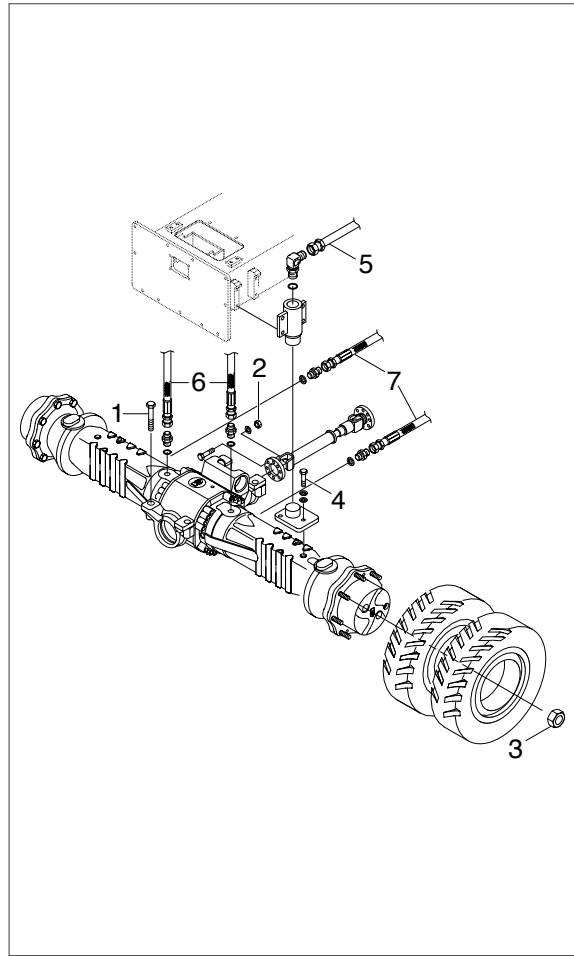


## GROUP 11 FRONT AXLE

### 1. REMOVAL FRONT AXLE

- 1) Front axle mounting bolt(1, M20)
  - Tightening torque :  $46.0 \pm 5.1 \text{kgf} \cdot \text{m}$   
( $333 \pm 36.9 \text{lb} \cdot \text{ft}$ )
- 2) Propeller mounting nut(2, M10)
  - Tightening torque :  $5.9 \pm 0.6 \text{kgf} \cdot \text{m}$   
( $42.7 \pm 4.3 \text{lb} \cdot \text{ft}$ )
- 3) Wheel nut(3, M22)
  - Tightening torque :  $52 \pm 0.5 \text{kgf} \cdot \text{m}$   
( $378 \pm 3.6 \text{lb} \cdot \text{ft}$ )
- 4) Oscillating cylinder supporting mounting bolt(4, M14)
  - Tightening torque :  $19.6 \pm 2.9 \text{kgf} \cdot \text{m}$   
( $142 \pm 21 \text{lb} \cdot \text{ft}$ )
- 5) Pipe assy(5, PF 3/8)
  - Tightening torque :  $5.0 \text{kgf} \cdot \text{m}$ ( $36.2 \text{lb} \cdot \text{ft}$ )
- 6) Hose assy(6, PF 1/4)
  - Tightening torque :  $4.0 \text{kgf} \cdot \text{m}$ ( $28.9 \text{lb} \cdot \text{ft}$ )
- 7) Hose assy(7, PF 3/8)
  - Tightening torque :  $5.0 \text{kgf} \cdot \text{m}$ ( $36.2 \text{lb} \cdot \text{ft}$ )
- 8) Front axle weight : 375kg(827lb)



## 2. GENERAL INSTRUCTIONS

### 1) GENERAL WORKING INSTRUCTIONS

The efficiency and continued operation of mechanical units depend on constant, correct maintenance and also on efficient repair work, should there be a break-down or malfunction. The instructions contained in this manual have been based on a complete overhaul of the unit.

However, it is up to the mechanic to decide whether or not it is necessary to assemble only individual components, when partial repair work is needed. The manual provides a quick and sure guide which, with the use of photographs and diagrams illustrating the various phases of the operations, allows accurate work to be performed.

All the information needed for correct disassembly, checks and assembly of each individual component is set out below. In order to remove the differential unit from the machine, the manuals provided by the machine manufacturer should be consulted. In describing the following operations it is presumed that the unit has already been removed from the machine.

#### (1) Important

In order to facilitate work and protect both working surfaces and operators, it is advisable to use proper equipment such as: trestles or supporting benches, plastic or copper hammers, appropriate levers, pullers and specific spanners or wrenches.

Before going on to disassemble the parts and drain the oil, it is best to thoroughly clean the unit, removing any encrusted or accumulated grease.

#### (2) Introductory remarks

All the disassembled mechanical units should be thoroughly cleaned with appropriate products and restored or replaced if damage, wear, cracking or seizing have occurred.

In particular, thoroughly check the condition of all moving parts (Bearings, gears, crown wheel and pinion, shafts) and sealing parts (O-rings, oil shields) 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 component requires the replacement of the other one. During assembly, the prescribed pre-loading, backlash and torque of parts must be maintained.

#### (3) Classification

This manual classifies units according to part numbers. For a correct interpretation, classification is indicated as follows:

▶▶  = Up to the part number

▶▶ = From the part number on

When no classification is given, disassembly and assembly operations are the same for all versions.

#### (4) Specific equipment

The drawings of all specific tools required for maintenance and repair work can be found at the end of this manual.

## 2) NOTES ON SAFETY PRECAUTIONS

- (1) During all operations described in this manual, the axle should be fastened onto a trestle, while the other parts mentioned should rest on supporting benches.
- (2) When removing one of the arms, an anti-tilting safety trestle should be placed under the other arm.
- (3) When working on an arm that is fitted on the machine, make sure that the supporting trestles are correctly positioned and that the machine is locked lengthways.
- (4) Do not admit any other person inside the work area; mark off the area, hang warning signs and remove the ignition key from the machine.
- (5) Use only clean, quality tools; discard all worn, damaged, low-quality or improvised wrenches and tools. Ensure that all dynamometric wrenches have been checked and calibrated.
- (6) Always wear gloves and non-slip rubber shoes when performing repair work.
- (7) Should you stain a surface with oil, remove marks straight away.
- (8) Dispose of all lubricants, seals, rags and solvents once work has been completed. Treat them as special waste and dispose of them according to the relative law provisions obtaining in the country where the axles are being overhauled.
- (9) Make sure that only weak solvents are used for cleaning purposes; Avoid using turpentine, dilutants and toluol-, xylool-based or similar solvents; Use light solvents such as Kerosene, mineral spirits or water-based, environment friendly solvents.
- (10) For the sake of clarity, the parts that do not normally need to be removed have not been reproduced in some of the diagrams.
- (11) The terms RIGHT and LEFT in this manual refer to the position of the operator facing the axle from the side opposite the drive.
- (12) After repair work has been completed, accurately touch up any coated part that may have been damaged.

## 3) LUBRICANT AND MAINTENANCE SPECIFICATIONS

### (1) Lubricant

Gear oils with limited-slip additives.

API GL-5

MIL-L-2105D(SAE 85W-90, 85W-140 with LS-Additive)

### (2) Maintenance

Oil change interval

- 1st : 500hr

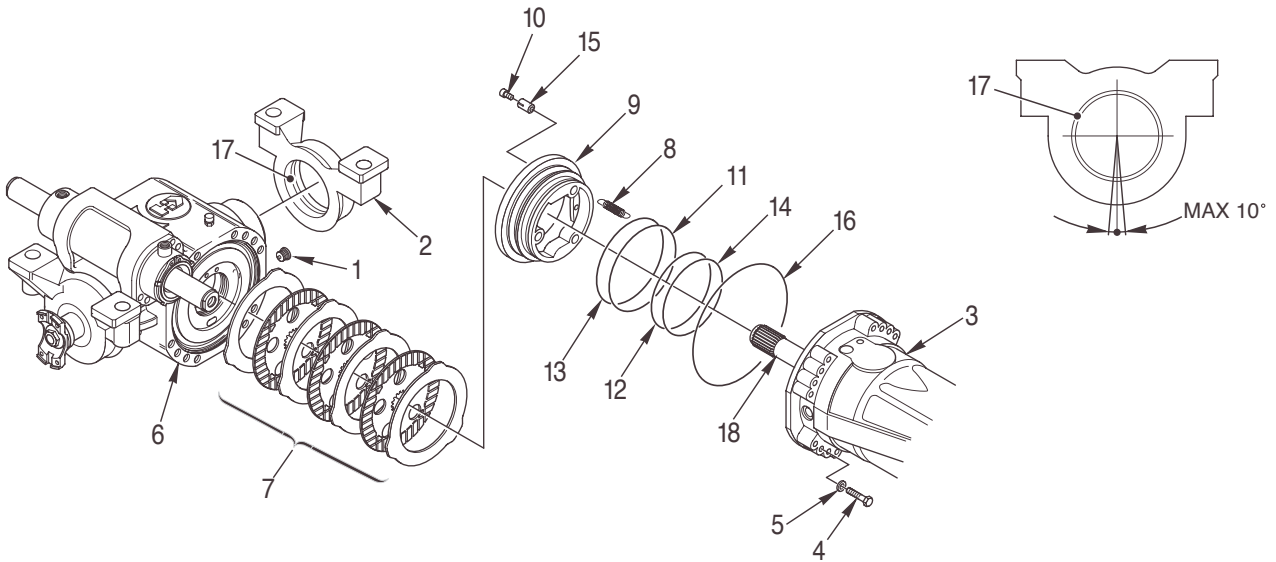
- Every 1000hr or at least once a year.

Grease

- Monthly

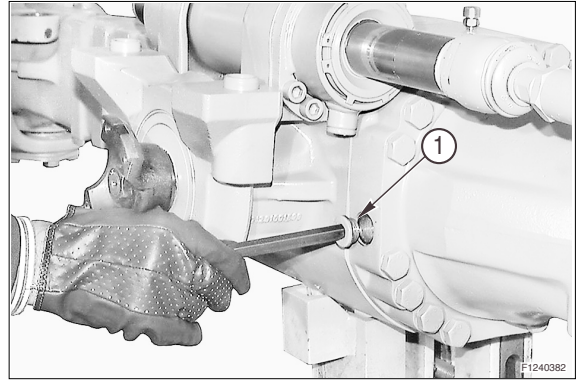
### 3. DISASSEMBLY AND ASSEMBLY

#### 1) CHECKING WEAR AND REPLACING THE BRAKING DISKS

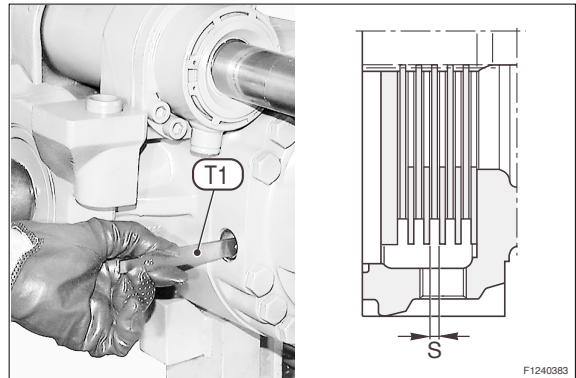


- |   |               |    |               |    |                     |
|---|---------------|----|---------------|----|---------------------|
| 1 | Plug          | 7  | Braking disks | 13 | Anti-extrusion ring |
| 2 | Swing support | 8  | Spring        | 14 | Anti-extrusion ring |
| 3 | Arm           | 9  | Piston        | 15 | Regulation spring   |
| 4 | Screw         | 10 | Pin screw     | 16 | Sealing ring        |
| 5 | Washer        | 11 | O-ring        | 17 | Bushing             |
| 6 | Central body  | 12 | O-ring        | 18 | U-joint             |

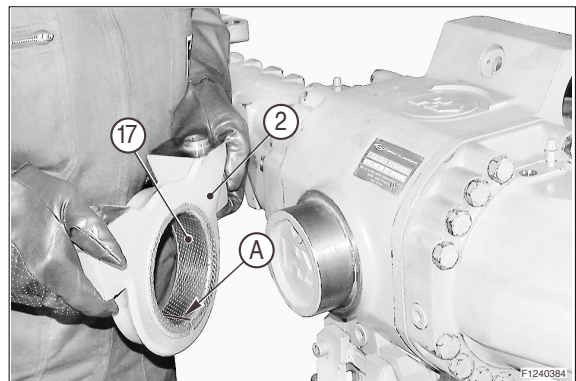
- (1) Remove the oil level plug(1).  
Perform all operations on both arms.



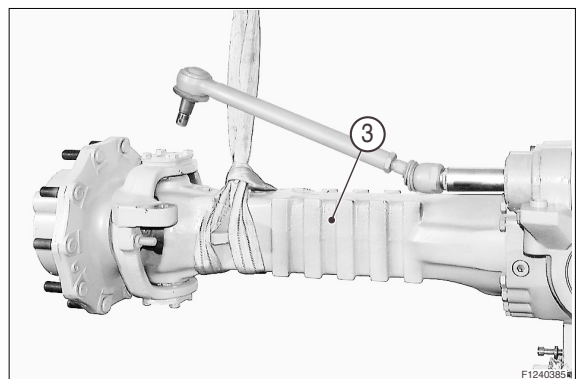
- (2) Apply the brakes and, keeping them under pressure, check the linings S between the disks using tool T1.  
· Minimum S : 4.5mm  
Replace the braking disks and the intermediate disks on both sides if necessary.



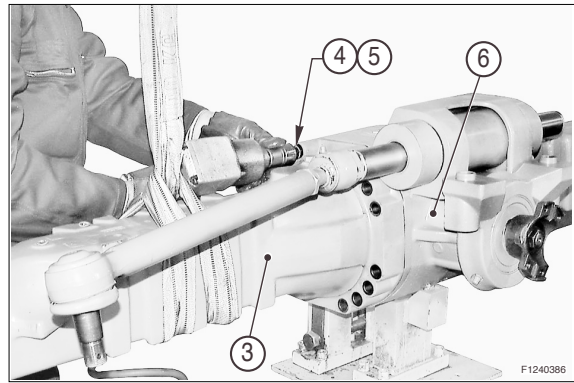
- (3) Remove the swinging support(2) on the side opposite the drive.  
If the bushing(17) is worn and needs replacing, note down the assembly side of the connection notch A.



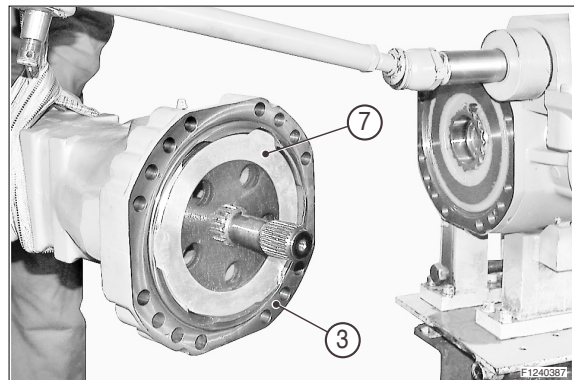
- (4) Disconnect the pins of the steering bars from the steering case(See How to remove the steering cylinder).  
Sling the arm(3) to be removed and put the rod under slight tension.



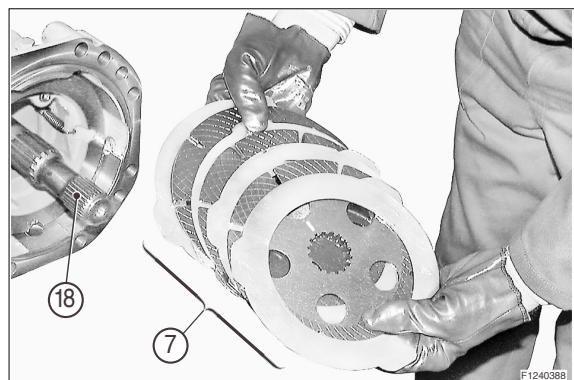
- (5) Unloose and remove the screws(4) and the washers(5) that fix the arm(3) to the central body(6).



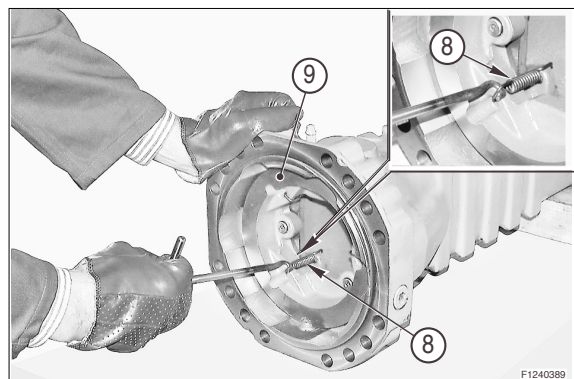
- (6) Remove the arm(3) together with the pack of the braking disks(7). Place the arm on a bench.



- (7) Remove the braking disks(7) and note down their order of assembly. If the disks do not need replacing, avoid switching their position. Extract the u-joint(18).

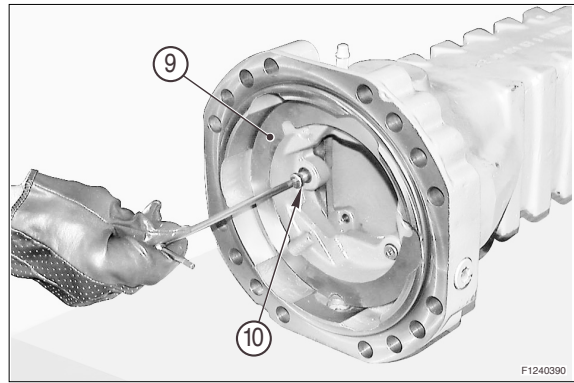


- (8) Remove the reversal springs(8) from the piston(9).
- If the springs(8) are weak or deformed they must be replaced.

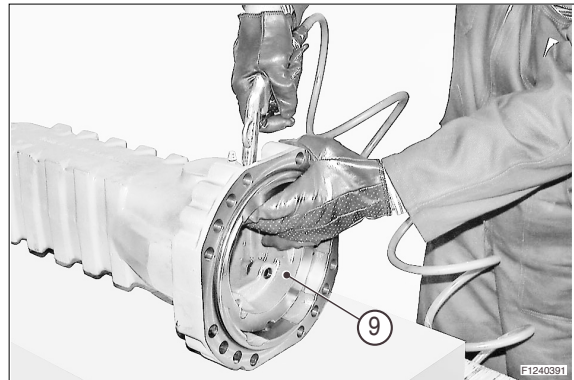


(9) Remove the pin screws(10) guiding the piston(9).

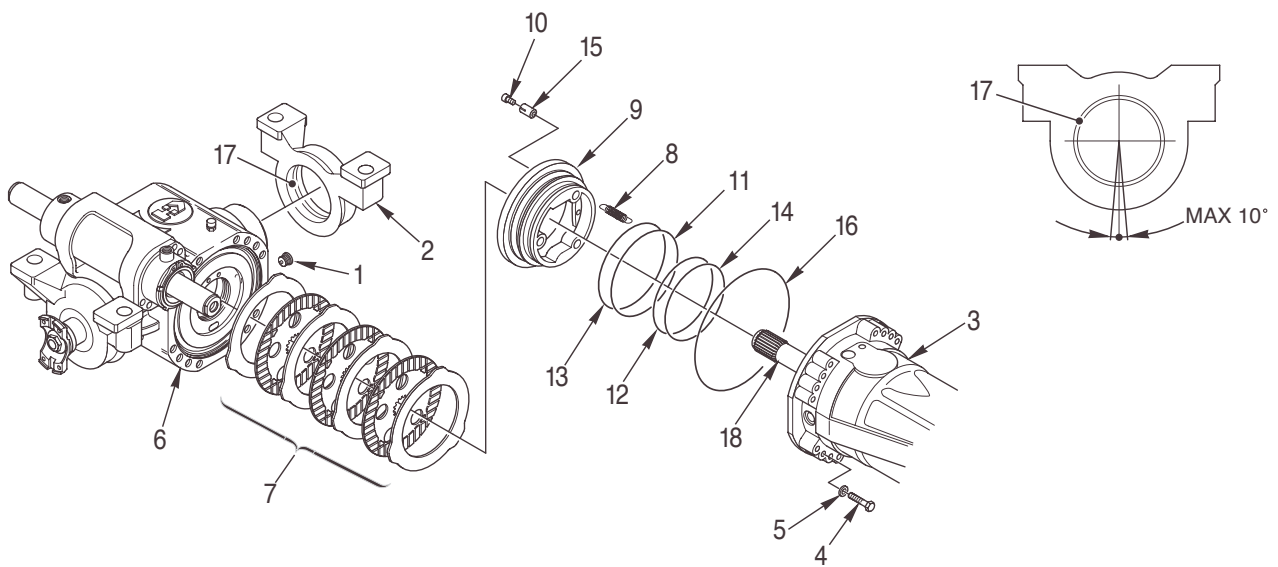
If the screws are to be replaced, note down the different colors for the different brake gap.(See How to assemble the braking units)



(10) Slowly introduce compressed air through the connection of the braking circuit in order to extract the entire piston. Hold on to the piston as it may be suddenly ejected and damaged.

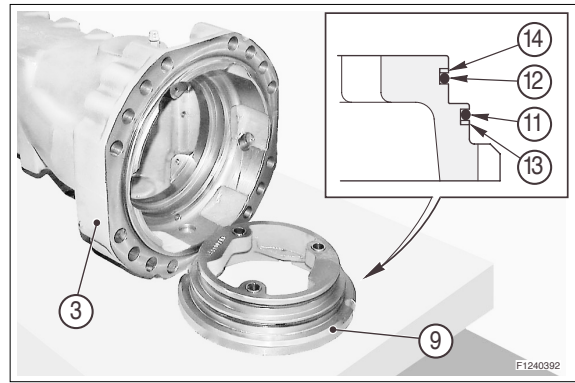


## 2) HOW TO ASSEMBLE THE BRAKING UNITS

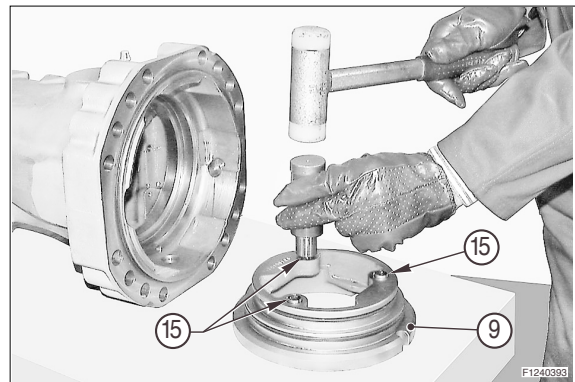


- |   |               |    |               |    |                     |
|---|---------------|----|---------------|----|---------------------|
| 1 | Plug          | 7  | Braking disks | 13 | Anti-extrusion ring |
| 2 | Swing support | 8  | Spring        | 14 | Anti-extrusion ring |
| 3 | Arm           | 9  | Piston        | 15 | Regulation spring   |
| 4 | Screw         | 10 | Pin screw     | 16 | Sealing ring        |
| 5 | Washer        | 11 | O-ring        | 17 | Bushing             |
| 6 | Central body  | 12 | O-ring        | 18 | U-joint             |

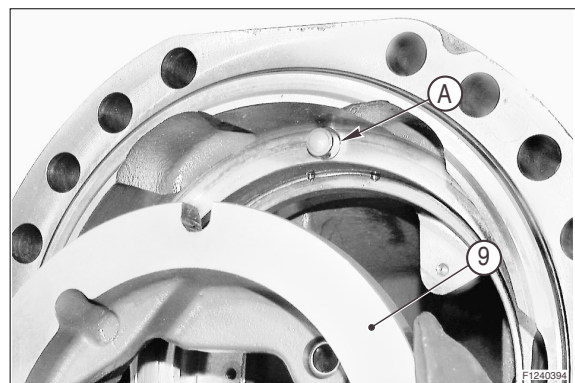
- (1) Accurately clean the piston(9) and the seats of slide and seal. Replace the O-rings(11) and (12) and the anti-extrusion rings(13) and (14); Make sure that the assembly side is correct. Accurately check the positioning of the anti-extrusion rings(13) and (14).



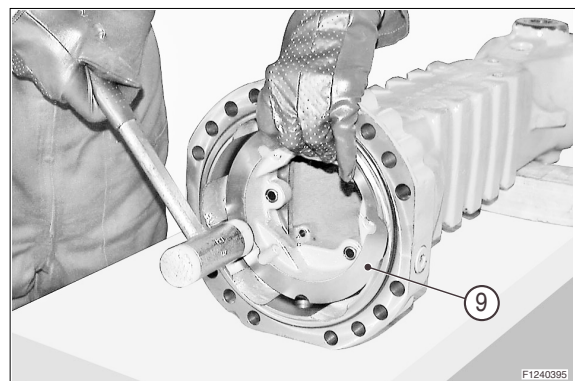
- (2) Insert the stroke automatic regulation springs(15); Place them in line with the piston(9).



- (3) Lubricate the seals(11) and (12) and fit the piston(9) into the arm(3). Make sure that the piston seat fits into the stop pin(A) inside the arm.



- (4) Assist the insertion of the piston(9) by lightly hammering around the edge with a plastic hammer.

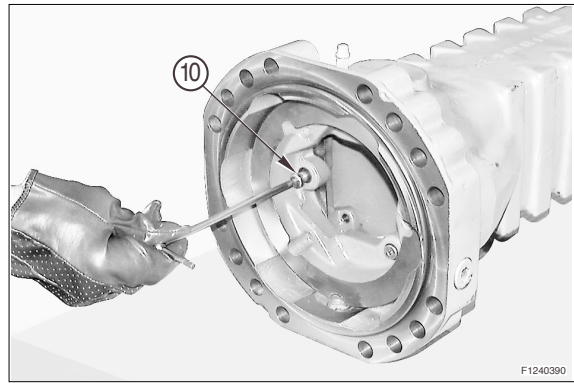


(5) Fit the pin screws(10) making sure that they are all of the same color.

- White : 1mm gap
- Yellow : 0.75mm gap
- Blue : 0.5mm gap

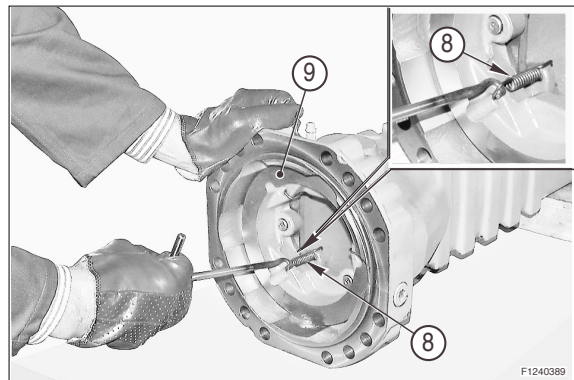
Apply Loctite 270 to the thread.

- Tightening torque :  $0.6 \pm 0.1 \text{kgf} \cdot \text{m}$   
( $4.3 \pm 0.7 \text{bf} \cdot \text{ft}$ )



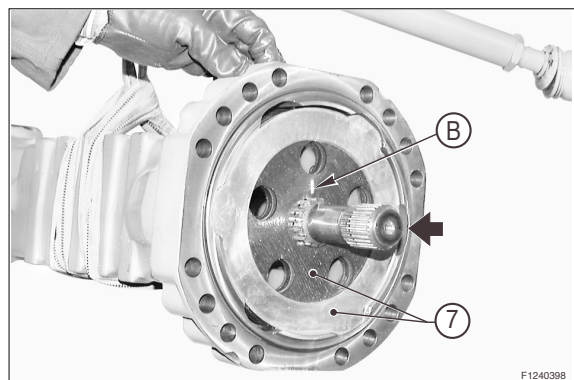
(6) Fit the reversal springs(8) on the piston (9).

Pay due attention not to deform the connections of the springs.

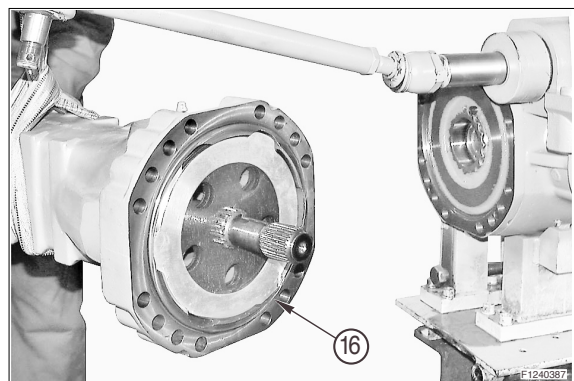


(7) Slightly lubricate the braking disks(7) and fit them in the arm following the correct sequence; orient them so that the oil circulation holes and the marks B are perfectly lined up.

When installing the steel discs, the slot corresponding to the oil level cap should always be kept free.

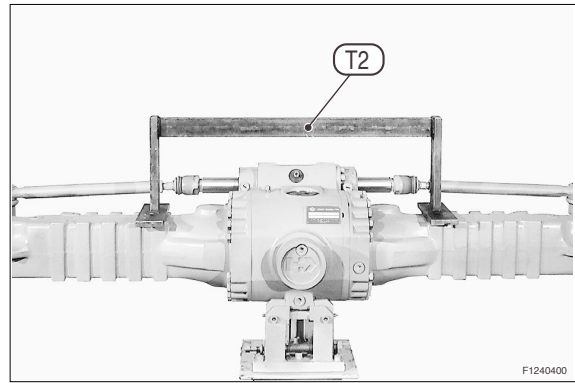


(8) Check that the positioning of the sealing ring(16) on the arm is intact; Install the complete arm. Lock it into position using two facing screws(4) and washers(5).

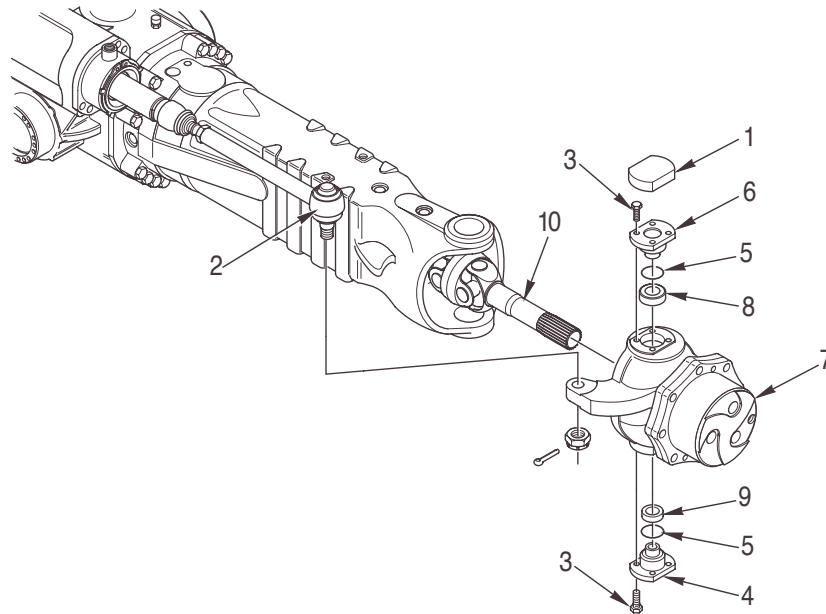


(9) Check the flatness of the arms using tool T2 and finally lock the arms with the screws(4) and the washer(5) using the cross-tightening method.

- Tightening torque : 30.4kgf · m(220lb · ft)

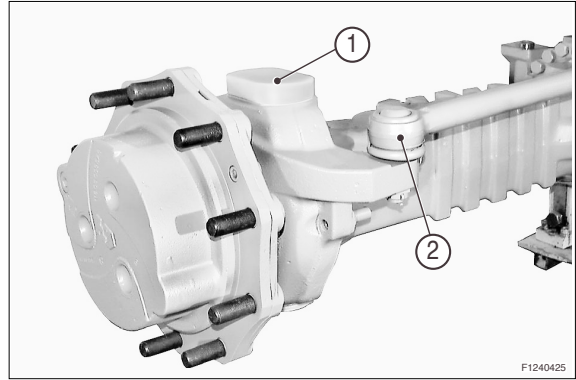


### 3) HOW TO REMOVE THE COMPLETES STEERING CASE

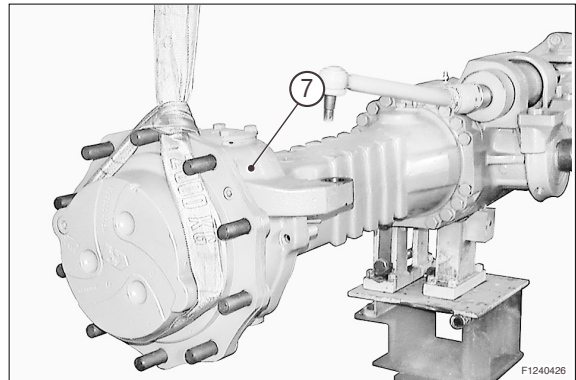


- |   |                         |   |                      |    |              |
|---|-------------------------|---|----------------------|----|--------------|
| 1 | Guard                   | 5 | Seal                 | 8  | Bushing      |
| 2 | Articulation pin        | 6 | Top articulation pin | 9  | Ball bushing |
| 3 | Screw                   | 7 | Steering case        | 10 | U-joint      |
| 4 | Bottom articulation pin |   |                      |    |              |

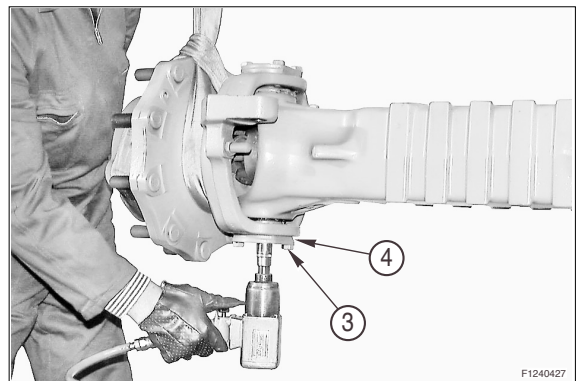
- (1) Remove the guard(1) and disconnect the articulation pin(2)(See How to remove the steering cylinder).



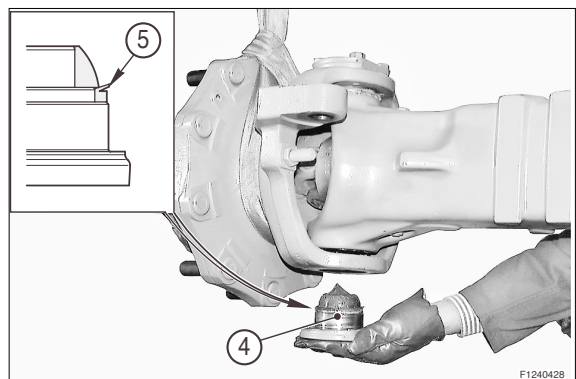
- (2) Sling the entire unit (7) and connect it to the hoist, putting the rod under light tension.



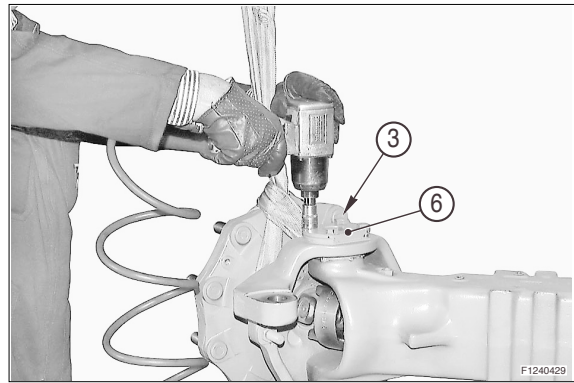
- (3) Unloose and remove the fitting screws(3) from the bottom articulation pin(4). Screws cannot be reused.



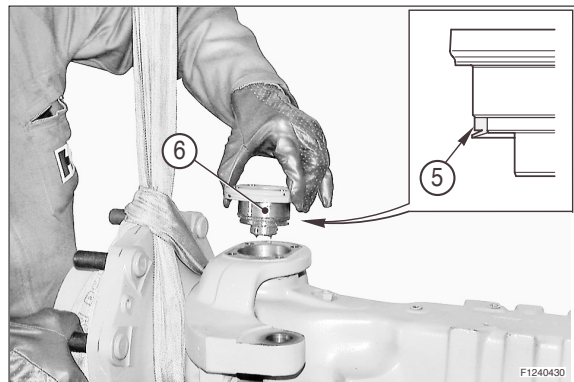
- (4) Remove the bottom articulation pin(4) complete with front seal(5).



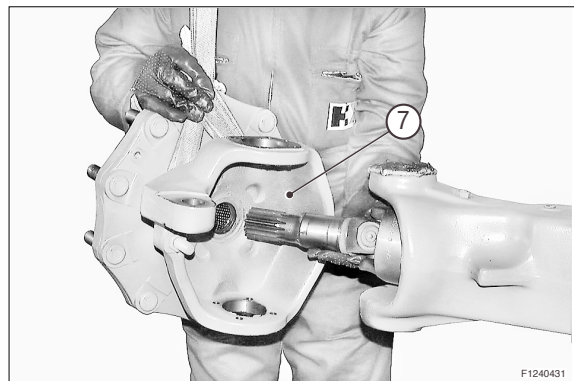
- (5) Unloose and remove the fitting screws(3) from the top articulation pin(6).



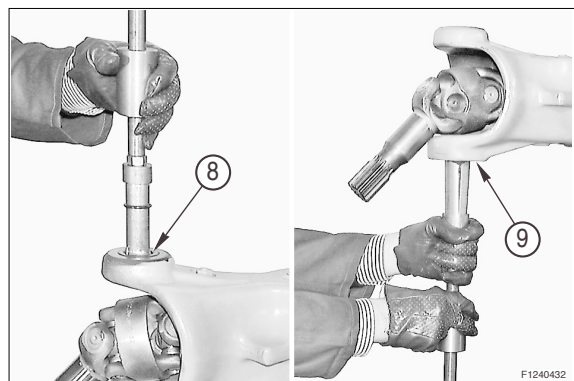
- (6) Using two levers, remove the top articulation pin(6) complete with front seal (5). Pay attention not to damage the surfaces.



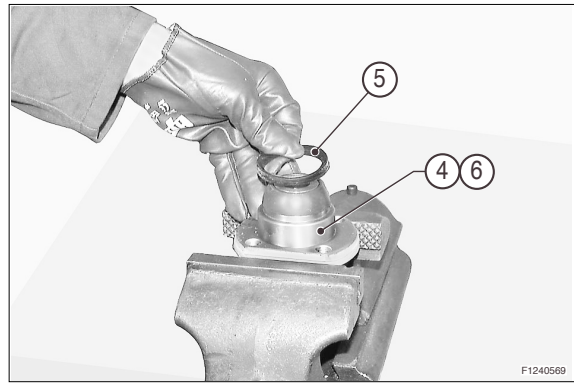
- (7) Remove the complete steering case(7).



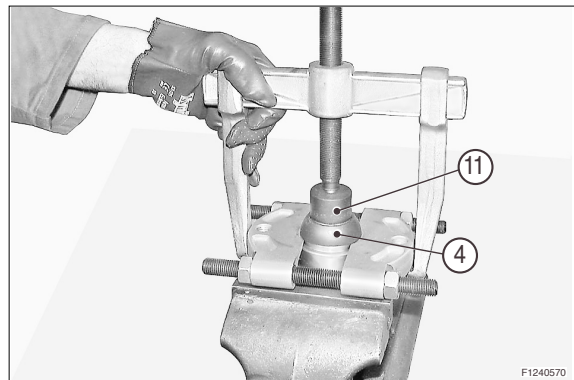
- (8) Using a puller for inner parts, remove the top bushing(8) and the bottom ball bushing(9).



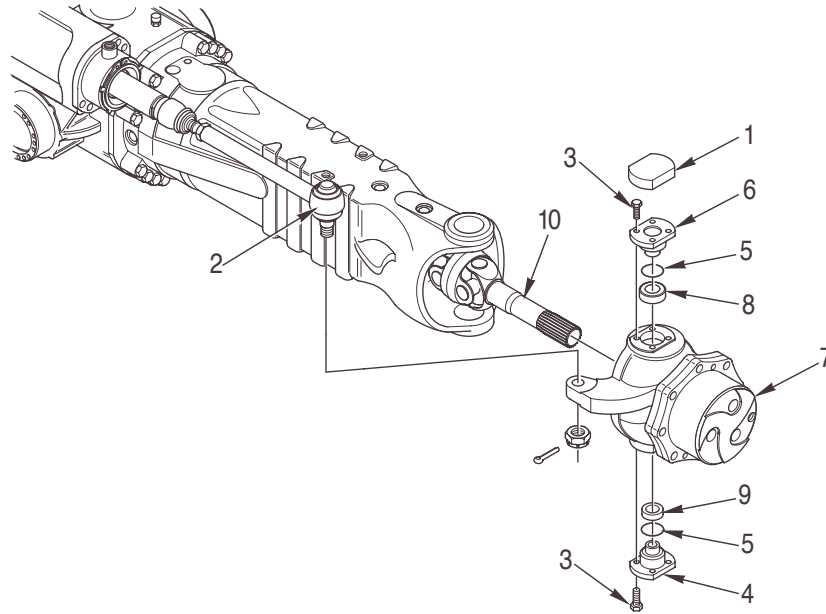
- (9) Remove the articulation pins(4) and (6) and front sealing rings(5).  
Note down the side for assembly.



- (10) If the ball cover(11) needs replacing, remove it from the bottom articulation pin(4).

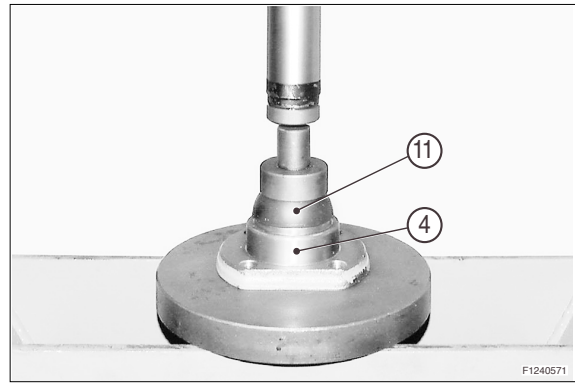


#### 4) HOW ASSEMBLE THE COMPLETE STEERING CASE

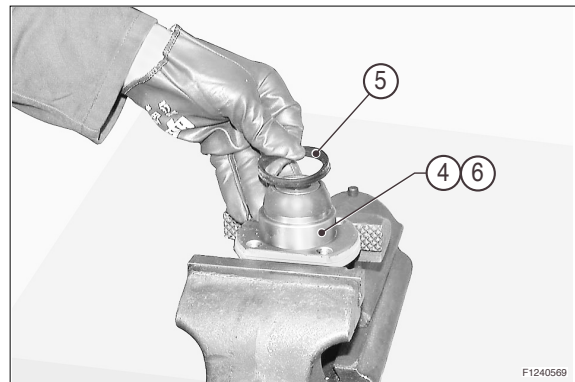


- |   |                         |   |                      |    |              |
|---|-------------------------|---|----------------------|----|--------------|
| 1 | Guard                   | 5 | Seal                 | 8  | Bushing      |
| 2 | Articulation pin        | 6 | Top articulation pin | 9  | Ball bushing |
| 3 | Screw                   | 7 | Steering case        | 10 | U-joint      |
| 4 | Bottom articulation pin |   |                      |    |              |

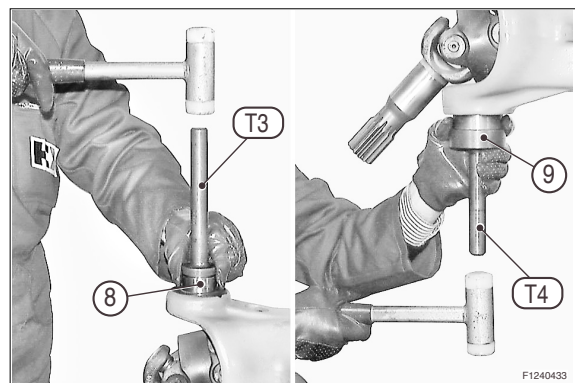
- (1) If the bottom articulation pin(4) has been extracted, position the pin under a press and fit the ball cover(11).



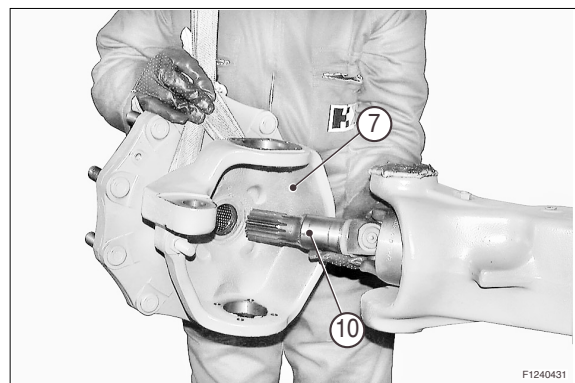
- (2) Fit the front sealing rings(5) onto the articulation pins(4) and (6). Carefully check that the rings are properly oriented(5).



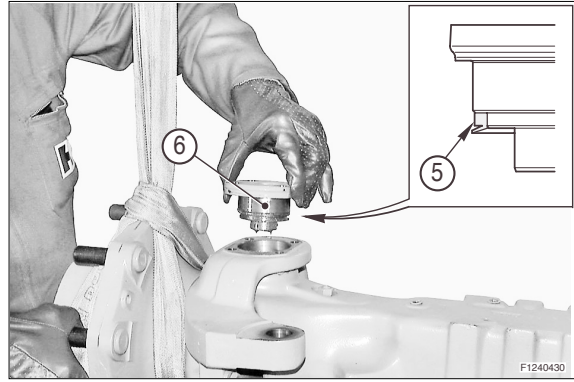
- (3) Lubricate the top bushing(8) or the bottom ball bushing(9) and fit them into the fulcrum holes of the arm. Use tools T3 and T4.



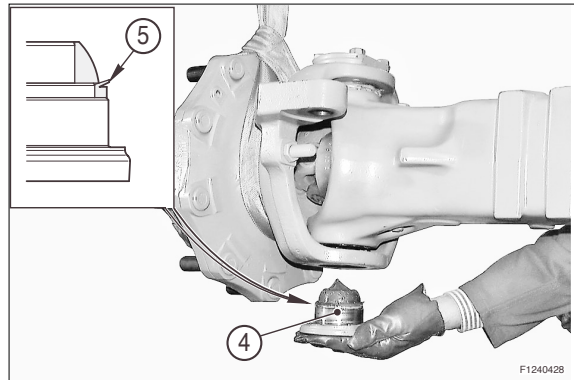
- (4) Lubricate the terminal of the U-joint(10) and install the steering case(7). Pay due attention not to damage the dust cover rings and the sealing rings.



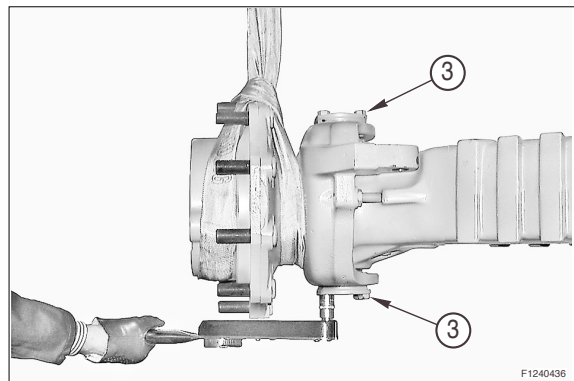
- (5) Fit a new seal(5) onto the top articulation pin(6). Lubricate and install the unit in the steering case. Position the screws(3) and lightly tighten.  
Check the correct assembly side of the seal(5).



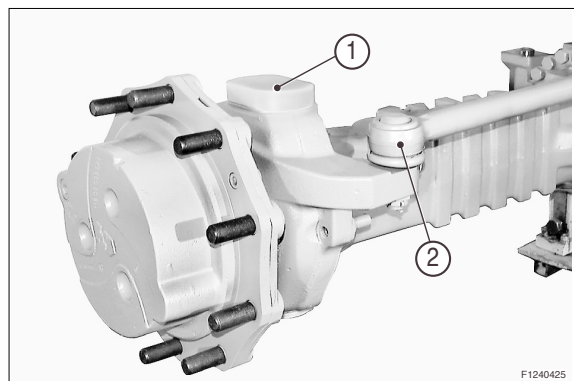
- (6) Fit a new seal(5) onto the bottom articulation pin(4). Lubricate and fit the unit in the steering case. Position the screws(3) and lightly tighten.  
Check for the correct assembly side of the seal(5).



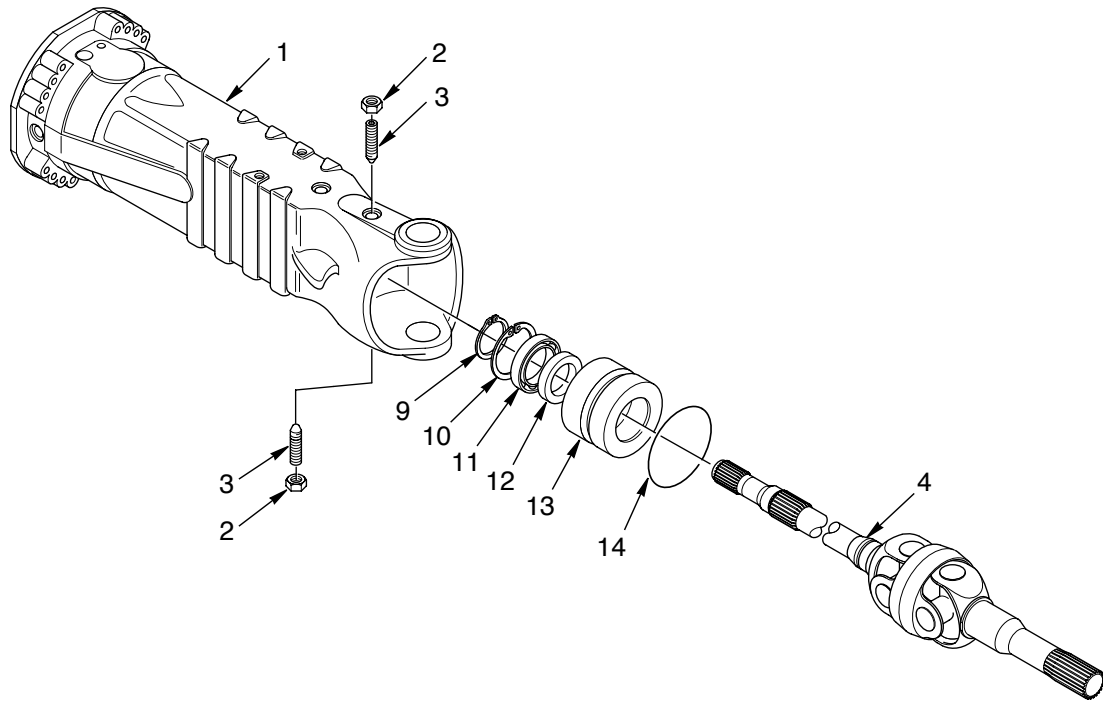
- (7) Tighten the new fitting screws(3) of top and bottom articulation pins in sequence using the cross tightening method.  
· Tightening torque :  $13.8 \pm 0.7 \text{ kgf} \cdot \text{m}$   
 $(99.8 \pm 5.1 \text{ lbf} \cdot \text{ft})$



- (8) Connect the articulation pin(2)(See How to install the steering cylinder).  
Lubricate articulations with Molikote and fit the dust cover(1).



## 5) HOW TO REMOVE THE U-JOINT



1 Axle case  
2 Nut  
3 Dowel  
4 U-joint

9 Snap ring  
10 Snap ring  
11 Bearing

12 Sealing ring  
13 Bushing  
14 O-ring

- (1) The u-joint can only be removed after extraction of the steering case has been performed (See Removing the steering case). Different procedures need to be followed depending on the kind of repair operation needed and the type of axle.

Axle without parking brakes: Compressed air(7bar approx.) should be introduced in the braking circuit in order to hold the braking disks in position.

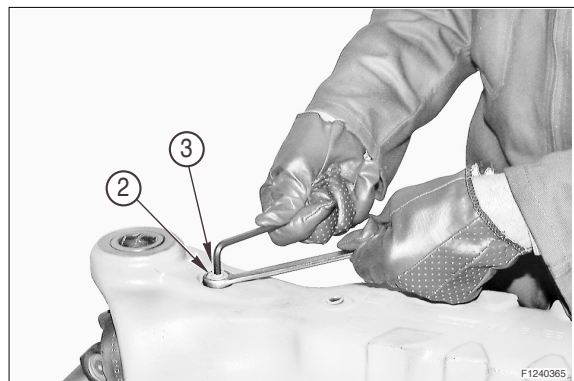
Axle with negative brake: does not require any preparation as the disks are mechanically locked in position.

Axle with mechanical brake: requires that the external control levers are put under tension in relation to each other.

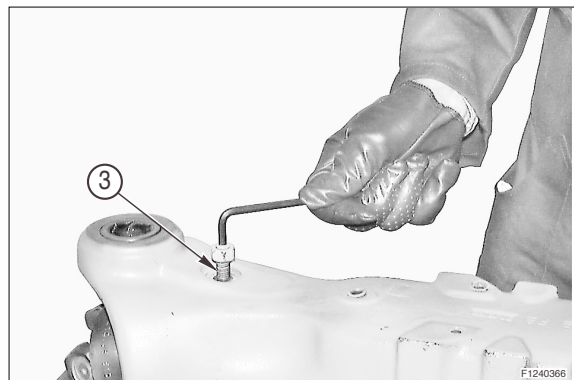
Disassembly to be carried out with the arm resting on the bench.

The explanations reported herewith refer to removal operations carried out on the bench; the different stages of u-joint removal also apply to all other solutions or versions.

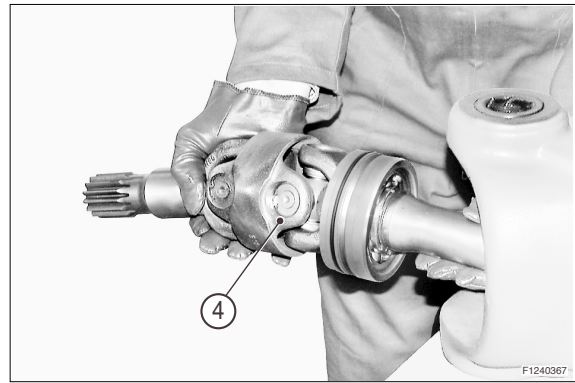
- (2) Unloosen and remove the top and bottom check nuts(2)(3).



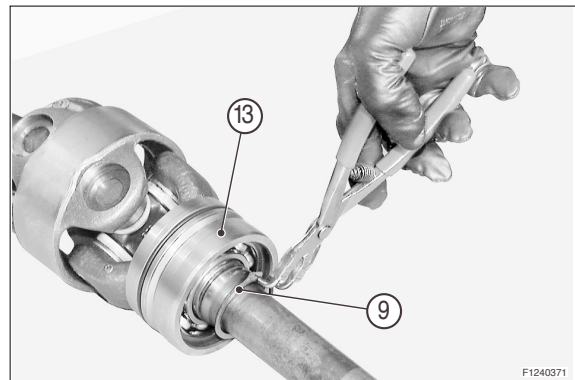
- (3) Remove top and bottom check dowels(3) from the flange(5) or bushing(13).



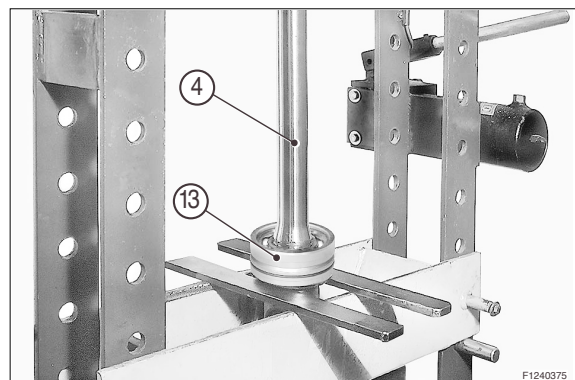
- (4) Remove the entire U-joint(4)  
To remove the U-joint use, if necessary, a plastic hammer or a lever.



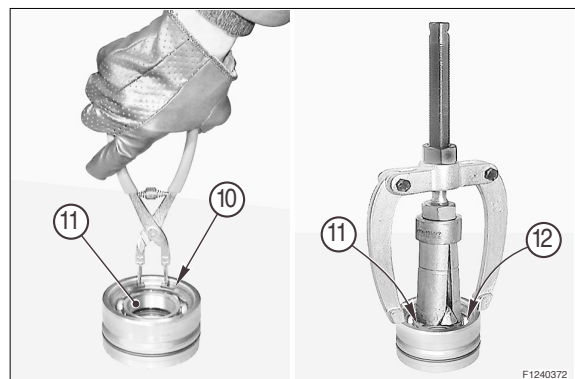
- (5) Remove the snap ring(9) from the bushing unit(13).



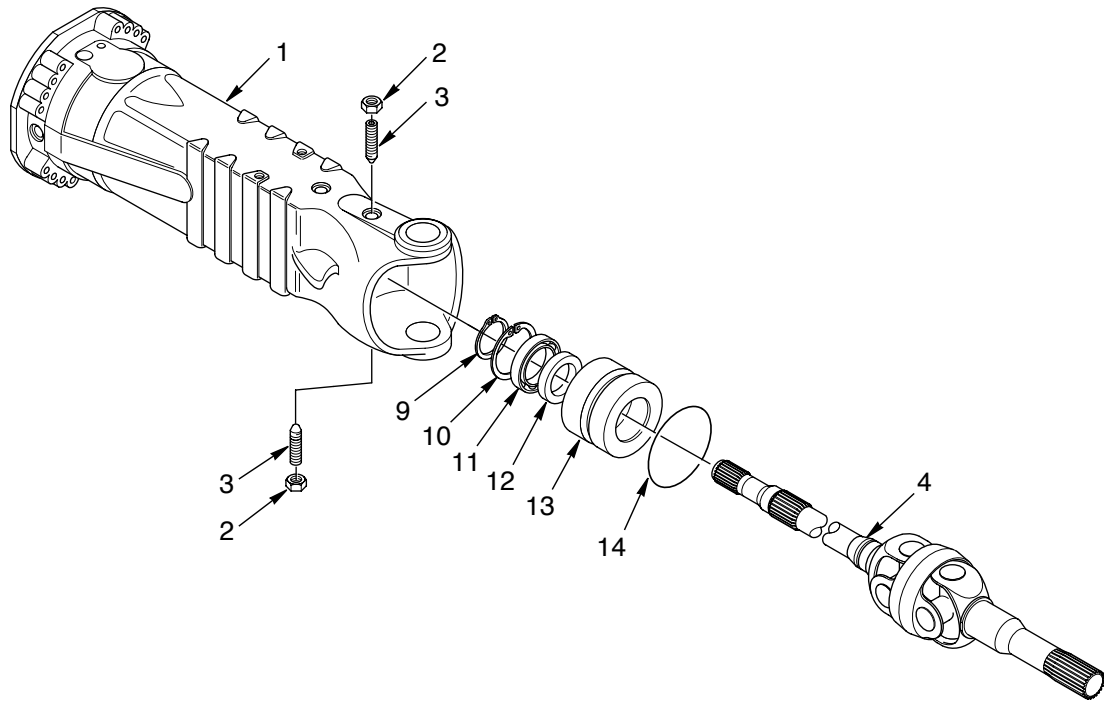
- (6) Position the entire U-joint(4) under a press and remove the complete bushing(13).



- (7) Remove the snap ring(10) from the bearing(11). Use a puller to remove the bearing(11), the sealing ring(12) and the O-ring(14).  
Note down the assembly side of the ring (12).



## 6) INSTALLATION OF U-JOINT

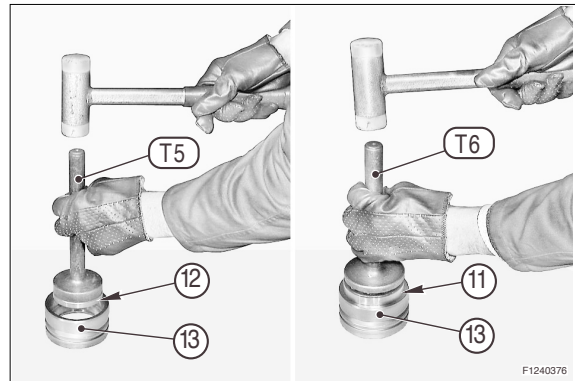


1 Axle case  
2 Nut  
3 Dowel  
4 U-joint

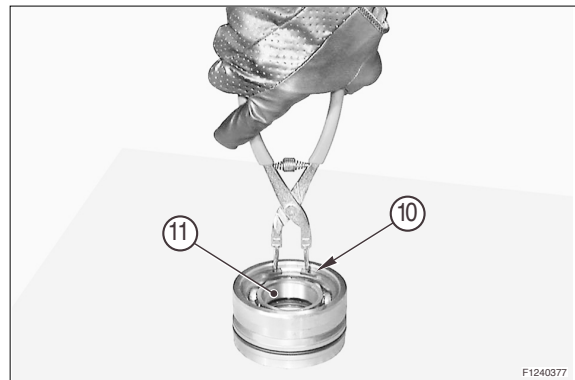
9 Snap ring  
10 Snap ring  
11 Bearing

12 Sealing ring  
13 Bushing  
14 O-ring

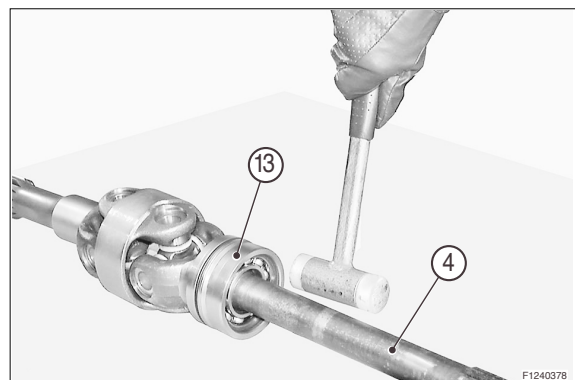
- (1) Using tools T5 and T6, insert the sealing ring(12) and the bearing(11) in the bushing(13).  
Carefully check the assembly side of the seal(12).



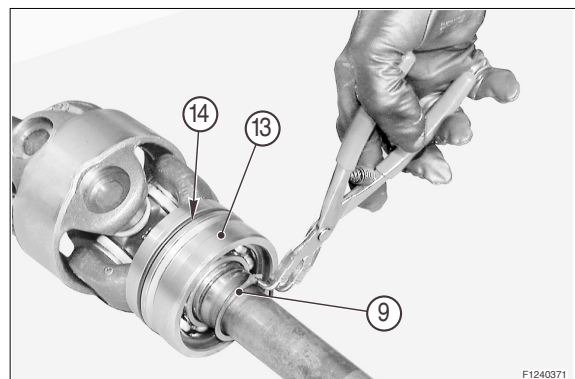
- (2) Fit the snap ring(10) on the bearing(11).



- (3) Heat the bearing in oil at an approx. temperature of 100°C and fit the entire bushing(13) on the U-joint(4).



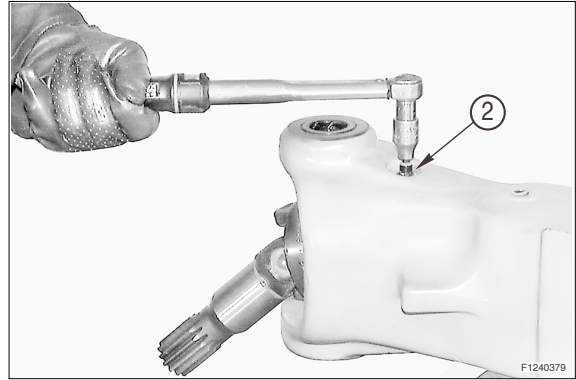
- (4) Fit the check ring(9) on the bushing unit(13); Also put the O-ring(14) into position.



- (5) Insert the U-joint and tighten the top and bottom dowels(2).

For U-joint coming with a bushing, center the point of the check dowels in the slot.

· Tightening torque : 1.5kgf · m(10.8lf · ft)

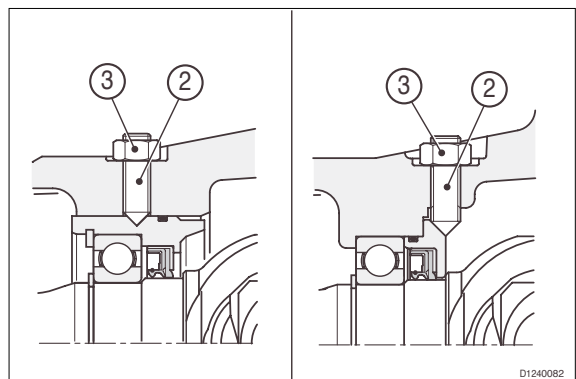
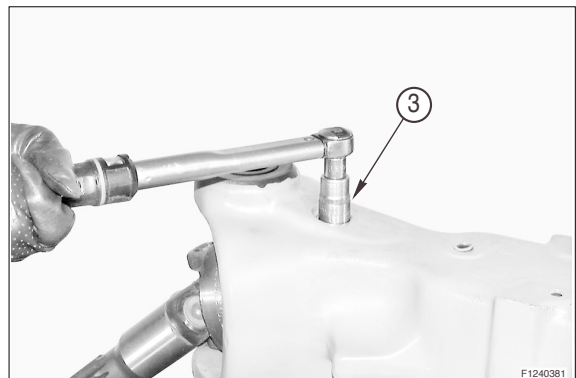


- (6) Apply loctite 242 to the jutting parts of the dowels(2)



- (7) Screw the check nuts(3) of the dowels(2) and lock them using a dynamometric wrench.

· Tightening torque : 12.4kgf · m(89.7lf · ft)

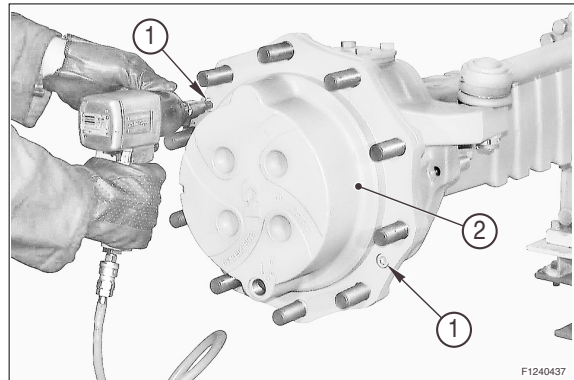


## 7) DISASSEMBLE THE PLANETARY REDUCTION

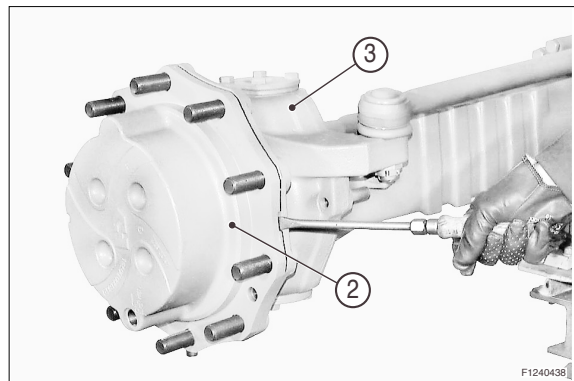
- (1) Disconnect the steering bars from the steering case(3).

For details, see Remove the complete steering case.

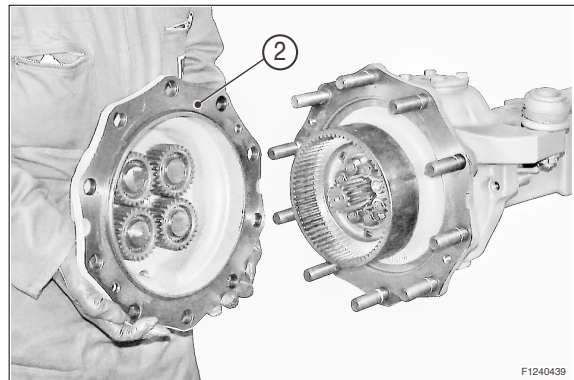
Remove the securing screws(1) from the planetary carrier cover(2).



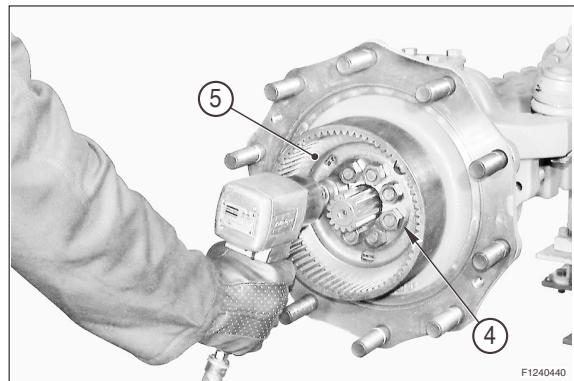
- (2) Disjoint the planetary carrier cover(2) from the steering case(3) by alternatively forcing a screwdriver into the appropriate slots.



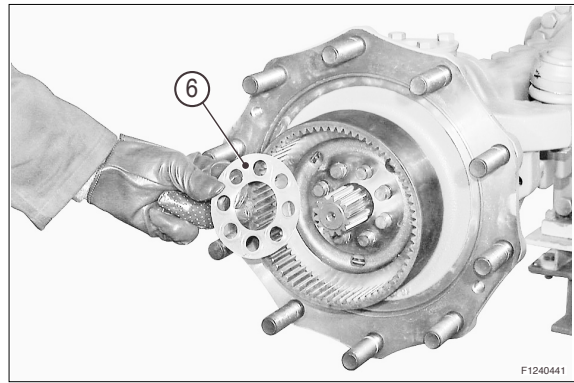
- (3) Remove the complete planetary carrier cover(2).



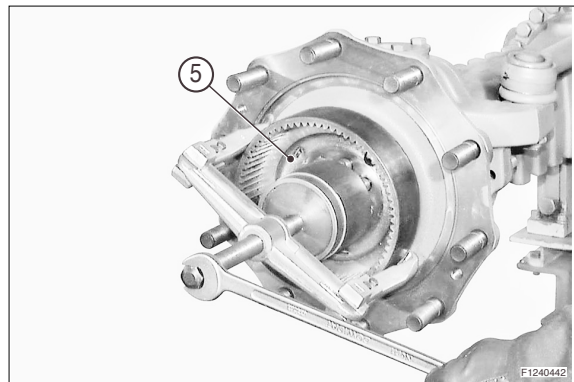
- (4) Unloose and remove the tightening nuts(4) from the crown flange(5).



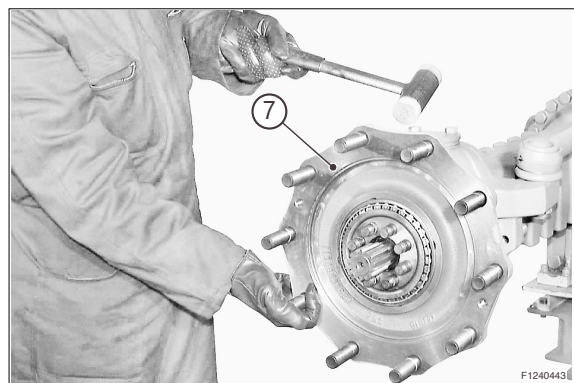
(5) Remove the safety flange(6)



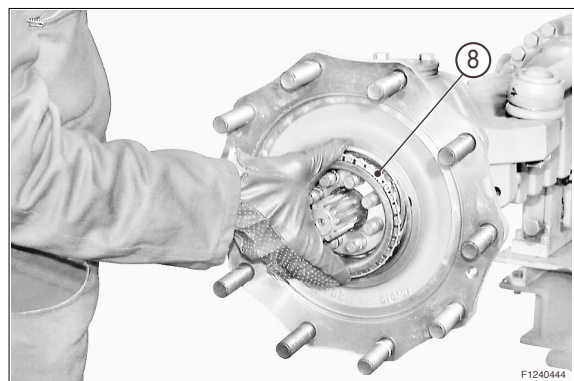
(6) Using a puller, remove the complete crown flange(5) by acting on the stud bolts.



(7) Partially extract the hub(7) using a plastic hammer.  
Alternately hammer on several equidistant points.



(8) Remove the external bearing(8).



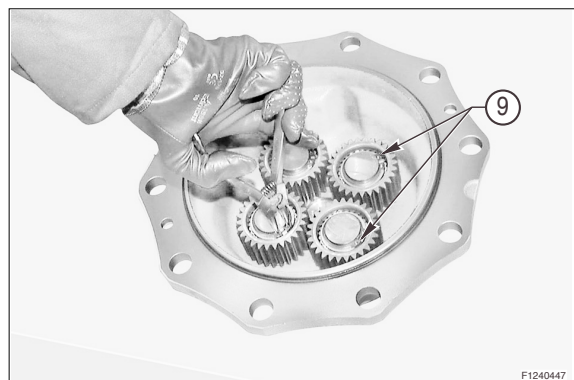
(9) By hand remove the complete hub(7).



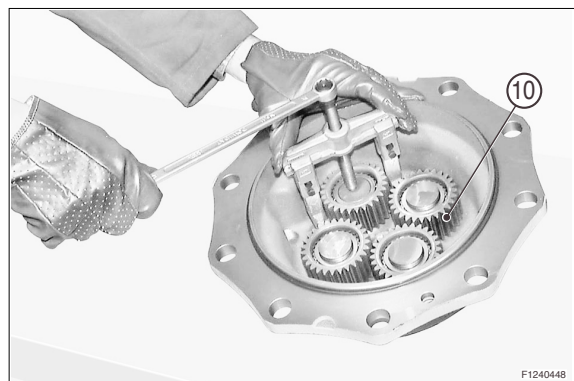
(10) Remove the pins and remove the steering case(3).  
For details, see Remove the complete steering case.



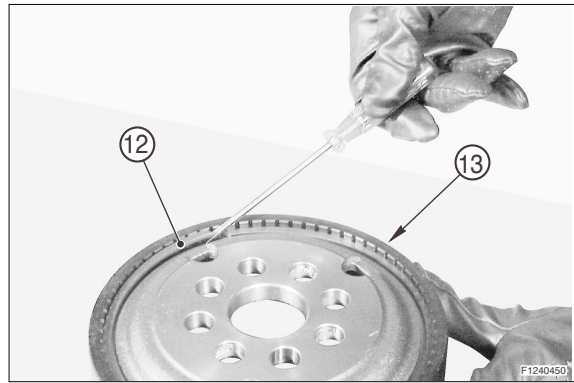
(11) Remove the snap rings(9).



(12) With the help of a puller, remove the planet wheel gears(10).  
Note down the assembly side of planet wheels.



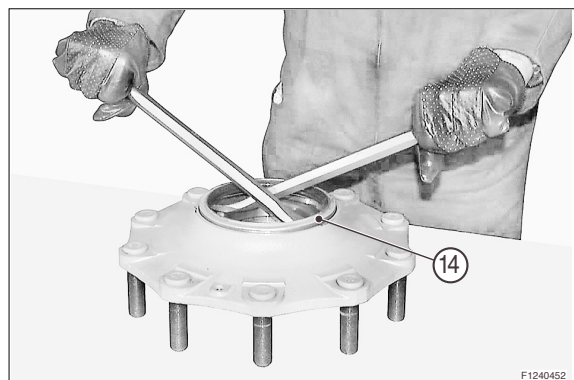
(13) Remove the snap ring(12) from the crown (13).



(14) Remove the crown flange(5).



(15) Remove the sealing ring from the hub(14).



(16) Remove the internal bearing(15).



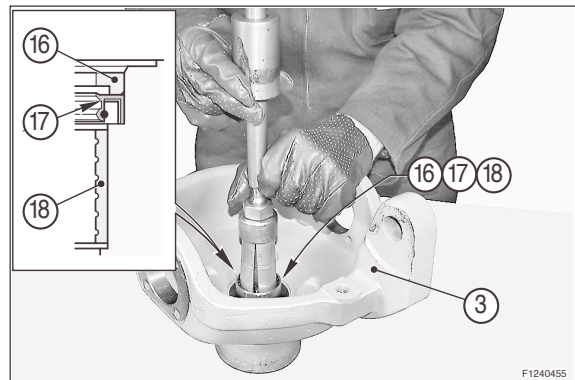
- (17) Remove the external thrust blocks from the bearings(8) and (15) forcing a pin driver into the appropriate slots on the hub (7).

Hammer in an alternate way so as to avoid crawling or deformation of the thrust blocks.

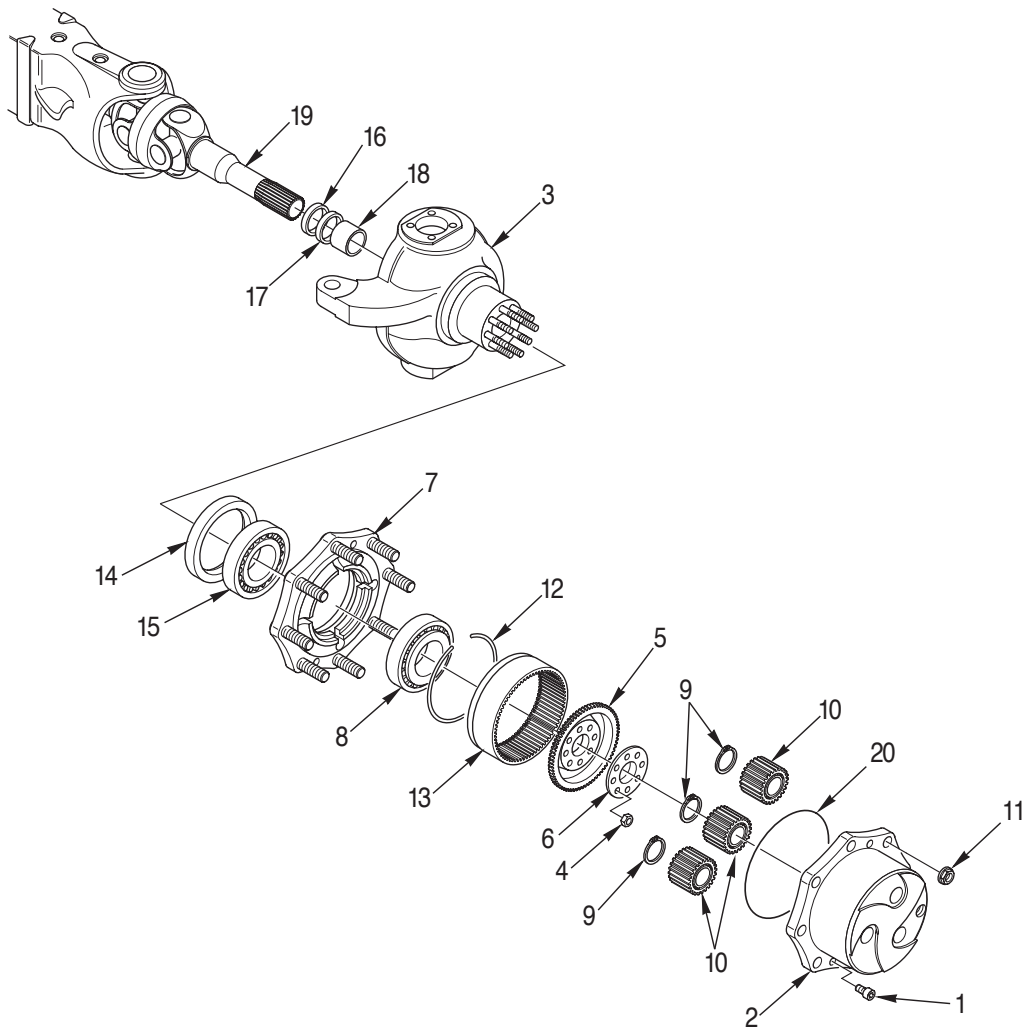


- (18) Use a puller to remove the centring ring (16), the sealing ring(17) and the bearing(18) from the steering case(3).

Note down the orientation of both centering ring(16) and sealing ring(17).

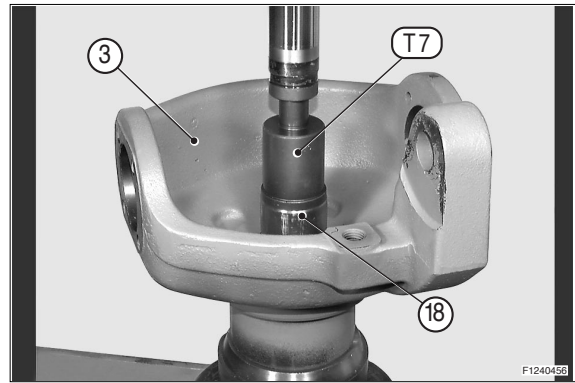


## 8) ASSEMBLING THE PLANETARY REDUCTION

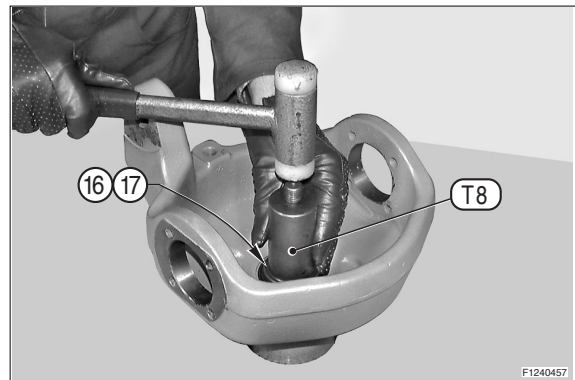


- |   |                         |    |                   |    |               |
|---|-------------------------|----|-------------------|----|---------------|
| 1 | Screw                   | 8  | Bearing           | 15 | Bearing       |
| 2 | Planetary carrier cover | 9  | Snap ring         | 16 | Centering pin |
| 3 | Steering case           | 10 | Planet wheel gear | 17 | Sealing ring  |
| 4 | Nut                     | 11 | Wheel nut         | 18 | Bearing       |
| 5 | Crown flange            | 12 | Snap ring         | 19 | U-joint       |
| 6 | Safety flange           | 13 | Crown             | 20 | O-ring        |
| 7 | Hub                     | 14 | Hub               |    |               |

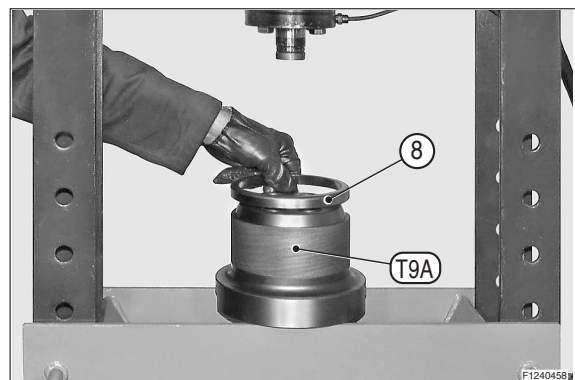
- (1) Lubricate the bushing(18) and the seat of the steering case(3). Install the bushing(18), using tool T7.



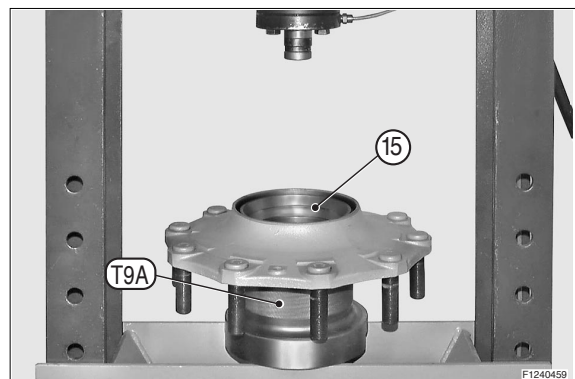
- (2) Lubricate the outer surface of the sealing ring(17) and centering ring(16); Fit them into their seat using tool T8.



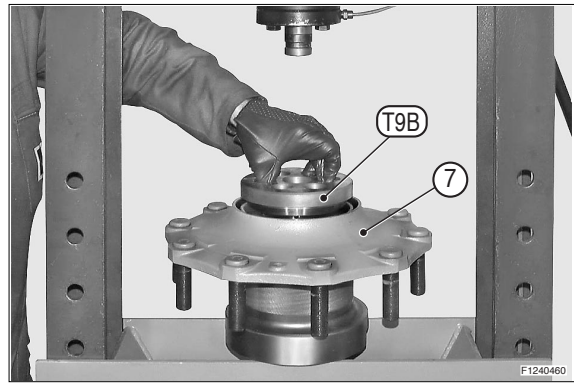
- (3) Position the lower part of tool T9A and the thrust block of the external bearing(8) under the press.



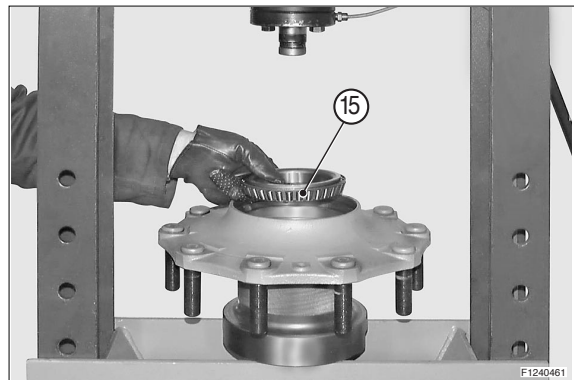
- (4) Lubricate the seats of the bearings and position the hub(7) on tool T9A; Position the thrust block of the internal bearing(15). Check that the thrust block is correctly oriented.



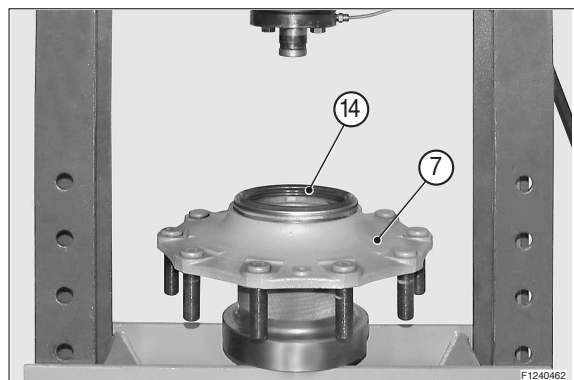
- (5) Position the upper part of tool T9B and press the thrust blocks into the hub(7) all the way down.



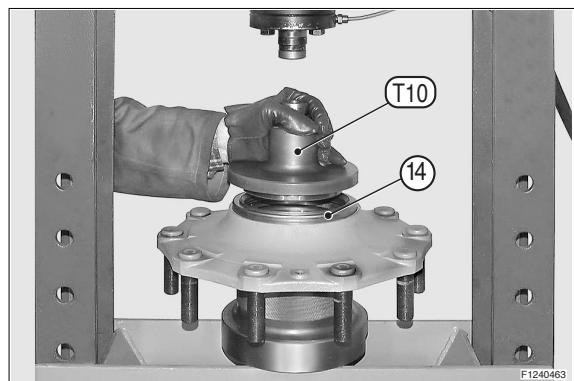
- (6) Fit the bearing(15) into the internal thrust block.



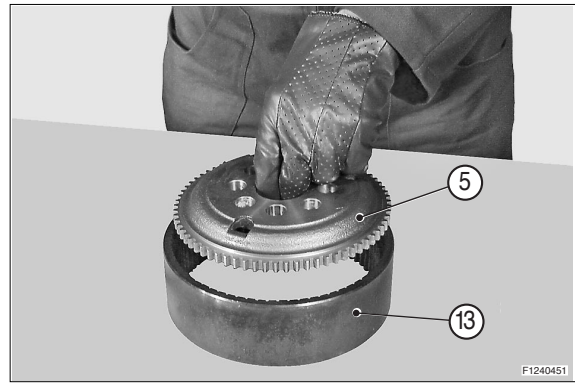
- (7) Apply a repositionable jointing compound for seals to the outer surface of the sealing ring(14). Position the sealing ring(14) in the hub(7). Check that the ring(14) is correctly oriented.



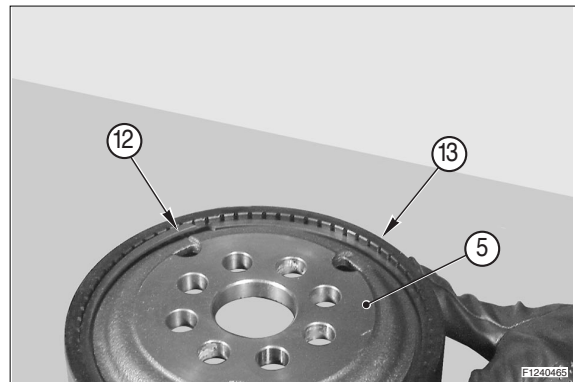
- (8) Position tool T10 and press the sealing ring(14) into its seat.



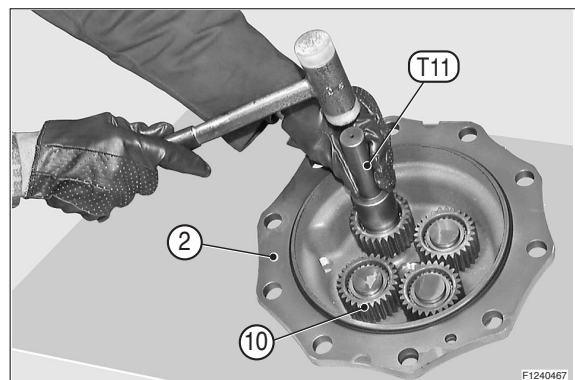
(9) Insert the flange(5) in the crown(13).



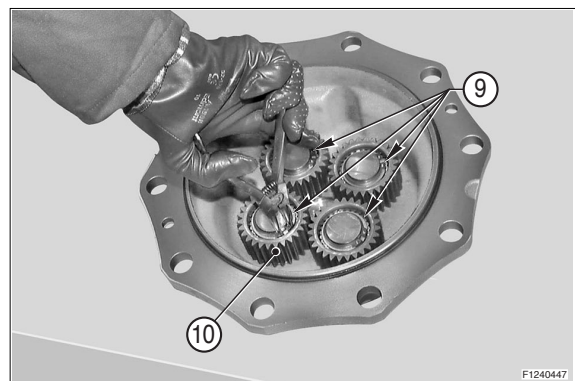
(10) Insert the snap ring(12) in order to fix the flange(5) in the crown(13).  
Carefully check that ring(12) is properly inserted in the slot of the crown(13).



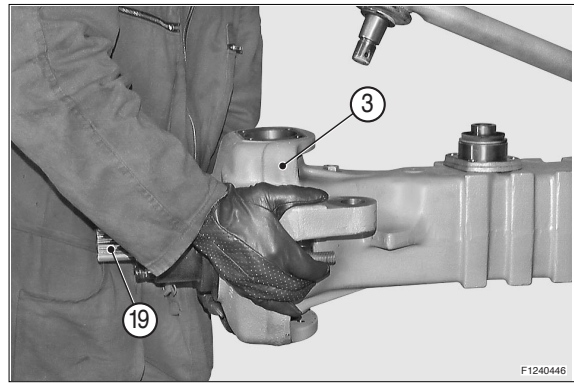
(11) With the help of tool T11, insert the planet wheel gears(10) into the cover(2).  
Accurately check the orientation.



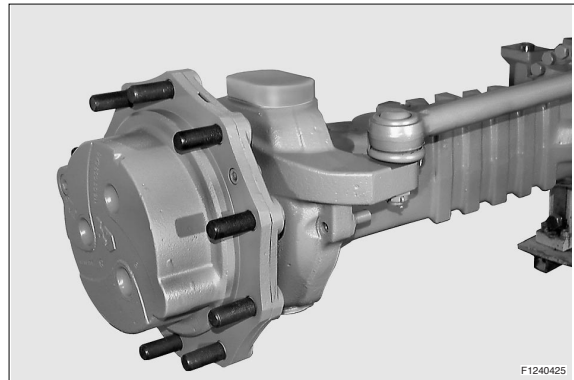
(12) Lock the gears(10) into position by fitting the snap rings(9).



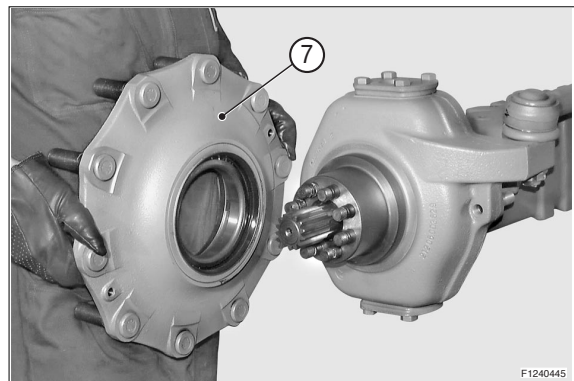
- (13) Fit the steering case(3) onto the U-joint(19) and install the articulation pins. For pin assembly details, see Assemble the complete steering case.



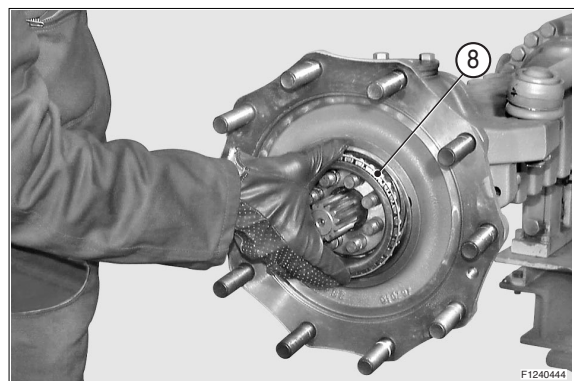
- (14) Connect the steering bars.  
For details, see Assembly the complete steering case.



- (15) Install the hub(7).

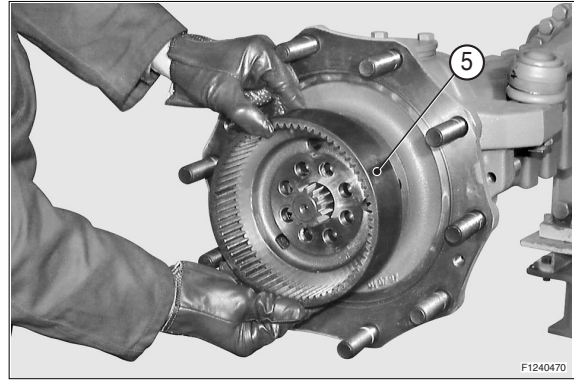


- (16) Install the external bearing(8).  
Using a plastic hammer, drive the bearing to the limit stop by lightly hammering around the edge.

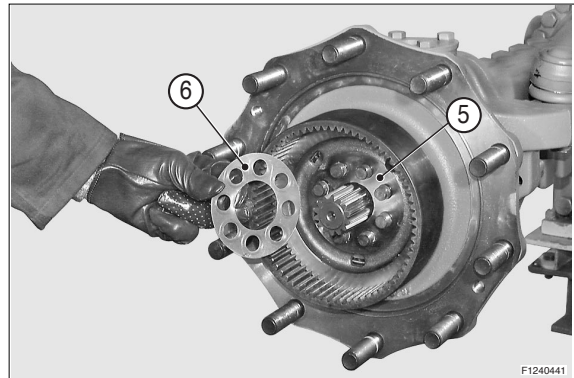


(17) Fit the complete crown flange(5).

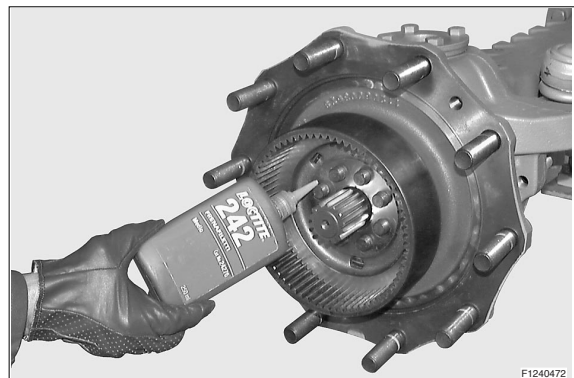
In order to fasten the flange(5), use a plastic hammer and alternately hammer on several equidistant points.



(18) Apply tec nolube seal 101 grease to the surface of the safety flange(6) which touches the crown flange(5).  
Fit the safety flange(6).

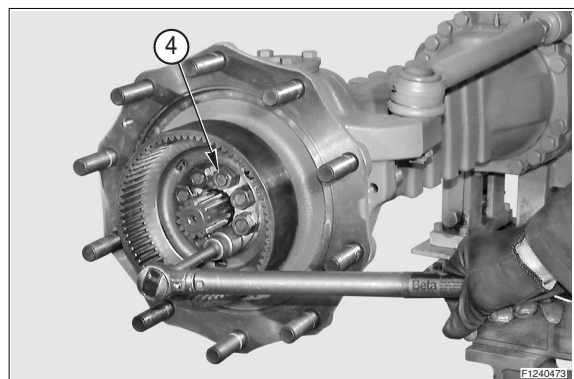


(19) Apply loctite 242 to the studs and fit in the nuts(4).

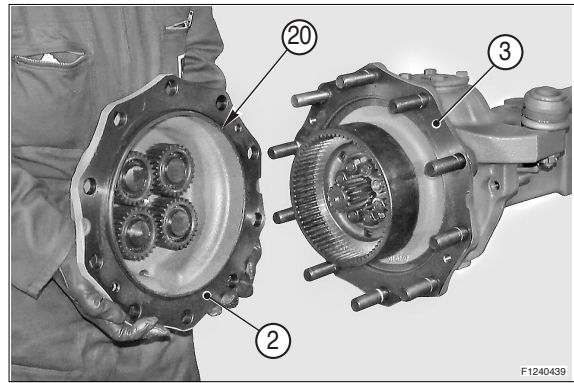


(20) Cross tighten the nuts(4) in two stages.

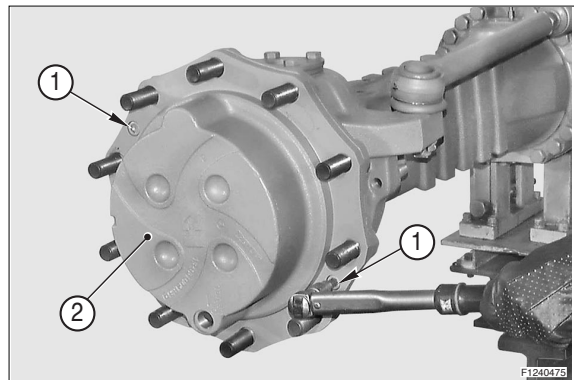
- Tightening torque
  - Initial : 12.2kgf · m(88.2lb · ft)
  - Final : 27.5 ± 1.5kgf · m(199 ± 10.8lb · ft)



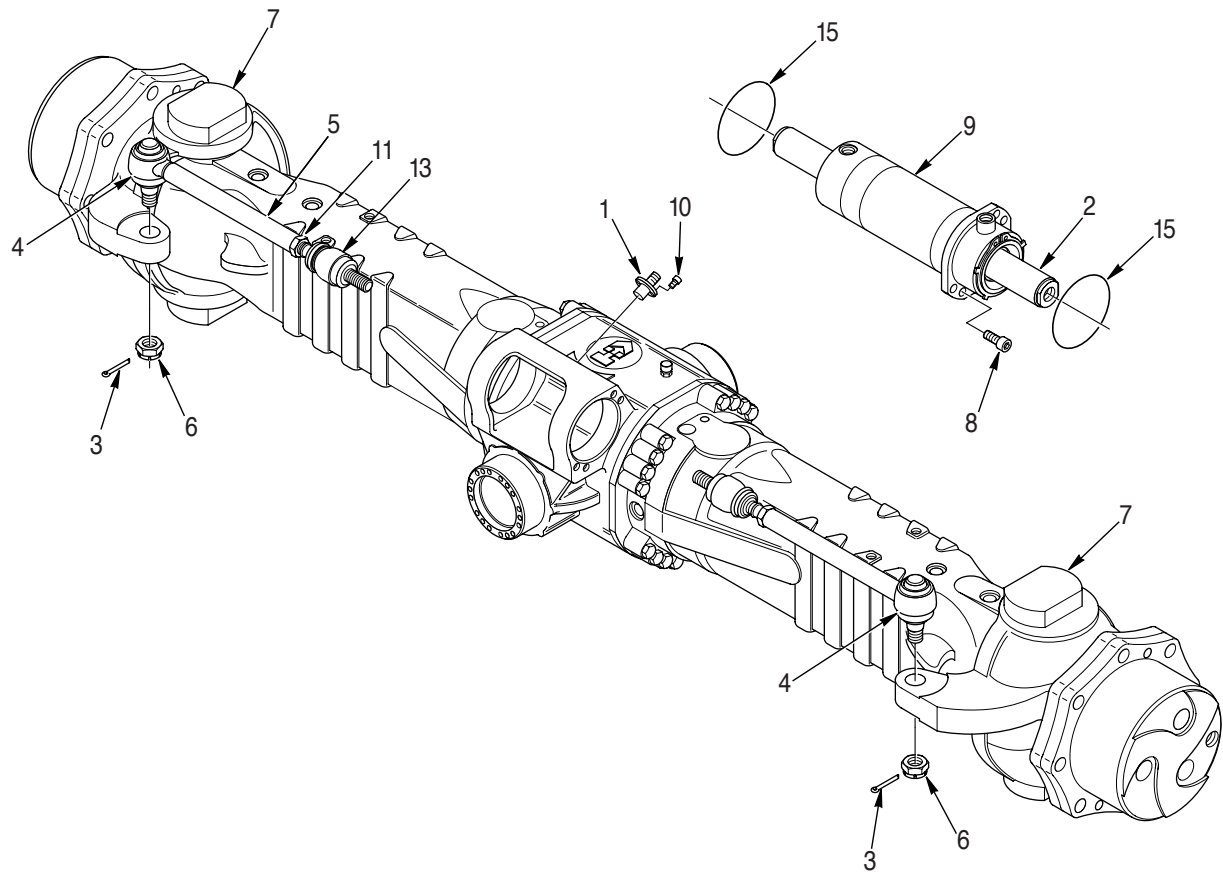
- (21) Fit the planetary carrier cover(2) onto the hub(3).  
Check that the O-ring(20) is in good condition and in position.



- (22) Lock the planetary carrier cover(2) by tightening the screw(1).  
· Tightening torque :  $4.6 \pm 0.5 \text{ kgf} \cdot \text{m}$   
( $33.3 \pm 3.6 \text{ lbf} \cdot \text{ft}$ )

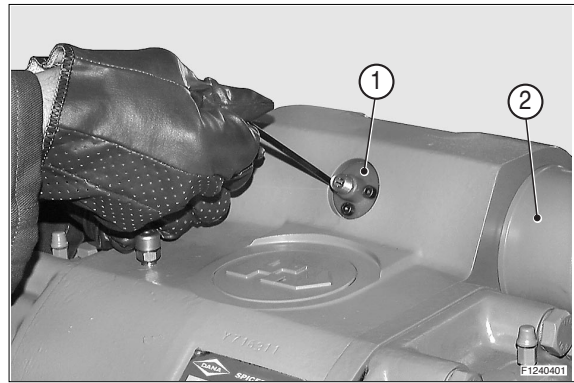


## 9) REMOVE THE STEERING CYLINDER

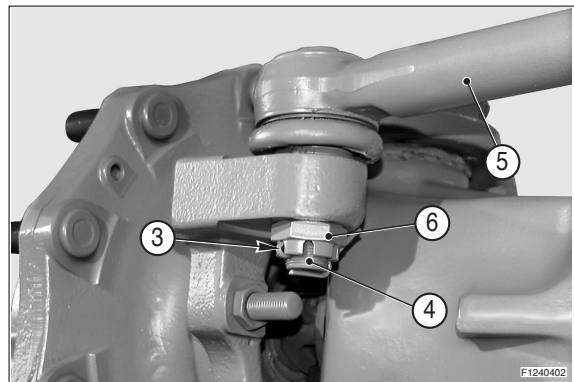


- |   |                  |   |                   |    |               |
|---|------------------|---|-------------------|----|---------------|
| 1 | Sensor           | 6 | Nut               | 10 | Screw         |
| 2 | Steering pin     | 7 | Steering case     | 11 | Nut           |
| 3 | Cotter pin       | 8 | Screw             | 13 | Safety collar |
| 4 | Articulation pin | 9 | Steering cylinder | 15 | O-ring        |
| 5 | Steering bar     |   |                   |    |               |

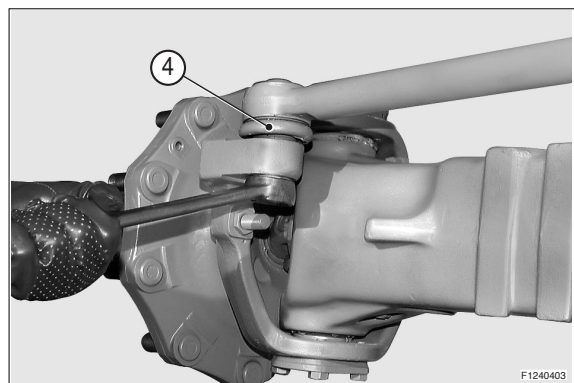
- (1) Remove the centering sensor(1) of the steering piston(2), if supplied.



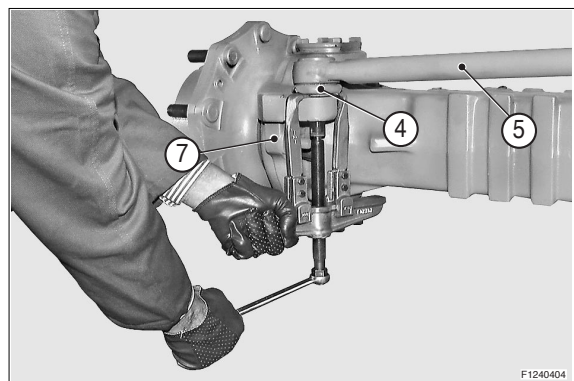
- (2) Remove the safety cotter pins(3) from the articulation pins(4) of the steering bars(5). Dispose of used cotter pins.



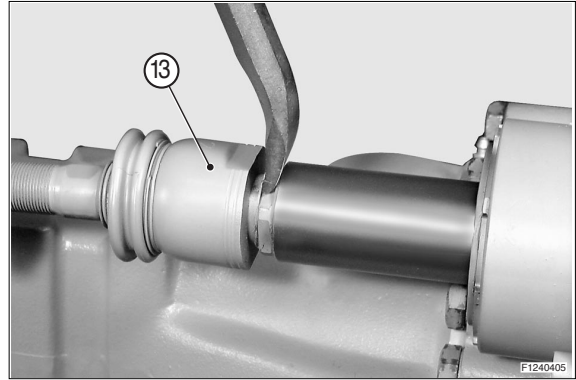
- (3) Remove the castellated nuts(6) that lock the articulation pins(4).



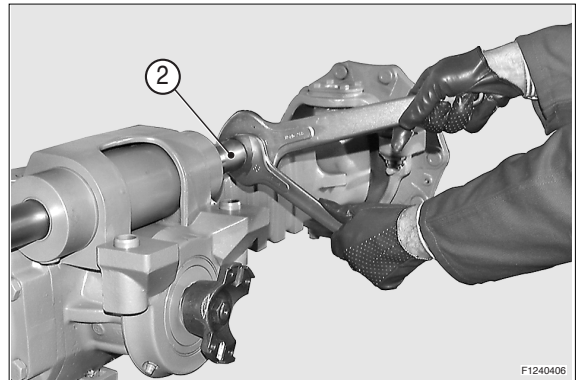
- (4) Disconnect the tapered pins of the articulation(4) from the steering case(7) by means of a puller.



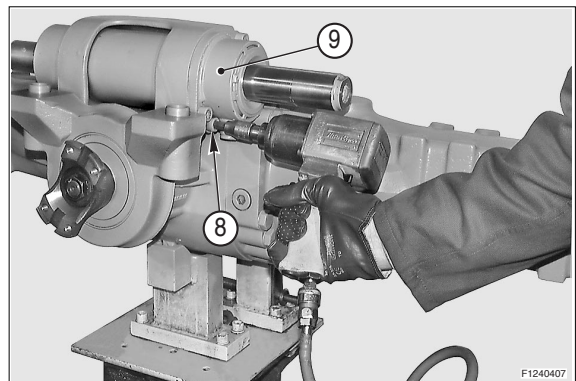
- (5) If the connection of the steering bars includes a safety collar(13), raise the border.



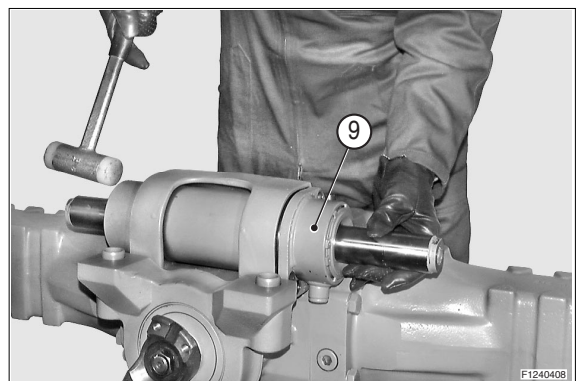
- (6) Disconnect left and right steering bars(5) from the piston(2).



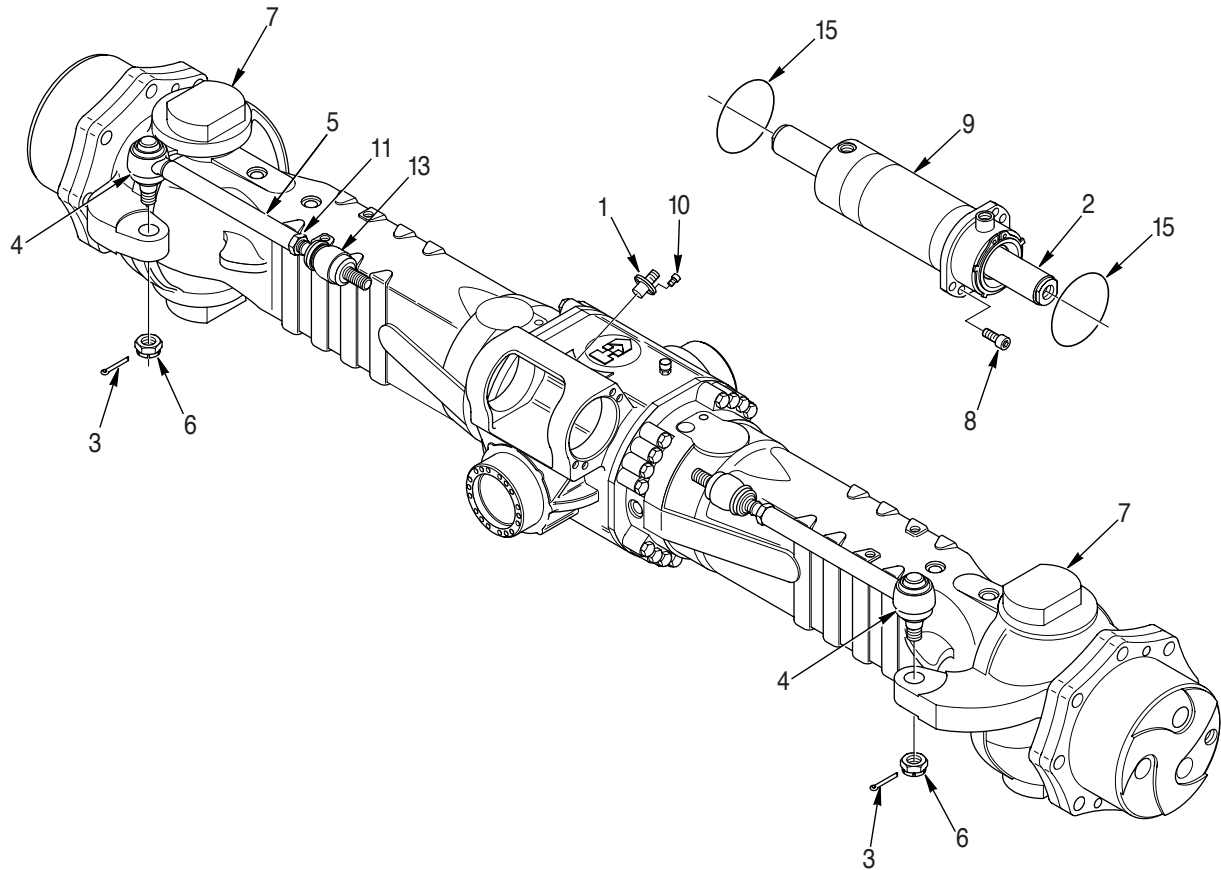
- (7) Remove the securing screws(8) from the steering cylinder(9).



- (8) Extract the cylinder (9) using a plastic hammer.  
For cylinder disassembly, refer to disassemble the steering cylinder.

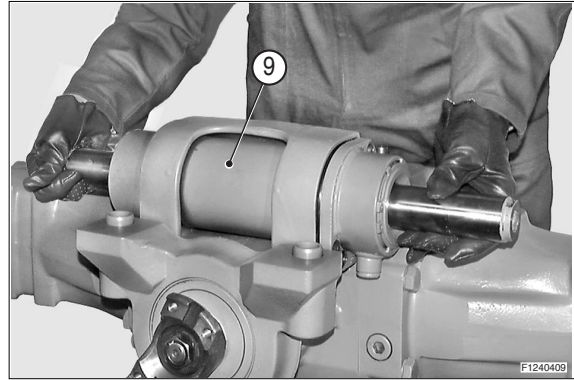


## 10) INSTALL THE STEERING CYLINDER

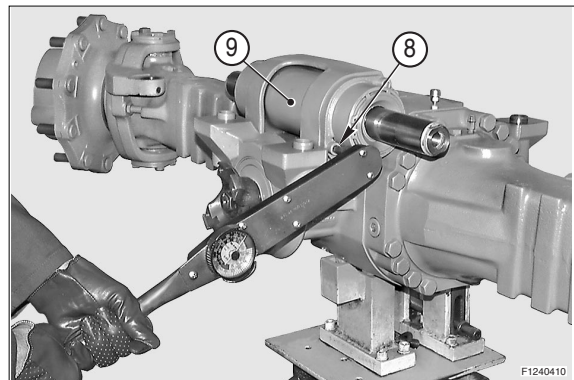


- |   |                  |   |                   |    |               |
|---|------------------|---|-------------------|----|---------------|
| 1 | Sensor           | 6 | Nut               | 10 | Screw         |
| 2 | Steering pin     | 7 | Steering case     | 11 | Nut           |
| 3 | Cotter pin       | 8 | Screw             | 13 | Safety collar |
| 4 | Articulation pin | 9 | Steering cylinder | 15 | O-ring        |
| 5 | Steering bar     |   |                   |    |               |

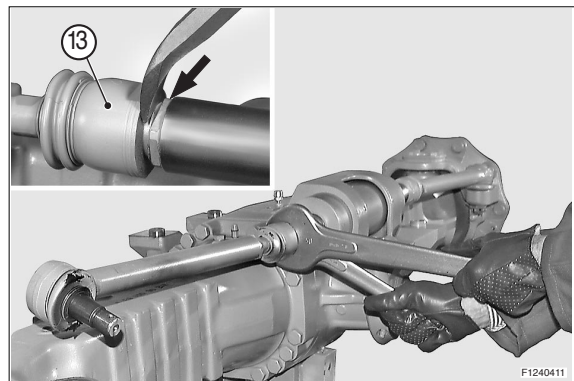
- (1) Check that the O-rings(15) of the axle unit are in good condition; lubricate the seats of the seals(15) and fit the steering cylinder(9) into its seat.



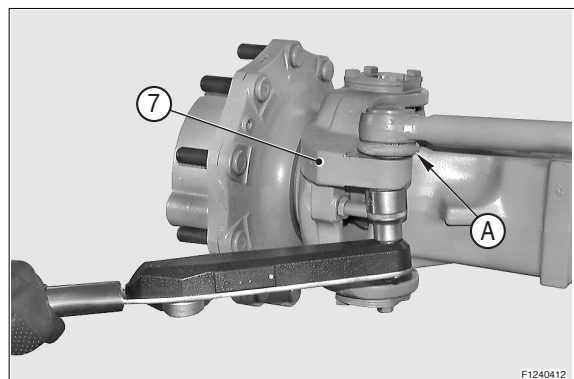
- (2) Lock the cylinder by cross-tightening the screws(8).
- Tightening torque :  $12.4 \pm 0.6 \text{ kgf} \cdot \text{m}$   
( $89.7 \pm 4.3 \text{ lbf} \cdot \text{ft}$ )



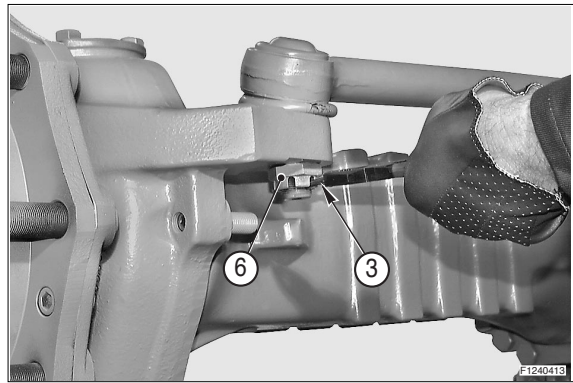
- (3) Apply loctite 242 to the thread and connect the steering bars by screwing the terminals onto the piston stem.
- Versions with coupling require that the rim of the articulation(13) is riveted onto the surfaces of the piston stem.
- Tightening torque :  $26 \pm 1.5 \text{ kgf} \cdot \text{m}$   
( $188 \pm 10.8 \text{ lbf} \cdot \text{ft}$ )



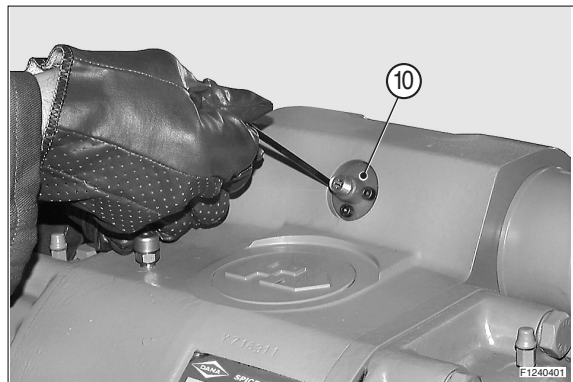
- (4) Insert the pins(4) in the steering case(7) and lock into position using a tightening torque  $28 \pm 1.5 \text{ kgf} \cdot \text{m}$  ( $203 \pm 10.8 \text{ lbf} \cdot \text{ft}$ ).
- Find the position of the notching in relation to the hole of the cotter pins and tighten the nut(6) further.
- Check that rubber guards(A) are intact.



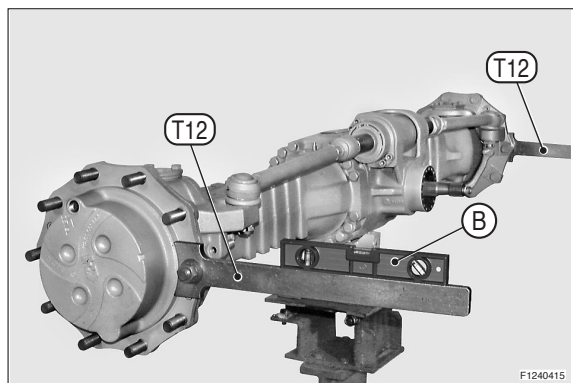
- (5) Insert the cotter pins(3) and bend the safety stems.  
Use new cotter pins.



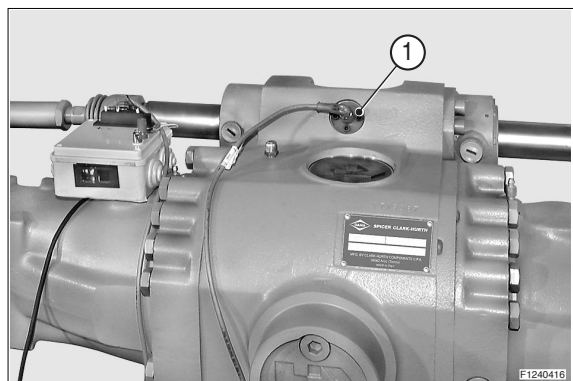
- (6) Install the proximity(1) for checking piston centering-if applicable-and tighten the screws(10).  
· Tightening torque : 0.5~0.6kgf · m  
(3.6~4.3lbf · ft)



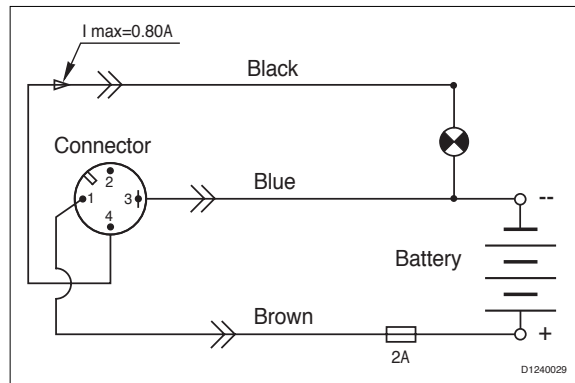
Eliminate the action of the negative brake, if fitted. Apply tools T12 to the hubs and lock them.  
Using a level B, check that tools are perfectly flat and parallel to each other.



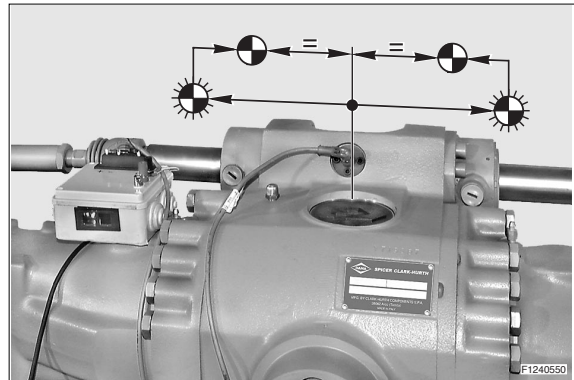
- (7) Connect the sensor(1) to the inspection device according to either diagram.



(8) Sensor connection card

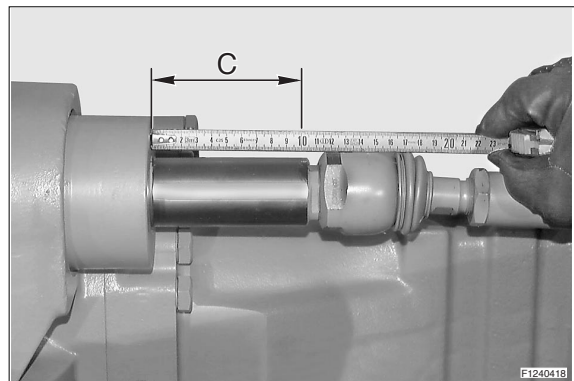


(9) Center the piston by slowly moving it first in one direction then in the other and position it half way on the stroke, which is determined by the switching on and off of the signal lamp of the inspection device in the reversal stage.



(10) Inspect jut C on one side of the piston and note down the size for checking later adjustments.

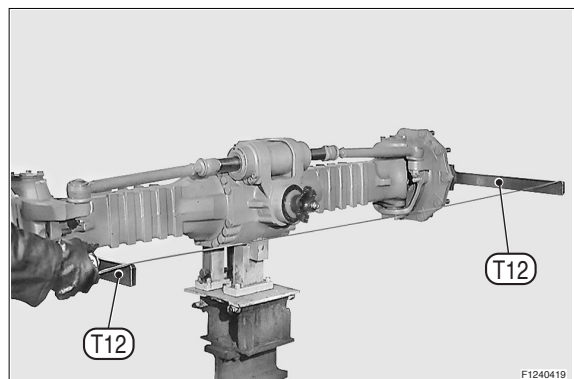
If cylinders come without a sensor, the centering of the piston must be carried out on the basis of the maximum stroke.



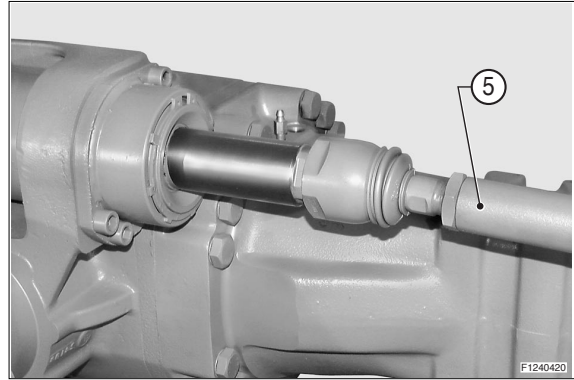
(11) Without moving the piston, check front and rear size at the edge of tools T12.

· Maximum difference : 0.6~0.7mm

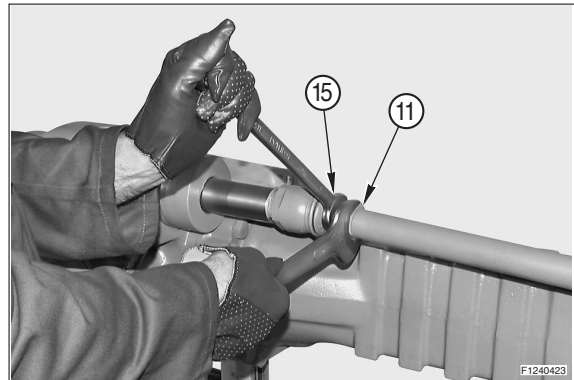
In order to check the rear size, rotate the bevel pinion and check that tools T12 are flat.



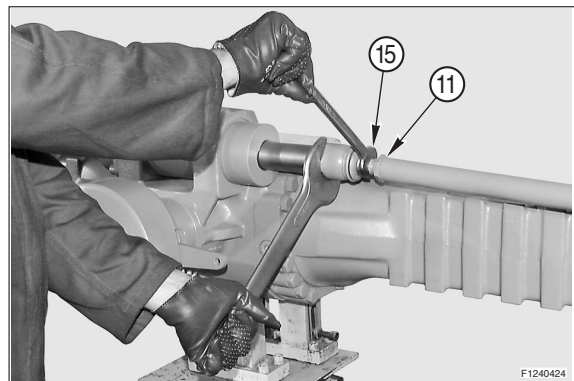
- (12) If necessary, adjust convergency without moving the centering of the piston and adjust the length of the steering bars(5).  
With a half turn of screw, the front size is reduced by about 3mm, whereas the rear one is increased by about 3mm.



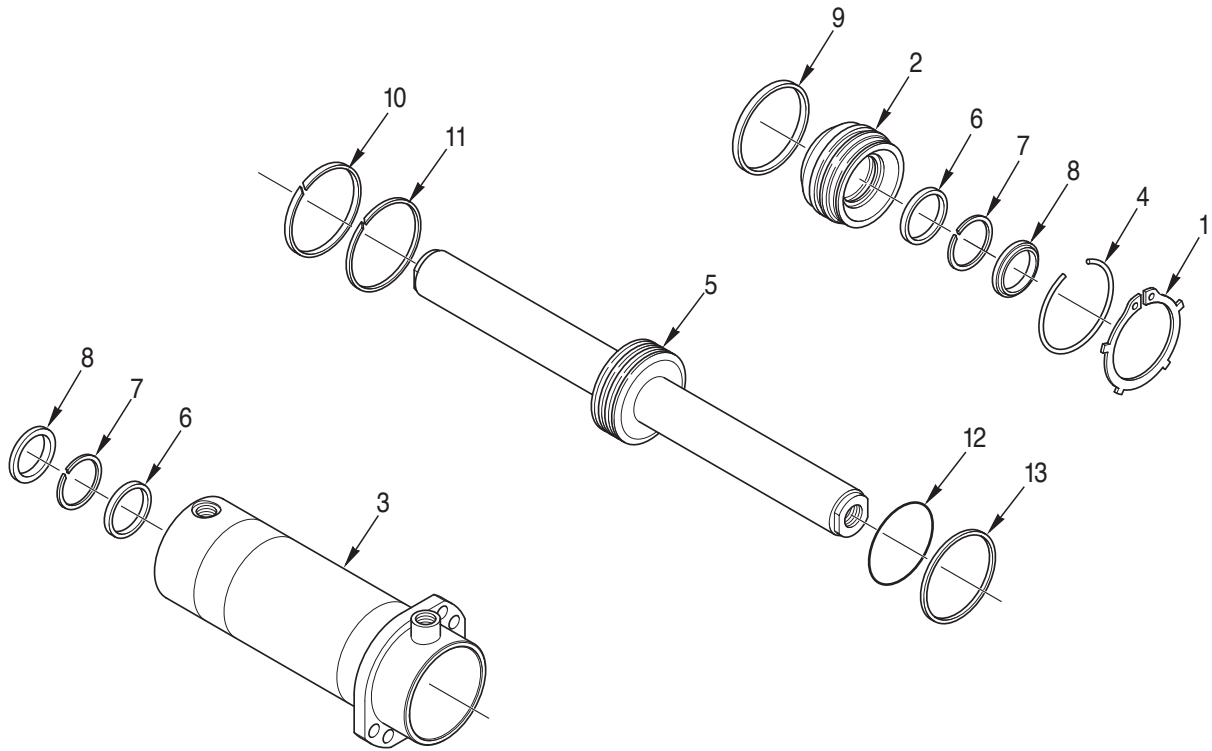
- (13) Unloose the nuts(11) and screw them onto the ball and socket joints(15).



- (14) Hold the articulations still and rotate the ball-and-socket joints(15).  
Once the convergency has been adjusted, lock the nuts(11).  
· Tightening torque :  $31.9 \pm 1.5 \text{ kgf} \cdot \text{m}$   
( $231 \pm 10.8 \text{ lbf} \cdot \text{ft}$ )

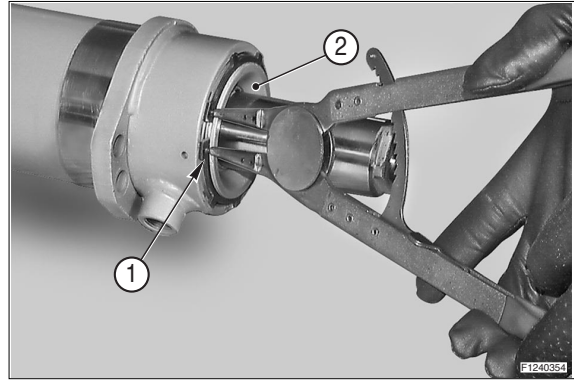


## 11) DISASSEMBLE THE STEERING CYLINDER

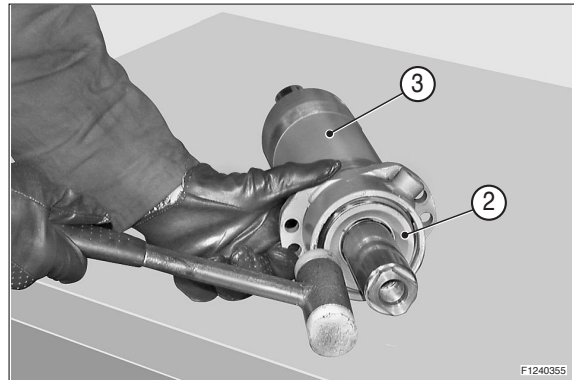


- |   |               |   |                     |    |               |
|---|---------------|---|---------------------|----|---------------|
| 1 | Snap ring     | 6 | Sealing ring        | 10 | Guide ring    |
| 2 | Cylinder head | 7 | Anti-extrusion ring | 11 | Magnetic ring |
| 3 | Cylinder      | 8 | Scraper ring        | 12 | O-ring        |
| 4 | Stop ring     | 9 | Seal                | 13 | Seal          |
| 5 | Piston        |   |                     |    |               |

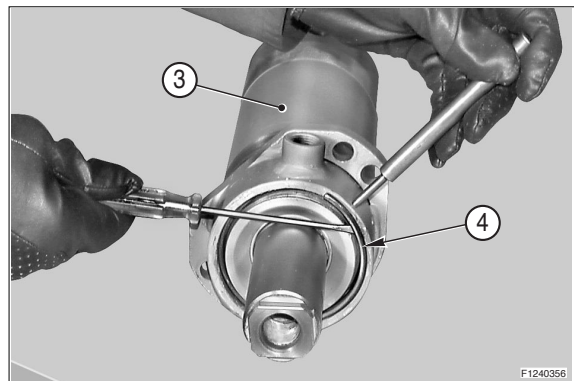
- (1) Remove the snap ring(1) from the cylinder head(2).



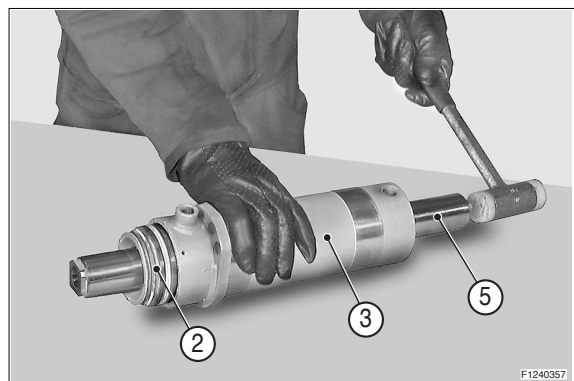
- (2) With the help of a plastic hammer, push the head(2) inside the cylinder(3).  
The head should line up with the edge of the cylinder.



- (3) With the help of a drift, apply pressure to the stop ring(4) that is placed inside the cylinder(3) and extract the ring using a screwdriver.

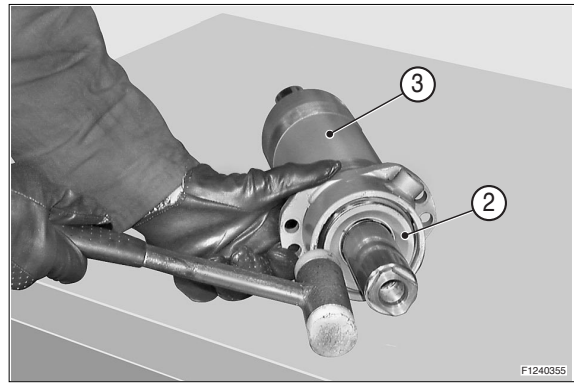


- (4) Hammer the piston(5) on the rear of the head(2) using a plastic hammer.  
Continue hammering until the head(2) is ejected from the cylinder(3).



- (5) Disassemble the cylinder unit(3) by extracting first the head(2), then the piston (5).

Note down the assembly side of the piston(5). The beveled part A of of the piston is oriented towards the head(2).

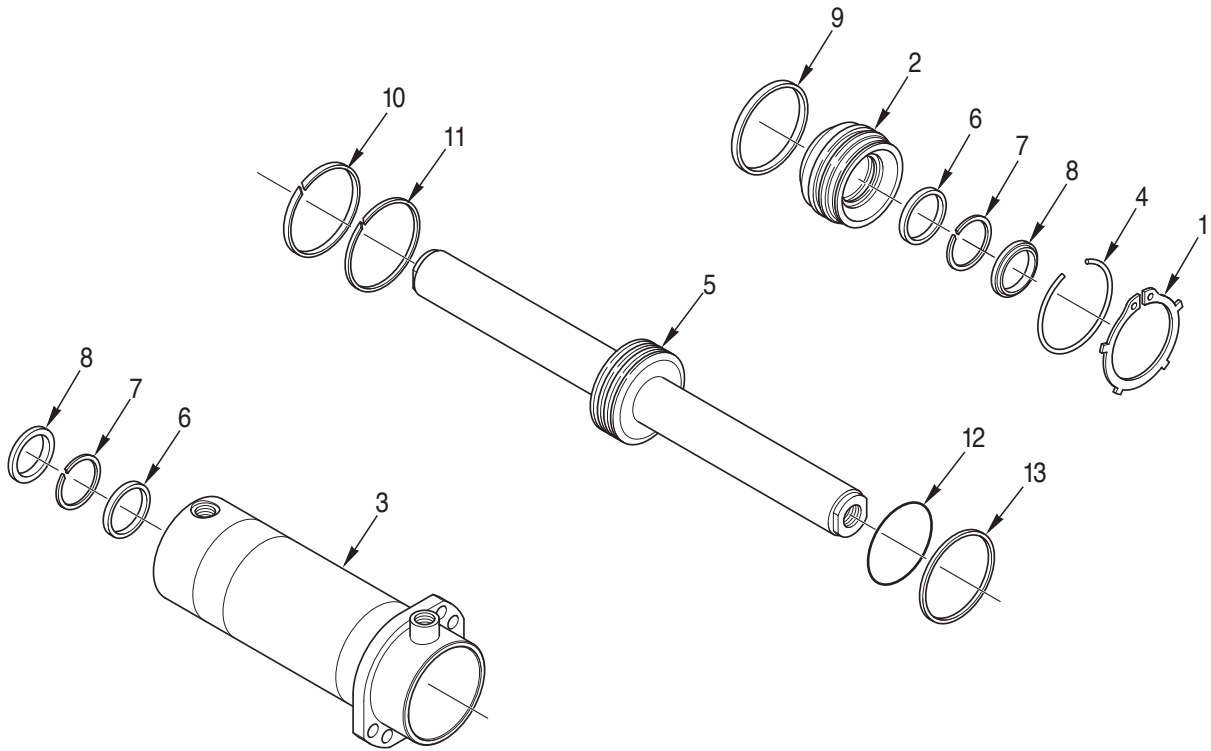


- (6) Remove all seals, anti-extrusion rings and scraper rings from head(2), cylinder(3) and piston(5).

All seals must be replaced every time the unit is disassembled.

Particular attention must be paid not to damage the seats of both seals and piston slide.

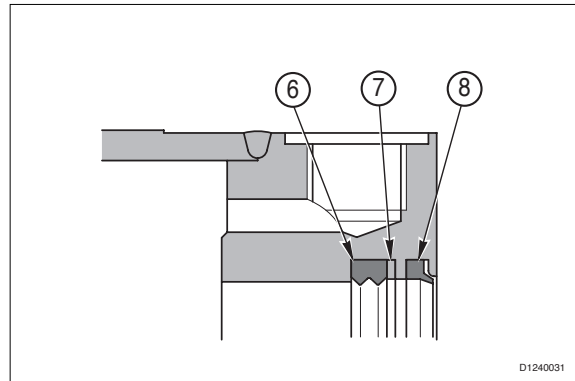
## 12) ASSEMBLE THE STEERING CYLINDER



- |   |               |   |                     |    |               |
|---|---------------|---|---------------------|----|---------------|
| 1 | Snap ring     | 6 | Sealing ring        | 10 | Guide ring    |
| 2 | Cylinder head | 7 | Anti-extrusion ring | 11 | Magnetic ring |
| 3 | Cylinder      | 8 | Scraper ring        | 12 | O-ring        |
| 4 | Stop ring     | 9 | Seal                | 13 | Seal          |
| 5 | Piston        |   |                     |    |               |

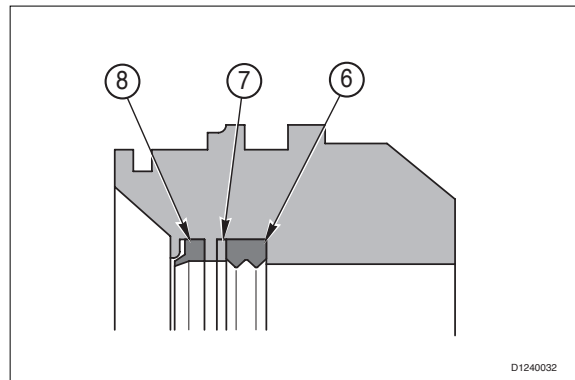
- (1) After applying grease, install the sealing ring(6) of the shaft, the anti-extrusion ring (7) and the scraper ring(8) inside the cylinder(3).

Thoroughly check that positioning of the anti-extrusion ring(7) is correct.



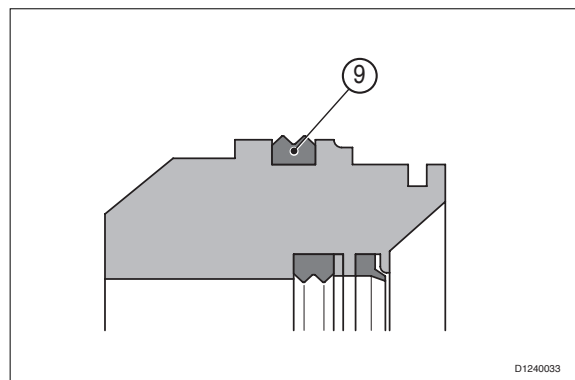
- (2) After applying grease, install the sealing ring(6) of the shaft, the anti-extrusion ring (7) and the scraper ring(8) in the head(2).

Thoroughly check that positioning of the anti-extrusion(7) ring is correct.



- (3) Fit the seal(9) onto the outside of the head (2).

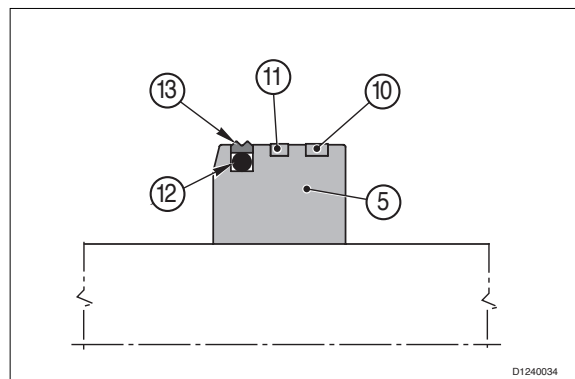
In order to facilitate assembly, apply grease to the outer surface of the piston. Do not roll the seal(9) up.



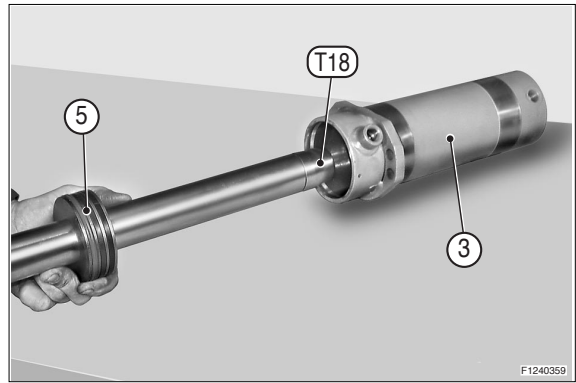
- (4) Prepare the piston(5) by fitting it with the guide ring(10), the magnetic ring(11), the O-ring(12) and the seal(13).

In order to facilitate assembly, apply grease.

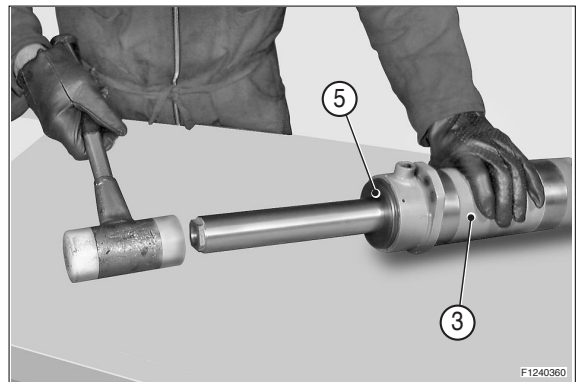
If a centering sensor is not fitted, then the magnetic ring(11) should be replaced by another guide ring(10).



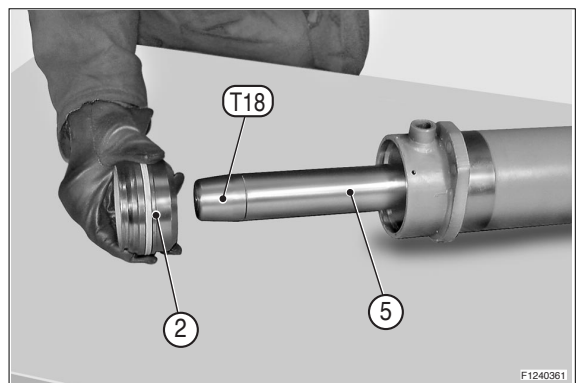
- (5) Apply tool T18 to the shaft on the opposite side of the head(2) and centre it on the cylinder(3) so that it fits into the piston(5). Apply a little grease to seals and cylinder.



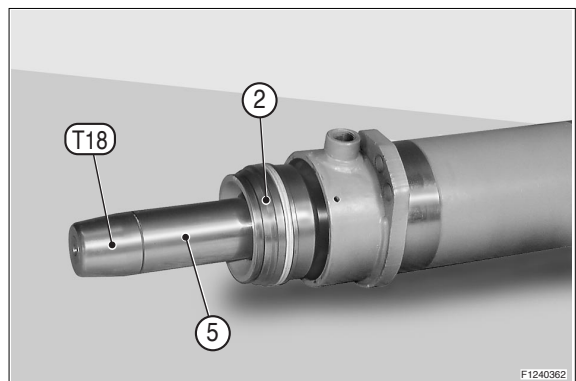
- (6) Push the piston(5) into the cylinder for 100mm using a plastic hammer.



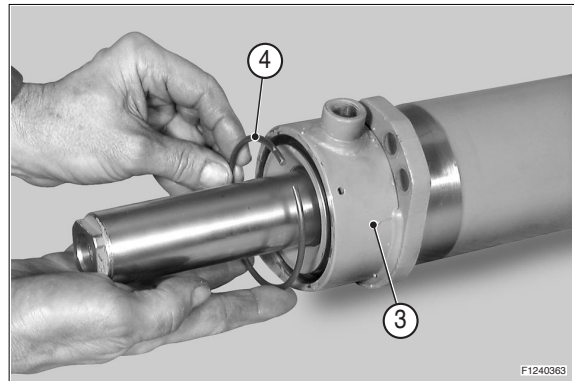
- (7) Remove tool T18 and apply it to the opposite side of the piston(5).



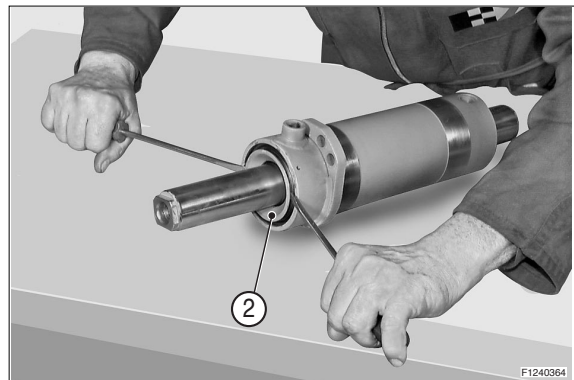
- (8) Apply grease to head(2) seals, fit the head onto the piston and push it into the cylinder(3) using a plastic hammer. Insert the head as to line it up with the edge of the cylinder.



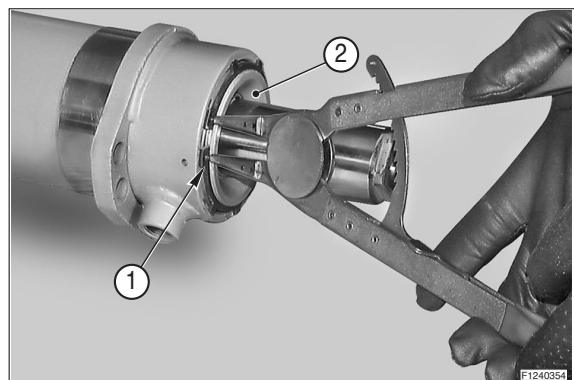
- (9) Insert the stop ring(4) ensuring that it fits into the seat of the cylinder(3).



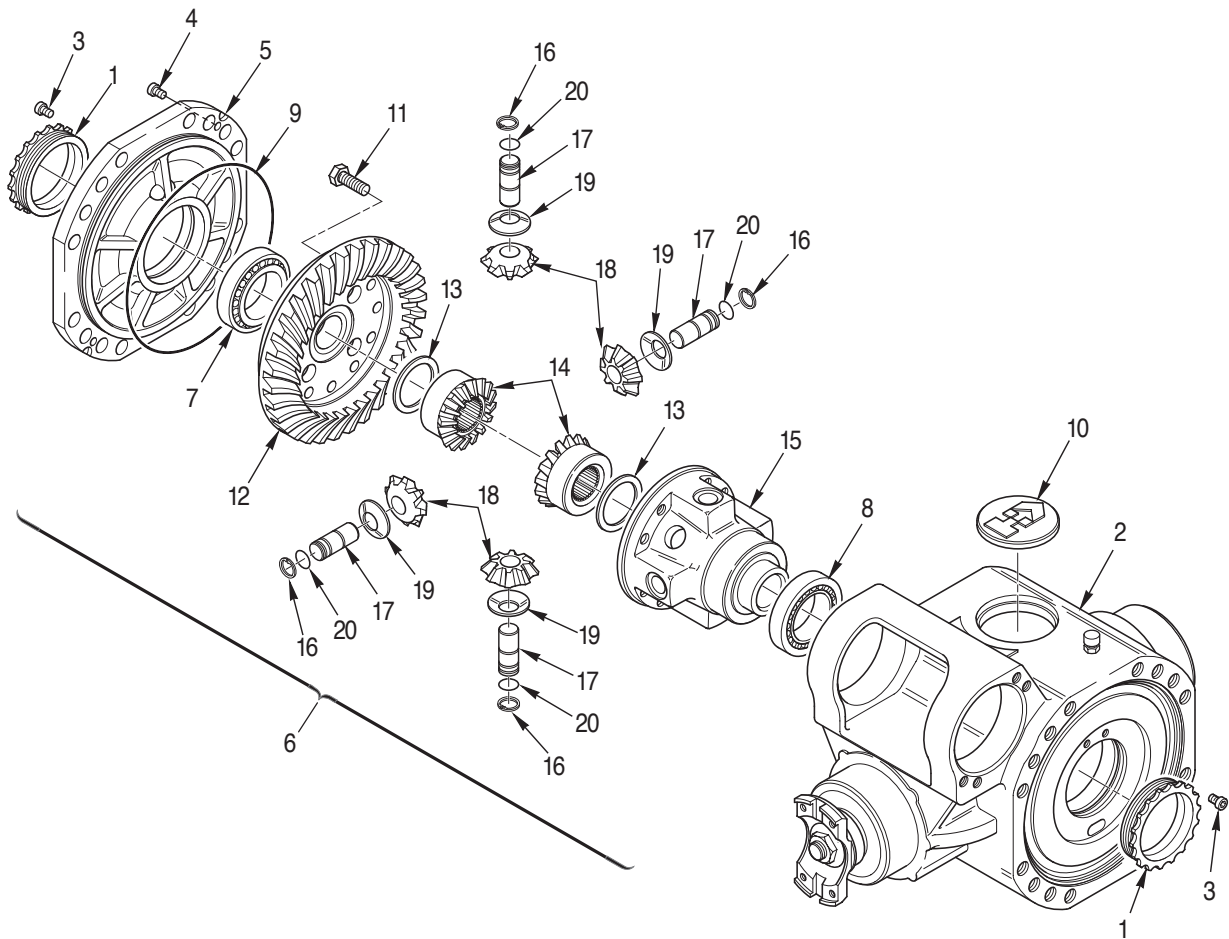
- (10) Apply pressure to the head using two screwdrivers or levers until the head is fastened onto the stop ring(4).



- (11) Fit the snap ring(1) on the head(2).  
Make sure that the snap ring(1) is securely fastened in its seat.  
If necessary, force it into its seat using a drift and a hammer.



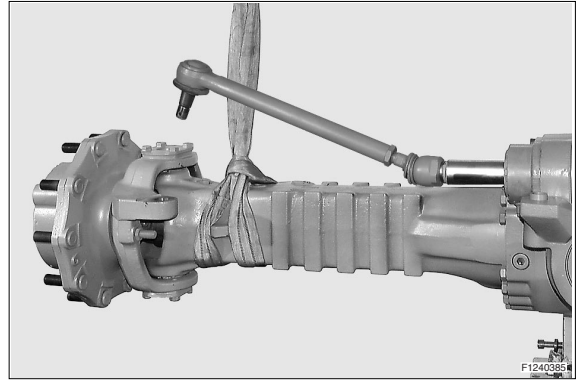
### 13) REMOVE AND DISASSEMBLE THE DIFFERENTIAL UNIT



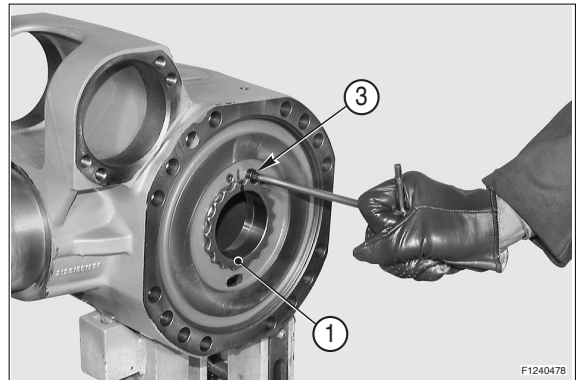
- |   |                   |    |                |    |                      |
|---|-------------------|----|----------------|----|----------------------|
| 1 | Ring nut          | 8  | Bearing        | 15 | Differential carrier |
| 2 | Central body      | 9  | O-ring         | 16 | Snap ring            |
| 3 | Screw             | 10 | Plug           | 17 | Pin                  |
| 4 | Screw             | 11 | Screw          | 18 | Wheel gear           |
| 5 | Cover             | 12 | Crown          | 19 | Shim washer          |
| 6 | Differential unit | 13 | Washer         | 20 | Snap ring            |
| 7 | Bearing           | 14 | Planetary gear |    |                      |

**(1) Removing**

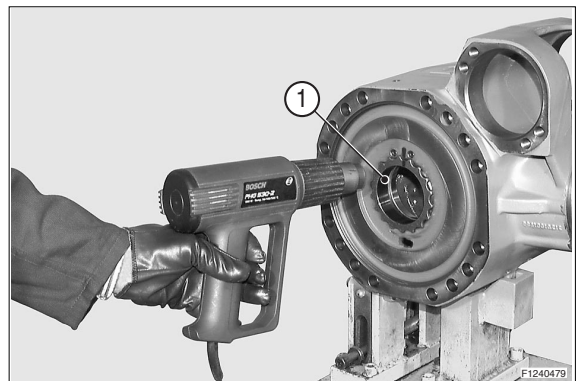
Remove the complete arms.  
For details, see Checking wear and replacing the braking disks.



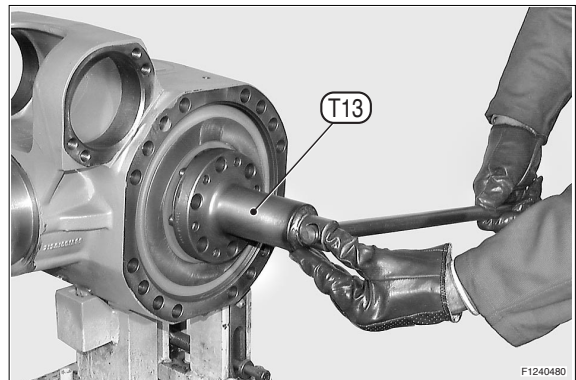
Mark the position of the ring nuts(1).  
Remove the fitting screws(3) from the ring nuts(1).



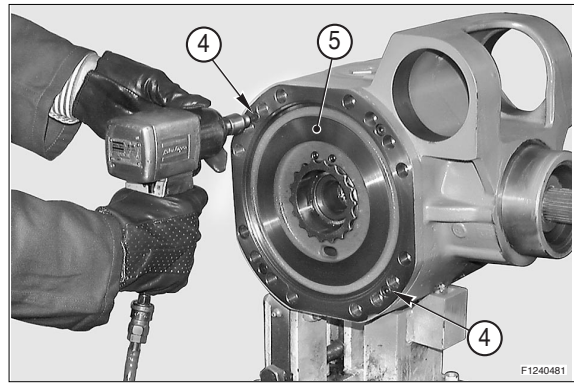
Uniformly heat the ring nuts(1) up to a temperature of 80.C.



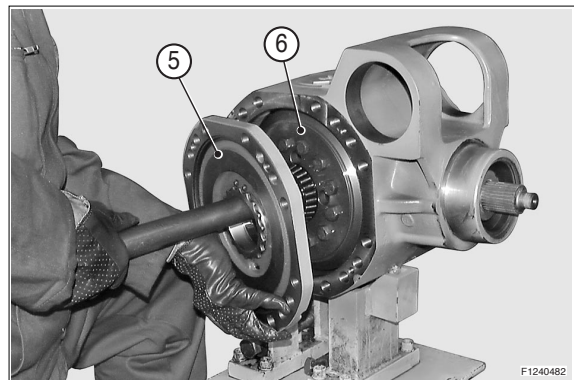
Apply tool T13 and remove the ring nuts.  
Accurately clean the threaded portions on ring nuts of body and cover.



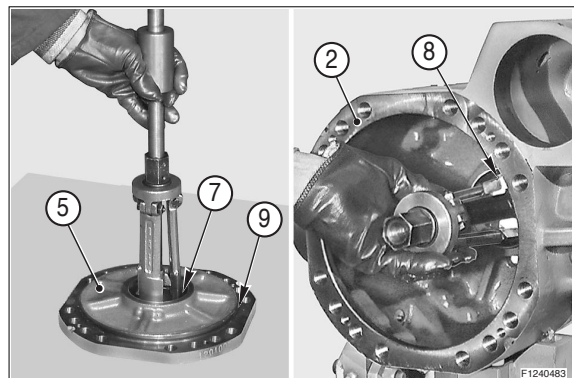
Remove the fitting screws(4) from the middle cover(5).



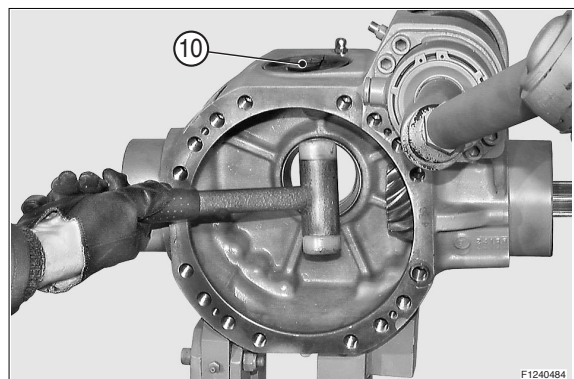
Insert a screw-driver in the opposing slots then force and remove the middle cover(5) and the complete differential unit (6).  
Support the pieces using a rod.



If the bearings need replacing, extract the external thrust blocks of the bearings (7) and (8) from middle cover(5) and central body(2).  
Accurately check the O-ring(9).

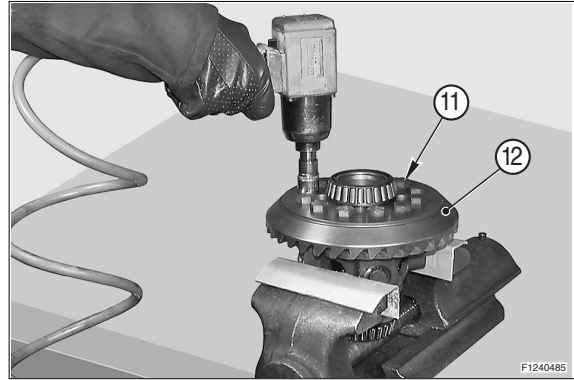


Remove the top plug(10).

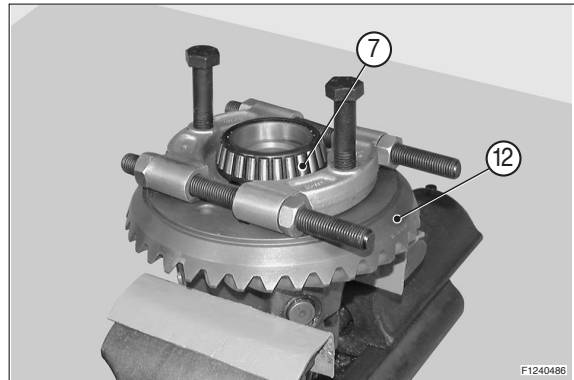


**(2) Disassembling**

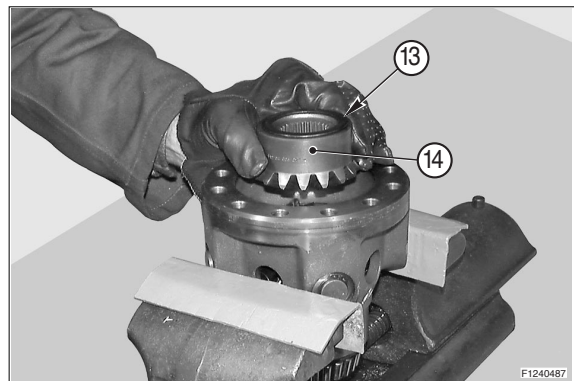
Remove the fitting screws(11) from the crown(12).



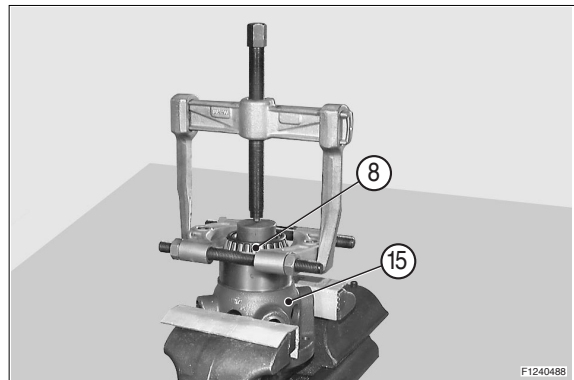
If the bearing need replacing, extract the bearing(7) and remove the crown(12).



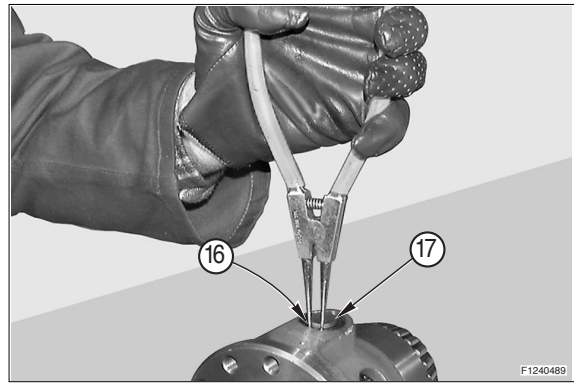
Remove the shim washer(13) and the planetary gear(14).



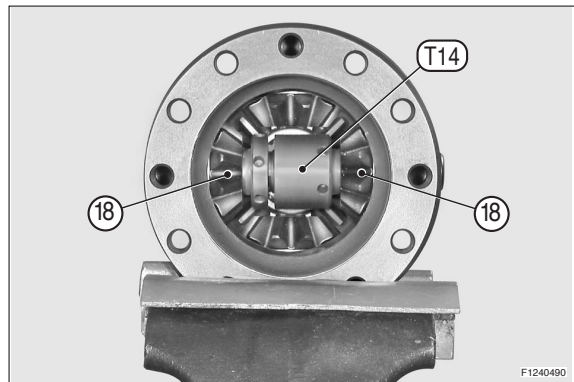
If the bearing need replacing, extract the bearing(8) from the differential carrier(15).



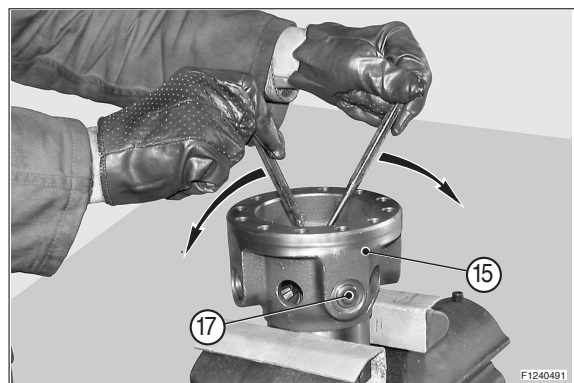
Remove the snap rings(16) from the two pins(17) of the planet wheel gears(18).



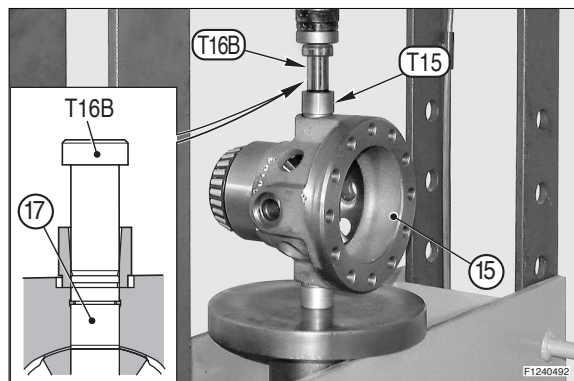
Insert tool T14 between the planet wheel gears(18).



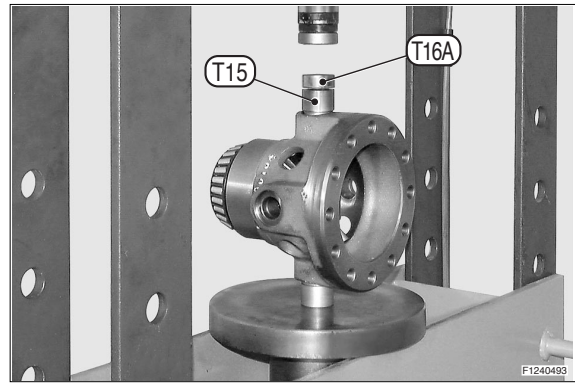
Force tool T14 in-between the planet wheel gears(18) using two pin-drivers. Make sure that tool T14 is perfectly lined up with the pins(17) when locked.



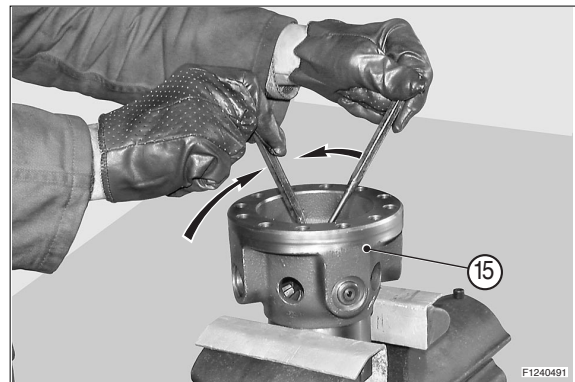
Place the differential carrier(15) under a press, position bushing T15 and insert gudgeon T16A. Press T16A pin to limit position.



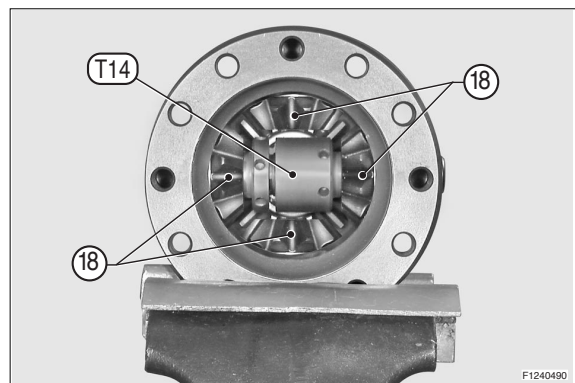
Remove gudgeon T16A and bushing T15.  
In this condition the tool T14 contains pin (17).



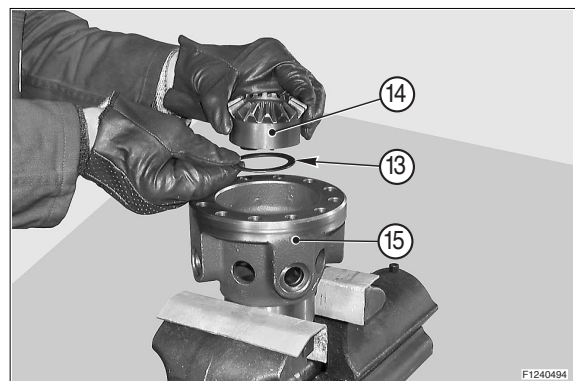
Remove tool T14 together with the pin (17) of the planet wheel.



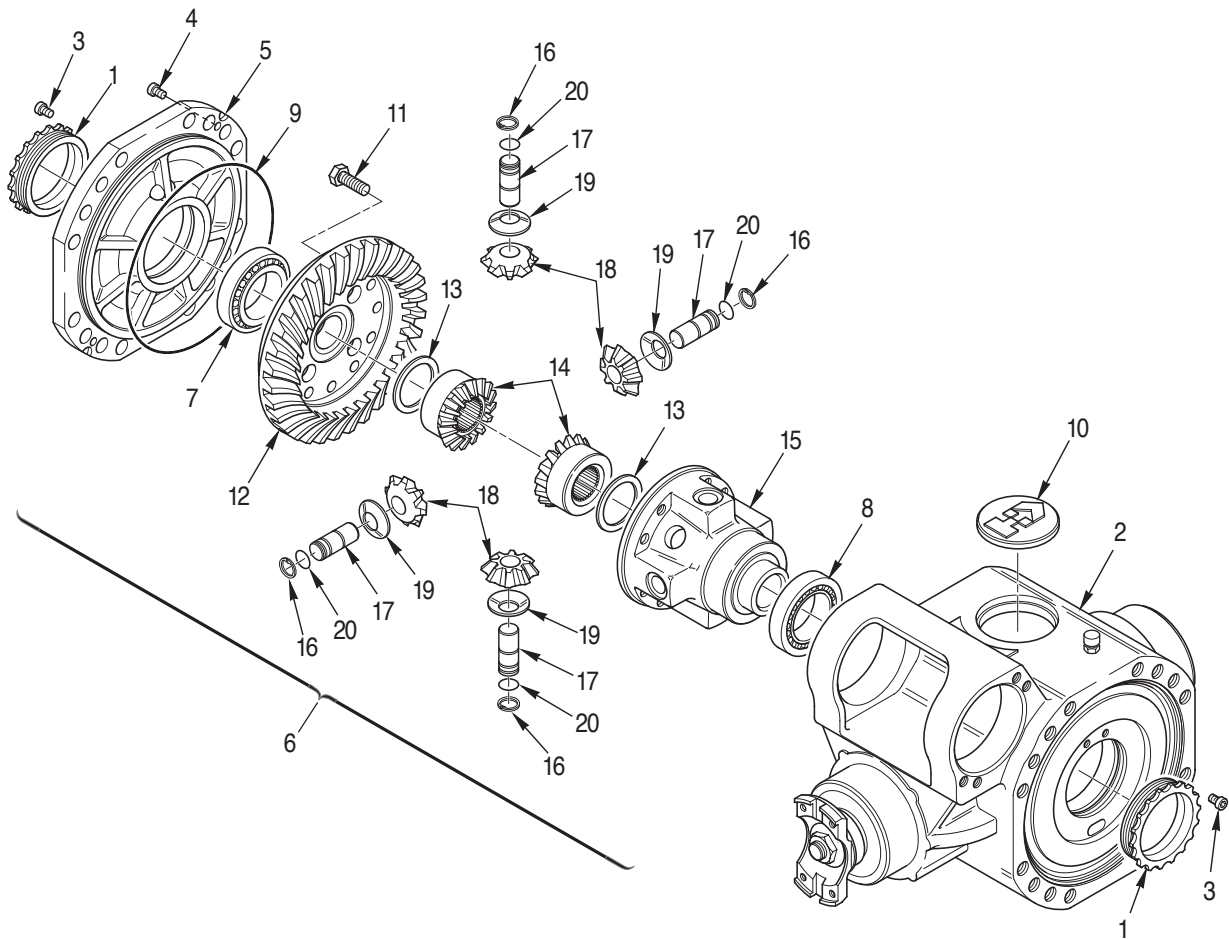
Leave the released planetary gear in position and again lock tool T14.  
Repeat the operations for the extraction of the pin of the 2nd planet wheel(17).  
Repeat the operations for all other pins.



Remove tool T14 and remove the last two planet wheel gears(18), the 2nd differential unit gear(14) and the relative shim washer(13) from the differential carrier.



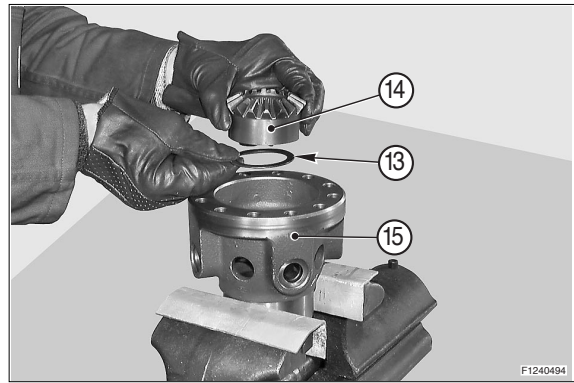
## 14) ASSEMBLE AND INSTALL THE DIFFERENTIAL UNIT



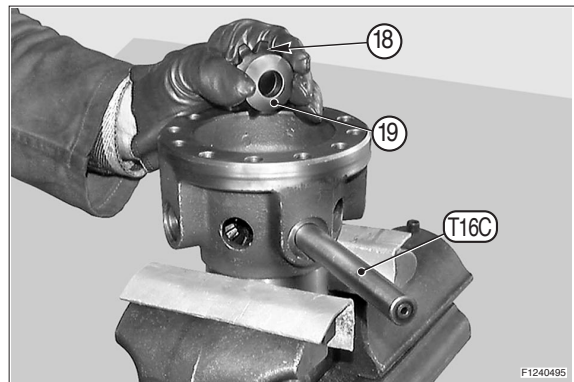
- |   |                   |    |                |    |                      |
|---|-------------------|----|----------------|----|----------------------|
| 1 | Ring nut          | 8  | Bearing        | 15 | Differential carrier |
| 2 | Central body      | 9  | O-ring         | 16 | Snap ring            |
| 3 | Screw             | 10 | Plug           | 17 | Pin                  |
| 4 | Screw             | 11 | Screw          | 18 | Wheel gear           |
| 5 | Cover             | 12 | Crown          | 19 | Shim washer          |
| 6 | Differential unit | 13 | Washer         | 20 | Snap ring            |
| 7 | Bearing           | 14 | Planetary gear |    |                      |

**(1) Assembling**

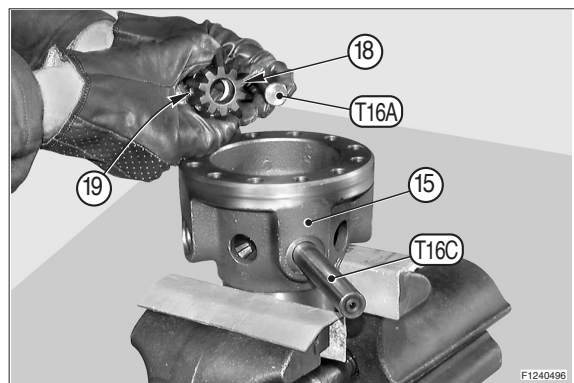
Insert the shim washer(13) and the planetary gear(14) in the differential carrier(15).



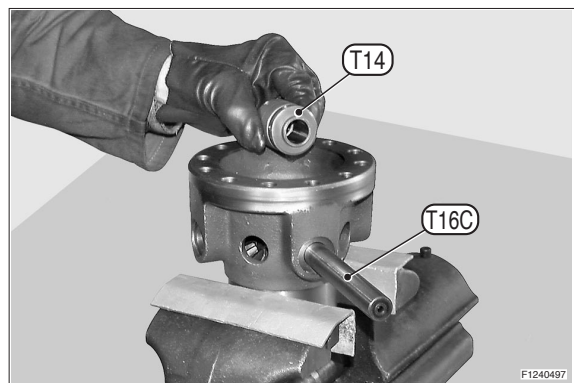
Position the shim washer(19) and the first planet wheel gear(18). Hold them in position using bar T16C.



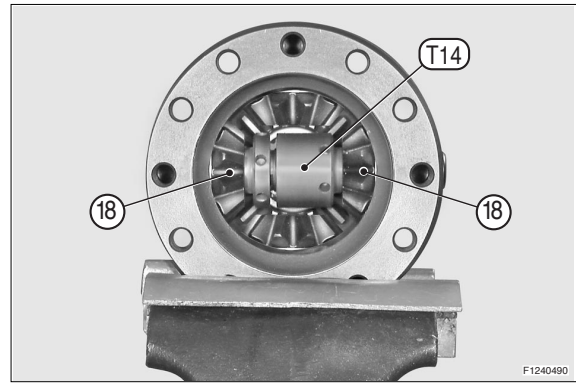
With the help of gudgeon T16A, position the second planet wheel gear(18) and the relative shim washer(19).



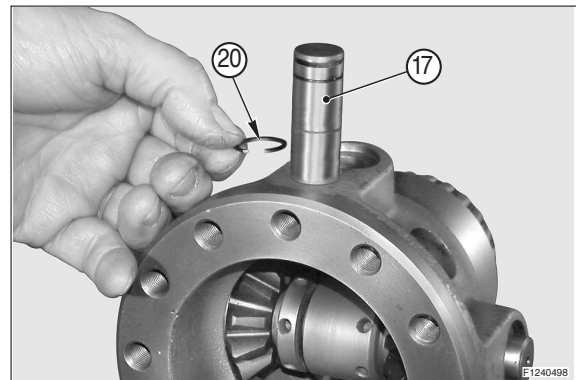
Insert tool T14 between the two planetary gears (18). Line up the entire unit by pushing bar T16C all the way down until gudgeon T16A is ejected.



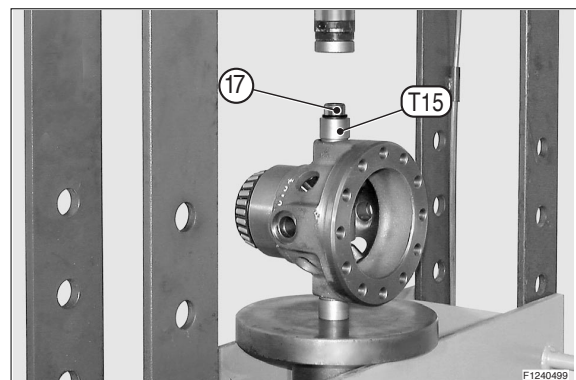
Look tool T14 behind the planet wheel gears(18).  
After locking, remove bar T16C.



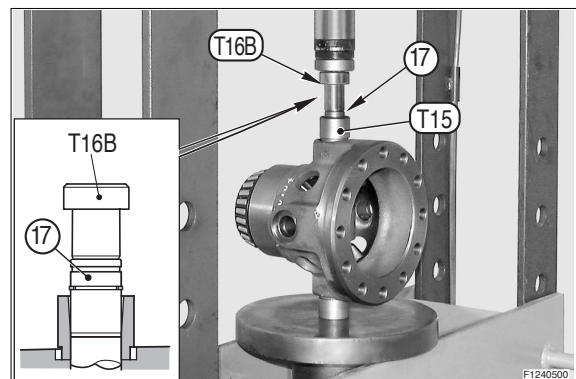
Fit the snap ring(20) onto the pins(17).



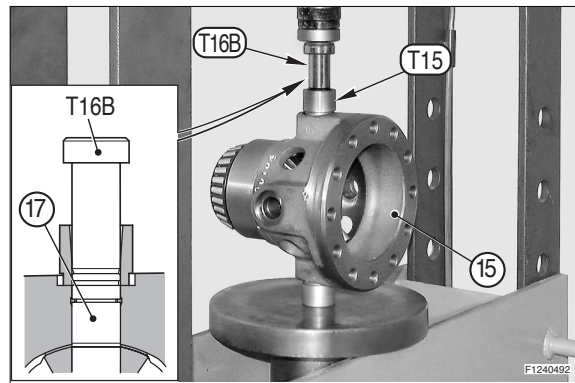
Place the differential carrier(15) under the press, position bushing T15 and insert the planet wheel pin(17).



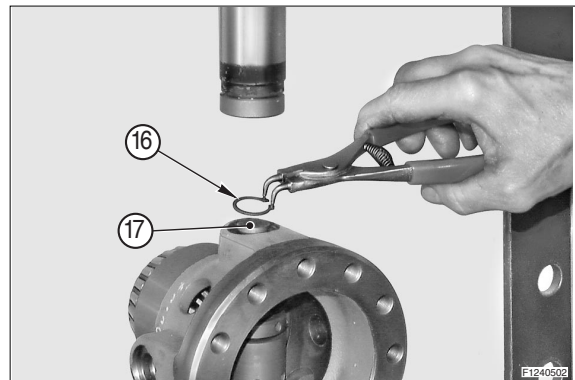
Put gudgeon T16B on top of the planet wheel pin(17).



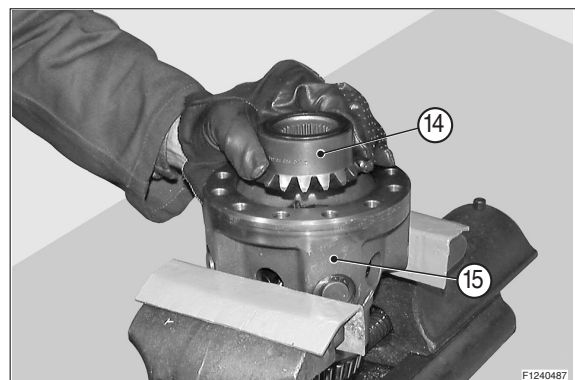
Press T16B pin all the way down.



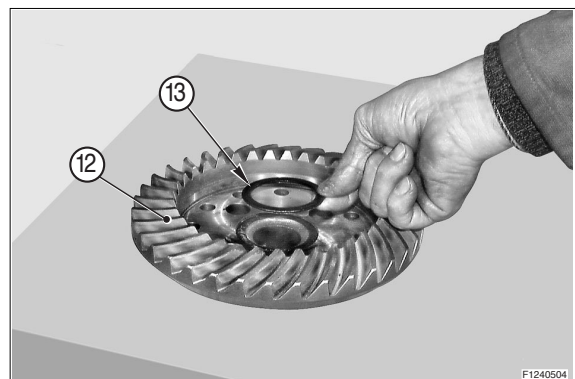
Remove gudgeon T16B, bushing T15 and fit the snap ring(16) on the pin(17).  
Make sure that the snap ring centers the seat and that it rests on the surface of the differential carrier.  
Repeat the operations on the other planet wheel pin or planet wheel axle.



Position the second planetary gear(14) in the differential carrier(15).



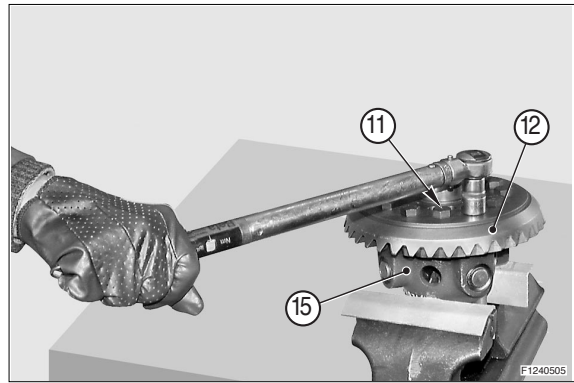
Position the shim washer(13) on the crown(12).  
In order to hold the shim washer(13) in position, apply grease to it.



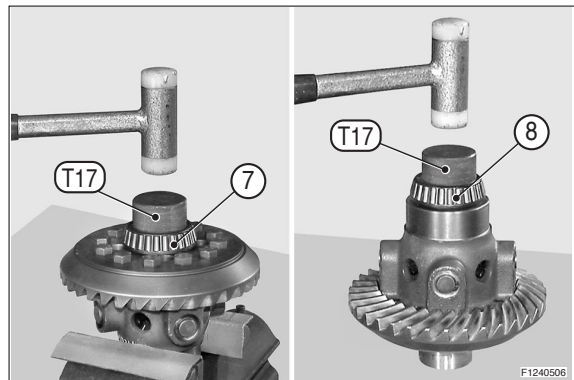
Position the crown(12) on the differential carrier(15) and lock it with screws(11) applied with Loctite 242.

Secure the screws using the cross-tightening method.

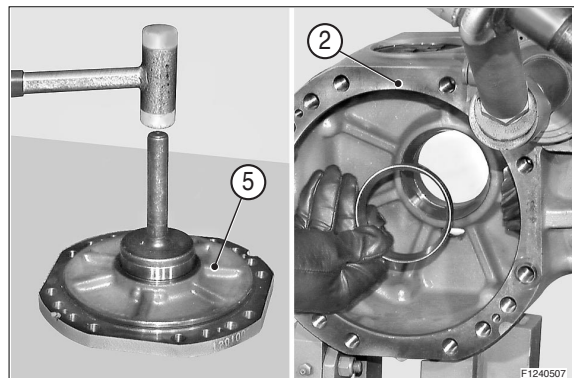
- Tightening torque :  $13.8 \pm 0.7 \text{kgf} \cdot \text{m}$   
( $99.8 \pm 5.1 \text{lbf} \cdot \text{ft}$ )



Install the bearings(7) and (8) using tool T17.



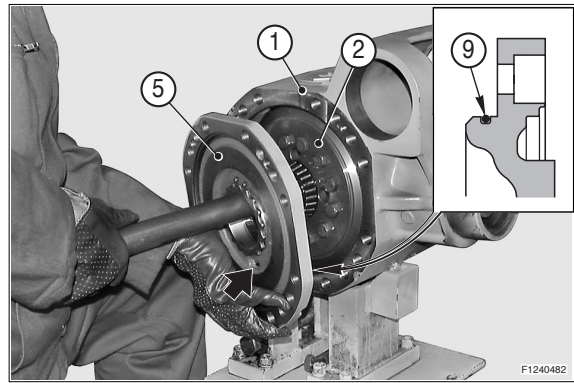
If the bearings are replaced, insert the external thrust blocks in the middle cover (5) and in the central body(2).



## (2) Installing

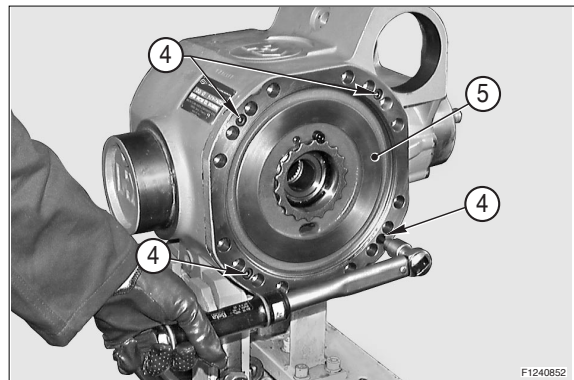
Position the differential unit(6) in the central body(2) with the help of a bar and fit the middle cover(5).

Thoroughly check the state of the O-ring (9) and make sure that the cover is fitted with the oil discharge in the lower position.



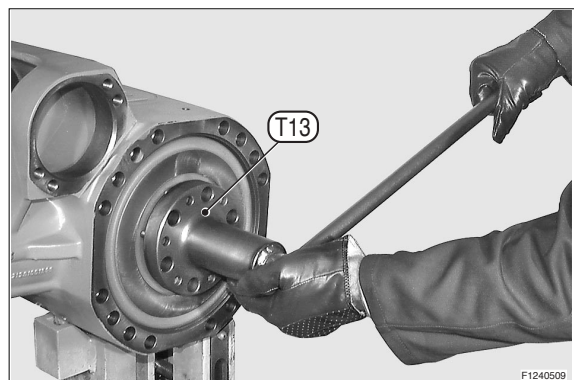
Lock the middle cover(5) with screws(4).

- Tightening torque :  $2.5 \pm 0.1 \text{ kgf} \cdot \text{m}$   
( $18.1 \pm 0.7 \text{ lbf} \cdot \text{ft}$ )



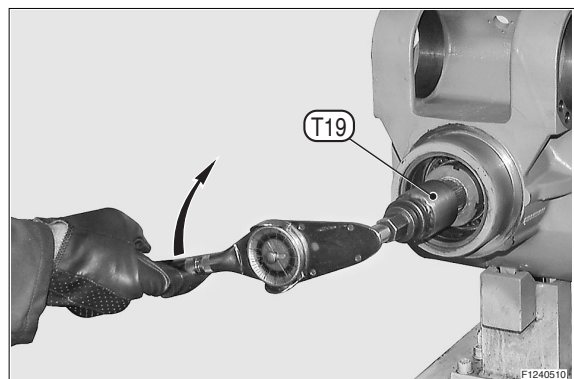
If the ring nuts(1) are removed, spread them with loctite 242.

Tighten ring nuts on the crown side until clearance between pinion and crown is zero, then lock the crown; Go back 1/4~1/2 turn.

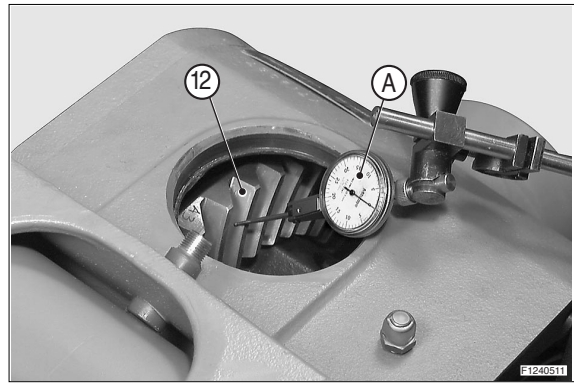


Pre-set the bearings by means of the ring nut situated on the opposite side of the crown, so as to increase pinion torque up to  $0.14 \sim 0.21 \text{ kgf} \cdot \text{m}$  ( $1.0 \sim 1.5 \text{ lbf} \cdot \text{ft}$ )

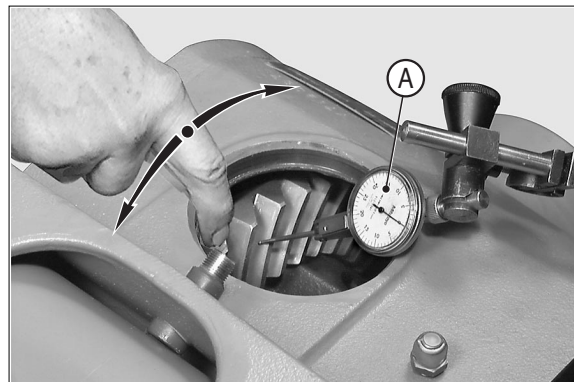
If bearings are not new, check the static torque; If bearings are new, check the continuous torque.



Introduce a comparator with rotary key A through the top plug hole(10). Position the comparator on the center of one of the teeth of the crown(12), pre-set it to 1mm and reset it.



Manually move the crown(12) in both directions in order to check the existing backlash between the pinion and the crown.

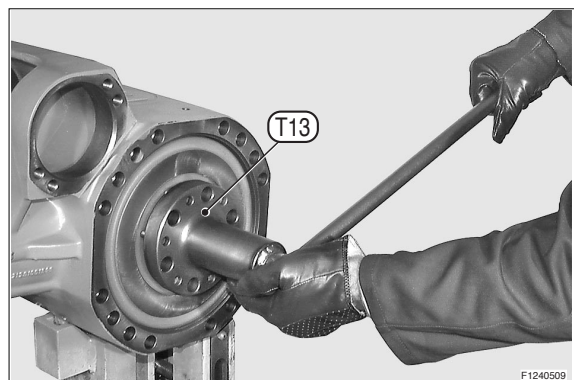


Adjust the backlash between the pinion and the crown by unloosing one of the ring nuts(1) and tightening the opposite to compensate.

Normal backlash: See table.

| Ratio   | Clearance |         |
|---------|-----------|---------|
|         | Minimum   | Maximum |
| 9 ~ 34  | 0.18      | 0.23    |
| 9 ~ 35  | 0.13      | 0.18    |
| 11 ~ 31 | 0.20      | 0.28    |
| 11 ~ 35 | 0.13      | 0.18    |
| 12 ~ 35 | 0.13      | 0.18    |
| 12 ~ 41 | 0.15      | 0.20    |
| 14 ~ 32 | 0.18      | 0.23    |
| 14 ~ 36 | 0.15      | 0.20    |
| 14 ~ 41 | 0.15      | 0.20    |
| 15 ~ 32 | 0.18      | 0.23    |
| 15 ~ 47 | 0.13      | 0.18    |

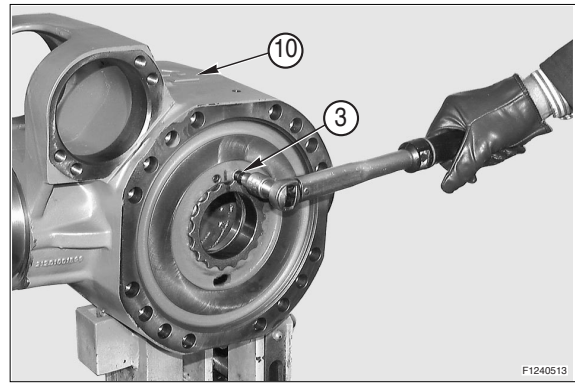
Difference between minimum and maximum clearance for whole circumference should not exceed 0.09mm.



Apply Loctite 242 to the screws(3), fit them into one of the two holes and tighten.

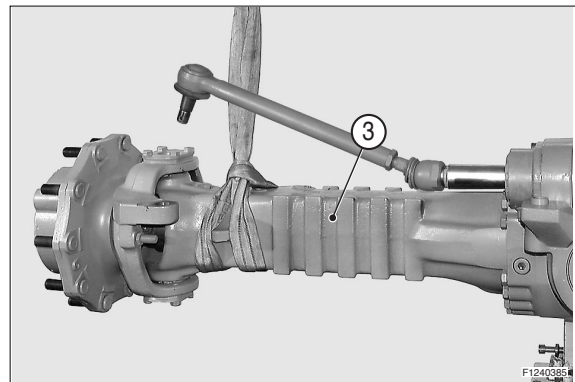
Fit the top plug(10) after applying repositionable jointing compound for seals to the rims.

- Tightening torque :  $2.5 \pm 0.1 \text{ kgf} \cdot \text{m}$   
( $18.1 \pm 0.7 \text{ lbf} \cdot \text{ft}$ )

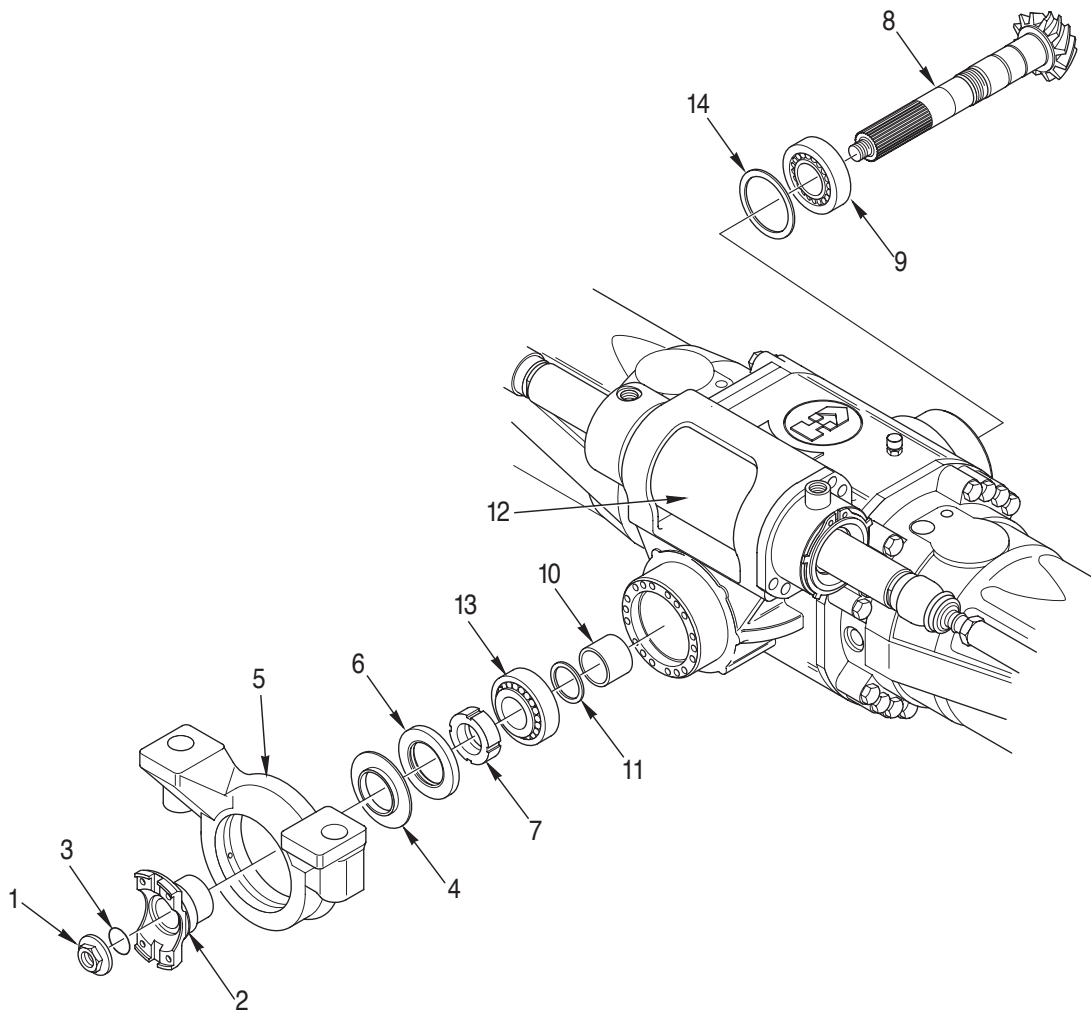


Re-install the complete arms.

For details, see Checking wear and replacing the braking disks.



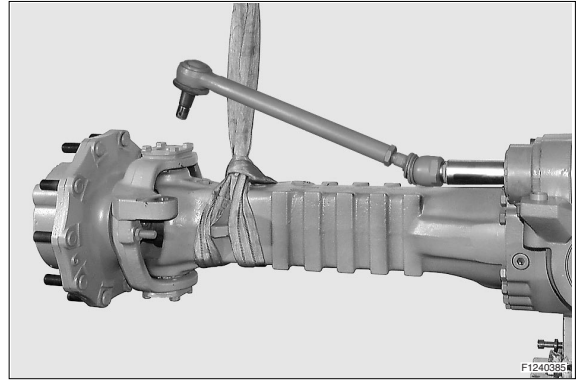
**15) REMOVE THE BEVEL PINION**



- |   |         |    |                |    |              |
|---|---------|----|----------------|----|--------------|
| 1 | Nut     | 6  | Sealing ring   | 11 | Shim         |
| 2 | Flange  | 7  | Ring nut       | 12 | Central body |
| 3 | O-ring  | 8  | Pinion         | 13 | Bearing      |
| 4 | Guard   | 9  | Bearing        | 14 | Washer       |
| 5 | Support | 10 | Distance piece |    |              |

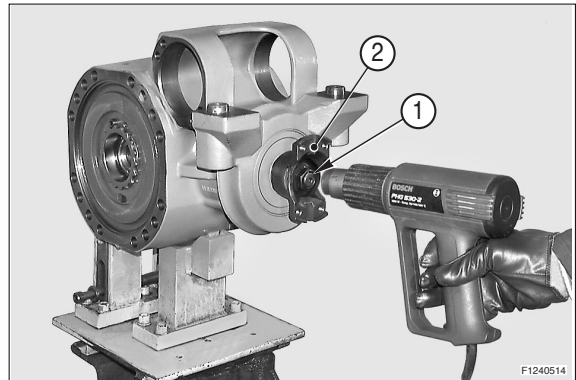
- (1) Remove the complete arms and the differential unit.

For details, see Checking wear and replacing the braking disks and Removing the differential unit.



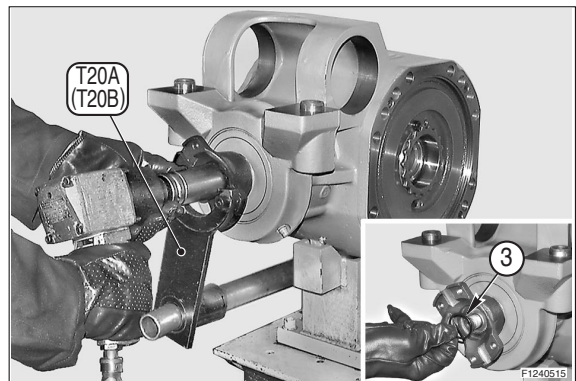
- (2) If disassembly is awkward, heat the check nut(1) of the flange(2) at 80°C.

Heating is meant to unloose the setting of loctite on the nut(1).

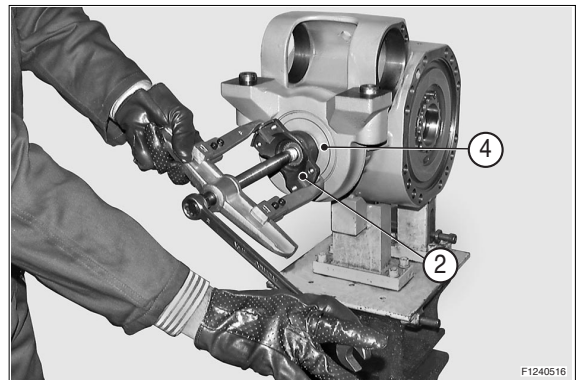


- (3) Position tool T20A(or T20B), so as to avoid pinion rotation.

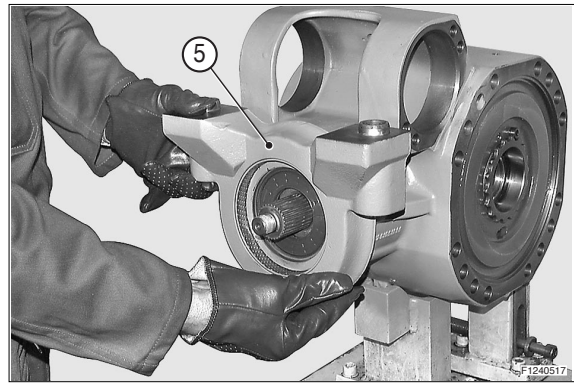
Unloose and remove the nut(1); Also remove the O-ring(3).



- (4) Remove the flange(2) complete with guard(4) by means of a puller.



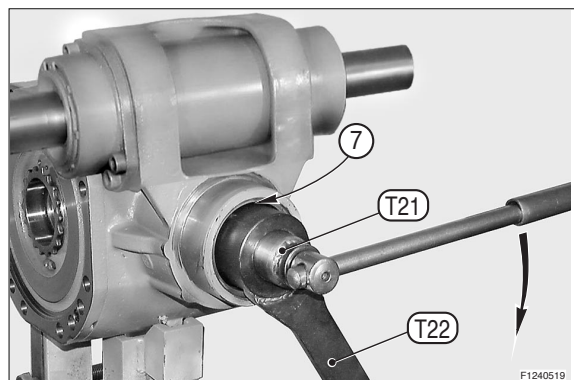
(5) Remove the swinging support(5).



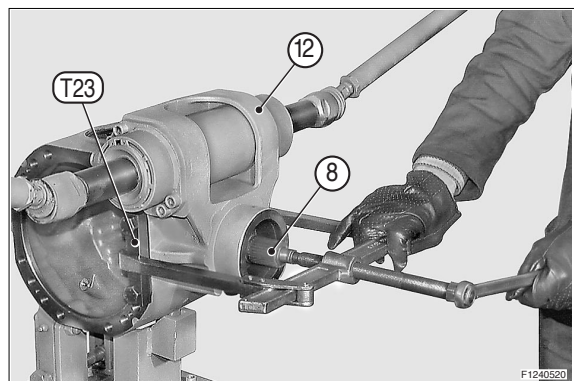
(6) Remove the sealing ring(6).



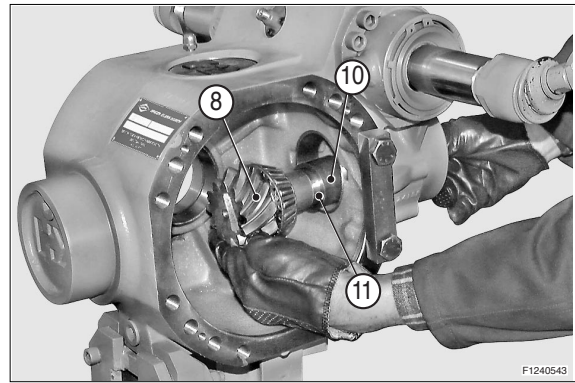
(7) Position wrench T22 onto the ring nut(7) and apply bar hold T21 to the pinion(8). Stop wrench T22 and rotate the pinion so as to release and remove the ring nut(7). If disassembly proves awkward, weld the ring nut at approx. 80°C.



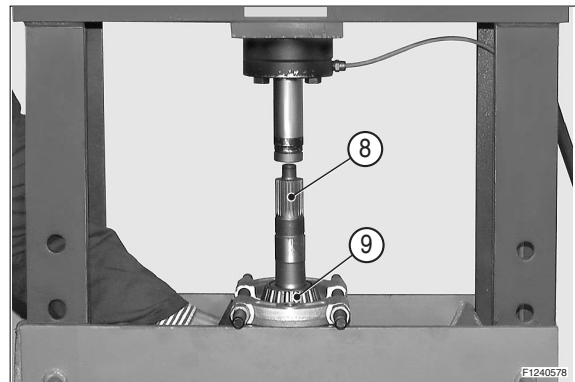
(8) Apply blocks T23 and, with the help of an extractor puller, extract the pinion(8) complete with the internal bearing(9), the distance piece (10) and shims(11). The thrust blocks of the bearings remain in the central body(12).



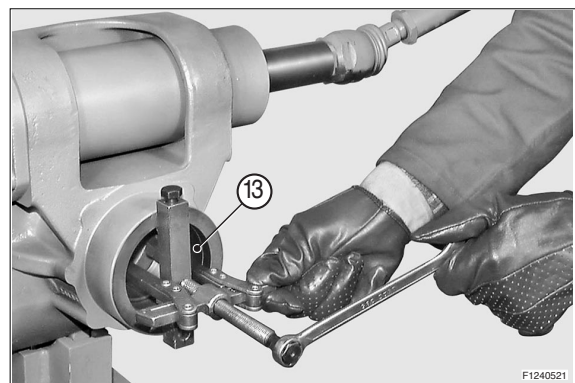
(9) Remove the pinion(8), shims(11) and distance piece(10).



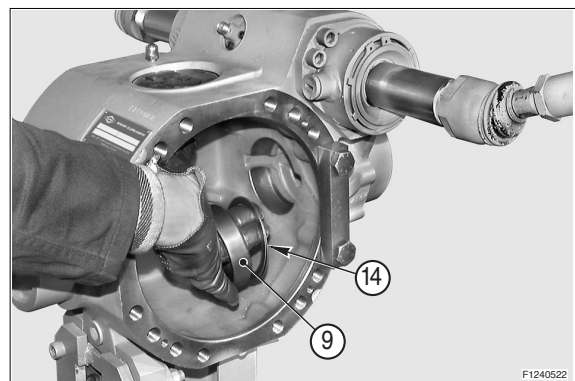
(10) Using an extractor and a press, remove the inner bearing(9) from the pinion(8).



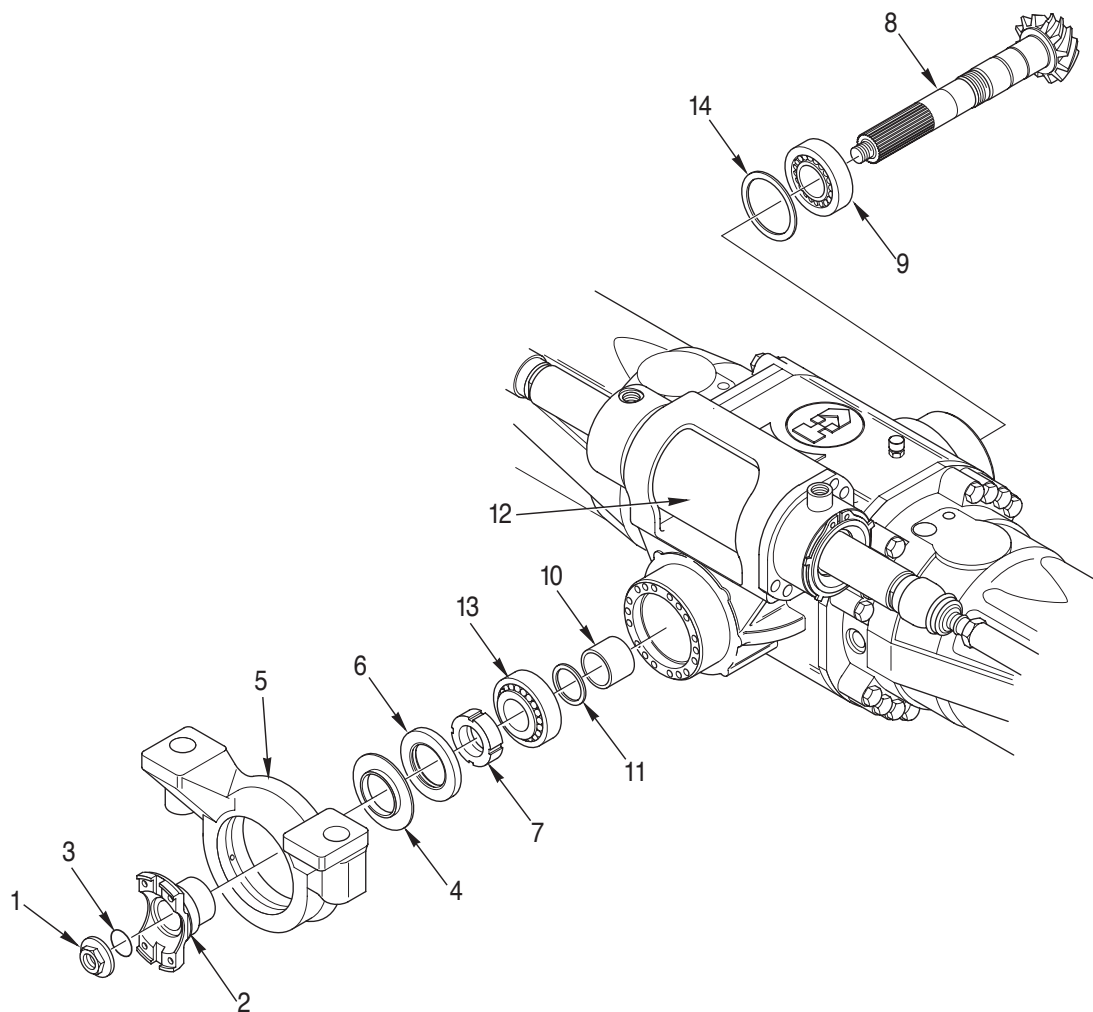
(11) Remove the thrust block of the external bearing(13).



(12) Insert a drift in the appropriate holes and remove the thrust block of the internal bearing(9) as well as the shim washers (14).



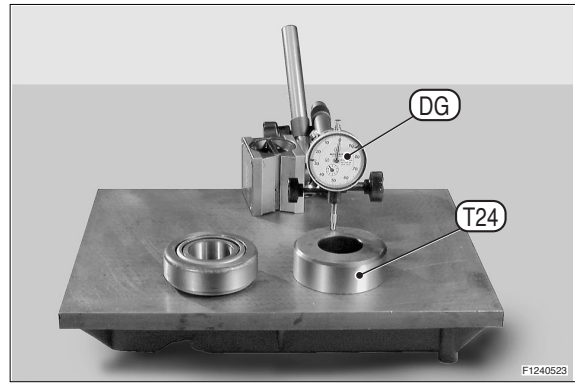
## 16) INSTALL AND ADJUST THE BEVEL PINION



- |   |         |    |                |    |              |
|---|---------|----|----------------|----|--------------|
| 1 | Nut     | 6  | Sealing ring   | 11 | Shim         |
| 2 | Flange  | 7  | Ring nut       | 12 | Central body |
| 3 | O-ring  | 8  | Pinion         | 13 | Bearing      |
| 4 | Guard   | 9  | Bearing        | 14 | Washer       |
| 5 | Support | 10 | Distance piece |    |              |

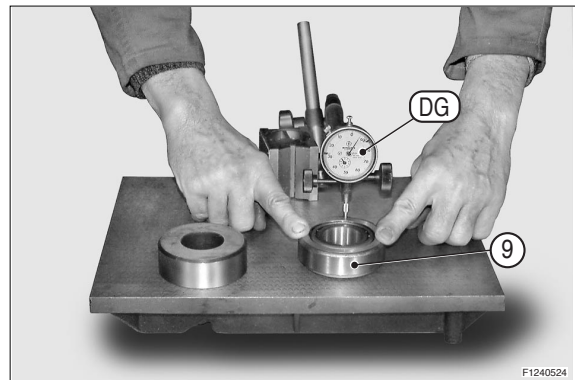
- (1) Using a surface plate, reset a centesimal comparator DG and place it on the measurement ring T24 (With a thickness of 30.2mm).

Preset the comparator to approx. 2mm.

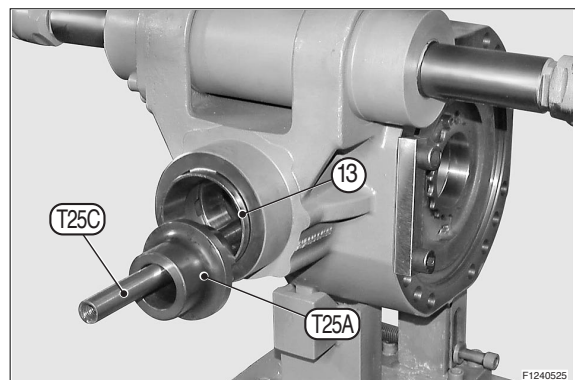


- (2) Bring the internal bearing (9), complete with its thrust block, under the comparator DG. Determine overall thickness "D" of the bearing checking the discrepancy between this size and the size of the measurement ring.

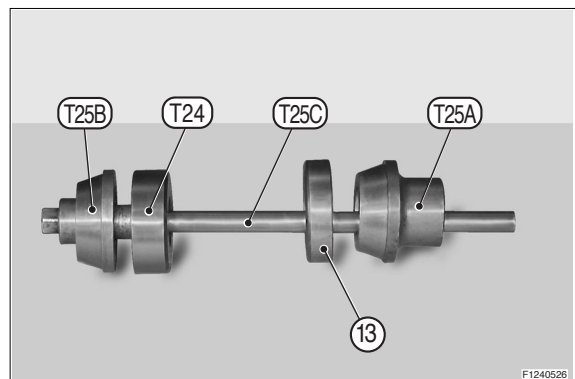
Press the thrust block in the center and take several measurements while rotating the thrust block.



- (3) Partially insert the thrust block of the external bearing (13).



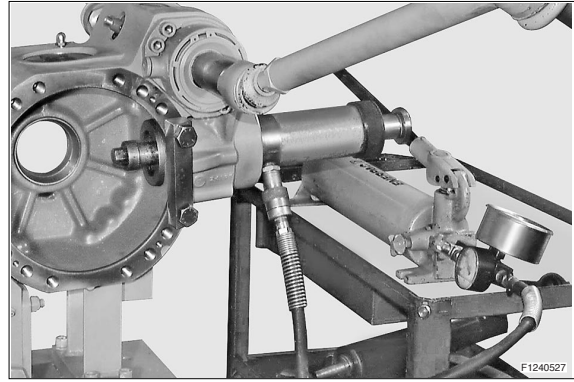
- (4) Install tension rod T25C, measurement ring T24 and front guide tool T25A on the thrust block of the external bearing (13).



- (5) Connect the tension rod to the press and move the thrust block of the external bearing(13) into its seat.

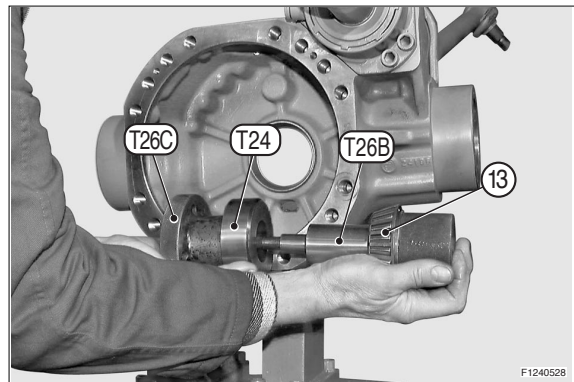
Disconnect the press and remove the tension rod.

Before starting the next stage, make sure that the thrust block has been completely inserted into its seat.



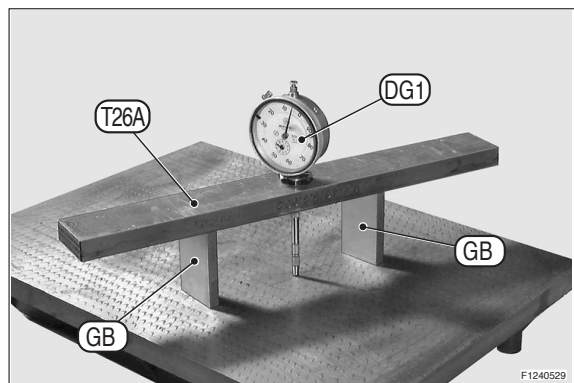
- (6) Insert tool T26B complete with external bearing(13), measurement ring T24 and gauged ring nut T26C.

Manually tighten.

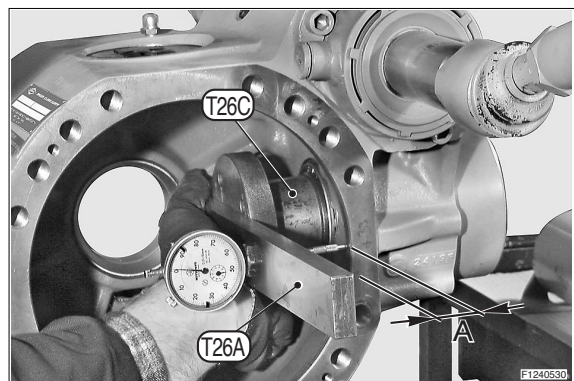


- (7) Fit a centesimal comparator DG1 with long stem into bar T26A; When the bar rests on two size- blocks GB of 57mm, reset the comparator.

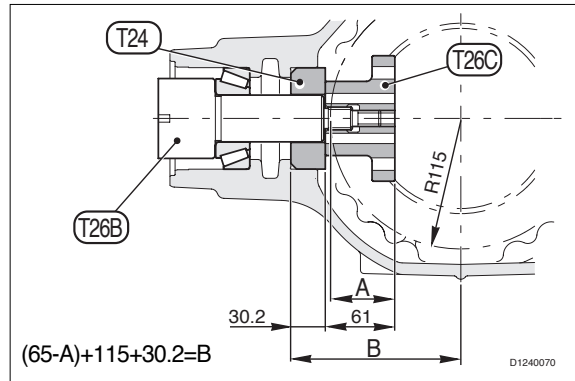
Preset the comparator to approx. 2mm and reset.



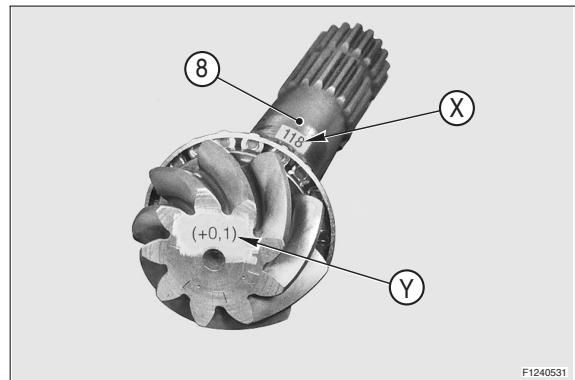
- (8) Lay bar T26A on gauged nut T26C and take the size A at about 57mm corresponding to the maximum diameter of arms centring.



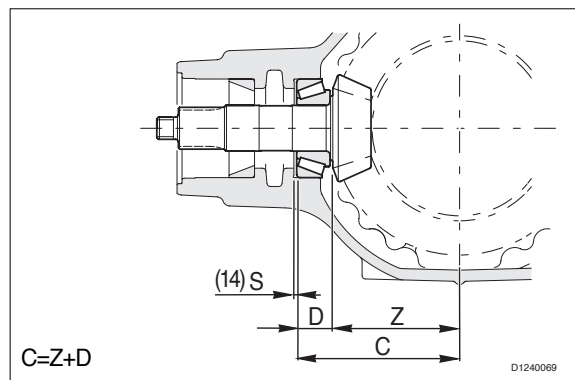
- (9) Calculate size B which will be the first useful value for calculating the size of the shims(14) that are to be inserted under the thrust block of the internal bearing(9).



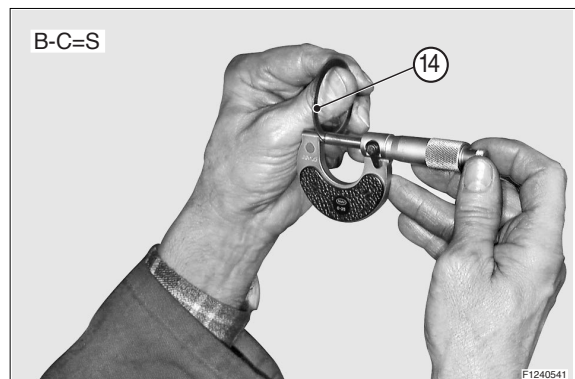
- (10) Check the nominal size(X) marked on the pinion and add or subtract the indicated variation(Y) so as to obtain size Z.  
 e.g.:  $Z = 118 + 0.1 = 118.1$   
 $Z = 118 - 0.2 = 117.8$



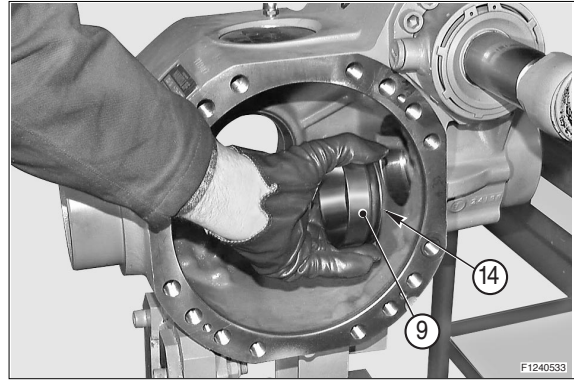
- (11) Calculate size C which represents the second value for calculating the size of the shims "S" that are to be placed under the thrust block of the internal bearing(9).



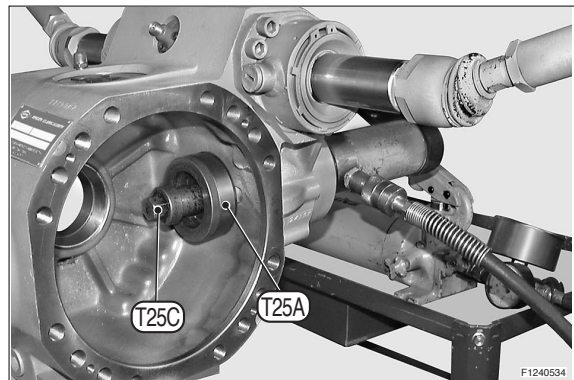
- (12) Calculate the difference between sizes B and C so as to obtain the size S of the shim(14) that will go under the thrust block of the internal bearing(9).



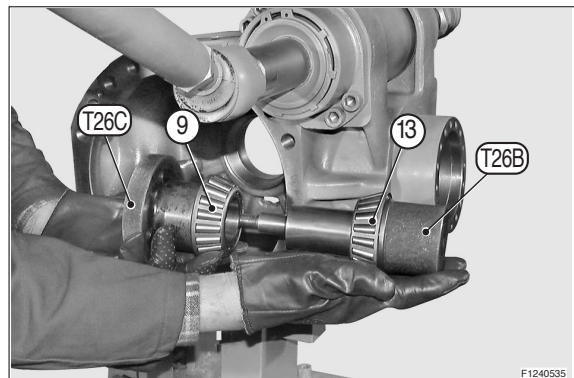
- (13) Insert shim S(14) and the thrust block of the internal bearing(9) in the central body. To hold shim S(14) in position, apply grease.



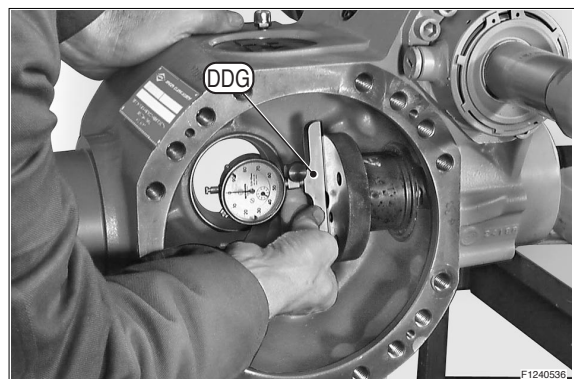
- (14) Position tool T25A and tension rod T25C. Connect the tension rod to the press, fasten the thrust block and then remove the tools. Before going on to the next stage, make sure that the thrust block has been completely inserted.



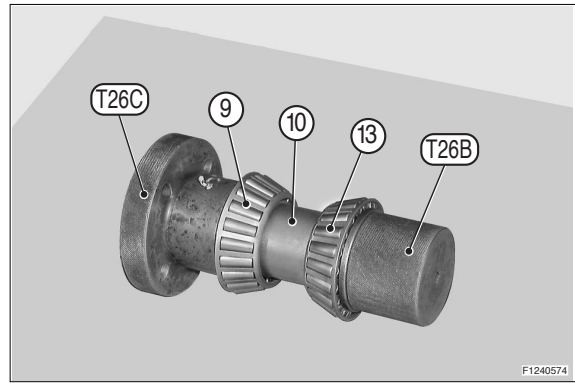
- (15) Position tools T26C and T26B complete with tapered bearings(9) and (13); Manually tighten until a rolling torque has been obtained.



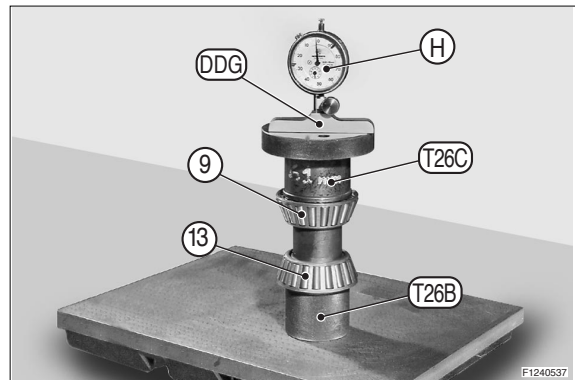
- (16) Insert the stem of a depth comparator DDG in either side hole of tool T26C; Reset the comparator with a presetting of approx. 3mm.



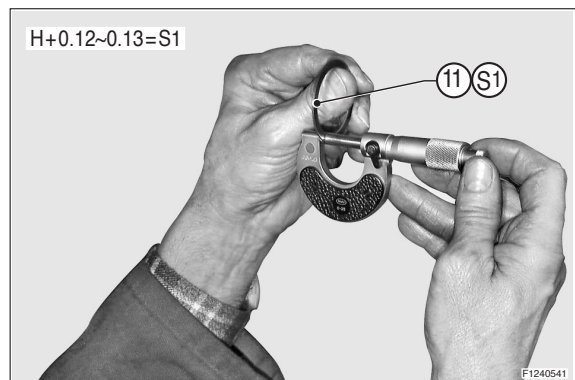
- (17) Remove the comparator and release tools and bearings from the central body.  
Re-install all and insert the distance piece (10) between bearings(9) and (13);  
Manually tighten the whole pack.



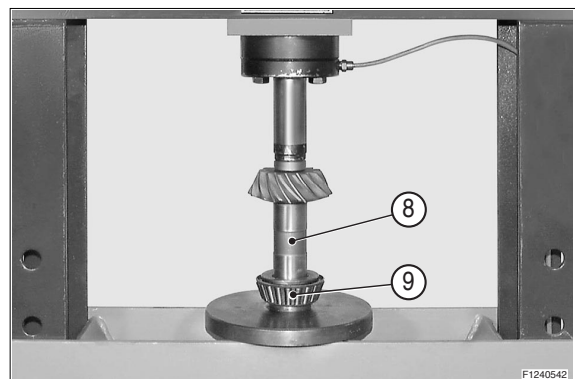
- (18) Insert depth comparator DDG into tool T26B-T26C and measure variation H in relation to the zero setting performed back at point d.



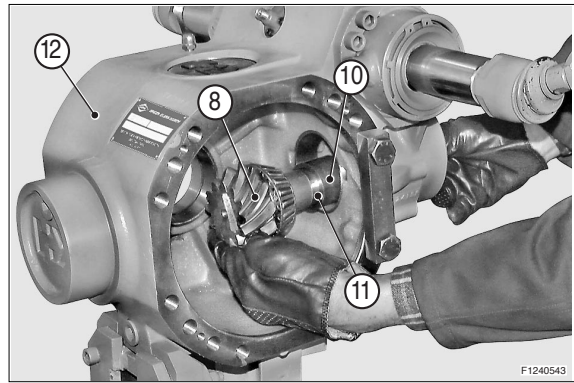
- (19) The variation is to be added to a set value of 0.12~0.13mm., so as to obtain the size of shim S1(11) which will be inserted between the external bearing(13) and the distance piece(10) and subsequently, to determine the preload for the bearings.



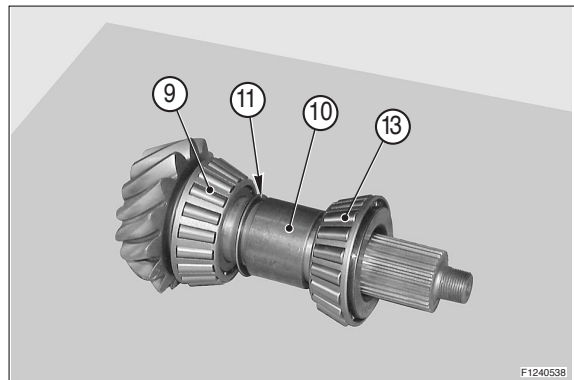
- (20) Position the internal bearing(9) and the pinion(8) under a press; Force the bearing onto the pinion.



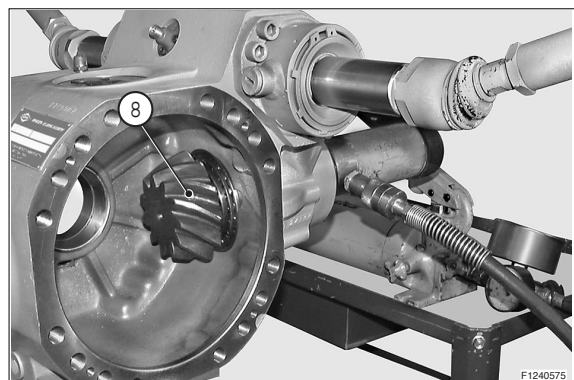
- (21) Fit the pinion(8), shim S1(11) and distance piece(10) in the main body(12).  
The finer shims must be placed in-between the thicker ones



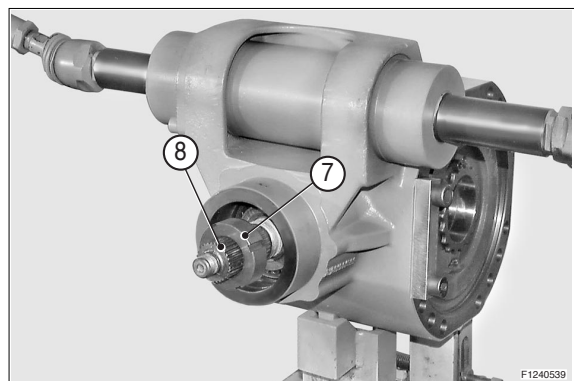
- (22) Insert the external bearing(13) in the central body in order to complete the pack arranged as in the figure.



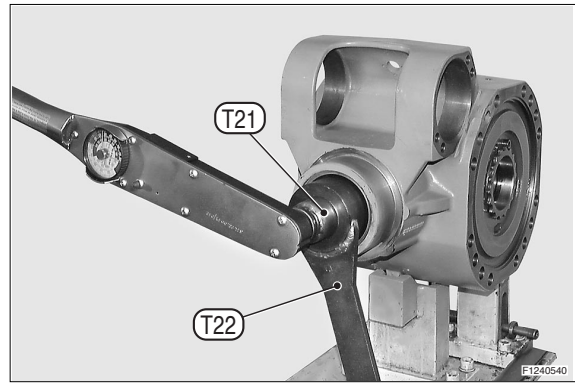
- (23) Connect the pinion(8) to the tie rod T28A and T28B; Connect the tie rod T28C(See special tools) to the press and block.



- (24) Apply loctite 242 to the thread of the ring nut(7) and screw the nut onto the pinion(8).



- (25) Apply special wrench T22 to the ring nut (7) and bar-hold T21 to the pinion(8).  
Lock the wrench T22 and rotate the pinion using a dynamometric wrench, up to a minimum required torque setting of 51kgf · m(369lbf · ft).



- (26) Apply onto the pinion(8) the bar-hold and with the help of a torque meter, check the torque of the pinion(8).

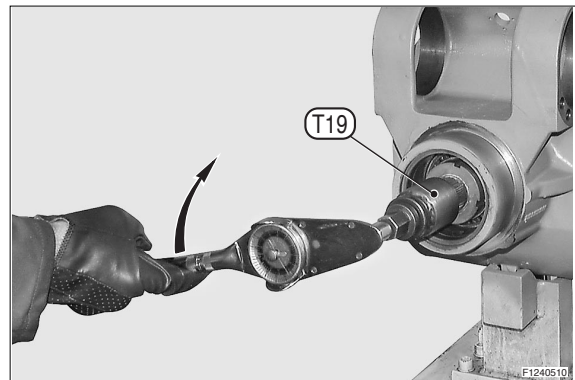
- Tightening torque :  $14.8 \pm 2.5\text{kgf} \cdot \text{m}$   
( $107 \pm 18\text{lbf} \cdot \text{ft}$ )

If torque exceeds the maximum value, then the size of shim S1(11) between the bearing(13) and the distance piece(10) needs to be increased.

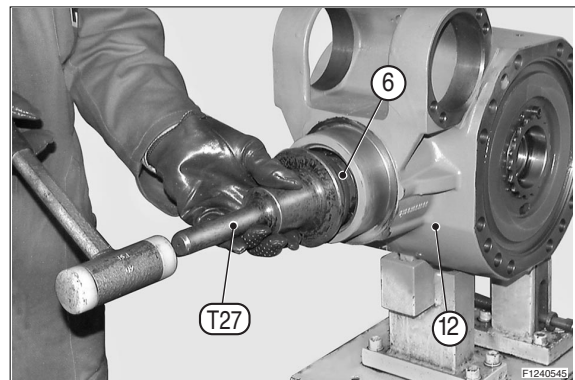
If torque does not reach the set value, increase the torque setting of the ring nut (7) in different stages to obtain a maximum value of 51kgf · m(369lbf · ft).

If torque does not reach the minimum value, then the size of shim S1(11) needs to be reduced.

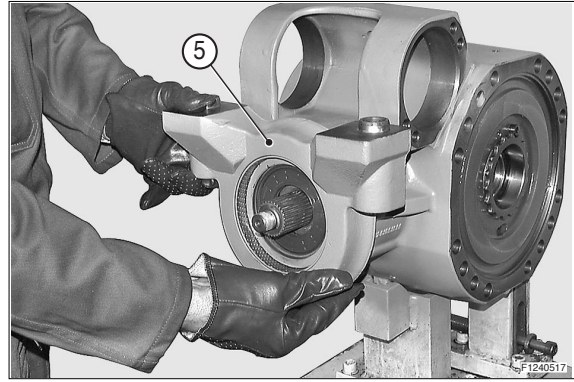
When calculating the increase or decrease in size of shim S1, bear in mind that a variation of shim(11) of 0.01mm corresponds to a variation of 0.06kgf · m (0.41lbf · ft) in the torque of the pinion(8).



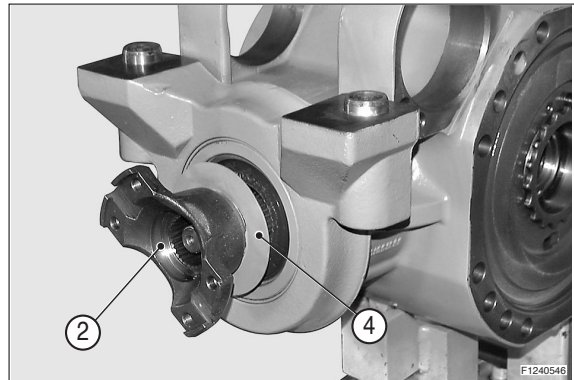
- (27) Lubricate the outer surface of the new sealing ring(6) and fit it onto the central body(12) using tool T27.



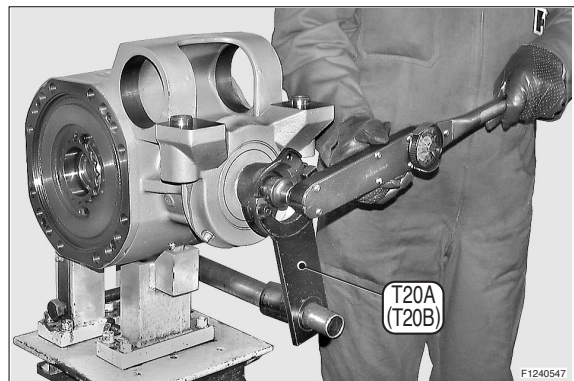
- (28) Install the swinging support(5).  
Check that it is properly oriented.



- (29) Fit the flange(2) complete with the guard (4) and fasten it.  
For keying the flange(2), use a plastic hammer if necessary.  
Make sure that the guard(4) is securely fastened onto the flange and that it is not deformed.



- (30) Apply loctite 242 to the threaded part of the pinion(8).  
Position tool T20A(or T20B) and fasten it in order to avoid rotation.  
Insert O-ring(3) the nut(1) and tighten it using a dynamometric wrench.  
- Tightening torque :  $30.1 \pm 1.5 \text{ kgf} \cdot \text{m}$   
( $218 \pm 10.8 \text{ lbf} \cdot \text{ft}$ )



- (31) Remove blocks T23(Used for extracting the pinion) and re-install the arms.  
For details, see Checking wear and replacing the braking disks.

