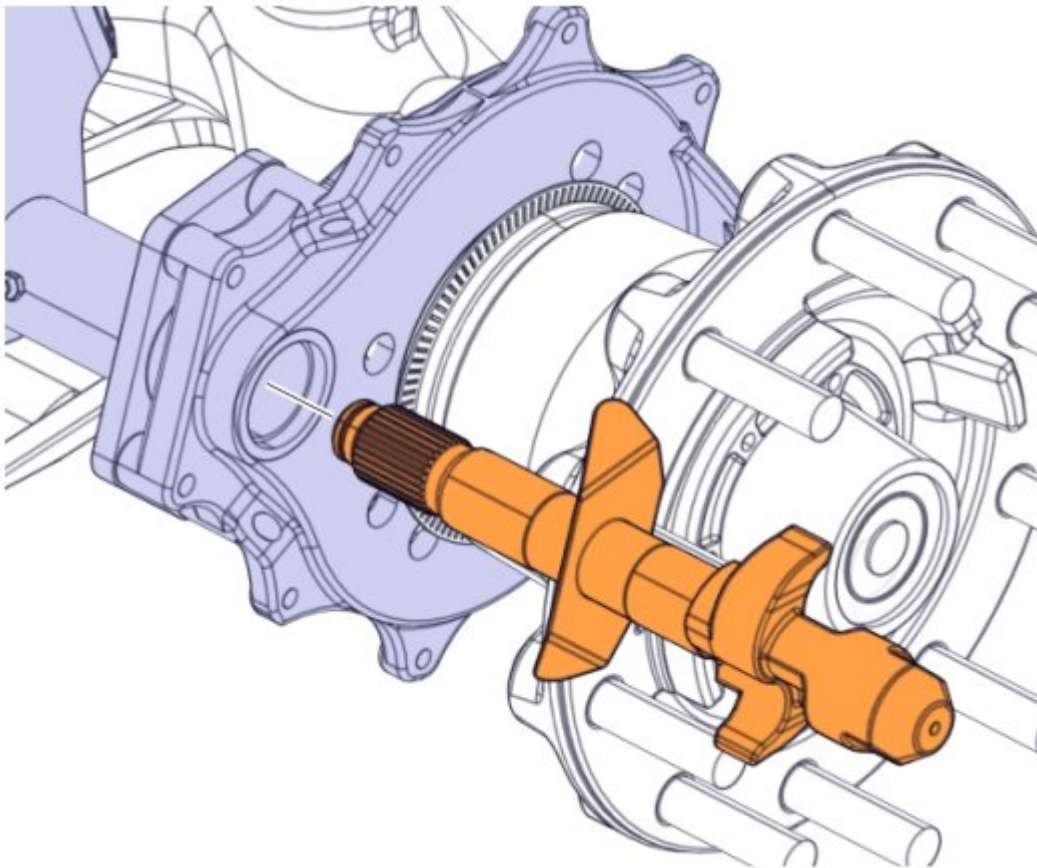
- . Inspect the cam tube. Ensure the grease seals and bushing are good.

Note: Replace the grease seals and/or bushings if needed.

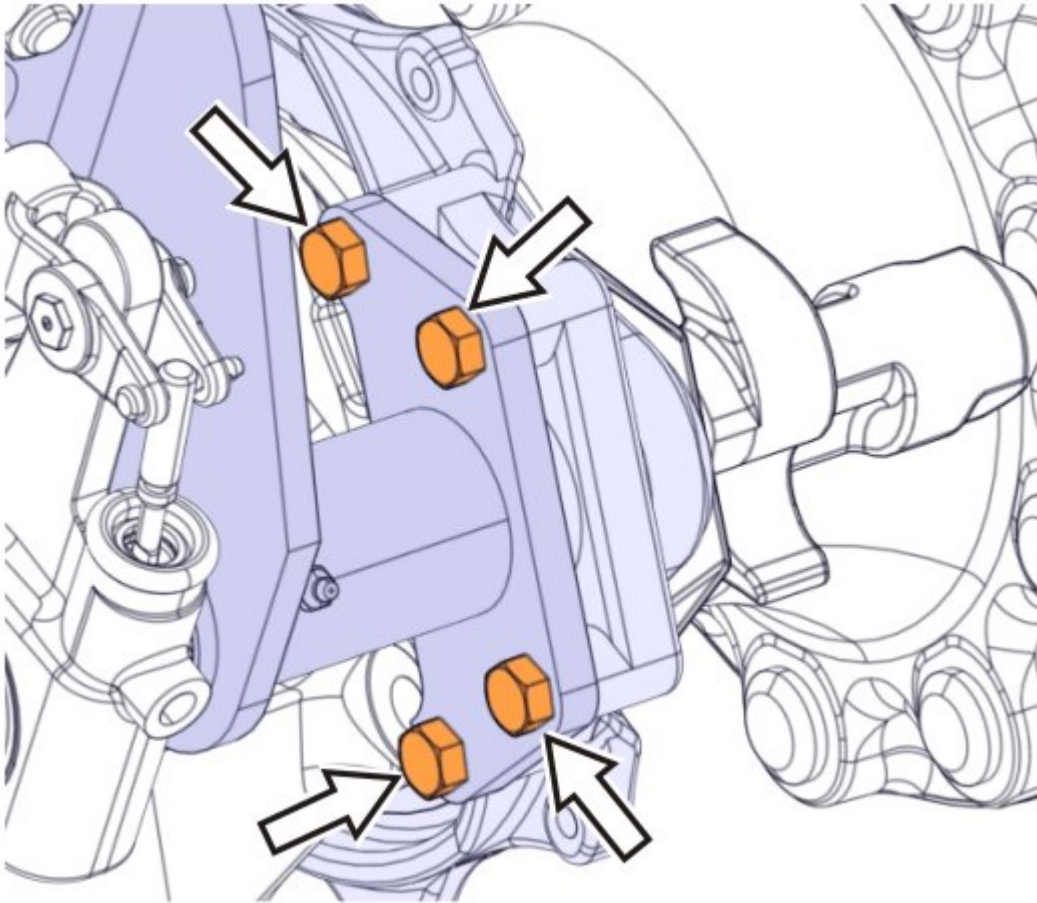
- . Retrieve the stored S-Cam head washer (2) and install it on the replacement S-Cam (1) in the proper direction.



- . Lube the replacement S-Cam before installing it in the cam tube.
- . Position the S-Cam in the cam tube and slide it into the brake spider.

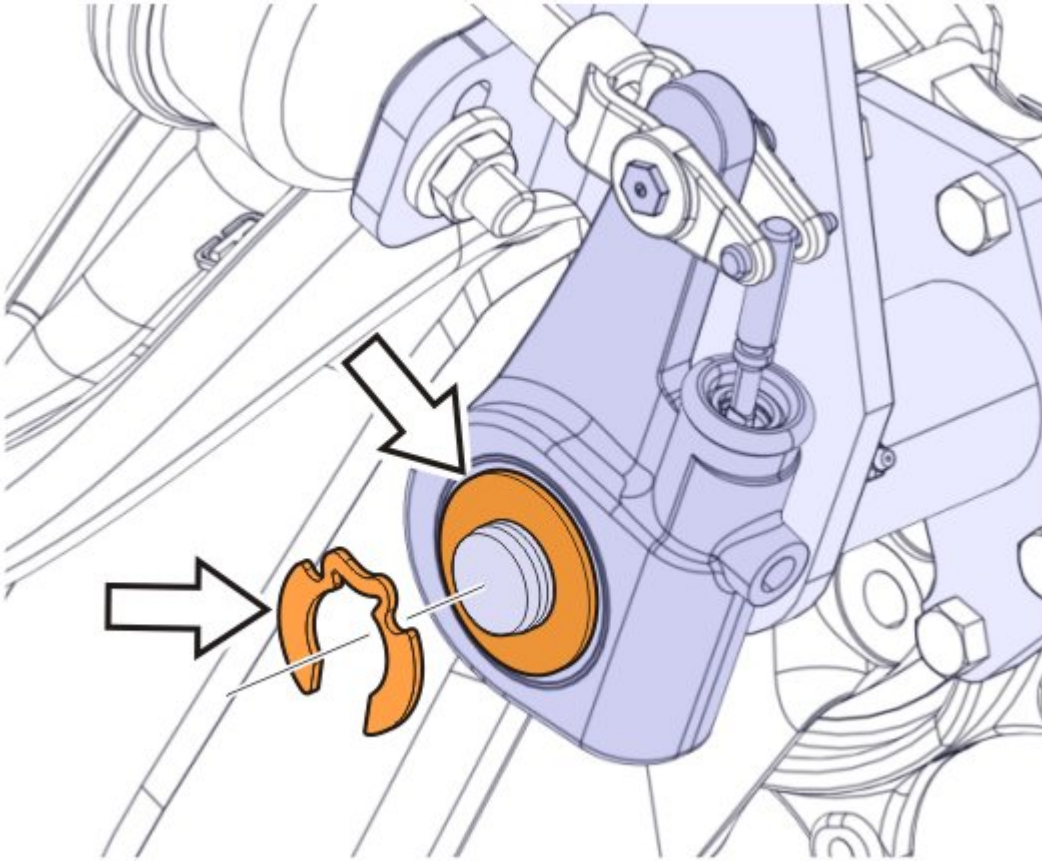


- . Install the four nuts securing the cam-tube and brake S-Cam to the brake spider.
- . Tighten the four nuts to 75 ft-lbs (102 N m).



- . Properly position the slack adjuster on the replacement S-Cam.
- . Install the shim washer on the S-Cam, slack adjuster, and shim S-Cam to set the lateral end play 0.127 – 0.635 mm (.005-.025 in).
- . Install the E-clip.

Note: Ensure the E-clip is in the groove at the end of the S-Cam.



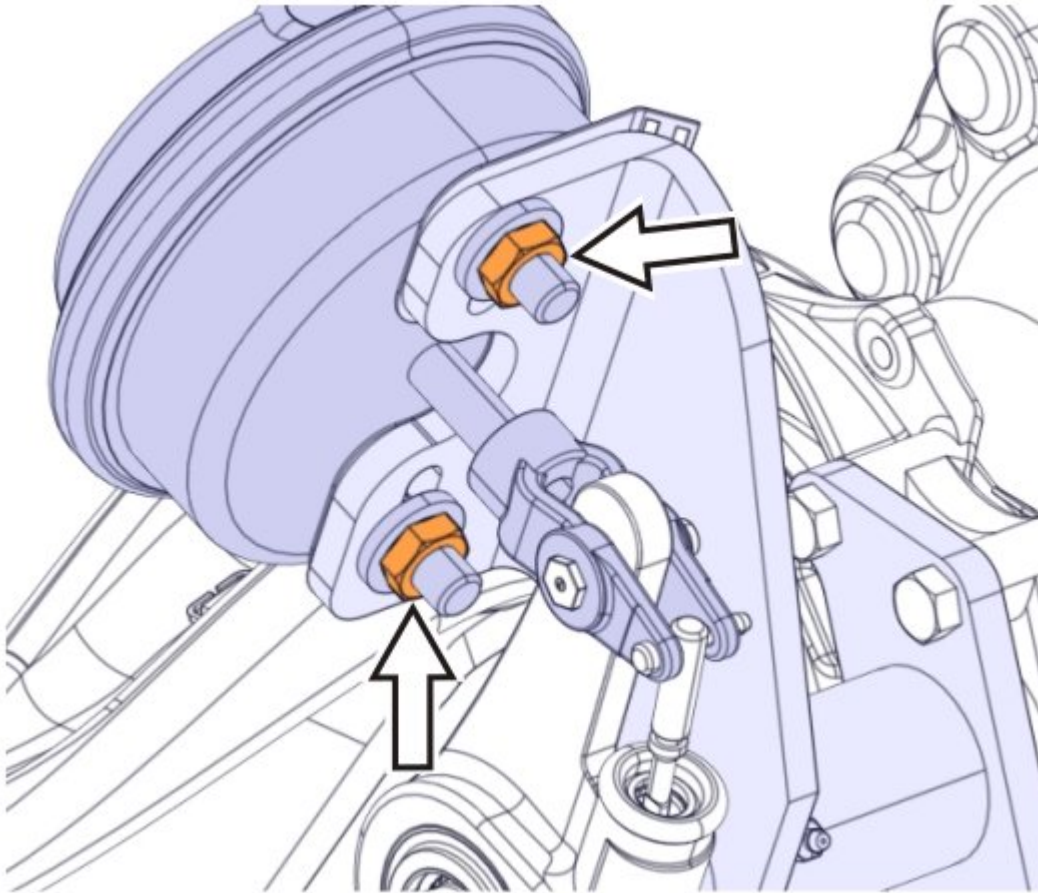
- . Measure the cam bushing play.

Note: The maximum S-Cam bushing vertical end play permitted is (0.035 in).

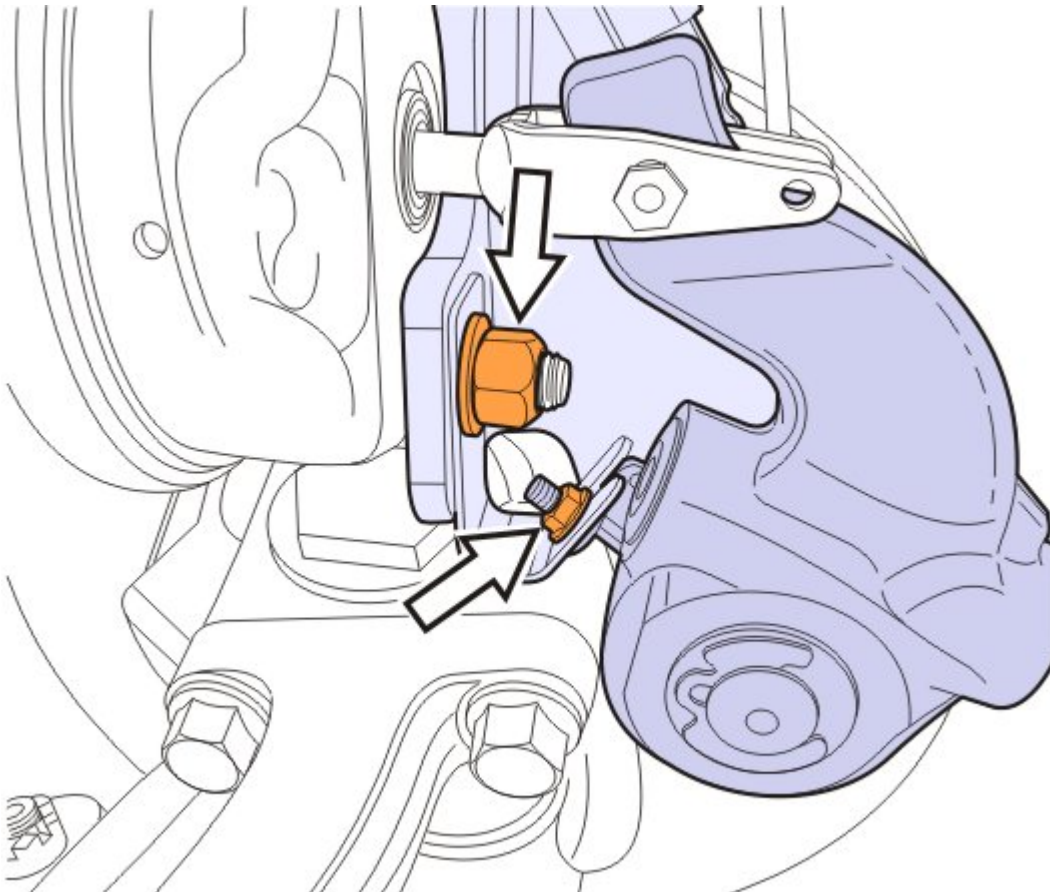
- . Tighten the two nuts securing the brake chamber to the cam tube mounting bracket.

Note: On the first pass, tighten the two nuts to 34 Nm (25 ft-lb).

Note: On the second pass, tighten the two nuts to 180 – 210 Nm (133 – 154 ft-lb).



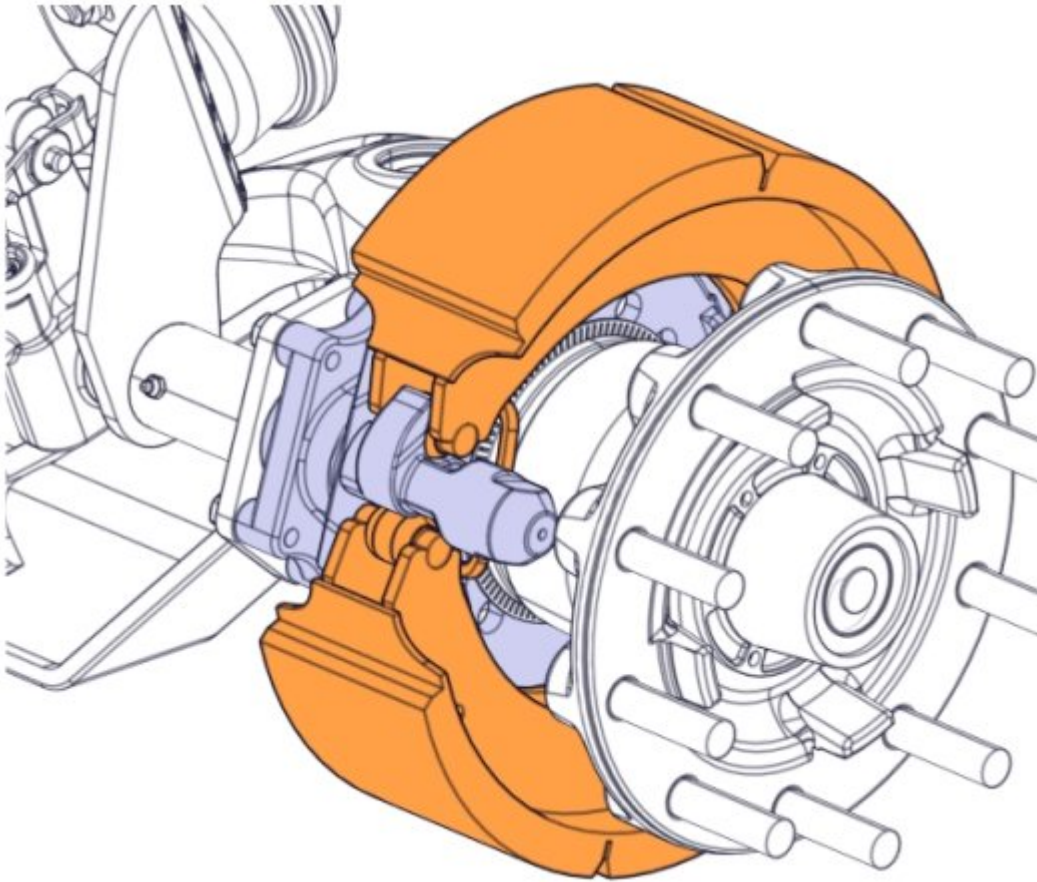
- . For Haldex slack adjusters, install the fasteners securing the slack adjuster to the cam tube bracket.
- . Tighten the slack mounting strap fastener to 11 – 16 Nm (8 – 12 ft-lb).



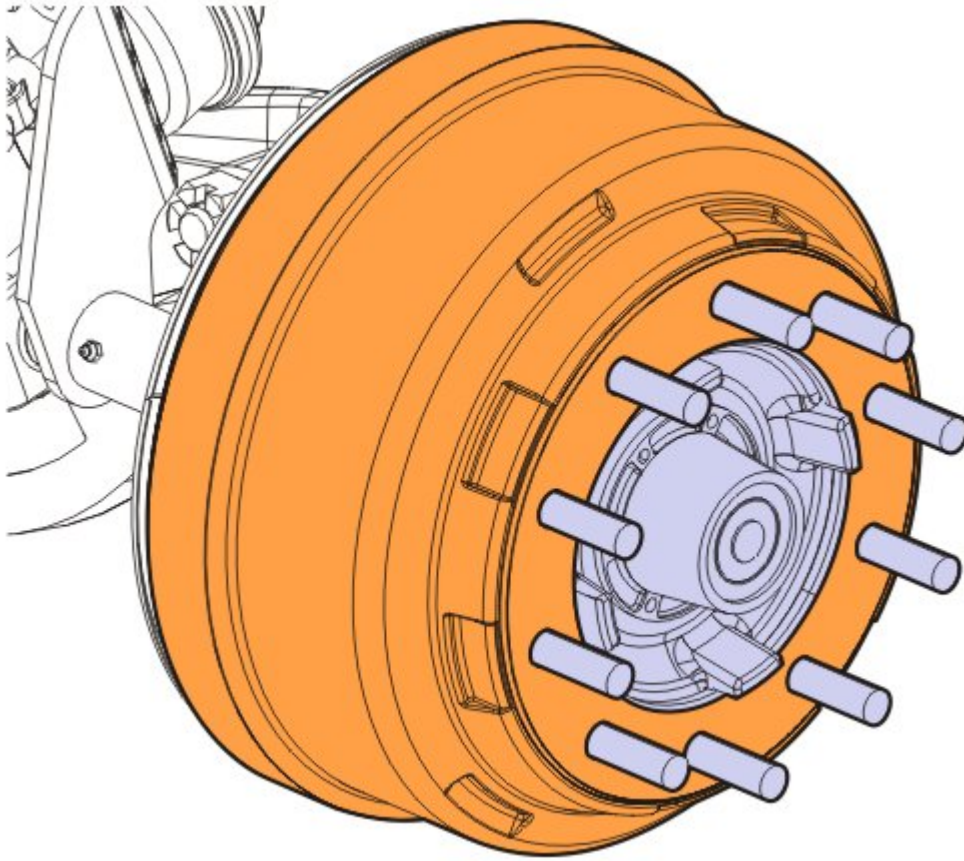
- . Using a grease gun, grease the cam tube and slack adjuster until they purge.

Note: Ensure the grease seal at the S-Cam head does not leak. If it does leak, replace the seal.

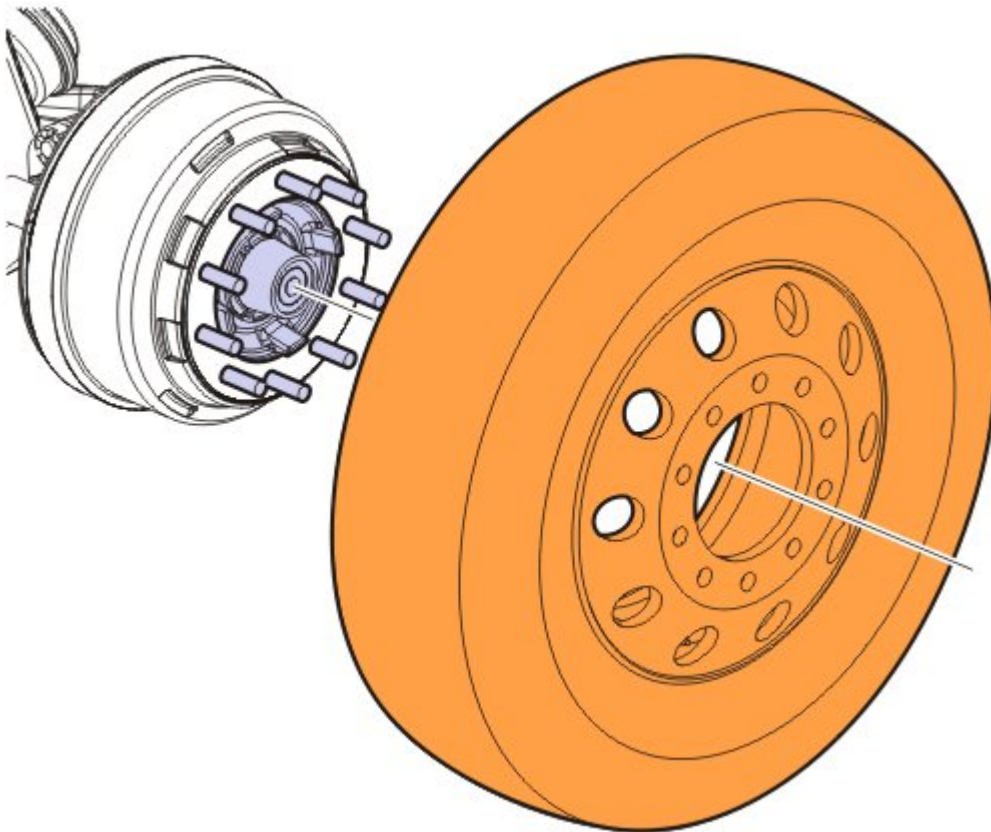
- . Pre-lube the rollers and anchor pin pockets on the brakes before installing brake shoes.
- . Install the brake shoes, springs and rollers in the same position (top or bottom) as previously recorded.



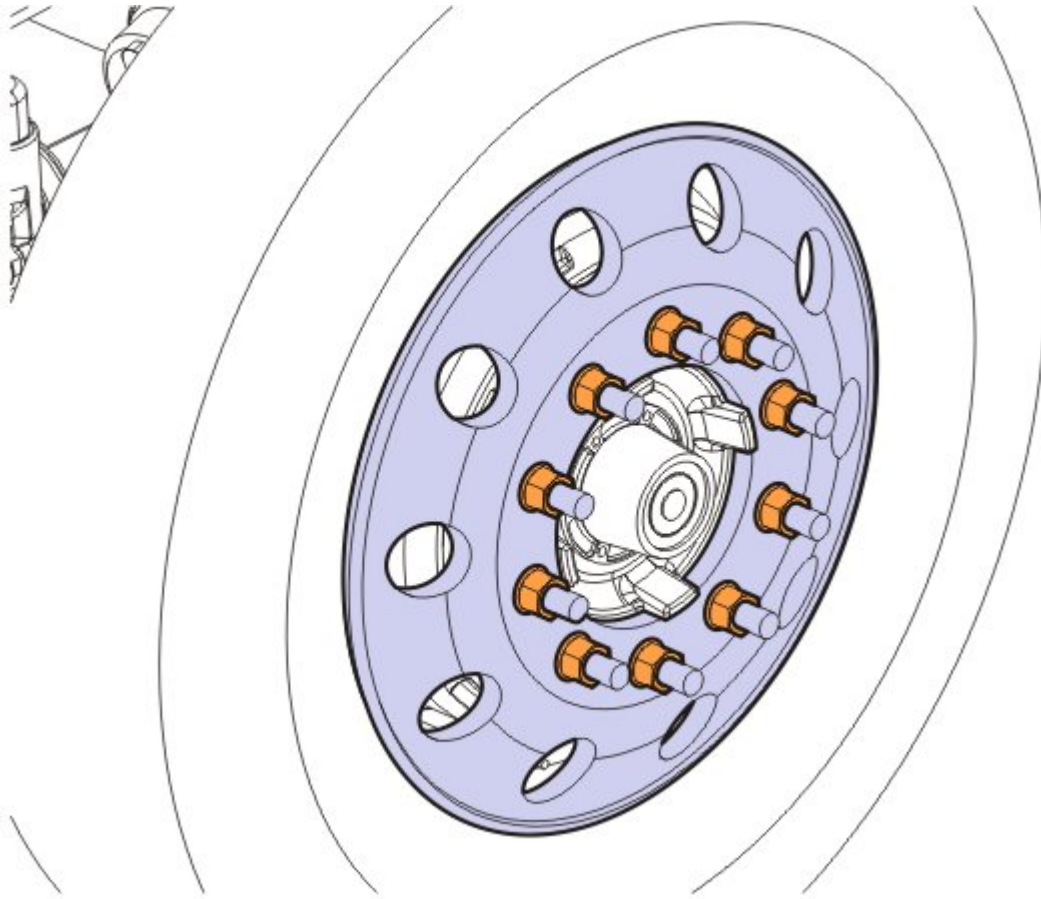
- . Install the brake drum as previously recorded on the drum and wheel stud during the removal procedure.



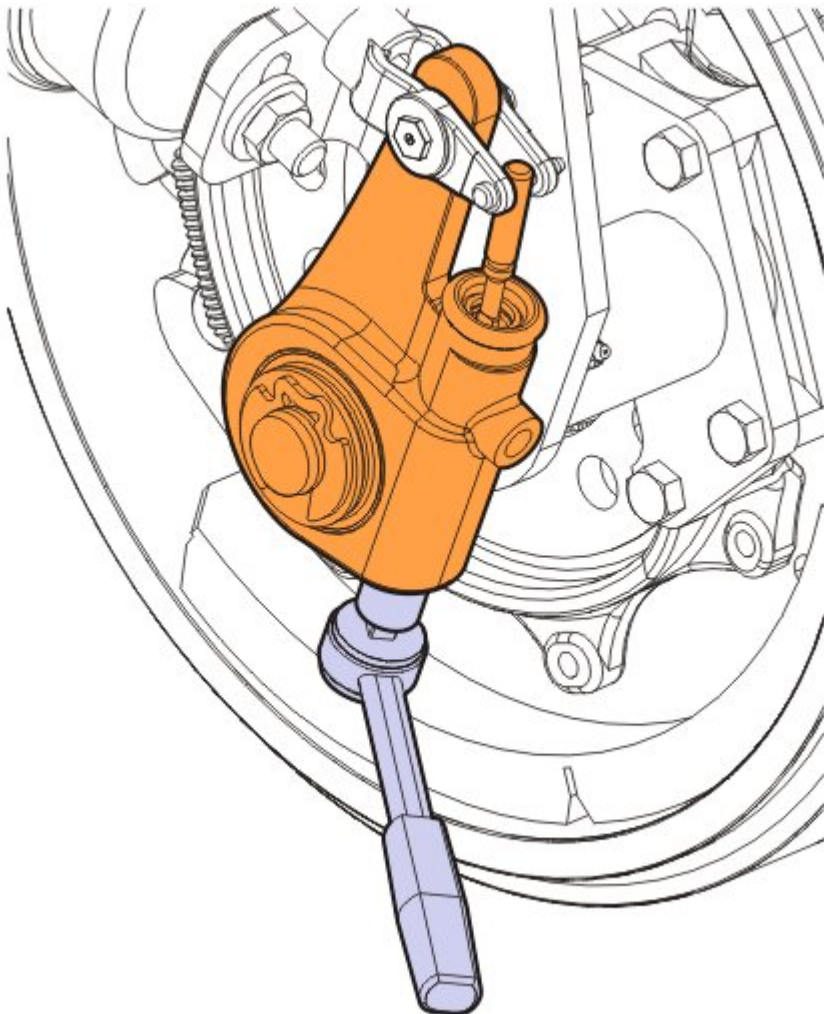
- . Install the wheel using the reference marks made on the wheel and the wheel stud during the removal procedure.



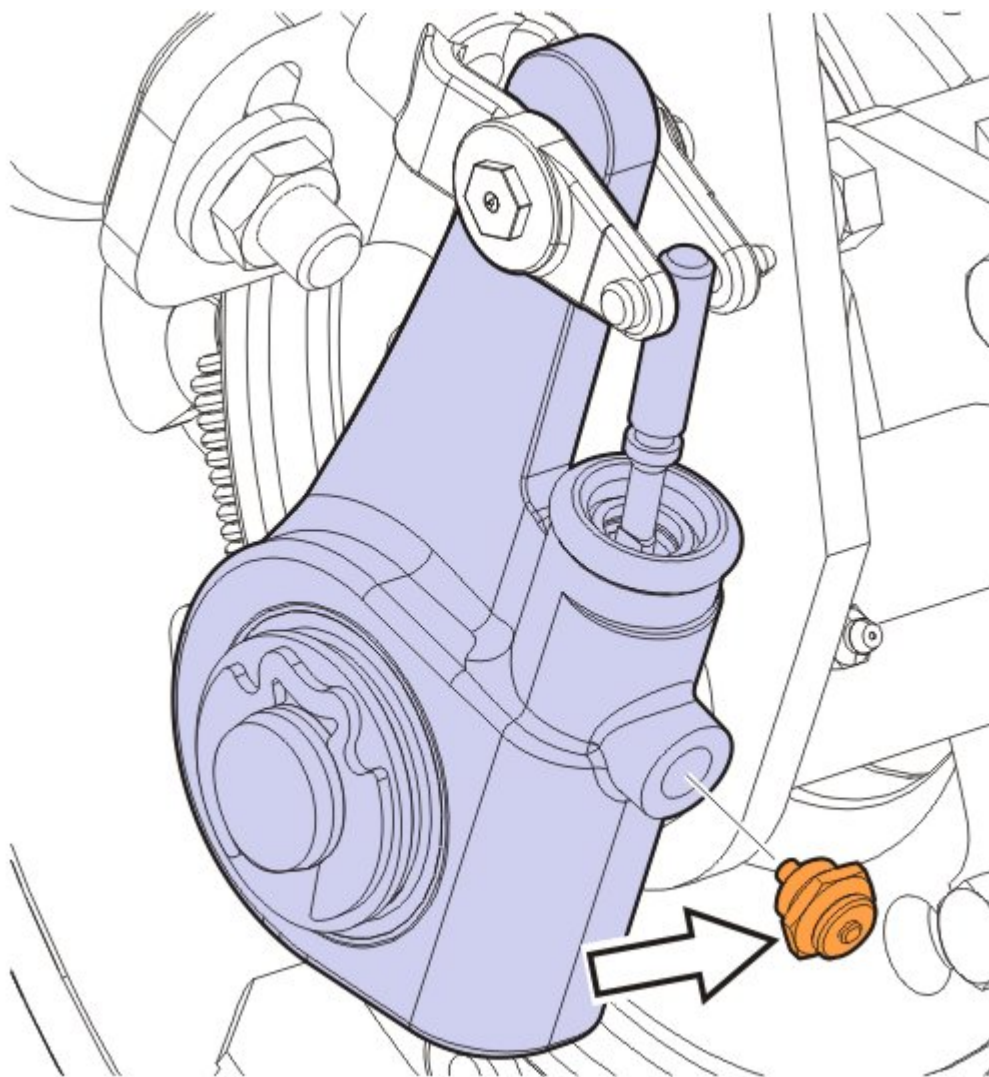
- . Install the wheel nuts.
- . Tighten the wheel nuts to 610 Nm (450 ft-lb).



- Adjust the brake as recommended per (slack adjuster) manufacturer.



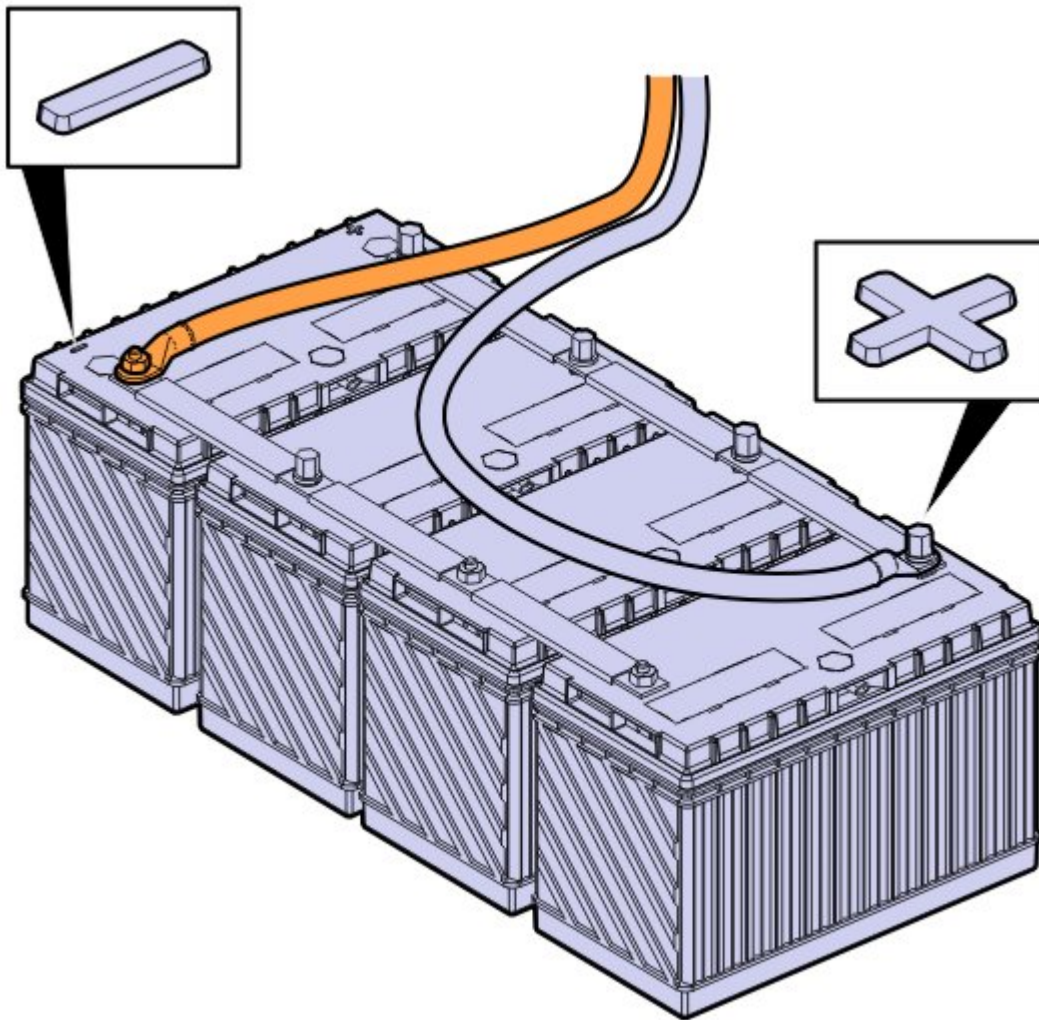
- . If applicable, install the slack adjuster pawl.



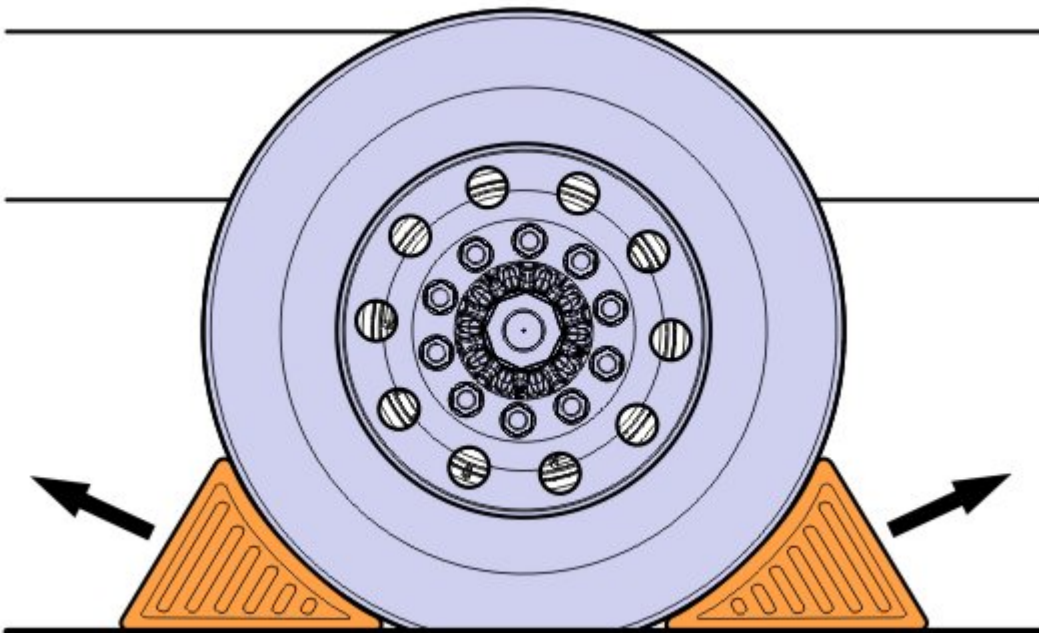
- . After brake the adjustment, rotate the wheel and ensure the brake is not dragging or the drum is not out of round.
- . Repeat steps 1 through 21 for the right side of the truck.
- . Lift the steer axle with a jack, remove the jack stands, and lower the axle.
- . Go to Commissioning the Truck for Operation.

Commissioning the Truck for Operation

- . Connect the battery cable to the negative (ground) terminal.



Remove the wheel chocks.



Reimbursement

<p>This repair may be eligible for reimbursement if a product failure was experienced within time and</p>	<p>UCHP Reimbursement</p>
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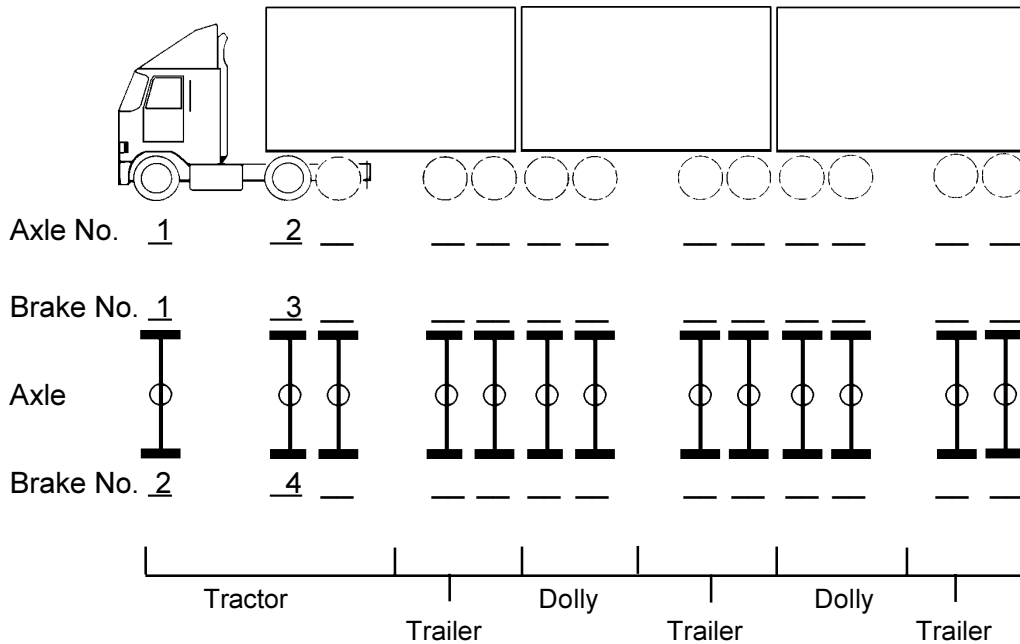
mileage limits of the applicable Warranty coverage. Reimbursement is obtained via the normal claim handling process.	
Claim Type (used only when uploading from the Dealer Bus. Sys.)	W
Labor Code	
Primary Labor Code (Brake S-Cam, Replacement)	5143-03-09-01 3.0 hrs.
Causal Part	85137267

VOLVO Trucks North America reserves the right to make any changes in design or to make additions to or upon its products without incurring any obligations to install the same on vehicles previously built.

AIR PRESSURE BALANCE & THRESHOLD PRESSURE TESTS



Air Pressure Balance and Threshold Pressure Tests



VEHICLE DATA

	<u>Vehicle Number</u>	<u>Manufacturer Model, Year</u>	<u>Comments</u>
Tractor	_____	_____	_____
#1 Trailer	_____	_____	_____
Conv. Dolly	_____	_____	_____
#2 Trailer	_____	_____	_____
Conv. Dolly	_____	_____	_____
#3 Trailer	_____	_____	_____

GENERAL INSTRUCTIONS:

1. Number the axle and each brake on the axle of the vehicle being tested using the illustration.
2. All testing should be performed using both increasing (INC) and decreasing (DEC) air pressure and using our instructions.
3. When performing the Air Brake Pressure Balance Tests the pressure from only one chamber of a tandem can be used when the same relay valve delivers pressure directly to all four chambers on the tandem.
4. Record test results in the charts provided.

Date: _____
 Test Conducted By: _____
 Vehicle No: _____

Air Brake Pressure Balance Test

		Service Chamber Pressure at Axle													
		Increasing Pressures for Axle Nos.							Decreasing Pressures for Axle Nos.						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
Trailer Control Line	5														
	10														
	15														
	20														
	25														
	30														
	40														
	50														
	60														

Foundation Brake Threshold Pressure Test

BR.#	INC	DEC	AVG	BR.#	INC	DEC	AVG
1				11			
2				12			
3				13			
4				14			
5				15			
6				16			
7				17			
8				18			
9				19			
10				20			

VEHICLE PREPARATION FOR TESTING

1. Adjust all brakes **equally** using the vehicle manufacturer's procedure.
2. Secure the vehicle on a level surface by means other than the brakes and charge the air system to governor cut-out (approximately 120 psi). Shut off engine. **CAUTION: To avoid possible injury due to automatic application of the parking brakes during testing, it is recommended that the parking brakes be mechanically caged.**
3. Check the vehicle or combination for excessive air system leakage. If the combined leakage exceeds the limits below, repair the sources of leakage before proceeding.

	Brakes Released	Brakes Fully Applied
Single Vehicle	4 psi in 2 mins.	6 psi in 2 mins.
Tractor w/Trailer	6 psi in 2 mins.	8 psi in 2 mins.
Tractor w/2 Trailers	8 psi in 2 mins.	10 psi in 2 mins.

AIR BRAKE PRESSURE BALANCE TEST

Objective: To determine the air pressure differences between the various axles of a single or combination vehicle.

Equipment: Dual test gauge (use a gauge with a 0-150 psi range.)

Testing:

1. Perform vehicle preparation and place the vehicle dash control valves in the normal over-the-road position.
2. If the vehicle being tested is a single unit, such as a straight truck or bus, install one half of the dual test gauge directly in the #1 or primary circuit delivery of the brake valve. For tractors or combination vehicles, install one half of the dual test gauge in the trailer service (control) line (between tractor and trailer). **NOTE: This half of the test gauge will remain here for the duration of the test.** Install the other half of the test gauge in a service brake chamber at axle #1. (Procedure will be repeated at each axle of the vehicle combination). **NOTE: Test gauge connection must be between the air chamber and any control valve, ideally directly in or at the chamber.**

3. **Gradually** apply the brakes via the brake valve and record the axle pressure in the increasing (INC) column of the axle #1 when brake valve primary delivery or trailer service (control) line pressure is at 5, 10, 15, 20, 25, 30, 40, 50 and 60 psi. Repeat procedure for each axle of the vehicle combination and record pressure readings on the chart. (See partial example.)

IMPORTANT: Readings during this phase of the procedure should be taken with **increasing** air pressure only. Do not over apply and then release, as an inaccurate reading will occur. Release brakes fully and re-apply, if pressure is over applied.

4. Repeat the procedure using decreasing air pressure. Fully apply (75 psi application min.) the service brakes then **gradually** release and record the axle pressure in the decreasing (DEC) column of the appropriate axle when brake valve primary delivery or trailer service (control) line pressure is at 60, 50, 40, 30, 25, 20, 15, 10 and 5, respectively. Repeat the procedure for each axle and record the pressure readings on the chart.

EXAMPLE:

Air Brake Pressure Balance Test

		Service Chamber Pressure at Axle														
		Increasing Pressures for Axle Nos.							Decreasing Pressures for Axle Nos.							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	
5	2	2	2	2	2	2	--	--	7	6	6	6	6	6	--	--
10	8	8	8	8	8	8	--	--	12	11	11	11	11	11	--	--

IMPORTANT: Readings during this phase of the procedure should be taken with **decreasing** air pressure only. Do not under shoot the pressure and partially reapply pressure as an inaccurate reading will result. Fully apply the brakes and exhaust down to the specified pressure.

5. When testing is complete, uncage the parking brakes unless you are proceeding to **FOUNDATION BRAKE THRESHOLD PRESSURE TESTING.**

FOUNDATION BRAKE THRESHOLD PRESSURE TESTING

Objective: To determine the air pressure required to make and release contact between the lining and drum at each foundation brake on the vehicle.

Equipment: Test gauge (use a gauge with a 0-60 psi range.)

Important: A low range (0-60 psi) pressure gauge is required for accurate data for the threshold pressure test. Using a higher range (0-100, or 0-150 psi) gauge can result in bad data.

Testing:

1. Perform the vehicle preparation and place the vehicle dash controls in the normal over-the-road position.
2. If the vehicle being tested is a single unit, such as a straight truck or bus, install the test gauge directly in the #1 or primary circuit delivery of the brake valve. For tractors or combination vehicles, install the test gauge in the trailer service (control) line (between tractor and trailer).
3. Raise the axle until tires (wheel ends) are no longer in contact with the floor.
4. While **manually** rotating a wheel, **gradually** make a service brake application as registered on the gauge until braking torque (drag) occurs. Note the gauge air pressure and record it in the "increasing" (INC) column for the appropriate brake in the chart.
5. Increase service air pressure to 40 psi. While gradually decreasing the air pressure at the gauge, attempt to rotate the wheel. Note the gauge air pressure at which the wheel can be freely rotated and record that pressure in the "decreasing" (DEC) column for the appropriate brake in the chart.
6. Add the pressure recorded in the "increasing" (INC) and "decreasing" (DEC) columns together then divide by two. Record that value in the "average" (AVG) column for the appropriate brake. This average is the threshold pressure for that brake.

For example: If the number in the "increasing" column was 9 and the number in the "decreasing" column was 3, then $9 + 3 = 12$, $12 \div 2 = 6$, and 6 is recorded in the average column.

EXAMPLE:

Foundation Brake Threshold Pressure Test

BR.#	INC	DEC	AVG	BR.#	INC	DEC	AVG
1	9	3	6	11			
2	8	3.5	6.5	12			

7. When testing is complete, uncage the parking brakes.

RECOMMENDATIONS:

Bendix recommends that all brake threshold pressures for all axles (average calculated value from the test results) be within a 2 psi range. This is to enable the brake force distribution to be within acceptable limits, especially at low brake application pressures. Industry studies have indicated that 80% of all brake applications made in actual service are below 20 psi.

For pressure balance, on increasing pressures we recommend that the pressure recorded at each axle be within 2 psi of one another for trailer control line pressures of 10 to 40 psi. The decreasing pressures recorded should also be within 2 psi of one another in this pressure range. For axles fitted with special valves which enable the threshold pressure recommendation to be achieved or which proportion or limit the delivery to the chambers this recommendation is not valid. Under these conditions the specific application must be analyzed in more detail to understand the brake distribution.

There are many factors that affect vehicle brake balance. Balancing the brake threshold pressures and the pressure at the chambers of all axles are important factors in achieving brake balance. However, this does not necessarily ensure even lining wear or brake force distribution. Consideration must also be given such factors as tire size, brake size, brake type, friction material and others.

NOTE: The difference recorded in these tests can be attributed to specific vehicle design considerations. Before any brake system modification are made the test data should be reviewed by both the vehicle OEM and our Engineering Departments.

5 Assembly and Installation

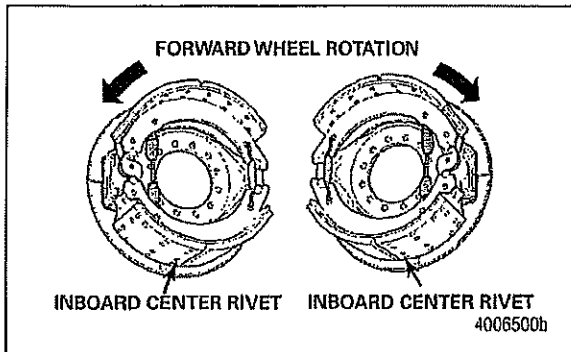


Figure 5.32

Drum and Wheel

Follow the manufacturer's instructions to install the drum and wheel onto the axle.

Brake Burnishing Procedure

The brake burnishing procedure can be used to help reduce brake related noise or imbalance concerns which may occur in the field.

⚠ WARNING

To prevent serious personal injury and damage to components, burnish the brakes in a safe area.

1. Adjust the automatic slack adjuster using the initial manual setup procedure. Refer to Section 6.
2. Find a service road or non-busy state road where the vehicle can be driven safely at 20-25 mph (32-40 km/h).
3. Drive the vehicle at a speed of 20-25 mph (32-40 km/h). While driving at this speed, apply a light service brake application while applying a slight engine throttle application for a duration of 15-20 seconds. Release the service brakes for 15-20 seconds.
4. Using a hand-held temperature gun, immediately check the temperatures on the outside of the brake drums. Repeat Step 3 as many times as needed to obtain brake drum temperatures at least 450° F (232° C) at the coolest wheel-end brake, but not to exceed 550° F (260° C) at the warmest wheel end.
5. Drum temperature differences from side-to-side of approximately 50° F (10° C) or greater can indicate brake imbalance. If this condition exists, correct the issue before continuing.
6. Once the brake drums reach a temperature range above 450° F (232° C), return the vehicle to the service facility.
7. Let the truck sit for a minimum of 30 minutes for the brakes to cool to ambient temperature.
8. Check all wheel ends for the correct minimum Free Stroke measurement and ensure the Applied Stroke measurements are within CVSA specifications.
 - If the brake is not within specifications: Readjust the automatic slack adjuster using the initial manual setup procedure. Refer to Section 6.
9. Road test the vehicle and correct any issues if found.