



Axles

MAINTENANCE MANUAL

FRMP-10/11 Foremost Tandem Axle

FRDP-10/11 Rear Tandem Axle & Rear axle



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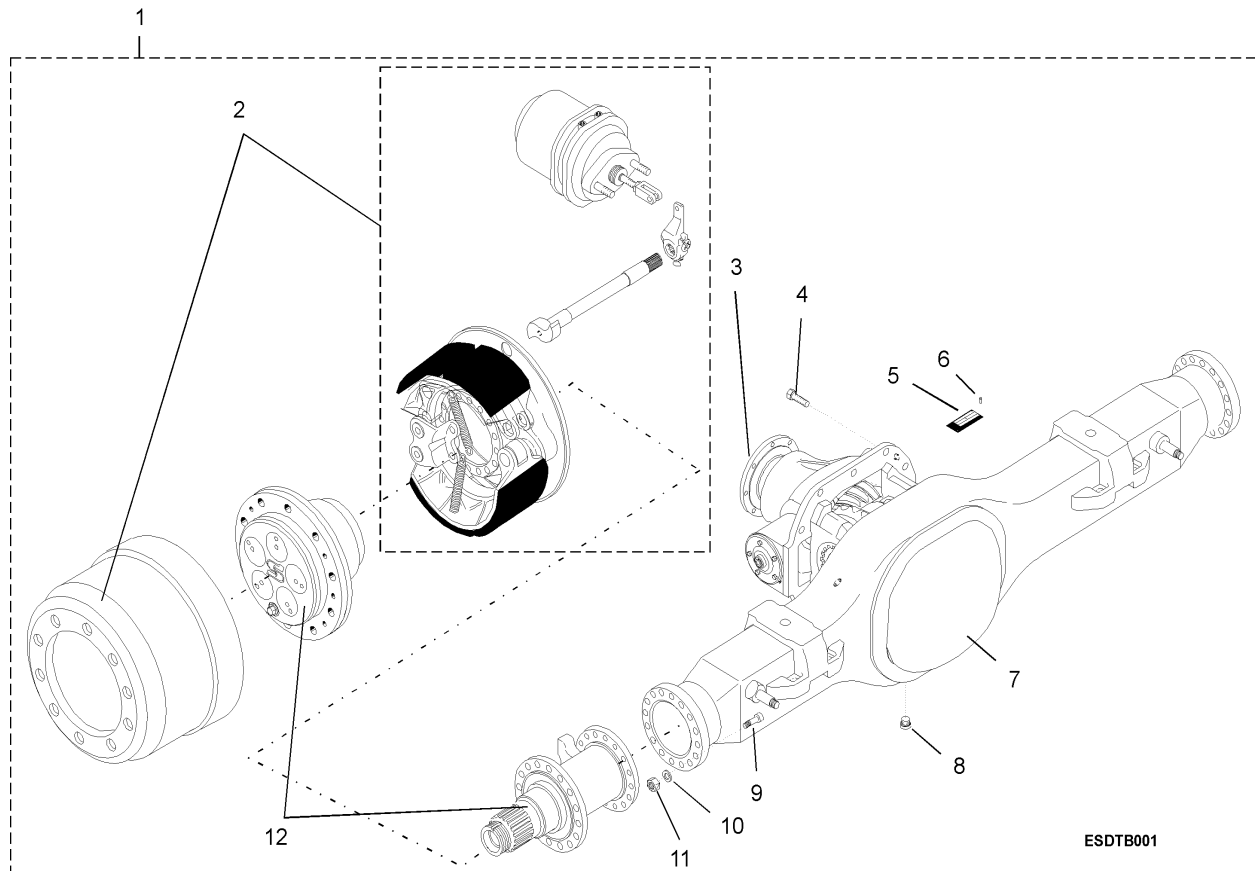
NOTE ! This Manual is intended for use by experienced mechanics using safe procedures in properly equipped shops. Safety precautions should always be followed such as wearing safety glasses, using adequate lifting aids, and using tools and equipment in good condition. Sisu Axles, Inc., its agents, associates or representatives are not responsible for damage or injury occurring while working on their components.

1 AXLE DESIGN

The axle primary gearing is composed of a pair of bevel wheels located among the drive gear between the axles.

Power from the drive gear is transmitted by an axle shaft to the wheel hub, which has a five-planet type planetary gear to act as a secondary gearing.

The sun wheel connected to the end of the axle shaft rotates the planet wheel carrier by means of the planet wheels, which are connected to the wheel hub. The ring gear is locked to the axle housing. The drive gear and differential, gear, together with bearings, are lubricated with oil from the drive gear housing. The hubs of the wheels have their own separate oil reservoirs to lubricate the planetary gears



Picture 1: FRXP axle in exploded view



Note!

There are two axle design, one piece axle housing and three piece one, where outer ends are detachable. In this book, there are illustration of both ones, but only difference there is axle housing screw joints and O-ring sealing in three piece design. All other parts are identical.

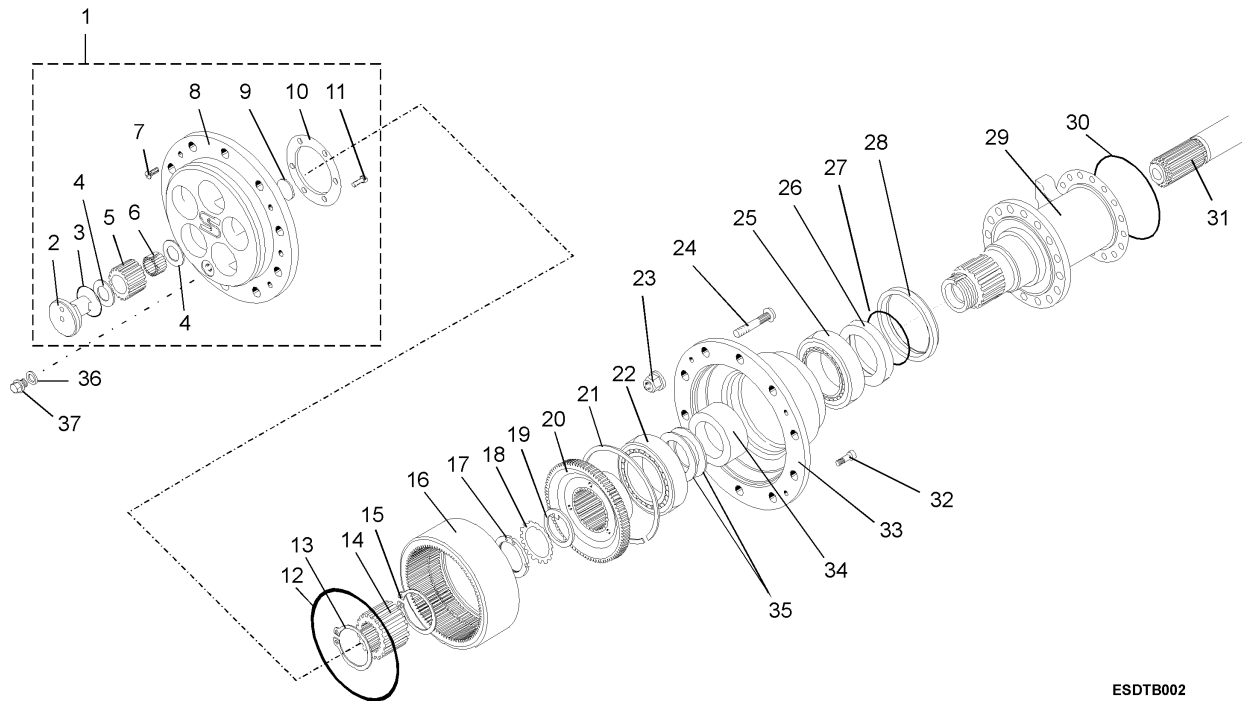
Drive gear is in separate manual.

Brakes are in separate manual.

2 PLANETARY HUBS

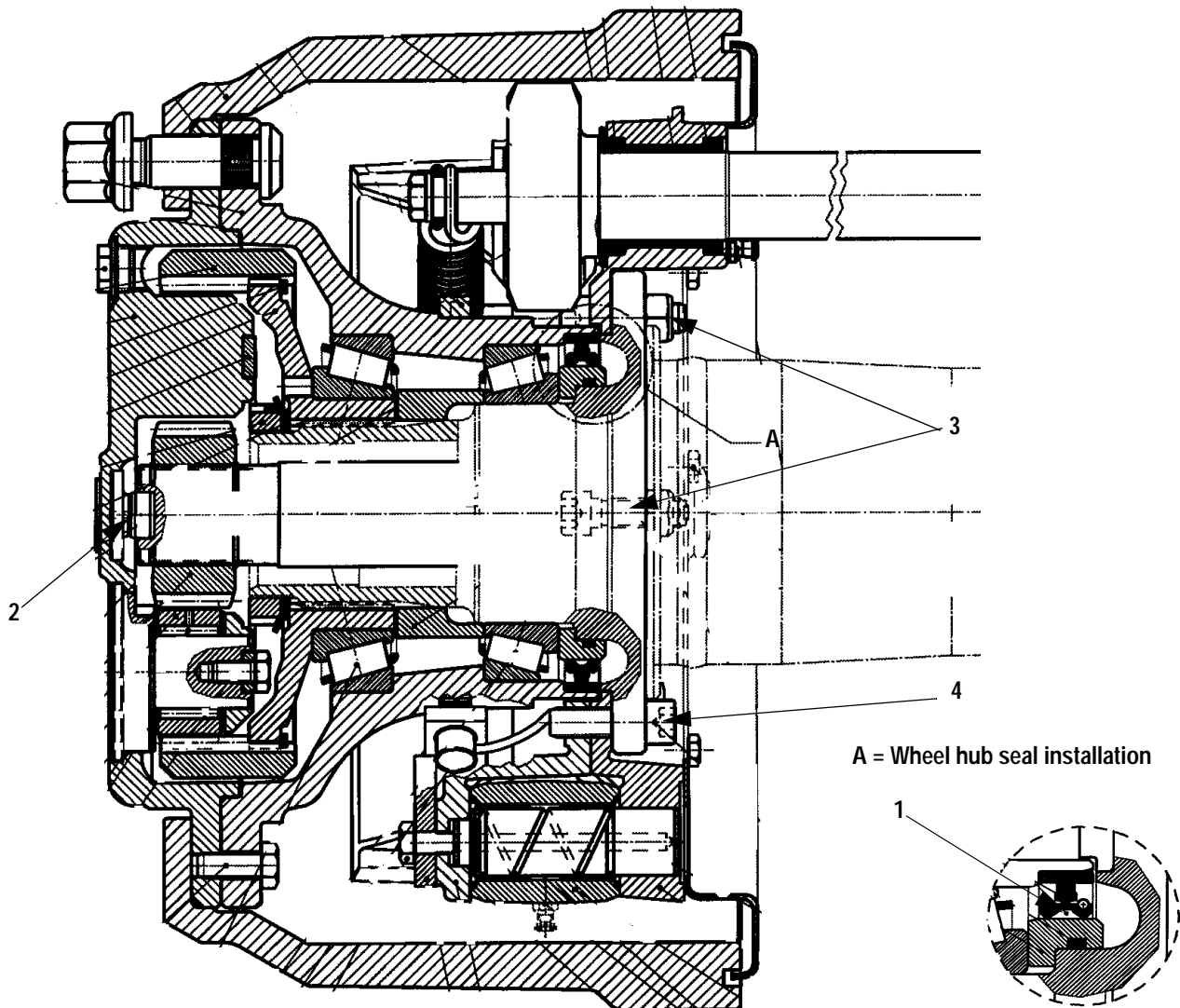
2.1 Design

FRXP axle planetary hubs are of five planet gear design.



ESDTB002

Picture 2: Wheel hub in exploded view

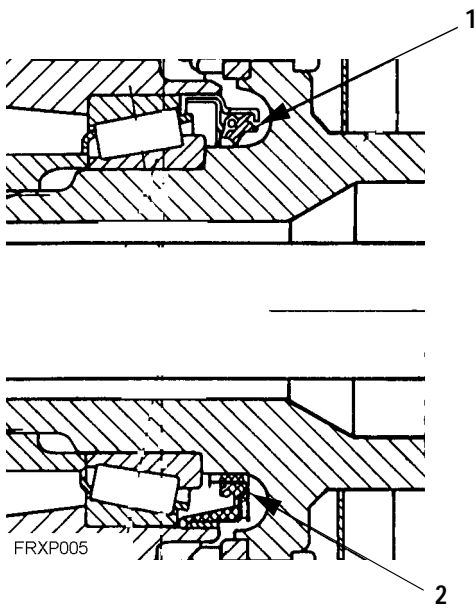


FRXP006

Picture 3: Wheel hub in sectional view


Note!
Details in picture 3:

1. Fill the seal and the seal cavity with good quality lithium base grease, consistency NLGI 1 or NLGI2.
2. Check within repair and maintenance works, that the thrust bearing for the axle shaft is properly installed. If it is loose, it must be fastened by Loctite 638 or similar adhesive.
3. Brake support retaining bolts (12 pcs/each side) with nuts - tightening torque 210 Nm when necessary.
4. Brake support retaining bolts (2 pcs/each side) without nuts, but threads in the brake support - must be torqued only to 110 Nm torque.



Picture 4: Wheel hub seal details - early design

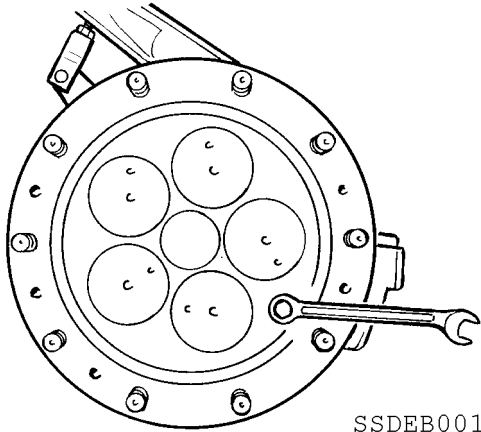


Note!

In early axles, there was no separate wear ring under the wheel hub seal, but seal attachment surface is machined on the axle tube. This design can be seen in the picture 4. There have been two cassette type seal variants (1 and 2), in this design.

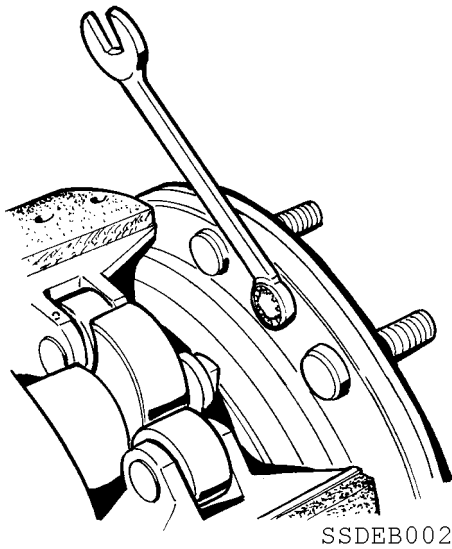
2.2 DISASSEMBLY

Raise the wheels off the ground. Release the wheel and brake drum.



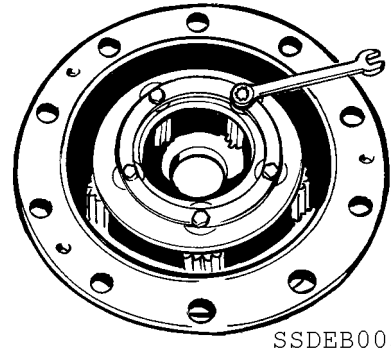
Picture 5:

1. Open the oil plugs and let the oil drain out of the hub.



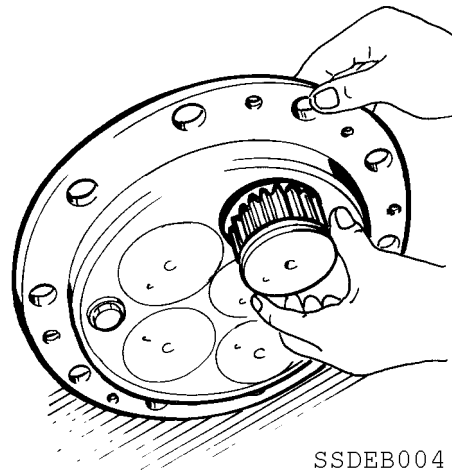
Picture 6:

2. Release the planet wheel carrier by opening the four bolts on the inside of the hub. Take off the planet wheel carrier by pulling it out. If necessary, turn extractor bolts in screw threads located on the carrier flange.



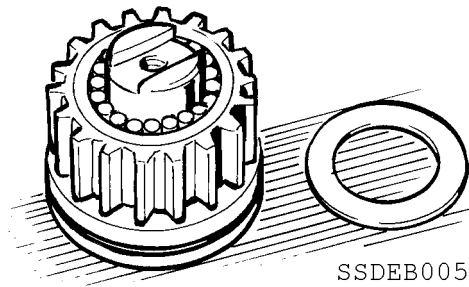
Picture 7:

3. Unfasten the bolts on the planet wheel carrier and remove the lock washer.



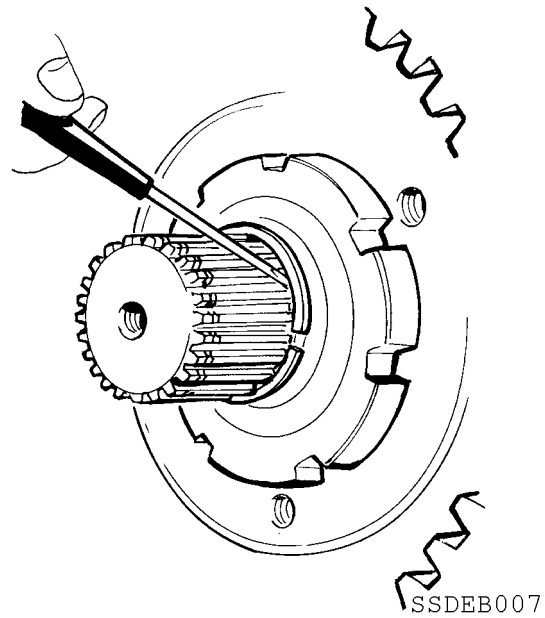
Picture 8:

4. Unfasten the planetary wheel axles from the planet wheel carrier, taking care not to drop the gear wheels.



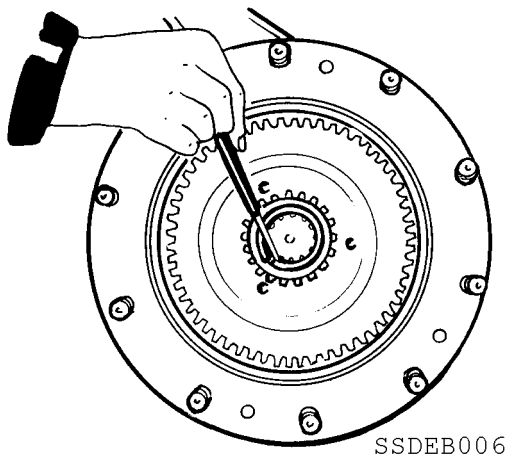
Picture 9:

5. Take off the upper shim plate and lift up the gear wheel, taking care not to lose the bearing rollers (they are loose!) Also remove the lower shim plate.



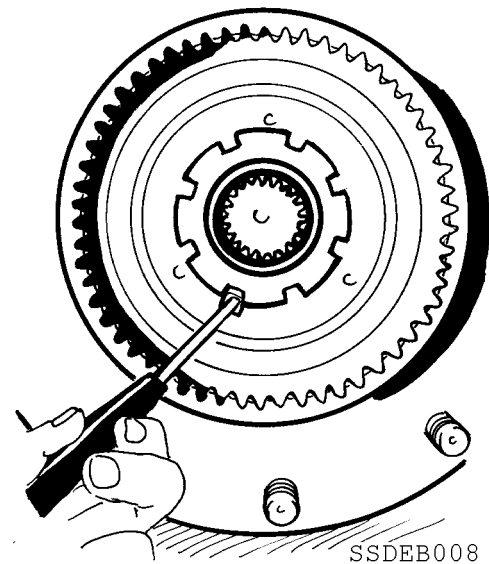
Picture 11:

7. Remove the inner circlip.



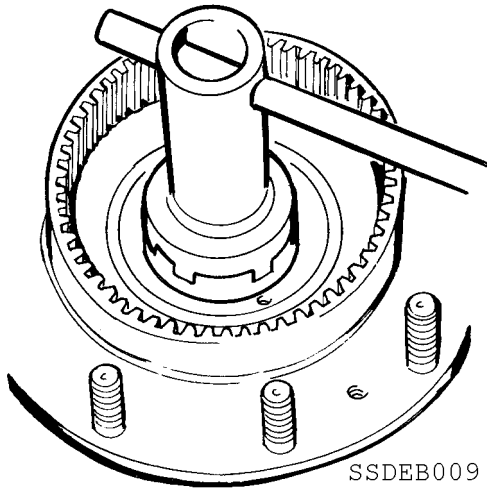
Picture 10:

6. Unfasten the circlip at the end of the axle shaft, and remove the sun wheel by pulling it outward.



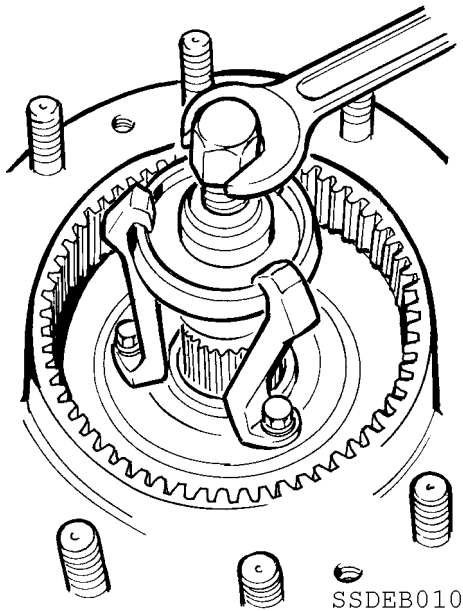
Picture 12:

8. Open the hub nut lock with a suitable tool or with a drift.



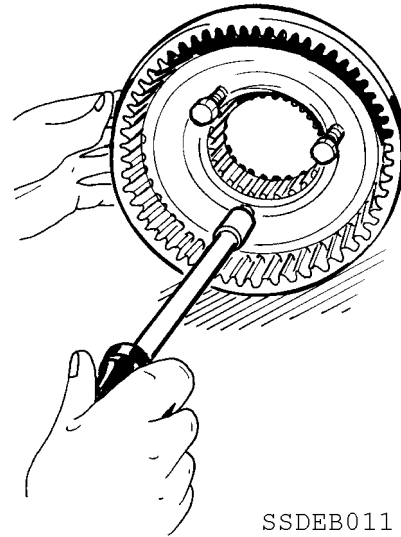
Picture 13:

9. Open the hub nut with special tool no. 7141-014-020. Remove the nut, washer and locking washer.



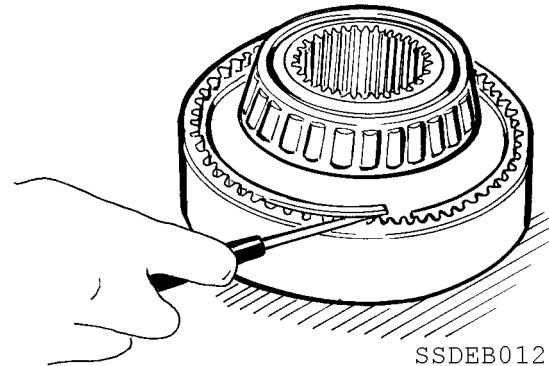
Picture 14:

10. Unfasten the ring gear by tapping it lightly with a hammer and pulling it outward at the same time. If necessary, use an extractor.



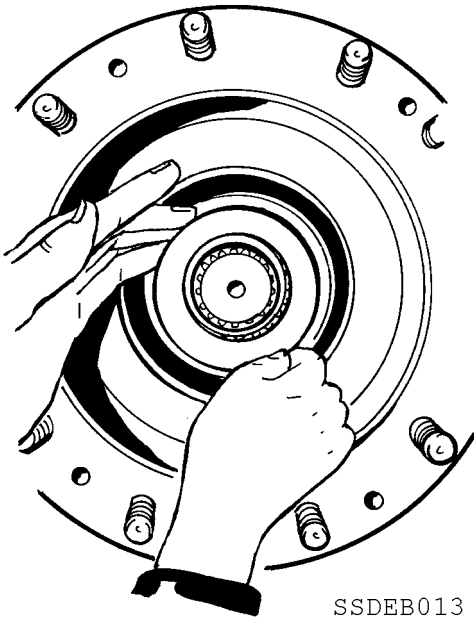
Picture 15:

11. Unfasten the ring gear by screwing three M10 bolts into the hub of the ring gear. Tighten the bolts evenly in turn.



Picture 16:

12. Unfasten the ring gear hub lock washer. Separate the ring gear and the hub by tapping lightly with a hammer.



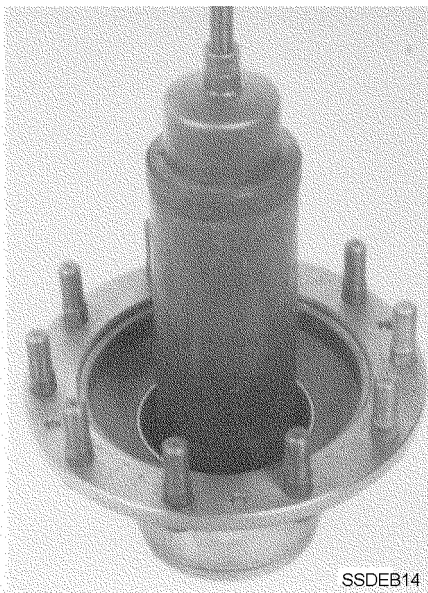
Picture 17:

13. Remove the shim plates and spacer. Remove the hub by pulling it out.



Picture 19:

15. Unfasten the outer bearing by pressing the outer race.



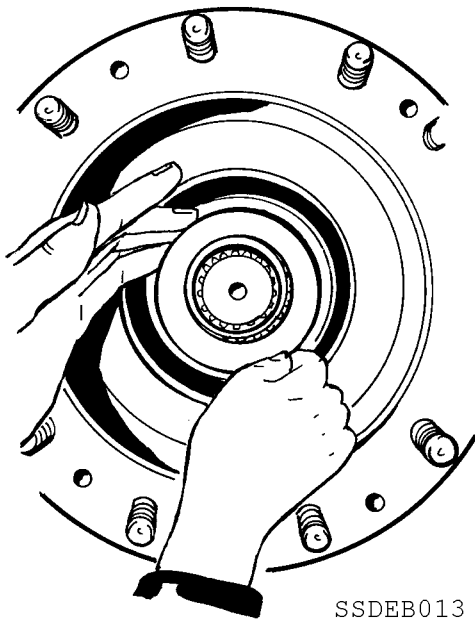
Picture 18:

14. Press the sealing ring and inner bearing of the hub away from the hub.

2.3 Assembly

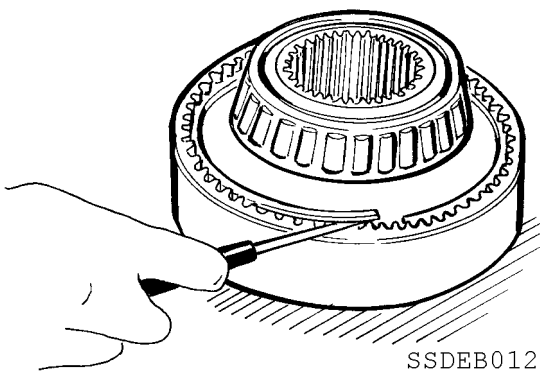
Before assembly, carefully clean all the parts. Check the condition of the threads especially carefully.

1. Install the bearing outer races into the wheel hub.
2. Lubricate the inside bearing cone by oil and fill the seal cavity and seal lips area with good quality grease.
3. Place the inside bearing cone onto the race and install the seal into the hub onto the bearing cone.



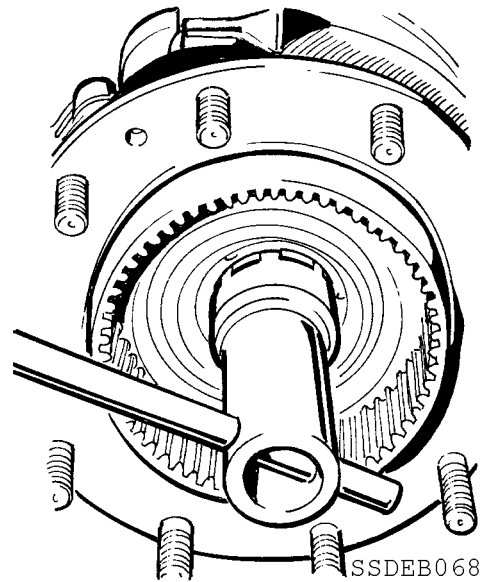
Picture 20:

4. Fit the hub onto the axle. Fit the spacer and the shim plates that were removed from the hub previously.



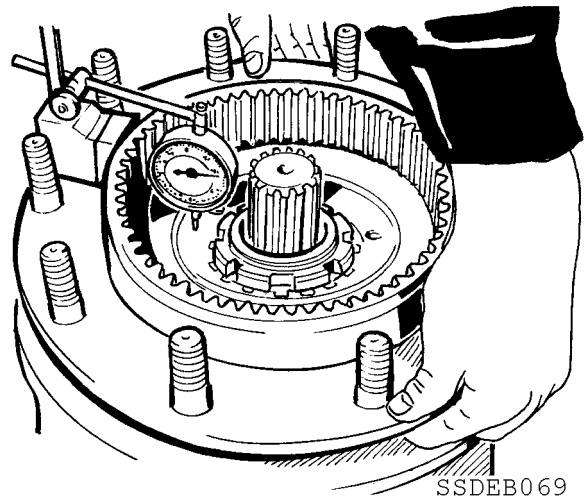
Picture 21:

5. Fit a new bearing on the hub of the ring gear. Fit the ring gear on the ring gear hub. Attach a lock washer.



Picture 22:

6. Lubricate and fit the hub outer bearing. Attach the hub to the swivel axle. Fit the washer and lock washer, and tighten the nut with special tool 7141-014-020 while rotating the hub at the same time. If the hub rotation is heavy, open the nut and put more shim plates on the axle. Tighten the nut with 1000 Nm torque.

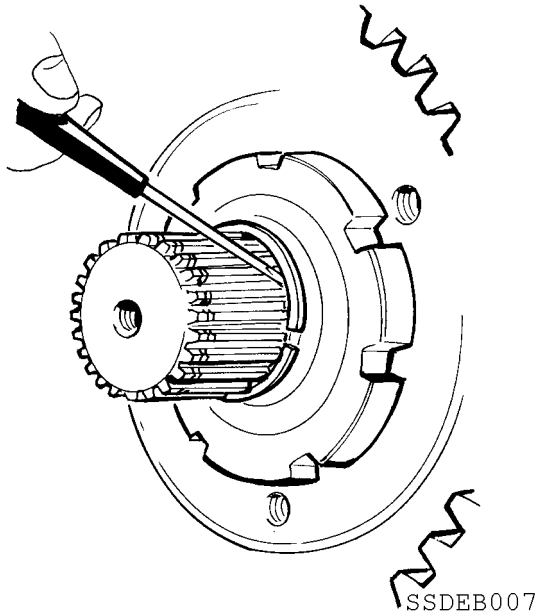


Picture 23:

7. Attach a dial gauge 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 and read the bearing clearance on the dial. The correct clearance is 0.00 - 0.10 mm. Adjust the clearance, if necessary, by changing the shim plates. Thicker plates increase the clearance.

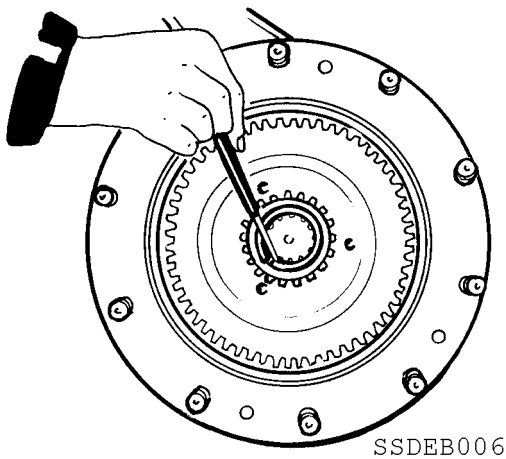
Available shims for bearing adjustment

Spare no.	Thickness/ mm	Spare no.	Thickness/ mm
099 519 1000	0,05	099 519 1002	0,20
099 519 1001	0,10	099 519 1003	0,50



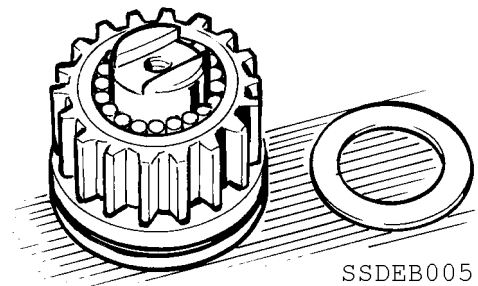
Picture 24:

- Bend the nut's locking plate lug into the nut slot with suitable tool or by a screw driver. Fit the half shaft inner locking washer.



Picture 25:

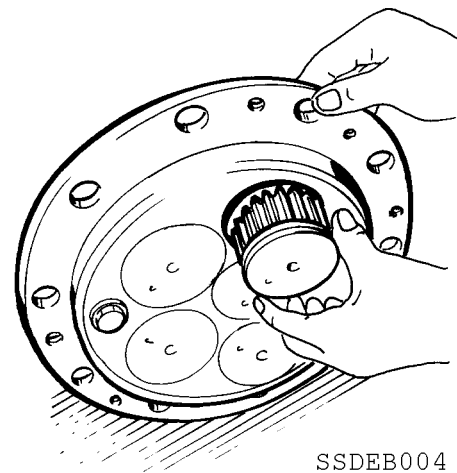
- Fit the sun wheel and the outer lock washer.



Picture 26:

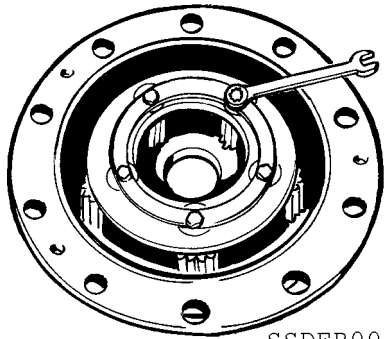
- Assemble the planet wheels' axle:

- Shim plate, smooth side towards the gear wheel (the other edge is bevelled)
- Gear wheel
- 26 Bearing rollers
- Shim plate, smooth side towards the gear wheel
- O-ring into the flange groove.



Picture 27:

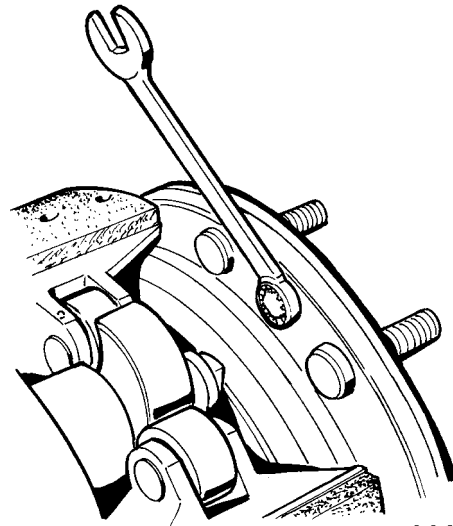
- Fit the planet wheels' axles onto the planet wheel carrier so that the tension washer fits in place.



SSDEB003

Picture 28:

12. Apply adhesive to the bolts' screw threads and tighten the bolts with 41 Nm torque, tapping the axles at the same time. Make sure that the gear wheels rotate freely.



SSDEB002

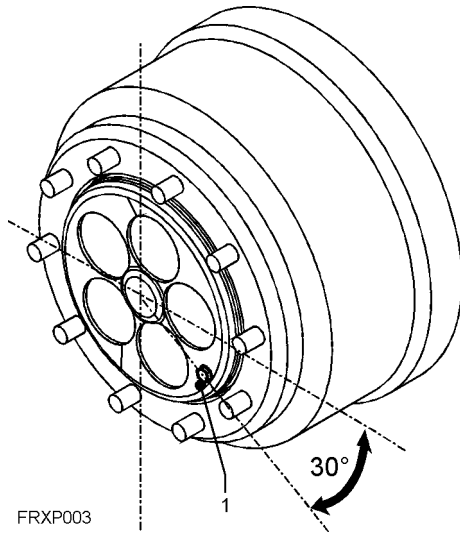
Picture 29:

14. Fit the brake drum and wheel.

13. Fit a new O-ring to the planet wheel carrier and fit the carrier on the hub. Spread adhesive on the bolts' screw threads. Tighten the bolts with 67Nm torque.

3 MAINTENANCE

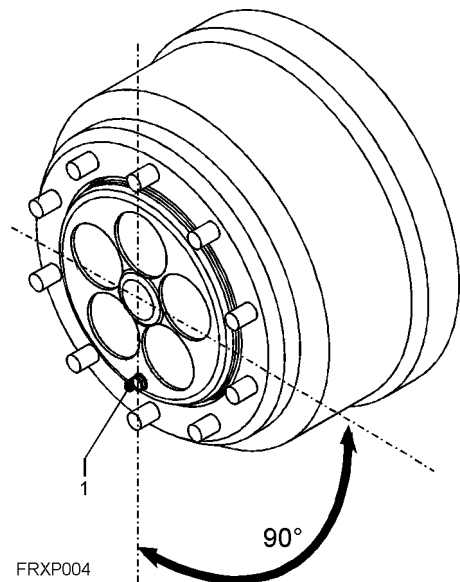
3.1 Wheel hub oil check and oil filling



Picture 30:

1. Rotate the wheel hub so that the oil plug is in 30° below center line as in picture 30.
2. Remove the oil plug and fill recommended oil to the level of the plug opening.

3.2 Wheel hub oil change



Picture 31:

1. Rotate the wheel hub so that the oil plug is in 90° below center line as in picture 31.
2. Remove the oil plug and drain oil into a suitable container
3. Rotate the wheel hub so that the oil plug is in 30° below center line as in picture 30.
4. 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 within plug installation. Spread the sealing compound evenly on the plug and the opening threads before installation.

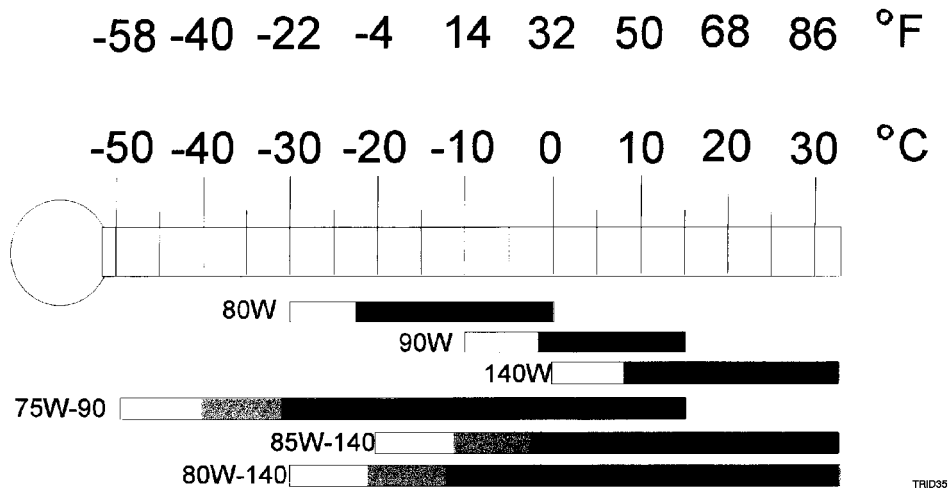
THIS APPLIES TAPERED OIL DRAIN PLUGS IN AXLE CASING ONLY - ALL FLANGED OIL PLUGS ARE FITTED WITH SEPARATE SEALS AND DO NOT REQUIRE USE OF THE SEALING COMPOUND.

3.3 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 32: Recommended oil viscosity (SAE) according to the ambient atmospheric temperature.

4 SPECIAL TOOLS

Description	Number:
Wheel hub wrench	7141-014-020

5 TECHNICAL DATA

Wheel Hub

Oil volume approx.	0,6	l
Wheel hub bearing clearance	0,00 - 0,10	mm

Tightening torques

	Nm	[lb. -ft]
Wheel hub nut	1000	[738]
Planet wheel pin locking ring bolts	41	[30.2] (cement)
Planetary carrier retaining bolts	67	[49.5]
Wheel nut	550	[405]
Oil plugs	50 - 70	[37 - 52]

Hub reduction design

With 5planetary gears	Ratio 3,64
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