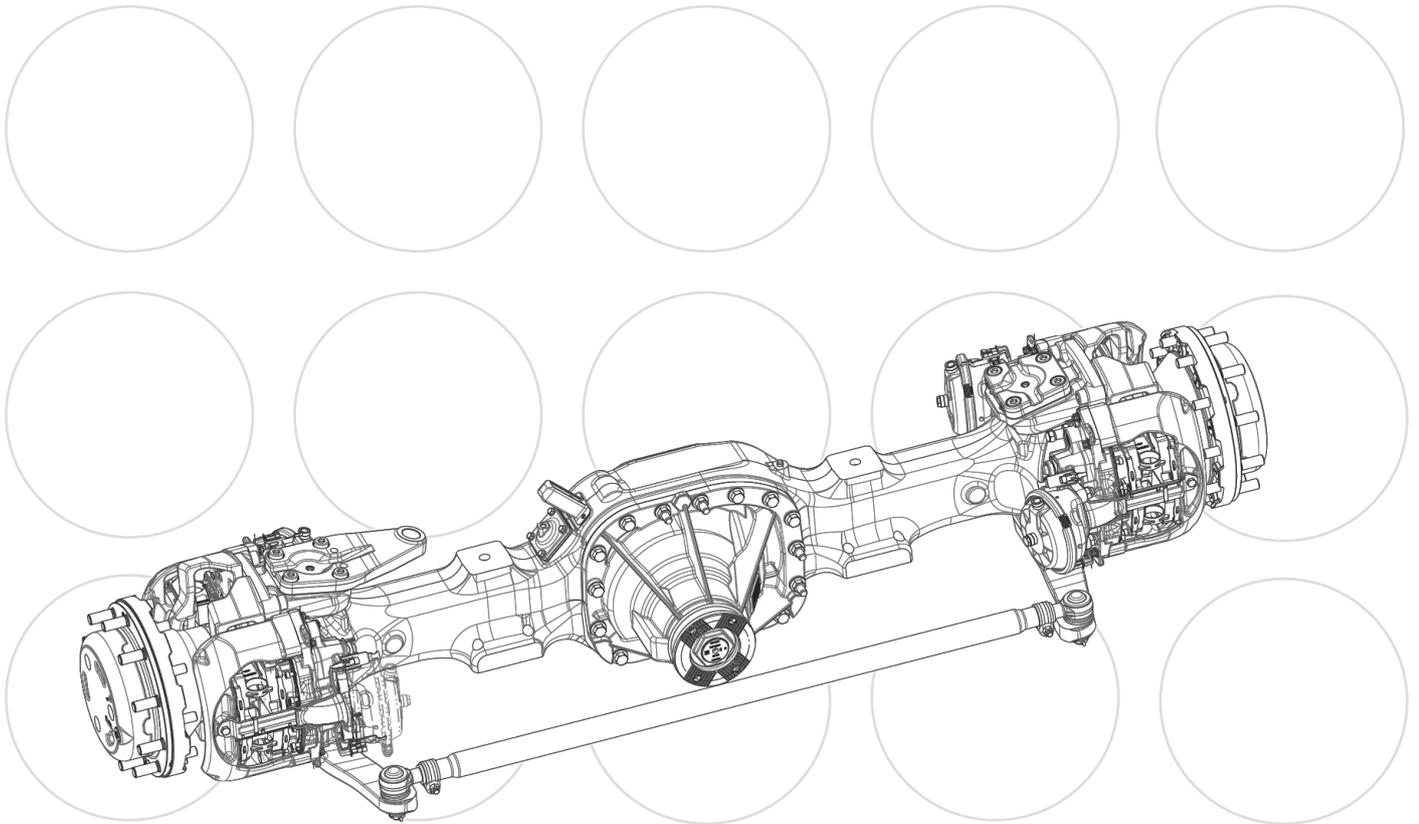


Maintenance Manual MM-1942

# Heavy-Duty Front Drive Steer Axles (disc brake version) - MX13610 Series

Issue June 2020



# Service Notes

## Before You Begin

This publication provides installation and maintenance procedures for the MERITOR Heavy-Duty Planetary Wheel End Drive Steer Axles MX13610 Series

The information contained in this publication was current at the time of printing and is subject to revision without notice or liability.

You must understand all procedures and instructions before you begin maintenance and service procedures.

You must follow your company's maintenance and service guidelines.

You must use special tools, when required, to avoid serious personal injury and damage to components.

MERITOR uses the following notations to alert the user of possible safety issues and to provide information that will help to prevent damage to equipment and components.

## WARNING

**A WARNING indicates a procedure that you must follow exactly to avoid serious personal injury.**

## CAUTION

**A CAUTION indicates a procedure that you must follow exactly to avoid damaging equipment or components. Serious personal injury can also occur.**

**NOTE:** A note indicates an operational, procedure or instruction that is important for proper service. A NOTE can also supply information that will help to make service quicker and easier.

This symbol indicates that you must tighten fasteners to a specific torque.

## Access Information on Meritor's Web Site

Additional maintenance and service information for Meritor's commercial vehicle systems component lineup is also available at [www.meritor.com](http://www.meritor.com) visiting the "Literature on Demand" page.

To access information, click on Support, Literature, Literature-on-demand. The screen will display an index of publications by type.

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Issue: June 2020

Information contained in this publication was in effect at the time the publication was approved for printing and is subject to change without notice or liability. Meritor Commercial Vehicle Systems reserves the right to revise the information presented to discontinue the production of parts described at any time.

## Terms used in this manual

**Manufacturer:**

MERITOR

**Manual:**

Maintenance manual no. MM-1942

**Device:**

Heavy-Duty Planetary Wheel End Drive Steer Axles  
MX13610 Series

**Technician:**

Qualified personnel working on rear or tandem axle; differential carrier, wheel end single or double reduction; front steer axle or front non drive axle for maintenance and servicing.

**Maintenance and servicing:**

Maintenance and servicing refer to periodical checks and/or replacement of the front drive axle parts or components. It also refers to the determining of the cause of a malfunction in order to restore the initial operating conditions.

**Operator:**

Any person who will use the front drive axle and/or a carrier single reduction differential as part of a more complex device.

**Warranty**

Warranty applies to the product describe in this manual installed on vehicles for which it was designed. Warranty is void in the following cases:

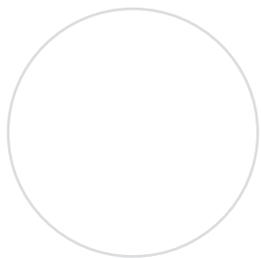
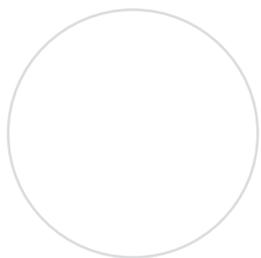
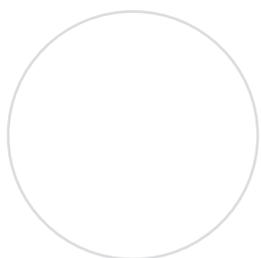
- Improper use of the vehicle on which the single reduction differential carrier is installed (usage conditions, overloading etc.)
- Tampering with vehicle components that may affect the single reduction differential carrier performance.
- Use of non-original spare parts.
- Improper installation, adjustment, repair or modification.
- Poor or improper maintenance (including consumables other than those specified).

Further information on warranty conditions may be obtained directly from the manufacturer or by referring to the Meritor web site [www.meritor.com](http://www.meritor.com)

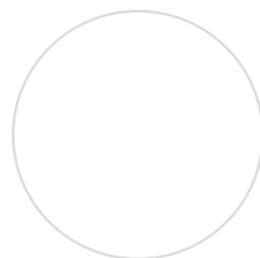
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		73	MST5000 Spindle and axle bushing tool
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		75	MST5002 Wheel end Bearing tool
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# Introduction



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# Exploded view

Heavy-Duty Front Drive Steer Axles (disc brake version) - MX13610 Series

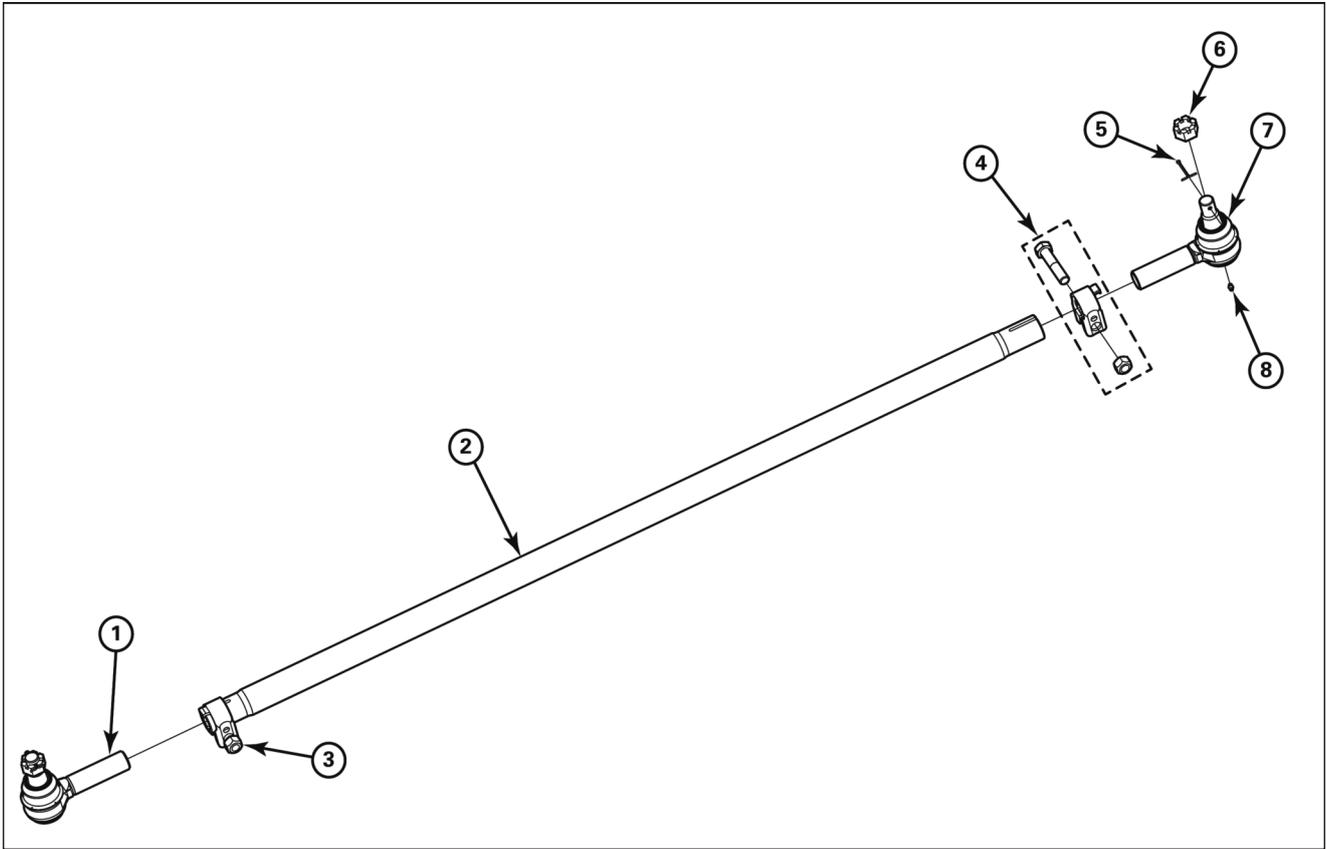


# Parts list

Heavy-Duty Front Drive Steer Axles (disc brake version) - MX13610 Series

<b>Ref.</b>	<b>Description</b>	<b>Q.ty</b>	<b>Ref.</b>	<b>Description</b>	<b>Q.ty</b>
1	Carrier assembly	1	25	Socket hex screw	16
2	Wheel end assembly	2	26	Grease zerk	4
3	Hex head screw	12	27	Oil plug	1
4	Stud	4	28A	Break assembly	2
5	Nut	4	28B	Break assembly	2
6	Seal	4	29	Tie rod assembly	1
7	Bushing-king pin	4	30	Housing assembly	1
8	Bushing-axle shaft	4	31	Seal assembly-oil	4
9	Thrust washer	2	32	Magnet	4
10	Parallel pin	2	33A	Cardan shaft-RH	1
11	Plug-retainer	4	33B	Cardan shaft-LH	1
12	Plug	1	34	Sensor bushing	2
13	Shim	2	35	Sensor with socket	2
14	Shim	2	36	Nut-jam	2
15	Shim	2	37	Screw-stop	2
16	Shim	2	38	Steering arm	1
17	Knuckle-steering, fin.	2	39	Pin	2
18A	Tie rod arm-RH	1	40	Collar	1
18B	Tie rod arm-LH	1	41	Copper-washer	4
19	Spindle, fin.	2	42	Plug-oil magnetic	3
20	Kingpin cap, fin.	1	43	Clamp- abs wire	2
21	Socket hex screw	6	44	Hex socket screw	2
22	Socket hex screw	8	45	Cotter pin	2
23	Socket hex screw	16	46	Silencer	2
24	Socket hex screw	10	47	Plug-special	2

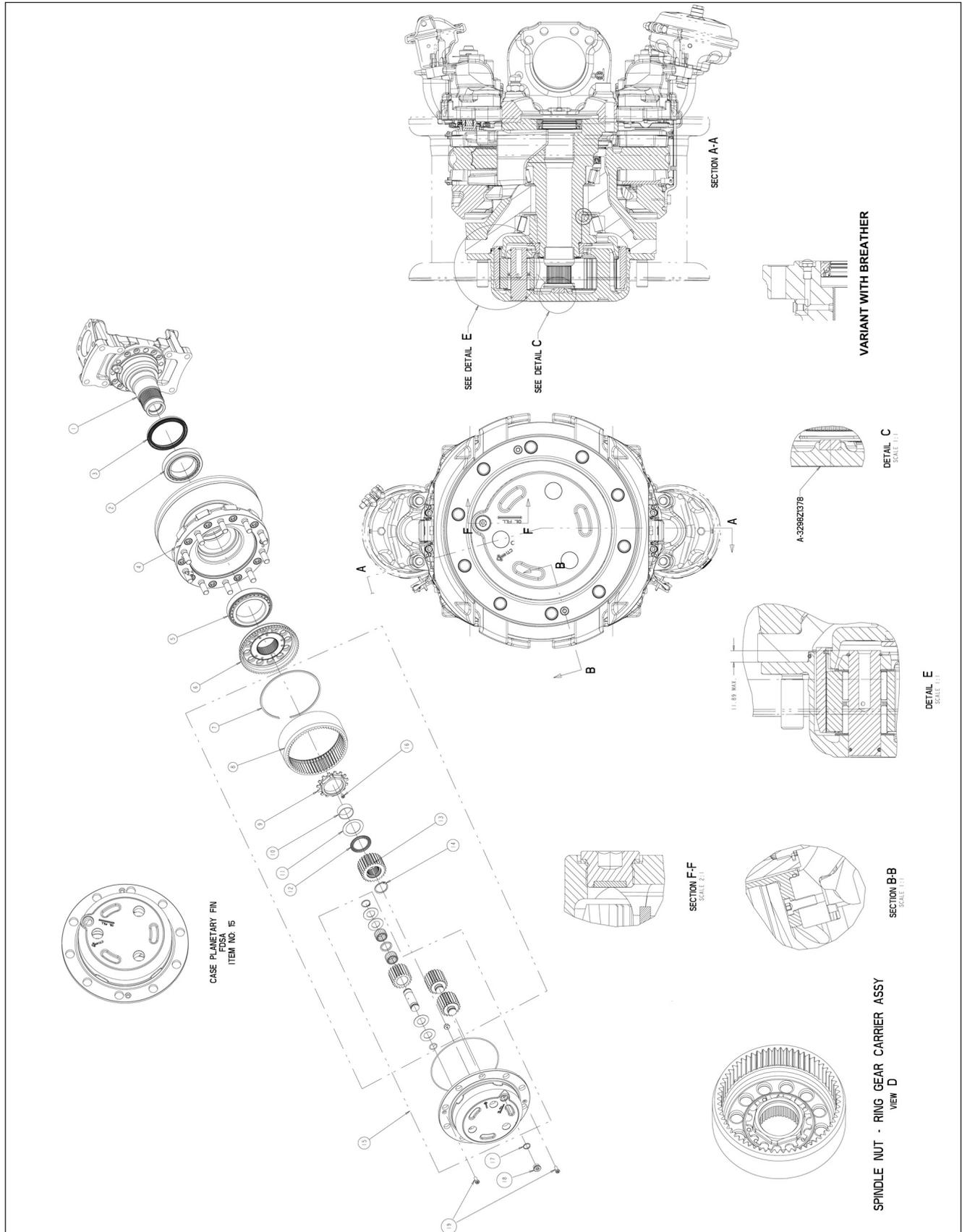
# Tie Rod assembly



Ref.	Description	Q.ty
1	LH Tie Rod End	1
2	Tie Rod Cross Tube	1
3	Clamp Fastener	2
4	Clamp Assembly	2
5	Cotter Pin	2
6	Tie Rod End Castle Nut	2
7	RH Tie Rod End	1
8	Grease Fitting	2



# Wheel End Exploded view

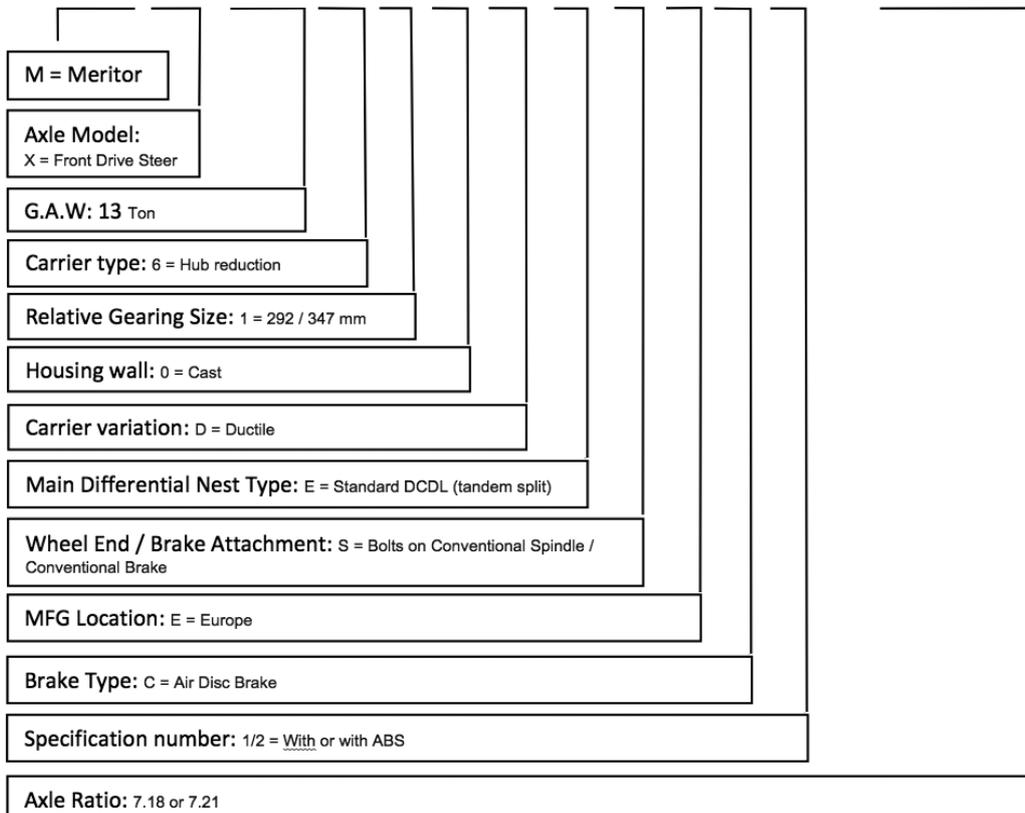


# Wheel End Parts list

Ref.	Description	Q.ty	Ref.	Description	Q.ty
1	Spindle	1	11	Thrust Washer	1
2	Bearinginner Wheel	1	12	Thrust Bearing	1
3	Seal Assy	1	13	Sun Gear	1
4	Hub	1	14	Snap Ring	1
5	Bearing - Outer Wheel	1	15	Case - planetary	1
6	Carrier - Planetary Ring Gear (3.46)	1	16	Hexagonal Socket Screw	1
7	Nut - wheel Bearing	1	17	Copper - washer	1
8	Retaining Ring	1	18	Oil Plug - magnetic	1
9	Ring Gear (3.46)	1	19	Screw-cap	2
10	Thrust Sleeve	1			

## Nomenclature

# MX13610DESECX-XXX



# 1 Introduction

## Description

The hub reduction unit consists of a cylindrical planetary assembly in each hub, fig. 1.1.

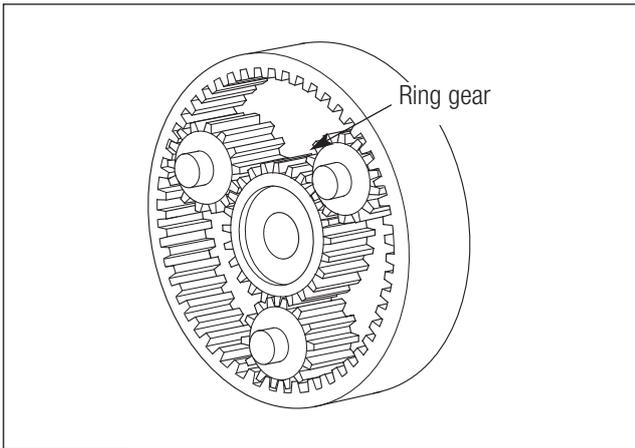


Fig. 1.1

The reduction is made up of a sun gear, a number of planetary gears 3 which rotate round the sun gear and a ring gear which houses the planets gears.

The sun gear is located on the axle shaft by spline, fig. 1.

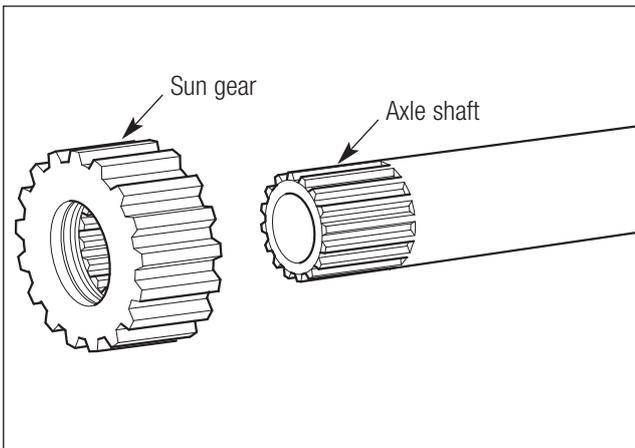


Fig. 1.2

The ring gear is jointly to the rear axle spindle by spline, fig. 1.3

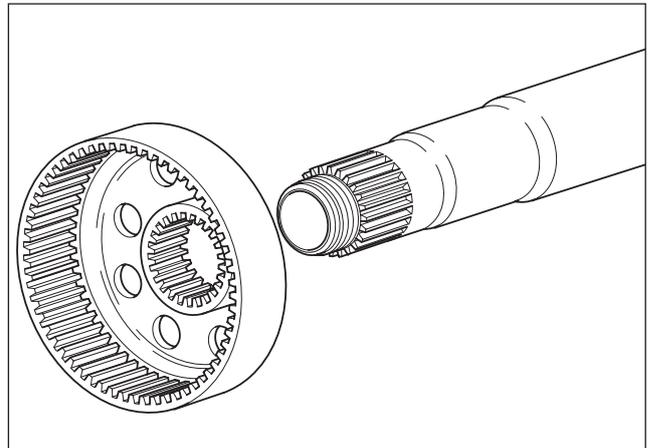


Fig. 1.3

The hub is carried on two tapered roller bearings.

When the drive shaft, and the sun gear rotates, the rotation is transmitted to the planets gears.

Because the ring gear is fixed to the rear axle spindle, the planets gears rotate inside the ring gear and the rotation movement is transmitted to the hub assy.

**Ratio formula =  $1 + (Z \text{ Ring gear} / Z \text{ Sun teeth})$ , fig. 1.4**

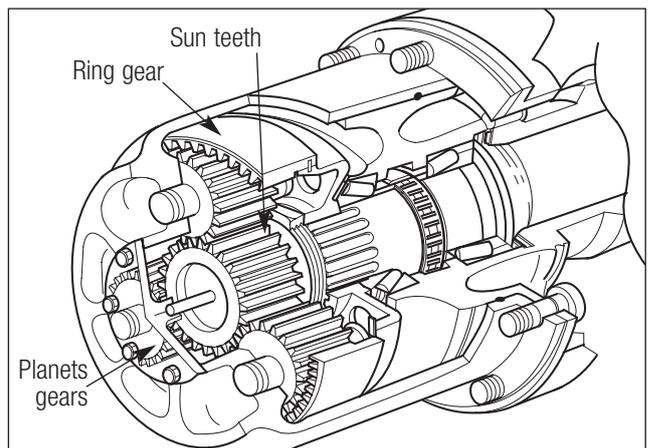


Fig. 1.4

The hub reduction ration is 3.46:1 or 3.33:1

Designation: 3 planets (19 teeth)

Ratio (3.46:1) - 3 planets  $1 + (64/26) = 3.46$

Ratio (3.33:1) - 3 planets  $1 + (63/27) = 3.33$

# 1 Introduction

## Procedures for Carrier on MX13610 Series Axles

For service, maintenance and troubleshooting procedures refer to Maintenance Manual MM-01105. To obtain these publications, refer to the Service Notes page on the front inside cover of this manual.

## Procedures for Disc Brake on MX13610 Series Axles

For service, maintenance and troubleshooting procedures, refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake; and Maintenance Manual MM-0350, ELSA 225L Reaction Beam Air Disc Brake. To obtain these publications, refer to the Service Notes page on the front inside cover of this manual

## Hazard Alert Messages

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**

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

## Inspection

### Tie Rod End Wear

You may not be able to detect loose or worn tie rod ends during operation. Under normal operating conditions, wear occurs over time. The preload bearings inside each tie rod end provide less resistance, which can affect steering control, front tire wear and other axle components. Regularly-scheduled inspection and maintenance helps to minimize the effects of tie rod end wear on the vehicle. Refer to Table for greasing intervals. Figure 1.5.

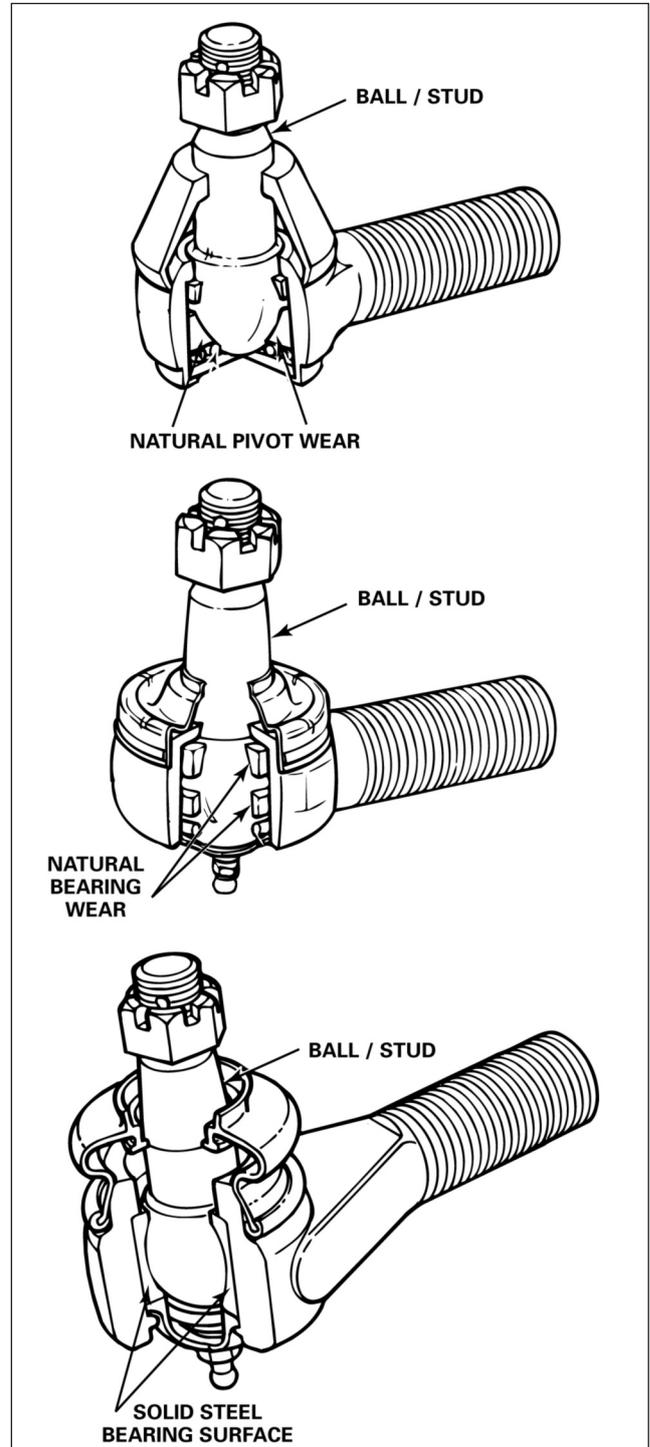


Fig. 1.5

# 1 Introduction

## Does Tie Rod End Wear Affect the Steering Linkage?

Unless tie rod end wear becomes excessive, a safe steering linkage is maintained. However, tie rod end wear can affect uniform steering control and, ultimately, wear to the front tires.

## Can the Driver Detect Tie Rod End Wear During Vehicle Operation?

A driver may not always detect a loose tie rod end condition during vehicle travel conditions. This is why it is important to inspect tie rod ends for wear and allowable movement at regular intervals.

## Tie Rod Assembly for Movement

For roadside inspection, refer to the procedure in this section.

## Vehicle Raised and Supported with Safety Stands

To perform this inspection, the entire system must be unloaded. The front end of the vehicle must be raised and supported with stands.

**NOTE: Do** not grease the tie rod assembly before you perform the inspection.

### **WARNING**

**Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury and damage to components can result.**

1. Park the vehicle on a level surface with the wheels STRAIGHT. Block the wheels to prevent the vehicle from moving. Set the parking brake. Fig. 1.6

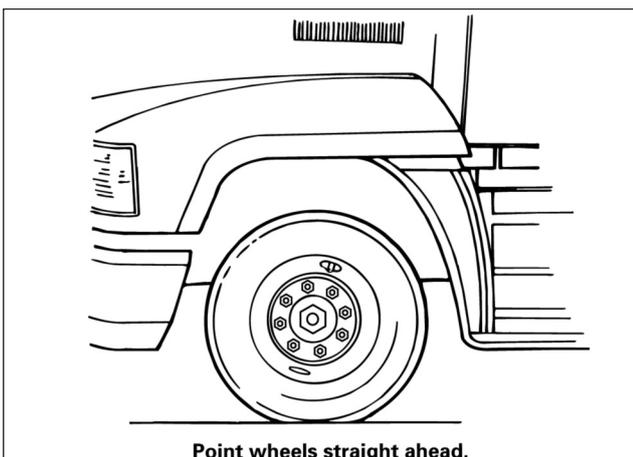


Fig. 1.6

2. Raise the vehicle so that the front wheels are off the ground. Support the vehicle with safety stands. Do not use a jack to support the vehicle.
3. With the engine off, turn the wheels from full left to full right. Return to the straight-ahead position. This step will require more force for vehicles with the power steering off.
4. Check the tie rod boot for cracks, tears or other damage. Also check the boot seals for damage. Replace the entire tie rod end if the boot is damaged or missing. Fig. 1.7

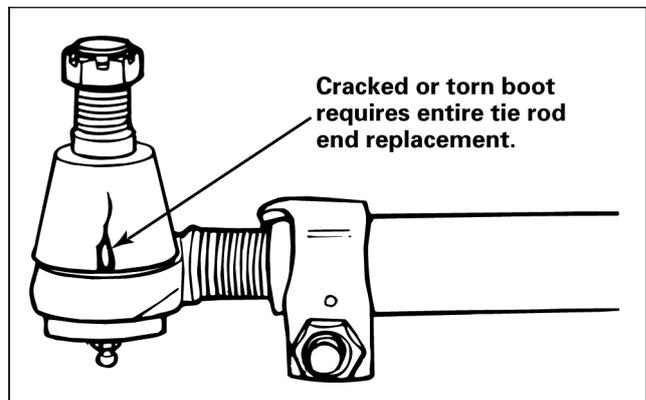


Fig. 1.7

### **WARNING**

**Verify that a cotter pin is installed through the tie rod end, and the tie rod end nut is tightened to the correct torque specification. Replace a missing cotter pin and tighten a loose tie rod end nut. A missing cotter pin or loose tie rod end nut can cause loss of steering control. Serious personal injury and damage to components can result.**

5. Check that the tie rod end nut is installed and secured with a cotter pin.

- **If the cotter pin is missing:** Tighten the tie rod end nut to the correct specification. Install a new cotter pin. Always tighten the tie rod end nut to the specified torque when setting the cotter pin. Refer to Section 8. Do not back-off the nut to insert the cotter pin. Fig. 1.8

# 1 Introduction

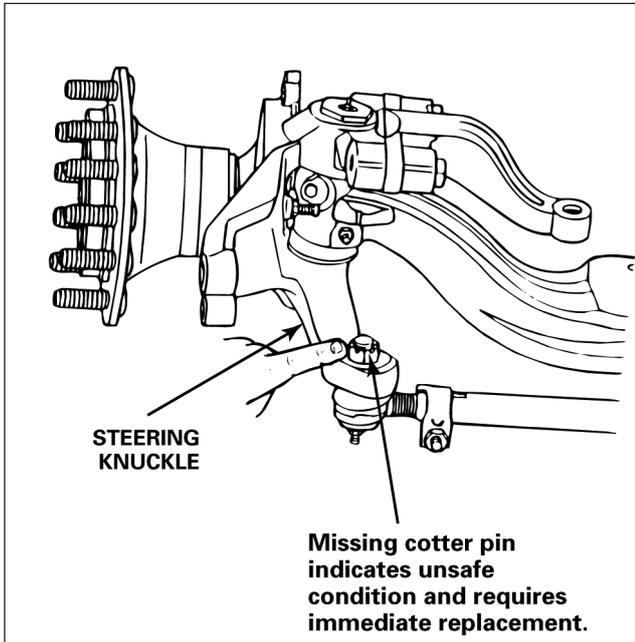


Fig. 1.8

6. Check that the tie rod end is threaded correctly into the cross tube and installed deeper than the end of the cross tube slot. The tie rod end must be visible the entire length of the cross tube slot. Fig. 1.9

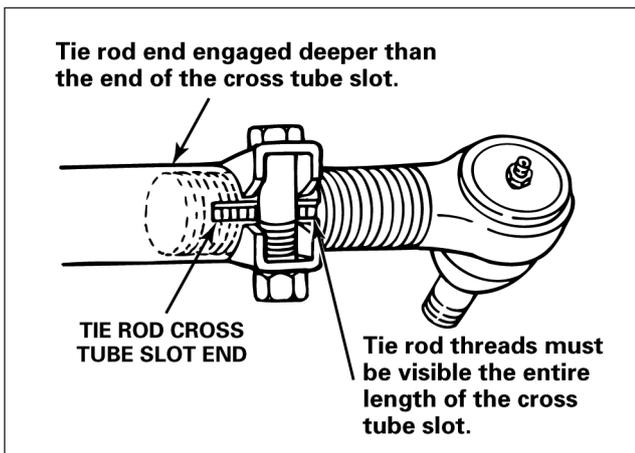


Fig. 1.9

7. Check that the grease fittings are installed. Replace a damaged grease fitting.

- **If the tie rod ends are non-greaseable:** Do not install a grease fitting. Fig. 1.10

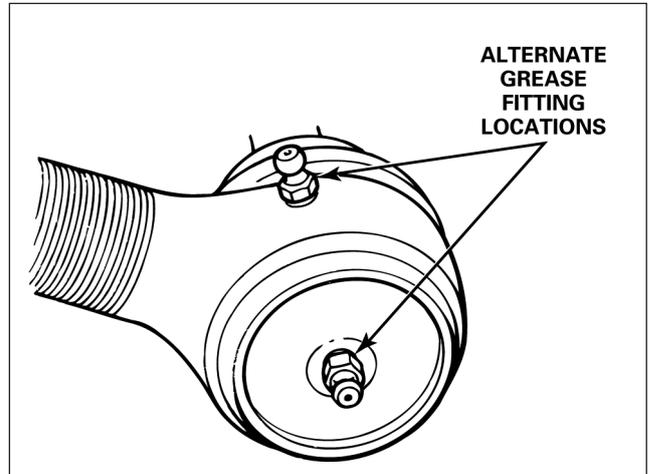


Fig. 1.10

8. By hand or using a pipe wrench with jaw protectors to avoid gouging the cross tube, rotate the cross tube toward the FRONT of the vehicle and then toward the REAR. After rotating, center the cross tube between the stop positions.

- **If the cross tube will not rotate in either direction:**  
Replace both tie rod ends.

9. Position yourself directly below the ball stud socket. Using both hands, grasp the assembly end as close to the socket as possible, no more than 6-inches (152.4mm) from the end.

## ⚠ CAUTION

Only use your hands to check for movement or looseness of the tie rod assembly. Do not use a crow bar, pickle fork or two-by-four. Do not apply pressure or force to the tie rod assembly ends or joints. Do not rock the tires with the vehicle on the ground or with the wheels raised. Damage to components can result.

10. Apply hand pressure of approximately 100 pounds (45 kg) in a vertical PUSH-and-PULL motion several times. Check for any movement or looseness at both tie rod ends. Fig. 1.11

- **If there is any movement in the tie rod assembly:**  
Replace both tie rod ends.

# 1 Introduction

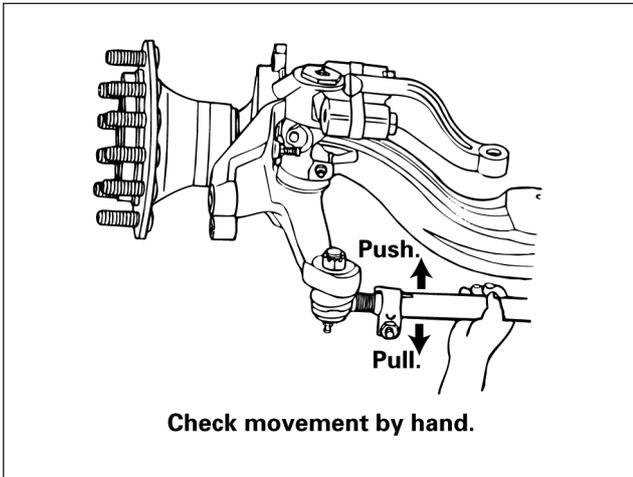


Fig. 1.11

## CAUTION

Replace bent or damaged cross tubes with original equipment parts of the same length, diameter and threads. Do not attempt to straighten a bent cross tube. Damage to components can result.

11. Inspect the cross tube and clamps for damage. Fig. 1.12

- **If the cross tube is bent or cracked:** Replace it. Use original equipment parts of the same length, diameter and threads.
- **If the clamps are damaged:** Replace them.
- **If either clamp has become welded to the cross tube:** Replace the entire cross tube assembly. Use original equipment parts of the same length, diameter and threads.

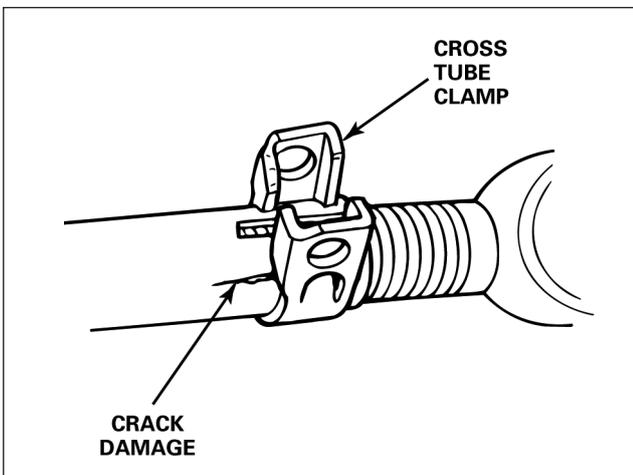


Fig. 1.12

## Federal Out of Service Roadside Inspection Criteria (Department of Transportation)

The following cross tube and tie rod end components may be checked during roadside inspections. Deficiencies may result in the vehicle being placed out-of-service by authorized personnel.

1. Loose clamps or clamp bolts on the tie rods.
2. Any looseness in the threaded tie rod end and cross tube joint.
3. Loose or missing nuts on the tie rods or cross tube.
4. Any movement under the steering load of a tie rod arm ball stud nut.
5. Any motion, other than rotational, between any linkage member and its attachment point of more than 0.125-inch (3mm), when measured with hand pressure.
6. Any obvious welded repairs.

## Replacement Criteria

Any detectable movement of 0.125-inch (3mm) or more requires that the vehicle is immediately taken out of service for replacement of the tie rod ends. When the roadside check indicates tie rod end movement of less than 0.125-inch (3mm), the vehicle does not need to be immediately removed from a service run. It is advisable to schedule a major out-of-service inspection and maintenance as soon as possible.

## Raising the Vehicle

1. Make sure the vehicle is on a level surface.

### ⚠ WARNING

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury and damage to components can result.

2. Raise the vehicle so that the wheels are off the ground. Support the vehicle with safety stands.
3. Remove the oil drain plug from wheel end and rotate it till the hole is in bottom position and drain the axle lubricant from the wheel end assembly (if need to operating on the wheel end assembly).

# 1 Introduction

## Preliminary operation for Wheel End maintain.

### Remove the Caliper Assembly

**NOTE:** These chambers have vent lines (snorkels) that look similar to service and parking brake air lines. Ensure the hoses are correctly marked before removal to ensure correct reassembly.

1. Remove the service chambers. Mark the air hoses for reference during reassembly. Carefully remove the air hoses from the air chamber. Use the correct wrench to remove the air chamber nuts and washers. Fig. 1.13

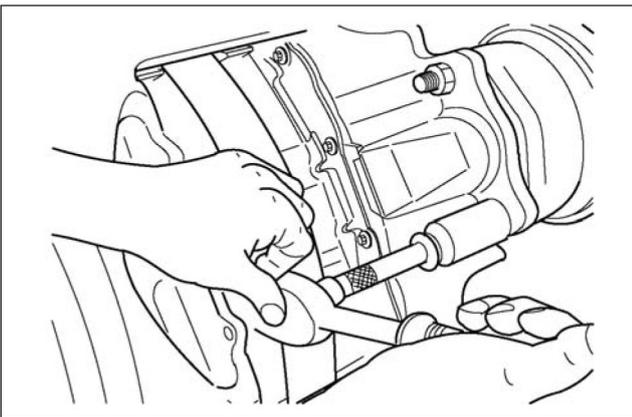


Fig. 1.13

2. Cover the exposed air chamber mounting aperture with tape to prevent debris from entering the caliper housing assembly. Fig. 1.14

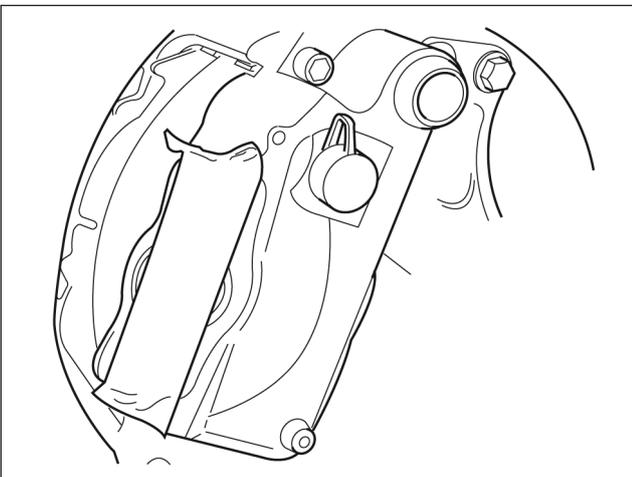


Fig. 1.14

3. De-adjust the caliper and remove the brake pads. Refer to the procedure in this section.
4. Use a 17mm Allen-head socket wrench to remove the carrier bolts and washers. Fig. 1.15. Use an appropriate lifting device to carefully remove the caliper assembly from the axle.

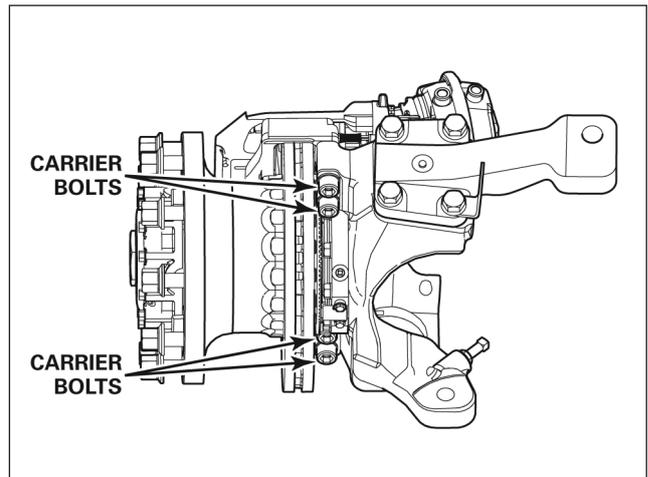


Fig. 1.15

### Install the Caliper Assembly

#### WARNING

To avoid serious personal injury and damage to components, take care when using lifting devices during service and maintenance procedures. Inspect a lifting strap to ensure that it is not damaged. Do not subject the lifting straps to shocks or drop-loading.

1. Use an appropriate lifting device to place the caliper assembly over the rotor.
2. Align the caliper carrier bolt holes. Assemble the caliper to the knuckle using the caliper carrier bolts and washers. For axles with serial numbers lower than LRS00962355, spacers must also be installed between the caliper and knuckle. Tighten the caliper carrier bolts to 350-450 lb-ft (475-610Nm).
3. Check the caliper assembly to verify that it slides by hand.
4. Install the brake pads if applicable.



# 1 Introduction

5. Before you install the air chamber onto the caliper assembly, ensure the perforated transit plug is removed from the caliper chamber seal by pulling the tab. Fig. 1.16 and Fig. 1.17
6. Install the air chamber onto the caliper assembly. Refer to the manufacturer's instructions.
7. Inspect the rotors, install the pads and set the initial brake pad-to-rotor clearance. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

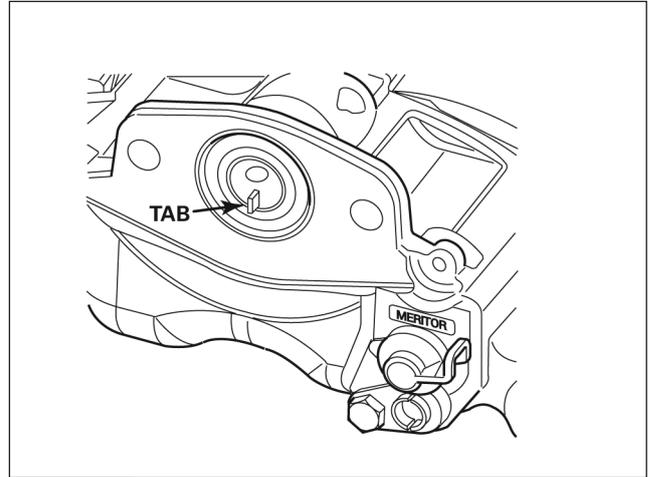


Fig. 1.16

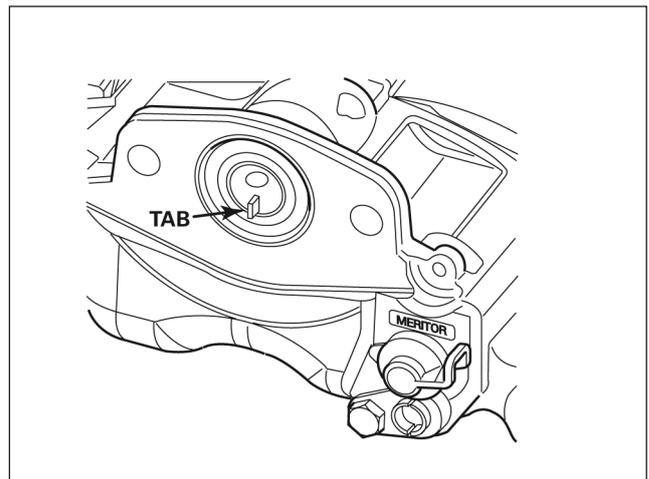
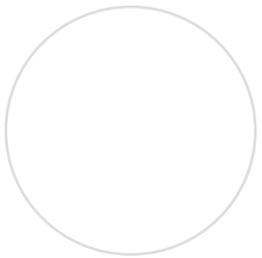
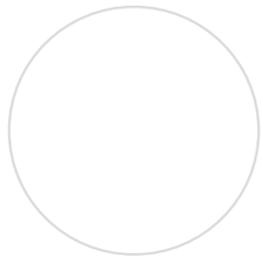
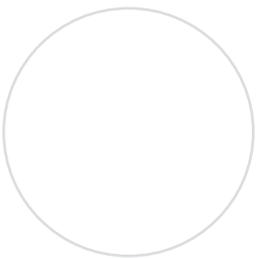
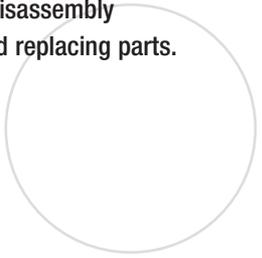
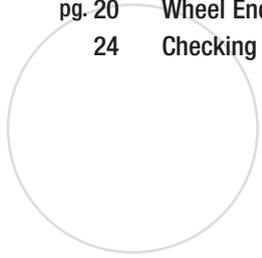
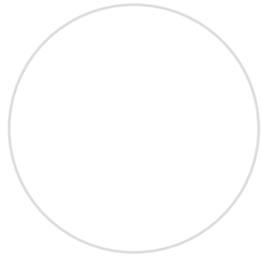
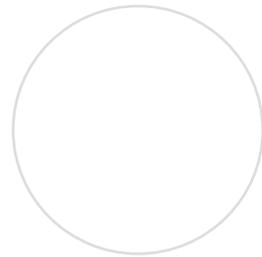


Fig. 1.17



# Wheel End Disassembly

2



pg. 20 Wheel End Disassembly  
24 Checking and replacing parts.

## 2 Wheel End Disassembly

### Wheel End Disassembly

Remove the wheel nuts and retain. Pull off the wheels using a wheel trolley. Remove the hub drain plug and discard. Drain oil from wheel end. Fig. 2.1

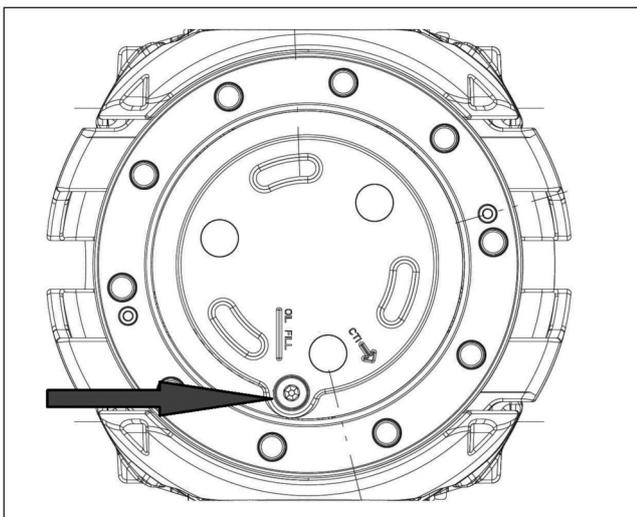


Fig. 2.1

#### **⚠ WARNING**

Some variants could have a two sunk head connection between the wheel end assy and the hub. In this case, untighten it in advance.

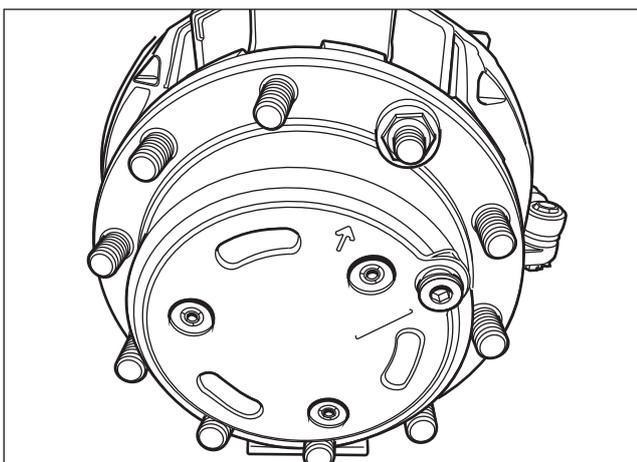


Fig. 2.2

If it is necessary to disassemble the wheel end assembly, see below otherwise go to section 4.

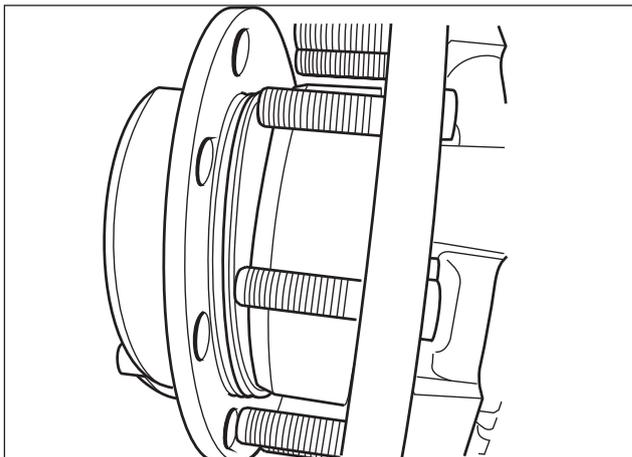


Fig. 2.3

Remove the circlips from the planets gear journal pins Fig. 2.4

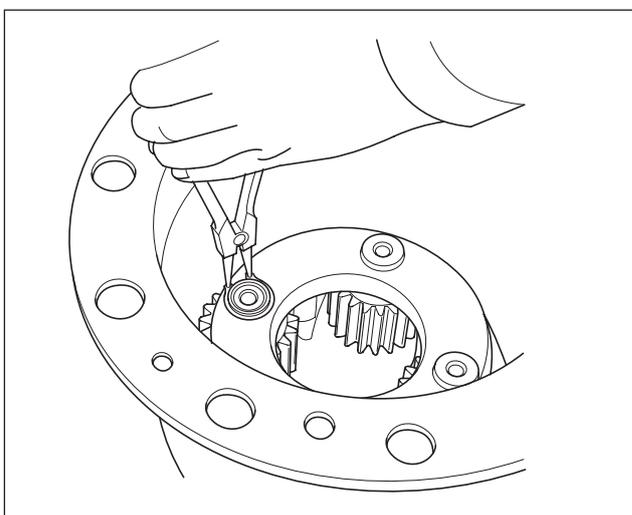


Fig. 2.4

## 2 Wheel End Disassembly

### Hubs can contain 3 planetary gears.

Press out the journal pins using a suitable drift.

Remove the planet gears, washers and needle rollers. Fig. 2.5

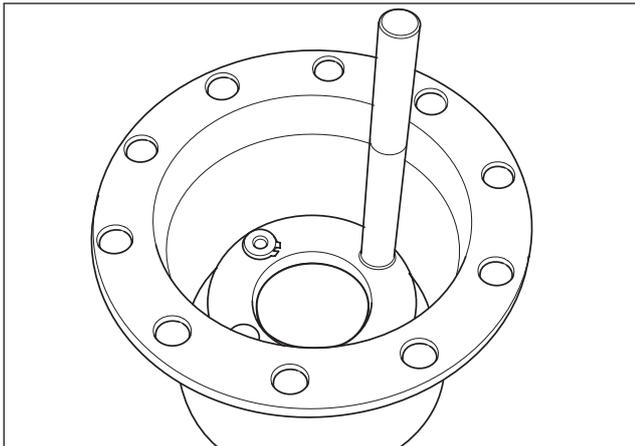


Fig. 2.5

Remove the O-ring seals from the journal pins, and discard.

Fig. 2.6

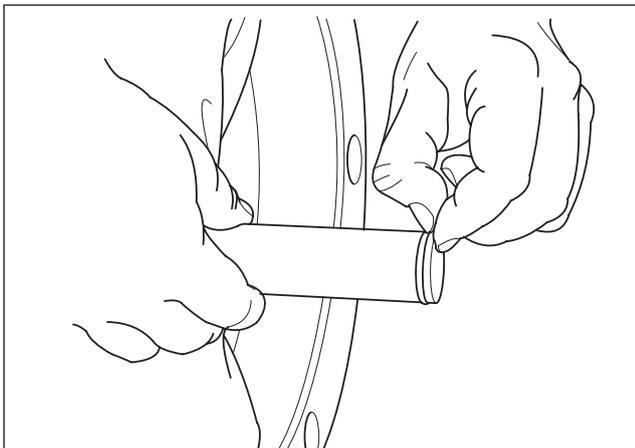


Fig. 2.6

### **⚠ WARNING:**

Do not reuse these O-Ring seals as old seals cannot protect against oil leaks when rebuilt.

Remove the circlips from axle shaft.

Remove the sun from the axle shaft.

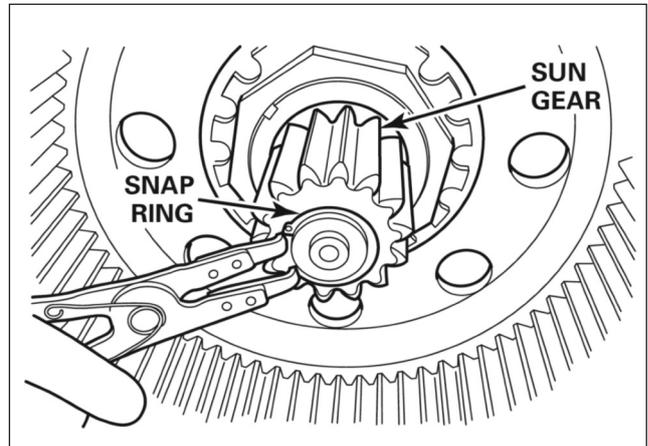


Fig. 2.7

Remove the thrust bearing and thrust washer from the axle shaft.

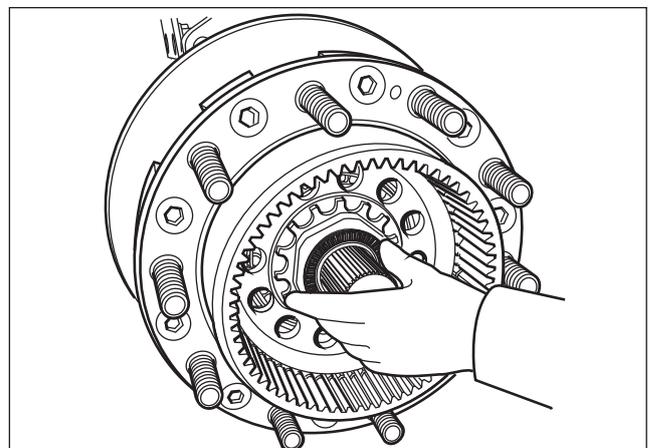


Fig. 2.8

Remove locking screw and discard. Unscrew the hub retaining nut and discard. Fig. 2.8

## 2 Wheel End Disassembly

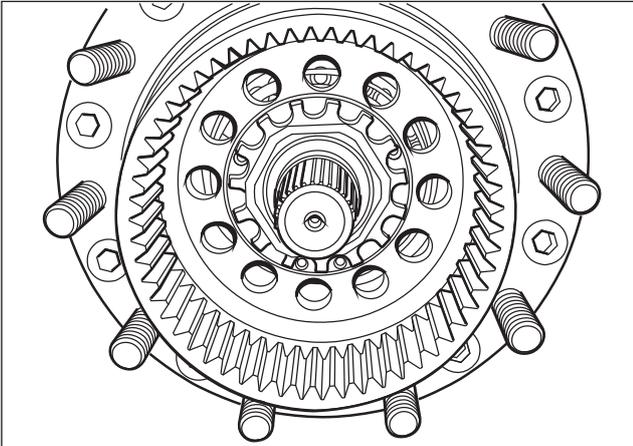


Fig. 2.9

Nut cannot be reused because the anti-friction coating on the hub nut face maybe damaged.

Remove the stellar nut - Fig. 2.9

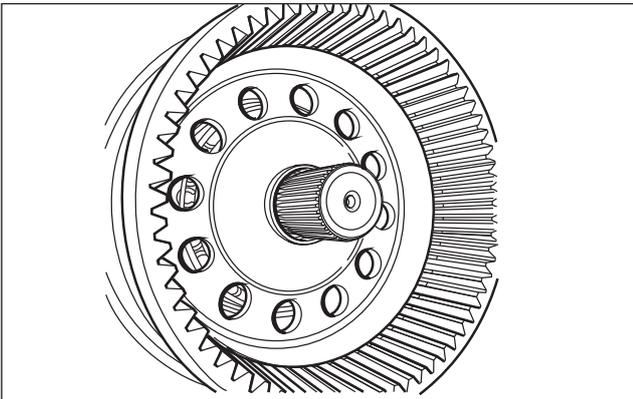


Fig. 2.10

Remove the carrier planetary ring gear. Fig. 2.10

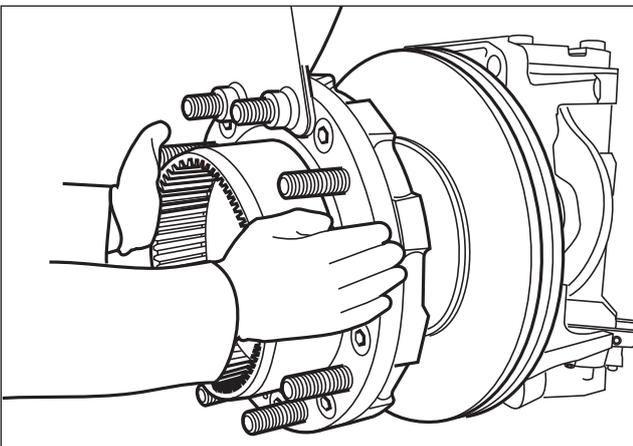


Fig. 2.11

### **⚠ WARNING**

The ring gear supports the outer bearing wheel. Proceed carefully with the disassembling operation (support the hub and disc brake) to prevent any damage to the components and injury to the people involved.

The wheel appears as shown here below.

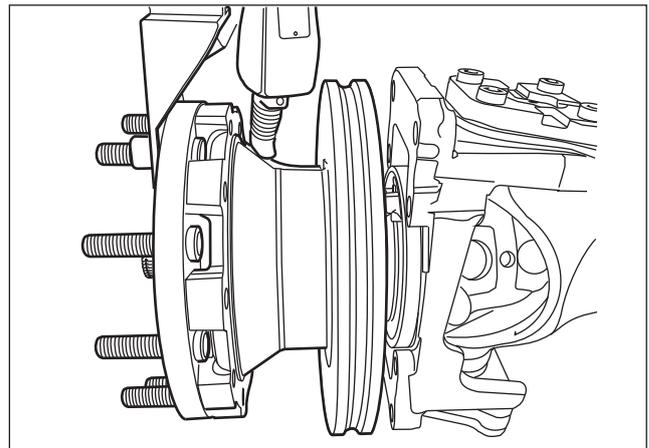


Fig. 2.12

At this moment, the wheel end is free but the hub, the wheel bearings and the disc brake are present. If it is necessary to work on the disc or on the wheel hub or to check the spindle, the easiest solution is to disassemble the group (disc brake – wheel hub – inner wheel bearing – inner and outer seal) from the spindle and, if needed, proceed with the remaining operation on the bench.

Support the wheel end group with a trolley or a lift during the disengagement operations from the spindle.

When the group is available in a bench, the disassembling procedure of the disc from the hub is easier, as well as inspecting the spindle separately from the knuckle. Fig. 2.13 e 2.14

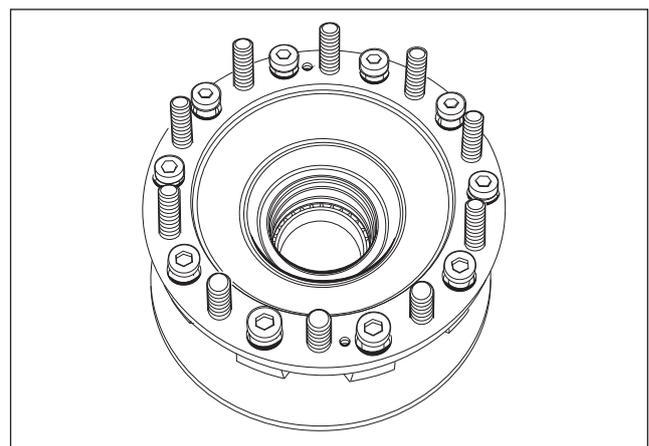


Fig. 2.13

## 2 Wheel End Disassembly

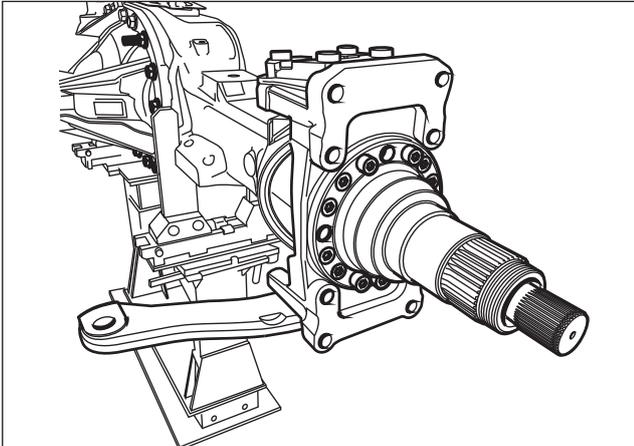


Fig. 2.14

If it is necessary to replace the spindle, remove the ABS sensor in advance (if present). Fig. 2.15

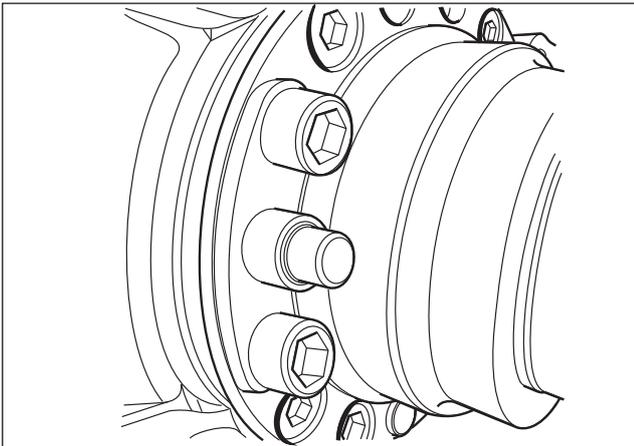


Fig. 2.15

If needed, remove the cable connection as shown below. Fig. 2.16

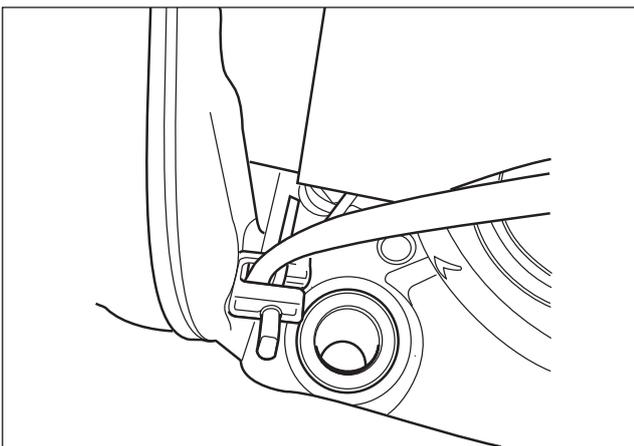


Fig. 2.16

Untighten the screw from the knuckle and remove it. Fig. 2.17 and 2.18

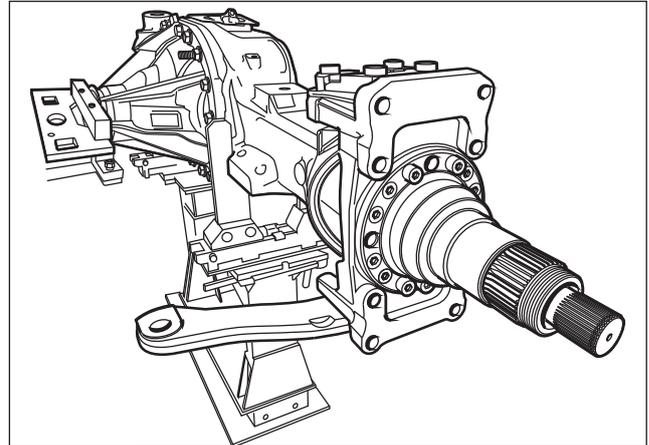


Fig. 2.17

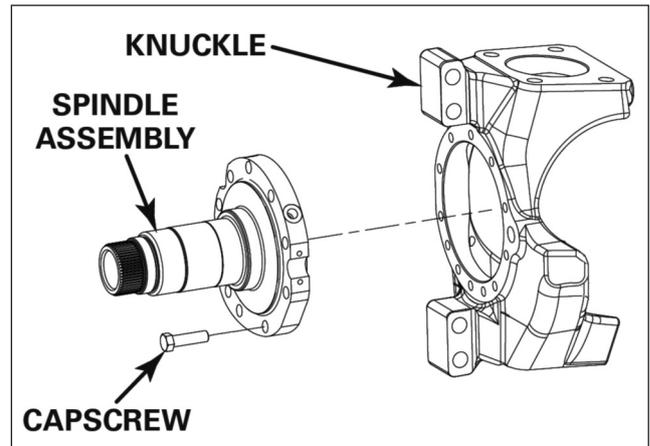


Fig. 2.18

Scrap screws, seal and bushing from the spindle.

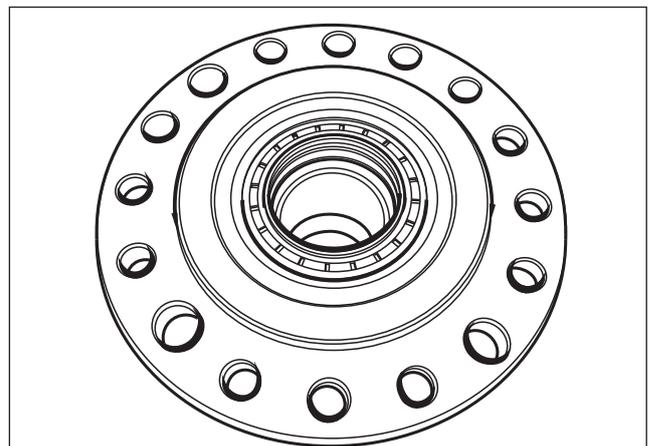


Fig. 2.19

## 2 Wheel End Disassembly

### Checking and replacing parts.

1. Thoroughly clean all the hub parts.
2. Check all the parts for wear, deformation or other damage.
3. Check needle rollers, gears and all bearing surfaces.
4. If a planetary gear is damaged, all the planetary gear journals and rollers must also be replaced at the same time since they are matched within the same tolerance class for optimally smooth operation.
5. Also check the contact surface of the seal on the drive shaft.
6. Replace damaged parts. Grease the rollers of the planets gears and assemble them in the gears, with the spacer sleeve. Fig. 2.20

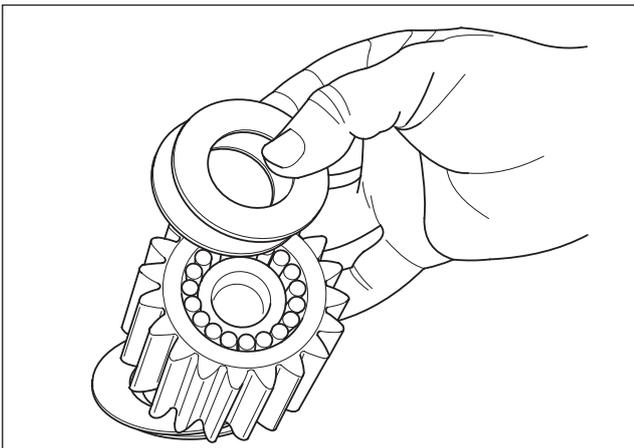


Fig. 2.20

7. Wheel end components: Inspect the cup, cone, rollers and cage of all tapered roller bearings in the hub assembly. If you find any defect or marks, replace the bearings and/or the parts. Grease the bearings and the surfaces before assembly.

**NOTE:** each gear must have 38 needle rollers.

Place the planets gears and thrust washers in the hub casing, aligning with the journal pin bore, and ensuring that the brass washers are in contact with the hub casing. Fit new O-rings on the journal pins and grease thoroughly with GLEITMO 805 grease. Press in the journal pins using a drift. The pins should be pressed in sufficiently to allow the retaining circlips to be fitted inside. Fig. 2.21

Fit the retaining circlips on the journal pins. Fig. 2.22

If damaged: remove the old inner seal and lubricate and press into position by hand a new inner hub seal. Fig. 2.23

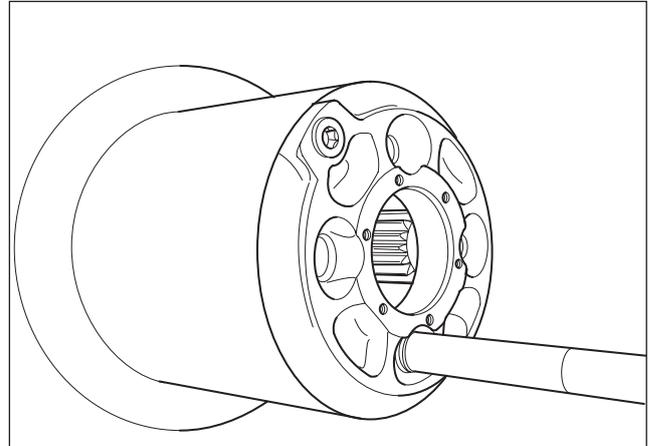


Fig. 2.21

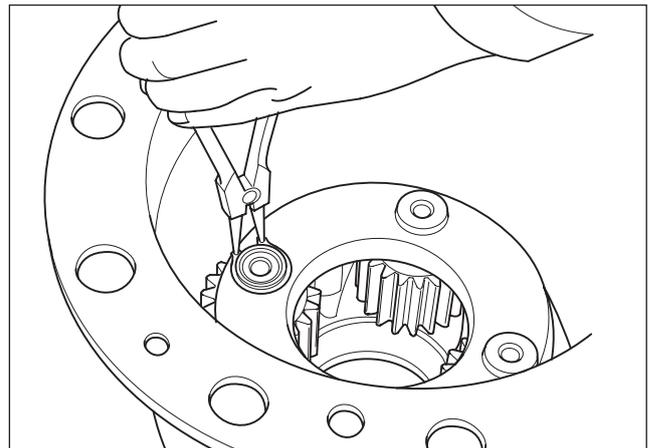


Fig. 2.22

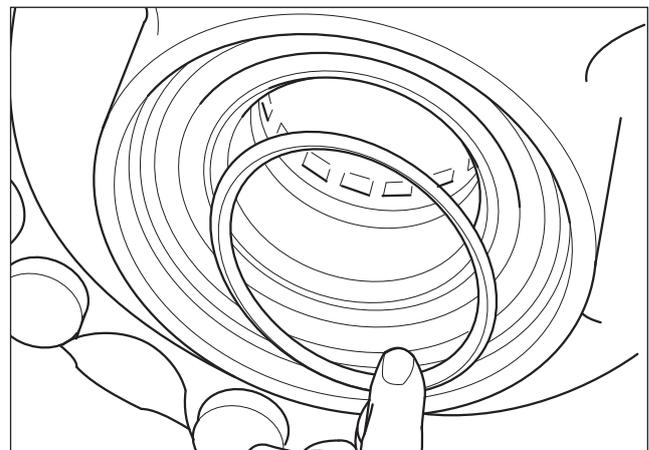
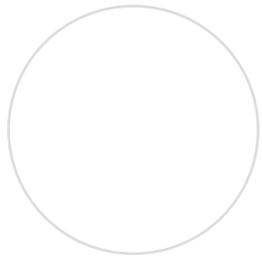
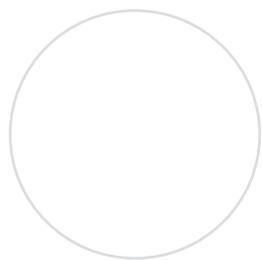
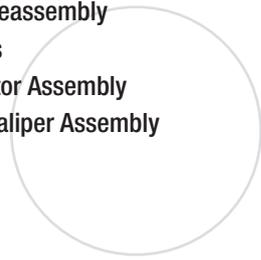
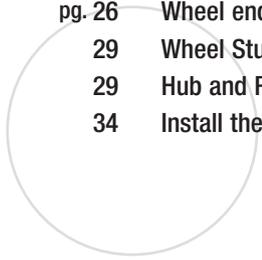
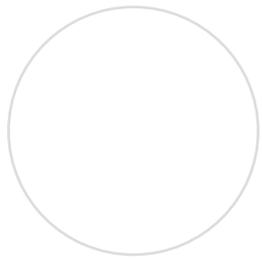
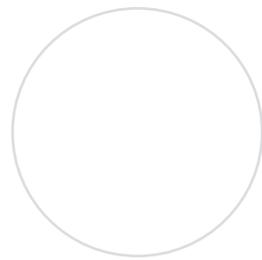
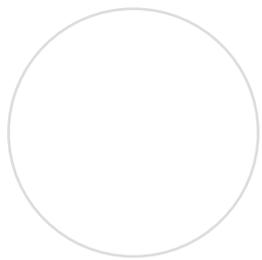


Fig. 2.23



# Wheel End Reassembly

# 3



- pg. 26 Wheel end reassembly
- 29 Wheel Studs
- 29 Hub and Rotor Assembly
- 34 Install the Caliper Assembly

# 3 Wheel End Reassembly

## Wheel end reassembly

This section of the manual contains the instructions to prepare the wheel end.

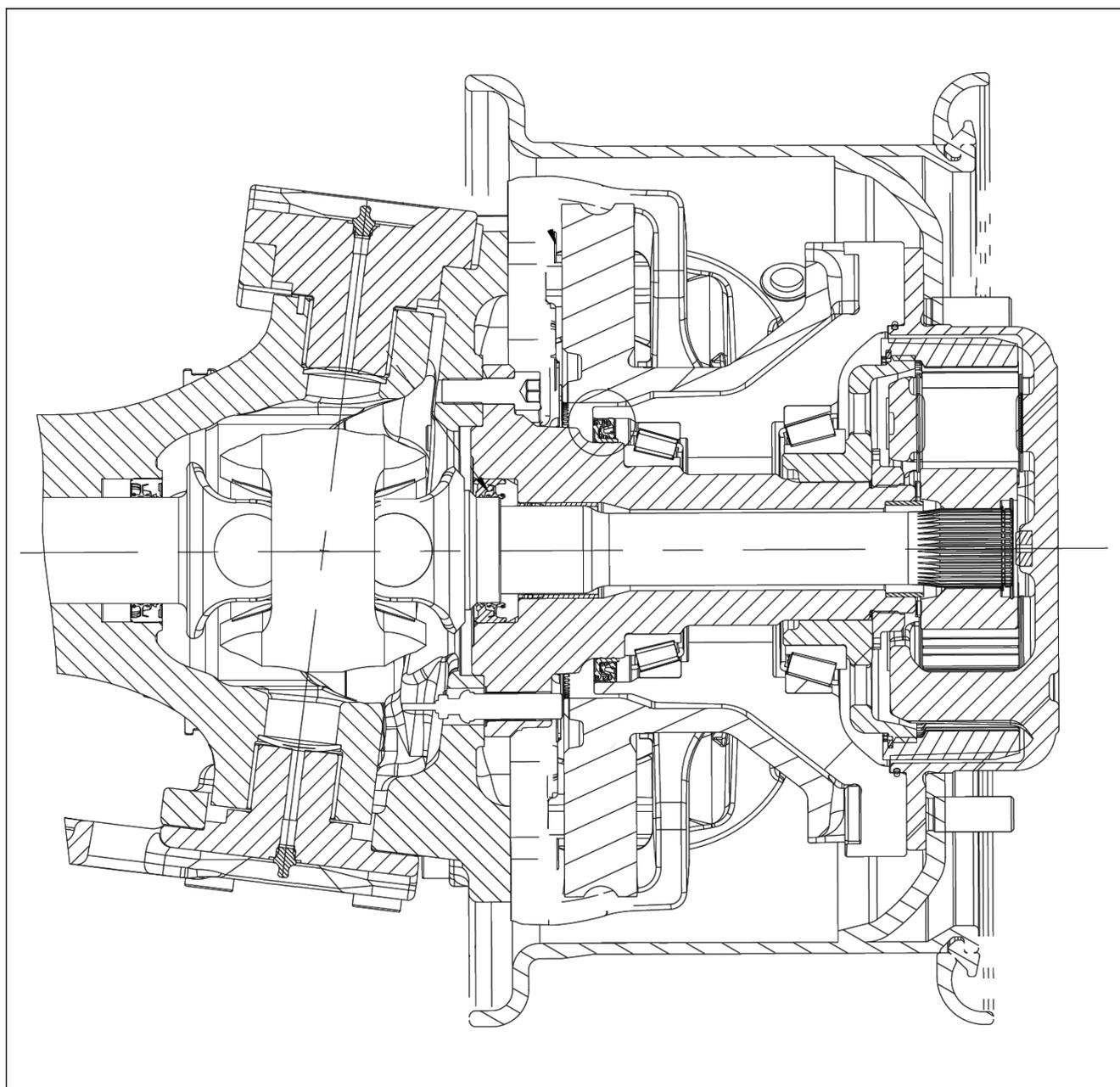


Fig. 3.1

# 3 Wheel End Reassembly

The first step for the wheel end assembly operations is to lubricate the spindle location in correspondence of the bushing and the seal.

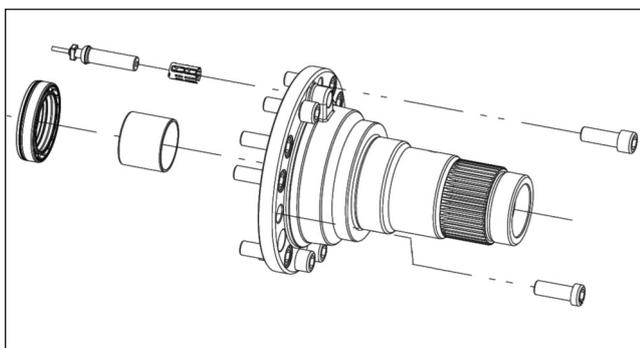


Fig. 3.2

Fit the bushing, fit a tool or a tube. Fig. 3.3 and 3.4

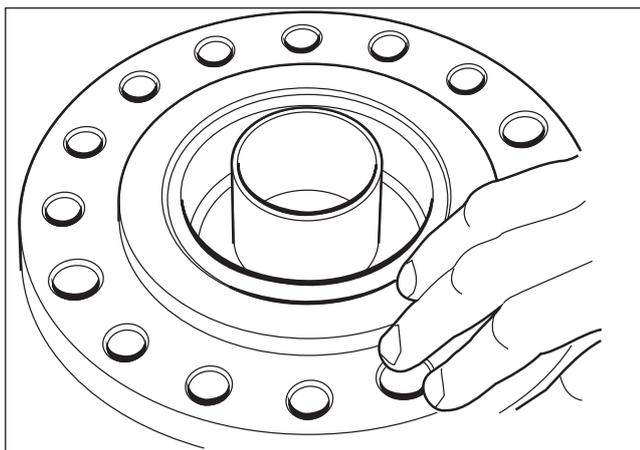


Fig. 3.3

Use the appropriate tool (MST5000) or a correct replacement

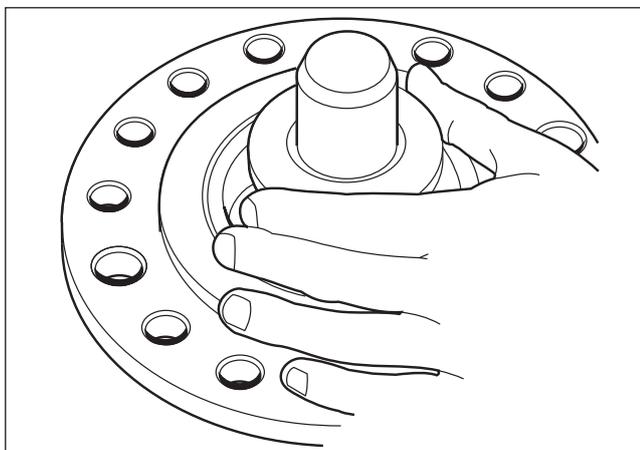


Fig. 3.4

Fit the seal with the appropriate tool (MST5001) or a correct replacement. Fig. 3.5

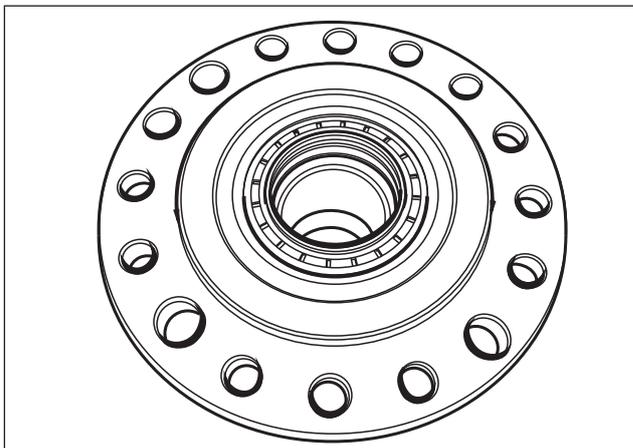


Fig. 3.5

Before assembling the spindle at the knuckle apply grease on the centering diameter. Fig. 3.6

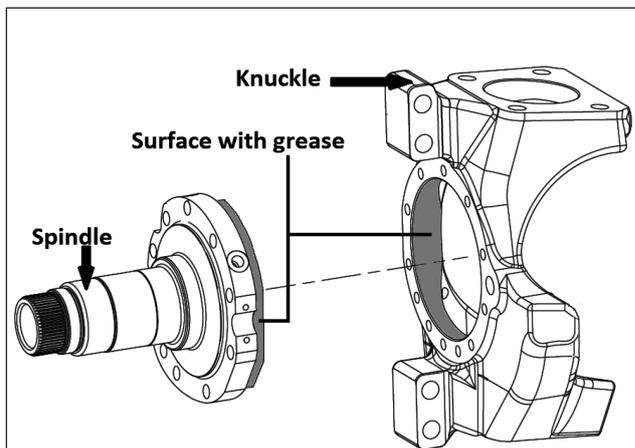


Fig. 3.6

# 3 Wheel End Reassembly

**⚠ WARNING**

Proceed carefully about the assembling operation (support the spindle for prevent damage of the components and injury at the people involved).

Assembly the spindle with the knuckle. Close the screw at the torque  $205 \div 245\text{Nm}$  in cross modality (see section 8) - Fig. 3.7

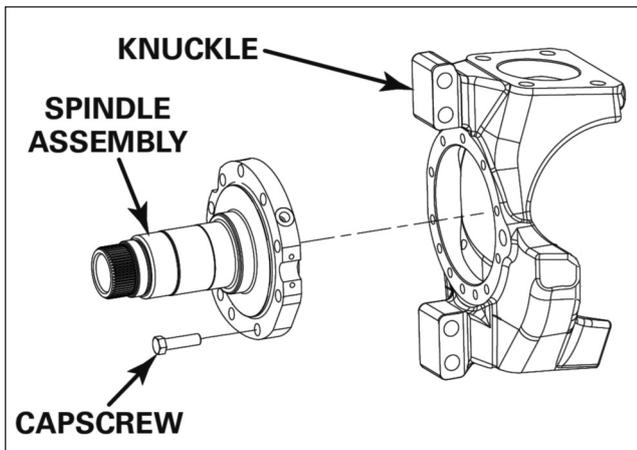


Fig. 3.7

After tightening to the correct torque, put a mark with a marking pen.

Apply grease on the surface of the spindle. - Fig. 3.8

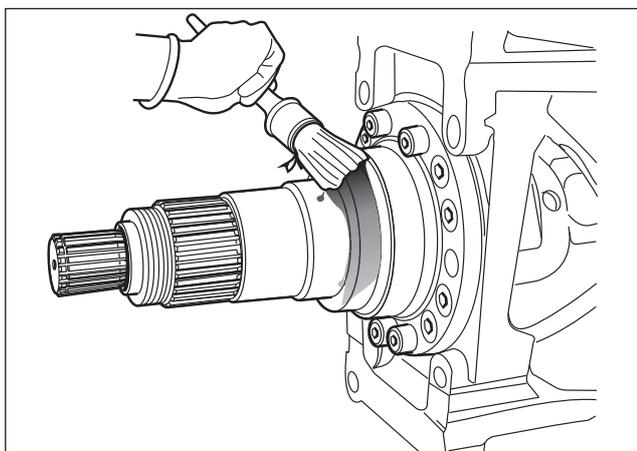


Fig. 3.8

If the wheel end configuration requires the ABS sensor, fit it in the location. Check that the sensor will be over the spindle flange about 15mm. - Fig. 3.9

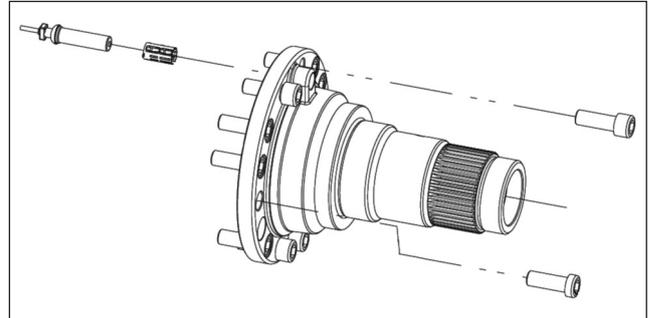


Fig. 3.9

The correct sensor position is settled when the hub and disc brake will be assembled.

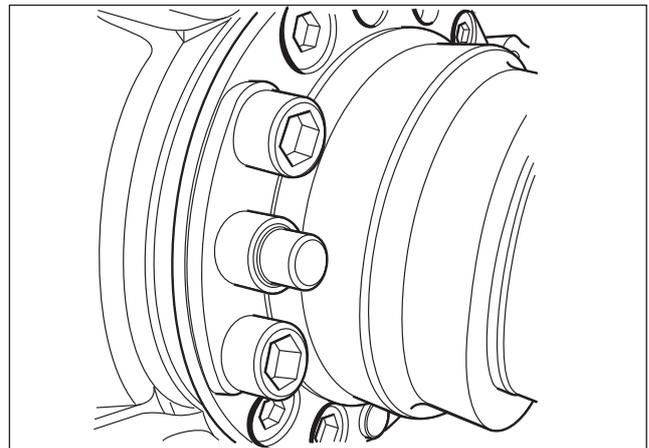


Fig. 3.10

If the bushing is not present in the spigot of the spindle provide to insert a new one and fit it with interference. Use a rubber mallet or a wooden one to prevent any damage to the bushing.

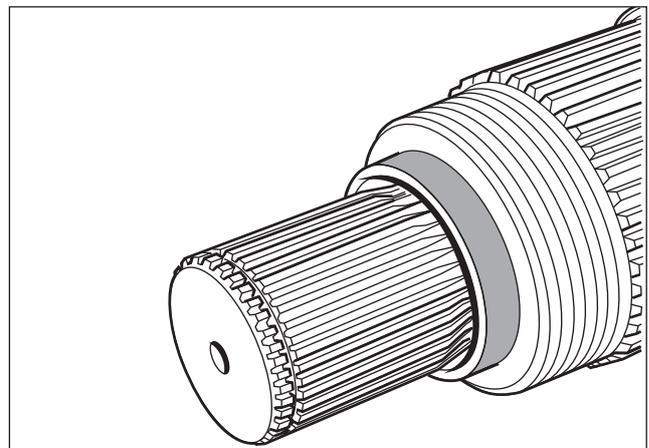


Fig. 3.11

Apply grease in the internal surface of the spindle in correspondence of the seals position.

# 3 Wheel End Reassembly

## Wheel Studs

1. If wheel studs were removed from the hub, place the hub into a press with the disc side at the bottom.
2. Align the grooves on the studs with the grooves in the hub stud holes. Press the studs into position (used a mallet if needed).

Fig. 3.12

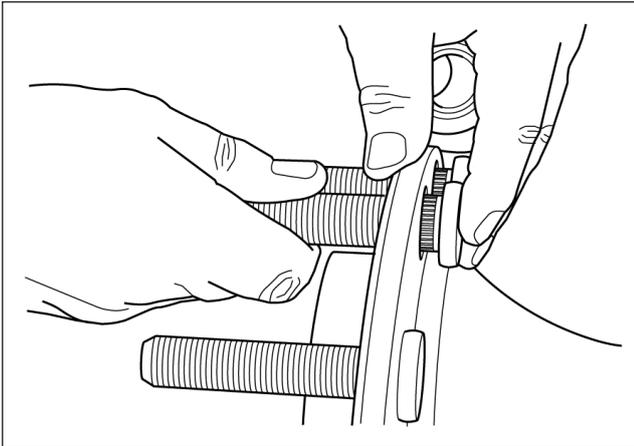


Fig. 3.12

## Hub and Rotor Assembly

Push inside the internal seal (optional version) on the hub with the suitable tool or an appropriate replacement - Fig. 3.13

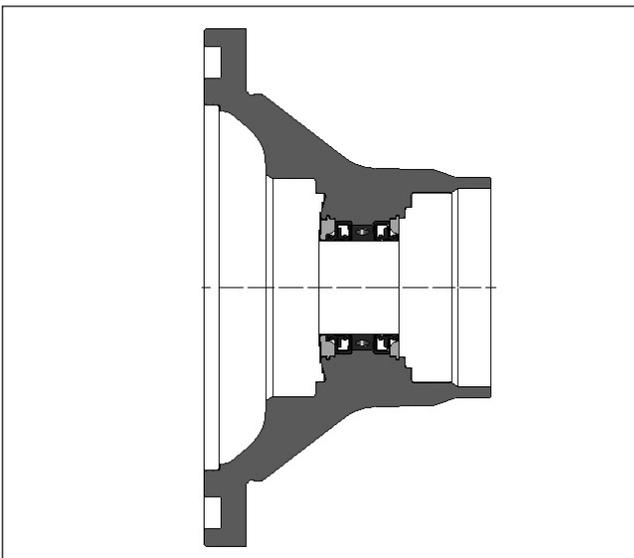


Fig. 3.13

After the seal assembly, install the circlips. - Fig. 3.14

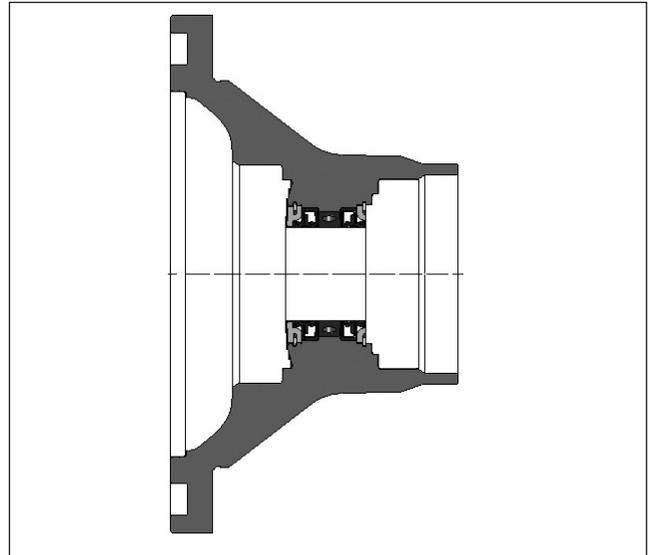


Fig. 3.14

Apply grease in the internal surface of the spindle in correspondence with the wheel bearing position.

Assemble the cap bearing with interference (it's suggested under the press at 10 ton) and the tapered bearing for each side. Fig. 3.15 and 3.16

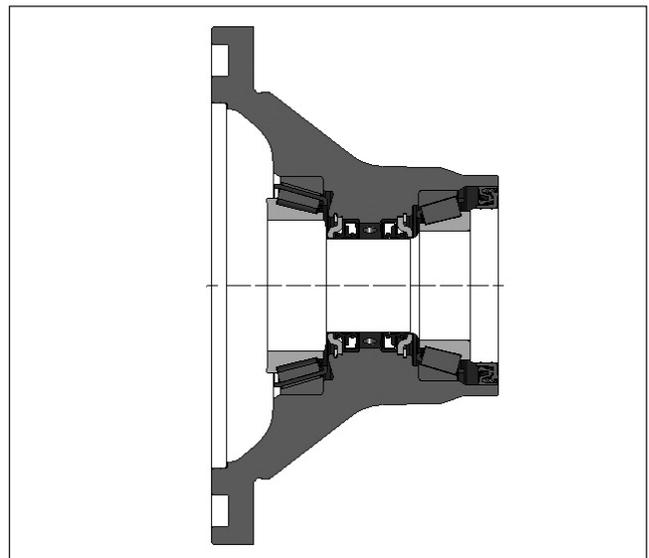


Fig. 3.15

### 3 Wheel End Reassembly

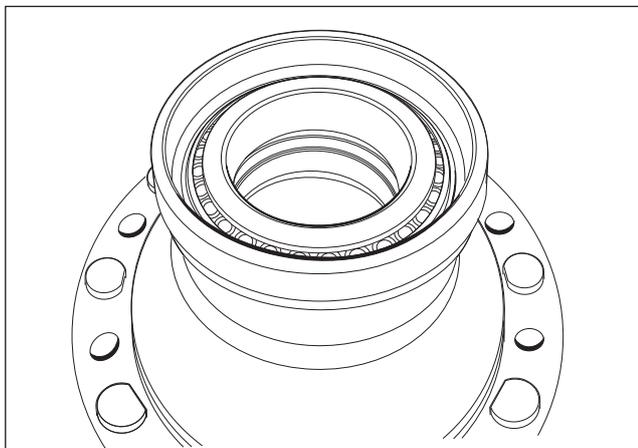


Fig. 3.16

Install the wheel end seal with the suitable tool (MST5002) or an appropriate replacement. Fig. 3.17 and 3.18

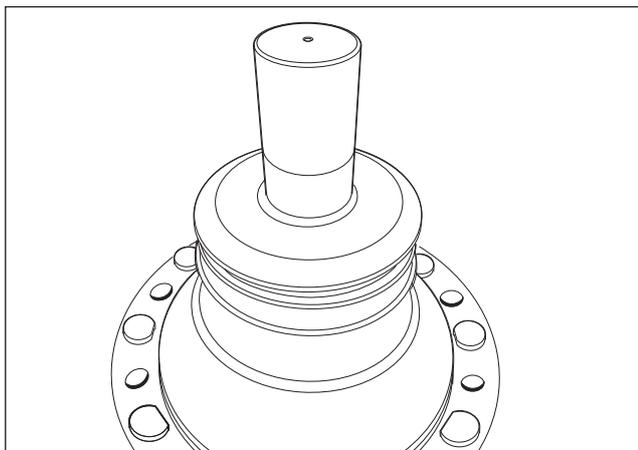


Fig. 3.17

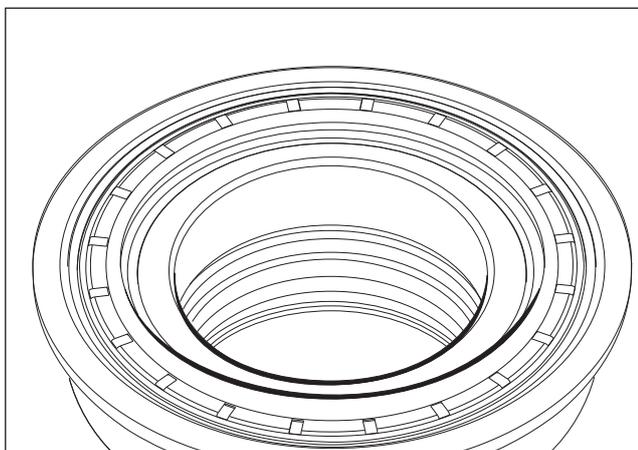


Fig. 3.18

The next step is to assemble the wheel hub and generate the assembly with the disc brake.

Apply grease on the centered diameter of the hub wheel in correspondence with the rotor disc. Fit the disc on the hub and tighten the socket screws in cross as shown in the picture.

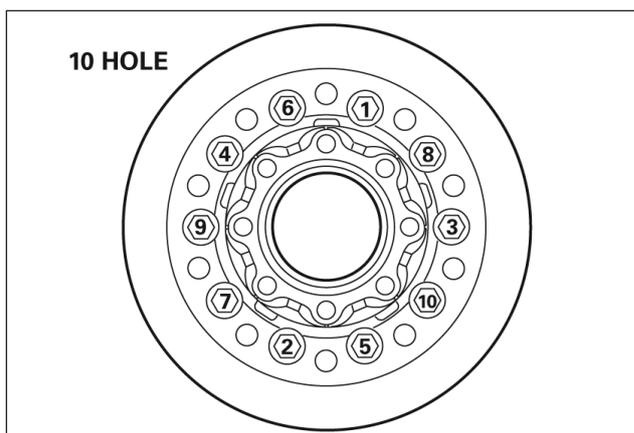


Fig. 3.19

If not yet done, apply grease on the spindle and fit the hub assembly onto the spindle.

Fig. 3.20

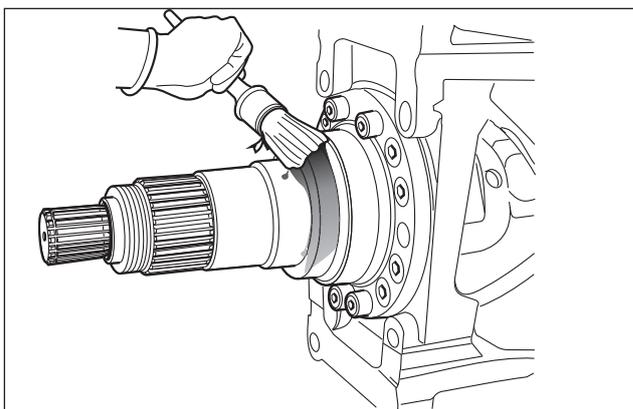


Fig. 3.20

# 3 Wheel End Reassembly

Install the hub assembly onto the spindle using an appropriate lifting device. Remove the tool. The inner bearing must be flat against the face of the spindle. - Fig. 3.21

**NOTE:** If available, use a lifting tool

**⚠ WARNING:**  
Do not damage the thread of the wheel end spindle.

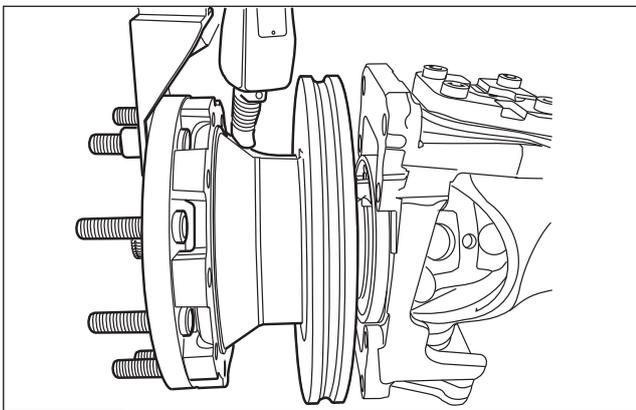


Fig. 3.21

**⚠ WARNING**  
The ring gear supports the outer bearing wheel. Proceed carefully to the assembly operation (support the hub and the disc brake) to prevent component damage or personal injury.

Assembly the outer bearing wheel see Fig.3.22

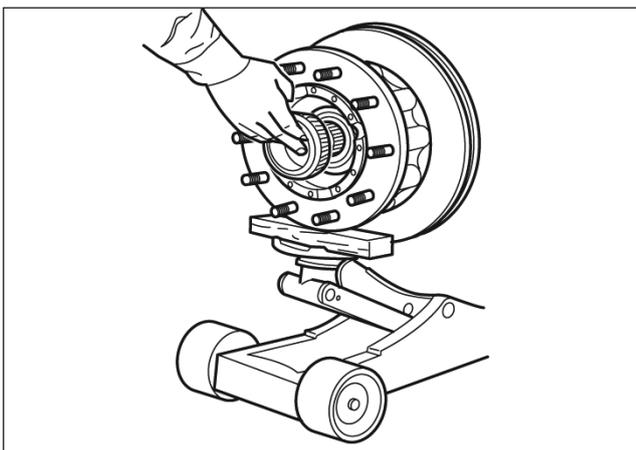


Fig. 3.22

Maintain the wheel end in position and install the ring gear.

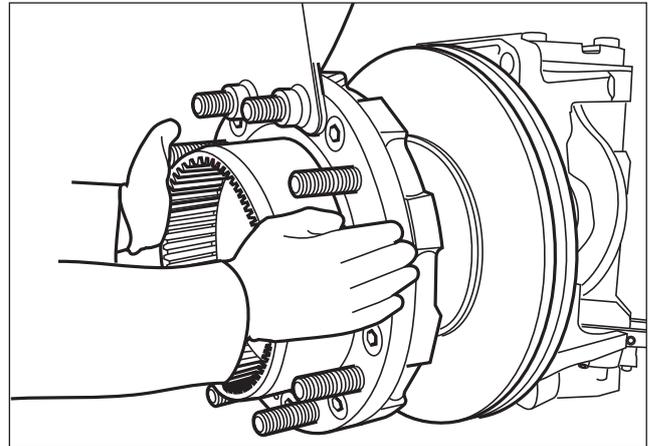


Fig. 3.23

Fit new locking patch screw to one of the six thread holes that allows the cap screw head to sit into one of the slots in the nut flange. Fig. 3.24

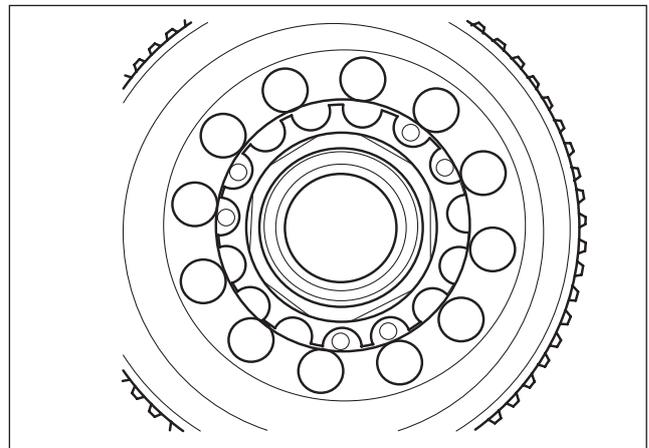


Fig. 3.24

Tighten hub nut to: 95 ÷ 115 Nm - Fig. 3.25

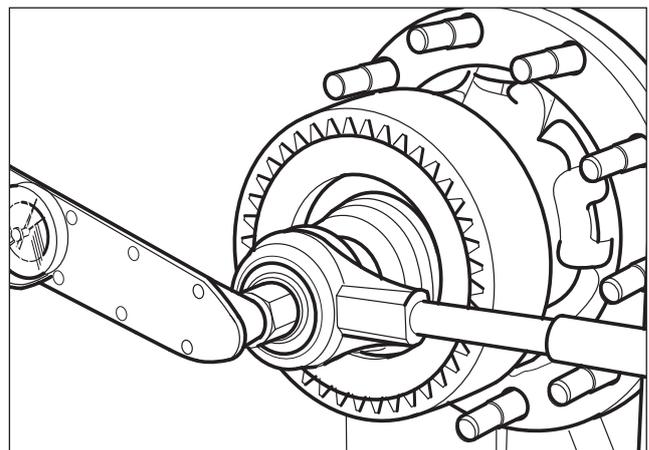


Fig. 3.25

# 3 Wheel End Reassembly

Do not clamp the nut flange under the head of the locking screw.  
Tighten screw to 40 ÷ 50 Nm.

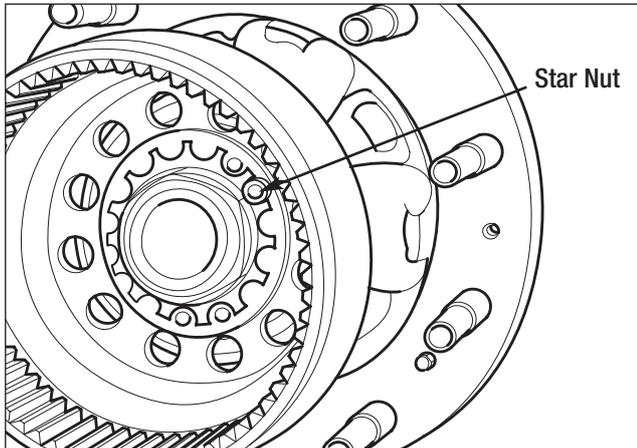


Fig. 3.26

Fit the thrust bearing and thrust washer against the thread of the spindle. Fig. 3.28

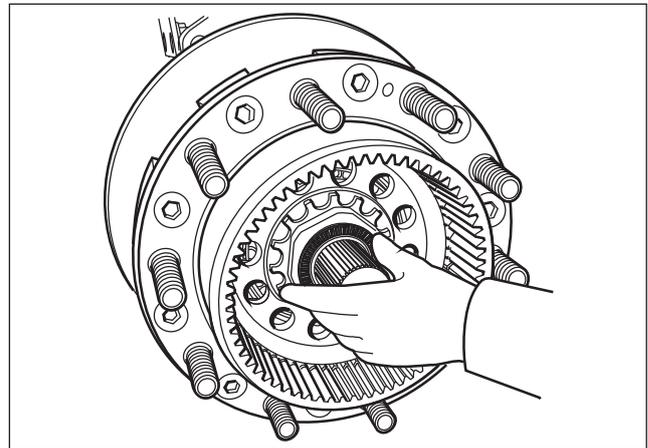


Fig. 3.28

**⚠ WARNING:**

Do not clamp the nut flange under the head of the screw.  
See fig. 3.27

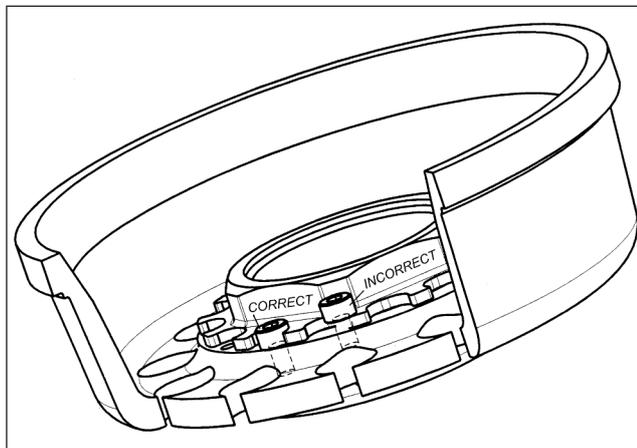


Fig. 3.27

Assemble the sun on the axle shaft and fit the circlips. Fig. 3.29

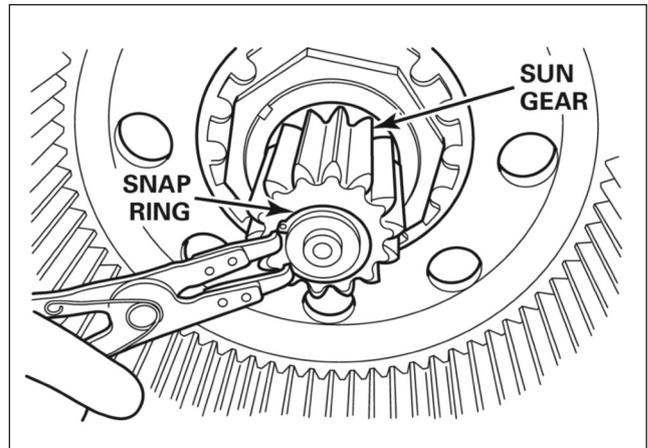


Fig. 3.29

If the circlips are correctly fitted, the scenario will be the same as shown in the picture here below. Fig. 3.29 and 3.30

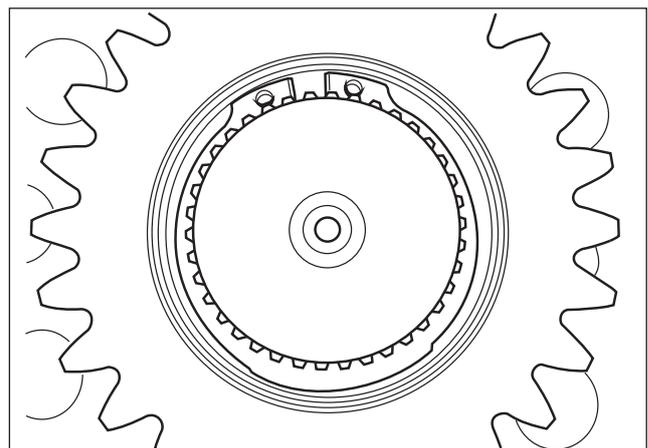


Fig. 3.30



### 3 Wheel End Reassembly

Fit the wheel end assembly on the hub. Fig. 3.31

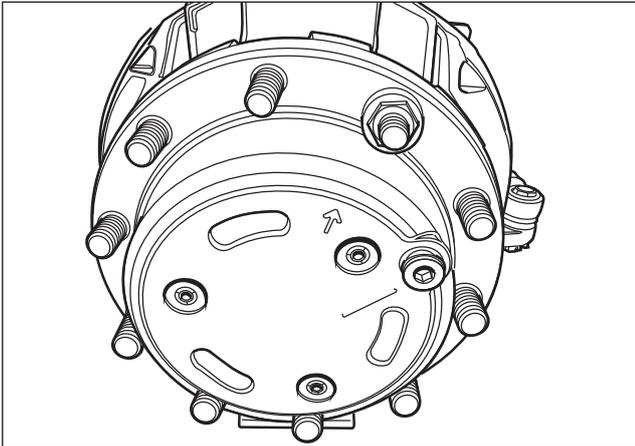


Fig. 3.31

#### **⚠ WARNING**

Some variant could have a two sunk head connection between the wheel end assy and the hub.

In this case, tighten them when the hub wheel is in the correct position.

# 3 Wheel End Reassembly

## Install the Caliper Assembly

### WARNING

To avoid serious personal injury and damage to components, take care when using lifting devices during service and maintenance procedures. Inspect a lifting strap to ensure that it is not damaged. Do not subject the lifting straps to shocks or drop-loading.

1. Use an appropriate lifting device to place the caliper assembly over the rotor.
2. Align the caliper carrier bolt holes. Assemble the caliper to the knuckle using the caliper carrier bolts. Tighten the caliper carrier bolts (M20x1.5) at the torque: 570 ÷ 630Nm. For additional indication, check the manual of disc brake producer.
3. Install the brake pads if applicable.

### **NOTE:** For a new caliper only:

Before you install the air chamber onto the caliper assembly, ensure the perforated transit plug is removed from the caliper chamber seal by pulling the tab. Figure 3.32 and 3.33

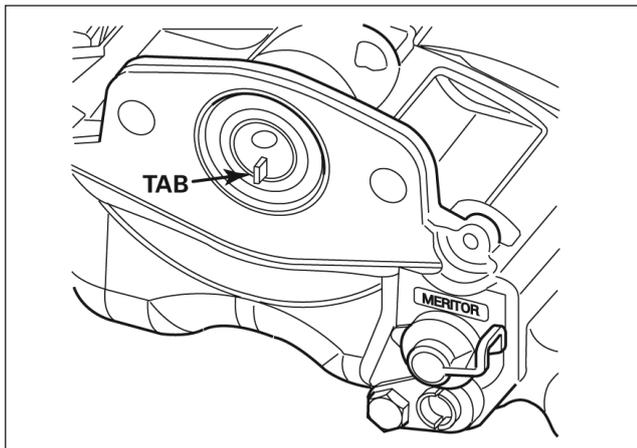


Fig. 3.32

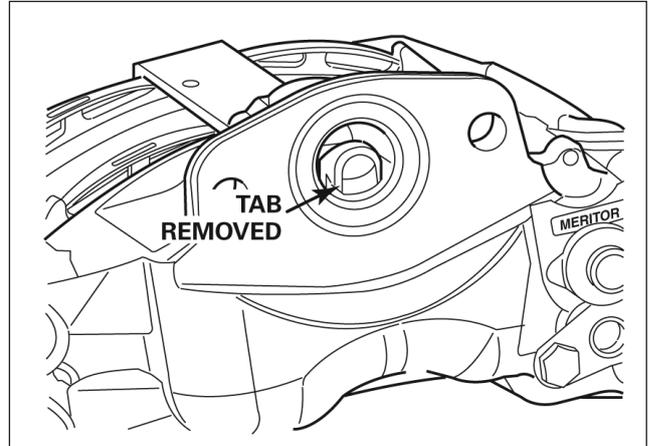


Fig. 3.33

6. Install the air chamber onto the caliper assembly. Refer to the manufacturer's instructions.
7. Inspect the rotors, install the pads and set the initial brake pad-to-rotor clearance. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake. To obtain this publication, refer to the Service Notes page on the front inside cover of this manual.

# Wheel-End and Axle Shaft Removal

4

- pg. 36 Wheel-End and Axle Shaft Removal
- 36 Removal of the Tie Rod Assembly from the Tie Rod Arm
- 37 Wheel-End and Axle Shaft Removal
- 39 Axle shaft disassembly
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# 4 Wheel-End and Axle Shaft Removal

## Wheel-End and Axle Shaft Removal

**NOTE:** This section describes the operation to disengage the wheel end from the rest of the axle. The wheel end could be disassembled or not (e.g.: to remove the carrier the previous section is not needed).

### Raising the Vehicle

1. Make sure the vehicle is on a level surface

### **WARNING**

**Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury and damage to components can result.**

2. Raise the vehicle so that the wheels are off the ground. Support the vehicle with safety stands.
3. Remove the oil drain plug from bottom of the axle housing and drain the axle lubricant from the housing assembly (if need to operating on the carrier assembly).
4. Remove the oil drain plug from wheel end and rotate it till the hole is in bottom position and drain the axle lubricant from the wheel end assembly (if need to operating on the wheel end assembly).
5. Disconnect the driveline from the input yoke.
6. Disconnect the vehicle air line from the main differential lock actuator assemblies.

First operation is to disconnect the Tie Rod Assembly from the tie rod arms from both sides.

Each wheel end should move independently to each other.

## Removal of the Tie Rod Assembly from the Tie Rod Arm

**NOTE:** The Tie Rod Arm and Tie Rod Assemblies can be serviced without removing the Steering Knuckle from the housing.

1. Remove the Cotter Pin and Nut-End Castle to disconnect the Steering Assembly linkage from the Steering Arm.
2. Remove the Tie Rod Assembly, Cotter Pin and Nut Castle to disassemble the Tie Rod Assembly from the Tie Rod Arm.

Fig. 4.1

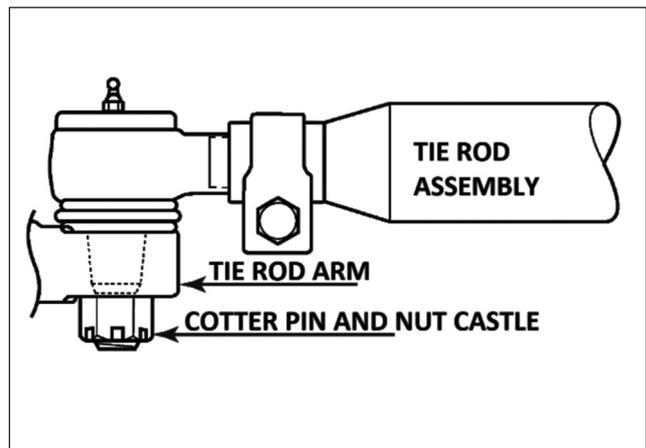


Fig. 4.1

3. Push the stud for the Tie Rod Assembly end through the Tie Rod Arm. If necessary, use a soft mallet to drive the stud through the Tie Rod Arm.

**NOTE:** On units equipped for ABS, remove the grommet for the ABS cable and the ABS sensor from the knuckle.

**NOTE:** Use an appropriate lifting device to support the wheel end, and for wheel end removal later.

# 4 Wheel-End and Axle Shaft Removal

## Wheel-End and Axle Shaft Removal

### **WARNING**

Take care when using lifting devices during service and maintenance procedures, to avoid serious personal injury and damage to components.

1. Wear safe eye protection.
2. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
3. Use a jack to raise the vehicle so that the front wheels are off the ground. Support the vehicle with safety stands.
4. Remove the drain plug from the axle bottom end and drain lubricant.
5. Remove the tyre and wheel assembly.
6. Disconnect the pneumatic lines.
7. Remove the brake caliper. Refer to Section 2 Preliminary operation. Remove the caliper assembly.

**NOTE:** Before you remove the axle shafts from the axle, cage the driver-controlled differential lock (DCDL) if equipped.

8. Remove the hub drain plug and discard.
9. Drain oil from wheel end. Fig. 4.2
10. Support the wheel-end with safety stands or a lift.
11. Disconnect the drag link at the Steering Arms (see previous chapter).

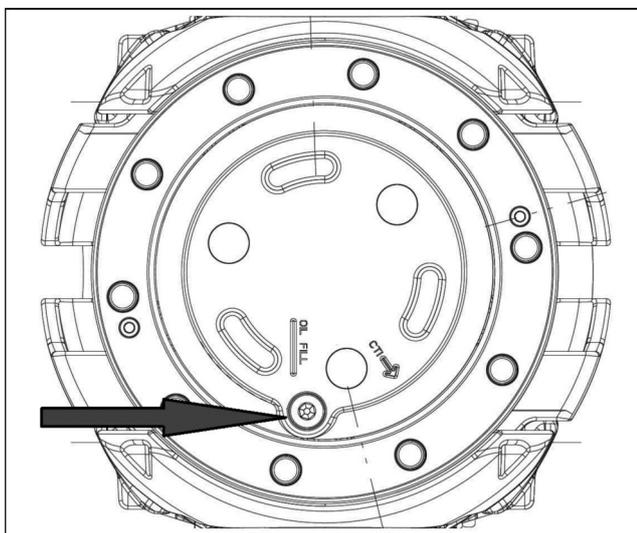


Fig. 4.2

12. With the wheel end appropriately secured, remove the four M20 x 2.5 (metric system) capscrews. Remove the steering arm or upper kingpin cap. Set the steering arm or upper kingpin cap shims aside for reinstallation.

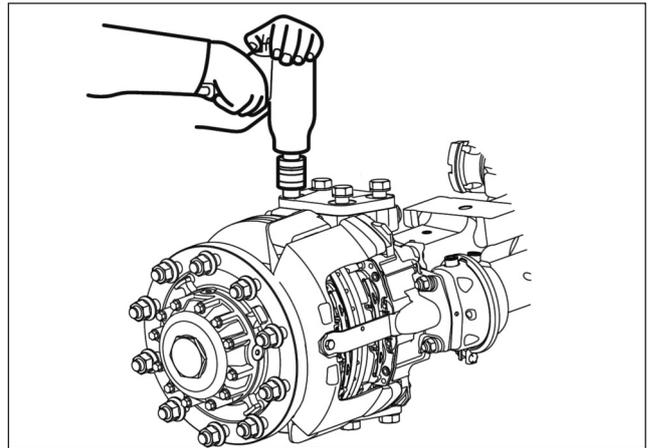


Fig. 4.3

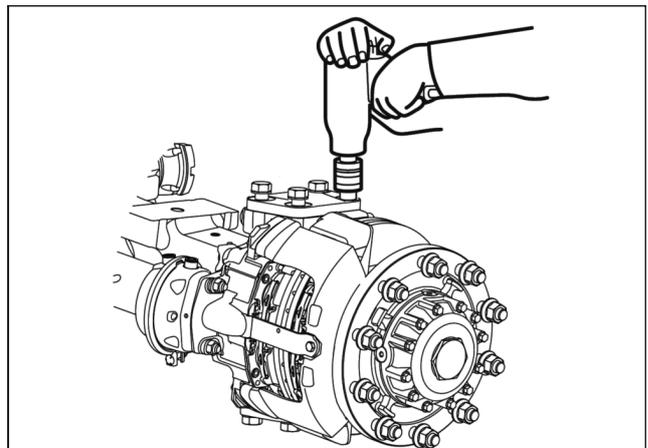


Fig. 4.4

13. Remove the four M20 x 2.5 (metric system) capscrews. Remove the lower Tie Rod Arms cap. - Fig. 4.5

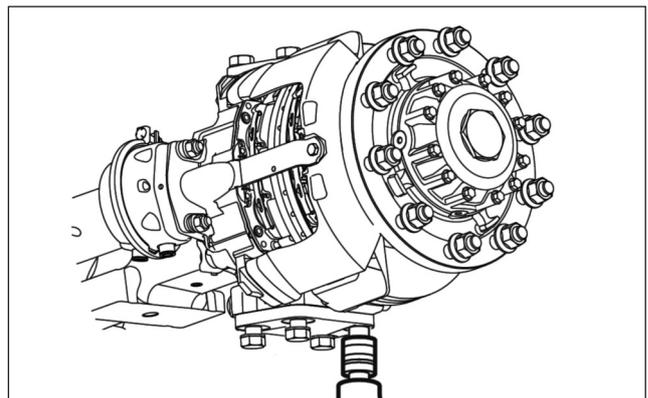


Fig. 4.5

## 4 Wheel-End and Axle Shaft Removal

14. Remove the wheel end and front axle shaft from the axle housing using the appropriate lifting device.- Fig. 4.6

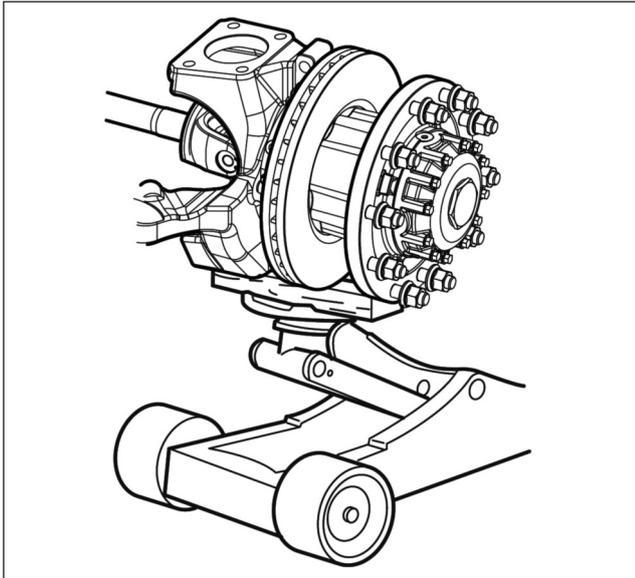


Fig. 4.6

15. If required, remove the upper and lower king pin bushings. To facilitate removal, locate the king pin bushing seam and fold it over. Pull the edge with an appropriate tool.- Fig. 4.7

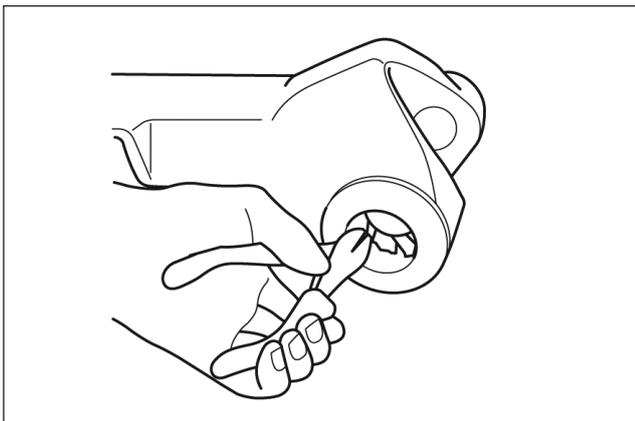


Fig. 4.7

16. The axle shaft seals will come apart. The seal journals will be attached to the axle shaft and the seal casing will remain in the axle seal retainer and spindle. The seal casing can be removed by prying on the inner part of the casing. Be careful not to damage the washer surface.- Fig. 4.8

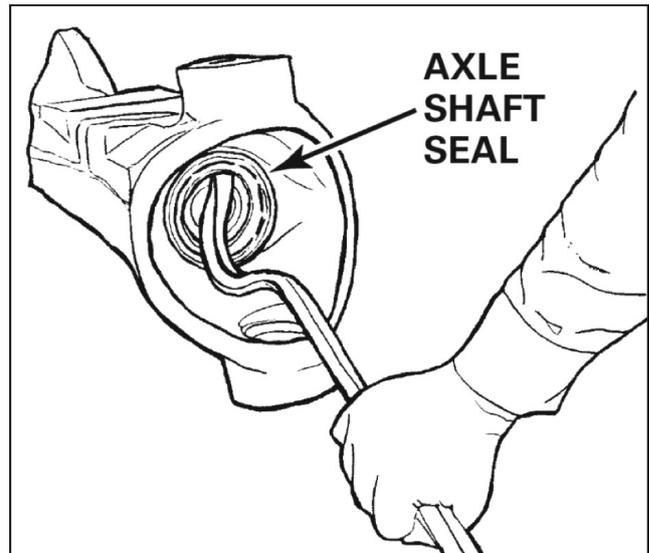


Fig. 4.8

17. If the inner axle bushings are to be removed. If required, use a slide hammer to remove inner axle bushings. Discard the bushings. - Fig. 4.9

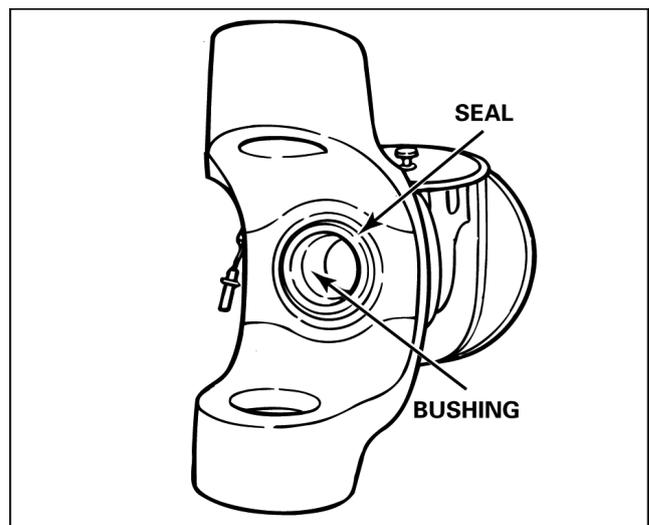


Fig. 4.9

# 4 Wheel-End and Axle Shaft Removal

## Axle Shaft Maintenance

### Axle shaft disassembly

1. When the wheel end and front axle shaft is in on an appropriate lifting device it's possible to proceed with the maintenance of the axle shaft. - Fig. 4.10

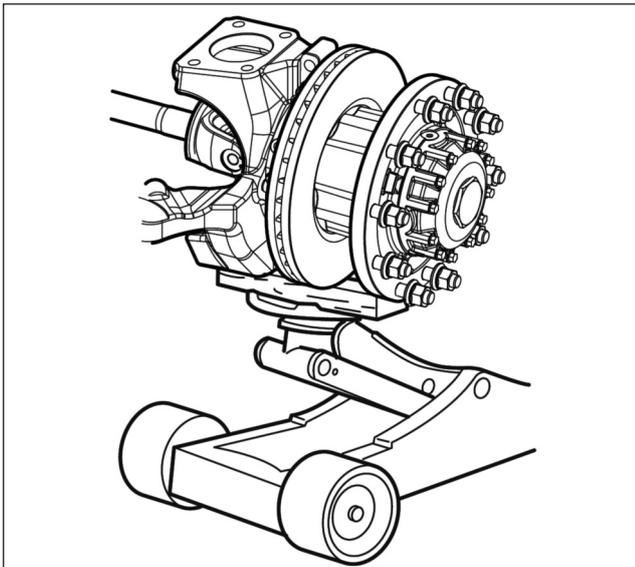


Fig. 4.10

2. It's possible to replace the full axle shaft with a new one but need to replace the Seal Assy on the wheel-end with another one.
3. In alternative of the previous point it's possible to replace the single component of the shaft. Use snap ring pliers to remove the snap rings. - Fig. 4.11

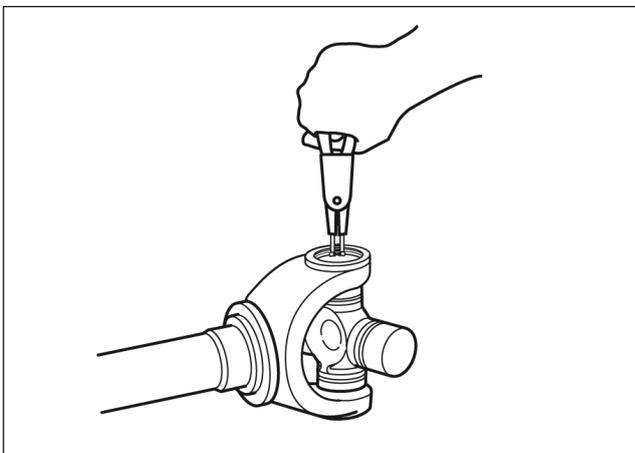


Fig. 4.11

4. If necessary, use a brass drift and lightly tap the center of the bushing to assist in snap ring removal. - Fig. 4.12

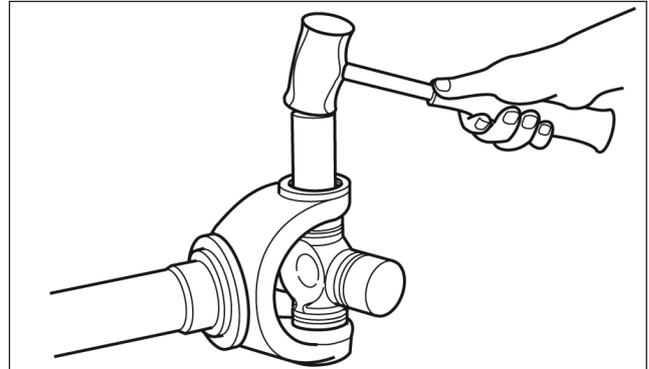


Fig. 4.12

5. Repeat the previous step on the other sides of the yoke.
6. **Alternative Method:** It's possible to use a press with a bridge and bearing cup bushing receiver as shown. Press DOWN until the first round bushing is loose. Fig. 4.13

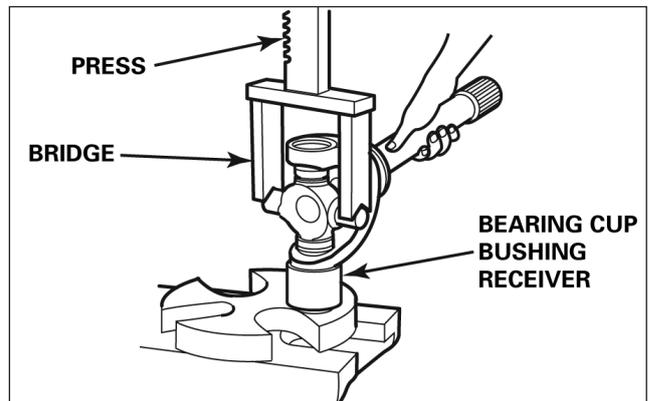


Fig. 4.13

7. Remove the round bushing. - Fig. 4.14

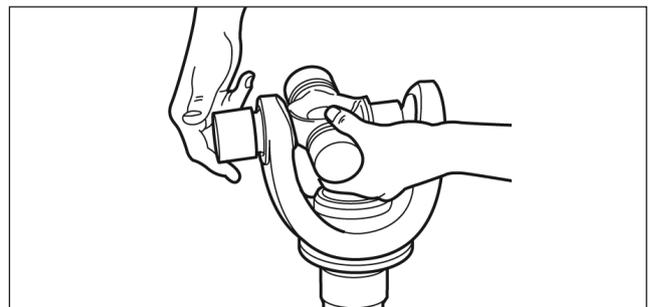


Fig. 4.14

8. Turn over the universal joint. Repeat the procedure for the opposite side of the universal joint.
9. Inspect the parts and if need replaced the components that showed marks or damage.

# 4 Wheel-End and Axle Shaft Removal

## Axle shaft maintenance

1. Slide the first bushing onto the trunnion. Fig. 4.15

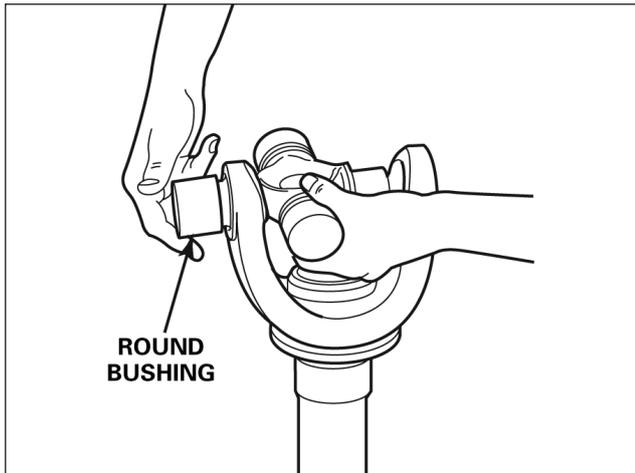


Fig. 4.15

2. Press the first round bushing into the yoke slightly past the snap ring groove. Check that the bushing is aligned with the universal joint trunnion. Fig. 4.16

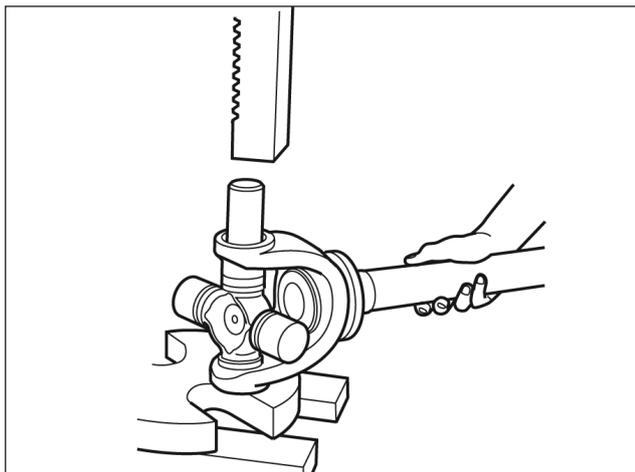


Fig. 4.16

3. Use snap ring pliers to install the snap ring into the snap ring groove. You must fully seat the snap ring into the snap ring groove to avoid damage to the driveline. Fig. 4.17

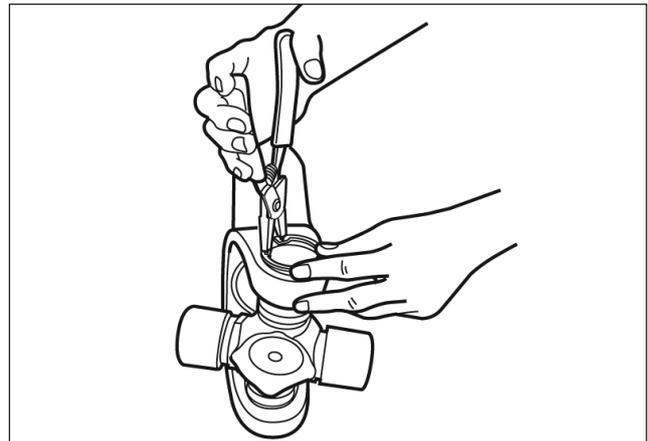


Fig. 4.17

4. Use a snap ring installation gauge to check that the snap ring is fully seated in the snap ring groove. Fig. 4.18

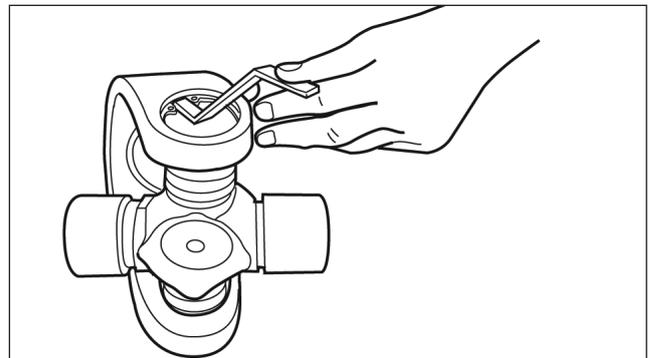


Fig. 4.18

5. Repeat the previous four steps to install the remaining bushings into the yoke.
6. Lubricate the universal joint when the joint includes a grease fitting.

**NOTE:** If the universal joint does not move freely: Strike the yoke ear with a brass or copper hammer. Fig. 4.19

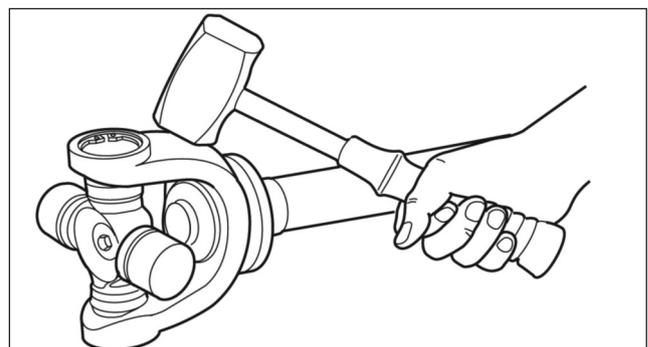


Fig. 4.19



# Wheel-End and Axle Shaft Reassembly

# 5

- pg. 42 Axle Shaft and Wheel-End Assembly Installation
- 42 King Pin Bushing Installation
- 42 Axle Shaft Bushing and Axle Seal Installation
- 43 Spindle End Assembly
- 44 Carrier Maintenance
- 44 Carrier Removal
- 44 Refitting the Carrier to the Axle Housing
- 45 Wheel-End and Axle Shaft Reassembly
- 47 Assembly
- 47 Tie rod assy to the tie rod arm (and Knuckle)

# 5 Wheel-End and Axle Shaft Reassembly

## Axle Shaft and Wheel-End Assembly Installation

### King Pin Bushing Installation

1. Use the king pin bushing driver tool (MST5003) to drive the new upper and lower king pin bushings into the socket bore until the bushings are level with the outside of the socket.  
Fig. 5.1 & 5.2

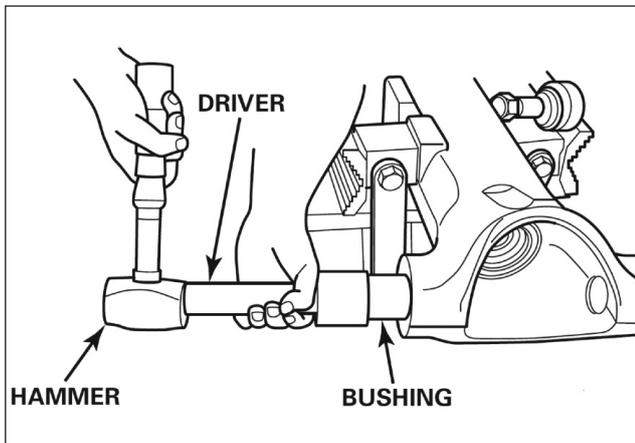


Fig. 5.1

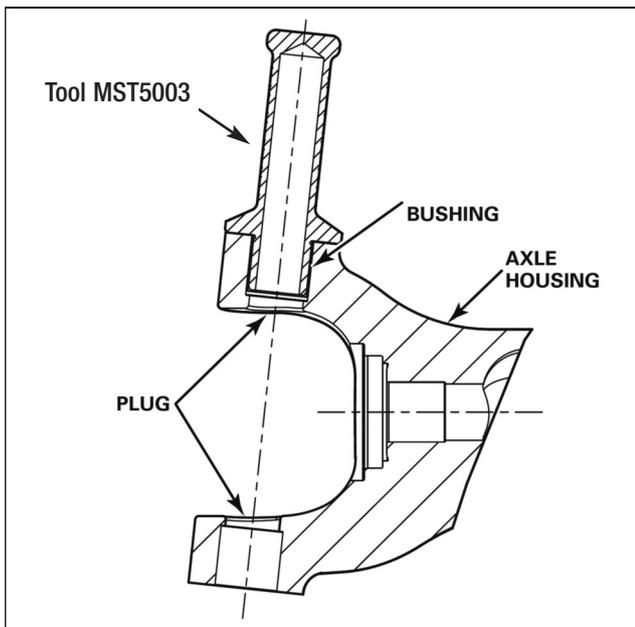


Fig. 5.2

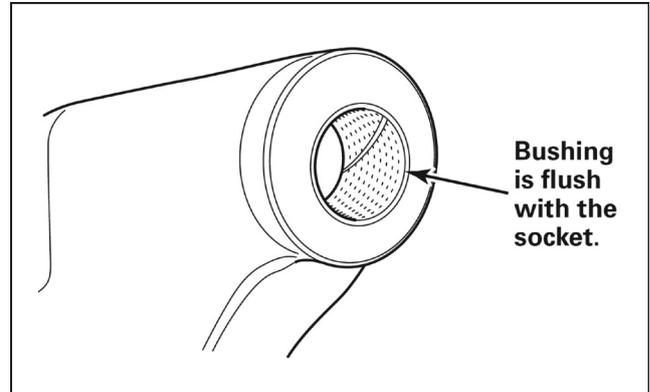


Fig. 5.3

2. Assemble the thrust washer in the bottom of the axle. Fit the parallel pin for avoid any problem.

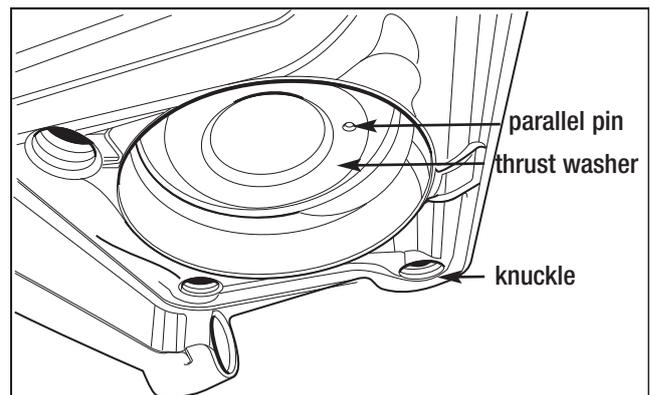


Fig. 5.4

3. Pack the bushings with grease before assembling the knuckle to the axle.

### Axle Shaft Bushing and Axle Seal Installation

1. If disassembled, assemble the wheel-end components according to the instructions in Part 3.
2. Apply a layer of Loctite® 680 sealant on the outside diameter of the bushing and install it into the axle housing.

## 5 Wheel-End and Axle Shaft Reassembly

3. Install new bushings into the axle housing (Tool MST5000).

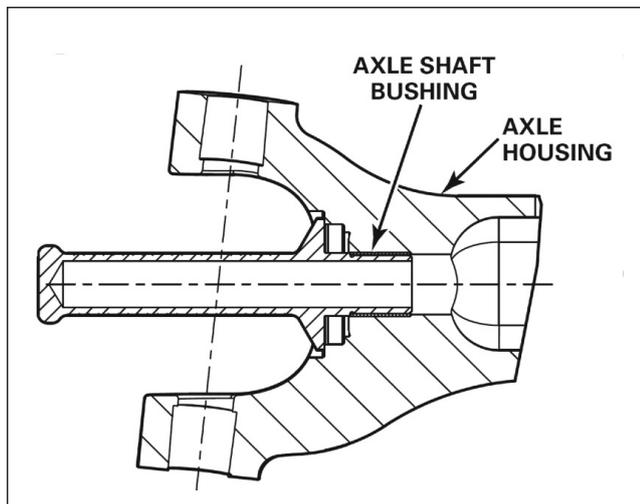


Fig. 5.5

4. Install the bushings until fully seated in the bore.
5. Install the thrust washers.
6. Install the seals into the housing and the wheel-end spindle (Tool 5001). Fig. 5.6

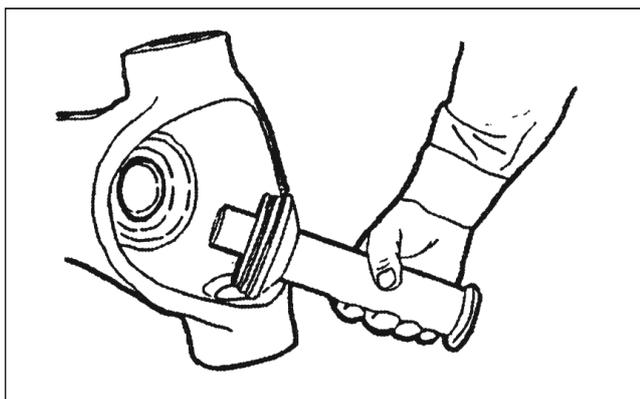


Fig. 5.6

7. Apply a liberal amount of oil or grease to the shaft bushing

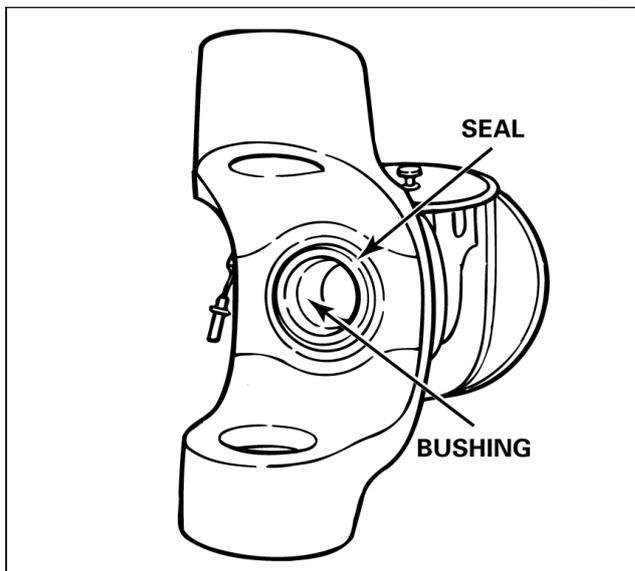


Fig. 5.7

### Spindle End Assembly

1. If a new bushing is required, apply a layer of Loctite® 680 sealant on the outside diameter of the bushing.
2. Install the bushing into the spindle until it is fully seated (MST5000). Fig. 5.8

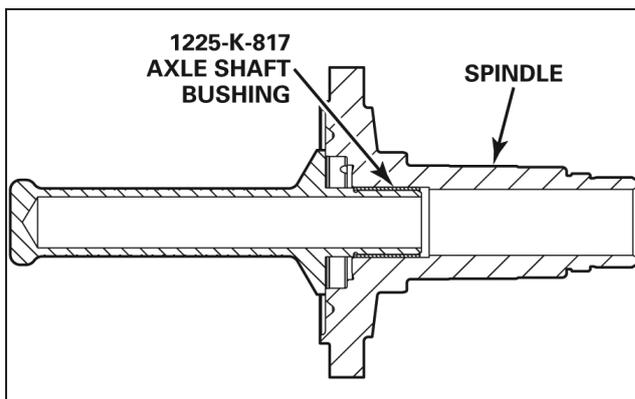


Fig. 5.8

# 5 Wheel-End and Axle Shaft Reassembly

## Carrier Maintenance

### Carrier Removal

1. Place a hydraulic roller jack under the differential carrier to support the assembly.
2. Remove all but the top two carrier-to-housing capscrews or stud nuts and washers.
3. Loosen, but do not remove, the top two carrier-to-housing fasteners. The fasteners will hold the carrier in the housing.
4. Loosen the differential carrier in the axle housing. Use a plastic mallet to hit the mounting flange of carrier at several points.
5. After the carrier is loosened, remove the top two stud nuts and washers that hold the assembly in the axle housing.

### **CAUTION**

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

6. Carefully remove the carrier from the axle housing using the hydraulic roller jack. Use a pry bar that has a round end to help remove the carrier from the housing.
7. On axles with a driver controlled main differential lock, if air pressure is used to shift the differential to the locked (engaged) position, release the air pressure. Disconnect the air hose from the shift unit.
8. Lift the differential carrier by the input yoke or flange and place the assembly in a repair stand. Use a lifting tool for this procedure. Fig. 5.9

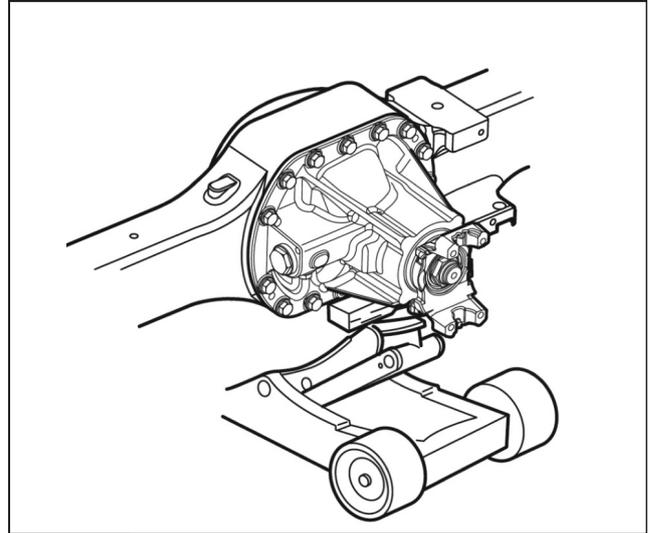


Fig. 5.9

For the carrier maintenance (type MS-MR61 or DS 70 in the old nomenclature) refer at the manual MM01105.

### Refitting the Carrier to the Axle Housing

Clean the axle housing to carrier mounting face by scraping clear of debris - old sealing compound, etc.

Apply a continuous bead of sealing compound DC 7091 to the mounting face. Ensure the continuous bead of sealant is applied around the slots in the mounting face to achieve correct sealing. DO NOT apply the sealant over the slots.

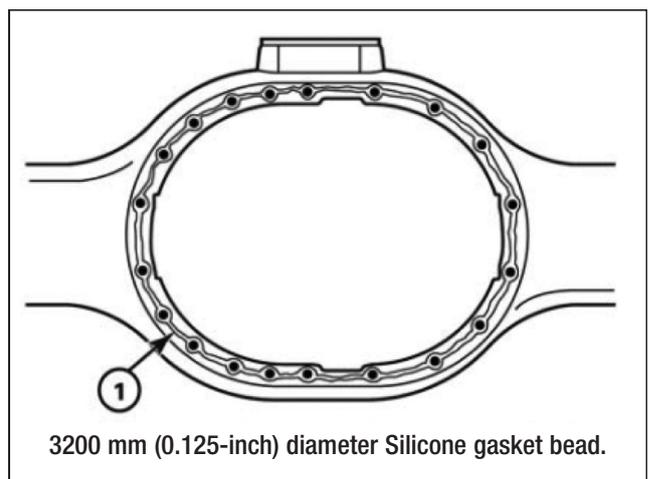


Fig. 5.10

Take care that the differential lock mechanism is not fouled and remains free to operate when the carrier is fitted.

Fasten the carrier to the axle housing with 16 screws tightened in a progressive cross pattern to a torque of 250 ÷ 310 Nm. (see manual MM01105)

# 5 Wheel-End and Axle Shaft Reassembly

## Wheel-End and Axle Shaft Reassembly

**NOTE:** Before assembling the wheel end to the axle, it is suggested to assemble the full wheel end (with the caliper disc brake) in a dedicated bench.

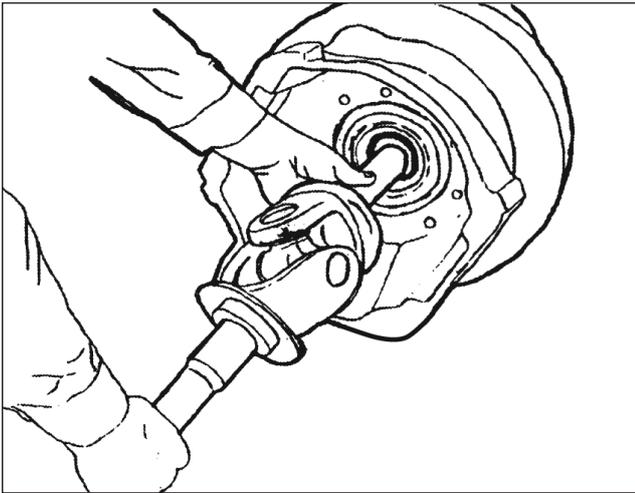


Fig. 5.11

1. Check in advance at the assembly if the Upper and Lower bushing, the Thrust Washer Bushings and Seals Assy are fitted correctly otherwise return at the "Axle Shaft Bushing and Axle Seal Installation" section.
2. Use Meritor-approved grease, specification 0-617, to lubricate the surfaces of the lower king pin and king pin bushing inside axle housing
3. Insert the shaft into the axle first. The shaft must fully seat against the seal. The shaft will bottom out solidly when the seal is fully seated. Do not retract the shaft after it is fully seated.

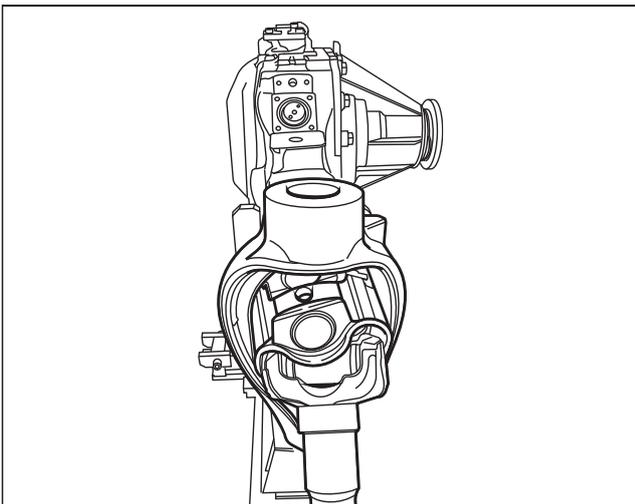


Fig. 5.12

4. Support the wheel end (by a lift or a trolley) at the correct height for assembly operations.

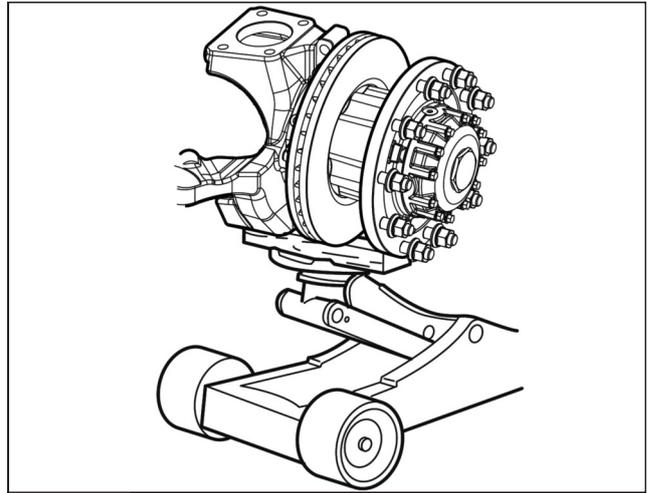


Fig. 5.13

5. Use Meritor-approved grease, specification 0-617, to lubricate the surfaces of the lower king pin and king pin bushing inside axle housing
6. Insert the shaft into the wheel end assy. The seal must be fully seated on the shaft. Do not retract the shaft after it is fully seated.
7. Align the kingpin bore present in the bottom of the knuckle with the correspondent of the axle. After the previous step shall be aligned, the bores present in the top. At this moment, it's possible to remove the trolley and start to fit the joint.

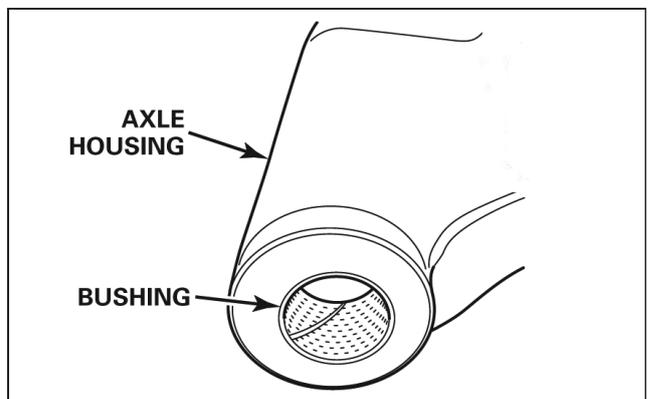


Fig. 5.14

## 5 Wheel-End and Axle Shaft Reassembly

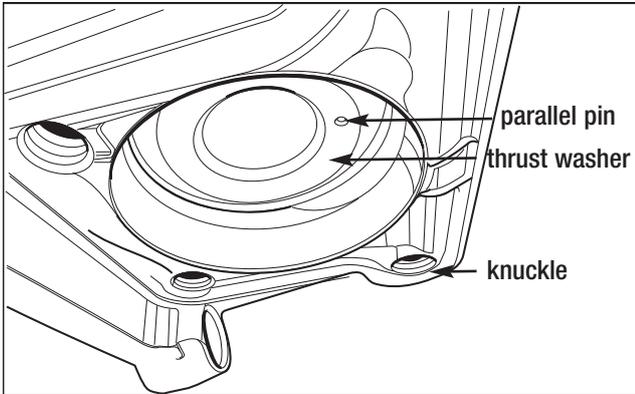


Fig. 5.15

8. Install the steering arm with the pins and kingpin caps. Reuse the same thickness shim pack that was removed during disassembly. Fit the four plus four screws and in this step for safety reason close them at low torque only.

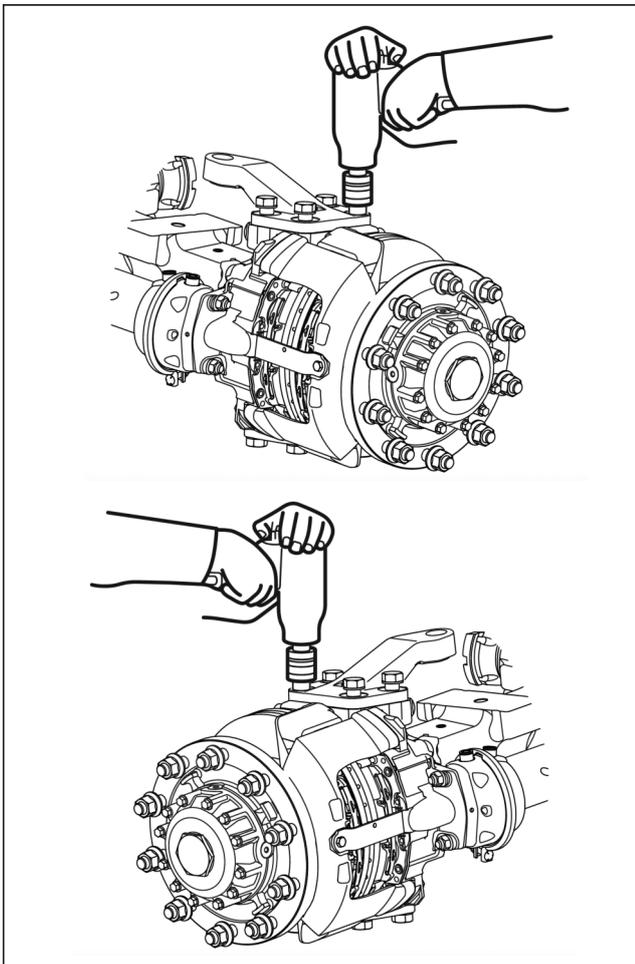


Fig. 5.16

9. Fit the four plus four screw in the bottom between tire rod arm and knuckle M20x2.5 and close them at the prescribe torque (500 ÷ 600Nm)

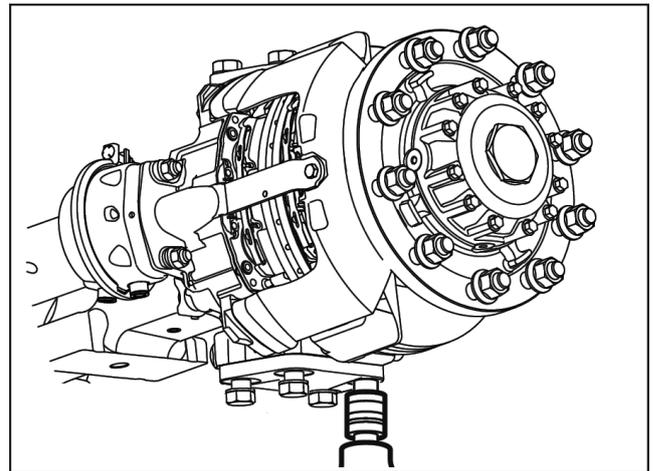


Fig. 5.17

10. Tighten the four plus four screws between steer arm or kingpin cap and the kingpin at the prescribe torque (500 ÷ 600Nm)

11. Check steering knuckle end play.

- a. Place a magnetic base dial indicator in position on the housing.

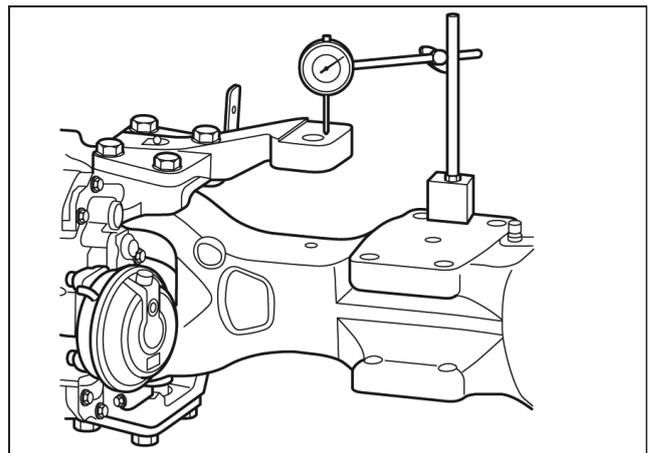


Fig. 5.18

- b. Use a jack to place pressure onto the lower knuckle cap. Set the dial indicator to ZERO.
- c. Fully release the jack pressure and read the end play on the dial indicator. Correct end play is between 0.150-0.350 mm (0.005-0.015-inch). Remove or add shims from between the upper knuckle cap and steering knuckle to obtain the correct end play.

# 5 Wheel-End and Axle Shaft Reassembly

## Assembly

### Tie rod Assy to the tie rod arm (and Knuckle)

1. If the tie rod Assy newer disassembled and maintain the original dimension proceed here below otherwise move at point 2
  - a. Install the slotted nut-end castle and between tie rod Assy and tie rod arm.
  - b. Install the cotter pin.
  - c. Assemble the wheel, tire and rim. Tighten the wheel nuts to the manufacturer's specifications.

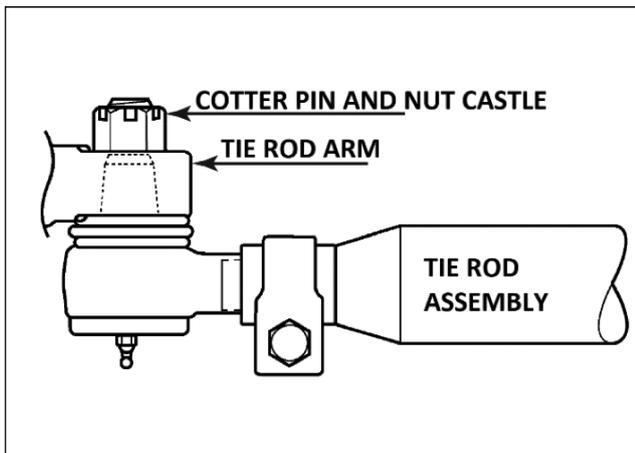


Fig. 5.19

2. Assemble the tie Assy and clamp if these parts were disassembled. Tighten the locknuts to the correct torque.
3. Push the stud of the tie rod end through the tie rod arm tapered hole. Tighten the tie rod Assy nut to the torque (240 ÷ 260Nm). - See section 8
4. Install the slotted nut-end castle and cotter pin assembly.
  - A. Tighten the nut to the initial torque specified.
  - B. Advance the nut, do not back it off, to align the cotter pin.
  - C. Final installed torque must not exceed the maximum specified.
- **If the final torque exceeds the maximum:** Remove the nut and reinstall it to correct specification.
- **If the minimum torque is not met:** Check if the stud taper is showing. If necessary, shim with a 0.125-inch (3.18 mm) washer.
5. Install the cotter pin.
6. Assemble the wheel, tire and rim. Tighten the wheel nuts to the manufacturer's specifications.





# Axle Assembly Adjustments

# 6

pg. 50	Steering Stop Adjustment
50	Wheel Toe-In Adjustment
51	Tie Rod Adjustment

# 6 Axle Assembly Adjustments

## Steering Stop Adjustment

All Meritor front drive steer axles are shipped with the steering stop screws preset at the factory according to the manufacturer's specifications. Additional adjustments can be made by the vehicle manufacturer or end user to accommodate a specific chassis design or tire size, as long as the maximum angle does not exceed the universal joint capability.

Check the adjustments of both axle steering stops and power steering units every time part of the steering system is disassembled.

### Maximum Turn Angle Setting

Do not adjust the turn angle beyond the specifications set by the vehicle manufacturer.

### Manual Steering Adjustment

1. Adjust to a 37° inside turn angle both the right- and left-hand steering stop screw.
2. Lock the steering stop in position with the jam nut tightened to the correct torque.
3. There should be a gap of 3.0 mm between the stopper screw and housing when adjusted to the specified turn angles.
4. Make adjustment for both full right and full left turns.

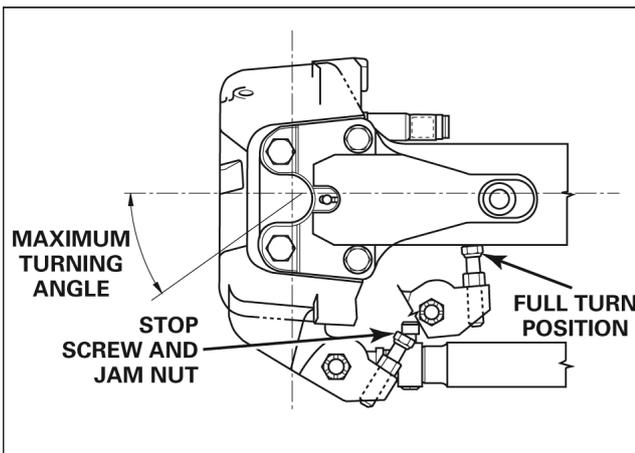


Fig. 6.1

5. For tightening torque see the section LLL.

**NOTE:** This torque is defined as safety torque. Check two times and put a mark with a pen after that the operation was completed correctly.

## Wheel Toe-In Adjustment

Check and adjust toe-in on all front drive axles after the axle is installed in the vehicle. Fig. 6.2

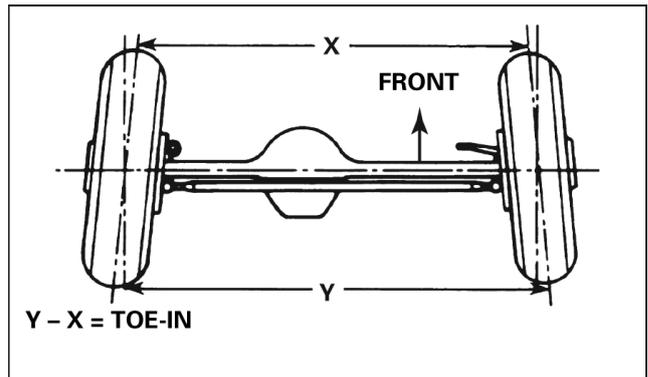


Fig. 6.2

Measure toe-in with the weight of the vehicle on the axle and the axle on a level floor. Use the following procedure.

1. Use a jack to raise the front axle. Support the axle with safety stands.
  2. Use a piece of chalk to mark the center area of both front tires around the complete circumference.
  3. Place a scribe or pointed instrument against the center of the whitened part of each tire and rotate the tires. The scribe must be held in place so that a single straight line is marked all around the tire.
  4. Place a full-floating turning radius gauge plate under each wheel. Lower the vehicle and remove the lock pins from the gauge plates.
- NOTE:** If full-floating gauge plates are not available: Lower the vehicle to the floor and move the vehicle backward approximately six feet and then forward for the same distance.
5. Set the slide scale end of a trammel bar to ZERO and lock the scale in place.

## 6 Axle Assembly Adjustments

6. Place the trammel bar at the rear of the tires. Adjust the pointer to line up with the scribe lines on the tires. Lock the pointers in place. The sliding scale still must be set on ZERO. Fig. 6.3

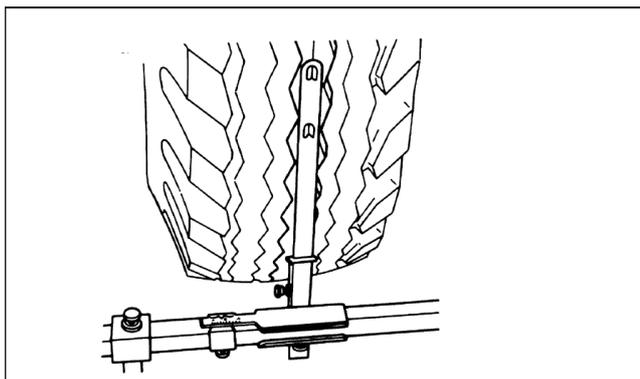


Fig. 6.3

7. Place the trammel bar at the front of the tires. Adjust the pointer to line up with the scribe lines. - Fig. 6.4

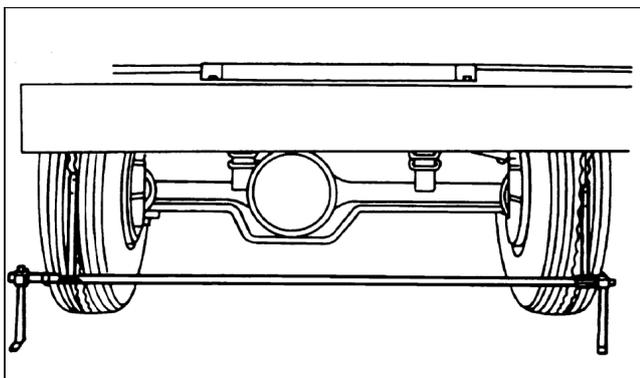


Fig. 6.4

8. Calculate the total Toe In = Y-X.
9. Adjust total Toe In to  $1.6 \pm 0.8$ mm from center line of the axle per side with wheels above the ground.

**NOTE:** If toe-in adjustment is necessary: Adjust the tie rod assembly.

### Tie Rod Adjustment

1. Loosen the cross tube clamps and rotate the tube or adjusting sleeve as required.
2. Tighten the clamps to  $70 \div 80$ Nm ( $50 \div 60$  lb-ft).
3. Check the toe-in measurement again to verify that it is within the correct limits.

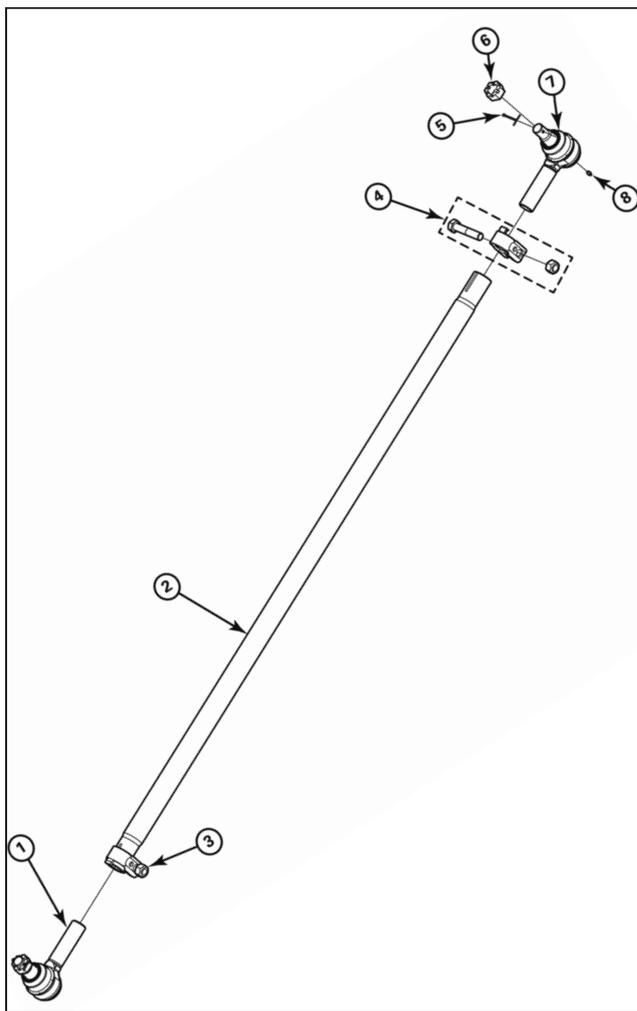


Fig. 6.5



# Maintenance and Lubrication

# 7

- pg. 54 Oil lubrication
- 54 Check and Adjust the Oil in the Axle Housing
- 54 Axle Oil Change Interval
- 56 Grease check points

# 7 Maintenance and Lubrication

## Oil lubrication

### Oil specification:

Hypoid gear oil S.A.E. J2360 - GL5 - tested and approved.

### Oil capacity:

Housing oil capacity: 15 litres

Wheel end: 1.5 litres

Total axle oil capacity: 18 litres

**NOTE:** For the list of approved oil please contact your Meritor Engineering reference.

## Check and Adjust the Oil in the Axle Housing

1. Park the vehicle on a level surface.
2. Remove the fill plug from the axle.
3. The oil level must be within an inch of the bottom of the hole for the fill plug.
  - If oil flows from the hole when the plug is loosened: The oil level is high. Let the oil drain to the correct level.
  - If the oil level is more than one inch below the bottom of the hole for the fill plug: Add the specified oil.
4. Install and tighten the fill plug to 50÷80Nm (35-60 lb-ft).

## Axle Oil Change Interval

### Active approach:

Here below Meritor suggests an interval oil change but to reduce the total cost of vehicle Meritor suggests to adopt an active approach during the 12 – 18 month from date in service.

Drain every month a little quantity of oil and verify the status of oil and compare the visual aspect with the chart shown here below.

When the drained oil assumes a visual color like sample 4, it is suggested to drain the full quantity of oil from the subcomponents (axle or wheel ends) and refill the oil with a new one (same brand of the previous one).

If the mission will be redefined, it is necessary to review the basic chronology.

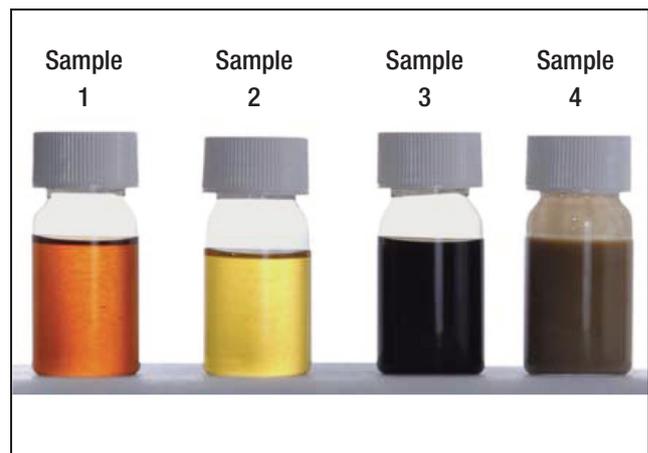


Fig. 7.1

### Sample 1 & 2

Both the red and golden brown samples show the typical appearance of new GL5 EP oils that meet the SAE J2360 specification. They usually are golden brown, but also can be red in color.

### Sample 3

This black sample is used-oil with significant time and mileage. The black color does not necessarily indicate that the oil's useful life has been exhausted. Perform a lubrication analysis to verify that the oil can still be used in the carrier.

### Sample 4

This "milky" brown sample indicates the oil is contaminated with significant moisture well above the allowable change specification of >0.3%. Change the oil immediately.

# 7 Maintenance and Lubrication

## Axle (housing) Oil Change Interval – Defined interval:

Initial Oil Change	Not required
Check Oil Level*	2500 hours or 15000Km whichever comes first
Petroleum Oil Change	5000 hours or 30000Km whichever comes first
Synthetic Oil Change	5000 hours or 40000Km whichever comes first

\* If needed, add the correct type and amount of oil as required.

**Note:** For additional information about lubricant please refer to Meritor website Technical Bulletins TP0838 and TP0460.

## Guidelines and Intervals:

Component	Inspection and Maintenance	Interval
Axle	Inspect the axle for oil, grease leaks. If leaks are found, repair the axle.	2500 hours or 15000Km whichever comes first
Breather	Inspect for damage and correct operation. Clean as necessary.	2500 hours or 15000Km whichever comes first
Cross Tube Tie Rod Ends	Inspect the seals and boots for damage and wear. Grease the ball joints.	2500 hours or 15000Km whichever comes first
Knuckle Bushings	Grease the upper and lower knuckle bushings.	2500 hours or 15000Km whichever comes first
Housing Axle Shaft Bushing (Inner and Outer)	Inspect for damage and wear. Oil the bushing and seal.	5000 hours or 40000Km whichever comes first

## Wheel Ends Oil Change Interval:

Wheel Ends Oil Change Interval – Active approach:

See previous section as mention for the axle.

Adopt a similar strategy based on the oil check in according to the real vehicular mission for the wheel ends too.

## Wheel End Oil Change Interval – Defined interval:

Initial Oil Change	Not required
Check Oil Level*	2500 hours or 15000Km whichever comes first
Petroleum Oil Change	5000 hours or 30000Km whichever comes first
Synthetic Oil Change	5000 hours or 40000Km whichever comes first

\* If needed, add the correct type and amount of oil as required.

# 7 Maintenance and Lubrication

## Grease check points

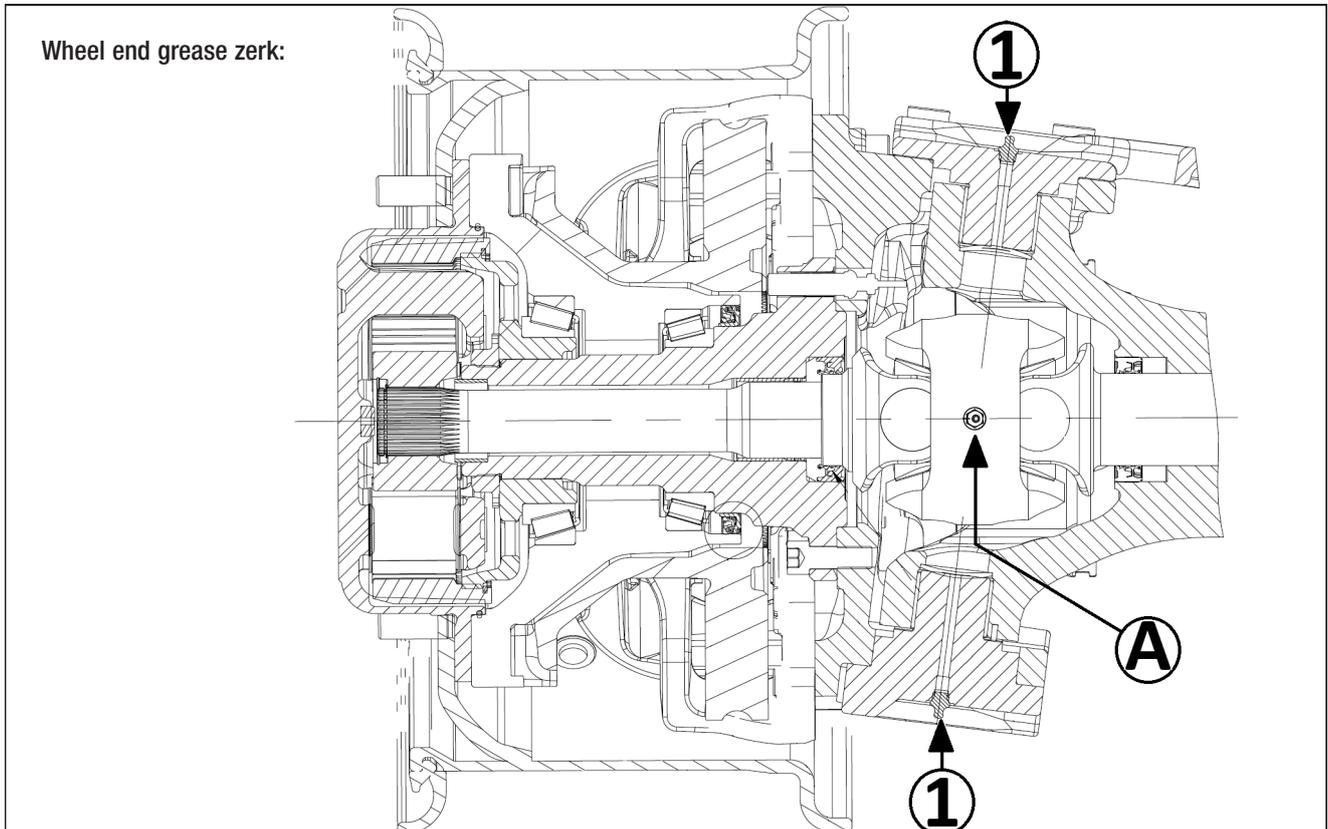


Fig. 7.2

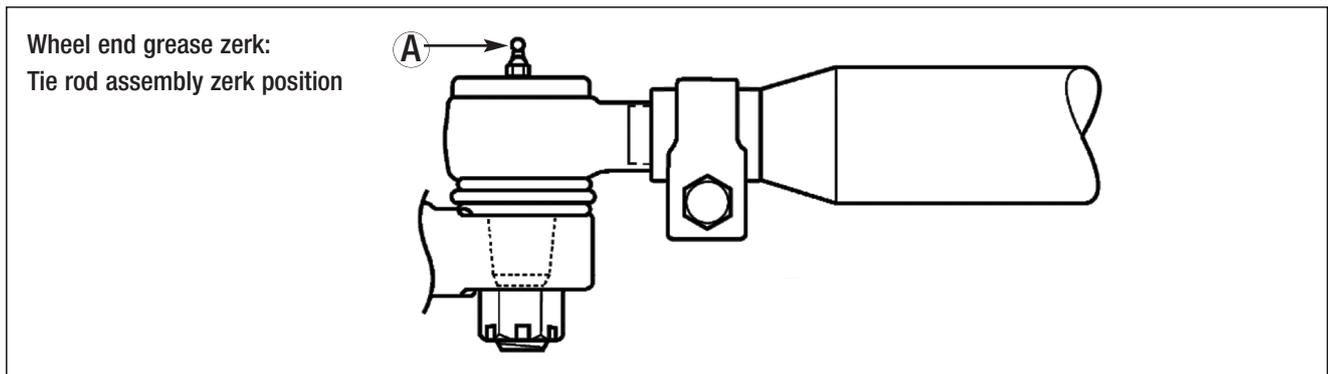


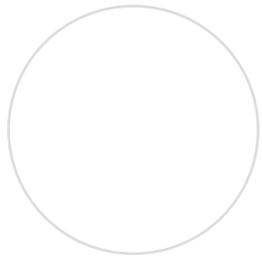
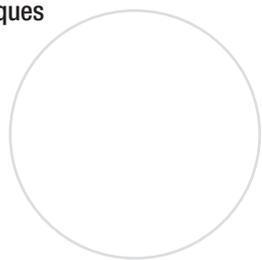
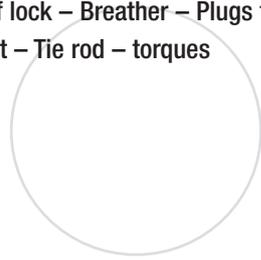
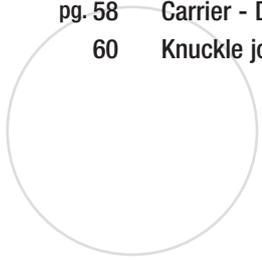
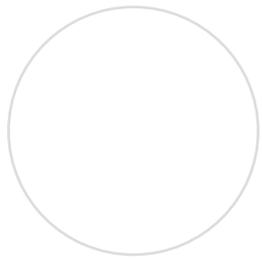
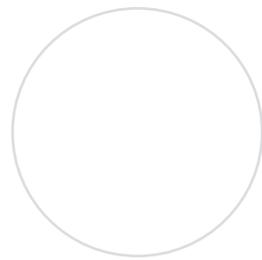
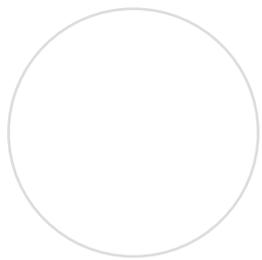
Fig. 7.3

Position 1:	Always present
Position A:	Some versions adopt a Service Free solution. In this case the zerk is not present.
Grease Check:	2500 hours or 15000Km whichever comes first
Service Free component:	20000 hours or 120000Km whichever comes first. Check the parts and if need replace them
<b>NOTE:</b>	If is necessary to refit a new zerks use: Material: Steel Thread: M10 x 1.25 Torque: 15 ÷ 30 Nm



# Torque specification

8



pg. 58 Carrier - Diff lock – Breather – Plugs torques  
60 Knuckle joint – Tie rod – torques

# 8 Torque specification

## Carrier - Diff lock – Breather – Plugs torques

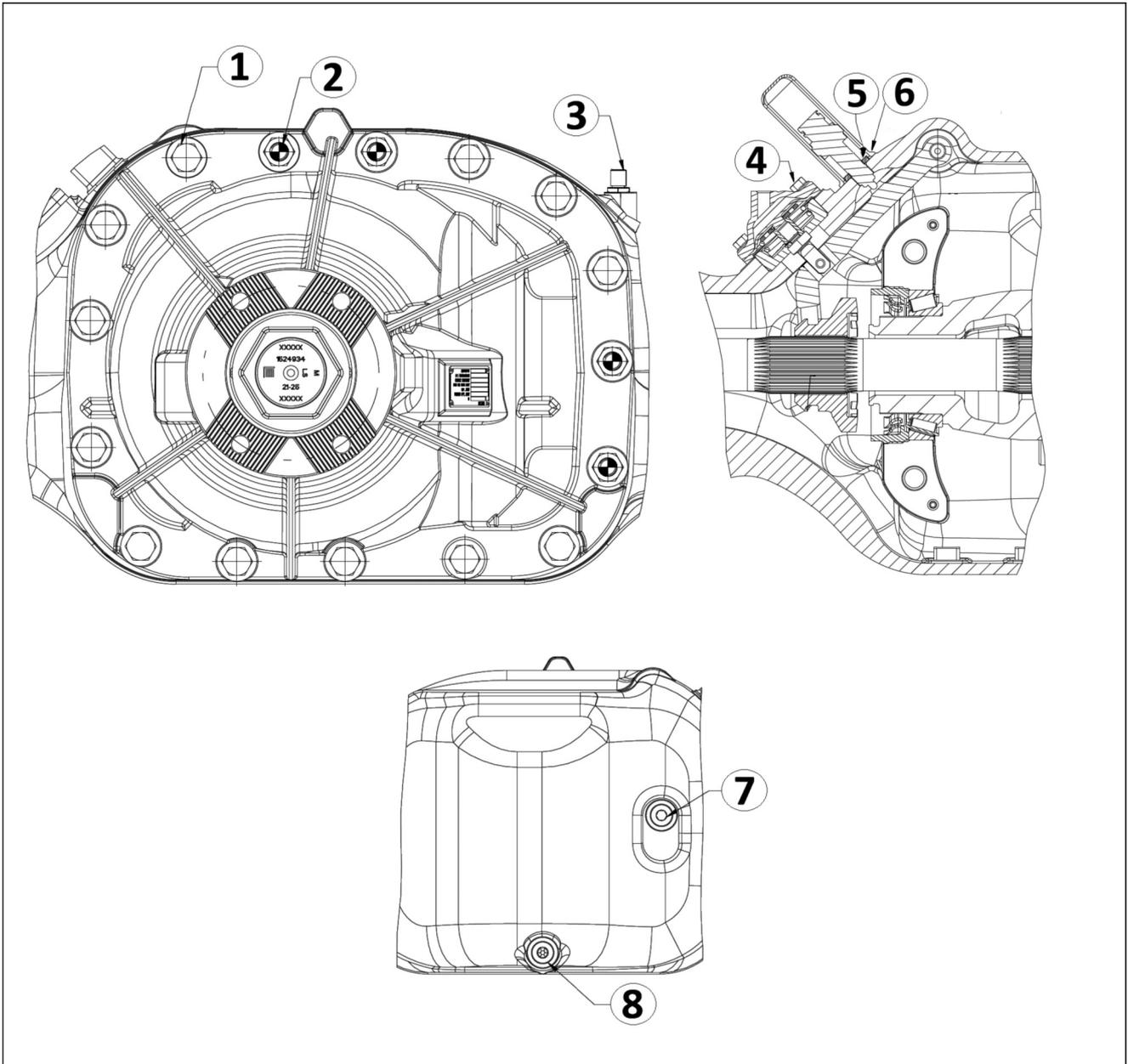


Fig. 8.1

## 8 Torque specification

### Carrier - Diff lock – Breather – Plugs torques

Pos.	Description	Type	Torque [Nm]	Safety [S]	Demands
1	Carrier assembly to cast housing screw / nut	M16 x 1.5	250 ÷ 310		a – b
2	Stud into cast housing	M16 x 1.5	63 ÷ 77		a – b
3	Breather	M12 x 1	25 ÷ 30		b
4	Cover plate fasteners	M8 x 1.25	15 ÷ 25		a – b
5	Hex socket	M18 x 1.5	25 ÷ 35		b
6	Flange Screw protecting casting	M8 x 1.25	15 ÷ 25		b
7	Fill plug	M24 x 1.5	60 ÷ 100		b – c
8	Magnetic drain plug	M24 x 1.5	60 ÷ 100		b – c

- a. Cross-wise tightening = Tightening the fasteners in pairs opposite each other.
- b. For reassembly; use new screws or apply locking fluid.
- c. Use a new copper seal

**NOTE:** For additional information regarding carrier operations, check manual MM01105 available at Meritor web site.

## 8 Torque specification

### Knuckle joint – Tie rod – torques

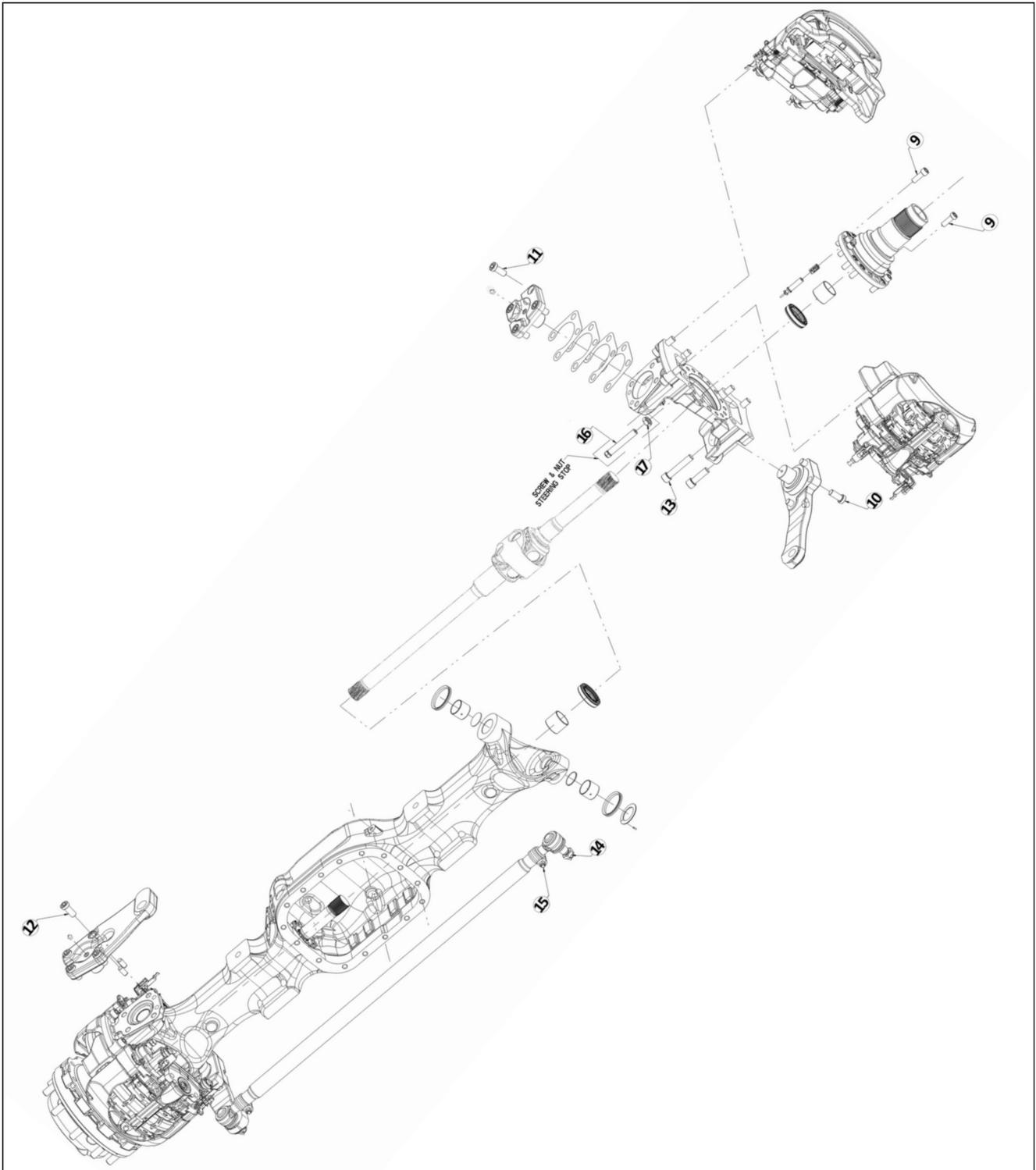


Fig. 8.2

## 8 Torque specification

### Knuckle joint – Tie rod – torques

Pos.	Description	Type	Torque [Nm]	Safety [S]	Demands
9	Torque-screws of spindle to knuckle joint	M16 x 2	205 ÷ 245	S	a – b
10	Torque- screws of tie-rod arm to knuckle joint	M20 x 2.5	500 ÷ 650	S	a – b
11	Torque-screws of kingpin cap to knuckle joint	M20 x 2.5	500 ÷ 650	S	a – b
12	Torque-screws of steering arm to knuckle joint	M20 x 2.5	500 ÷ 650	S	a – b
13	Torque- screws of brakes to knuckle joint & steering lock nut	M20 x 1.5	500 ÷ 600	S	a – b
14	Torque- tie rod end castle nut & cotter assembly	M24 x 1.5	240 ÷ 260	S	b
15	Torque- tie rod clamp nut	M12 x 1.5	70 ÷ 90	S	b
16	Stop screw	M20 x 1.5	Min. 90	S	b – c
17	Jam nut	M20 x 1.5	500 ÷ 600	S	b

- a. Cross-wise tightening = Tightening the fasteners in pairs opposite each other.
- b. For reassembly; use new screws or apply locking fluid.
- c. For reference only.

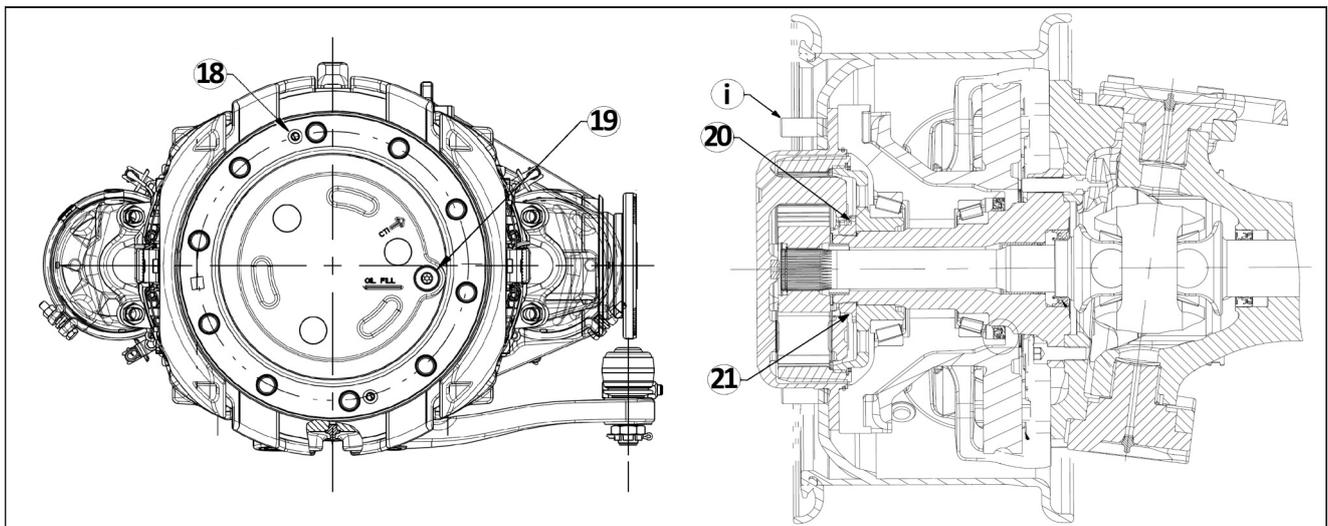


Fig. 8.3

Pos.	Description	Type	Torque [Nm]	Safety [S]	Demands
18	Hub screw	M10x1.25	15 ÷ 25		a
19	Oil plugs (level and draining)	M24 x 1.5	60 ÷ 100		b
20	Socket head bolt	M8 x 1.25	40 ÷ 50	S	b
21	Torque- spindle nut & locking (screw)	M80 x 2.0	95 ÷ 115	S	c
i	Studs	M22		S	d

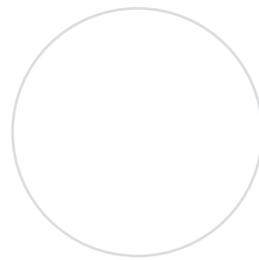
- a. Optional variant.
- b. For reassembly; use new screws or apply locking fluid.
- c. Use a new copper seal.
- d. Check the manual prescription provided by the vehicle manufacturer.

Note: If the wheel end variant has the breather, this component does not require maintenance.

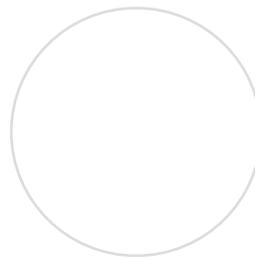
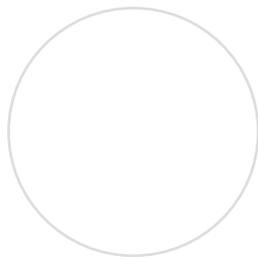
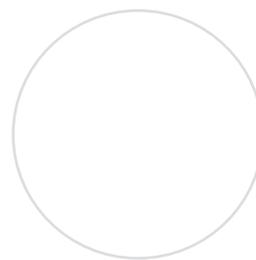
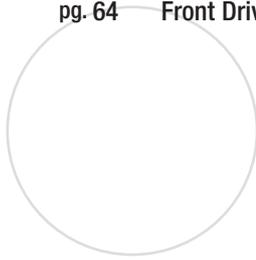
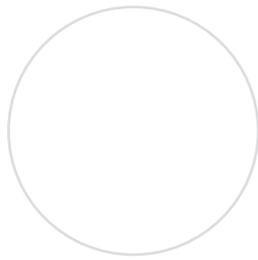


# Front Drive Steer Axle Troubleshooting

9



pg. 64 Front Drive Steer Axle Troubleshooting



## 9 Front Drive Steer Axle Troubleshooting

<b>Condition</b>	<b>Cause</b>	<b>Correction</b>
<b>Tires wear out quickly or have uneven tire tread wear.</b>	Tires have incorrect air pressure	Place specified air pressure in the tires.
	Tires out-of-balance	Balance or replace the tires.
	Incorrect tandem axle alignment	Align the tandem axles.
	Incorrect toe-in setting	Adjust the toe-in specified setting.
	Incorrect steering arm geometry	Service the steering system as necessary.
	Excessive wheel end play	Readjust the wheel bearings.
<b>Vehicle is hard to steer.</b>	Power steering system pressure low	Repair the power steering system.
	Steering gear linkage not assembled correctly	Assemble the steering gear correctly.
	Steering linkage needs lubrication	Lubricate the steering linkage.
	King pins binding	Replace the king pins.
	Incorrect steering arm geometry	Service the steering system as necessary.
	Caster out-of-adjustment	Adjust the caster as necessary.
	Tie rod ends hard to move	Replace the tie rod ends.
<b>Tie rod ends are worn and require replacement.</b>	Worn thrust bearing	Replace the thrust bearing.
	Tie rod ends require lubrication	Lubricate the ends of cross tube. Verify that the lubrication schedule is followed.
	Severe operating conditions	Increase the frequency of inspection and lubrication intervals.
	Damaged boot on tie rod end	Replace the boot.



## 9 Front Drive Steer Axle Troubleshooting

Condition	Cause	Correction
<b>Bent or broken cross tube, tie rod end ball stud, steering arm or tie rod end. Component requires replacement.</b>	Too much pressure in the power steering system; pressure exceeds vehicle manufacturer's specification	Adjust the power steering system to the specified pressure.
	Power steering system cut-off pressure, out of adjustment	Adjust the power steering system to the specified pressure.
	Vehicle operated under severe conditions	Verify that the vehicle is operated correctly.
	Add-on type of power steering system not installed correctly	Correctly install the add-on power steering system.
	Steering gear overtravel poppets incorrectly set or malfunctioning	Check for correct operation or adjust the overtravel of poppets to vehicle manufacturer's specifications.
<b>Worn or broken steering ball stud.</b>	Axle stops incorrectly set	Set the axle stops to vehicle manufacturer's specification.
	Drag link fasteners tightened higher than OEM specified	Tighten the drag link fasteners to the specified torque.
	Lack of lubrication or incorrect lubricant	Lubricate the linkage with the specified lubricant.
<b>Worn king pins and king pin bushings.</b>	Power steering stops out-of-adjustment	Adjust the stops to the specified dimension.
	Worn or missing seals and gaskets	Replace the seals and gaskets.
	Incorrect lubricant	Lubricate the axle with the specified lubricant.
	Axle not lubricated at scheduled frequency	Lubricate the axle at the scheduled frequency.
	Incorrect lubrication procedures	Use the correct lubrication procedures.
<b>Vibration or shimmy of front axle during operation.</b>	Lubrication schedule does not match operating conditions	Change the lubrication schedule to match the operating conditions.
	Caster out-of-adjustment	Adjust the caster.
	Wheels or tires out-of-balance	Balance or replace the wheels and tires.
	Worn shock absorbers	Replace the shock absorbers.



# Service tools

# 10

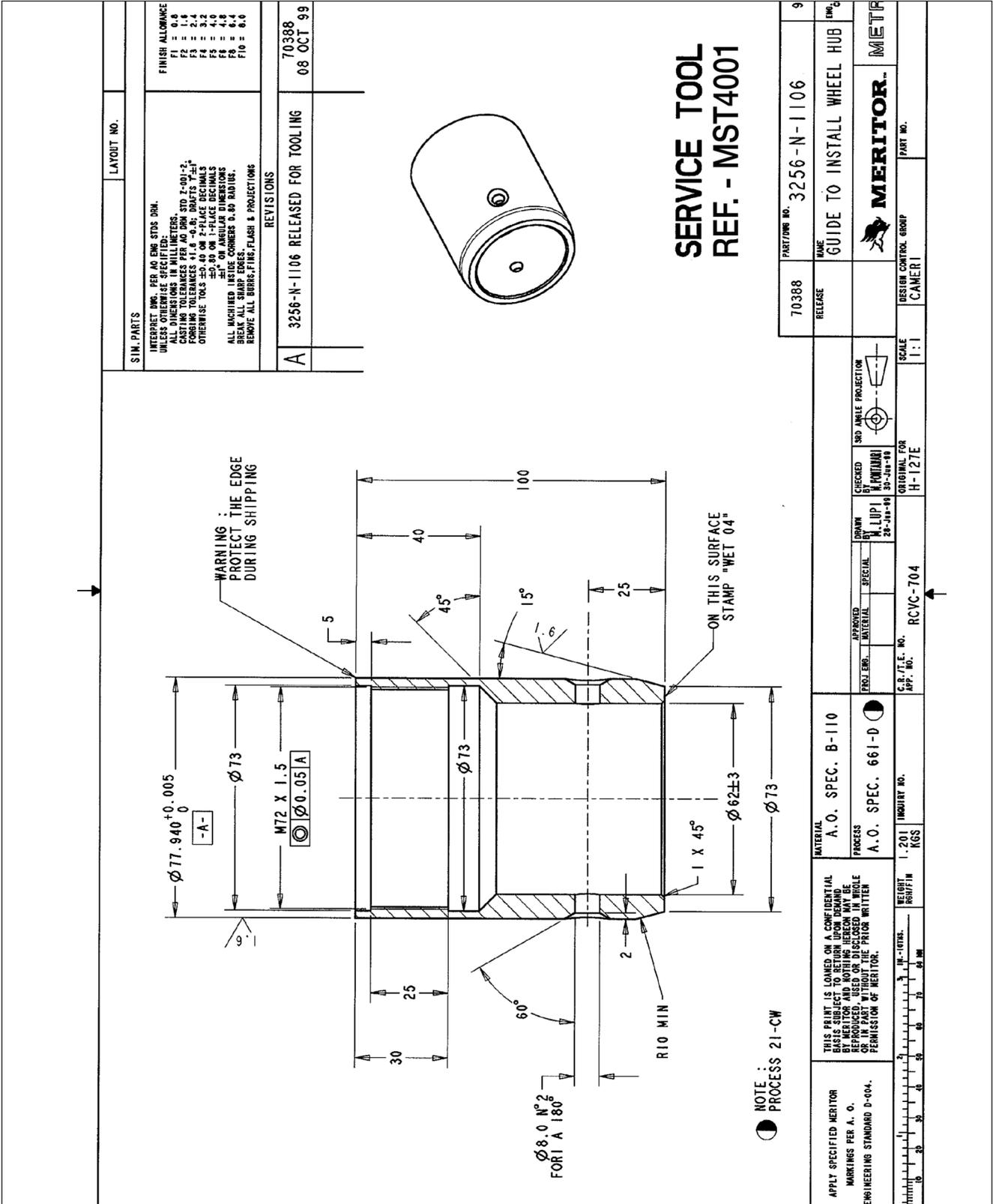
- pg. 68 MST4200 Wrench for wheel hub bearing adjustment nut
- 69 MST4201 Guide to install wheel hub
- 70 MST4002 Hub bearing removing tool
- 71 MST4203 Hub bearing fitting tool
- 72 MST4500 Reaction Lever tool
- 73 MST5000 Spindle and axle bushing tool
- 74 MST5001 Spindle and axle seal tool
- 75 MST5002 Wheel end Bearing tool
- 76 MST5003 Kin ping bushing tool



# 10 Service tools

## MST4001

Guide to install wheel hub



**SERVICE TOOL  
REF. - MST4001**

70388	RELEASE	70388	3256-N-1106	9
PART/IMG NO.		MATERIAL		
A.O. SPEC. B-110		A.O. SPEC. 661-D		
PROCESS		201 INGS		
WEIGHT		R10 MIN		
REVISION		H-127E		
C.B.T.E. NO.		RCVC-704		
APP. NO.		H-127E		
APPROVED		RCVC-704		
MATERIAL		RCVC-704		
SPECIAL		RCVC-704		
DRAWN		RCVC-704		
CHECKED		RCVC-704		
3RD ANGLE PROJECTION		RCVC-704		
SCALE		RCVC-704		
DESIGN CONTROL GROUP		RCVC-704		
PART NO.		RCVC-704		
MERITOR		MERITOR		
GUIDE TO INSTALL WHEEL HUB		MERITOR		
3256-N-1106		MERITOR		
RELEASE		MERITOR		



# 10 Service tools

## MST4003

Hub bearing fitting tool

Technical drawing of the hub bearing fitting tool (MST4003) showing dimensions and surface treatments. The drawing includes a 3D perspective view and a 2D cross-sectional view. Key dimensions include: overall length 45, a 30-length section, a 3-length section, an outer diameter of  $\phi 129.74 \pm 0.02$ , an inner diameter of  $\phi 55.0$ , a diameter of  $\phi 77.6 \pm 0.2$ , and a total diameter of  $\phi 122.7$ . Surface treatments include 1.5 X 45° chamfers, 3.2 surface finish, and R3 typical radii. A note indicates 'ON THIS SURFACE STAMP \*WET 10\*'. A 15° chamfer and a 1 X 45° chamfer are also shown. A note specifies 'NOTE : PROCESS 21-CW'.

**SERVICE TOOL**  
**REF. - MST4003**

<b>SIM. PARTS</b>	INTERPRET DWG. PER AG ENG STDS DIM. UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN MILLIMETERS CASTING TOLERANCES PER AG DIM STD Z-001-2 FORGING TOLERANCES PER AG DIM STD Z-001-2 OTHER TOLERANCES ±1.6 -0.8; DRIFTS 7.6 ±0.4 ±0.40 ON 1-PLACE DECIMALS ±0.05 ON 2-PLACE DECIMALS ±0.02 ON 3-PLACE DECIMALS ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED BREAK ALL SHARP EDGES REMOVE ALL BURRS, FLASH & PROJECTIONS	<b>LAYOUT NO.</b>	
	<b>FINISH ALLOWANCE</b> F1 = 0.8 F2 = 1.6 F3 = 2.4 F4 = 3.2 F5 = 4.0 F6 = 4.8 F10 = 8.0		
	<b>REVISIONS</b> A 3256-S-1111 RELEASED FOR TOOLING		70388 08 10 99

PART/NO. NO.	70388	911	ENG. DES. CODE
NAME	HUB BEARING FITTING TOOL		
APPROVED			
DRAWN BY	N. LUP	CHECKED BY	M. PONTINI
DATE	30-08-99	DATE	30-08-99
SCALE	1:1	SCALE	1:1
DESIGN CONTROL GROUP	CAMERI	PART NO.	
ORIGINAL FOR	H-127E		
C.B./I.E. NO.	RCVC-704		
INQUIRY NO.			
WEIGHT	1.836		
HEIGHT			
INQUIRY NO.			















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