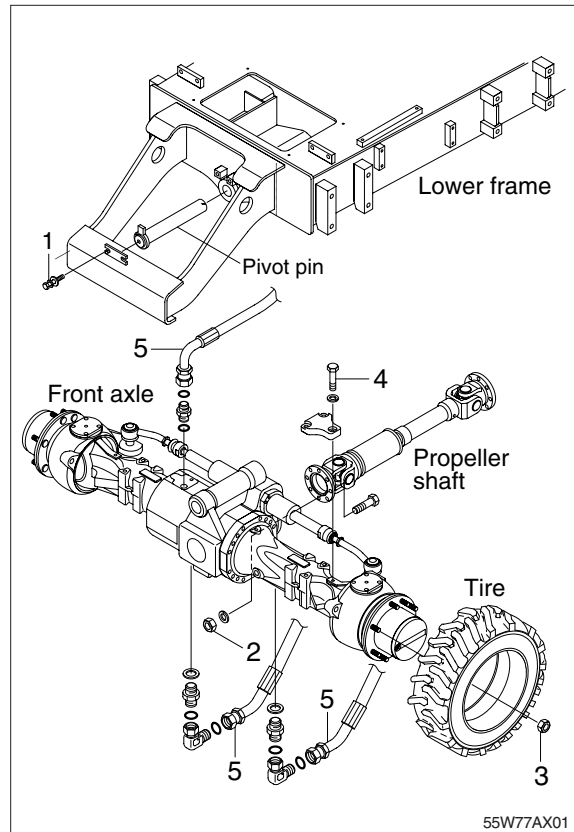


GROUP 9 AXLE

1. REMOVAL AXLE

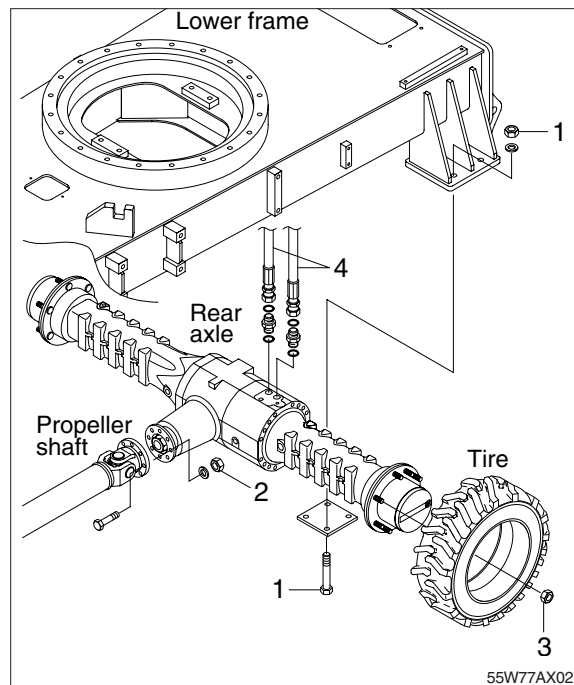
1) FRONT

- (1) Propeller shaft mounting nut (2, M10)
 - Tightening torque : 6.9 ± 1.4 kgf · m
(49.9 ± 10.1 lbf · ft)
- (2) Wheel nut (3, M18)
 - Tightening torque : 46 ± 3.0 kgf · m
(333 ± 21.7 lbf · ft)
- (3) Oscillating cylinder supporting mounting bolt (4, M12)
 - Tightening torque : 12.8 ± 3.0 kgf · m
(92.6 ± 21.7 lbf · ft)
- (4) Front axle mounting pin lock bolt (1, M10)
 - Tightening torque : 6.9 ± 1.4 kgf · m
(49.9 ± 10.1 lbf · ft)
- (5) Hose assy (5)
- (4) Front axle weight : 275 kg (610 lb)



2) REAR

- (1) Rear axle mounting bolt and nut (1, M16)
 - Tightening torque : 6.9 ± 1.4 kgf · m
(49.9 ± 10.1 lbf · ft)
- (2) Propeller shaft mounting nut (2, M10)
 - Tightening torque : 7.4 ± 1.5 kgf · m
(53.5 ± 10.8 lbf · ft)
- (3) Wheel nut (3)
 - Tightening torque : 46 ± 3 kgf · m
(333 ± 21.7 lbf · ft)
- (4) Hose assy (4)
- (5) Rear axle weight : 195 kg (430 lb)



2. GENERAL INTRODUCTIONS

1) Introduction

The efficiency and continued operation of mechanical units depends on constant and correct maintenance and also on efficient repair work should there be a break-down or malfunction.

The instructions in this manual have been made based on a complete overhaul of the unit. However the mechanic must decide whether or not it is necessary to dismantle the individual components when only partial repair work is needed.

The manual provided a quick and sure guide which, with the use of photographs and diagrams illustrating the various phases of the operations, allows accurate work to take place. Therefore all the information needed for correct disassembly, the relative checks and assembly of each individual component, has been written down.

In order to remove the differential unit from the vehicle, the manuals provided by the vehicle manufacturer should be consulted. In describing the following operations it is presumed that the unit has already been removed from the vehicle.

- ※ Throughout the phases of repair or maintenance work it is advisable to use proper equipment such as : trestles, or supporting benches, plastic or copper hammers, appropriate levers, extractors and specific spanners or wrenches. So that the work is facilitated and the working surfaces and the operators themselves are protected.

Before going on to disassemble the parts it is best to thoroughly clean the unit, removing any encrusted or accumulated greases and then drain the oil through the oil-draining plugs.

2) Introductory statement

All the disassembled mechanical units should be thoroughly cleaned with appropriate products and then restored or replaced if damage, wear, cracking or seizing have occurred. In particular, thoroughly check the state of all moving parts (bearing, gears, crown wheel and pinion, shafts) and sealing parts (O-ring, oil shield) which are subject to major stress and wear. In any case it is advisable to replace the seals every time a component is overhauled or repaired. During assembly the sealing rings must be lubricated on the sealing edge. In the case of the crown wheel and pinion, replacement of one requires the replacement of the other. During assembly the prescribed pre-loading and backlash of the parts must be maintained.

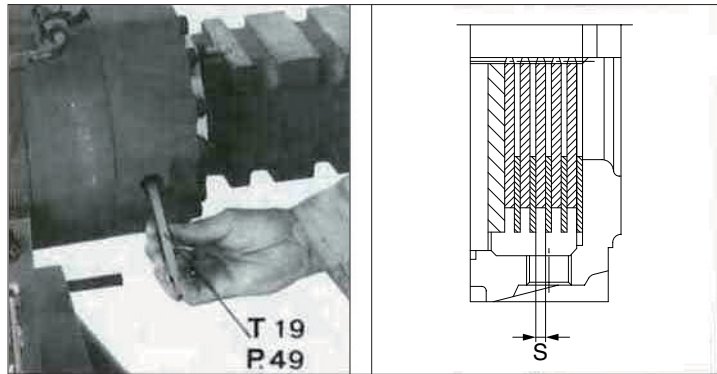
3) Maintenance and repair

We have compiled these instructions for maintenance and repair in order to facilitate any such work on the CLARK-HURTH Components differential units and gear change unit.

3. BRAKES

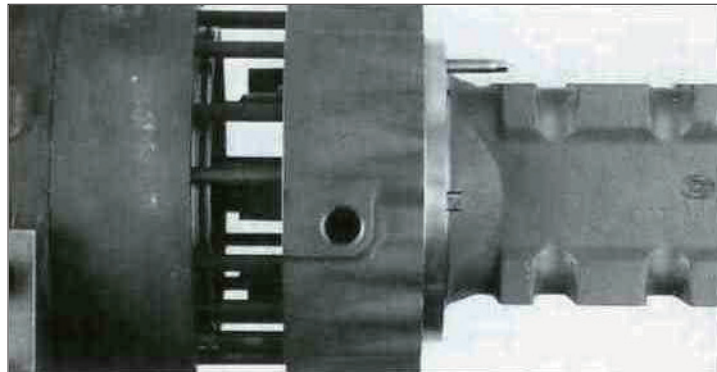
WEAR CHECK AND REPLACEMENT OF BRAKE DISCS

- 1) Use till minimum thickness of $s = 4.5$ mm.



AXLE001

- 2) Loose fixing nuts and remove horizontally the axle housing.



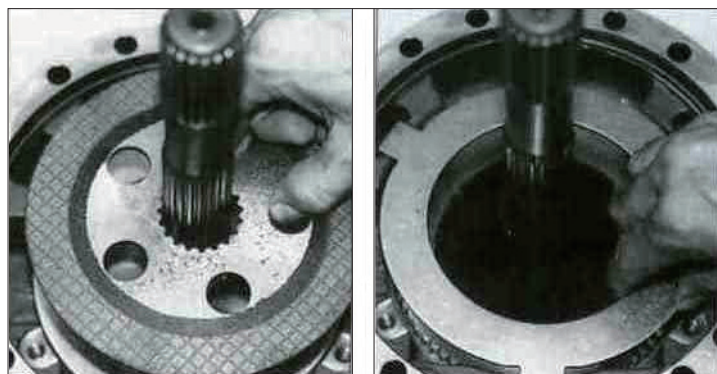
AXLE002

- 3) Remove brake discs.
※ If the brake discs must not be replaced, remove the complete pack without changing the position of the discs.



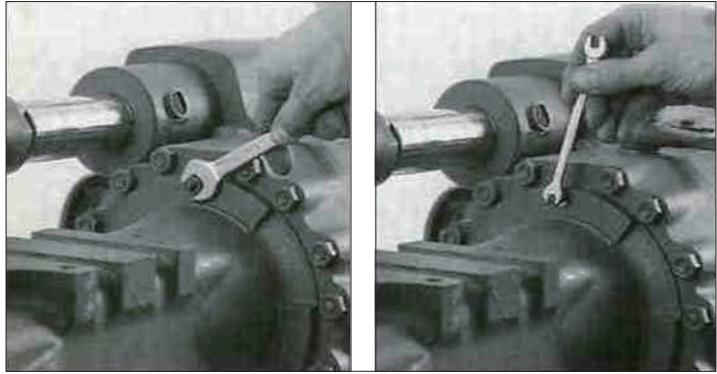
AXLE003

- 4) For assembling proceed in opposite sense, align lubrication holes.



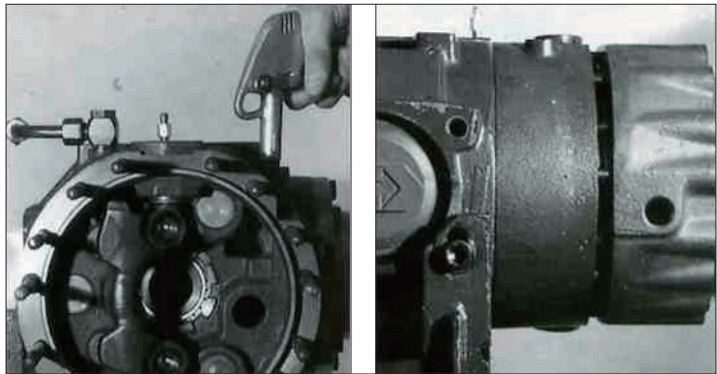
AXLE004

- 5) Adjustment of brake discs gap.
Adjusting bolts counterclockwise and turn them a half revolution clockwise. This corresponds to a gap of 0.5 mm between the brake discs.



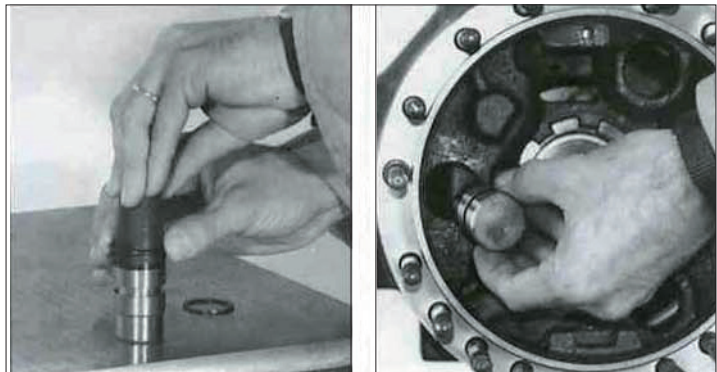
AXLE005

- 6) Remove brake pistons using air pressure at 3~5 bar.



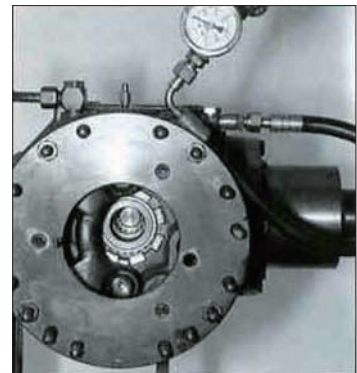
AXLE006

- 7) Install O-rings and brake pistons.
※ Observe that neither the pistons nor the cylinders have scratches.

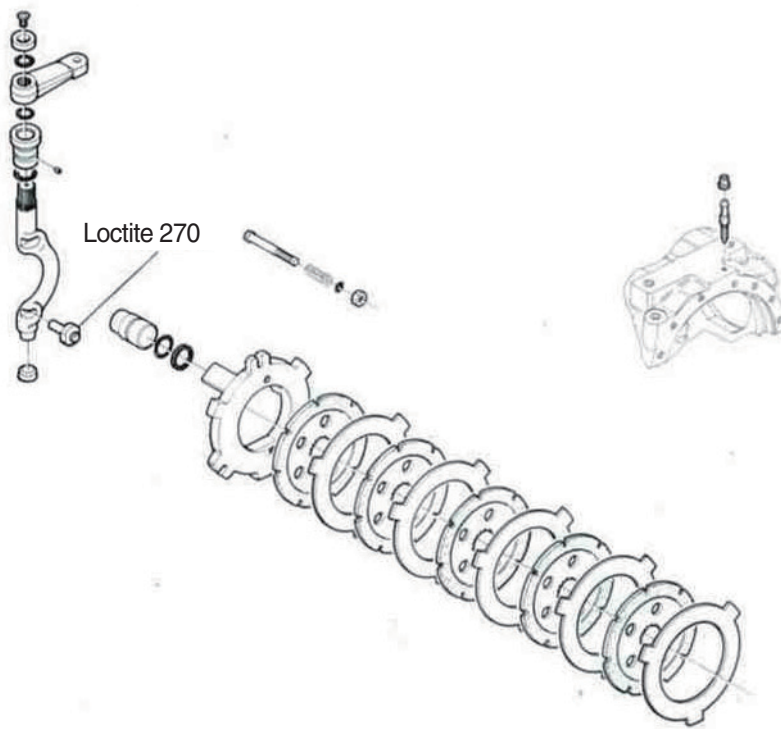


AXLE007

- 8) Tight checking with compressed air at 0.5~1 bar for 10 minutes each side.



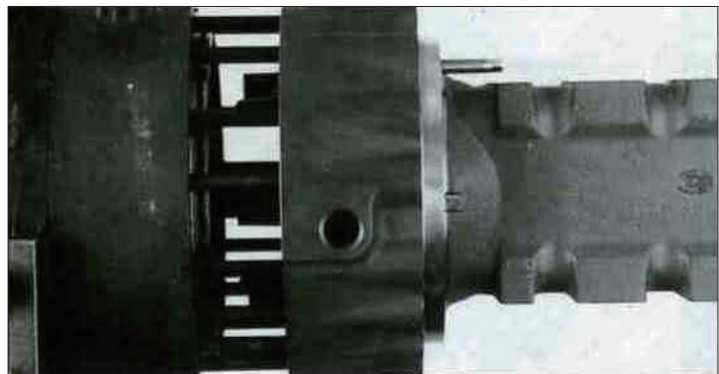
AXLE008



AXLE009

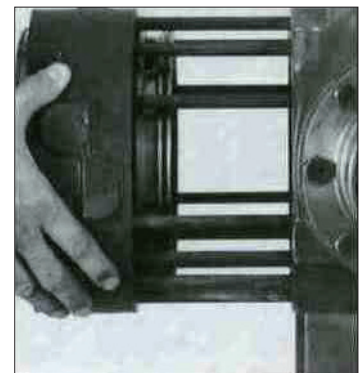
4. SAFETY BRAKE

- 1) Introduce in the hydraulic circuit 15~20 bar pressure, then remove the axle housing.



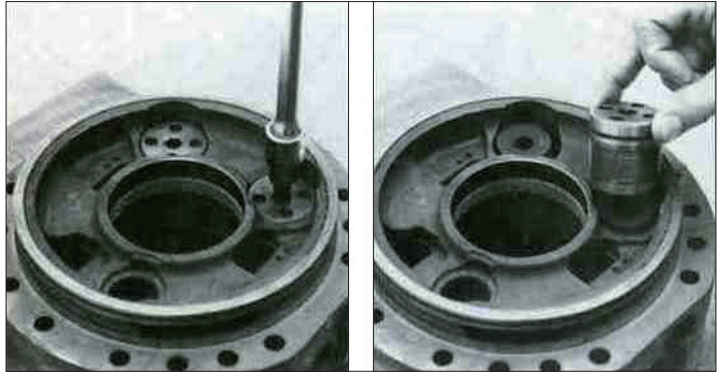
AXLE010

- 2) Loose the 4 assembling stud bolts and disassemble the intermediate covers.

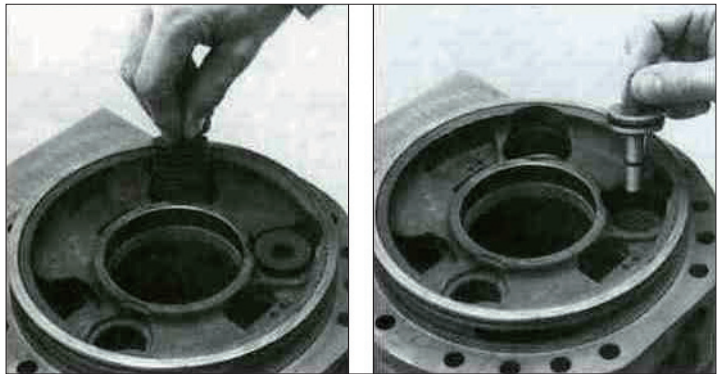


AXLE011

- 3) Disassembling of spring applied safety brake pistons. Reassemble the components in opposite sense.

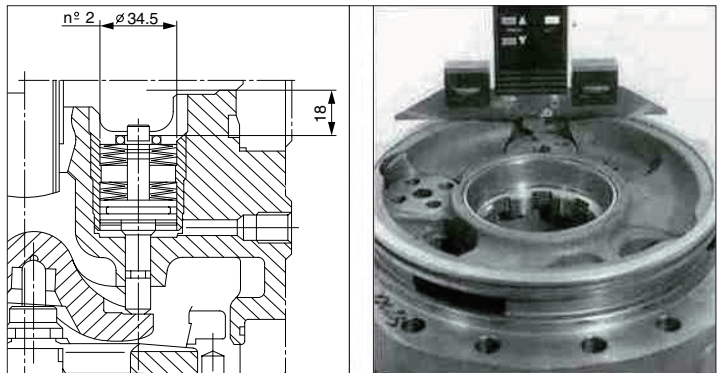


AXLE012



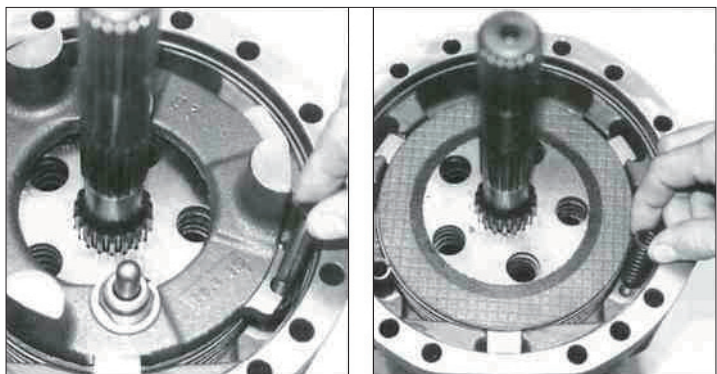
AXLE013

- 4) Check quote of cover.



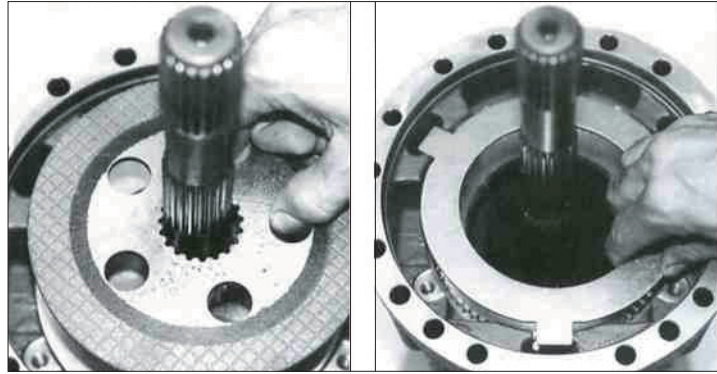
AXLE014

- 5) Remove brake discs.



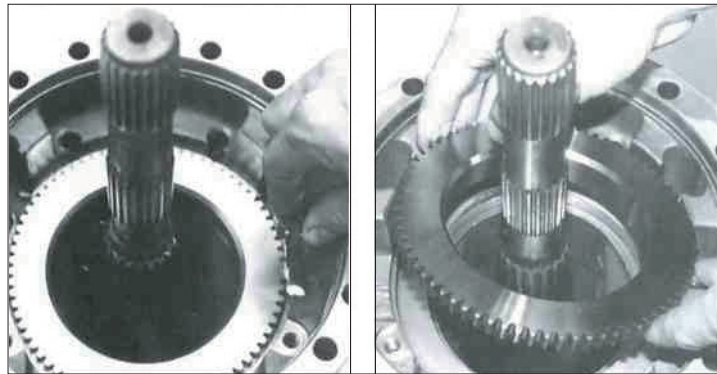
AXLE015

6) For assembling align lubrication holes of brake discs.



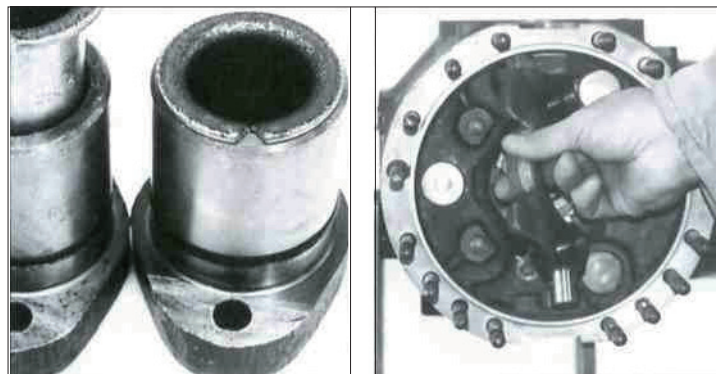
AXLE016

7) Remove pinion and ring gear.



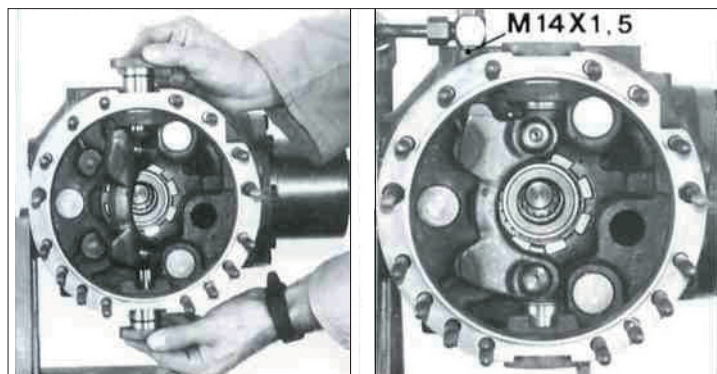
AXLE017

8) Assemble of internal leverism.



AXLE018

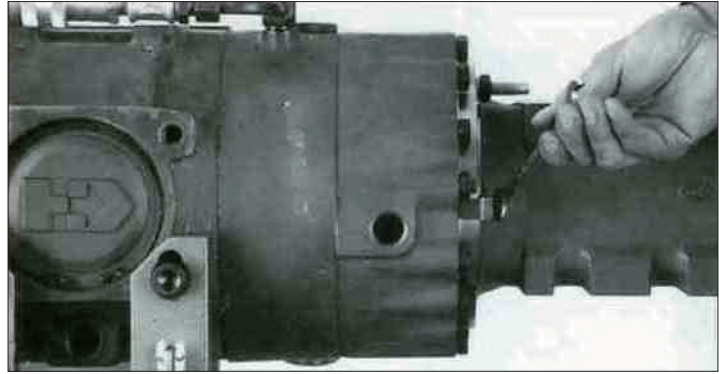
9) Introduce in the hydraulic circuit 15~20 bar pressure and assemble the axen.



AXLE019

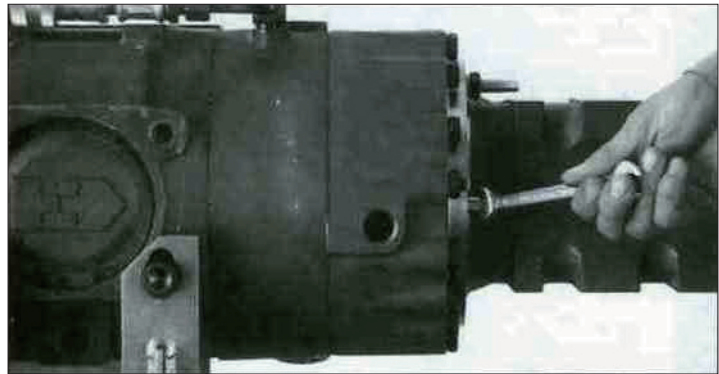
ADJUSTMENT

- 10) Introduce pressure in the hydraulic circuit with 15~20 bar. Remove bolt and locking plate.



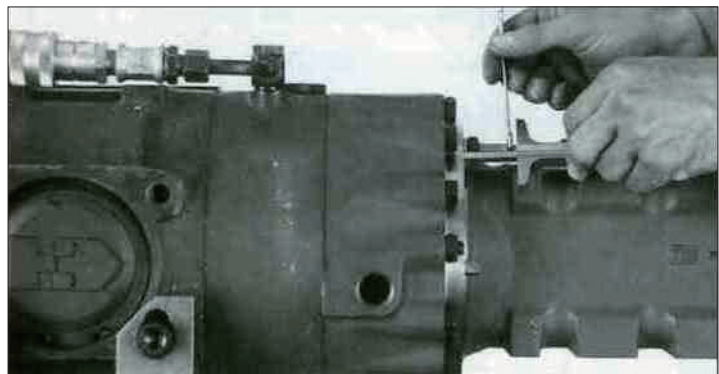
AXLE020

- 11) Turn the pinion with 0.82 kgf · m (5.9 lbf · ft) torque counterclockwise til it stops. Adjust the gap between the brake discs by turning 3 complete revolutions clockwise.

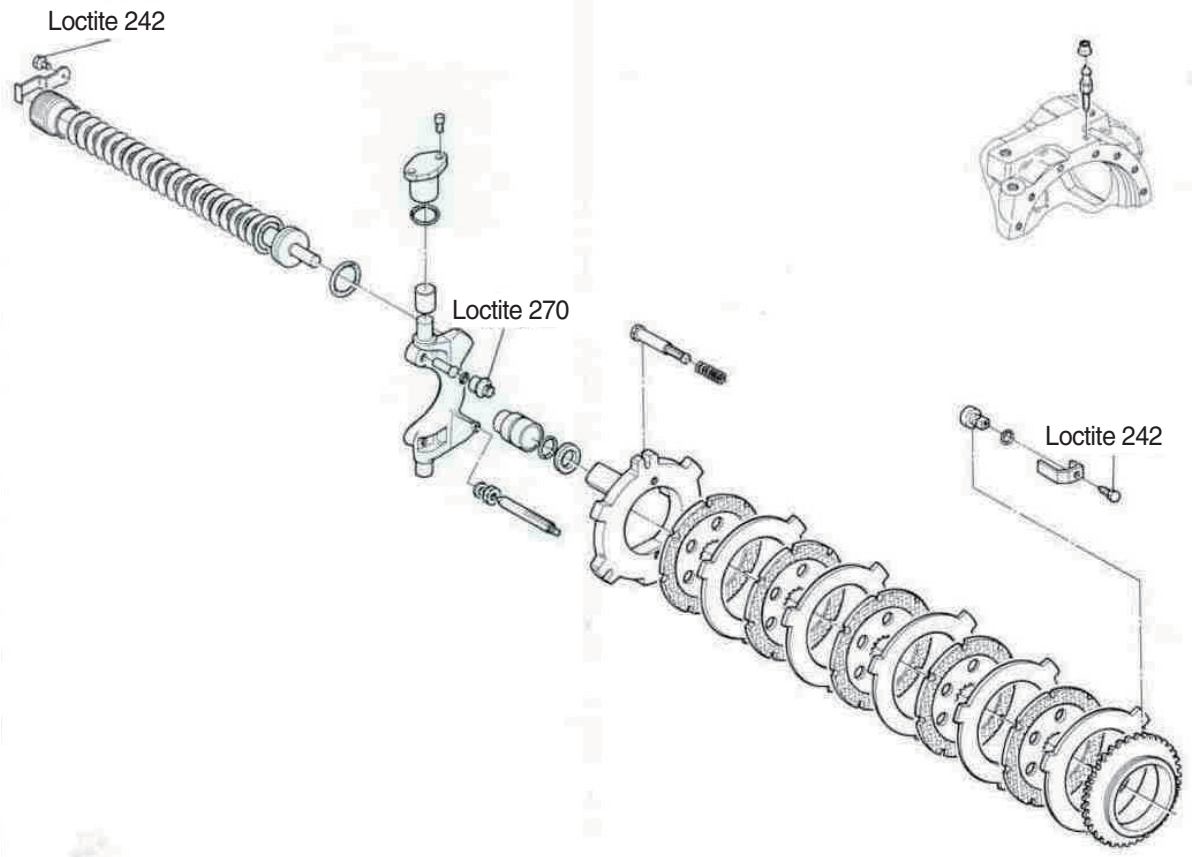


AXLE021

- 12) Adjust the bolts to unlock the safety brake at 37 mm (1.5 in) and lock the counter nut.



AXLE022

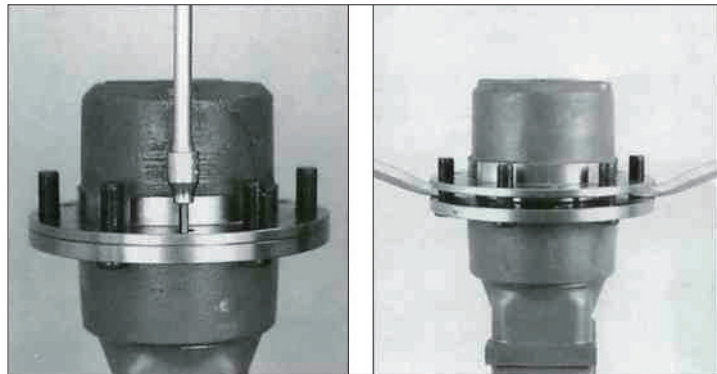


AXLE023

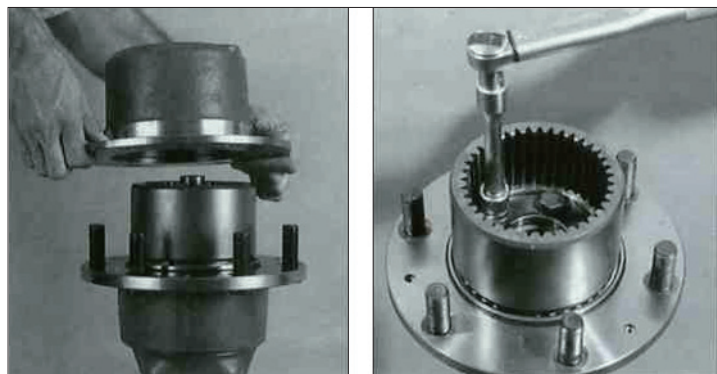
5. WHEEL HUB

DISASSEMBLING AND ASSEMBLING

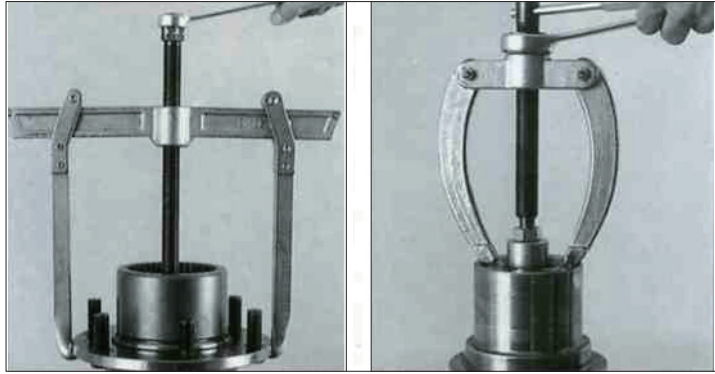
- 1) Disassembling of wheel hub, seal and center ring.



AXLE024

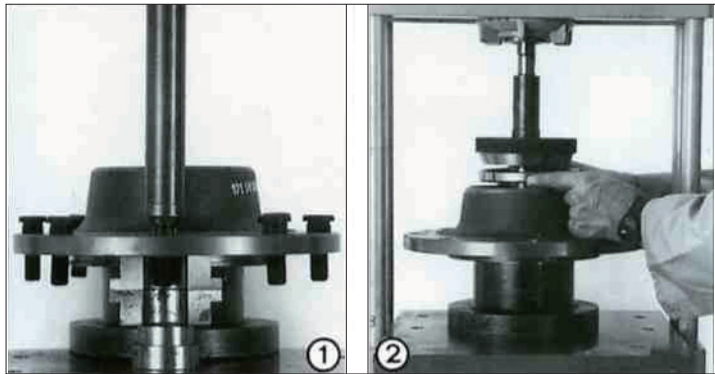


AXLE025

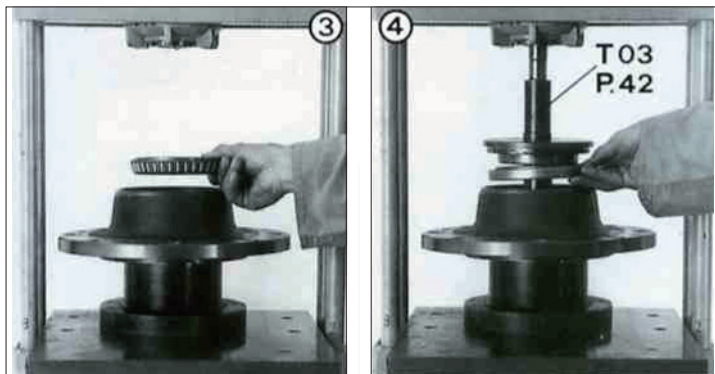


AXLE026

- 2) Assembling of wheel hub :
- 1 Fitting of wheel studs
 - 2 Installation of outer races of taper roller bearings
 - 3 Assembling of bearings
 - 4 Fitting of seal



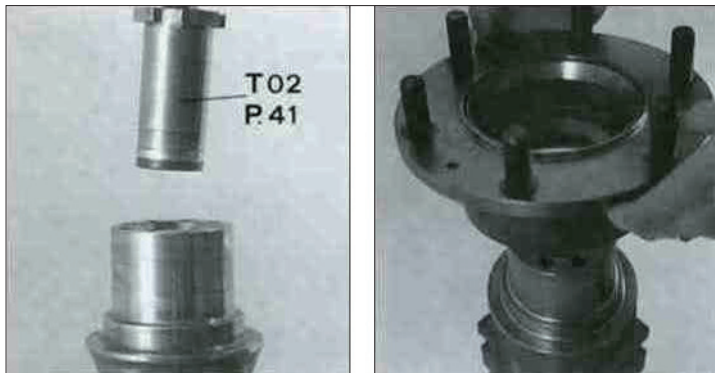
AXLE027



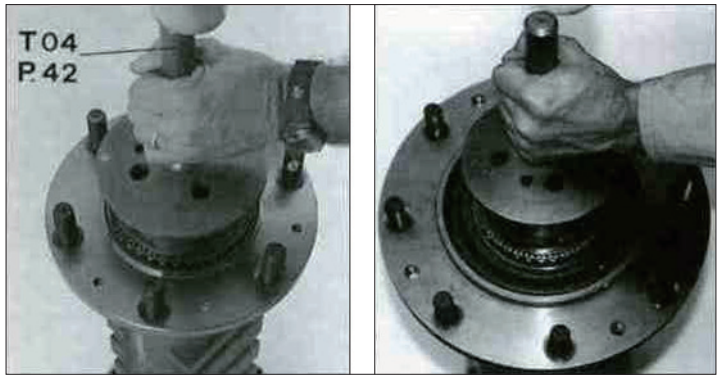
AXLE028

6. WHEEL HUB ONTO AXLE HOUSING

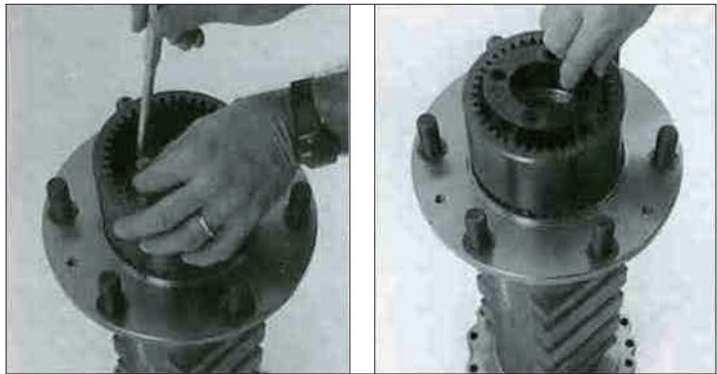
- 1) Assembling of wheel hub, seal and center ring



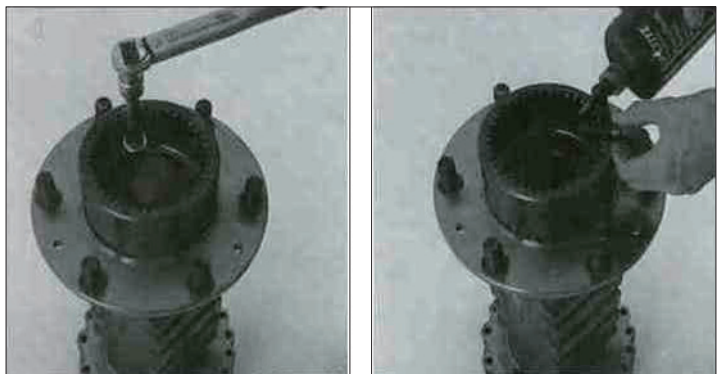
AXLE029



AXLE030

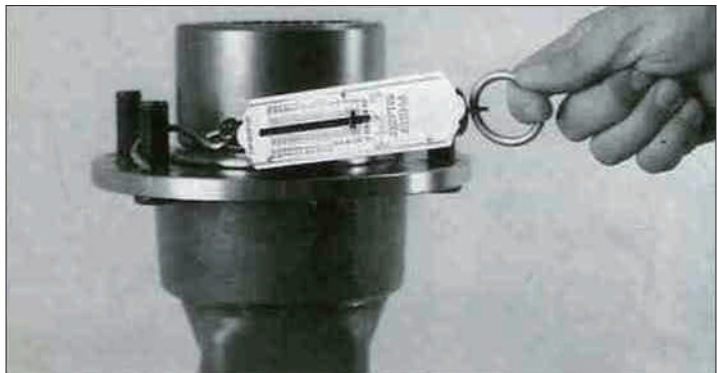


AXLE031



AXLE032

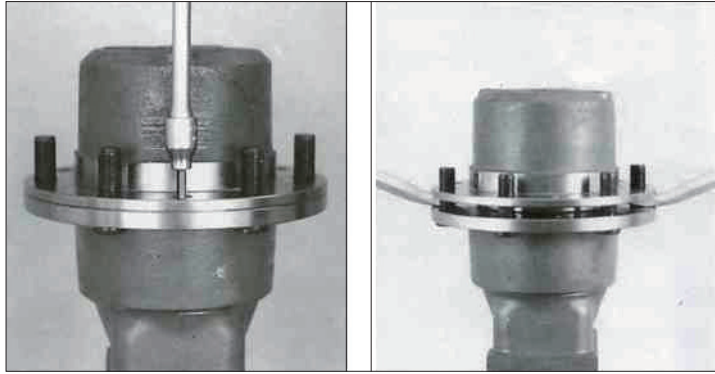
2) Torque of new bearings with seal : 0.71~2.04 kgf · m
(5.1~14.8 lbf · ft).



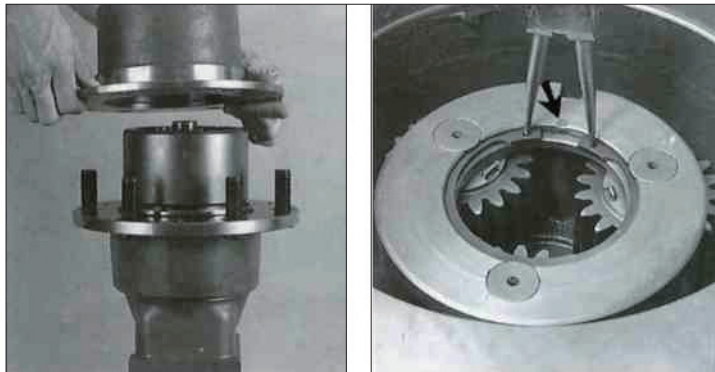
AXLE033

7. EPYCICLOIDAL REDUCTION 4.25

- 1) Disassembling of planet carrier



AXLE034

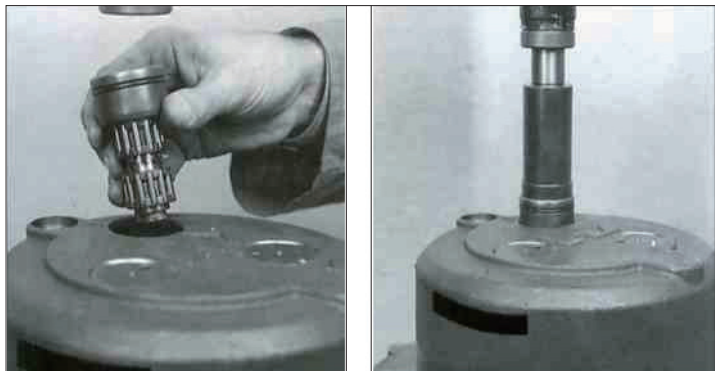


AXLE035



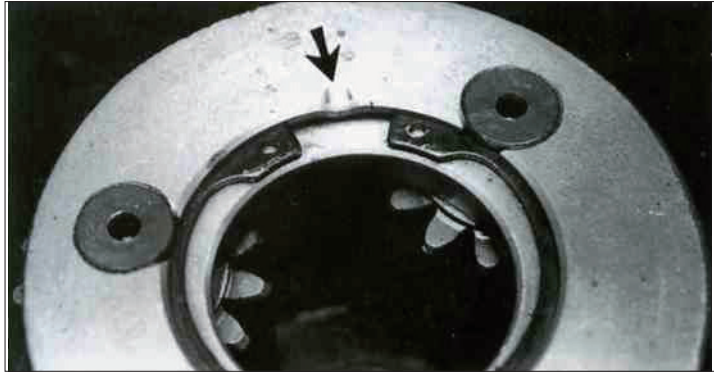
AXLE036

- 2) **Assembling of planet carrier**
Align trust washer with holes of planet gear and planet carrier.



AXLE037

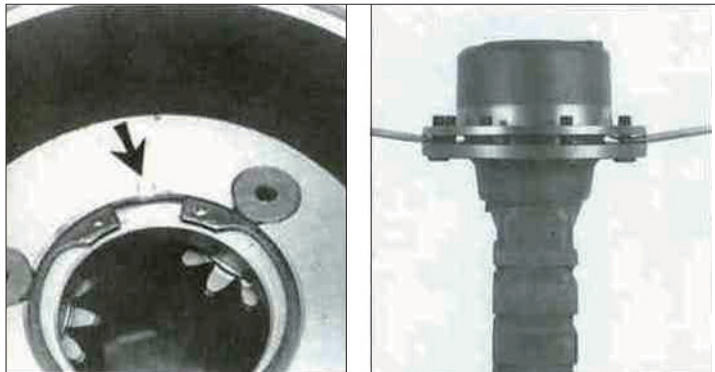
3) To punch after assembling of the circlip.



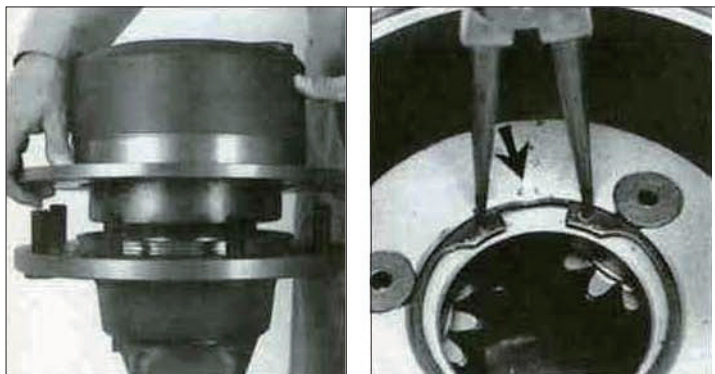
AXLE038

8. EPYCICLOIDAL REDUCTION 5.25

1) Disassembling of planet carrier



AXLE039

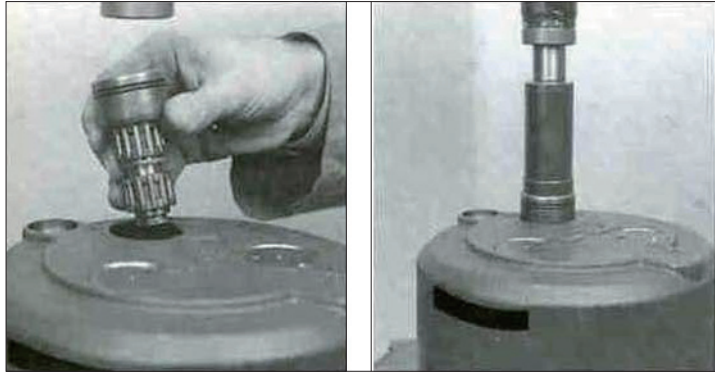


AXLE040



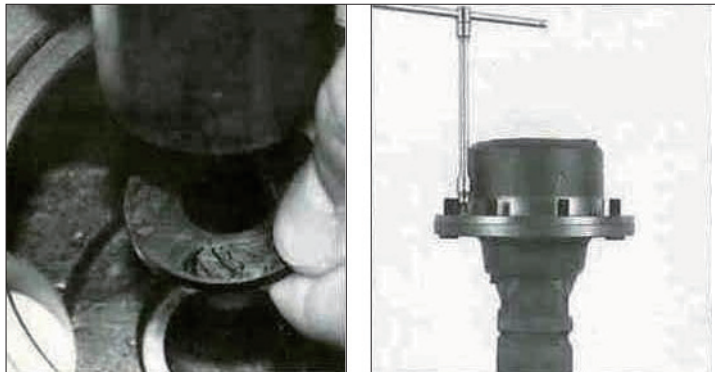
AXLE041

- 2) Assembling of planet carrier**
Align trust washer with holes of planet gear and planet carrier.



AXLE042

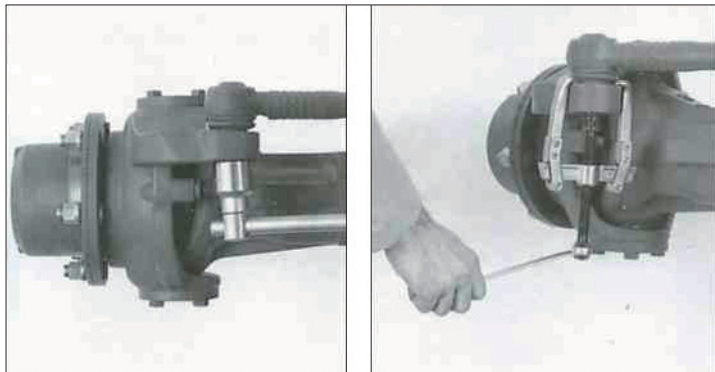
- 3) To punch after assembling of the circlip. Assemble trust plug with arexons sealing compound.**



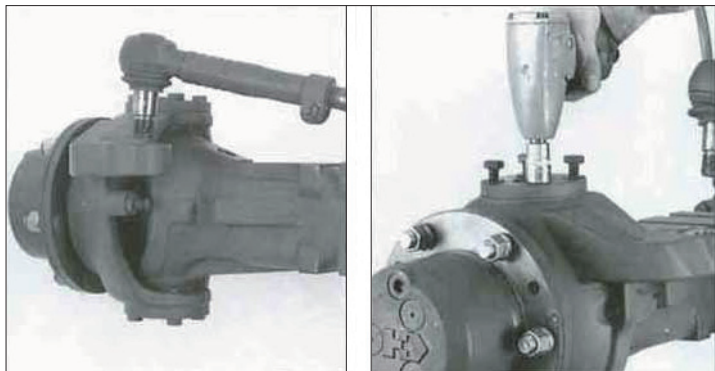
AXLE043

9. ARTICULATION 271-278

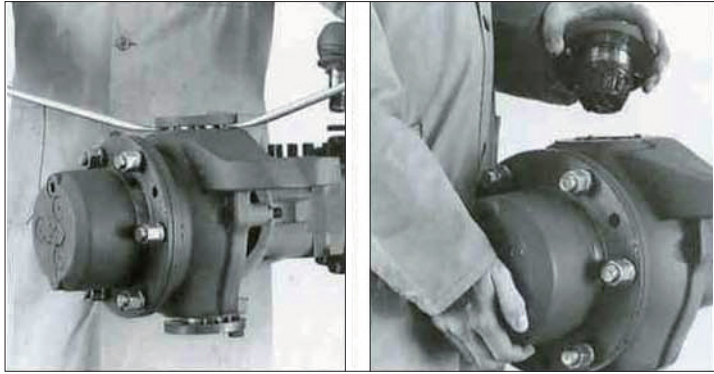
- 1) Disassembling of articulation**



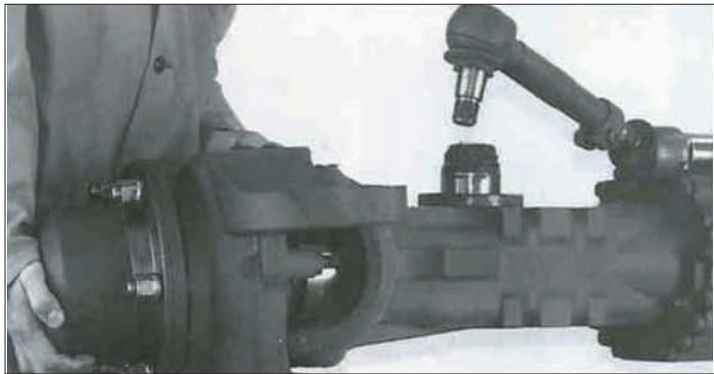
AXLE044



AXLE045



AXLE046



AXLE047

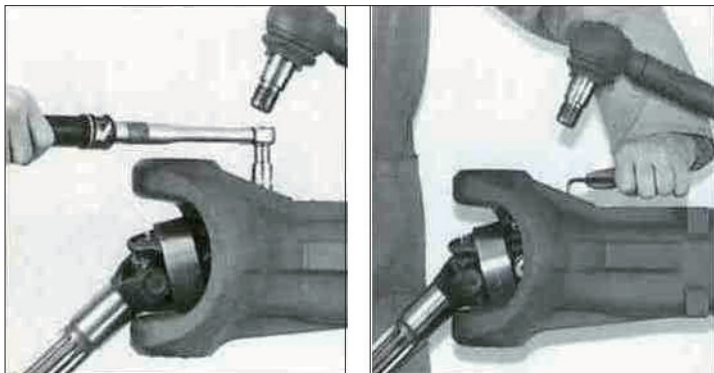
2) Disassembling of external races of taper roller bearing



AXLE048

3) Remotion of double cardan joint.

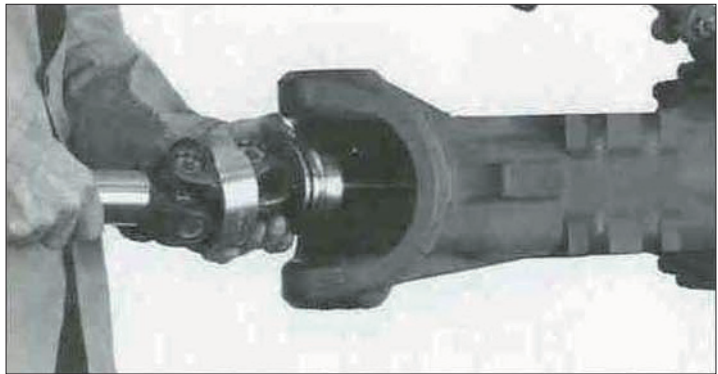
※ Lock the brake discs before removing the joint.



AXLE049

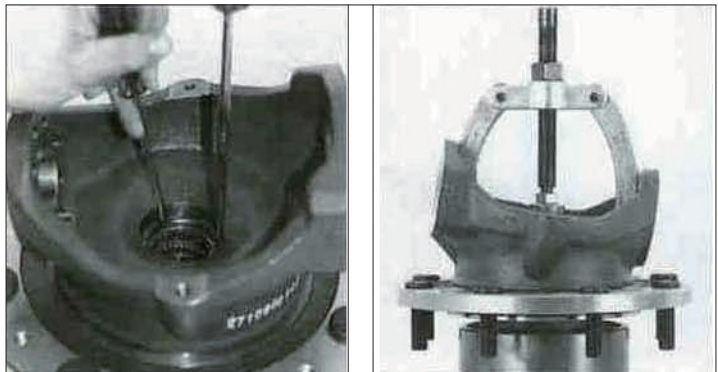


AXLE050



AXLE051

- 4) Disassembling of seal, circlip and needle bearing



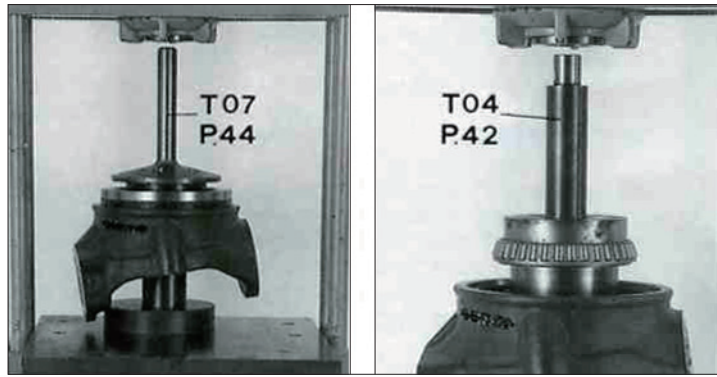
AXLE052

- 5) Check that the seats of the taper roller bearings are not deformed.

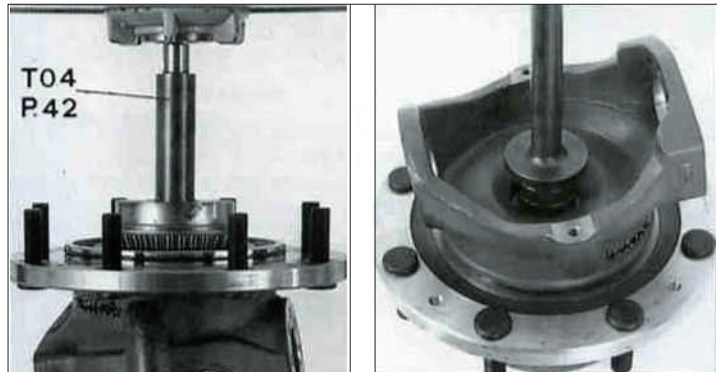


AXLE053

6) Assembling of wheel hub onto the steering housing.



AXLE054



AXLE055



AXLE056

7) Determination of preloadings of taper roller bearings

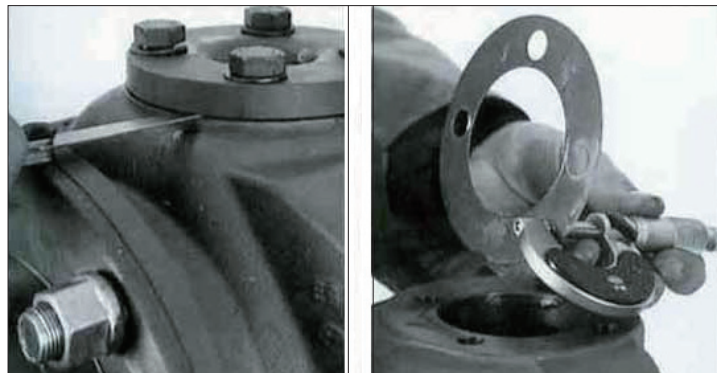
Check of rotating torque :

Articulation type 271:

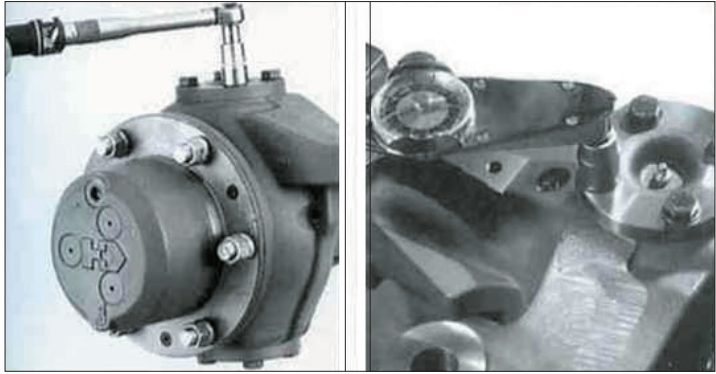
0.71~0.92 kgf · m
(5.1~14.8 lbf · ft)

Articulation type 278:

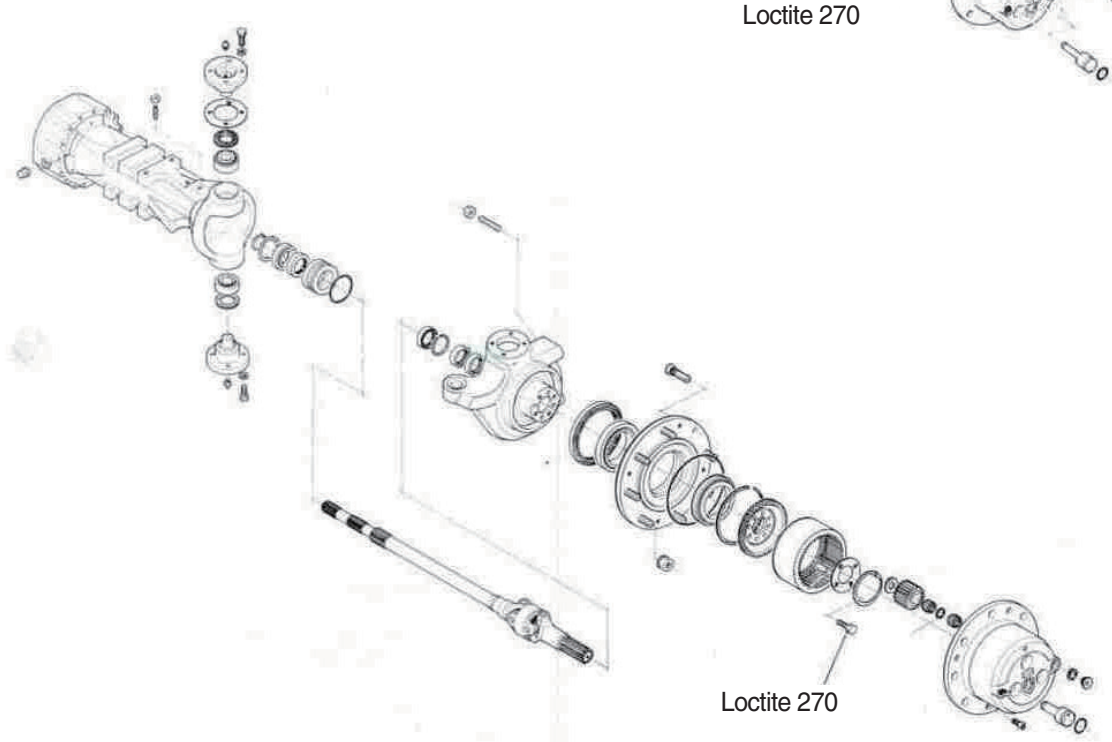
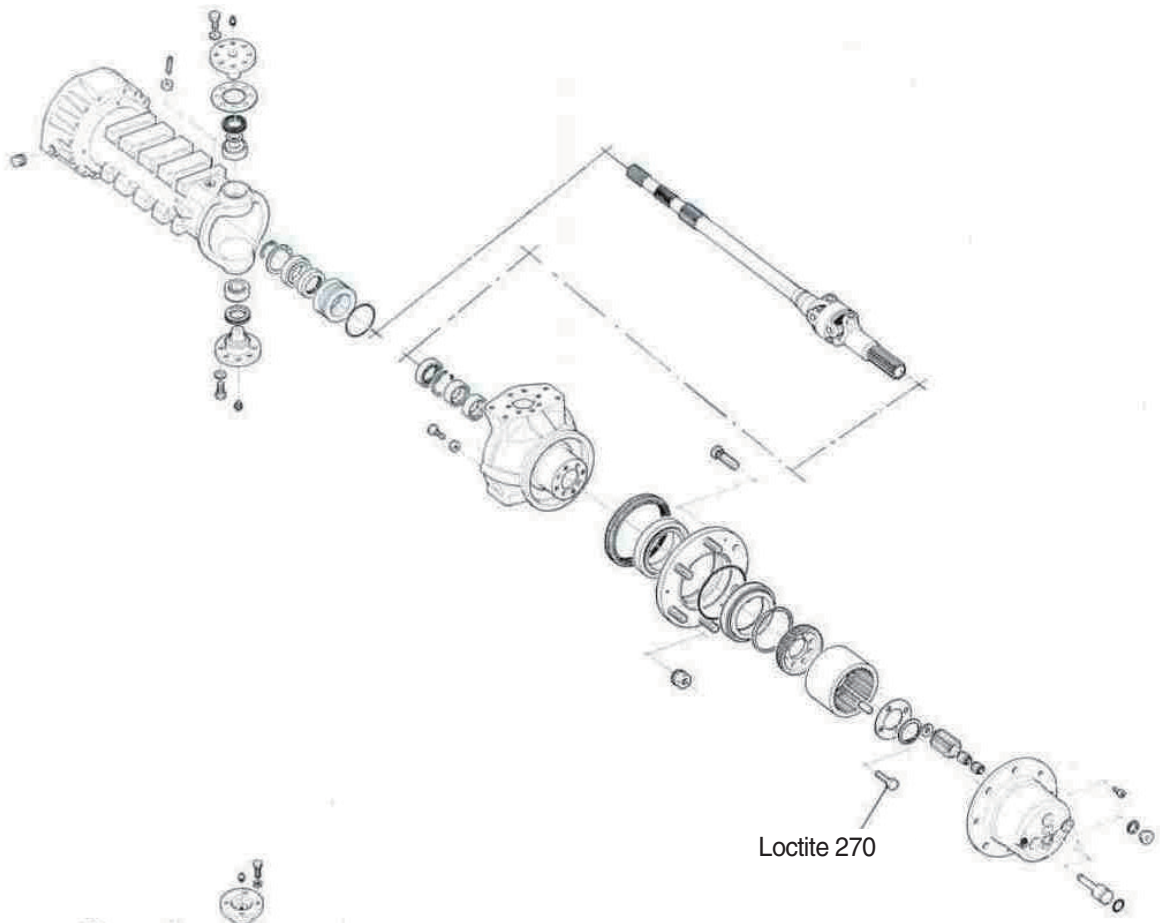
1.02~1.22 kgf · m
(7.4~8.8 lbf · ft)



AXLE057



AXLE058

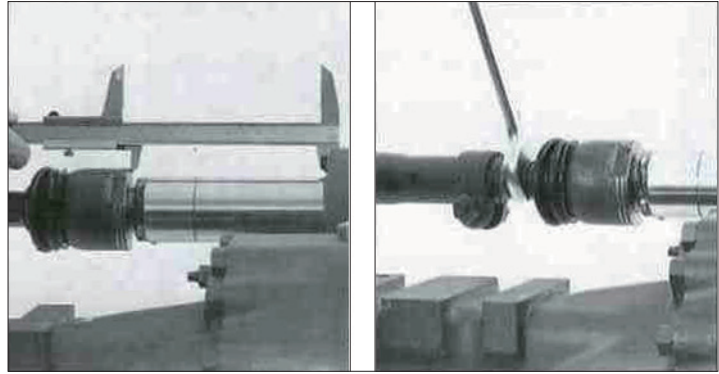


AXLE059

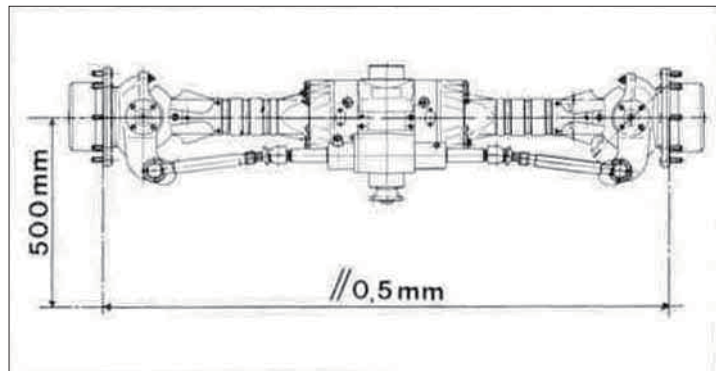
10. STEERING CYLINDER

- 1) Check that the piston rod of the steering cylinder is at half stroke. Check on both sides with a caliper.

Check parallelism between both wheel hubs at approx. 500 mm from the hub center (front and rear).

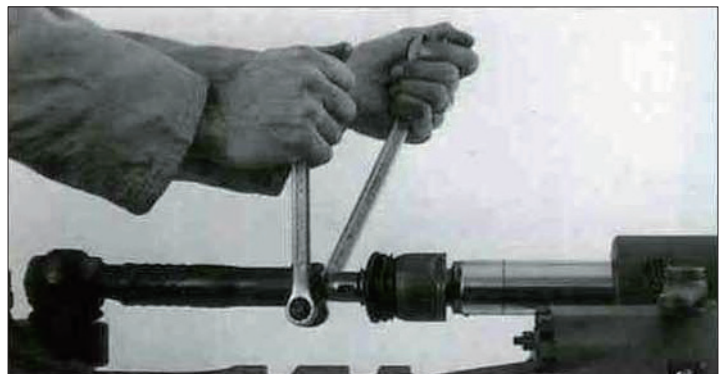


AXLE060



AXLE061

- 2) Close security clip.

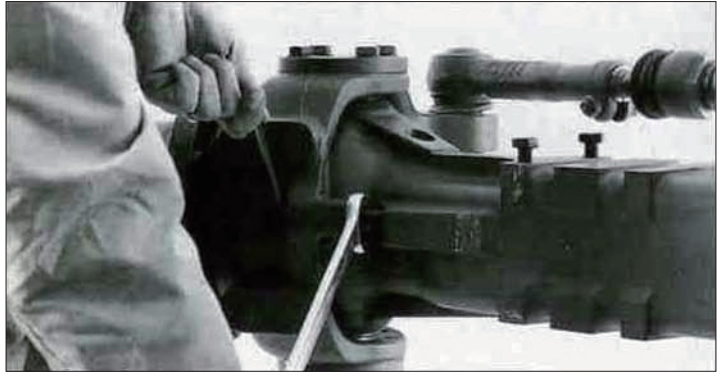


AXLE062

- 3) Determination of steering angle.



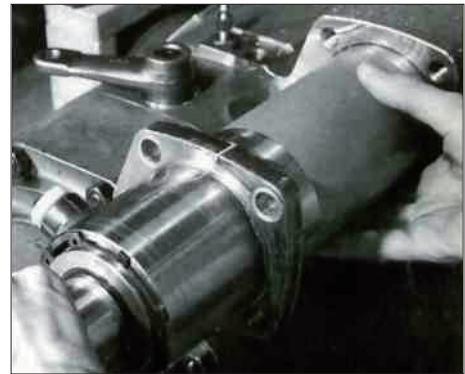
AXLE063



AXLE064

4) Disassembly - assembly (T 11 bis A, B, C - P.46)

- Remove snap ring AL 65 with circlip pliers.
- Retract gland until snap ring 78×2.5 is exposed.
- Slide snap ring 78×2.5 towards the inside of the cylinder on the tapered section of the oil connection to bring it out of its seat, then remove.
- Remove snap ring with a deburred screw driver. Retract piston rod assembled out of the cylinder body.
- Take off gland from piston rod.
- Remove wipers 45/53×4/7, seal rings 45×53×8, back-up rings 45/52.9×1.5, wear rings 70/75×5.5 and glyd ring 75×64×4.2 with deburred marking tool.



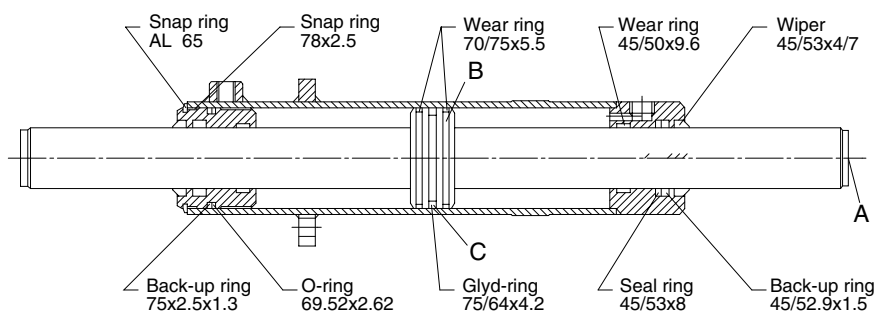
AXLE065

Seal ring housing must not be damaged.

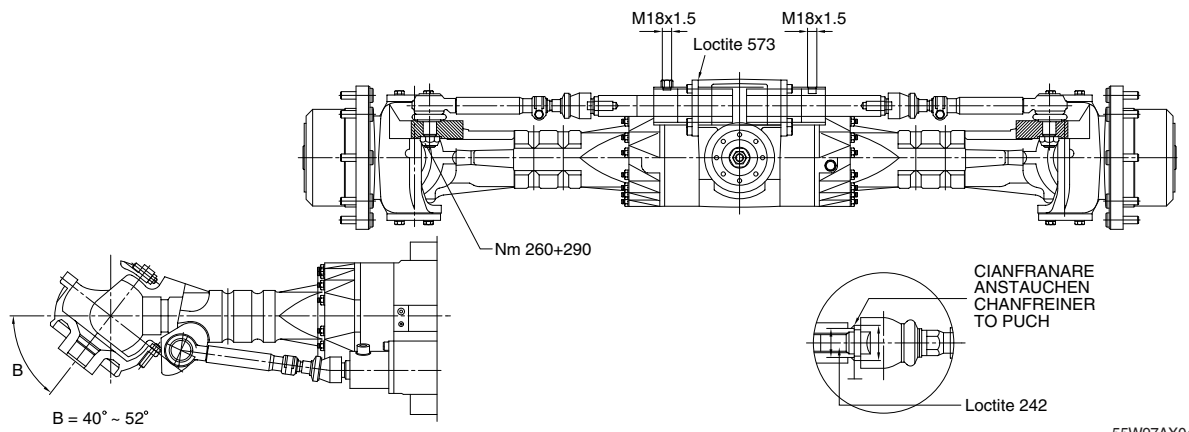
Assembly in reversed order. At mounting of the glands it has to be regarded, that the O-rings not damaged by the connecting hole.

Inspection :

Extend piston rod both sides and test with internal stop pressure 210 bars. At this no leakage must occur. Cylinder is for use.



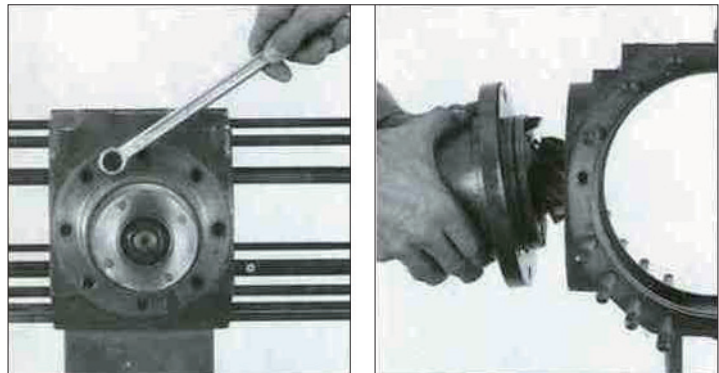
55W97AX03



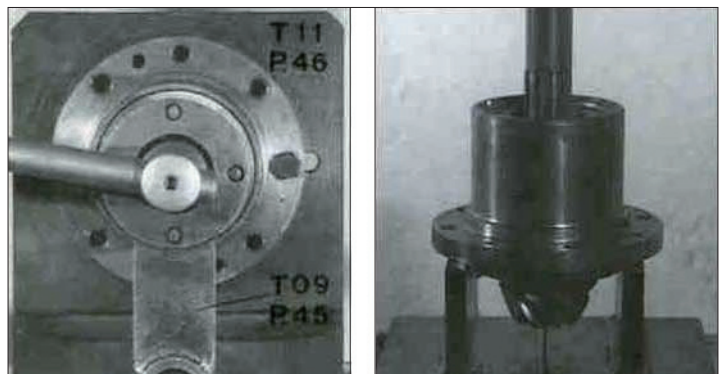
55W97AX04

11. BEVEL PINION SUPPORT

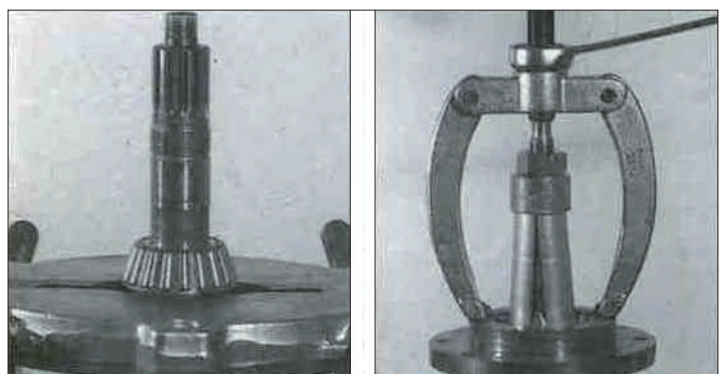
- 1) Disassembling of bevel pinion support



AXLE068



AXLE069



AXLE070

- 2) Assembling of external races of taper roller bearings



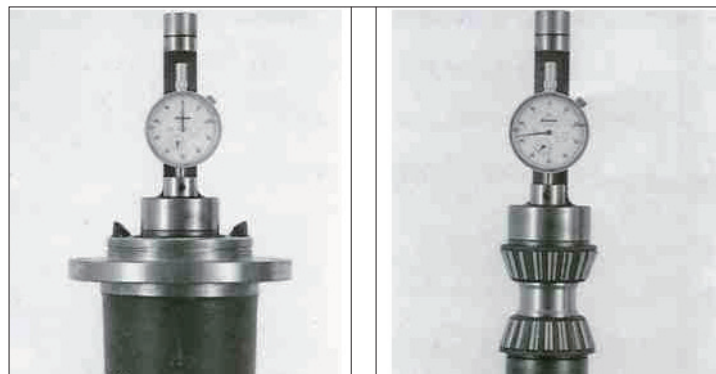
AXLE071

- 3) Control of dimension "A" of cover

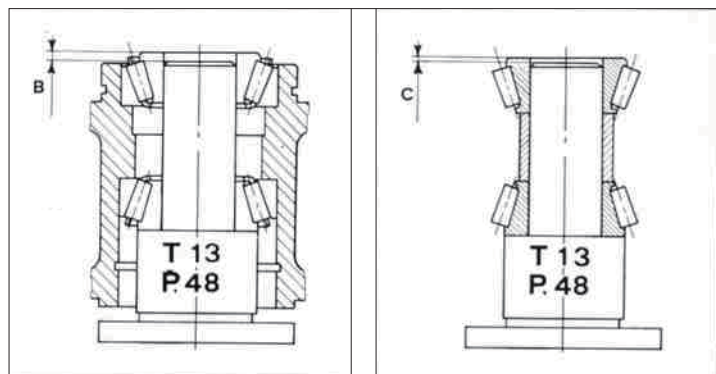


AXLE072

- 4) Determination of shim pack S1 for the preload of the taper roller bearings
 $S1 = B - C + X$
 X=Value to add in order to obtain the correct preload of the taper roller bearings

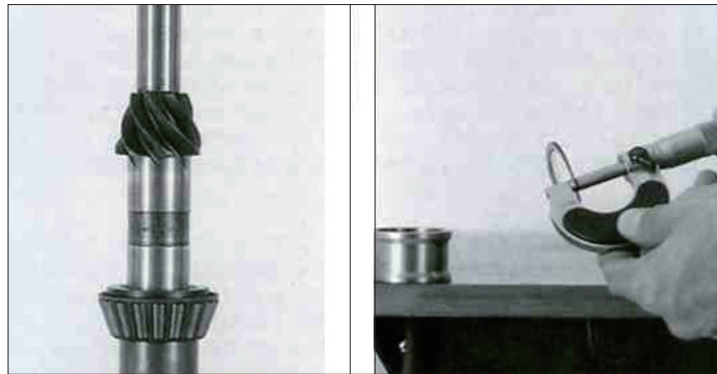


AXLE073

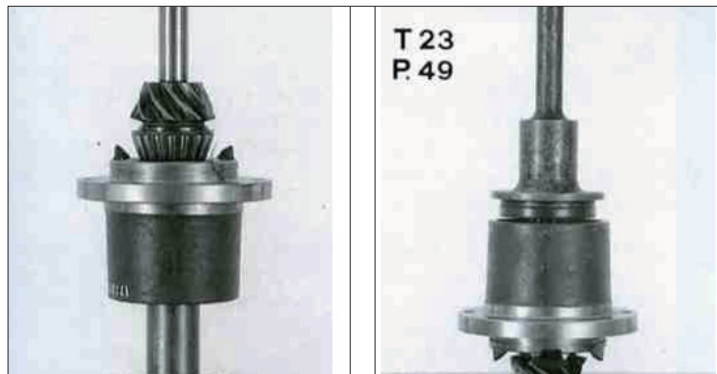


AXLE074

5) Assembling of bevel pinion support and seal

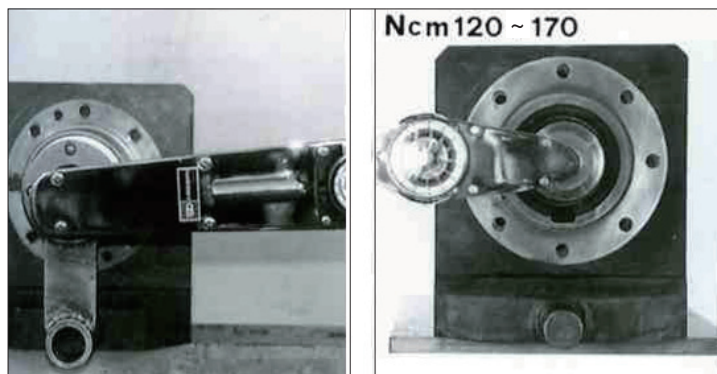


AXLE075

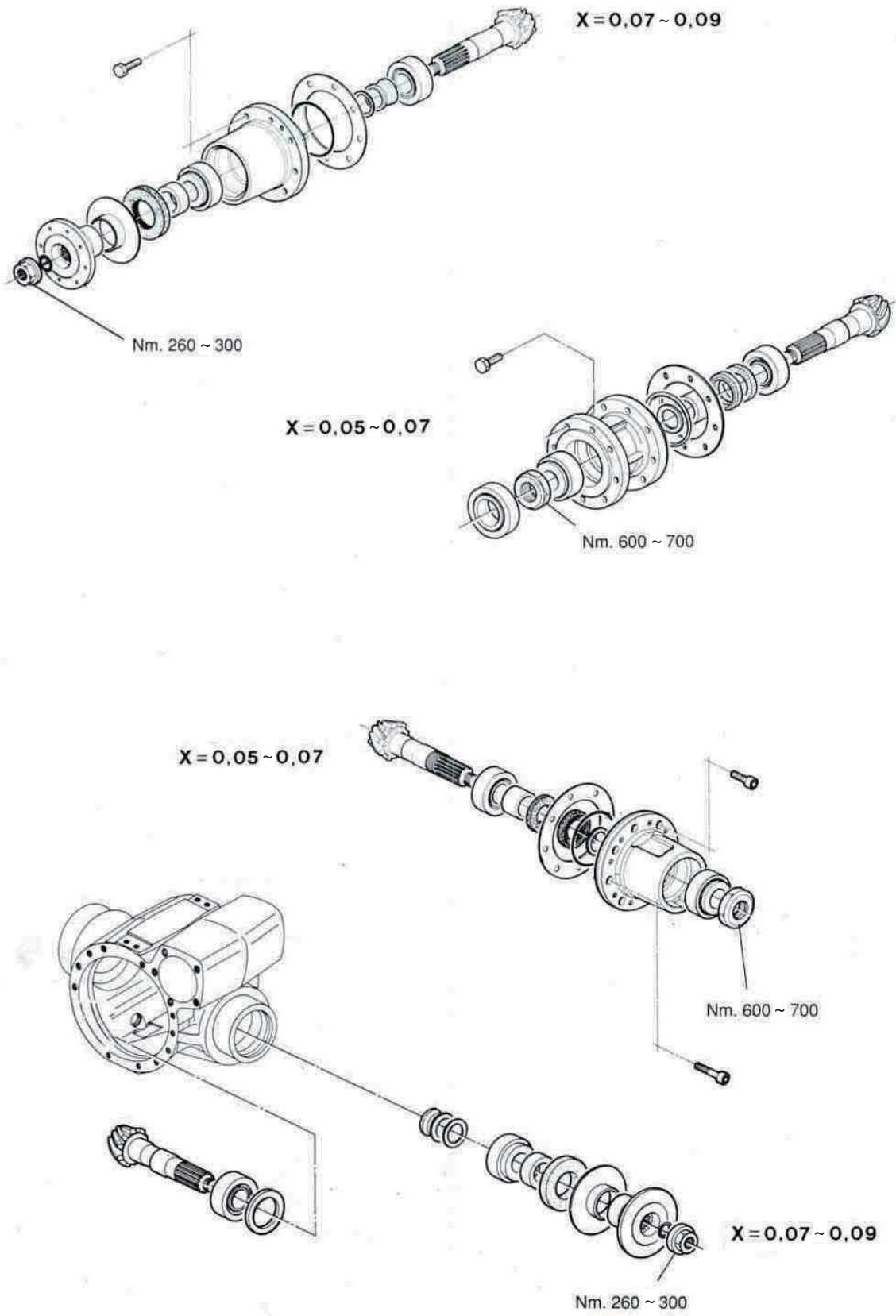


AXLE076

6) Ring nut tighten and torque checking.

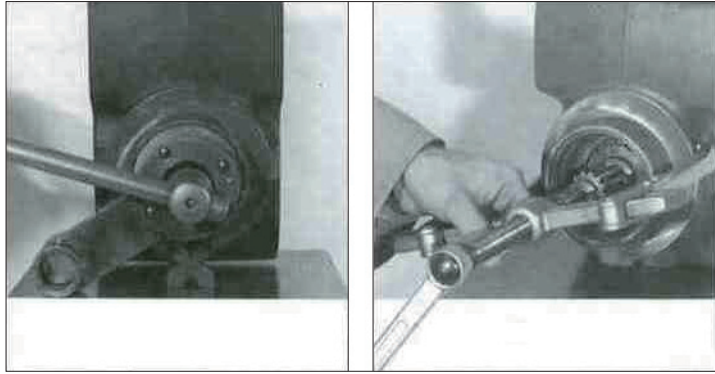


AXLE077

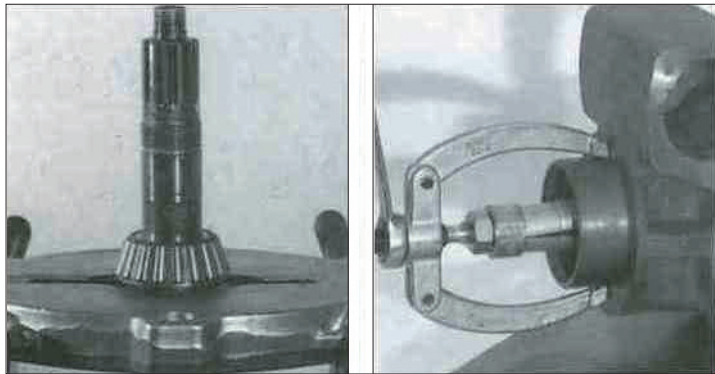


AXLE078

7) Disassembling of bevel pinion support



AXLE079



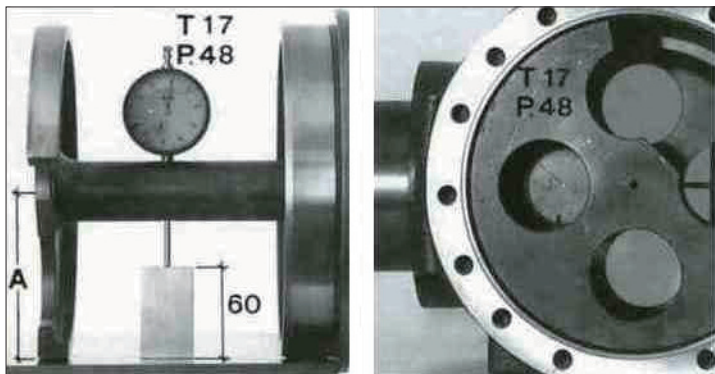
AXLE080

8) Determination of shim pack S2 for adjustment of bevel pinion position.

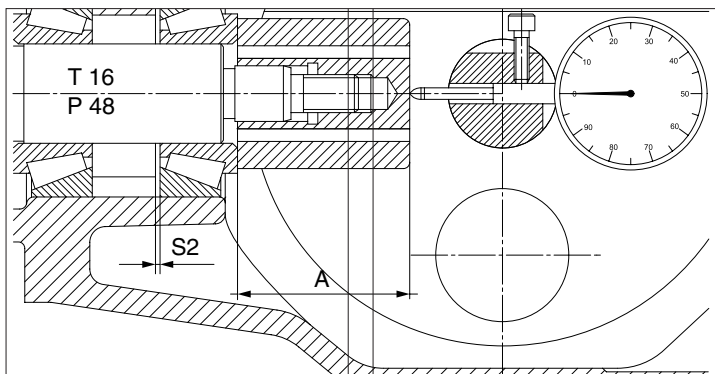
Assembling of outer race of taper roller bearing without shims.

Insert tool and verify after having set to zero the gauge on a surface plate.

The difference is S2. Remove outer race of taper roller bearing, inset shims and reassemble the outer race definitively.

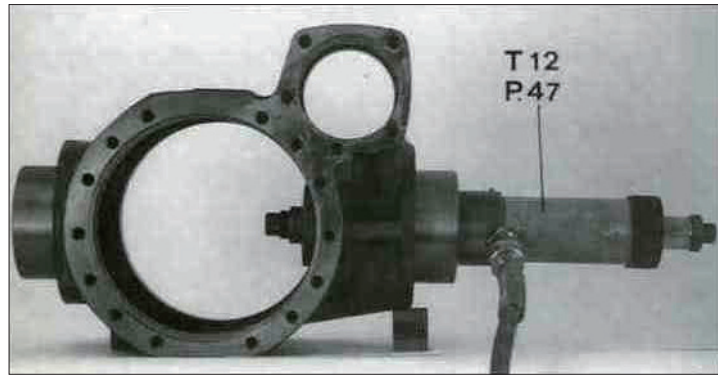


AXLE081



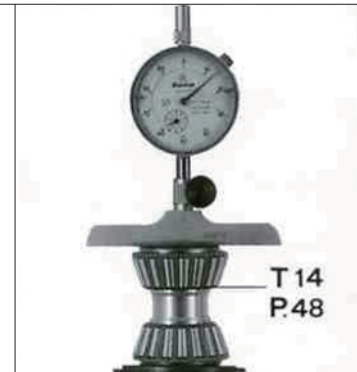
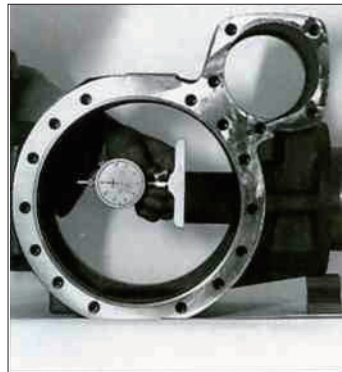
55W97AX05

- 9) Assembling of outer races of taper roller bearings

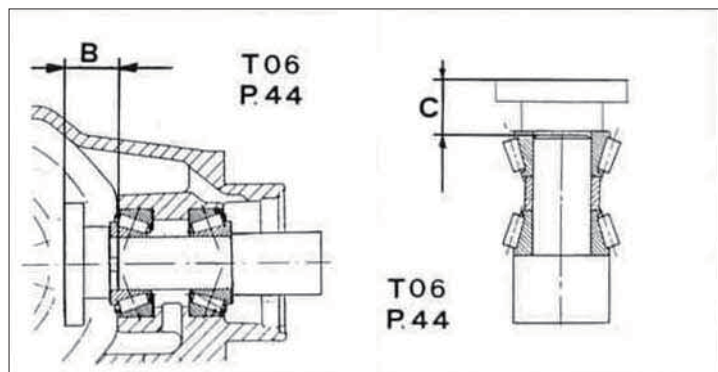


AXLE083

- 10) Determination of shim pack S1 for the preload of taper roller bearings :
 $S1 = B - C + X$
 X = Value to add in order to obtain the correct preload of the taper roller bearings (see exploded view drawing on page 7-169).

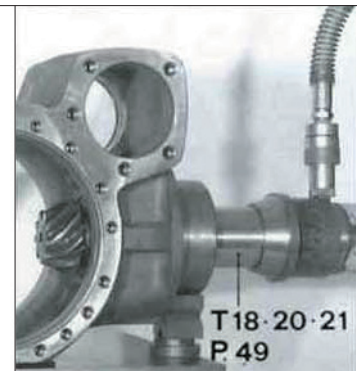


AXLE084

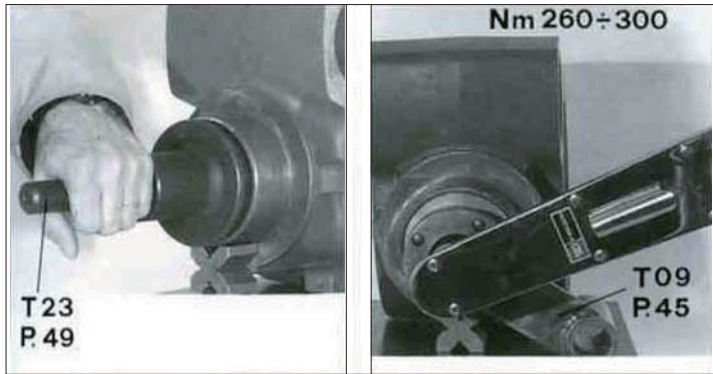


AXLE085

- 11) Assembling of bevel pinion support and tighten of flange nut.

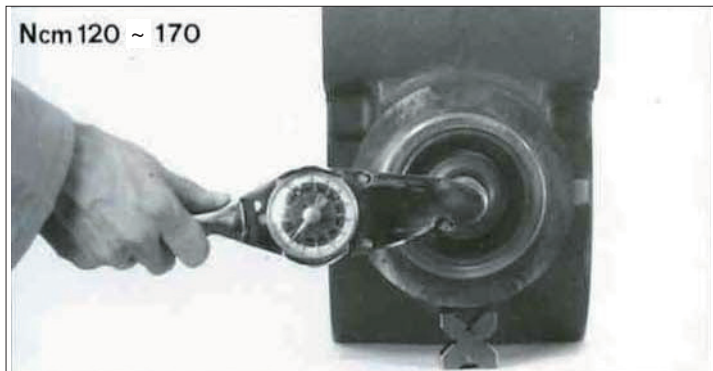


AXLE086



AXLE087

12) For checking of torque.

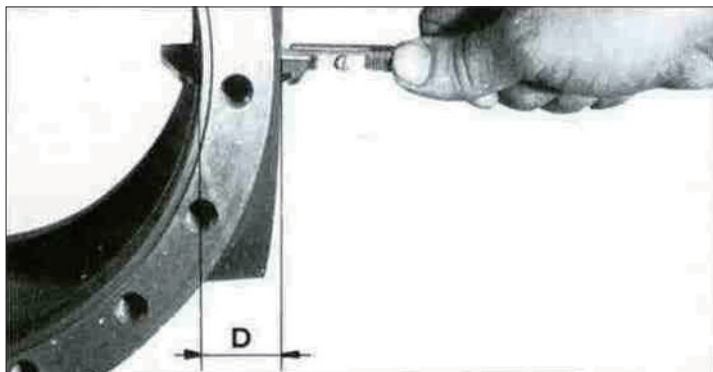


AXLE088

12. ADJUSTMENTS OF BEVEL GEAR SET

- 1) Determination of shim pack S2 for adjustment of bevel pinion position :

$$S2 = (l + A) - (D + r)$$

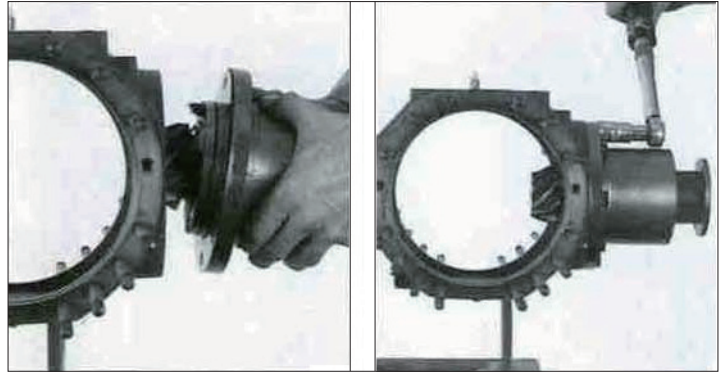


AXLE089



AXLE090

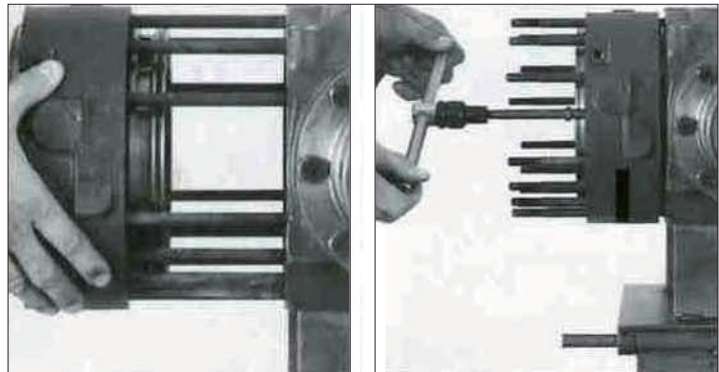
2) Assembling of bevel pinion support with shim pack S2.



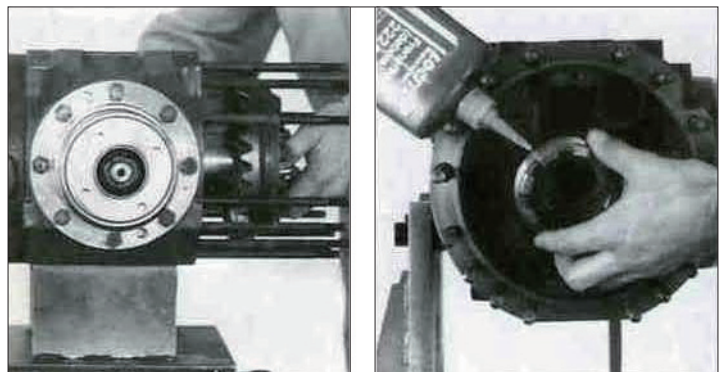
AXLE091

3) Assembling of central axle housing

※ Be careful not to damage the tight surfaced of the O-rings while introducing the differential case into the central axle housing.



AXLE092

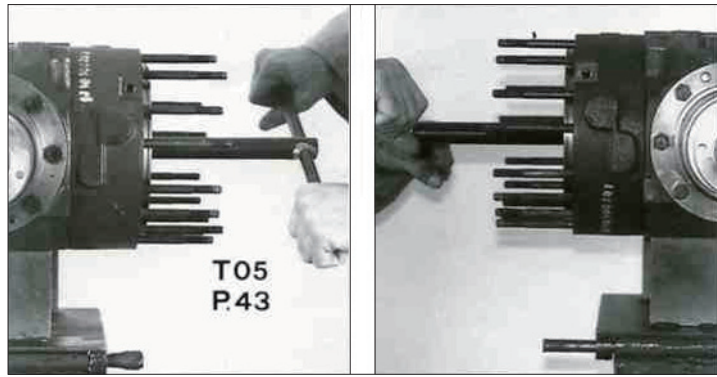


AXLE093

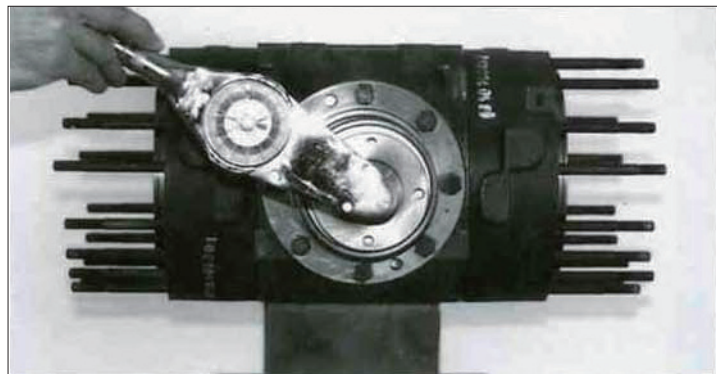
13. TAPER ROLLER BEARINGS OF DIFFERENTIAL

- 1) Screw in the adjusting nuts to obtain approx. 0.15~0.18 mm backlash between the teeth of the bevel gear set without pre-loading the taper roller bearings. Check the rotating torque of pinion and differential.

Tighten nut on opposite site to the crown wheel to obtain a 3.6~4.6 kgf · m (26~33 lbf · ft) higher rotating torque on the pinion.

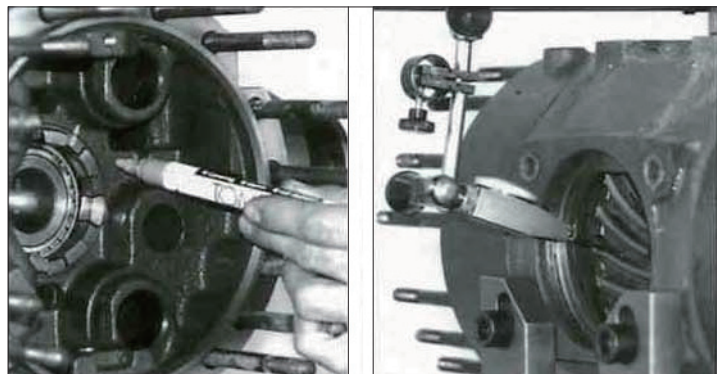


AXLE094



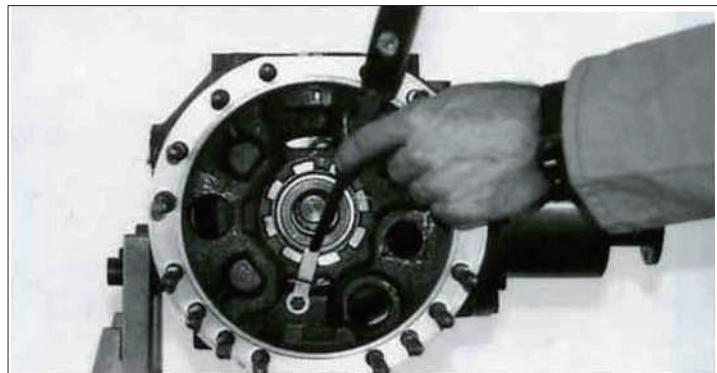
AXLE095

- 2) Mark both ring nuts. To adjust the backlash move ring nuts only. Loose the one on bevel crown wheel side and tighten the opposite one for the equal measure if the backlash is too low. Viceversa if the back lash is too high.



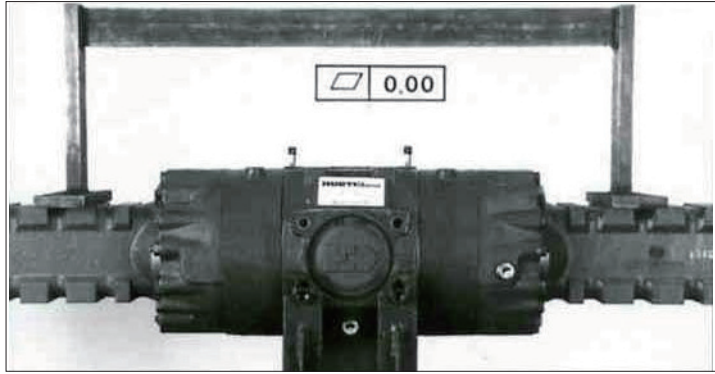
AXLE096

- 3) Fit security sheets in the best position and punch it.

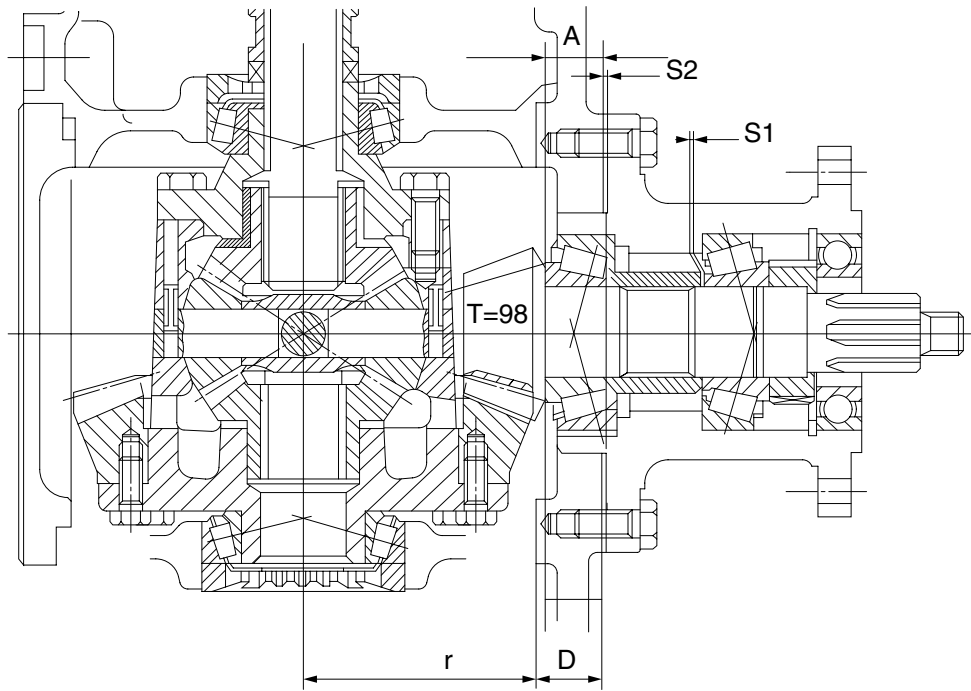


AXLE097

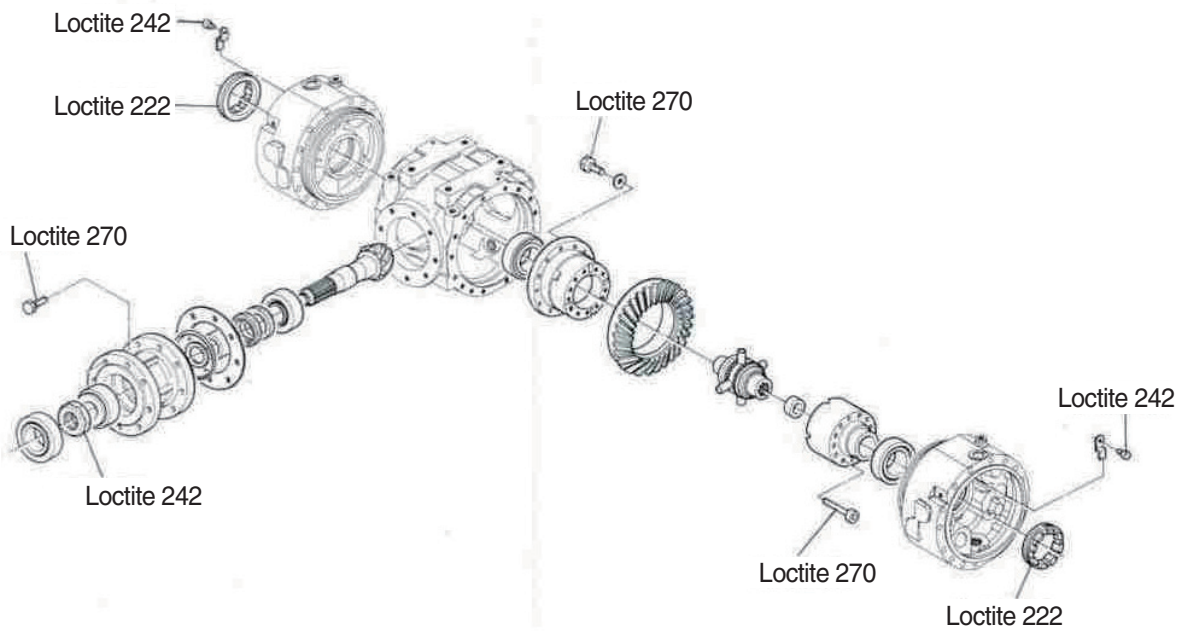
4) Assemble the axle and check parallelism between axle housing.



AXLE098



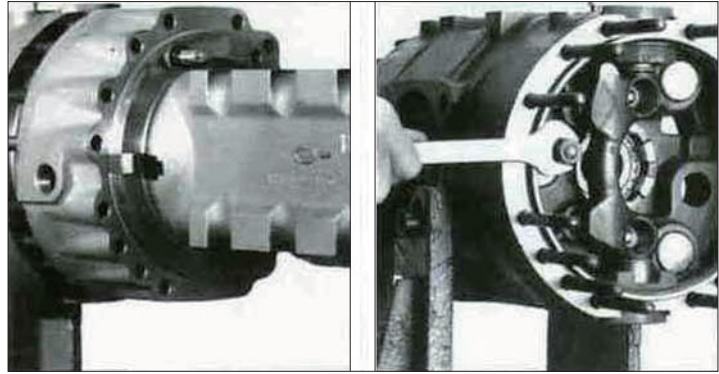
55W97AX06



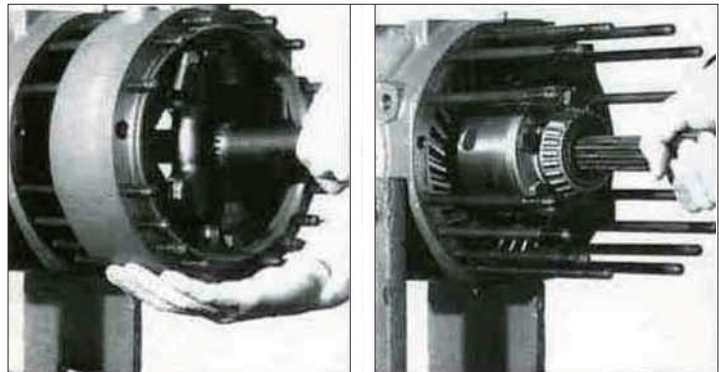
AXLE100

14. DISASSEMBLING OF THE DIFFERENTIAL

- 1) Disassembling of the differential from the axle.

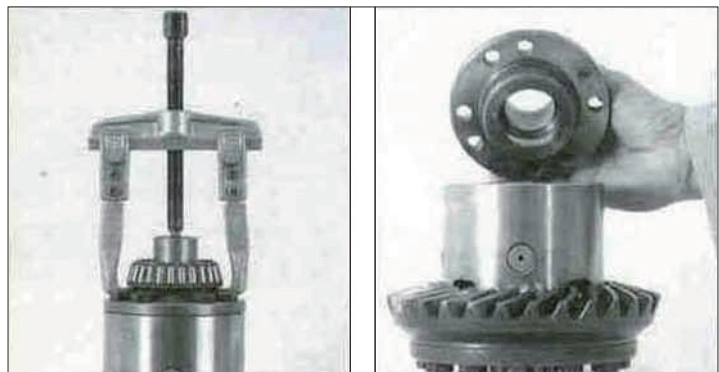


AXLE101

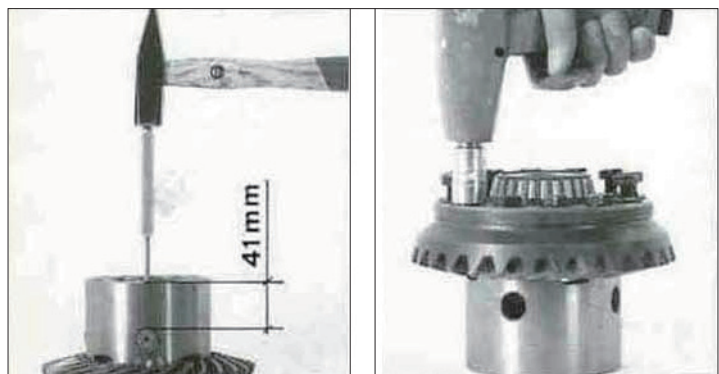


AXLE102

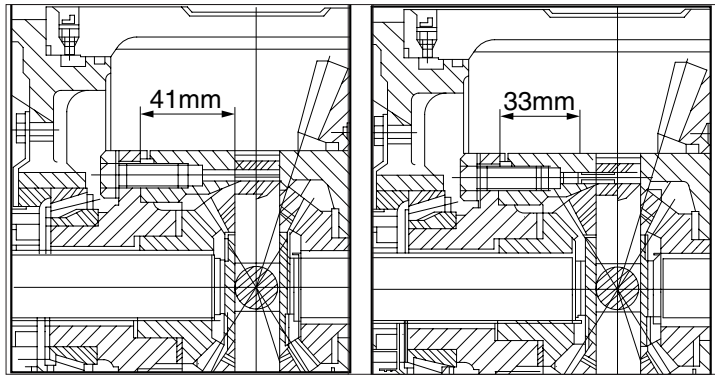
- ※ Replace the fitting bolts of the crown wheel every time that they have to be removed.



AXLE103



AXLE104



55W97AX07

15. ASSEMBLING OF THE DIFFERENTIAL

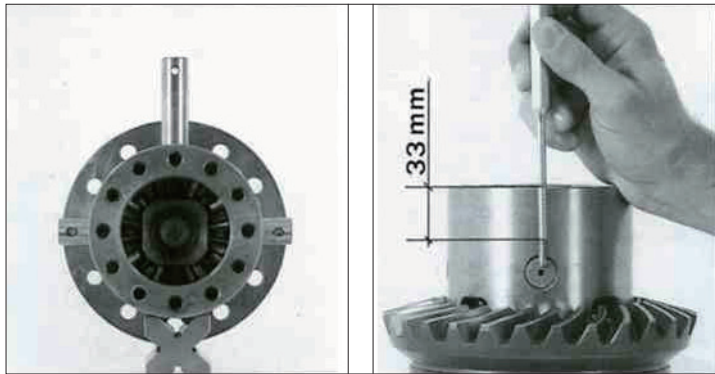
※ Tighten all bolts with torque wrench.

M10×1.25×25-10T :

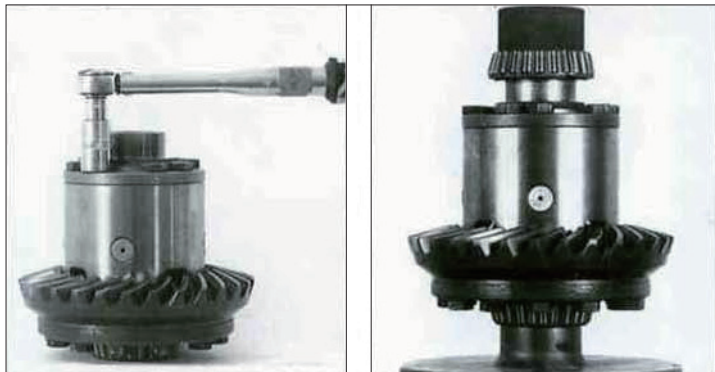
7.44~7.75 kgf · m
(54~56 lbf · ft)

M10×25-10T :

7.04~7.34 kgf · m
(51~53 lbf · ft)



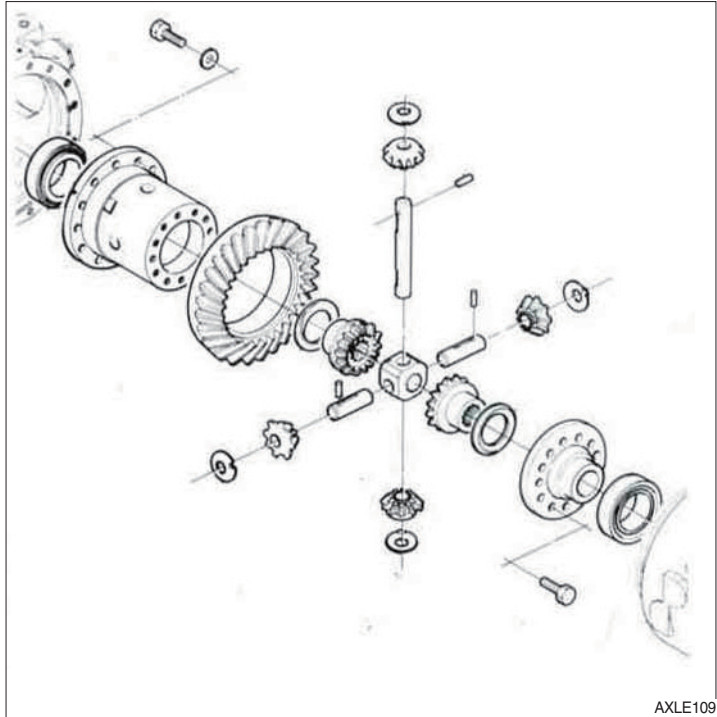
AXLE106



AXLE107



AXLE108



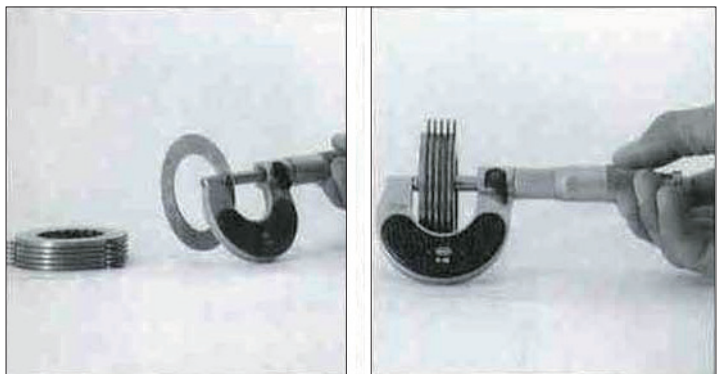
AXLE109

16. SELF LOCKING DIFFERENTIAL

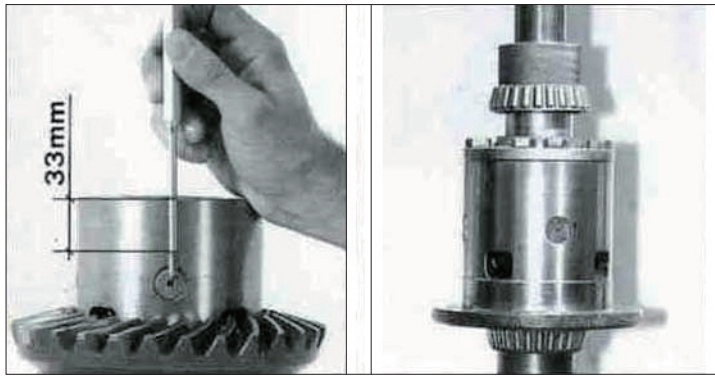
- 1) Check the disc pack to determine the shims.
The total thickness of the disc pack with eventual shims must be 17.5 ± 0.1 mm.



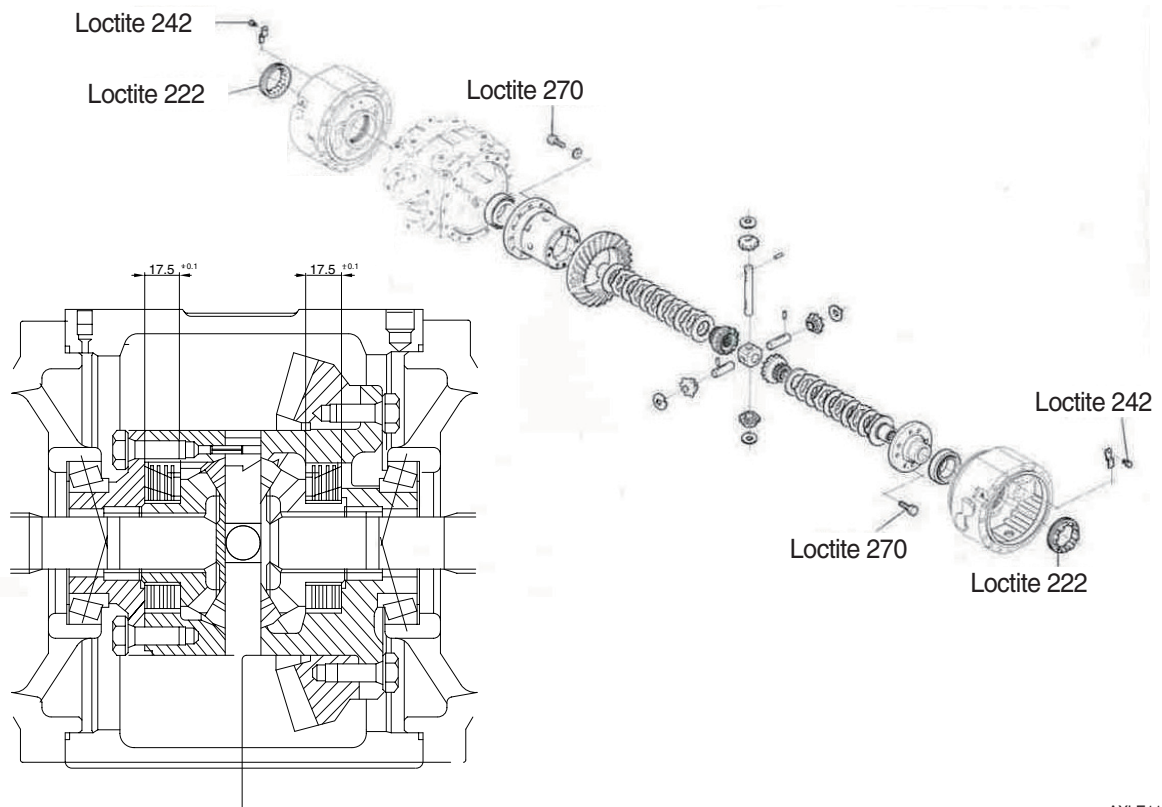
AXLE110



AXLE111

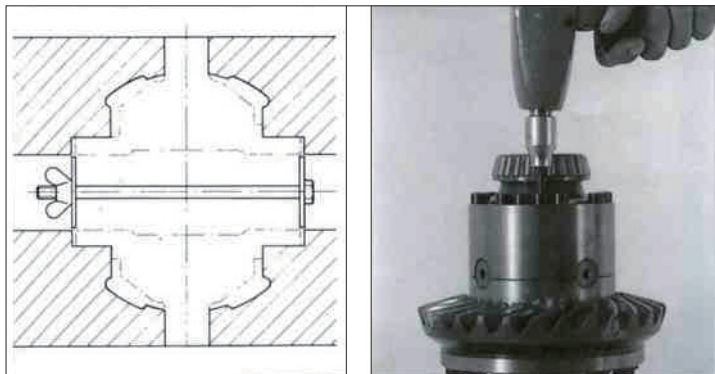


AXLE112



AXLE113

2) Disassembling



AXLE114

3) Assembling

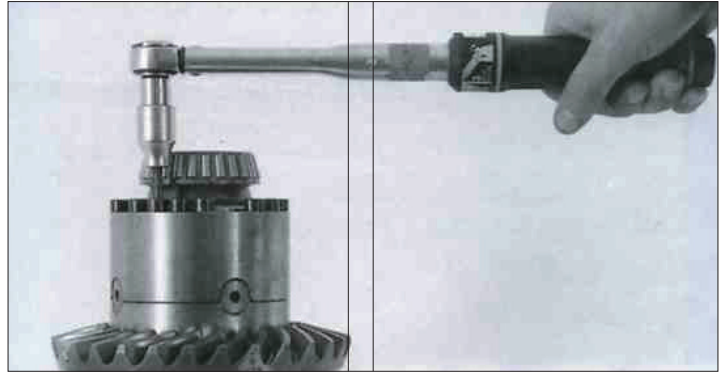
Observe pairing number on semi cases. Tighten the fixing bolts of the semi cases and remove mounting bolt.

Bolt M8×65-10T

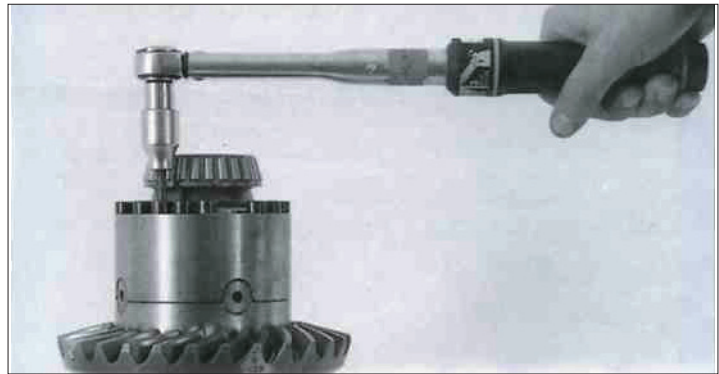
Tightening torque :

3.57~3.77 kgf·m

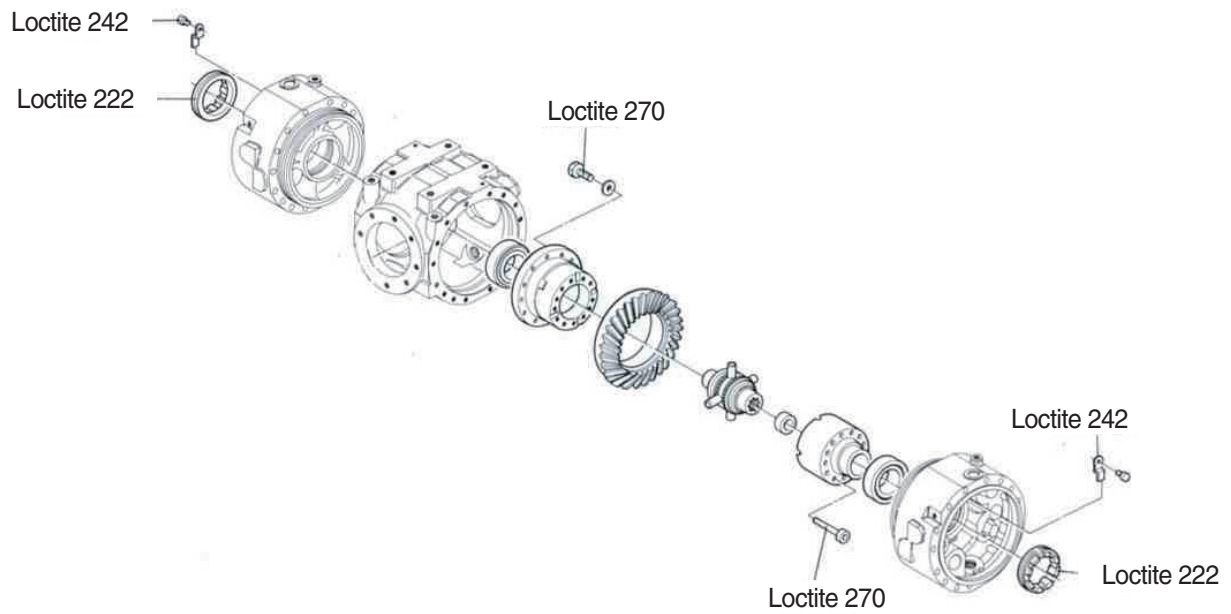
(26~27 lbf · ft)



AXLE114



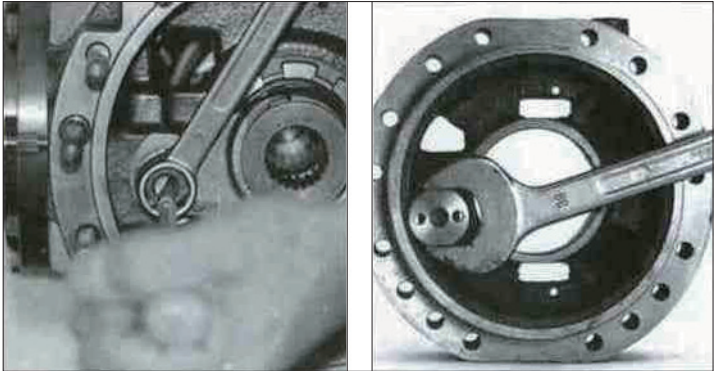
AXLE115



AXLE116

17. HYDRAULIC DIFFERENTIAL LOCK

1) Disassembling

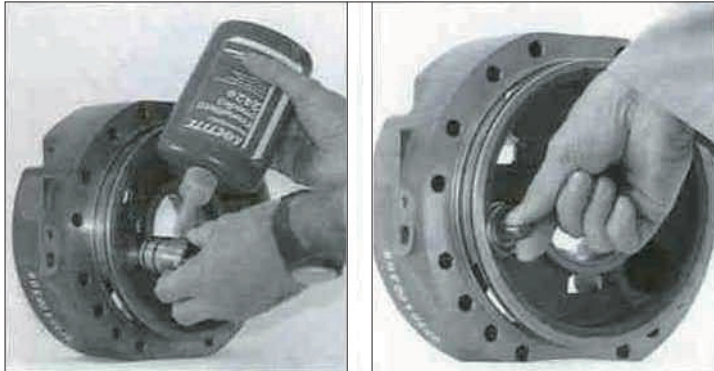


AXLE117

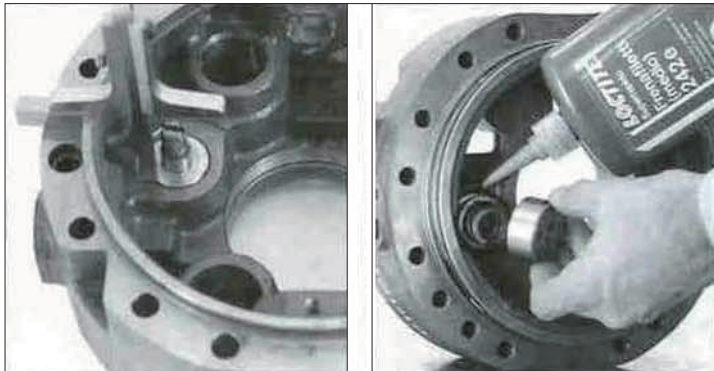


AXLE118

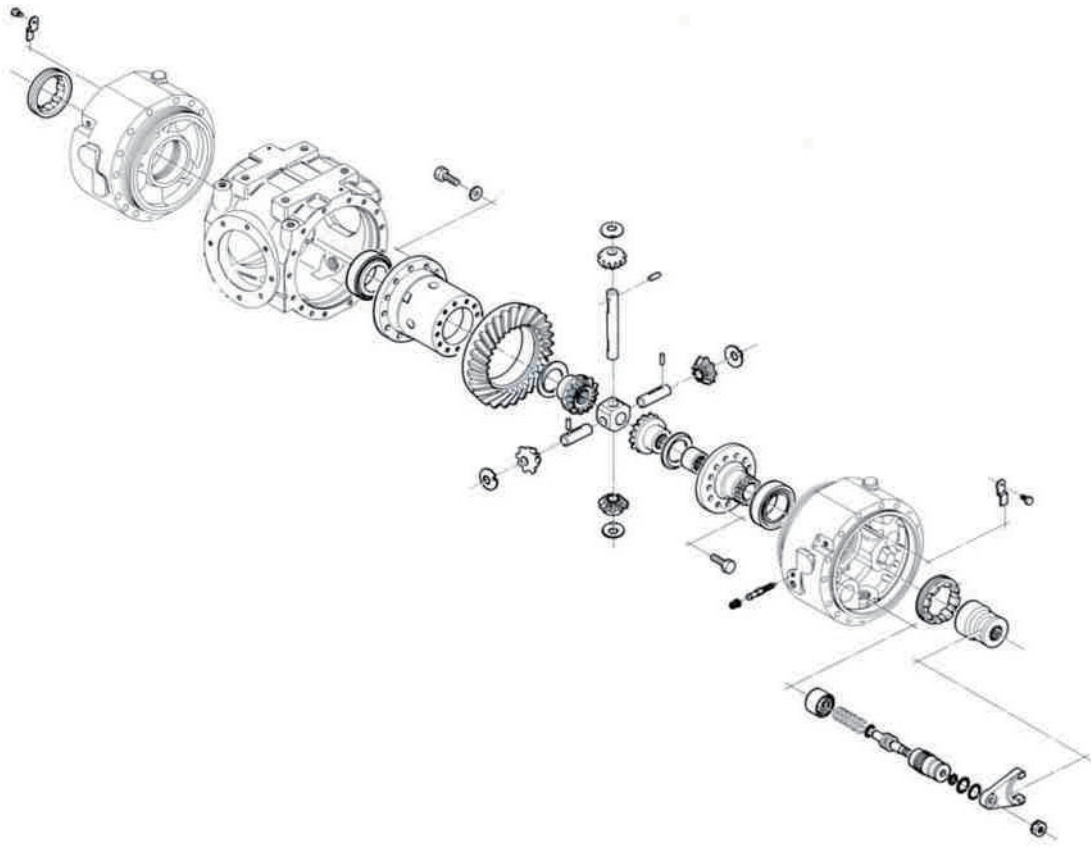
2) Assembling and check of position of cylinder.



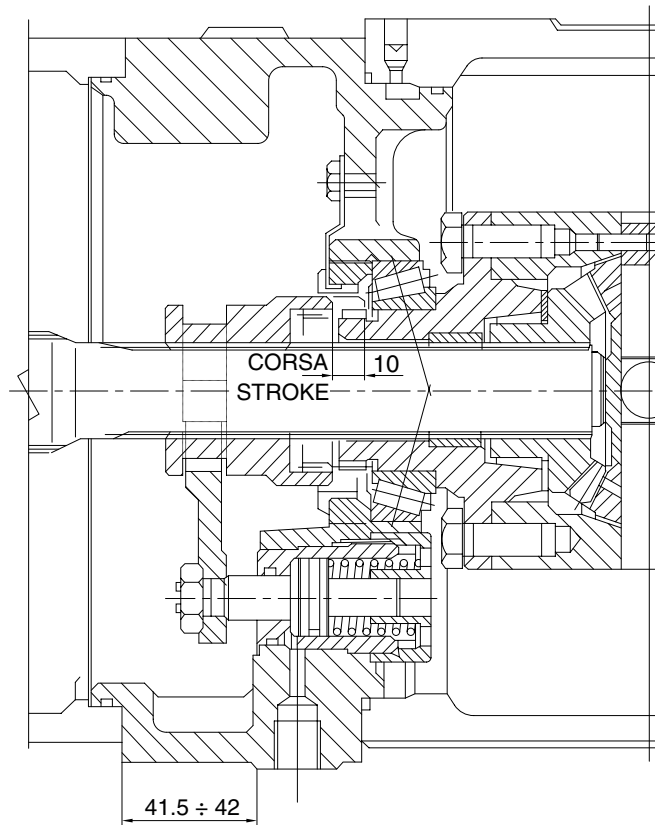
AXLE119



AXLE120

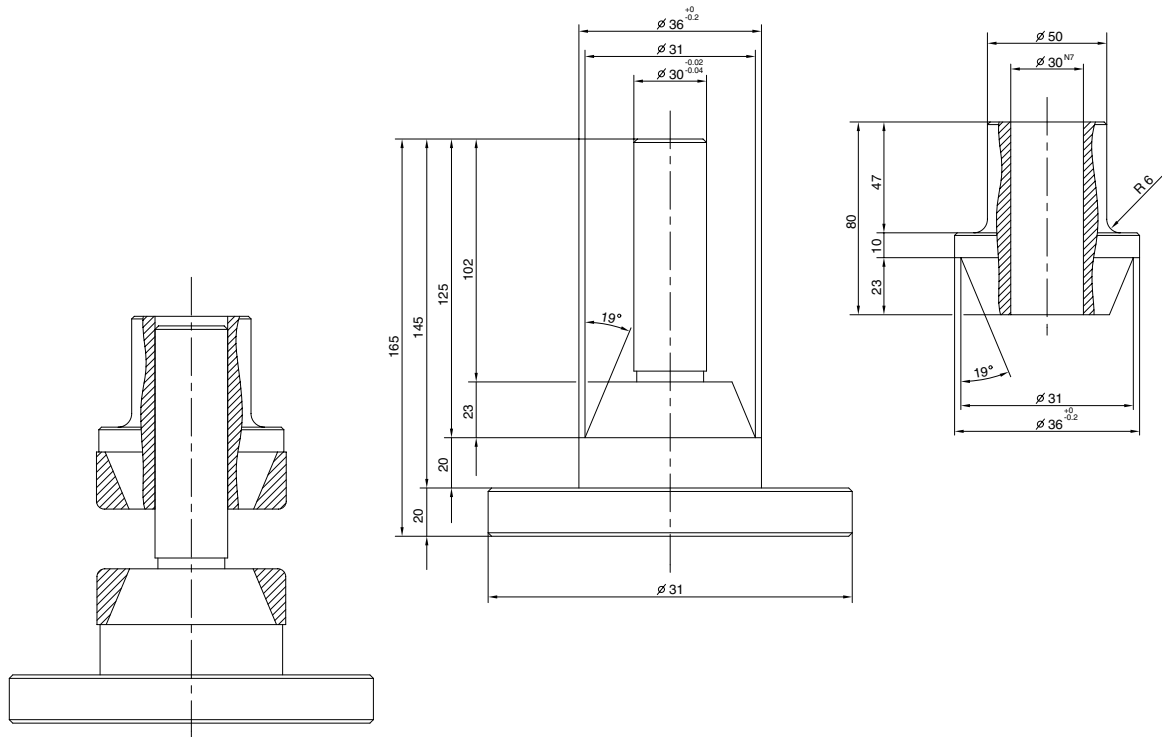


AXLE121



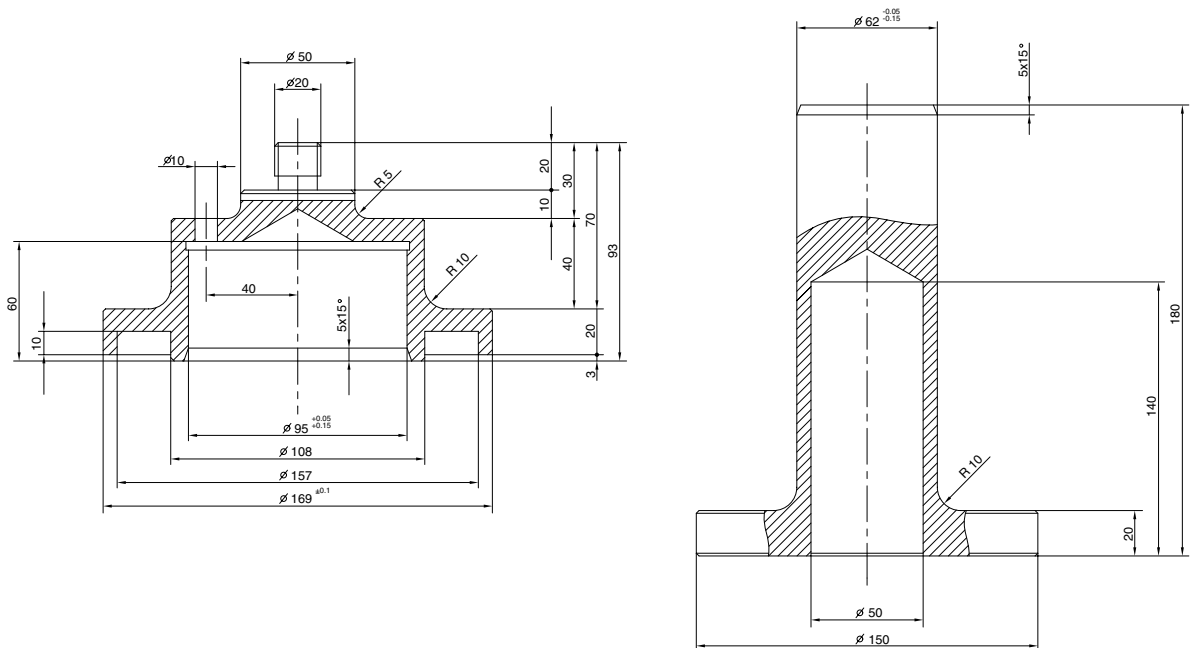
55W97AX09

6) T06 (1.6.60.3.8.1330)



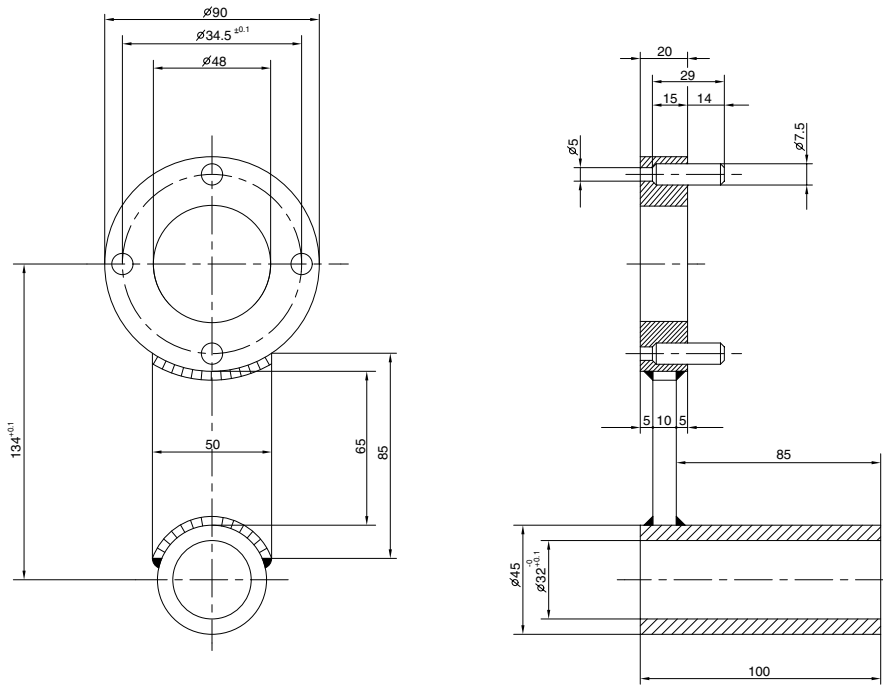
55W97AX15

7) T07 (1.6.60.3.8.1409)



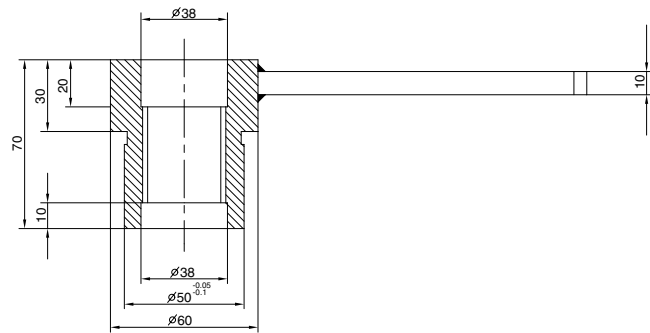
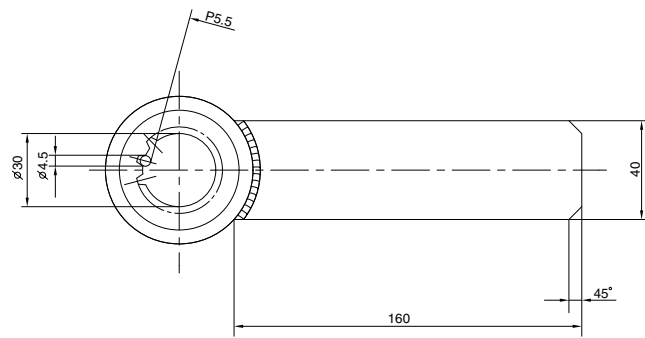
55W97AX16

9) T11-T11bis (1.6.60.3.8.861)



55W97AX18

10) T12 (1.6.60.3.8.1332)



55W97AX19

