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## 1. DRIVE AXLE

This vehicle is equipped with a ZF model A132 Hypoid Single Reduction drive axle, fitted with two Knorr Bremse brake chambers, Knorr Bremse SN7 disc brake with a visual wear indicator, potentiometer wear indicator and companion flange for Dana Spicer SPL250 propeller shaft. The carrier gear ratio is 3.82.

Additional information is found in the following manuals, included on your vehicle technical publications CD:

- OPERATING INSTRUCTIONS ZF AXLE A132 (version with US hub) #5871 207 982 EN.
- ZF AXLE A132 REPAIR MANUAL #5871 207 002E

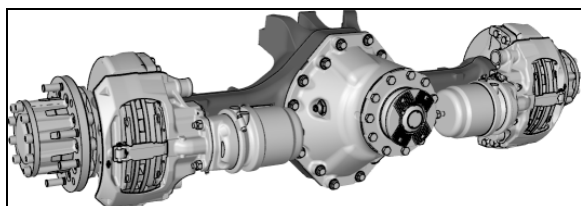


FIGURE 1: ZF A132 DRIVE AXLE

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### 1.1 MAINTENANCE

Proper vehicle operation begins with preventive maintenance, such as good differential use. The most common types of drive axle carrier failures are spinout, shock, fatigue, overheating and lubrication. Avoid neglecting these points since they would be the first steps to improper maintenance, expensive repairs, and excessive downtime.

Inspect at the pinion oil seal, axle shaft flange and carrier housing joint for evidence of lubricant leakage. Tighten the bolts and nuts, or replace the gaskets and seals to correct leaks.

Maintenance of the axle mountings consists primarily in a regular and systematic inspection of the radius rods, as directed in Section 16, "Suspension".

#### 1.1.1 Differential Oil Type

Use **Mobil Delvac synthetic gear oil 80W140** for best performance and extreme conditions. Additional lubrication information is covered in ZF's list of lubricants TE-ML 12. Check in Lubricant class 12M.

#### 1.1.2 Checking and Adjusting the Differential Oil Level

- Place the vehicle on a level surface.
- Level check plug must be cleaned carefully before opening.
- Check oil level at room temperature only.



### MAINTENANCE

#### Oil level check

Check differential oil level and add if necessary every 50 000 miles.



### WARNING

Check the oil level when the axle is at room temperature. When hot, the oil temperature may be 190°F (88°C) or more and can cause burns. Also, a correct reading is not obtained when the axle is warm or hot.

1. Make sure the axle is at room temperature.
2. Clean the area around the level check plug. Remove the level check plug from the differential case.
3. The oil level must be even with the bottom of the level check bore.


*If oil flows from the hole when the plug is loosened, the oil level is too high. Let drain the oil to the correct level.*

*If the oil level is below the bottom of the level check bore, add the specified oil through the level check bore.*

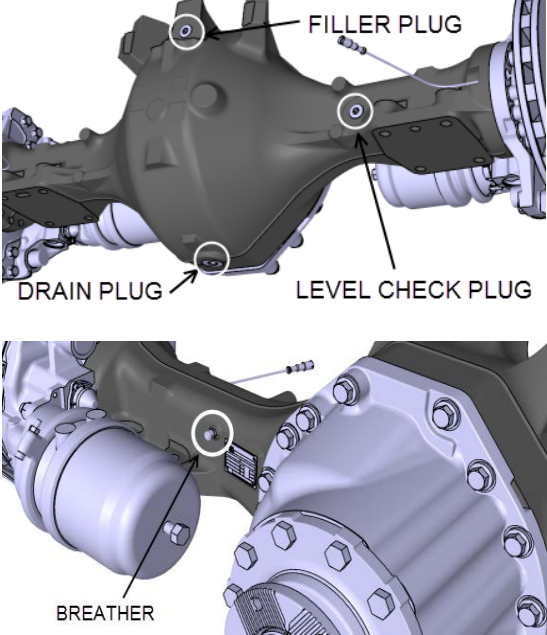
4. Reinstall the level check plug using a new seals (O-ring) and tighten to 52 lbf-ft.

#### 1.1.3 Differential Oil Change

- Place the vehicle on a level surface.
- Drain, filler and level check plugs must be cleaned carefully before opening.
- Drain oil only at operating temperature, immediately after the vehicle has been operated for an extended period of time.
- Renew seals components (O-rings).

 **MAINTENANCE**

**Oil change interval – Lubricant class 12M**  
 Change differential oil and breather, clean the drain plug's magnetic inserts after 100 000 miles or 3 years, whichever comes first.  
*Note: Oil change interval recommended by ZF in LIST OF LUBRICANTS TE-ML 12 is 110 000 miles/3 years, whichever comes first.*




**TORQUES**

Filler plug:	52 lbf-ft (70 Nm)
Drain plug:	96 lbf-ft (130 Nm)
Level check plug:	52 lbf-ft (70 Nm)
Breather:	4 lbf-ft (5.5 Nm)

**FIGURE 2: ZF A132 DRIVE AXLE**

5. Put a large container under the differential case drain plug. The differential case contains approximately 19 quarts of oil.
6. Remove the drain plug from the bottom of the differential case. Drain all the oil and discard in an environment friendly manner.
7. Clean the magnetic insert of the drain plug, fit a new seal (O-ring) and reinstall drain plug.

 **WARNING**


The oil temperature may be extremely high!  
 Risk of burn injuries.

8. Remove the filler plug and the level check plug.
9. Reinstall the drain plug and tighten to 96 lbf-ft (130 Nm).
10. Add the specified oil at the filler plug until the oil level is even with the bottom of the level check bore.  
*Filling volume is about 19 quarts (18 liters) at the level check bore*
11. Allow the oil to flow through the axle and check the oil level again after some minutes. Refill if necessary until specified level is reached and remains constant.
12. Reinstall the filler plug and level check plug using new seals (O-ring) and tighten to 52 lbf-ft (70 Nm).
13. Replace the breather with every oil change. Tighten to 4 lbf-ft (5.5 Nm).

**1.1.4 Compact Bearing (Hub Unit) Axial Play Check**

Check the compact bearing (hub unit) axial play every 100 000 miles. Furthermore, the bearing must be checked in case of brake disk change, ABS fault message and rising noise level at increasing speed.

Perform compact bearing (hub unit) axial play check as described in paragraph 6.2 HOW TO CHECK THE AXIAL PLAY of the following manual: OPERATING INSTRUCTIONS ZF AXLE A132 (version with US hub) #5871 207 982 EN.

 **MAINTENANCE**

**Compact bearing (hub unit) axial play**  
 Check axial play every 100 000 miles.

**1.1.5 Compact bearing (hub unit) Grease Change**

The compact bearing grease must be change every 4 years or 300 000 miles, whichever comes first.

## SECTION 11: REAR AXLES

The list of approved grease types for ZF A-132 compact bearing is found in ZF's list of lubricants TE-ML 12. Check in Lubricant class 12H.

Perform compact bearing (hub unit) grease change as described in paragraph 7.3 GREASE CHANGE IN THE HUB of the following manual: OPERATING INSTRUCTIONS ZF AXLE A132 (version with US hub) #5871 207 982 EN.

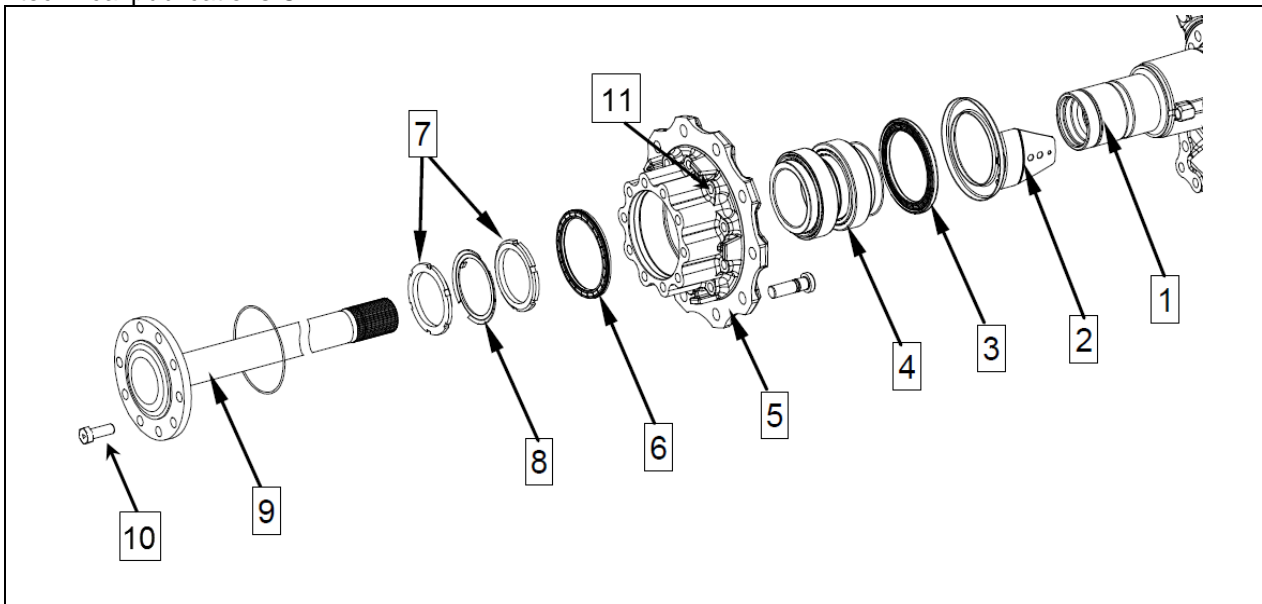
- OPERATING INSTRUCTIONS ZF AXLE A132 (version with US hub) #5871 207 982 EN.

### 1.1.6 Speed Sensors (Anti-Lock Brake system, ABS)

For removing and installing the drive axle speed sensors (for anti-lock brake systems, ABS), refer to Section 12: Brake and Air System.

### 1.2 DRIVE AXLE FLANGE SHAFT REMOVAL/INSTALLATION

Refer to "Replacement of Axle Insert" in the following manuals, included on your vehicle technical publications CD:



**FIGURE 3: ZF A-132 DRIVE AXLE HUB ASSEMBLY**

1	hub carrier	10	cap screw M18x1.5x50mm G10.9 torque=325 lbf-ft (use 14mm hex socket driver "Allen" )
2	screen sheet		
3	shaft seal (with impulse disc)		
4	compact bearing (hub unit)		
5	hub		
6	shaft seal	11	cap screw Torx M16x1.5x60 torque=221 lbf-ft (use E20 Torx socket)
7	slotted nut		
8	locking plate		
9	flange shaft		



**1.3 REMOVAL AND REINSTALLATION**

The following procedure deals with the removal of the drive axle assembly and its attachments as a unit. The method used to support the axle during removal and disassembly depends upon local conditions and available equipment.

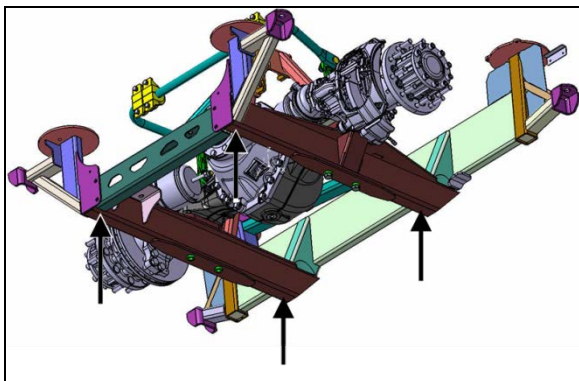
1. Raise vehicle from the front wheels and drive axle wheels. Place jack stands under the rear chassis hoisting points. Remove drive axle wheels (if required, refer to Section 13, "Wheels, Hubs and Tires".
2. Exhaust compressed air from the air supply system by opening the drain cock on each air reservoir.
3. Disconnect the propeller shaft as directed in Section 9, "Propeller Shaft", in this manual.
5. Disconnect the lower end both height control valve link then move the arm up to exhaust air suspension.
6. Disconnect the ABS speed sensors connector located over the differential housing.

<b>NOTE</b>
<i>When removing drive axle, if unfastening cable ties is necessary for ease of operation, remember to replace them afterwards.</i>

7. Disconnect the air brake supply hoses over the differential carrier.

<b>NOTE</b>
<i>Position the hoses so they will not be damaged when removing the axle.</i>

8. Install jack stands under the drive axle subframe at the four locations shown on figure 4.



**FIGURE 4: SUPPORT THE DRIVE AXLE SUBFRAME AT THE FOUR LOCATIONS SHOWN**

9. Disconnect the lower ends of the four shock absorbers as outlined in Section 16, "Suspension" under heading "Shock Absorber Removal".
10. Remove the two sway bar links.
11. Remove the lower and upper longitudinal radius rod supports as outlined in Section 16, "Suspension", under heading "Radius Rod Removal".
12. Remove the transversal radius rod (panhard bar).
13. Remove the two retaining nuts from each of the four air springs lower mounting supports.
14. Disconnect the drive axle speed sensor.
15. Use the jacks to lower axle. Carefully pull away the drive axle assembly from underneath vehicle.
16. Reverse removal procedure to reinstall drive axle.

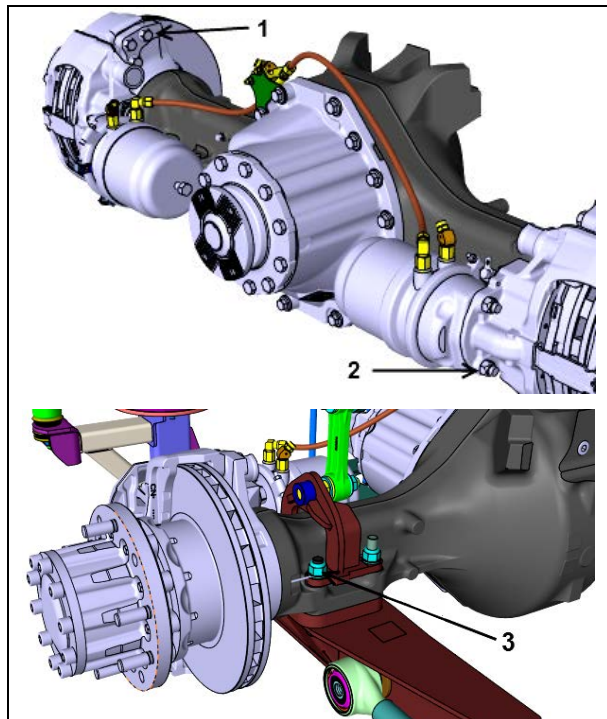
<b>NOTE</b>
<i>Refer to Section 16, "Suspension" for suspension components' proper tightening torques.</i>

<b>NOTE</b>
<i>Refer to section 13 "Wheels, Hubs And Tires" for correct wheel bearing adjustment procedure.</i>

**1.4 DISASSEMBLY, REASSEMBLY, ADJUSTMENT AND TORQUE CHART**

Disassembly and re-assembly procedures are covered in the following manual:

- ZF AXLE A132 REPAIR MANUAL #5871 207 002E



REF	QTY	TORQUE DRY (lbf-ft) <i>Threads must be free of oil or other lubricant</i>
1	12	200
2	4	120-150
3	8	405-495

1.5 DRIVE AXLE ALIGNMENT

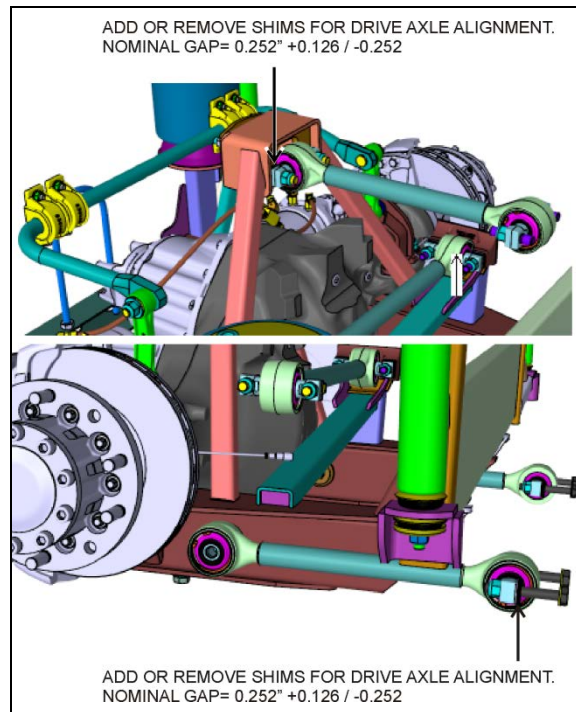
The drive axle alignment consists in aligning the axle according to the frame. The axle must be perpendicular to the frame. The alignment is achieved with the use of shims inserted between the lower longitudinal radius rod supports and the frame.

Drive axle alignment is factory set and is not subject to any change, except if the vehicle has been damaged by an accident or if there are requirements for replacement.

If the axle has been removed for repairs or servicing and if all the parts are reinstalled exactly in the same place, the axle alignment is not necessary. However, if the suspension supports have been replaced or altered, proceed with the following instructions to verify or adjust the drive axle alignment.

**NOTE**

*When drive axle alignment is modified, tag axle alignment must be re-verified.*



1.5.1 Procedure

1. Park vehicle on a level surface, then chock front vehicle wheels.
2. Using two jacking points (which are at least 30 inches [76 cm] apart) on drive axle, raise the vehicle sufficiently so that wheels can turn freely at about 1/2 inch from ground. Secure in this position with safety stands, and release parking brake.
3. Install wheel mount sensors on front end and drive axle wheels (Figure 5).

**NOTE**

*See reference numbers on wheel mount sensors (Figure 6).*

**NOTE**

*Select axle specifications in the appropriate chart.*

**DRIVE AXLE ALIGNMENT**

- With the system installed as in Figure 6, adjust drive axle according to specifications' chart below.

<b>DRIVE AXLE ZF A-132</b>			
	Minimum value	Nominal value	Maximum value
Thrust angle	±0.11°		
Total toe	0.15° toe-in	0°	0.15° toe-out

**TAG AXLE ALIGNMENT**

- Remove and reinstall all wheel mount sensors on the drive and tag axles (Figure 6);

**NOTE**  
*For an accurate alignment, the tag axle must be aligned with the drive axle.*

**NOTE**  
*Reinstall wheel mount sensors as shown in figure 7.*

Adjust tag axle according to specifications' chart below in reference with drive axle.

<b>TAG AXLE</b>			
	Minimum value	Nominal value	Maximum value
Thrust angle* (degrees)	-0.02	0	0.02
Total toe	0.08° toe-in	0°	0.02° toe-out
(*) Use the drive axle as reference			

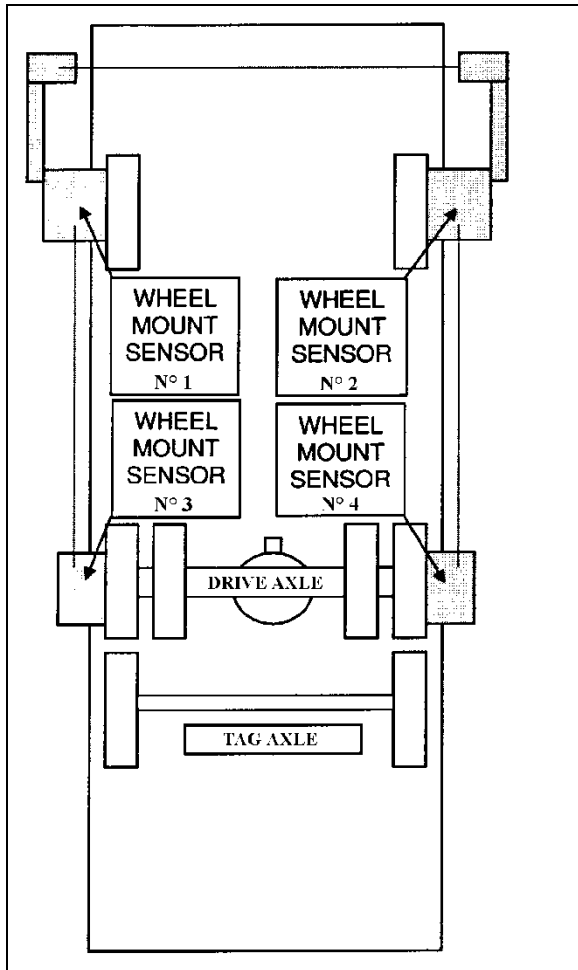


FIGURE 5: FRONT & DRIVE AXLE ALIGNMENT 11025

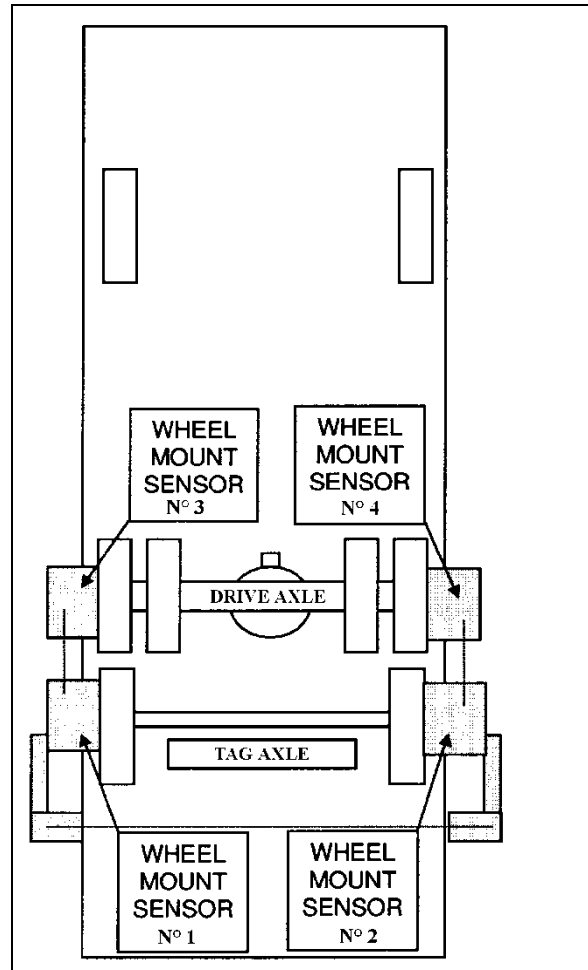


FIGURE 6: TAG AXLE ALIGNMENT 11026

**NOTE**

Refer to Section 16, "Suspension", for proper torque tightening of the longitudinal radius rod support nuts.

**NOTE**

When the drive alignment is changed, the tag alignment must also be adjusted.

**2. TAG AXLE**

The tag axle is located behind the drive axle. It carries a single wheel and tire on each side.

**2.1 UNLOADING TAG AXLE**

To reduce the turning radius, the air springs pressure will be automatically reduced by 75% when the coach is moving at speed lower than 5 mph (8 km/h) and with more than 1½ turn from the steering.

**2.2 RETRACTING TAG AXLE**

The standard tag axle retraction system is controlled by a valve located on the left lateral console and enables unloading and raising the tag axle (refer to the "OPERATOR'S MANUAL" for location of controls). This system has been designed for the following purposes:

1. Shortening of wheelbase, thus allowing tighter turning in tight maneuvering areas such as parking lots or when making a sharp turn.
2. Transferring extra weight and additional traction to the drive wheels on slippery surfaces.

The tag axle service brakes operate only when the axle is in normal driving (loaded) position.



**CAUTION**


Do not use tag axle in raised position for an



extended period. Raising tag axle increases load on the drive axle, suspension and tires. Do not drive vehicle with tag axle raised when speed is exceeding 12mph (20 km/h). In order to prevent damage to the suspension, always raise the tag axle before lifting the coach.


2.3 RETRACTING TAG AXLE FOR REPAIR PURPOSES

- Connect an external air pressure line to the emergency fill valve in the engine compartment.
- Lift the axle by pushing the lever forward.

 **WARNING**

Install a protective cover to prevent unfortunate lever operation while work is being carried out under the vehicle.

- Raise the vehicle using the lifts.


 **WARNING**

Lift manufacturers recommend lowering the vehicle to the ground or installing some safety stands before activating the suspension to prevent the lifts from becoming unstable.

- For added safety, install nylon slings over tag axle shock absorbers.

2.4 GREASE LUBRICATED WHEEL BEARINGS

The unitized hub bearings used on the NDS range of axles, are non-serviceable items. Bearings are pre-adjusted, lubricated and have seals fitted as part of the manufacturing process. The bearings are greased for life and there is no need or facility for re-lubrication.

 **MAINTENANCE**

Front and tag axle hub bearings need to be checked at intervals of 30,000 miles (48 000 km) or twice a year whichever comes first.

**NOTE**

For more information on front and tag axle wheel hub, refer to "DANA SPICER Service


*Manual NDS Axle Range" found in the OEM manuals folder.*

2.5 REMOVAL AND INSTALLATION

2.5.1 Removing Tag Axle Only

The following procedure deals with the removal of the tag axle while keeping the air springs installed. The method used to support the axle and suspension components during removal and disassembly depends upon local conditions and available equipment.

- Connect an external air pressure line to the emergency fill valve in the engine compartment.
- Lift the axle by pushing the lever forward.

 **WARNING**

Install a protective cover to prevent unfortunate lever operation while work is being carried out under the vehicle.

- Disconnect tag axle air springs pneumatic hoses and install valves or plugs.
- Raise the vehicle using the lifts.
- Dismount tag axle components.
- Before reinstalling air spring hoses, make sure there is no pressure left inside by opening the valves or unloading tag axle.

2.5.2 Removing Tag Axle Along With Suspension Components

The following procedure deals with the removal of the tag axle assembly along with the suspension components. The method used to support the axle and suspension components during removal and disassembly depends upon local conditions and available equipment.

1. Raise vehicle by its jacking points on the body. Place jack under frame. Remove drive axle wheels (if required, refer to Section 13, "Wheels, Hubs and Tires").
2. Exhaust compressed air from the air supply system by opening the drain cock on each air reservoir and deplete air bags by moving leveling valve arm down.
3. Install jacks under tag axle jacking points to support the axle weight (refer to figure 8).

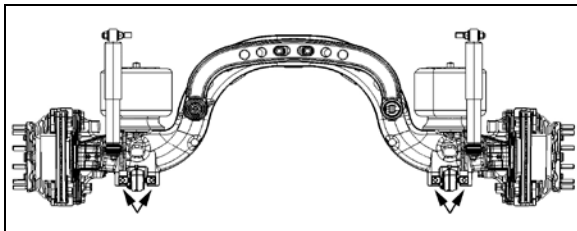


FIGURE 7: JACKING POINTS ON TAG AXLE 11029

4. Disconnect tag axle lifting chain collars from lower longitudinal radius rods.
5. Remove the propeller shaft as directed in Section 9, "Propeller Shaft", in this manual.
6. Disconnect the tag axle brake chamber hoses.



### CAUTION

Position the hoses so they will not be damaged when removing axle.

7. Disconnect hose from the air spring upper mounting plate.
8. Remove the two shock absorbers as outlined in Section 16, "Suspension", under "Shock Absorber Removal".
9. Disconnect the lower longitudinal radius rods as outlined in Section 16, "Suspension", under "Radius Rod Removal".
10. Disconnect the transversal radius rod.
11. Disconnect the upper longitudinal radius rod.
12. Remove the air bellows retaining nuts from each of the two upper mounting plates.
13. Use the jacks to move the axle forward to clear the axle off the transmission. Lower the axle.



### CAUTION

On vehicles equipped with an output retarder and an automatic transmission, move tag assembly very carefully. Pay special attention to the U-shaped section, as the transmission end components may be easily damaged through a false maneuver.

14. Reverse removal procedure to reinstall tag axle.

### NOTE

Refer to Section 16, "Suspension", for proper torque tightening of suspension components.

### NOTE

Refer to section 13 "Wheels, Hubs And Tires" for correct wheel bearing adjustment procedure.

#### 2.5.3 Removing Transversal radius Rod

Unfasten bolts and nuts fixing transversal radius rod ball joint to rear underframe.

Install extractor tool G32952 onto transversal rod.

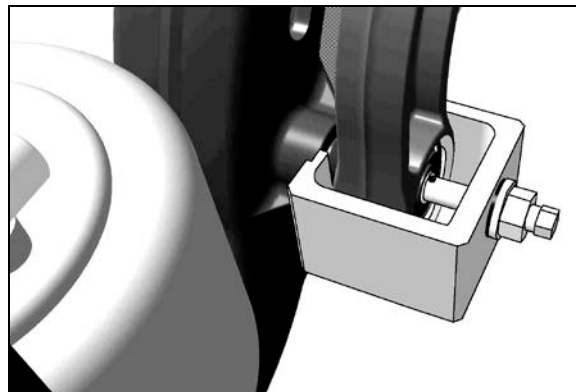


FIGURE 8: INSTALLING EXTRACTOR TOOL



### CAUTION

It is strongly suggested to use the extractor tool in order to remove transversal radius rod.

Partially unscrew ball joint fixing bolt. Tighten extractor threaded rod.

Supporting the transversal radius rod at all times, gradually extract transversal radius rod from tag axle.

Reinstall by reversing procedure. Torque bolt to 190 lbf-ft dry (255 Nm) dry.

#### 2.6 TAG AXLE ALIGNMENT

The tag axle alignment consists in aligning the tag axle parallel to the drive axle position. Before aligning the tag axle, proceed with the drive axle alignment (paragraph 1.10). Tag axle alignment is achieved with the use of shims inserted between the lower longitudinal radius rod supports and axle. Tag axle alignment is factory set and is not subject to any change, except if vehicle has been damaged by an accident or if there are requirements for parts replacement.



### CAUTION

If this setting is altered significantly, it will cause excessive tire wear.

**NOTE**  
*It may be necessary to adjust the axle TOE as well as its alignment. In this case, insert shims (7 min. - P/N 121203 or 15 min. - P/N 121240) in between mounting plate and spindle, as required.*

necessary. However, if the suspension supports have been replaced or have changed position, proceed with the following instructions to verify or adjust the tag axle alignment.

If axle has been removed for repair or servicing and if all parts are reinstalled exactly in their previous locations, axle alignment is not

**3. SPECIFICATIONS**

**Drive Axle**

Make and model.....ZF A132  
 Drive track..... 76.7 inches (1 949 mm)  
 Gear type .....Hypoid  
 Axle type ..... Full floating  
 Oil fill quantity ..... 19.5 quarts (39 pints)  
 Ratio..... 3.82

**Tag Axle**

Make ..... Prevost  
 Rear track ..... 83.6 inches (2 124 mm)  
 Axle type ..... Forged

**NOTE**  
*The tag axle alignment consists in aligning the tag axle parallel to the drive axle.*

**4. SECTION CHANGE LOG**

DESCRIPTION		DATE
1		
2		
3		
4		
5		
6		