

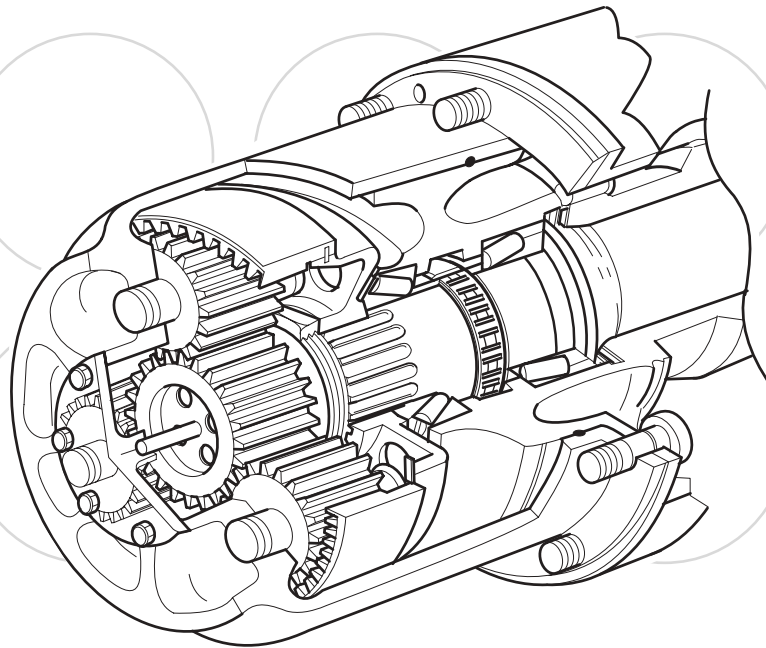


Maintenance Manual MM-0164

Wheel end assembly

Hub Reduction 3 planet - 4 planet

Issued 4.2005



Service Notes

Before You Begin

This publication provides installation and maintenance procedures for the ARVINMERITOR HVS wheel end assembly.

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 ArvinMeritor's Web Site

Additional maintenance and service information for ArvinMeritor's commercial vehicle systems component lineup is also available at www.arvinmeritor.com.

To access information, click on Products & Services/Tech Library Icon/HVS Publications. The screen will display an index of publications by type.

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. ArvinMeritor Commercial Vehicle Systems reserves the right to revise the information presented to discontinue the production of parts described at any time.

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Terms used in this manual

Manufacturer:

ARVINMERITOR

Manual:

Maintenance manual no. MM-0164

Device:

Wheel end assembly

Technician:

Qualified personnel working on wheel end assembly maintenance and servicing.

Maintenance and servicing:

Maintenance and servicing refer to periodical checks and/or replacement of wheel end 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 wheel end assembly as part of a more complex device.

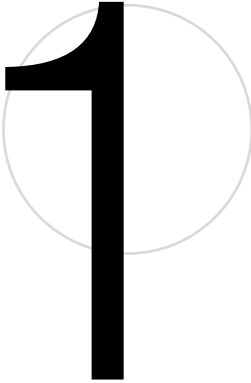
Warranty

Warranty applies to the wheel end assembly installed on vehicles for which it was designed. Warranty is void in the following cases:

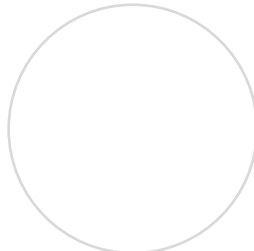
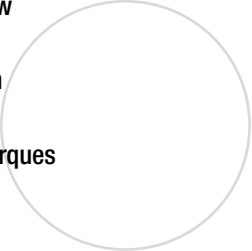
- Improper use of the vehicle on which the wheel end assembly is installed (usage conditions, overloading etc.)
- Tampering with vehicle components that may affect wheel end assembly performance.
- Use of non-original spare parts.
- Improper installation, adjustment, repair or modification.
- Poor or 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 ArvinMeritor web site www.arvinmeritor.com

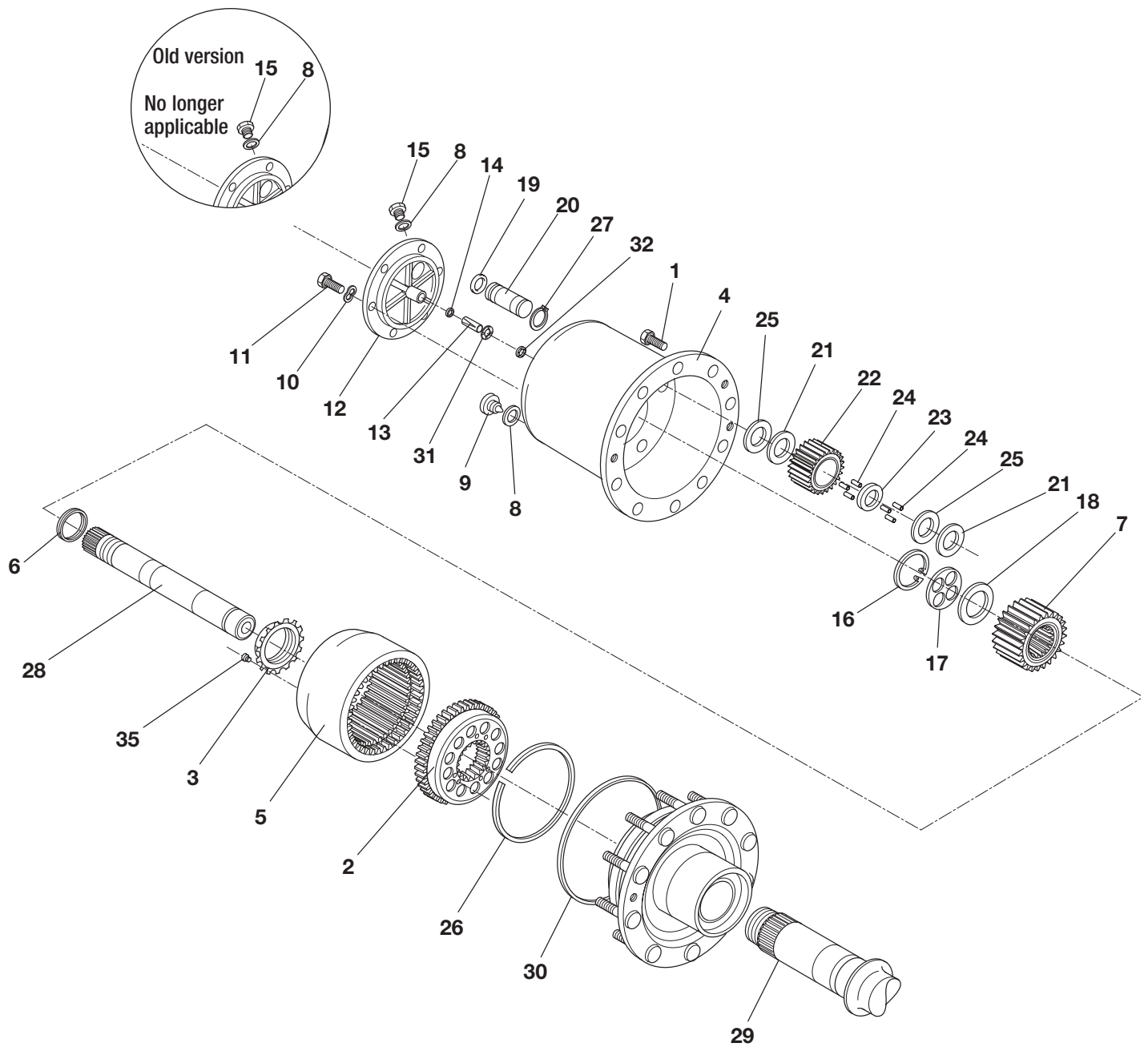
Introduction



pg. 06	Exploded view
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11	Lubricants



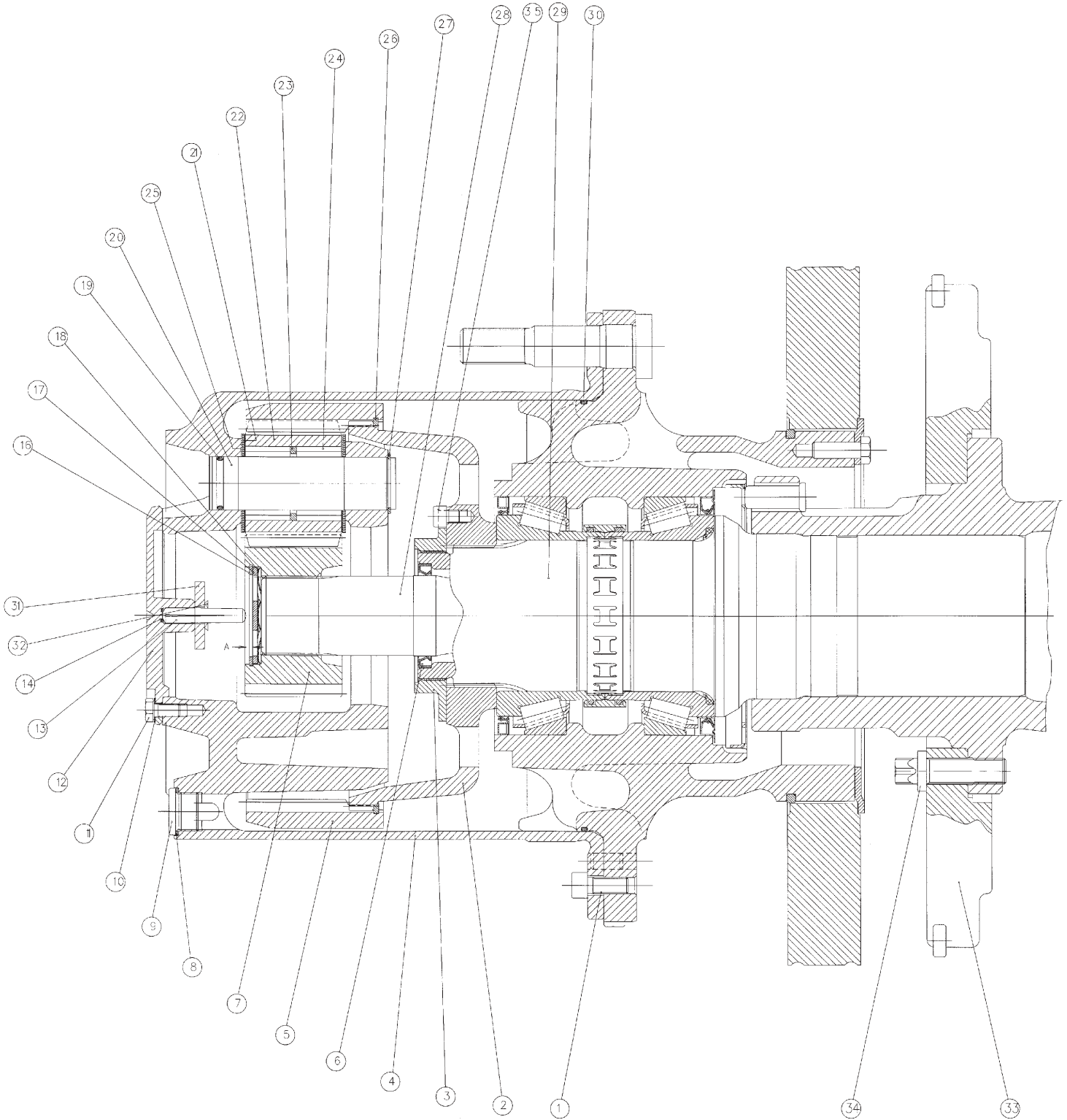
Exploded view



Parts list

Item	Description
1	Hex. socket screw M10x25
2	Ring gear carrier
3	Hub nut M80x2
4	Hub casing
5	Ring gear
6	Sealing ring
7	Sun gear
8	Gasket
9	Magnetic plug
10	Spring washer
11	Hexagon screw
12	Cover, hub reduction
13	Grooved pin
14	Washer
15	Old version - No longer applicable
16	Retaining ring
17	Thrust washer
18	Spring washer
19	O-ring
20	Bearing spindle
21	Thrust washer
22	Planet gear
23	Spacer ring
24	Needle rollers
25	Thrust washer
26	Circlip
27	Retaining ring
28	Drive shaft
29	Spindle
30	O-ring
31	Magnetic washer
32	Star lock push on fastener
35	Locking Screw

Cross section



Parts list

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32	Star lock push on fastener
35	Locking Screw

1 Introduction

Description

The hub reduction unit consists of a cylindrical planetary assembly in each hub, fig. 1. The assembly is made up of a sun gear, a number of planetary gears 3 or 4 which rotate round the sun gear and a ring gear which houses the planetary gears. The sun gear is splined to the drive shaft, fig. 2. The planetary gears are journalled in the hub casing which is fixed to the hub. The ring gear is splined to the rear axle casing, fig. 3.

The hub is carried in two tapered roller bearings in the rear axle casing.

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

Because the ring gear is fixed to the rear axle casing, the planetary gears rotate inside the ring gear. Since the hub casing accompanies this rotation, the movement is transmitted to the hub. The hub reduction is 3.46:1.

This has been achieved by the number of teeth on the various gears.

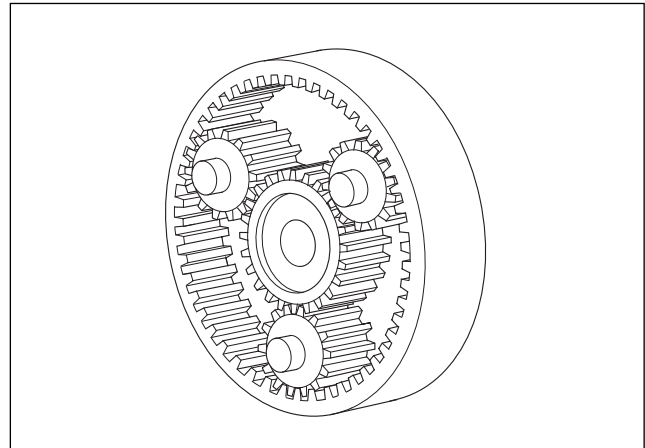


Fig. 1

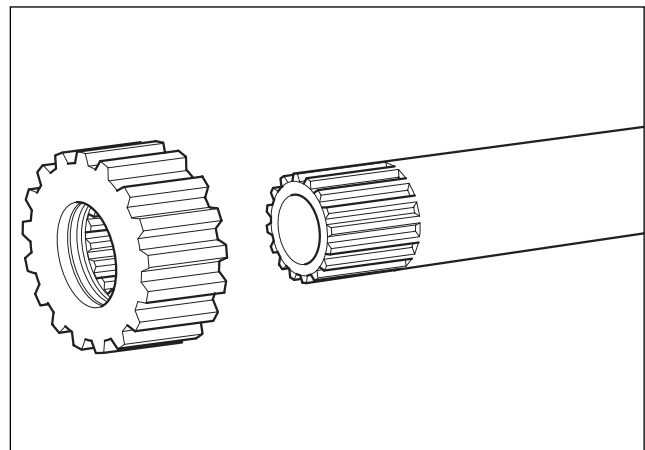


Fig. 2

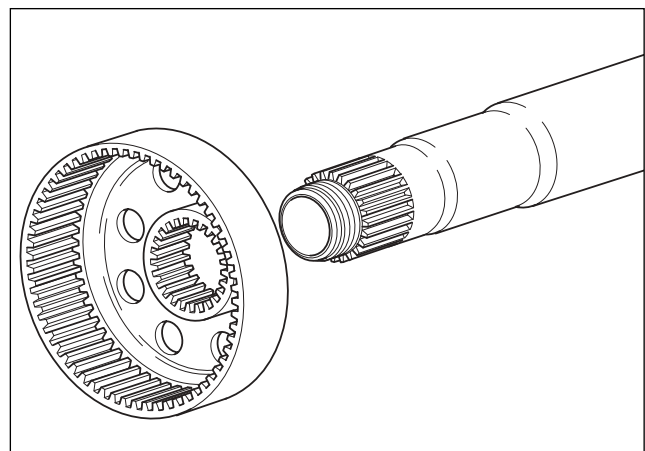


Fig. 3

1 Introduction

Description

Hub reduction 3 planet - fig. 5a

Hub reduction 4 planet - fig. 5b

In order to ensure reliable and efficient wheel end assembly operation, maintenance intervals, use of lubricants and correct procedures specified by the manufacturer should be strictly observed (refer to Lubrication Maintenance Manual no. 1).

For further information contact the manufacturer's engineering department or refer to the ArvinMeritor Web site at www.arvinmeritor.com (technical library - manuals).

⚠ WARNING

Only original Meritor spare parts should be used. Use of non-recommended lubricants will adversely affect performance and service life. Use of non-original parts could seriously affect wheel end assembly performance.

Torque chart specifications and data

Hub gear

Designation	3 Planet or 4 Planet
Type	cylindrical planetary gear
Reduction	3.46 : 1
No. of planetary gears	3-4

Tightening torques	Nm	Kgm
Hub nut	1,200 ± 120	120 ± 12
Bolts, hub cover	20 ± 5	2 ± 0.5
Oil plugs (level and draining)	50 ± 12.5	5 ± 1.25
Bolts, hub casing	40 ± 10	4 ± 1

Lubricants

Oil type

Rear axle oil: Quality API-GL-5 / MIL-L-2105E

Viscosity:

According to the vehicle manufacturers recommendations

Oil volume:

Hub reduction rear axle: 3 litres

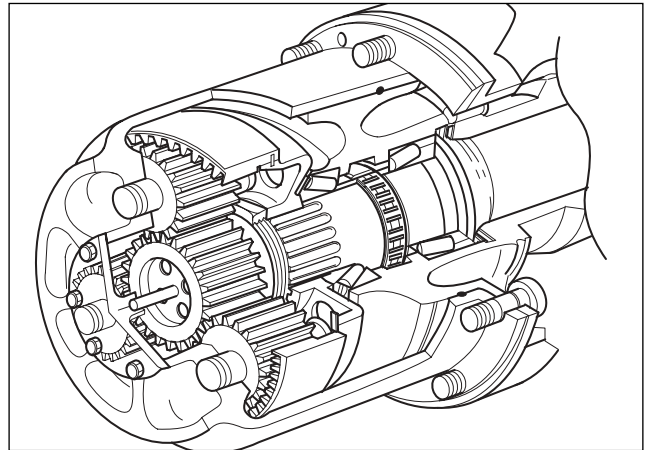


Fig. 4

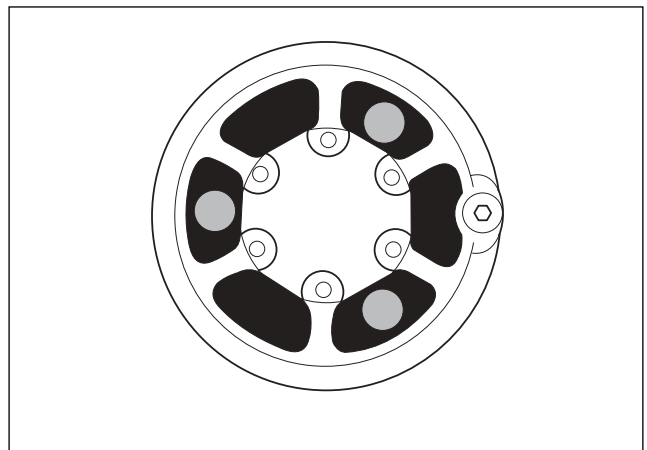


Fig. 5a

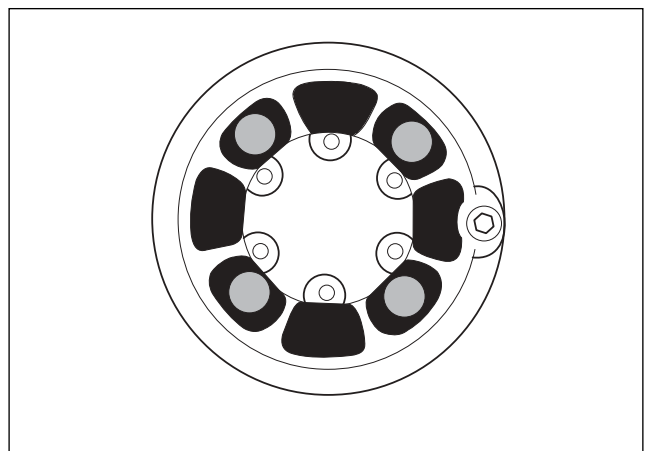


Fig. 5b

1 Introduction

Delivery, warranty and system service

This section contains instructions for the above delivery, warranty and system service. Given in the maintenance operations column below are the servicing instructions from these manuals which apply to the rear axle hub reductions.

Service	Interval	Maintenance operations
Delivery Service		Check for oil leakage Check bolting Check oil level and top-up if necessary
Warranty service 1	6 weeks or at least max. 10,000 Km	Check for oil leakage Check bolting Change oil
Warranty service 2	6 months	Check for oil leakage Check rear axle ventilation.
System service		
Maintenance programme		
Lubrication service	See respective lubrication chart	Change oil according to lubrication chart
Basic inspection	every 6 months	Check for oil leakage Check rear axle ventilation
Function and condition check		
Additional service	every 12 months	None

Repairing the wheel end assembly

2

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2 Repairing the wheel end assembly

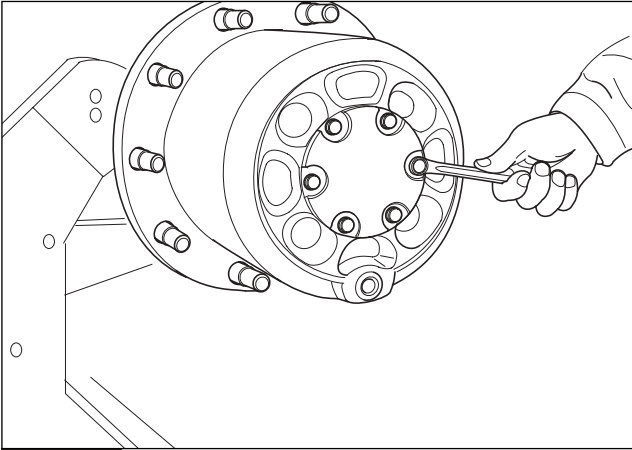


Fig. 6

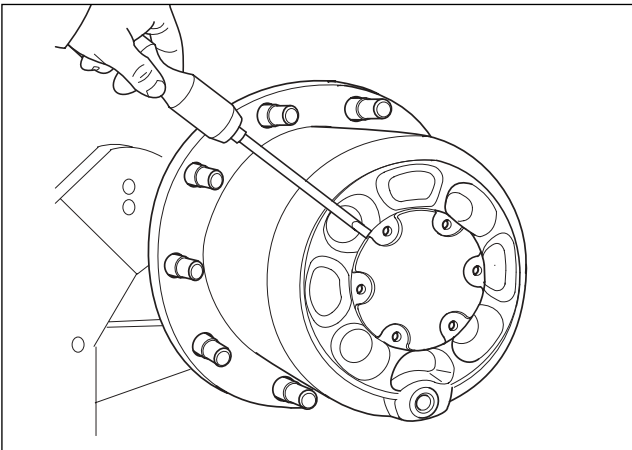


Fig. 7

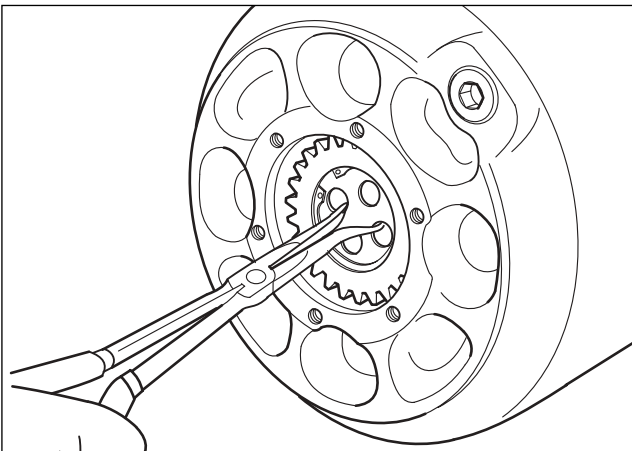


Fig. 8

Disassembly

Remove the wheel nuts and retain. Pull off the wheels using a wheel trolley. Remove the air inflation valve from its retainer in the inside wheel.

Jack up the rear axle of the vehicle to vehicle manufacturers recommendations and drain the oil from the axle(s).

Tighten each bolt equally and simultaneously, and avoid using excessive force as this could damage the drum.

A soft-faced mallet may be used on the drum to loosen and ease withdrawal.

Unscrew the drain plug in the hub and drain out all oil.

A: 3 planetary version

B: 4 planetary version

Remove retaining screws with suitable sized wrench fig. 6 and remove the hub cover from the end of the hub casing using a suitable screwdriver or pry bar - fig. 7.

Remove sun gear from axle shaft and hub casing before removing hub casing as it may fall out of hub casing and get damaged when the hub casing is removed. - fig 8

Block the rotation of the hub, and unscrew the socket screws retaining the hub casing and withdraw the hub casing - fig. 9.

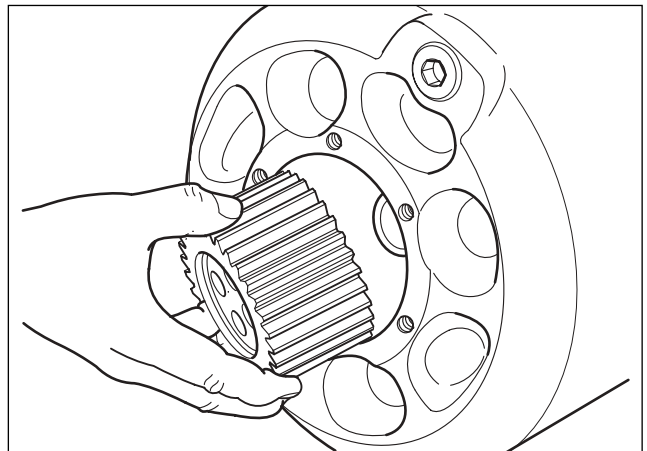


Fig. 9

2 Repairing the wheel end assembly

Remove axle shaft. fig. 10

Staked hub nut dismantling

Unscrew the hub retaining nut.

NOTE: A high torque is required to shear the staking points – and a torque multiplication device should be employed).

Remove the hub nut and discard.

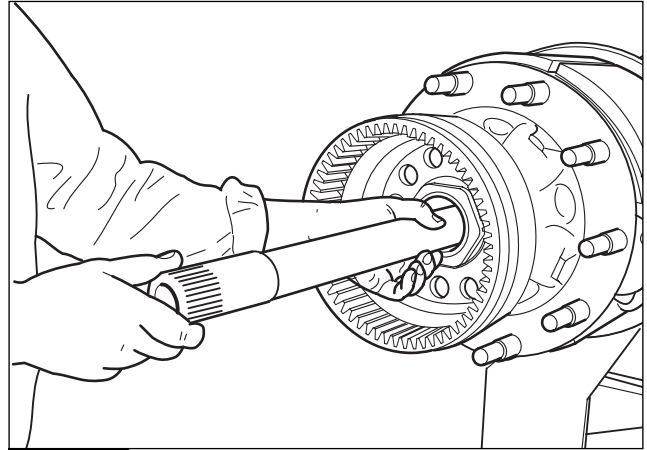


Fig. 10

Star hub nut dismantling

Remove locking screw and discard. Unscrew the hub retaining nut and discard. (fig. 11)

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

A high torque is required to release the nut, therefore a torque multiplication device should be employed. Remove ring gear carrier and ring gear.

Remove the hub assembly.

⚠ WARNING :
Support may be required as this unit is heavy

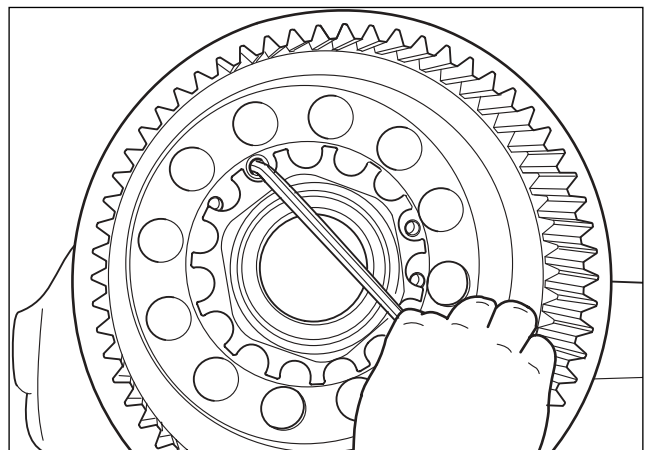


Fig. 11

Remove the drive shaft seal by levering out, and discard (fig. 12).

⚠ WARNING : Do not reuse this seal.

Hub bearings are pre-adjusted cartridge type and cannot be individually replaced. In case of non serviceability a replacement service exchange hub should be refitted.

⚠ WARNING : Do not reuse this seal.

Remove the outer O-ring (30) from the hub and discard.

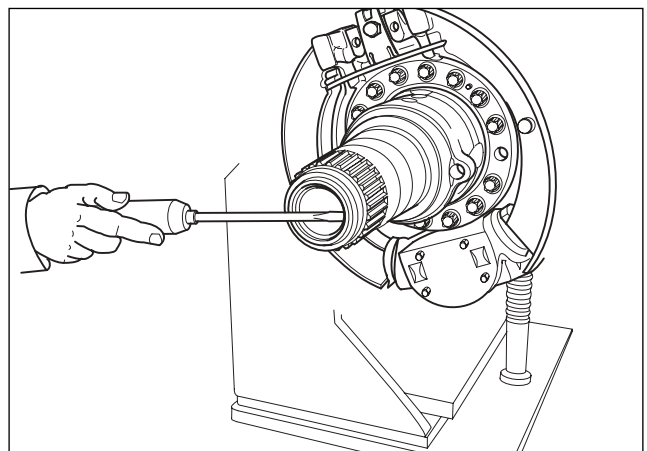


Fig. 12

2 Repairing the wheel end assembly

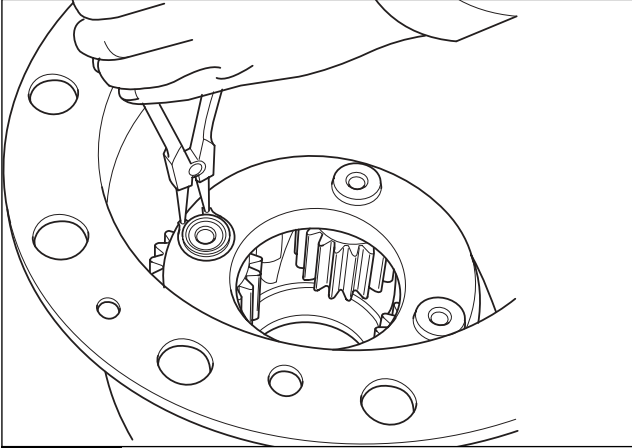


Fig. 13

Remove the circlips from the planetary gear journal pins fig. 13.

Hubs can contain 3 or 4 planetary gears.

A: 3 planetary version

B: 4 planetary version

Press out the journal pins (20) using a suitable drift fig. 14.

Remove the planetary gears, washers and needle rollers.

⚠ WARNING

Take care that the needle rollers do not become dislodged and lost. A suitably sized dowel can be inserted to retain the needle bearings in place.

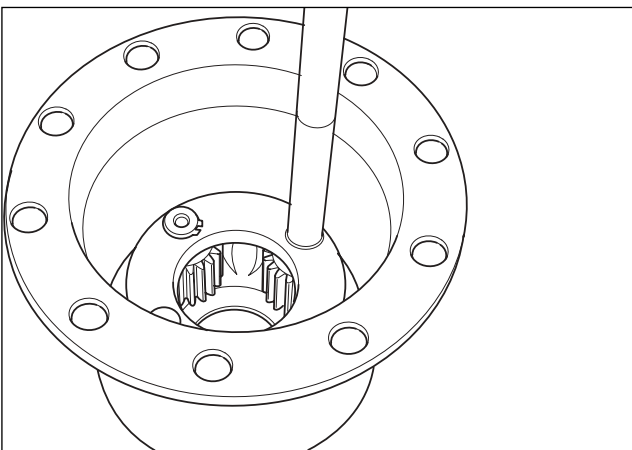


Fig. 14

Remove the O-ring seals from the journal pins, and discard - fig. 15.

⚠ WARNING

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

Remove the ring gear locking ring (internal circlip), and separate the ring gear from its carrier (Fig. 16)

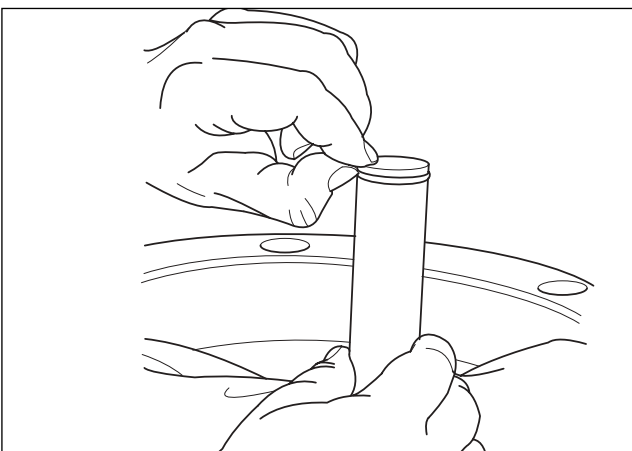


Fig. 15

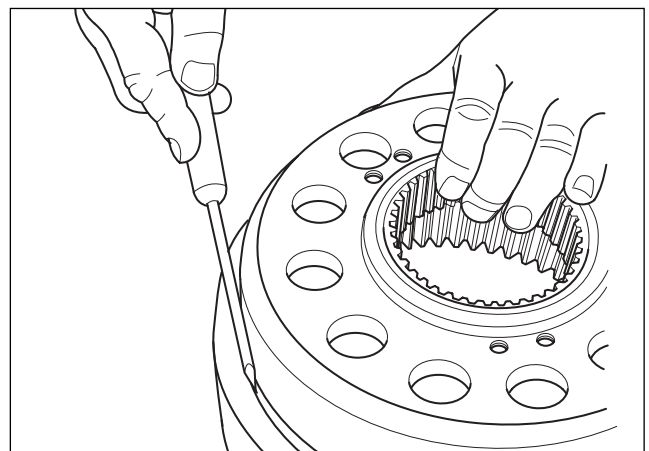


Fig. 16

2 Repairing the wheel end assembly

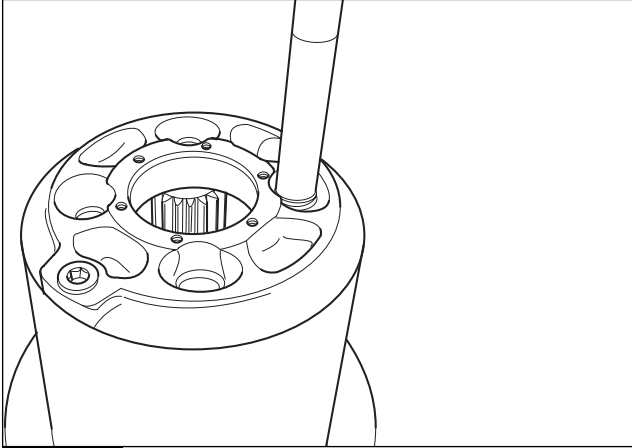


Fig. 17

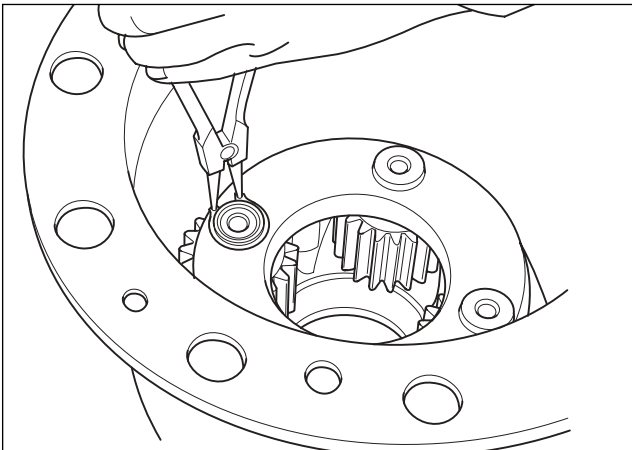


Fig. 18

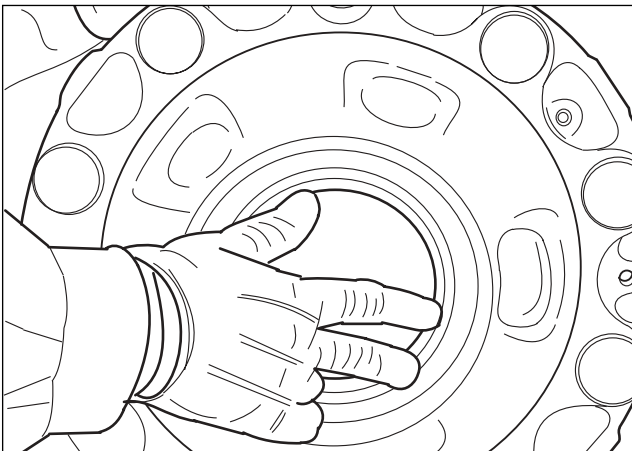


Fig. 19

Checking and replacing parts

Thoroughly clean all the hub parts. Check all the parts for wear, deformation or other damage.

Check needle rollers, gears and all bearing surfaces. 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. Also check the contact surface for the seal, on the wear ring and on the drive shaft. Replace damaged parts.

⚠ WARNING:

With damage to the hub reduction, the final drive must always be removed, checked and cleaned. The entire rear axle casing must be thoroughly clean on the inside even the space at the outer ends of the casing.

Concerning removal and installation of the drive, refer to the service manual for the relevant drive in question.

Assembly

Grease the rollers of the planetary gears and assemble them in the gears, with the spacer sleeve.

NOTE: each gear must have 38 needle rollers.

Place the planetary 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. 17) Fit the retaining circlips on the journal pins. (Fig. 18)

Lubricate and press into position by hand a new inner hub seal.

Refit a new outer O-ring on the hub using grease GLEITMO 805 as lubricant (fig. 19). Thoroughly grease (ALVANIA RL 3) the spindle bearing journals and locate the hub in position on the spindle. Locate the ring gear carrier into position.

2 Repairing the wheel end assembly

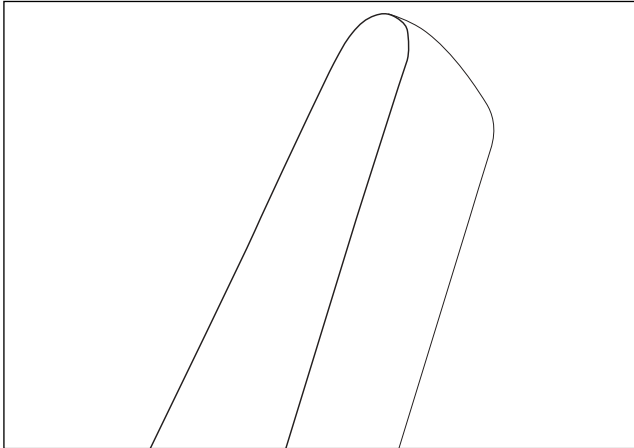


Fig. 20

Staked hub nut assembly

➤ Fit a new hub nut and tighten to a torque of 150 ± 30 Nm. Rotate hub 20 revolutions by hand and tighten the hub nut to a final torque of 1200 ± 120 Nm.

Stake the hub nut, by deforming the hub nut flange into the staking slots at two diametrically opposite positions.

Picture of suitable staking tool. (fig. 20)

Star hub nut assembly

➤ Fit a new hub nut and tighten to a torque of 150 ± 30 Nm. Rotate hub 20 revolutions by hand and tighten the hub nut to a final torque of 1200 ± 120 Nm.

Fit new locking patch screw into relevant clear screw hole to secure hub nut. Tighten screw to $34\text{Nm} \pm 3\text{Nm}$ (fig. 21).

Ensure head of the screw has bottomed out on face of ring gear and not on starred flange of hub nut (fig. 22).

Fit the axle shaft into position.

Fit a new axle shaft seal into the spindle by first lubricating with grease (GLEITMO 805) and driving into position using a suitable drift. (fig. 23)

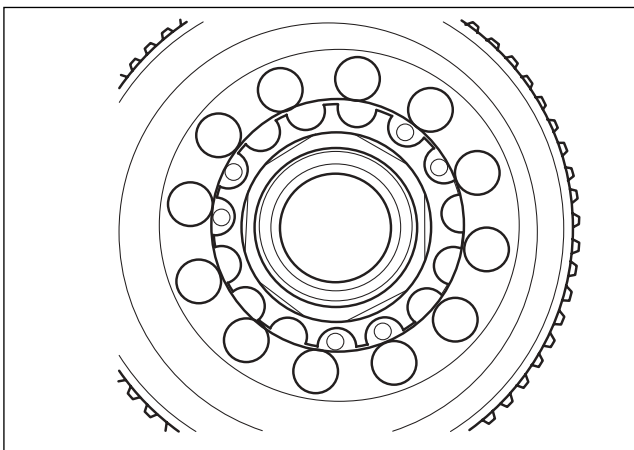


Fig. 21

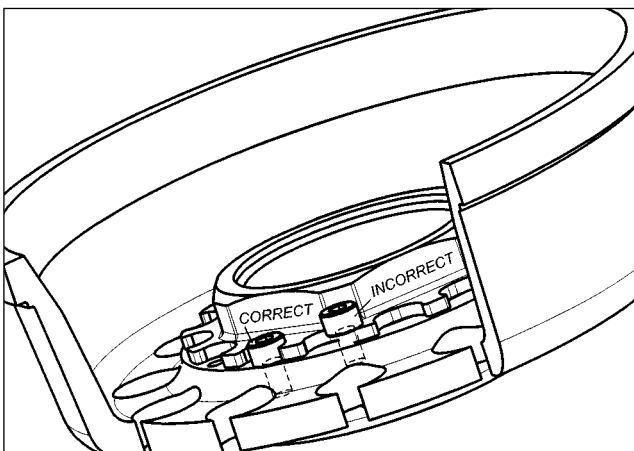


Fig. 22

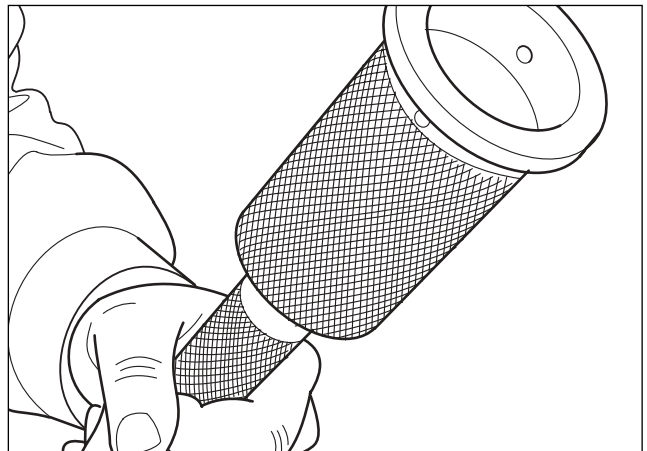


Fig. 23

2 Repairing the wheel end assembly

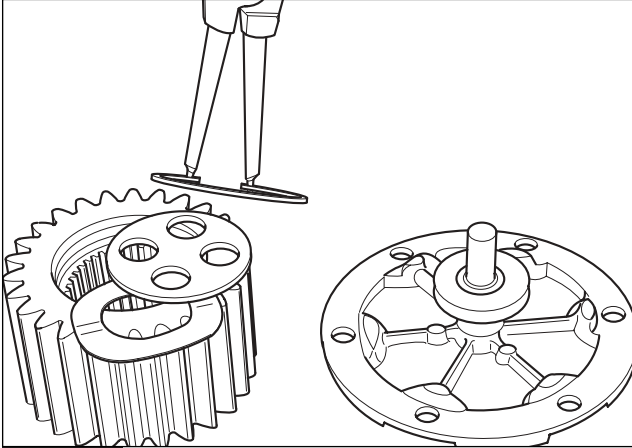


Fig. 24

Fit the sun gear with a spring washer and thrust washer and retain with an internal circlip. (fig. 24 - 25)

Fit the hub casing onto the hub ensuring that the hub external O-ring is thoroughly lubricated using hub oil.

Retain the hub casing in position with two socket bolts using thread locking compound (Loctite 243).

Tighten bolts to a torque of $40\text{Nm} \pm 10\text{Nm}$. Insert sun gear. (fig. 26)

Rotate hub to engage sun gear with axle shaft spline and planetary gears. (fig. 27)

Clean the outer face of the hub casing and inner mating face of the cover plate, of all debris (old sealing compound, etc) to ensure a close fit.

NOTE: If new axle shaft or new hub housing is fitted the following procedure to setup the correct end float must be carried out. However it is recommended to check the end float before re-assembly of the cover.

Push the sun gear in as far as possible.

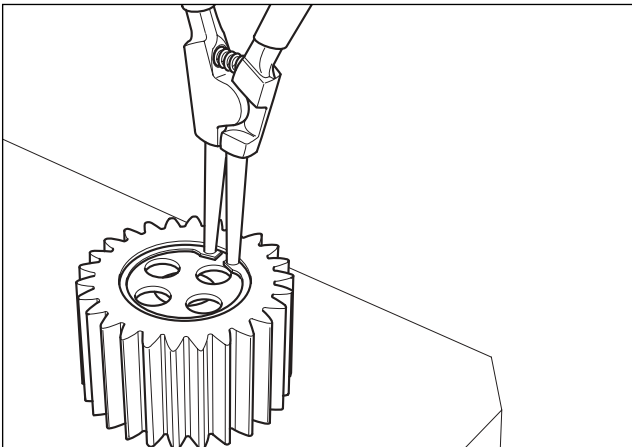


Fig. 25

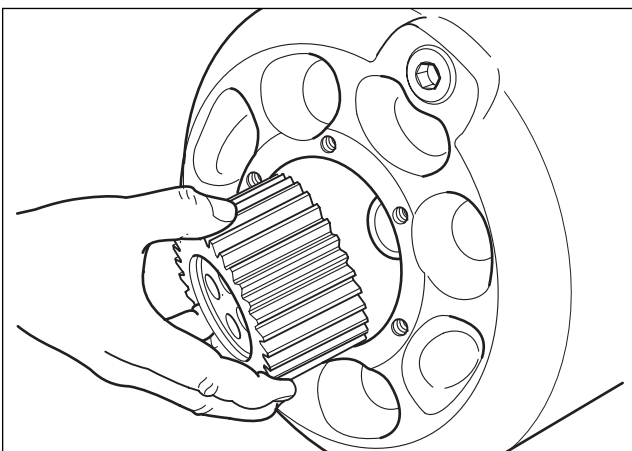


Fig. 26

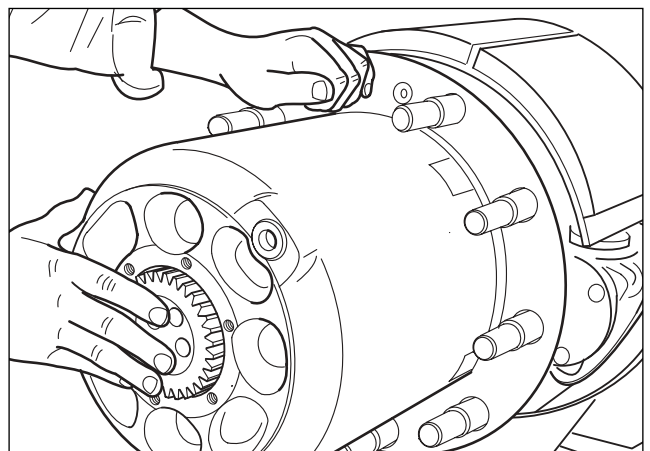


Fig. 27

2 Repairing the wheel end assembly

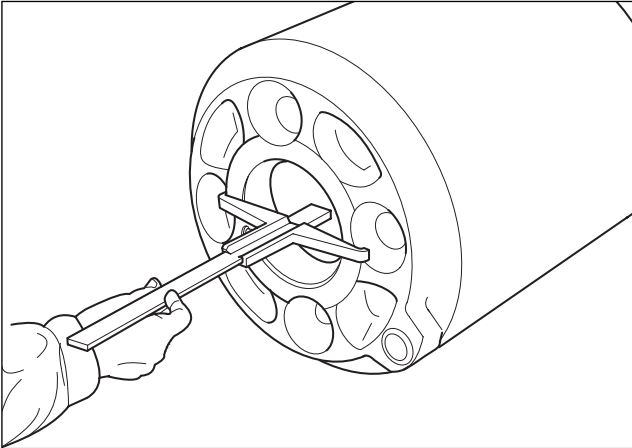


Fig. 28

Measure the distance between the sun gear thrust washer and the face of the hub casing. (Record Dim A) fig 28.

Check sun gear free movement as follows:

- Pull out the sun gear approximately 10 mm.
- Offer up the cover plate into its position against the end of the hub casing.
- Remove the cover, and remeasure the depth of the sun gear thrust washer, as previously (Record Dim B).
- Ensure that Dim B is shorter than Dim A by 1 to 2 mm.
- If outside these limits, remove the thrust pin and change the number of washers under the pin by the following procedure.

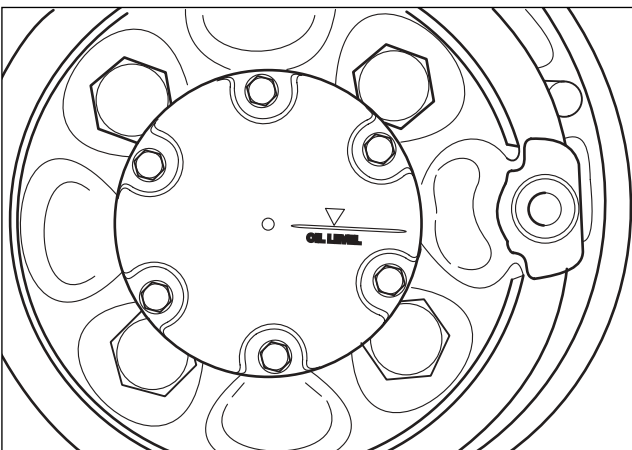


Fig. 29

Remove the serrated thrust pin from the cover plate. Select a serrated thrust pin for the cover plate and the number of washers to be fitted under the pin in the cover so that the total length of pin and washers is 0.4 to 0.6 mm shorter than the Dim A.

Place the washer in the pin bore in the cover plate and drive the pin into the cover plate, ensuring that the serrations in the pin do not engage in the former position. Then remeasure Dims. A and B

Refit the magnetic washer over the thrust pin and retain in position with a new star lock fastener.

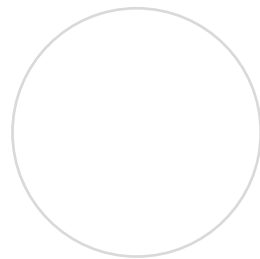
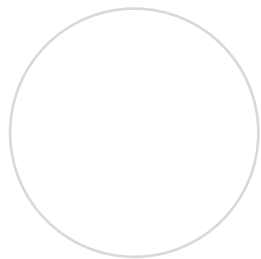
Apply sealing compound in approx. 6mm dia. bead (Dow Corning 7091) to the inner face of the cover plate in a continuous bead. The components must be assembled immediately to permit the silicone gasket material to compress evenly between the mating surfaces. Refit the cover plate on the end of the hub casing and retain with bolts and tighten to $20\text{Nm} \pm 5\text{Nm}$

Fill hub with 3 litres of oil as specified by vehicle manufacturer. Fit new oil drain plug and tighten to $80\text{Nm} \pm 20\text{Nm}$

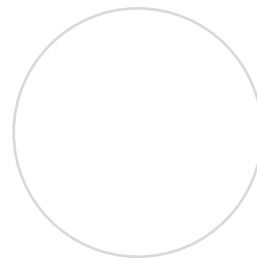
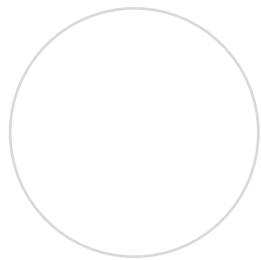
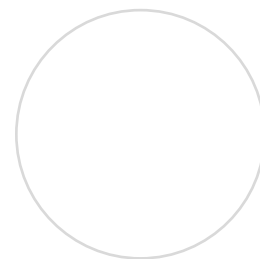
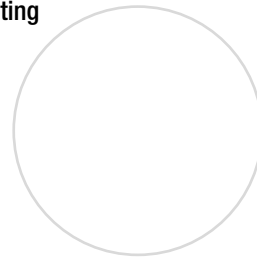
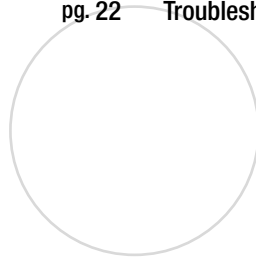
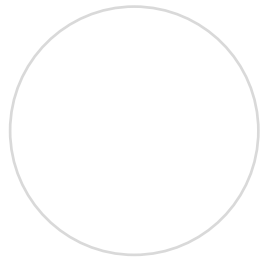
NOTE: with new hub cap there is an oil level line that aligns with the bottom of the filler hole. When line is horizontal it is an indication of permitted oil capacity. (fig. 29)

Troubleshooting

3



pg. 22 Troubleshooting



3 Troubleshooting

Shown below is a chart of the most common faults occurring to hub assemblies.

Condition	Possible Causes	Checks	Actions Required
Hub oil loss	Wheel bearing damaged	Oil loss coming from hub outwards	Remove wheel end assembly and replace bearing and any other damaged parts
Oil loss between hub cover and hub	Knocks/Sealant distributed incorrectly during a previous overhaul		Remove hub cover and correctly reapply sealant. Check the driveshaft and hub for integrity and that they are in working order.
Excessive hub clearance	Slackening	Check: - hub nut - presence of spacer	Check bearings for integrity. Ensure hub nut is correctly tightened. Ensure correct staking. Install spacer.
Abnormal ABS sensor signal	Abnormal impulses	Follow instructions from vehicle manufacturer	

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