Daimler Trucks North America LLC

Field Service Campaign

November 2012
SF471AB
SECOND REVISED NOTICE

Subject: Detroit Axles Driver-Controlled Differential Locks

Models Affected: Specific Freightliner Business Class M2, Cascadia, Columbia, and Coronado vehicles and Western Star 4900 vehicles manufactured July 22, 2011, through January 19, 2012.

General Information

Daimler Trucks North America LLC, on behalf of its Freightliner Trucks Division, is initiating Field Service Campaign SF471 to modify the vehicles mentioned above.

Material thickness and excess material from die punching may prevent retaining snap rings from seating fully in certain differential lock shift fork assemblies. This may cause the differential lock to remain engaged or unengaged.

The differential lock shift fork assembly will be inspected. Those that fail the inspection will be replaced.

There are approximately 750 vehicles involved.

REVISION: Vehicles in SF471A have tandem axles and will require two kits, vehicles in SF471B have single axles and will require one kit. The SRTs have been adjusted accordingly. This is a change from the previous bulletin.

Previous Revision: The measurement for determining when a repair is not needed has been updated. See step 8.6 of the inspection on page 6.

Additional Repairs

Dealers must complete all outstanding field service campaigns prior to the sale or delivery of a vehicle. A Dealer will be liable for any progressive damage that results from its failure to complete campaigns before sale or delivery of a vehicle.

Owners may be liable for any progressive damage that results from failure to complete campaigns within a reasonable time after receiving notification.

Please contact Warranty Campaigns for consideration of additional charges prior to performing the repair.

Work Instructions

Please refer to the attached work instructions. Prior to performing the campaign, check the vehicle for a completion sticker (Form WAR261).

Replacement Parts

Replacement parts are now available and can be obtained by ordering the kit number listed below from your facing Parts Distribution Center.

If our records show your dealership has ordered any vehicle(s) involved in campaign SF471AB, a list of the customers and vehicle identification numbers will be available on AccessFreightliner.com. Please refer to this list when ordering parts for this campaign.

Table 1 - Replacement Parts for SF471

Campaign Number	Kit Number	Part Description	Part Number	Qty. per Kit	Suggested Wholesale*
SF471A (Uses Two Kits) SF471B (Uses One Kit)	25-SF471-000	Cover Plate Seal	A94-23530-180	1	$230.82 US $235.44 CAN
		Locking Clip	A68-19940-137	1	
		Shift Fork Assembly	A68-13500-088	1	
		Shift Shaft O-Ring	A02-39971-048	1	
		Bolt (Carrier to Axle Hsg)	MBT N000000004392 or N000000004392	1	
		Gasket, Axle Shaft	11-14418-000	4	
		U-Joint Straps	TDA REBC17S	8	
		U-Joint Straps Bolts	23-12894-100	16	

* Please charge all U.S. and Canadian Direct Warranty Customers the above-listed price for the kit, as they are authorized to perform their own Recalls. This pricing does not apply to Export Distributors.

Table 1

Removed Parts

U. S. and Canadian Dealers, please follow Warranty Failed Parts Tracking shipping instructions for the disposition of all removed parts. Export distributors, please destroy removed parts unless otherwise advised.

Labor Allowance

Table 2 - Labor Allowance

Campaign Number	Procedure	Time Allowed (hours)	SRT Code	Damage Code
SF471A	Inspect tandem axles	0.8	996-0880C	000-Inspected
	Inspect and replace retaining snap ring-tandem axles	6.1	996-0880D	000-Modifiedx
SF471B	Inspect single axle	0.5	996-0880A	000-Inspected
	Inspect and replace retaining snap ring-single axle	3.5	996-0880B	000-Modifiedx

Table 2

IMPORTANT: When the campaign has been completed, locate the base completion label in the appropriate location on the vehicle, and attach the gray completion sticker provided in the field service kit (Form WAR261). If the vehicle does not have a base completion label, clean a spot on the appropriate location of the vehicle and first attach the base completion label (Form WAR259). If a field service kit is not required or there is no completion sticker in the kit, write the campaign number on a blank sticker and attach it to the base completion label.

Claims for Credit

You will be reimbursed for your parts, labor, and handling (landed cost for Export Distributors) by submitting your claim through the Warranty system within 30 days of completing this campaign. Please reference the following information in QuickClaim or OWL:

- **REVISION:** Vehicles in SF471A have tandem axles and will require two kits, vehicles in SF471B have single axles and will require one kit. The SRTs have been adjusted accordingly. This is a change from the previous bulletin.
- Claim type is **Field Service**.
- In the FTL Authorization field, enter the campaign number and appropriate condition code (**SF471A or SF471B**).
- In the Primary Failed Part Number field, enter **25-SF471-000**.
- In the Parts field, enter the appropriate kit number(s) and quantities as shown in the Replacement Parts Table. **NOTE:** Up to 1 quart of gear oil may be claimed for single axles and 2 quarts for tandem axles. One 6 oz. to 10 oz. container of flange sealant may be claimed per axle without additional authorization. Additional quantities require pre-approval before claims submission.
- In the Labor field, first enter the appropriate SRT from the Labor Allowance Table. For administrative time, enter SRT 939-0010A for 0.3 hours.
- For OWL, the VMRS Component Code is 022-005-001 and the Cause Code is A1 - Campaign.

This Field Service Campaign will **terminate on November 30, 2013**. Dealers will be notified of any changes to the termination date via Important Campaign Information Letter posted on AccessFreightliner.com.

IMPORTANT: ServicePro or OWL must be viewed prior to beginning work to ensure the vehicle is involved and the campaign has not previously been completed. Also, check for a completion sticker before beginning work.

All claims must be submitted within 30 days of the repair and within 30 days of the termination date of the campaign. U.S. and Canadian Dealers: All excess inventory to be returned to the PDC following the conclusion of the campaign must be returned in resaleable condition to the Memphis PDC within 90 days from the termination date. Please submit a PAR to request return to the Memphis PDC. (Canadian dealers should return the kits to their facing PDC.) Export Distributors: Excess inventory is not returnable.

U.S. and Canadian dealers, contact the Warranty Campaigns Department from 7:00 a.m. to 4:00 p.m. Pacific Time, Monday through Friday, via Web inquiry at AccessFreightliner.com / Support / My Tickets and Submit an Inquiry, or the Customer Assistance Center at (800) 385-4357, after normal business hours, if you have any questions or need additional information. Export distributors submit a Web inquiry or contact your International Service Manager.

November 2012
SF471AB
SECOND REVISED NOTICE

Copy of Notice to Owners

Subject: Detroit Axles Driver-Controlled Differential Locks

Daimler Trucks North America LLC, on behalf of its Freightliner Trucks Division, is initiating Field Service Campaign SF471 to modify specific Freightliner Business Class M2, Cascadia, Columbia, and Coronado vehicles and Western Star 4900 vehicles manufactured July 22, 2011, through January 19, 2012.

Material thickness and excess material from die punching may prevent retaining snap rings from seating fully in certain differential lock shift fork assemblies. This may cause the differential lock to remain engaged or unengaged.

The differential lock shift fork assembly will be inspected. Those that fail the inspection will be replaced.

Please contact an authorized Daimler Trucks North America dealer to arrange to have the campaign performed and to ensure that parts are available at the dealership. To locate an authorized dealer, search online at www.Daimler-TrucksNorthAmerica.com. The campaign will take approximately between one hour and six and one half hours, depending on the work needed, and will be performed at no charge to you.

This Field Service Campaign will **terminate on November 30, 2013**. Please make sure the campaign is completed prior to this date. Work completed after this date will be done at the customer's expense.

As stated in the terms of your express limited warranty, Daimler Trucks North America LLC will not pay for any damage caused by failure to properly maintain your vehicle. Daimler Trucks North America LLC considers the work necessary under this campaign to be proper maintenance and will, therefore, not pay for any damage to your vehicle caused by your failure to have the repairs that are the subject of this campaign performed in a reasonable time.

IMPORTANT: When the campaign has been completed on your vehicle, please ensure that a completion sticker has been affixed to your vehicle referencing **SF471**.

Contact the Warranty Campaigns Department at (800) 547-0712, from 7:00 a.m. to 4:00 p.m. Pacific Time, Monday through Friday, e-mail address DTNA.Warranty.Campaigns@Daimler.com, or the Customer Assistance Center at (800) 385-4357, after normal business hours, if you have any questions or need additional information.

WARRANTY CAMPAIGNS DEPARTMENT

Enclosure

Work Instructions

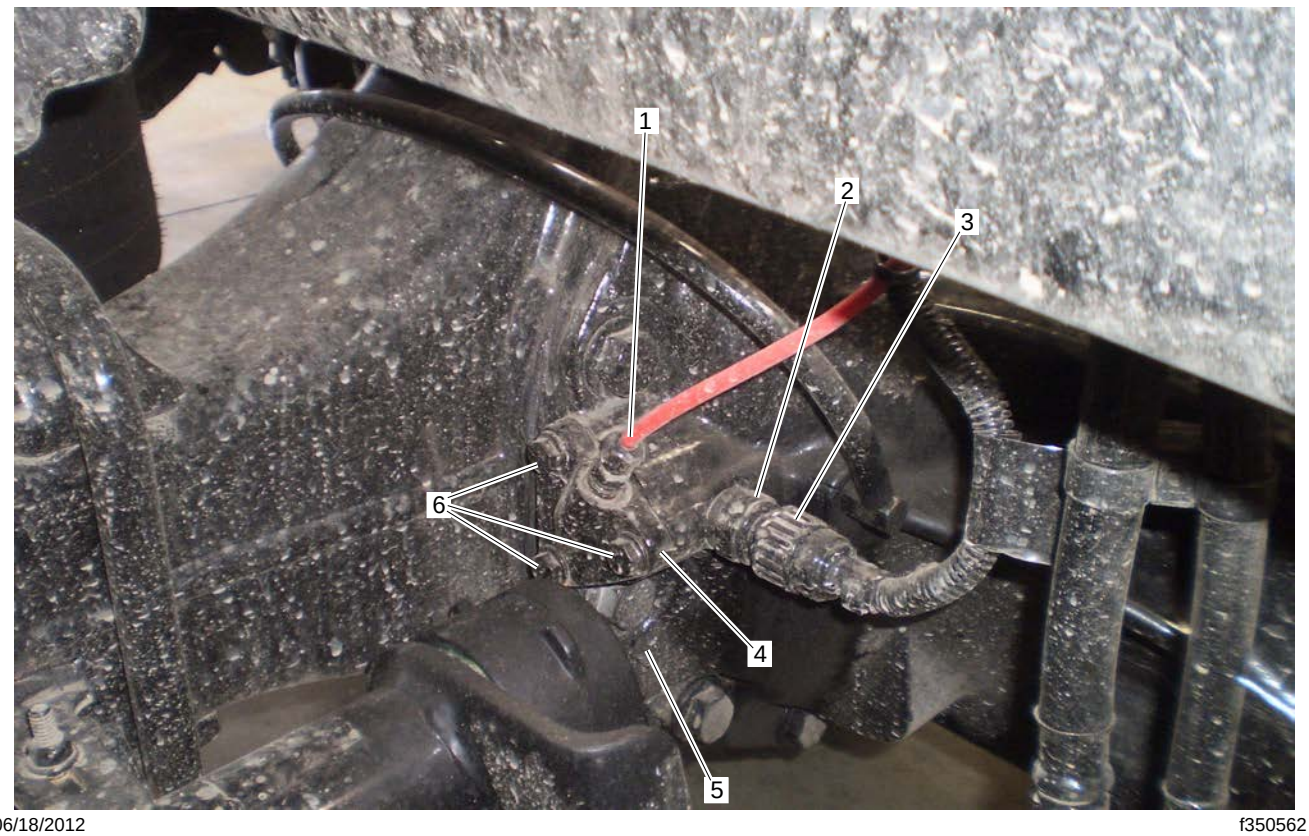
Subject: Detroit Axles Driver-Controlled Differential Locks

Models Affected: Specific Freightliner Business Class M2, Cascadia, Columbia, and Coronado vehicles and Western Star 4900 vehicles manufactured July 22, 2011, through January 19, 2012.

REVISION: Vehicles in SF471A have tandem axles and will require two kits, vehicles in SF471B have single axles and will require one kit. The SRTs have been adjusted accordingly. This is a change from the previous bulletin.

Inspection

1. Check the base label (Form WAR259) for a completion sticker for SF471 (Form WAR261) indicating this work has been done. The base label is usually located on the passenger-side door about 12 inches (30 cm) below the door latch. If a sticker is present, nothing needs to be done. If there is no sticker, continue with the next step.
2. Park the vehicle on a level surface, shut down the engine and set the parking brake. Chock the tires.
3. Disconnect the wiring harness, and remove the DCDL position sensor from the differential carrier housing. See **Fig. 1**.



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1. Air Line
2. Position Sensor
3. Sensor Wiring Harness
4. DCDL Air Interface
5. Differential Carrier Housing
6. Capscrews (3)

Fig. 1, DCDL External View (forward rear-axle shown, rear rear-axle similar)

4. Disconnect the air line from the DCDL air interface.
5. Attach a shop air line male coupling to the DCDL air interface.

NOTE: It may be necessary to raise an axle end and rotate one wheel to fully engage the DCDL.

6. Apply shop air to engage DCDL.
7. Using shop air, rapidly apply and release the DCDL approximately 50 times.
8. Inspect the shift fork assembly as follows.

   8.1 Loosen the capscrews on the DCDL air interface, and move the air interface out approximately 1/4 inch (5 mm).

   8.2 Look through the sensor hole and check the shift fork installation for a gap between the the shift fork and the alignment boss or the snap ring. See **Fig. 2**.

   If a gap is visible, the snap ring is not in place. Remove the carrier and the repair DCDL. Refer to "Differential Lock Repair" in these Work Instructions (page 7).

   If there is no gap, go to the next step. (8.3)

   8.3 Verify that the parking brakes are set, then if needed, disconnect the air lines at the brake chamber to get unobstructed access to the DCDL position sensor hole.

   NOTE: Perform the following measurement using a depth micrometer or vernier caliper.

   8.4 Measure from the outside machined surface to the closest point on the snap ring. Record this as measurement 1. See **Fig. 2**.

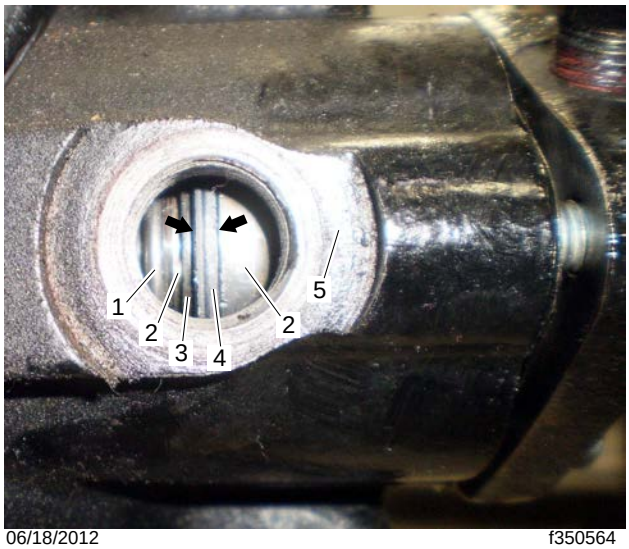
   8.5 Measure from the outside machined surface to the closest point on the alignment boss. Record this as measurement 2. See **Fig. 2**.

   8.6 Subtract measurement 2 from measurement 1.

   If the result is 0.125 inch (3.2 mm) or less, the snap ring is not properly installed. Remove the carrier and repair the DCDL. Refer to "Differential Lock Repair" in these Work Instructions (page 7).

   If the result is greater than 0.125 inch (3.2 mm), the snap ring is properly installed and no repair work is needed. Continue to step 9

9. If disconnected, connect the air lines at the brake chamber.
10. Install the DCDL position sensor and connect the wiring harness.
11. Secure the DCDL air interface. Tighten the capscrews 19 lbf·ft (25 N·m).
12. Install the air line to the DCDL air interface.
13. Clean a spot on the base label (Form WAR259), and attach a completion sticker (Form WAR 261) for campaign SF471to the base label.



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Arrows indicate where a gap will show if the snap ring is out of its slot.

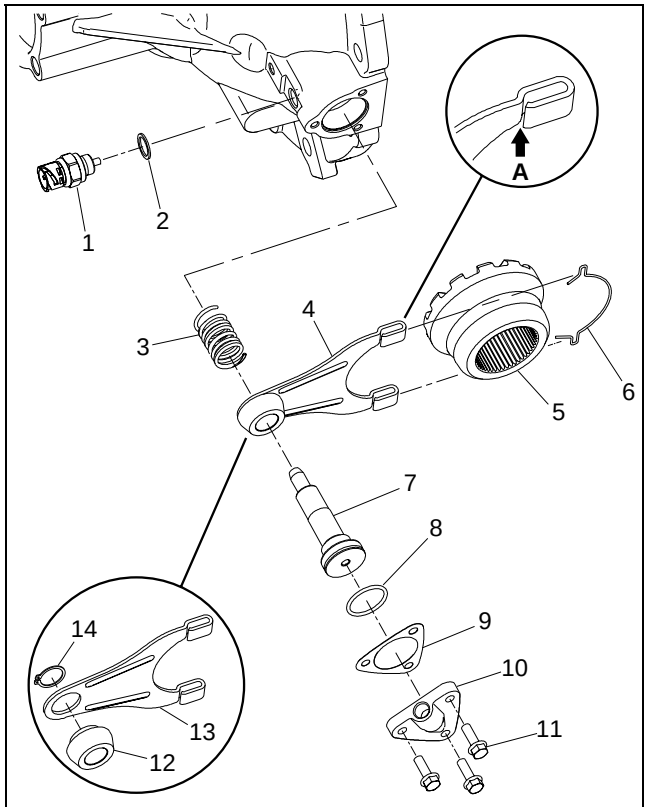
1. Return Spring
2. Alignment Boss
3. Snap Ring
4. Shift Fork
5. Machined Surface

Fig. 2, Checking for a Gap and Measuring Snap Ring Position

Differential Lock Repair

Refer to **Fig. 3** for this procedure.

1. Remove the carrier to access and repair the DCDL. Refer to removal under "Differential Carrier Removal and Installation" in these Work Instructions (Page 9).
2. Unlatch the retaining clip, and remove it.
3. Remove the clutch collar.
4. If not already done, remove the DCDL sending unit from the carrier housing.
5. Remove the three capscrews that attach the air interface to the carrier housing.
6. Remove the air interface and gasket.
7. Remove the shift shaft piston from the bore in the carrier housing.
8. Compress the spring and pull the shift fork from the carrier housing.
9. Remove the spring from the carrier housing.
10. Install the spring in the carrier housing, and compress it to install the shift fork in the housing. Ensure that the spring is centered in the bore.



A. Opening in fork loop faces away from the clutch collar.

1. Sending Unit	8. O-Ring
2. Sending Unit Seal	9. Air Interface Gasket
3. Spring	10. Air Interface
4. Shift Fork Assembly	11. Capscrew
5. Clutch Collar	12. Alignment Boss
6. Retaining Clip	13. Fork
7. Shift Shaft Piston	14. Snap Ring

Fig. 3, DCDL Components

11. Ensure the O-ring (from the kit) on the shift shaft piston is properly installed and lubricated. Then install the piston, being careful to properly align it in the bore. Do not force the piston into the bore.
12. Place the air interface and gasket over the air interface bore, and install the capscrews. Tighten the capscrews 19 lbf·ft (25 N·m).
13. Install the clutch collar.
14. Install the retaining clip on the shift fork.
15. Install the DCDL sending unit in the carrier housing, as removed. Connect the wiring harness.

16. Apply shop air to engage the DCDL, and ensure that the teeth of the lock fully engage the teeth of the gear inside the carrier housing.
17. With the DCDL disengaged, verify that the clutch collar clears the ring gear.
18. Install the carrier. Refer to installation under "Differential Carrier Removal and Installation" in these Work Instructions (page 11).

Differential Carrier Removal and Installation

Removal

Refer to **Fig. 4** for this procedure.

1. If not already done, park the vehicle on a level surface, shut down the engine, set the parking brake, and put the transmission in neutral. Chock the front tires.
2. If applicable, release the suspension air pressure.
3. Using suitable jacks, raise the vehicle evenly until there is room to fit a jack underneath the axle housing.
4. Remove the oil drain plug from the bottom of the axle housing and drain the oil from the axle housing into a clean container. Save the oil for reuse if it is not contaminated. Install the drain plug after emptying.
5. Disconnect the driveshaft from the carrier yoke.

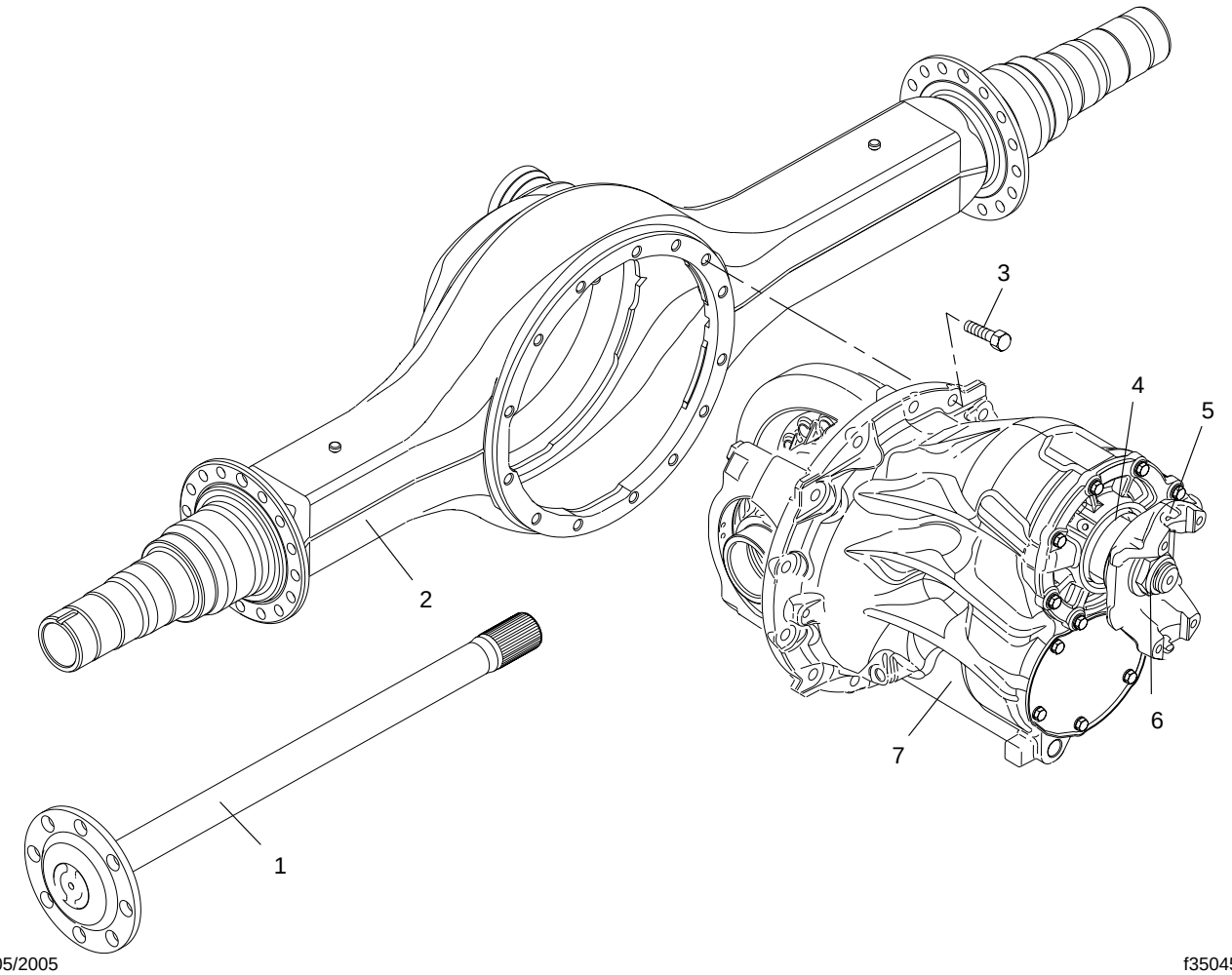
   If removing the forward rear axle, support the end of the driveshaft by attaching it to the frame rail using suitable straps.

   If removing the rear rear axle, uncouple both ends of the interaxle driveshaft and remove the driveshaft.
6. Place a basin under the axle shaft flanges to catch any oil; then remove the axle shafts. See "Axle Shaft Removal and Installation" in these Work Instructions (page 13).

⚠ WARNING

The differential carrier is heavy. Do not try to move it without a suitable support. To do so could result in the carrier falling, which could cause serious personal injury and component damage. Support the carrier with a suitable jack and secure it to the jack, or use a hoist if the axle has been removed from the vehicle.

7. Using a suitable jack, support the differential carrier. Secure the differential carrier to the jack.



1. Axle Shaft
2. Forward-Rear Axle Housing
3. Carrier Capscrew
4. Input Seal
5. Carrier Yoke
6. Input Yoke Nut
7. Forward Differential Carrier

Fig. 4, Axle Components (forward rear-axle shown, rear rear-axle similar)

NOTICE

When using a pry bar, be careful not to damage the carrier or housing flange. Damage to these surfaces will cause oil leaks.

8. Remove the differential carrier from the axle housing, as follows.

    8.1 Remove all but the top two carrier capscrews.

    8.2 Loosen and back off, but do not remove, the top two carrier capscrews. The capscrews will hold the carrier in the housing.

NOTE: Use a pry bar that has a round end to help separate the carrier from the housing.

8.3 Using a pry bar, separate the mating surfaces of the differential carrier and axle housing.

8.4 When the surfaces are separated, remove the top two capscrews.

8.5 With the carrier on the jack, slide the carrier away from the axle housing.

8.6 Lift the carrier assembly onto a suitable stand.

9. Go to step 2 in "Differential Lock Repair" in these Work Instructions (page 7).

Installation

NOTE: Use a cleaning solvent and clean rags to remove dirt. Blow dry the cleaned areas with air.

1. Remove any old sealant material from the mating surfaces of the axle housing. Clean the inside of the axle housing and the carrier mating surface.
2. Inspect the axle housing for damage. Repair or replace the axle housing as necessary.

NOTE: One 6 oz. to 10 oz. container of flange sealant may be claimed per axle without additional authorization.

3. Apply a thin bead of Loctite® 5900 sealant, or an equivalent flange sealant, all the way around the mating surface of the axle housing, and around each bolt hole.

NOTE: Alignment dowels for installing the differential carrier can be made by sawing off the heads of two M16 x 1.5 x 100 mm bolts.

4. If needed, install alignment dowels in the 3 o'clock and 9 o'clock positions on the axle housing flange.
5. Position the forward differential carrier in front of the axle housing, using an axle jack or other suitable lifting tool.

IMPORTANT: The carrier will not fit into the axle housing if the DCDL is not locked.

6. Apply shop air to the DCDL to engage the lock.

NOTICE

Do not use a hammer or a mallet to install the differential carrier. A hammer or a mallet will damage the mounting flange of the carrier and cause oil leaks.

7. Slide the end caps at the sides of the differential carrier into the corresponding slots in the axle housing. See **Fig. 5** (page 12).

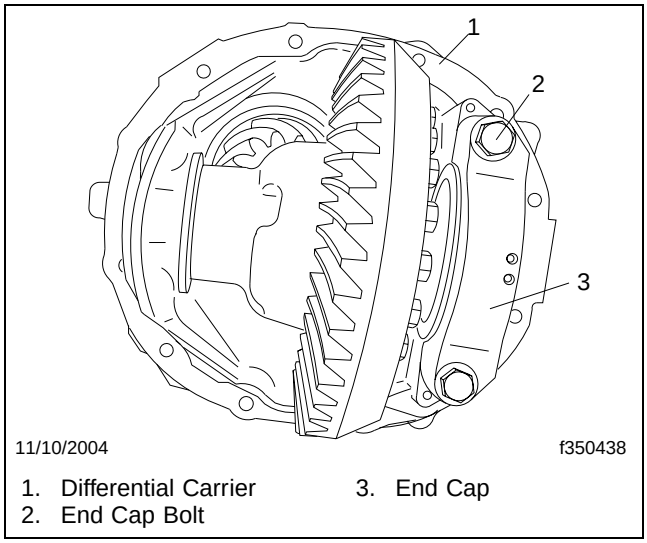
7.1 For the last 3/4 inch (19 mm) or so of travel, walk the carrier slowly into the housing.

IMPORTANT: The end caps fit tightly into the axle housing. Be very careful not to cock the carrier.

7.2 Install the carrier capscrews finger-tight. Make sure the carrier capscrews turn easily in the axle housing.

7.3 In a star pattern, gradually tighten the M16 forward carrier capscrews 200 lbf·ft (270 N·m).

8. Connect or install the driveshaft.
9. Using new gaskets, (from the kit) install the axle shafts. See installation under "Axle Shaft Removal and Installation" in these Work Instructions (page 13).



1. Differential Carrier
2. End Cap Bolt
3. End Cap

Fig. 5, Carrier End Caps

NOTE: Up to 1 quart of gear oil may be claimed for single axles and 2 quarts for tandem axles. Additional quantities require pre-approval before claims submission.

10. Using approved axle oil, fill the axle housing to the bottom of the fill hole, or until filled to capacity as shown in **Table 3**.

Rear Axle Oil Type and Capacity				
Approved Oil Type	Capacity: quarts (liters)			
	Forward		Rear	
	Hubs Full	Hubs Dry	Hubs Full	Hubs Dry
75W-90 Synthetic Gear Oil	14.3 (13.5)	15.9 (15.0)	10.6 (10.0)	12.2 (11.5)
80W-90 Gear Oil				

Table 3, Rear Axle Oil Type and Capacity

11. If the hubs are dry, raise one side of the vehicle about 4 inches (10 cm) to let the oil flow into the hub on the opposite side, then raise the other side in the same manner. On each side, hold the tilted position for three minutes to allow oil to run into the wheel end.

NOTICE

Make sure the hubs are filled. Driving with the hubs dry will cause bearing damage.

12. Turn the wheels, wait one minute, and check the lubricant level.
13. Raise the vehicle, remove the safety stands, then lower the vehicle.
14. Start the engine, build the air pressure, and check that the suspension air bags inflate evenly and correctly. Make sure the ride height is correct.
15. Check the oil level in the axle housing. The level should be up to the bottom of the fill hole. Add approved axle oil, if needed.
16. Go to step 9 in the inspection procedure (page 6).

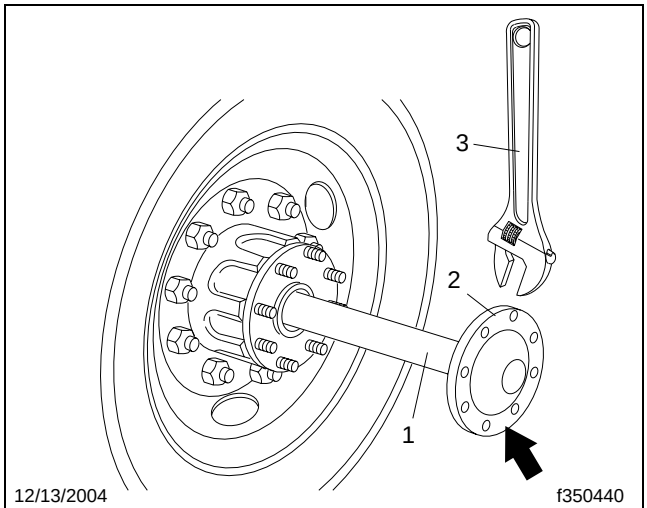
Axle Shaft Removal and Installation

Removal

1. If it is operational, use the DCDL switch in the cab to engage the lock. An indicator light comes on when the differential lock is engaged. Turn the appropriate wheels to ensure the lock is fully engaged.
2. Raise the rear of the vehicle with a suitable jack high enough to clear the axle. Support the axle with jack stands.
3. Place a basin under the axle shaft flanges to catch any oil.
4. Remove the drive axle stud nuts that attach the axle shaft to the wheel hub.
5. Tap the axle shaft flange if necessary to loosen it, and slide the axle shaft out of the axle. Remove and discard the gasket.
6. Go to step 7 of Removal under "Differential Carrier Removal and Installation" (page 9).

Installation

1. Position a new gasket on the axle shaft flange.
2. If DCDL is installed on the vehicle, ensure it is engaged.
3. Install the axle shaft, as follows. See **Fig. 6**.
   - 3.1 Carefully raise the axle with a floor jack, and support the axle with jack stands. Slide the axle shaft into the axle.
   - 3.2 Apply light pressure with the hand or knee to the axle flange.
   - 3.3 Use an adjustable wrench to center the shaft. Turn the shaft with a slight rotating motion.
   - 3.4 Install the drive axle stud nuts and tighten them to the values given.
     - 1/2–20 nuts: 75 to 115 lbf·ft (102 to 156 N·m)
     - 5/8–18 nuts: 150 to 170 lbf·ft (203 to 230 N·m)
4. Go to step 10 Installation, under "Differential Carrier Removal and Installation" (page 12).



Apply light pressure with the hand or knee at the arrow. Use the adjustable wrench to center the shaft.

1. Axle Shaft
2. Axle Flange
3. Adjustable Wrench

Fig. 6, Installing the Axle Shaft