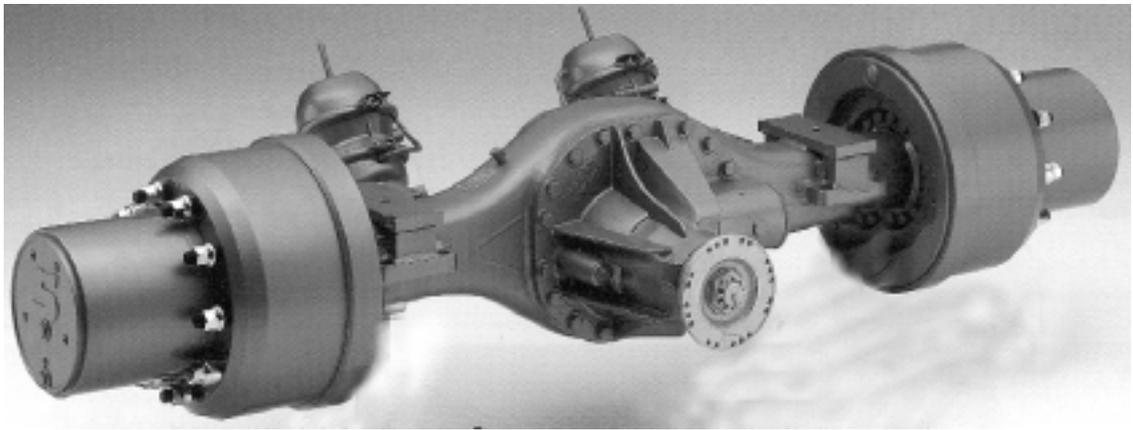




Axles

MAINTENANCE MANUAL

SRDP 30 Industrial Axles



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SRDP30AX 5/2000

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NOTE ! This Manual is intended for use by experienced mechanics using safe procedures in properly equipped shops.

Safety precautions should always be followed such as wearing safety glasses, using adequate lifting aids, and using tools and equipment in good condition. Sisu Axles, Inc., its agents, associates or representatives are not responsible for damage or injury occurring while working on their components.

1 AXLE DESIGN

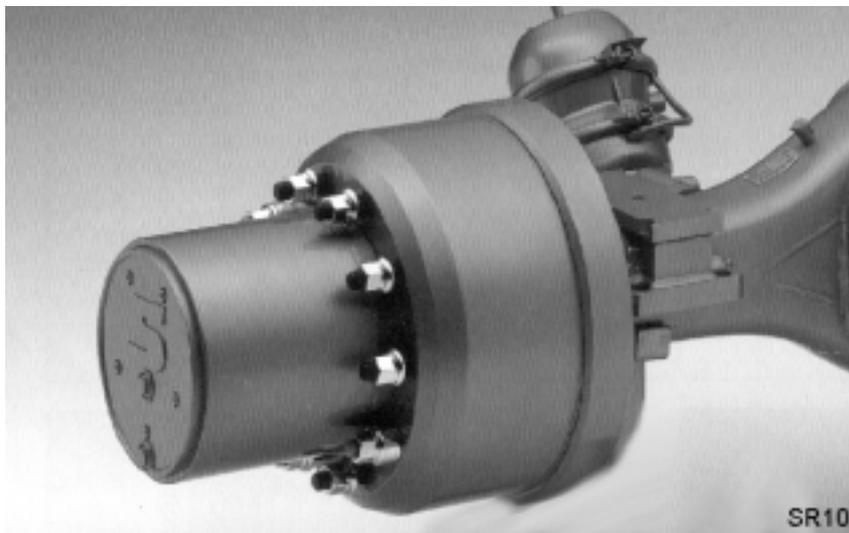
The axle casing is rectangular shaped and pressed of steel plate material.

The primary reduction takes place in hypoid gear unit and secondary reduction in planetary gears, which are located in the wheel hubs.

The differential and wheel hubs are lubricated by common oil, but filling, draining and checking must be done by using separate plugs.

Drive gear is in separate manual.

Brakes are in separate manual.

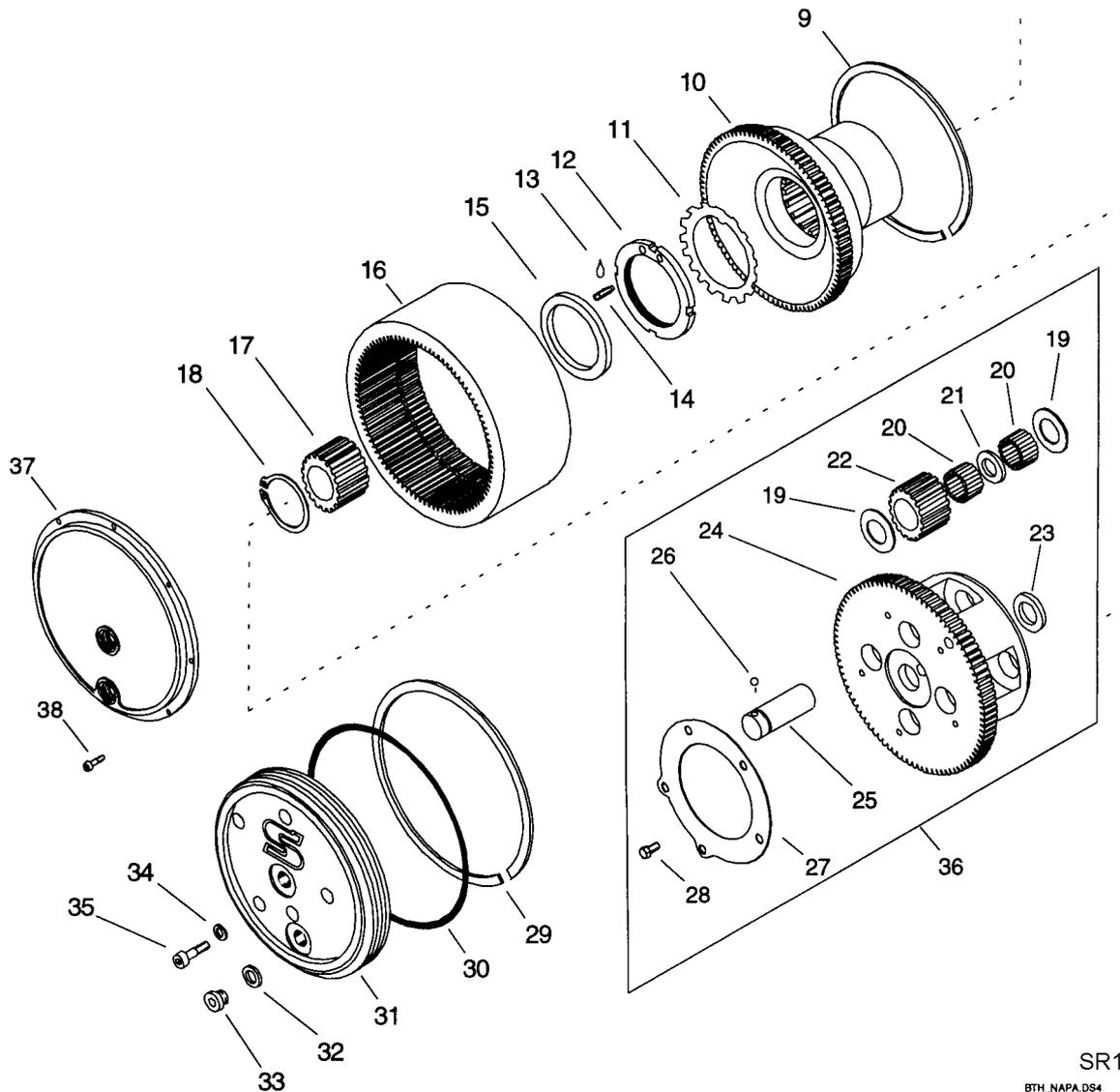


Picture 1: General view of SRDP Industrial axle

2 WHEEL HUBS

2.1 Design

There are two design of the wheel hub covers, which are slightly different. Most pictures in this manual do show the early design. In the following picture both variants are shown.



SR14

BTH_NAPA.DS4

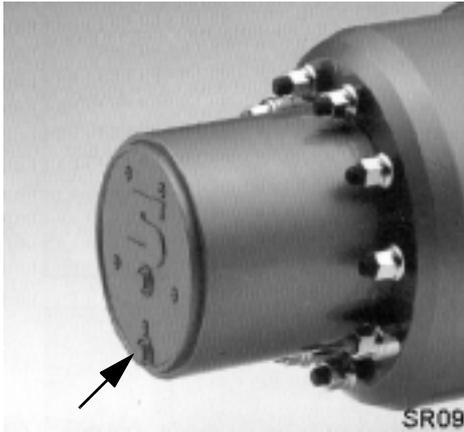
Picture 2: Wheel hub cover variants in the same illustration

In early wheel hub cover design items 31 - 35 are used. Items 29 and 30 and also 32 and 33 are common in both design.

The new type of the wheel hub cover, item 37 with different retaining screws (38) was **introduced approx. August 95** and with this change items 27 and 28 were added and these are used with this new design only.

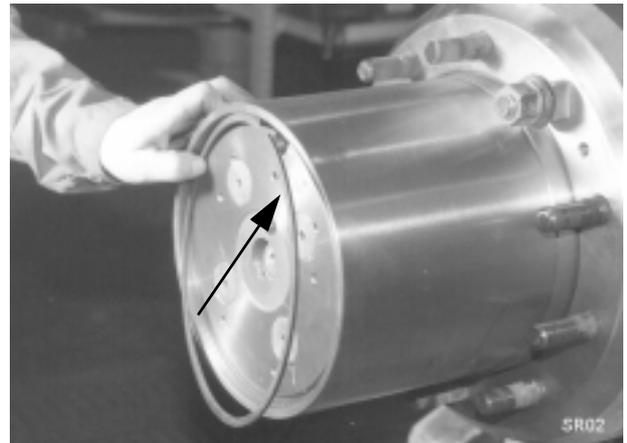
New version is easily identified by eight (8) retaining screws (item 38) instead of the original five (5)(item 35).

2.2 Removal:



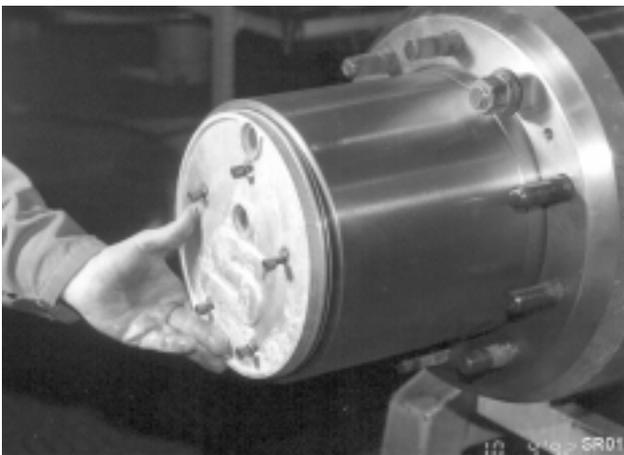
Picture 3: Oil drain plug (arrow)

1. Lift axle up and support it on axle stands. Take wheel off.
2. Remove drain plug (arrow in Picture no. 3) and drain oil from the planetary gears into a suitable container.



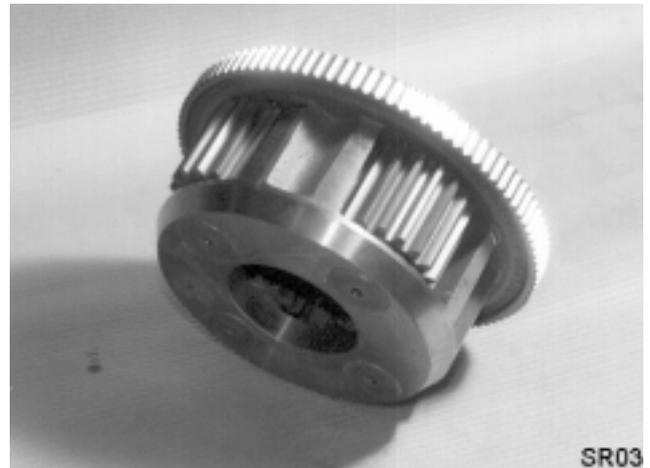
Picture 5: Locking ring removed

4. Remove locking ring (arrow) in Picture no. 5. Now the planetary carrier can be pulled out.



Picture 4: Hub cover retaining screws loosened

3. Unscrew hub cover retaining screws (5 or 8 pcs) and remove the cover.



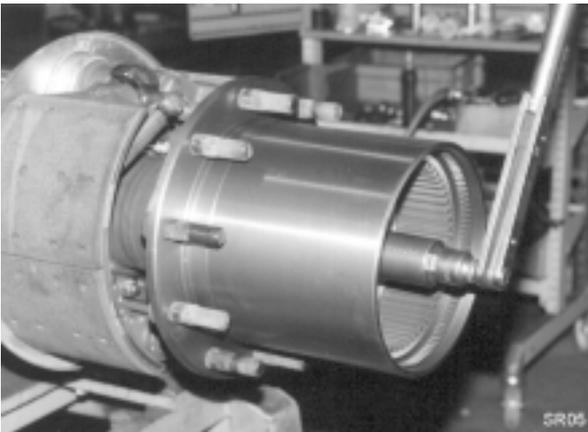
Picture 6: Planetary carrier removed

5. Pull the axle shaft out from axle casing.
6. Take care of the spacer ring, which is under the sun gear on the axle threads.



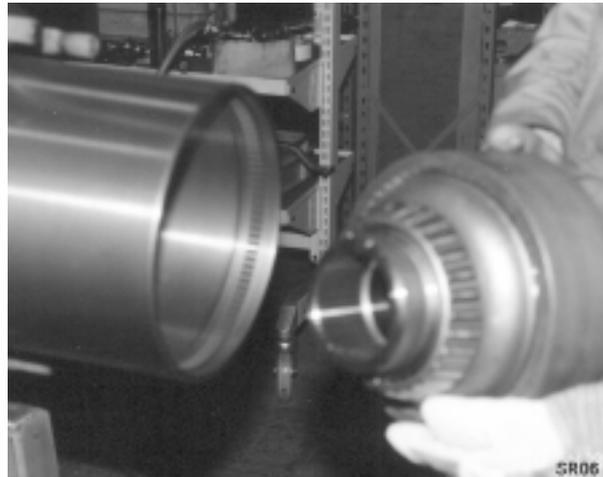
Picture 7: Planetary housing when planetary carrier is removed

7. Remove lock screws from the bearing adjustment nut and straighten lock plate tab in the groove of the nut. Undo the nut and take care of it and the lock plate under it. See Picture no. 7.



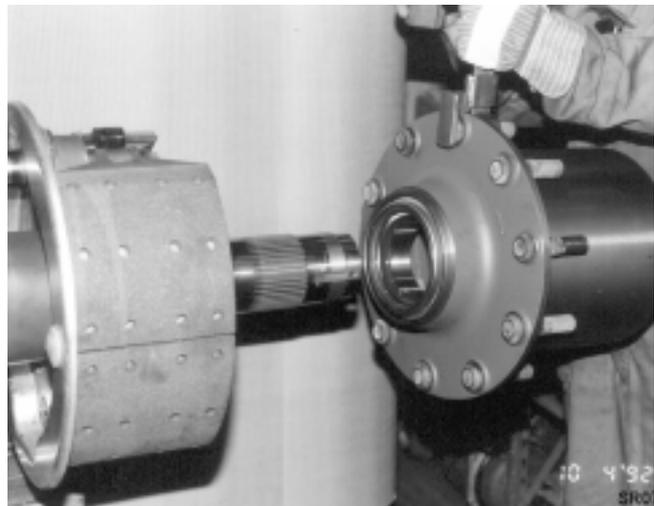
Picture 8: Removing the wheel hub bearing adjustment nut

8. Now it is possible to pull the ring gear with the hub out from the axle tube. Outer hub bearing will follow with the ring gear hub. To make removal easier, support the wheel hub a little.
9. Take care of the wheel hub bearing spacer and shim(s) and keep them separate so that they are not mixed with other adjustment parts.



Picture 9: Removing the planetary ring gear with its hub.

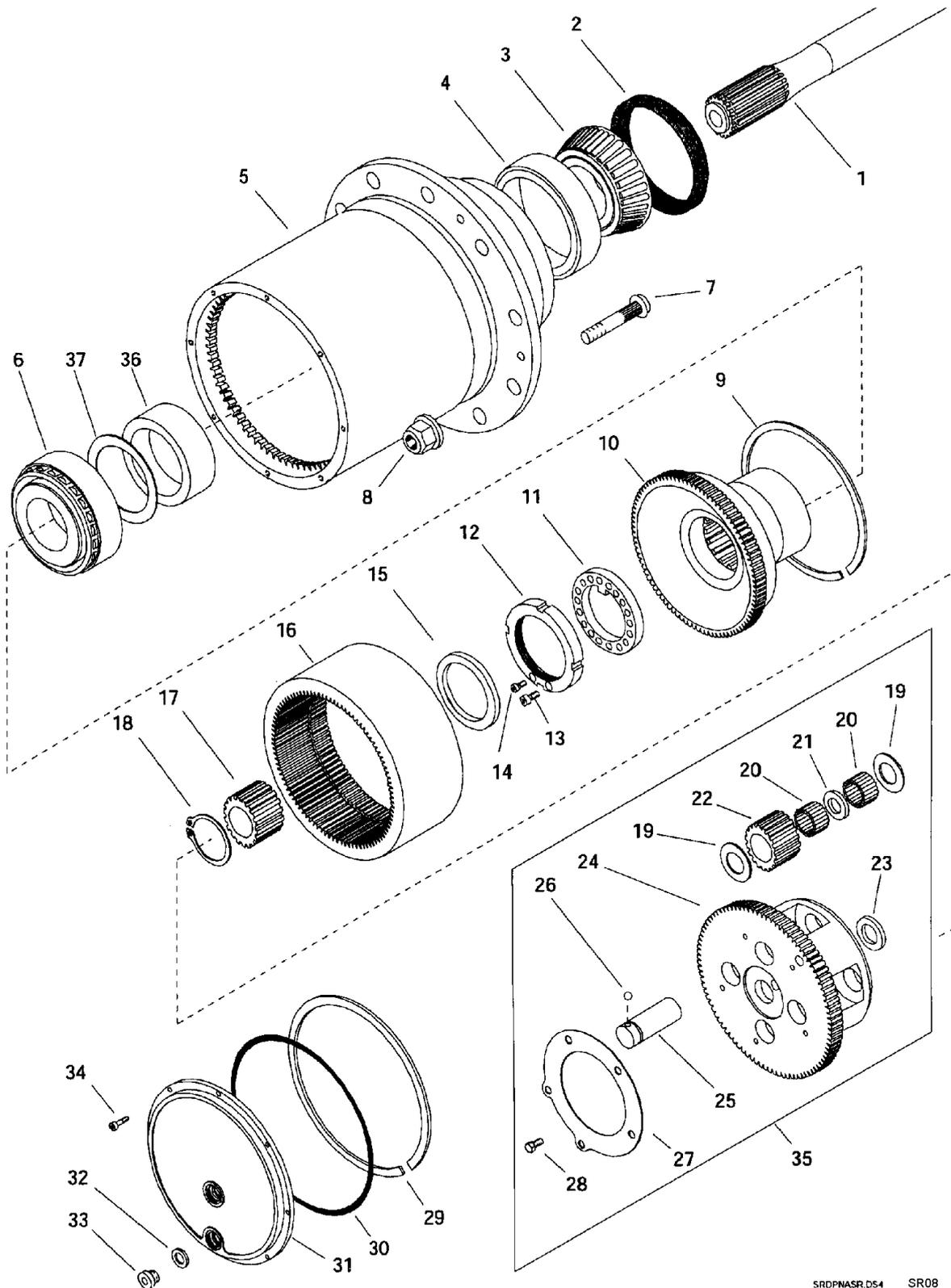
After removal of the planetary ring gear and its hub you can pull the wheel hub out. The inner wheel hub bearing and the hub seal will follow.



Picture 10: Removing the wheel hub.

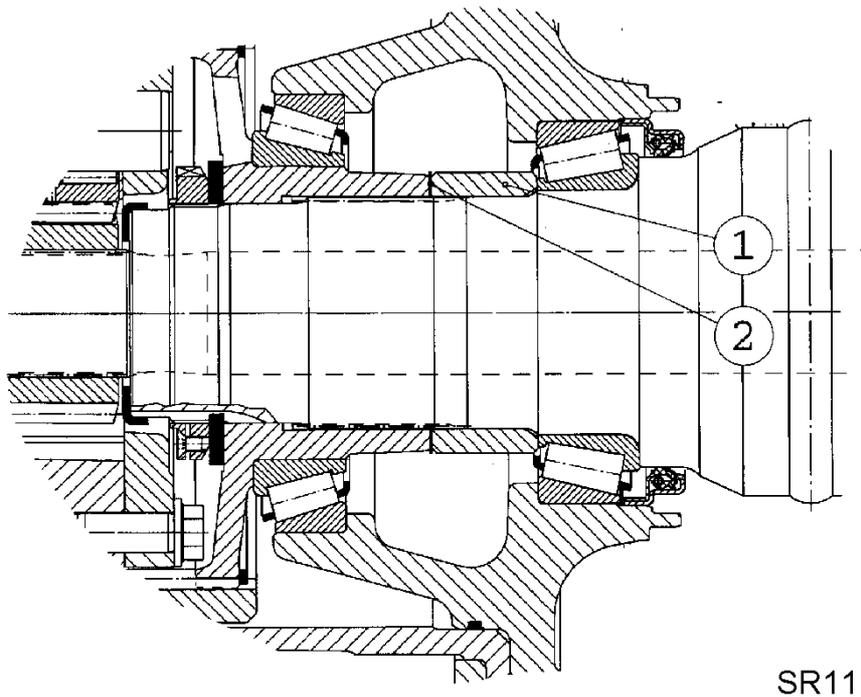
It is possible to remove brake drums separately if necessary, for example to make wheel hub assembly lift easier.

2.3 Wheel hub



SRDPNASR.DS4 SR08

Picture 11: Wheel hub exploded (spacer 36 and shim(s) 37 are standard in production line from November -99).



Picture 12: Spacer ring (1) and shims (2) which are standard in production line from November -99



Note!

A spacer ring and adjusting shim(s) (1 and 2 in above Picture no. 12) have been added in the wheel hub assembly in the hub reduction rear axles. This change has been made to reduce the need for re-tightening the wheel hub bearings.

There are no changes in other parts in the axle, only the spacer rings and the adjusting shims have been added.

Date of change:

012/SRDP-30-S-1641/002 axles from serial No.93320, date 12.10.1999

012/SRDP-30-S-2057/006axles from serial No. 93367, date 12.10.1999

All other SRDP-30 axles from serial No. 93833, date 3.11.1999

Interchangeability:

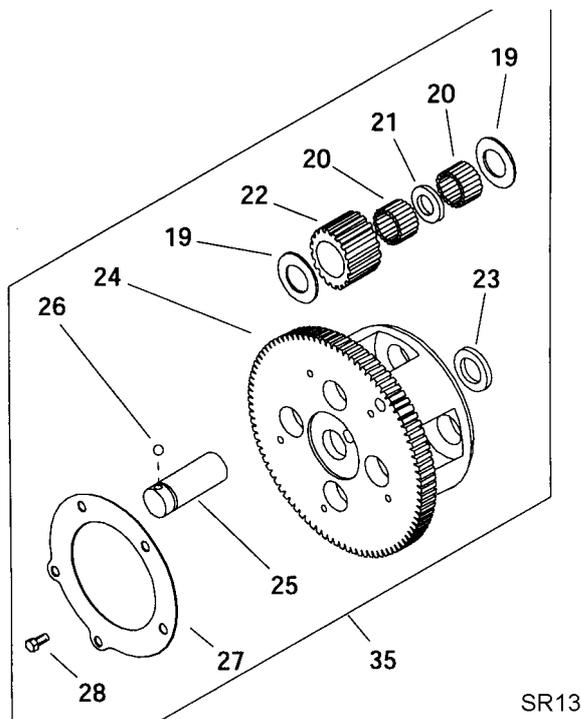
It is possible to install the new spacer rings and adjusting shims to the earlier design if desired.

Spare parts

| | | |
|--------------------------|--------------|----------|
| Spacer ring, l=44 mm | 543-416-0400 | 2 |
| Adjusting shim s=0.10 mm | 590731-09510 | as reqd. |
| Adjusting shim s=0.15 mm | 590731-09515 | as reqd. |
| Adjusting shim s=0.20 mm | 590731-09520 | as reqd. |
| Adjusting shim s=0.50 mm | 590731-09550 | as reqd |

2.3.1 Dismantling:

1. Remove the hub seal. Remove the inner wheel hub bearing out. Remove bearing outer races from hub by using soft drift, if bearing replacement is required.



Picture 13: Planetary in exploded view (later design)

2. Dismantle the planetary carrier by pressing the pins (25) of the planetary gears (22) out from inside by using a workshop press. After pin removal the planetary gears with bearing needles (20), thrust washers (19) and spacers (21) are all loose. Carefully take care of all parts. Take care of the pin locking balls (26) too. (See Picture no. 13).
3. Check that the thrust washer (23 in Picture no. 13) is firmly in position in the housing. If loose or worn out, replace it.

2.3.2 Assembly

1. Inspect all planetary gear components and discard all excessively worn or damaged parts. Start assembly by inserting bearing needles (20 in Picture no. 13) inside the planetary gears (21 in Picture no. 13). There are two rows of needles and a spacer (22 in Picture no. 13). Use grease in assembly to make it easier and assure lubrication at startup.

2.4 A change on the SRDP (BTH) axle wheel hub and on the wheel bearing adjusting and locking

2.4.1 A change on the wheel hub

The shoulder for the SRDP inner wheel bearing has been reinforced. This was introduced approx. August 1995.

2. When bearing needles and spacers are inserted you can place planetary gears with thrust washers (19 in Picture no. 13) inside the planetary carrier casing and press in respective pins (25 in Picture no. 13) so that locking balls (26 in Picture no. 13) may enter into their slots in the casing.



Note!

Work phases 3 - 4 apply to later wheel cover design only.



Picture 14: planetary wheel pin locking plate installed

3. Install planetary wheel pin locking plate (27 in Picture no. 13) on the planetary carrier surface and install the screws (28 in Picture no. 13).
4. Tighten screws to prescribed torque. (see page 18).

2.4.2 The following parts have been changed with the reinforcement:

| Description | Old part number | qty/axle | New part number | qty/axle | drum brake | WDB |
|-----------------|-----------------|----------|-----------------|----------|------------|-----|
| Wheel hub | 143-441-0100 | 2 | 143-441-0500 | 2 | | x |
| Wheel hub | 143-441-0200 | 2 | 143-441-0410 | 2 | x | |
| Planetary cover | 141-422-0600 | 2 | 141-422-0410 | 2 | x | x |
| Shaft seal | 91122-12103 | 2 | 91122-12701 | 2 | x | |
| Screw | 90311-08208 | 10 | 90313-06168 | 16 | x | x |
| Seal ring | 91208-08002 | 10 | ----- | | x | x |
| Screw | | | 90303-08203 | 10 | x | x |
| Lock plate | | | 135-259-0210 | 2 | x | x |
| Sliding ring | 143-428-0300 | 2 | 143-428-0310 | 2 | | x |
| Axle housing | 143-112-XXXX | 1 | 543-114-XXXX | 1 | x | x |



Note!

The old and the new design are NOT interchangeable.

2.5 A change on the wheel hub bearing adjusting and locking

The locking of the wheel bearing adjusting nut was changed in all SRDP- and FRDP axles beginning on the SRDP WDB-axle on June 1997 as follows:

Axle assembly numbers were not changed. Serial numbers are the following:

| | | |
|------------------|-------|----------------|
| SRDP WDB | 71546 | June 1997 |
| SRDP drum brakes | 72067 | September 1997 |

2.5.1 The following parts have been changed with the new adjusting nut:

| Description | Old part number | Qty/axle | New part number | Qty/axle |
|-----------------------|-----------------|----------|-----------------|----------|
| Ring gear hub | 135-271-0400 | 2 | 535-271-0401 | 2 |
| Special nut | 099-290-8003 | 2 | 599-290-8004 | 2 |
| Lock plate | 099-459-0000 | 2 | 143-418-0510 | 2 |
| Screw | 90319-06106 | 4 | -- | |
| Screw | -- | | 590319-08186 | 2 |
| Screw | -- | | 590319-08126 | 2 |
| Adjustment wrench | 7143-024-020 | | 7543-050-020 | |
| Adjustment wrench WDB | 7143-053-030 | | 7543-050-020 | |

**Note!**

The part number of the ring gear will not change. The new and the old parts cannot be used in the same design but the new locking can be used in the old axles if the ring gear hub is changed accordingly.

2.6 Assembly:

Inspect the wheel hubs carefully before assembly. The wheel hub seal should always be replaced. Bearings have to be inspected carefully and replaced if any defects, such as scratches, wear spots or discolouring appear. Check also that bearing outer races are tight in their seats. If races are loose in the hub, the hub has to be replaced. Inspect condition of the planetary ring gear and its fixing into the hub. If any defects are found in the ring gear it has to be replaced. Before removing the ring gear you removed the retaining ring (9 in Picture no. 11)

1. Install bearing races with a workshop press to assure their correct installation into their seats. When the races are installed, place inside bearing onto the race and install the wheel hub seal. Lubricate seal inside and the bearing rollers and surfaces prior the installation. Now the wheel hub is assembled and ready for installation.
2. Lift the wheel hub onto the axle tube.
3. Install spacer ring and shim(s) (36 and 37 in Picture no. 11) on the axle tube. **This is standard only in the latest design.**
4. Install lubricated outer hub bearing as well. Install the lock plate and bearing adjustment nut and tighten slightly with wrench No. 7143 015 020. Tighten the nut and rotate the hub few turns in both direction.
5. Perform adjustment of the wheel hub bearing as follows:

2.6.1 Wheel hub bearing adjustment (Earlier design with sheet metal lock plate with locking tabs):

1. Install the sheet metal lock plate and bearing adjusting nut and tighten slightly with wrench No. 7143 024 020.
2. Tighten the adjusting nut to 200 Nm [147 lb.-ft.] torque while rotating the hub. Then, loosen the nut by max 1 locking tab places (approx. 19°) and lock the nut in this position with two lock screws and by bending a lock plate tab into the nut groove
3. Use Loctite locking liquid and tighten lock screws to 12 Nm (9 ft.-lb.) torque by a torque wrench.

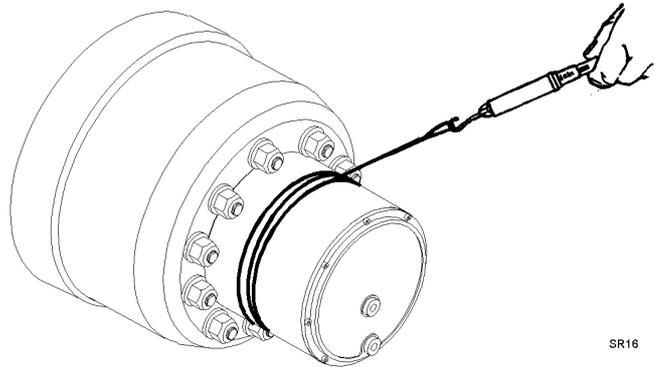
2.6.2 Instructions for the later design of the wheel hub adjusting nut and lock plate (Thicker lock plate with holes, from September 1997):

1. Install the lock plate and bearing adjusting nut.
2. Tighten the adjusting nut (12 in picture 11) with tool No. 7543-050-020 to 500 Nm [370 lb.-ft.] torque while rotating the hub.
3. Then loosen the nut about 1/4...1/2 turns and tighten the nut to 250 Nm [185 lb.-ft.] torque while rotating the hub again.
4. Then loosen the nut only so that the longer of the lock screws can be installed in one of the two thread holes (M8) so that the tip of the longer lock screw goes to the a bore in the lock plate.
5. Use Loctite locking liquid and tighten the lock screws to 12 Nm [9 lb.-ft.] torque.
6. Check the correct bearing clearance (0...0.05 mm) with a dial gauge by moving the hub in the direction of the axle spindle while rotating the hub.
7. Repeat the adjustment if necessary.

2.6.3 Adjustment of the wheel hub bearings with spacer rings:

1. Use standard spacer ring (36 in Picture no. 11) and all old shims (37) which were removed, or use standard spacer ring + 1,2 mm thick shim(s) if old shims are not available.
2. Install the hub and bearings as well the ring gear (16) with the hub.
3. Install locking plate (11) and nut (12).
4. Tighten the nut (12) to 250 Nm [185 lb.-ft.] torque while rotating the hub.
5. If the hub rotation stops while torquing the nut, remove the wheel bearing adjusting nut and remove the ring gear hub with the outer hub bearing inner race and insert some additional shim(s).

6. Repeat working phases 2 thru 4 until the wheel hub rotates freely.
7. Check the bearing clearance/preload with a dial indicator. Attach the dial indicator by its magnetic holder to the hub and place the tip of the gauge against the ring gear hub. Move the hub in the direction of the axle while turning it back and forth and read the clearance on the dial.
8. If the clearance is over 0.05 mm, [0.002 inches] remove the wheel bearing adjusting nut and remove the ring gear hub with the outer hub bearing inner race. Remove the adjusting shims to reduce the thickness of the shims so that the correct installing preload/clearance from -0.05 to +0.03 mm [-0.002 to 0.001 inches] can be achieved.
9. Install the shims and the ring gear hub with bearing and tighten the wheel bearing adjusting nut to 1000 Nm [738 lb.-ft.] torque while rotating the hub.
10. Check the wheel hub rolling torque. It must be 8 ± 2 Nm when measured by a torque wrench in the middle of the wheel hub cover (a special fixture is required) or 43 - 71 N when measured by a spring scale and a piece of the string around the wheel hub circumference (See Picture no. 15).



SR16

Picture 15: Rolling torque measurement with a spring scale



Note!

This measurement shall taken with rotating hub.

2.6.4 Axle shaft inspection and installation:

The axle shaft and associated sun wheels have to be inspected prior the installation.

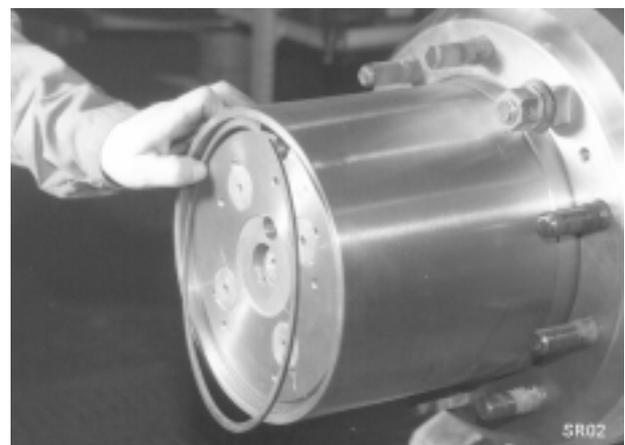
Special attention has to be paid to the condition of teeth of the sun wheel. No cracks are allowed. If defects are found the sun wheel has to be replaced.

If excessive clearance is found in the splines between the sun gear and axle shaft sun gear and/or axle shaft have to be replaced.

Install axle shaft after wheel hub bearing adjustment. Prior installation place the protection plate (item 15 in picture 11) onto the shaft or the axle tube threads and assure correct installation.

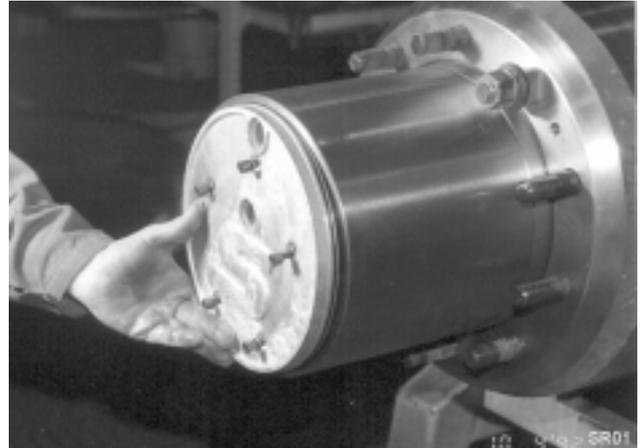
2.6.5 Installation of the planetary carrier (early design wheel hub cover)

1. Assembled planetary carrier may be installed after installation of the axle shaft and the protection plate (15 in Picture no. 11).
2. Before and under the installation of the planetary carrier, make sure that sun gear thrust ring (23 in Picture no. 11) is properly seated in the casing.
3. During installation of the casing rotate it back and forth a little so that all gears do engage and you can push it in.



Picture 16: Installation of the retaining ring

- When the planetary carrier is seated, lock it with the retaining ring (see Picture no. 16). Finally install the hub cover and the screws (35 in Picture no. 11) and tighten them to prescribed torque. (see page 18). O-ring (30 in Picture no. 11) and copper washers for the screws (34 in Picture no. 11) always have to be replaced with repairs.



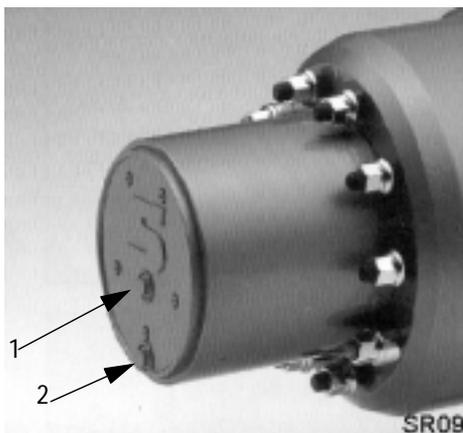
Picture 17: Installation of the hub cover

2.6.6 Installation of the planetary carrier (new wheel hub cover)(no illustration)

- Assembled planetary carrier may be installed after installation of the axle shaft and the protection plate (15 in Picture no. 11).
- Before and during the installation of the planetary carrier, make sure that sun gear thrust ring (23 in picture Picture no. 11) is properly seated in the casing.
- During installation of the casing rotate it back and forth a little so that all gears engage and you can push it in.
- When the planetary carrier is seated, lock it with the retaining ring (as in Picture no. 16). Finally install the hub cover and the screws (38 in Picture no. 11) and tighten them to prescribed torque. (see page 18). O-ring (30 in Picture no. 11) always has to be replaced with repairs.

3 MAINTENANCE

3.1 Wheel hub oil check and oil filling



Picture 18: Wheel hub oil drain plug (2) and level plug (1)

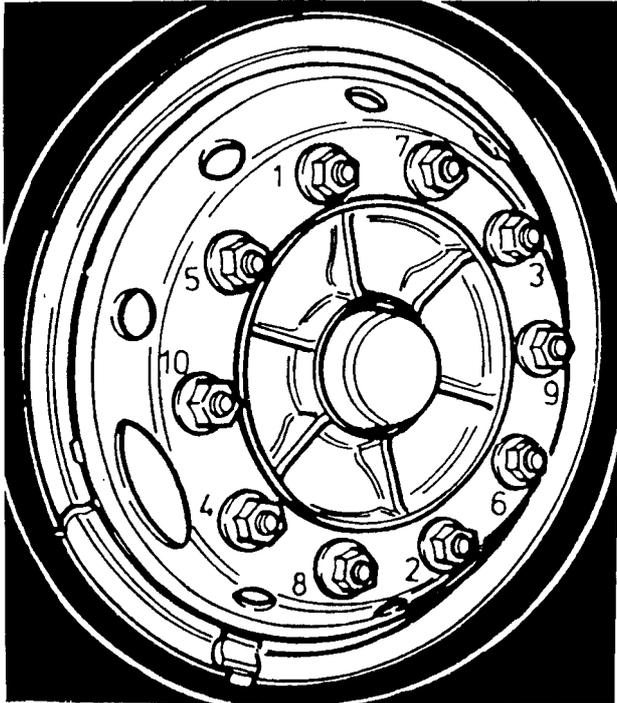
- Rotate the wheel hub so that the drain plug (2) in the lowest position.
- Remove the level plug (1) and fill recommended oil to the level of the plug opening.



Note!

To prevent possible oil leaks use FEL-PRO 51464 or LOCTITE 572 thread sealing compound in axle casing oil drain plug threads at plug installation. Spread the sealing compound evenly on the plug and the opening threads before installation. THIS APPLIES TO TAPERED OIL DRAIN PLUGS IN AXLE CASING ONLY - ALL FLANGED OIL PLUGS ARE FITTED WITH SEPARATE SEALS AND DO NOT REQUIRE USE OF THE SEALING COMPOUND.

3.2 Attaching the wheel



BRAKE07

Check that the wheel nuts and bolts are clean and undamaged. Lubricate the bolt threads with a little oil. The tightening torque of the nuts is 550 Nm.

Check the tightness of the nuts again at the latest after one day's driving.

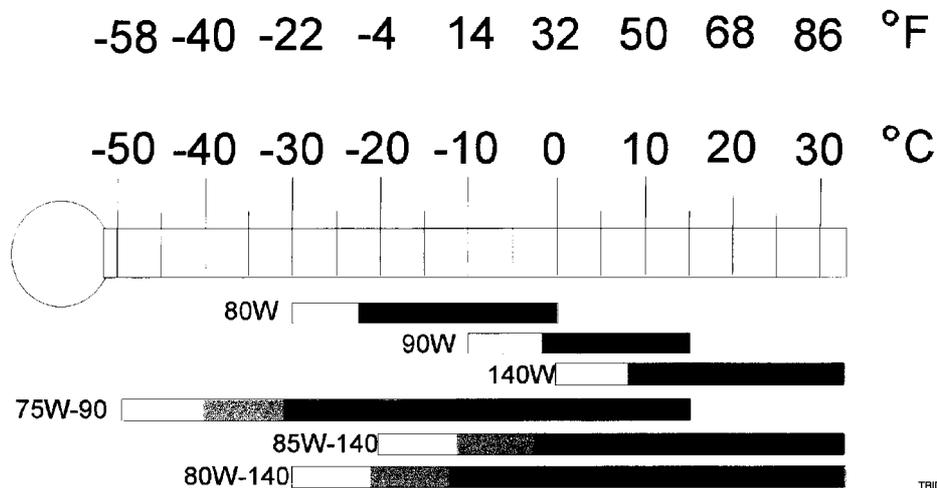
Kuva 19: Wheel nut tightening sequence

3.3 OIL RECOMMENDATION

Oil grade: API GL 5

Also synthetic oils are allowed.

Viscosity: selected from the following chart according to the ambient atmospheric temperature. The same oil is to be used for both the drive gear and the hubs.



TRID35

Picture 20: Recommended oil viscosity (SAE) according to the ambient atmospheric temperature.

3.4 SERVICE AND MAINTENANCE RECOMMENDATIONS

3.4.1 FIRST SERVICE AFTER APPROXIMATELY 300 HOURS

- Change the oil (API GL-5)
- Check wheel hub bearing adjustment

3.4.2 MAINTENANCE INTERVAL 750 HOURS OR 6 MONTHS

- Check the adjustment and the proper operation of the slack adjusters
- Check the thickness of the brake linings (if less than 6 mm the linings have to be replaced)
- Check the oil level of the differential carrier and the hubs
- Check that the breather is working properly
- Check the overall condition of the axle (possible oil leak etc.)

3.4.3 MAINTENANCE INTERVAL 1500 HOURS KM OR 12 MONTHS

- Perform all the above points
- Check wheel hub bearing adjustment
- Change the oil (API GL-5) for the differential carrier and the hubs
- Clean or change the suction filter in the oil pump inlet (if pump is used)

The crease lubrication according to the vehicle's standard schedule.

4 SPECIAL TOOLS

| Description | Number: |
|---|--------------|
| Wheel hub wrench - early design | 7143 024 020 |
| Wheel hub wrench WDB - early design | 7143-053-030 |
| Wheel hub wrench - later design - all models from approx. June 1997 | 7543-050-020 |

5 TECHNICAL DATA

Wheel Hub

| | | |
|-----------------------------|---------------------------|---------------------|
| Oil volume approx. | 1,0 | l |
| Wheel hub bearing clearance | According to the version, | see respective text |

Tightening torques

| | Nm | [lb. -ft] |
|---|---------|-----------------|
| Wheel hub nut with spacer rings | 1000 | [738] |
| Wheel hub nut locking bolts | 12 | [8.8] (cement) |
| Planet wheel pin locking plate bolts | 20 | [14.8] (cement) |
| Planetary cover bolts - M8 early design | 20 | [14.8] (cement) |
| Planetary cover bolts - M6 later design | 9 | [6.6] (cement) |
| Wheel nut | 550 | [405] |
| Oil plugs | 50 - 70 | [37 - 52] |

Hub reduction design

| | |
|------------------------|------------|
| With 4 planetary gears | Ratio 4,24 |
|------------------------|------------|