



**SPICER<sup>®</sup>**  
*Off-Highway Products*

# Service Manual

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Axle 730/563

ASM-0178E  
July 2013



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## INTRODUCTION

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

**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.

**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.

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

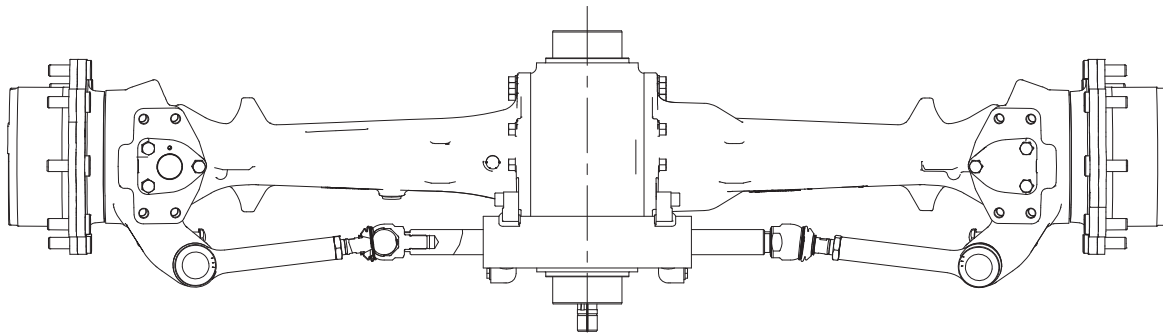
- ▶▶ □ = up to the part number
- ▶▶ = from the part number on

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

**SPECIFIC EQUIPMENT AND SPARE PARTS:** The drawings of all specific tools required for maintenance and repair work can be found at the end of this manual; spare parts may be ordered either from the vehicle manufacturer or directly from the Service Centers or Authorized Distributors of SPICER.


# MAINTENANCE & LUBRICATION

## DEFINITION OF VIEWPOINTS



LEFT SIDE ← ● → RIGHT SIDE  
LATO SINISTRO LATO DESTRO  
LINKE SEITE RECHTE SEITE  
LADO IZQUIERDO LADO DERECHO  
COTE GAUCHE COTE DROITE

## DATA PLATE

		<i>SPICER</i>	
MODEL	①		
RATIO	③	DIFF.	②
SERIAL N°	④		
AXLEN°	⑤		
MFG. BY DANA ITALIA S.p.A. MADE IN COMO - ITALY			

- 1 - Type and model unit - modification index
- 2 - Differential type
- 3 - Reduction ratio
- 4 - Serial number
- 5 - Axle number

# MAINTENANCE & LUBRICATION

## CONVERSION TABLES

### UNITS OF PRESSURE

1 ATM=1 BAR= $10^5$  PA=14.4 PSI

### UNIT OF WEIGHT

	<b>N</b>	<b>daN</b>	<b>kN</b>	<b>kg</b>	<b>lbs</b>
<b>1N</b>	1	0,1	0,001	0,102	0,225
<b>1daN</b>	10	1	0,01	1,02	2,25
<b>1kN</b>	1000	100	1	102	225
<b>1kg</b>	9,81	0,981	0,00981	1	2,205

### UNITS OF TORQUE

	<b>N·m</b>	<b>daN·m</b>	<b>kN·m</b>	<b>kg·m</b>	<b>lb·in</b>
<b>1N·m</b>	1	0,1	0,001	0,102	8,854
<b>1daN·m</b>	10	1	0,01	1,02	88,54
<b>1kN·m</b>	1000	100	1	102	8854
<b>1kg·m</b>	9,81	0,981	0,00981	1	86,8
<b>1 lb·in</b>	0,1129	0,01129	0,0001129	0,01152	1

# MAINTENANCE & LUBRICATION

## TORQUE SPECIFICATIONS

### COARSE PITCH

SIZE OF BOLT	TYPE OF BOLT					
	8.8	8.8 + Loctite 270	10.9	10.9 + Loctite 270	12.9	12.9 + Loctite 270
M6 x 1 mm	9,5 – 10,5 N·m	10,5 – 11,5 N·m	14,3 – 15,7 N·m	15,2 – 16,8 N·m	16,2 – 17,8 N·m	18,1 – 20 N·m
M8 x 1,25 mm	23,8 – 26,2 N·m	25,6 – 28,4 N·m	34,2 – 37,8 N·m	36,7 – 40,5 N·m	39 – 43 N·m	43,7 – 48,3 N·m
M10 x 1,5 mm	48 – 53 N·m	52 – 58 N·m	68 – 75 N·m	73 – 81 N·m	80 – 88 N·m	88 – 97 N·m
M12 x 1,75 mm	82 – 91 N·m	90 – 100 N·m	116 – 128 N·m	126 – 139 N·m	139 – 153 N·m	152 – 168 N·m
M14 x 2 mm	129 – 143 N·m	143 – 158 N·m	182 – 202 N·m	200 – 221 N·m	221 – 244 N·m	238 – 263 N·m
M16 x 2 mm	200 – 221 N·m	219 – 242 N·m	283 – 312 N·m	309 – 341 N·m	337 – 373 N·m	371 – 410 N·m
M18 x 2,5 mm	276 – 305 N·m	299 – 331 N·m	390 – 431 N·m	428 – 473 N·m	466 – 515 N·m	509 – 562 N·m
M20 x 2,5 mm	390 – 431 N·m	428 – 473 N·m	553 – 611 N·m	603 – 667 N·m	660 – 730 N·m	722 – 798 N·m
M22 x 2,5 mm	523 – 578 N·m	575 – 635 N·m	746 – 824 N·m	817 – 903 N·m	893 – 987 N·m	974 – 1076 N·m
M24 x 3 mm	675 – 746 N·m	732 – 809 N·m	950 – 1050 N·m	1040 – 1150 N·m	1140 – 1260 N·m	1240 – 1370 N·m
M27 x 3 mm	998 – 1103 N·m	1088 – 1202 N·m	1411 – 1559 N·m	1539 – 1701 N·m	1710 – 1890 N·m	1838 – 2032 N·m
M30 x 3,5 mm	1378 – 1523 N·m	1473 – 1628 N·m	1914 – 2115 N·m	2085 – 2305 N·m	2280 – 2520 N·m	2494 – 2757 N·m

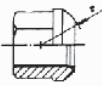
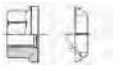

### FINE PITCH

SIZE OF BOLT	TYPE OF BOLT					
	8.8	8.8 + Loctite 270	10.9	10.9 + Loctite 270	12.9	12.9 + Loctite 270
M8 x 1 mm	25,7 – 28,3 N·m	27,5 – 30,5 N·m	36,2 – 39,8 N·m	40 – 44 N·m	42,8 – 47,2 N·m	47,5 – 52,5 N·m
M10 x 1,25 mm	49,4 – 54,6 N·m	55,2 – 61 N·m	71,5 – 78,5 N·m	78 – 86 N·m	86 – 94 N·m	93 – 103 N·m
M12 x 1,25 mm	90 – 100 N·m	98 – 109 N·m	128 – 142 N·m	139 – 154 N·m	152 – 168 N·m	166 – 184 N·m
M12 x 1,5 mm	86 – 95 N·m	94 – 104 N·m	120 – 132 N·m	133 – 147 N·m	143 – 158 N·m	159 – 175 N·m
M14 x 1,5 mm	143 – 158 N·m	157 – 173 N·m	200 – 222 N·m	219 – 242 N·m	238 – 263 N·m	261 – 289 N·m
M16 x 1,5 mm	214 – 236 N·m	233 – 257 N·m	302 – 334 N·m	333 – 368 N·m	361 – 399 N·m	394 – 436 N·m
M18 x 1,5 mm	312 – 345 N·m	342 – 378 N·m	442 – 489 N·m	485 – 536 N·m	527 – 583 N·m	580 – 641 N·m
M20 x 1,5 mm	437 – 483 N·m	475 – 525 N·m	613 – 677 N·m	674 – 745 N·m	736 – 814 N·m	808 – 893 N·m
M22 x 1,5 mm	581 – 642 N·m	637 – 704 N·m	822 – 908 N·m	903 – 998 N·m	998 – 1103 N·m	1078 – 1191 N·m
M24 x 2 mm	741 – 819 N·m	808 – 893 N·m	1045 – 1155 N·m	1140 – 1260 N·m	1235 – 1365 N·m	1363 – 1507 N·m
M27 x 2 mm	1083 – 1197 N·m	1178 – 1302 N·m	1520 – 1680 N·m	1672 – 1848 N·m	1834 – 2027 N·m	2000 – 2210 N·m
M30 x 2 mm	1511 – 1670 N·m	1648 – 1822 N·m	2138 – 2363 N·m	2332 – 2577 N·m	2565 – 2835 N·m	2788 – 3082 N·m



## WHEEL NUT TIGHTENING TORQUES

Wheel nut tightening torques recommended from rim's O.E.M. with reference to the quality of the rim's material.

WHEEL NUT TIGHTENING TORQUES				
CHARACTERISTICS	ILLUSTRATION	WHEEL STUD THREAD	RECOMMENDED WHEEL NUTS TORQUE	
			RIM MATERIAL QUALITY	
			ST 37	**ST 52
WHEEL NUTS WITH INTEGRATE SPHERICAL COLLAR		M18 x 1,5 mm	330 N·m	460 N·m
		M20 x 1,5 mm	490 N·m	630 N·m
		M22 x 1,5 mm	630 N·m	740 N·m
FLAT COLLAR WHEEL NUTS WITH SEPARATE SPHERICAL LOCK WASHER		M18 x 1,5 mm	270 N·m	360 N·m
		M20 x 1,5 mm	360 N·m	450 N·m
		M22 x 1,5 mm	460 N·m	550 N·m
WHEEL NUTS WITH INTEGRATE SEAT CAPTIVE WASHER		M18 x 1,5 mm	260 N·m	360 N·m
		M20 x 1,5 mm	350 N·m	500 N·m
		M22 x 1,5 mm	450 N·m	650 N·m

**\*\*RIM MATERIAL ST 52 IS RECOMMENDED BY DANA ON AXLE APPLICATIONS. IT IS THE OPTIMUM MATERIAL FOR TIGHTENING THE RIM TO THE HUB.**

**NOTE:**

The wheel nut tightening torque is related only on nut thread and stud thread dry (without oil or any lubricant).

**NOTE:**

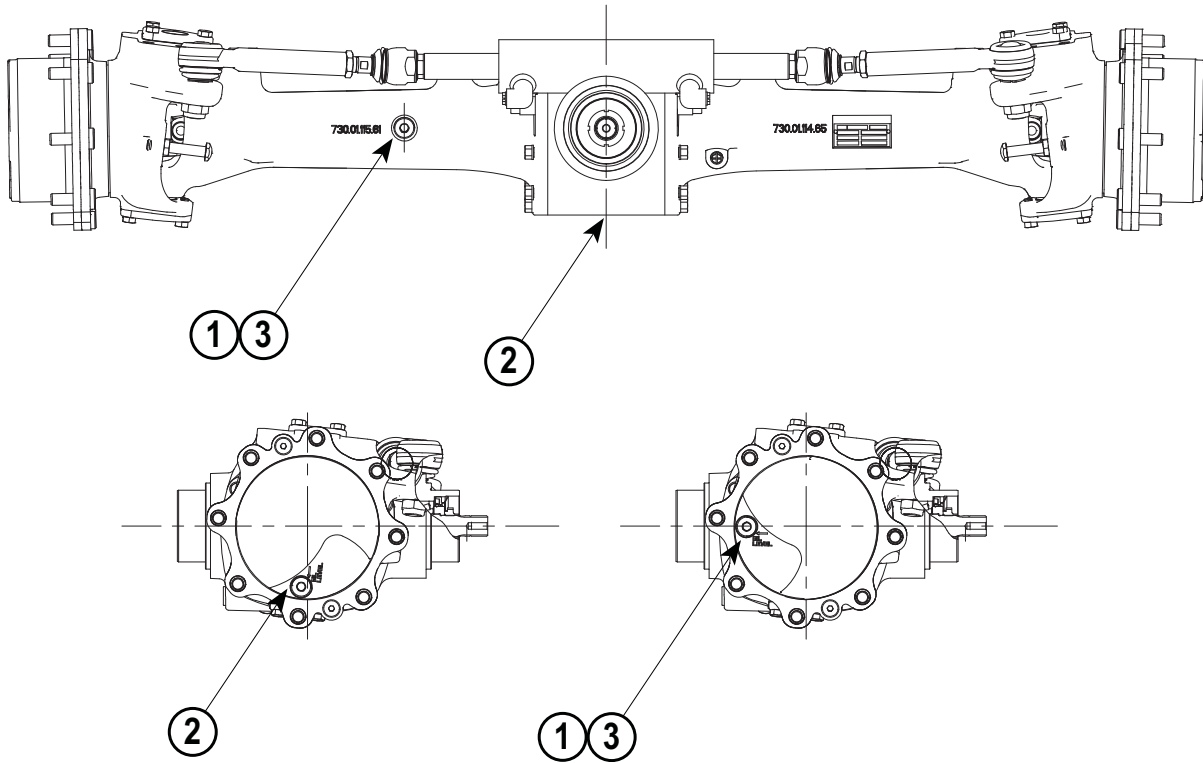
The wheel nut tightening torque takes into consideration not only the nut + stud characteristics, but also the quality of the rim material.

THE DANA OFFICIAL TIGHTENING TORQUE TABLE, THAT IS INCLUDED IN EACH SERVICE MANUAL, SHOWS THE TORQUE FIGURE RELATED TO THE BOLT CHARACTERISTIC ONLY.		
DANA OFFICIAL TIGHTENING TORQUE TABLE		
NUT MATERIAL QUALITY 8.8 & 10.9	STUD MATERIAL QUALITY 10.9	*ALLOW TIGHT TORQUE
M18 x 1,5 mm	M18 x 1,5 N·m	442 - 489 N·m
M20 x 1,5 mm	M20 x 1,5 N·m	613 - 677 N·m
M22 x 1,5 mm	M22 x 1,5 N·m	822 - 908 N·m

**\*THE TORQUE FIGURE ON NUT AND STUD COUPLING MUST BE RELATED ON STUD MATERIAL QUALITY (DANA AXLES ARE 10.9 ONLY).**

# MAINTENANCE & LUBRICATION

## MAINTENANCE POINTS



- 1 - Oil filling plug
- 2 - Oil draining plug
- 3 - Check level plug

# MAINTENANCE & LUBRICATION

## MAINTENANCE INTERVALS

OPERATION		FREQUENCY	LUBRICANTS
Check levels	Differential	Monthly	SAE85W90 (API GL4 - MIL L-2105) With additives for oil-bath brakes
	Planetary reduction	Every 200 hours	
Oil change	Differential	Every 1000/1200 hrs *	
	Planetary reduction	Every 1000/1200 hrs *	

It is recommended to set the axle's oil changes according to the machine maintenance intervals.

If working in heavy conditions half intervals should be used.

\* Initially after 100 working hours

OPERATION	MEMBER	CONDITIONS	FREQUENCY	LUBRICANTS
Greasing	Articulations	Normal work	Monthly	NLGI 3 EP
		Severe duty	Weekly	

## ADJUSTMENT AND CHECKS

UNIT	OPERATION	FREQUENCY	SERVICE BRAKE CIRCUIT
Wheel nuts	Tightening	Every 200 hours**	Only for mineral oil use e.g. ATF Dexron II. Make sure that master cylinder seals are suitable for mineral oil.

\*\* Initially after 10 working hours

# MAINTENANCE & LUBRICATION

## LUBRICANT & SEALANT SPECIFICATIONS

1 - Locking, sealing and lubricating materials referred to in this manual are the same used in the shop-floor.

2 - The table below gives an account of the typical applications of each single material, in order to facilitate replacement with similar products marketed by different brand names with different trade marks.

### **LOCTITE 242**

Anaerobic product apt to prevent the loosening of screws, nuts and plugs. Used for medium-strength locking. Before using it, completely remove any lubricant by using the specific activator.

### **LOCTITE 243**

The oleocompatible alternative to 242. Does not require the activation of lubricated surfaces.

### **LOCTITE 270**

Anaerobic product for very-high strength locking of screws and nuts. Before using it, completely remove any lubricant by using the specific activator.

To remove parts, it may be necessary to heat them at 80 °C approximately.

### **LOCTITE 275**

Anaerobic product suitable for high-strength locking and sealing of large threaded parts, bolts and stud bolts, for pipe sealing and for protecting parts against tampering; suitable for sealing coupling surfaces with a maximum diametrical clearance of 0.25 mm.

### **LOCTITE 510**

Anaerobic product for the hermetic sealing of flanged units and screw holes communicating with fluids. Can seal clearances between flanges up to 0.2 mm.

### **LOCTITE 577**

Quick anaerobic sealant for sealing threaded portions of conical or cylindrical unions up to M80. Before using it, remove any lubricant with the specific activator. After polymerisation, disassembly may result rather difficult, so heating may be necessary for larger diameters.

### **LOCTITE 638**

Anaerobic adhesive for fast and high-strength gluing of cylindrical metal joints (hub on shaft). Can glue together parts with clearance ranging between 0.1 and 0.25 mm.

### **LOCTITE 648**

Anaerobic adhesive for fast and medium-strength gluing of cylindrical metal joints (hub on shaft). Can glue together parts with radial clearance below 0.1 mm.

### **AREXONS (REPOSITIONABLE JOINTING COMPOUND FOR SEALS)**

Solvent-based sealing compound for elastic seals, drying through evaporation. Used for sealing the outer diameter of sealing rings for rotating shafts with outer metal reinforcement.

### **SILICONE**

Semi-fluid adhesive material used for sealing and filling and to protect components from environmental and physical elements. Polymerises with non-corrosive dampness.

### **TECNO LUBE/101 (SILICONE-BASED GREASE)**

Highly adhesive synthetic grease, with silicone compounds added.

Applied to adjustment screws with hole communicating with oil-type fluids.

Used when frequent adjusting is required.

### **MOLIKOTE (DOW CORNING)**

Lubricating compound containing molybdenum disulphide, used to lubricate articulation pins and to prevent sticking and oxidation of parts that are not lubricated on a regular basis.





### **(LITHIUM-BASED) GREASE**

Applied to bearings, sliding parts and used to lubricate seals or parts during assembly.

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## SAFETY PRECAUTIONS

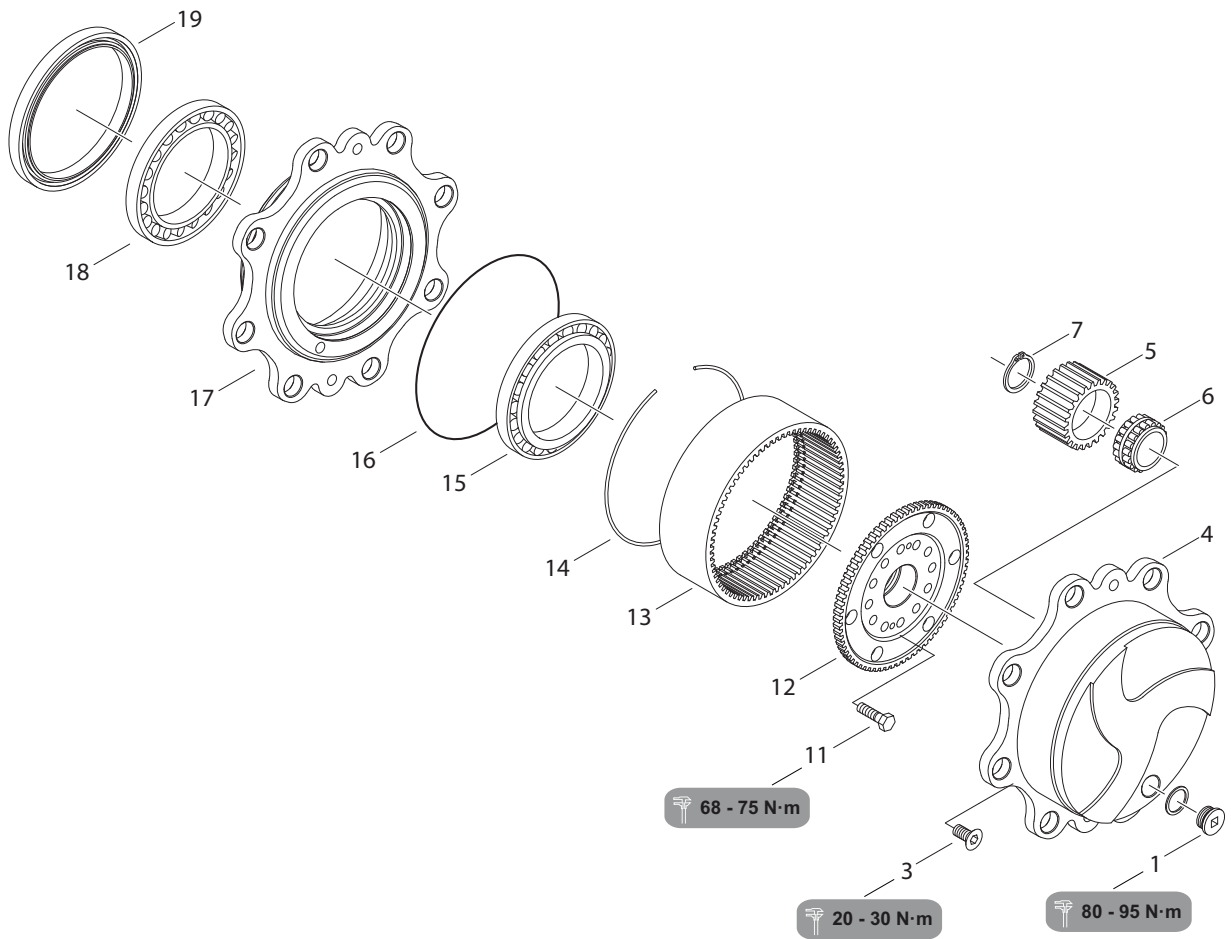
- 1 - During all operations described in this manual, the axle should be fastened onto a trestle, while the other parts mentioned should rest on supporting benches.
- 2 - When removing one of the arms, an anti-tilting safety trestle should be placed under the other arm.
- 3 - When working on an arm that 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, lowquality or improvised wrenches and tools. Ensure that all torque 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, xylolbased 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 - After repair work has been completed, accurately touch up any coated part that may have been damaged.
- 12 - Follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury.
	Indicates a situation which, if not avoided, may result in if not avoided, may result in damage to components.



# PLANETARY REDUCTION GEAR

## EXPLODED VIEW

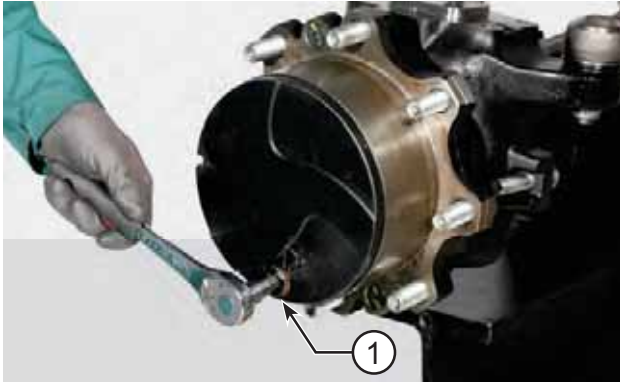


# DISASSEMBLY

## DISASSEMBLY

### ⚠ CAUTION

Perform all operations on both arms.



**FIGURE 1:** Remove the oil-level plug (1). Drain oil.

### ⚠ CAUTION

Make sure all fluids are contained during inspection, maintenance, tests, adjustment and repair of the product. Prepare a suitable container to collect the fluid before removing any component containing fluids. Dispose of all fluids following legal and local regulations.

### ⚠ WARNING

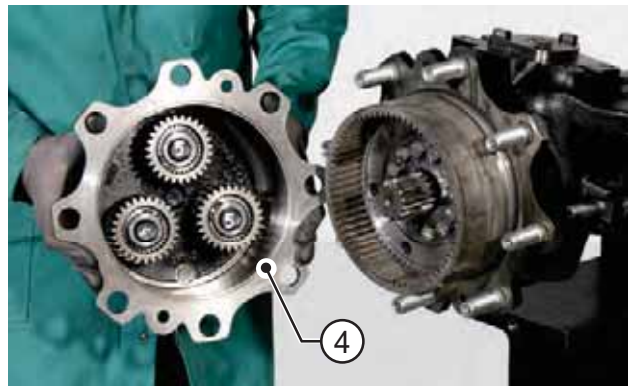
Hot oil and components can cause personal injury. Avoid skin contact.



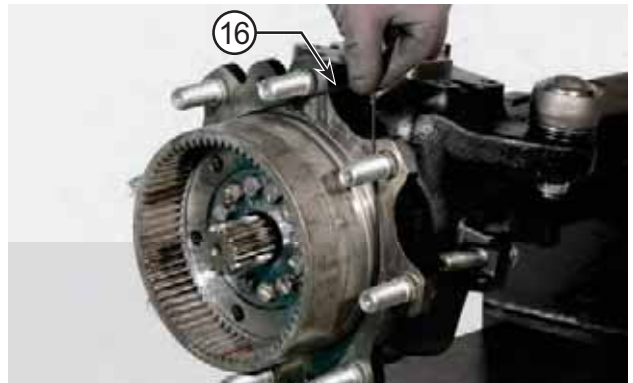
**FIGURE 2:** Remove the locking screws (3) of planetary cover (4).



**FIGURE 3:** Disjoin the spider cover (4) from the hub by alternatively forcing a screwdriver into the appropriate slots.

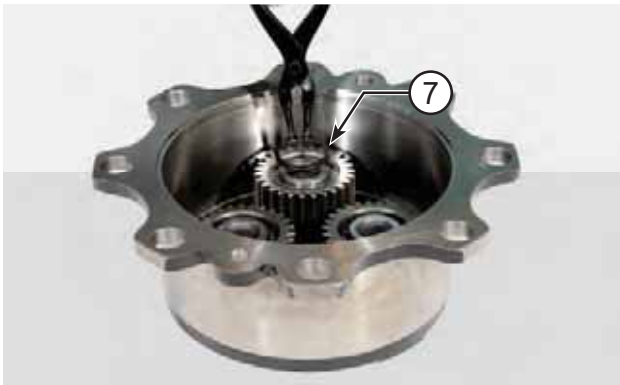


**FIGURE 4:** Remove the complete planetary carrier cover (4).



**FIGURE 5:** Use a screwdriver to remove the o-ring (16).





**FIGURE 6:** Remove snap ring (7).



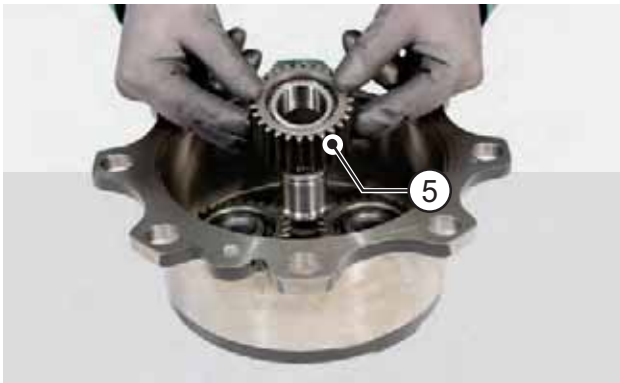
**FIGURE 9:** Tighten two M8 screws in the special threads. Tighten by one turn alternately.

## WARNING

Removal of the snap rings can cause personal injuries. You must wear appropriate safety equipment. To avoid injury to eyes, wear eye protection equipment.



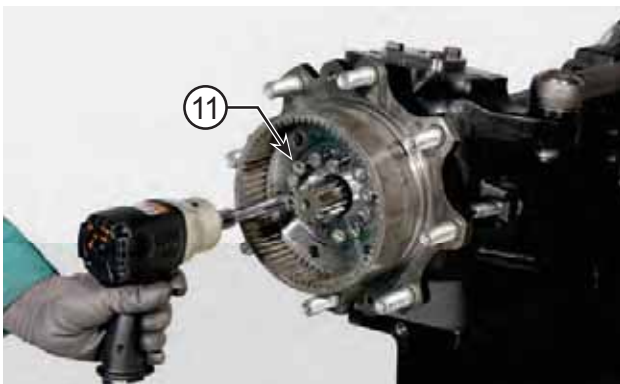
**FIGURE 10:** Remove the crown (13) with crown flange (12).



**FIGURE 7:** Remove the planetary gears (5) and the bearings (6).



**FIGURE 11:** Remove the snap ring (14) from the crown (13).

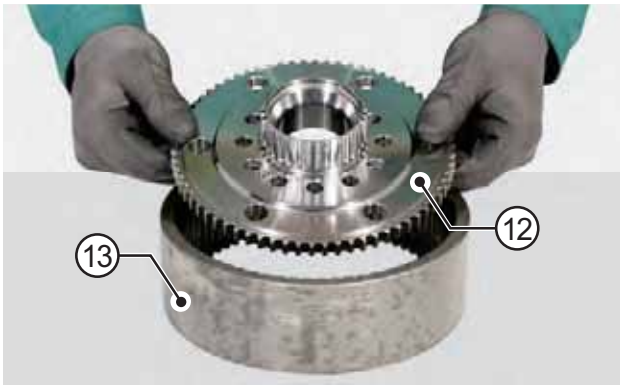


**FIGURE 8:** Loosen and remove the screws (11) from the crown flange (12).

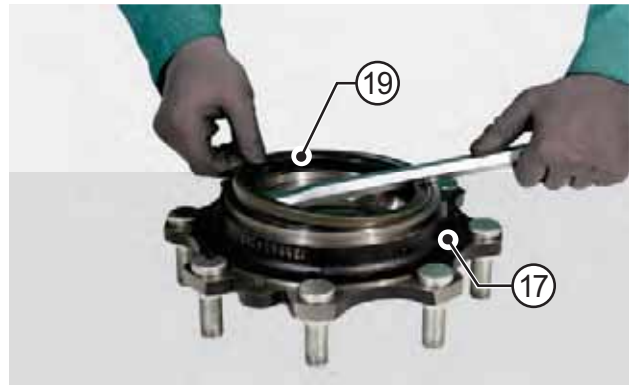
## WARNING

Removal of the snap rings can cause personal injuries. You must wear appropriate safety equipment. To avoid injury to eyes, wear eye protection equipment.

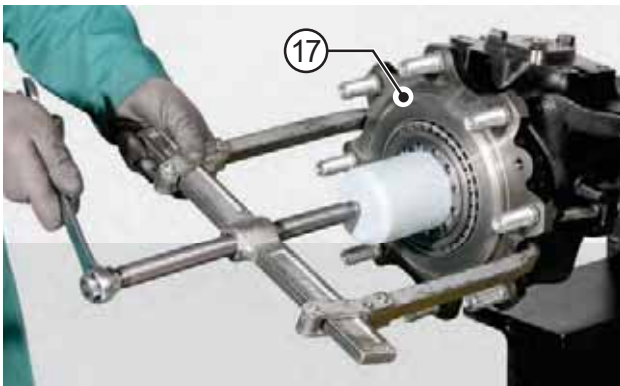
# DISASSEMBLY



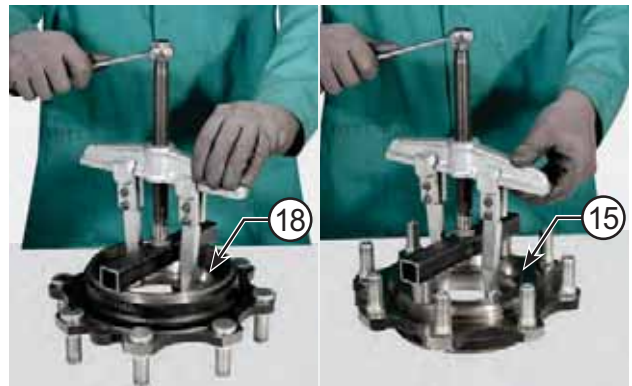
**FIGURE 12:** Remove the crown flange (12).



**FIGURE 15:** Remove the sealing ring (19) from the hub (17).



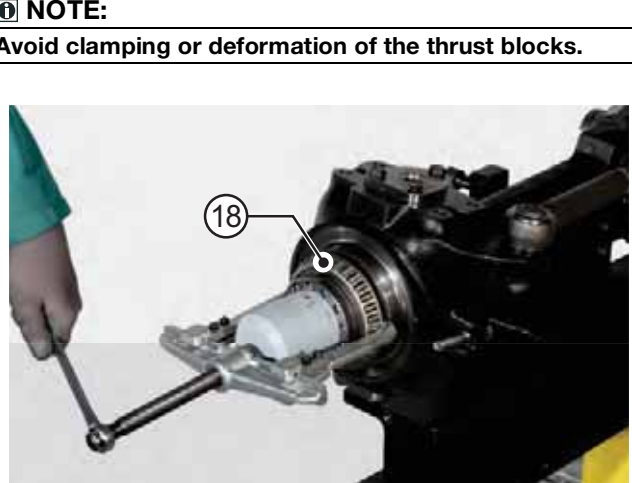
**FIGURE 13:** Harness the wheel hub (17). Partially extract the external bearing (15) using an extractor.



**FIGURE 16:** Remove the thrust blocks (15, 18) from the bearings and force a puller into the appropriate slots on the hub.



**FIGURE 14:** Remove the external bearing (15) and the hub (17).

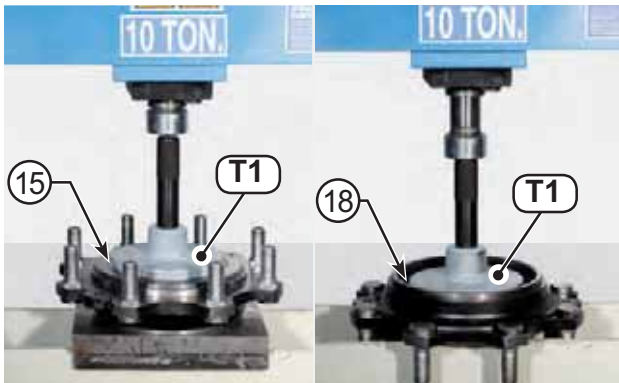


**FIGURE 17:** Remove the internal bearing (18).

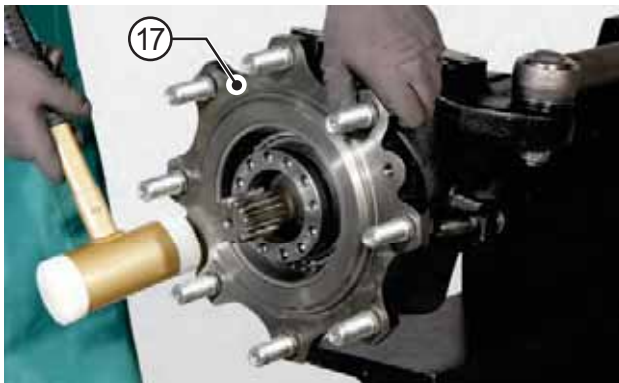
**NOTE:**

**Avoid clamping or deformation of the thrust blocks.**

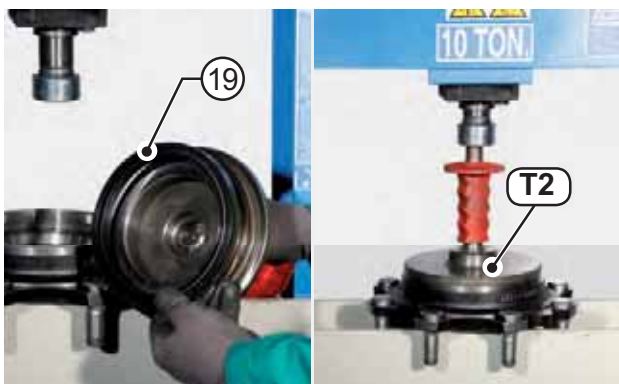
## ASSEMBLY



**FIGURE 18:** Position the tool T1 (See drawing T1 p. 67) and press the thrust blocks (15, 18) into the hub (17) all the way down.



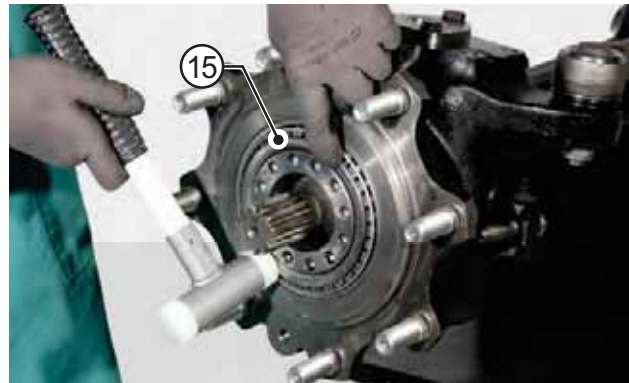
**FIGURE 19:** Install the wheel hub (17) on the steering knuckle.



**FIGURE 20:** Position the sealing ring (19) in the special tool T2 (See drawing T2 p. 67). Position tool T2 (See drawing T2 p. 67) and press the sealing ring (19) into its seat.

**NOTE:**

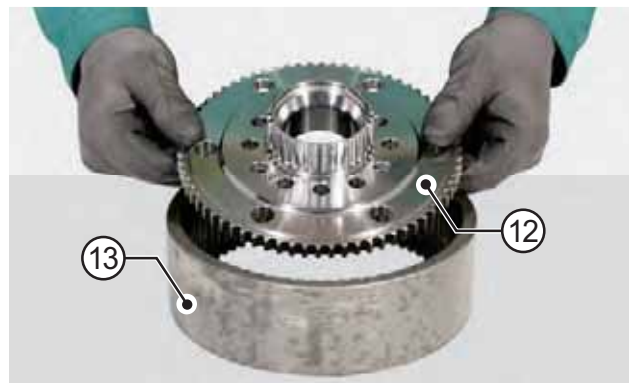
Check that the ring (19) is correctly oriented. Flat surface should be visible after mounting.



**FIGURE 21:** Install the inner bearing (15).

**NOTE:**

Using a plastic hammer, drive the bearing to the limit stop by lightly hammering around the edge.



**FIGURE 22:** Install the crown wheel (13).



**FIGURE 23:** Insert the snap ring (14) in order to fix the flange (12) in the crown (13).

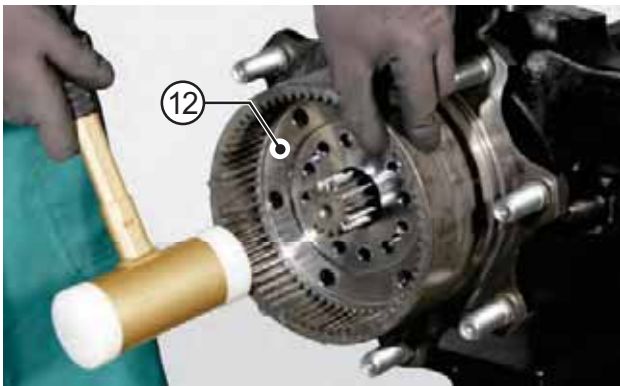
**WARNING**

Personal injury can result when installing snap ring. The appropriate safety equipment must be worn. To avoid injury to your eyes, wear protective glasses during this procedure.

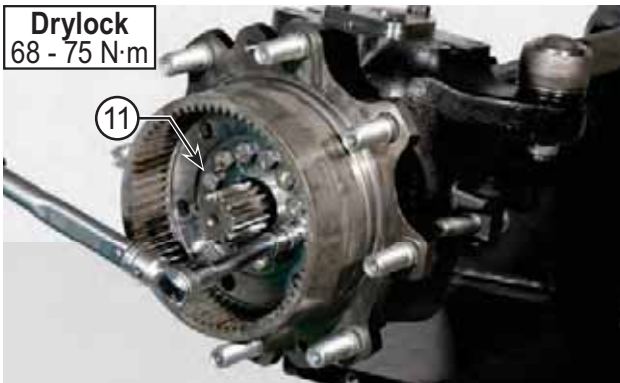
# ASSEMBLY



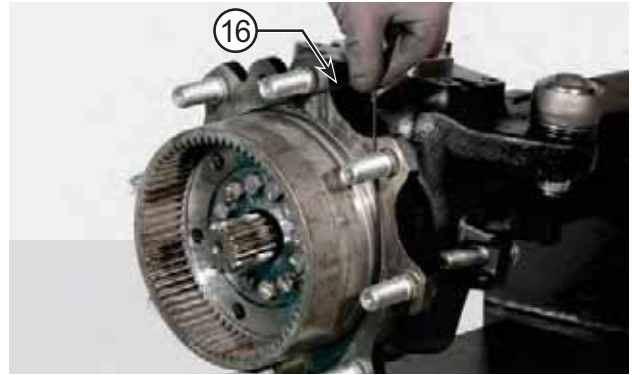
**FIGURE 24:** Match up the punch marks on the joint case and the crown wheel carrier flange.



**FIGURE 25:** Fit the complete crown flange (12). In order to fasten the flange (12), use a plastic hammer and alternately hammer on several equidistant points.



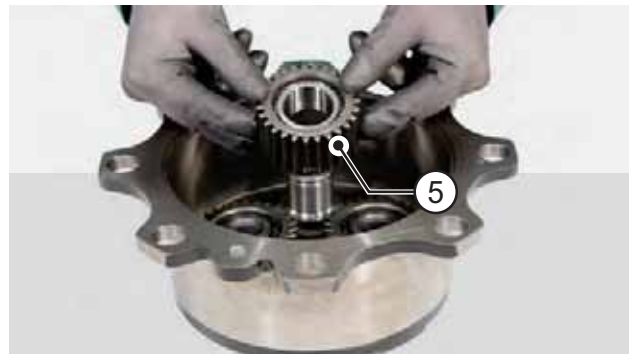
**FIGURE 26:** Coat the screws (11) with Loctite 243 and tighten them in two stages, using the criss-cross method. Final torque wrench setting: 68 - 75 N·m



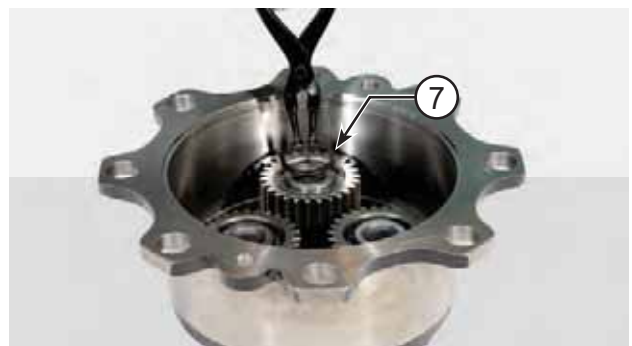
**FIGURE 27:** Insert a new o-ring (16) on the centering diameter of wheel hub.

**NOTE:**

In order to hold the o-ring (16) in position, apply grease to it.



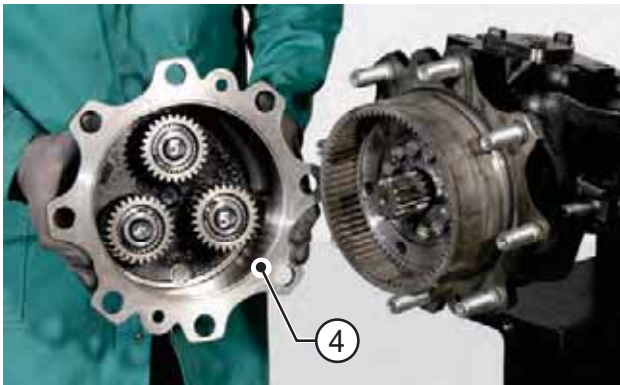
**FIGURE 28:** Fit the planetary gear (5) with bearing (6) onto the planetary gear cover (4). Using a drift, insert the planetary gears (5) into the cover (4).



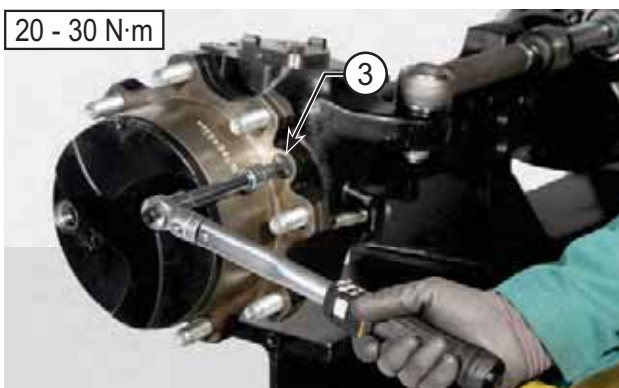
**FIGURE 29:** Lock into position the planetary gears (5) with the snap rings (7).

**⚠ WARNING**

Personal injury can result when installing snap ring. The appropriate safety equipment must be worn. To avoid injury to your eyes, wear protective glasses during this procedure.

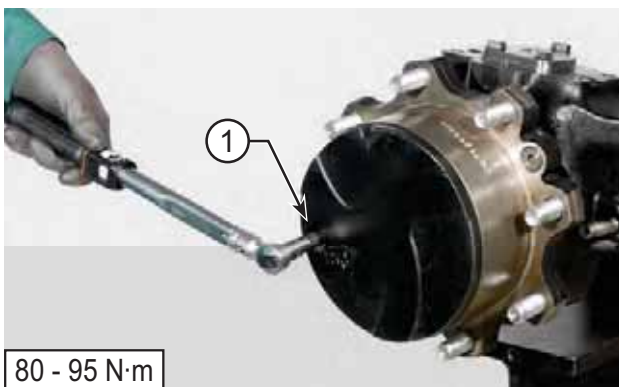


**FIGURE 30:** Fit the planetary carrier cover (2) onto the hub (3).



**FIGURE 31:** Lock the planetary carrier cover (4) by tightening the screws (3).

Torque wrench setting for screws: 20 - 30 N·m



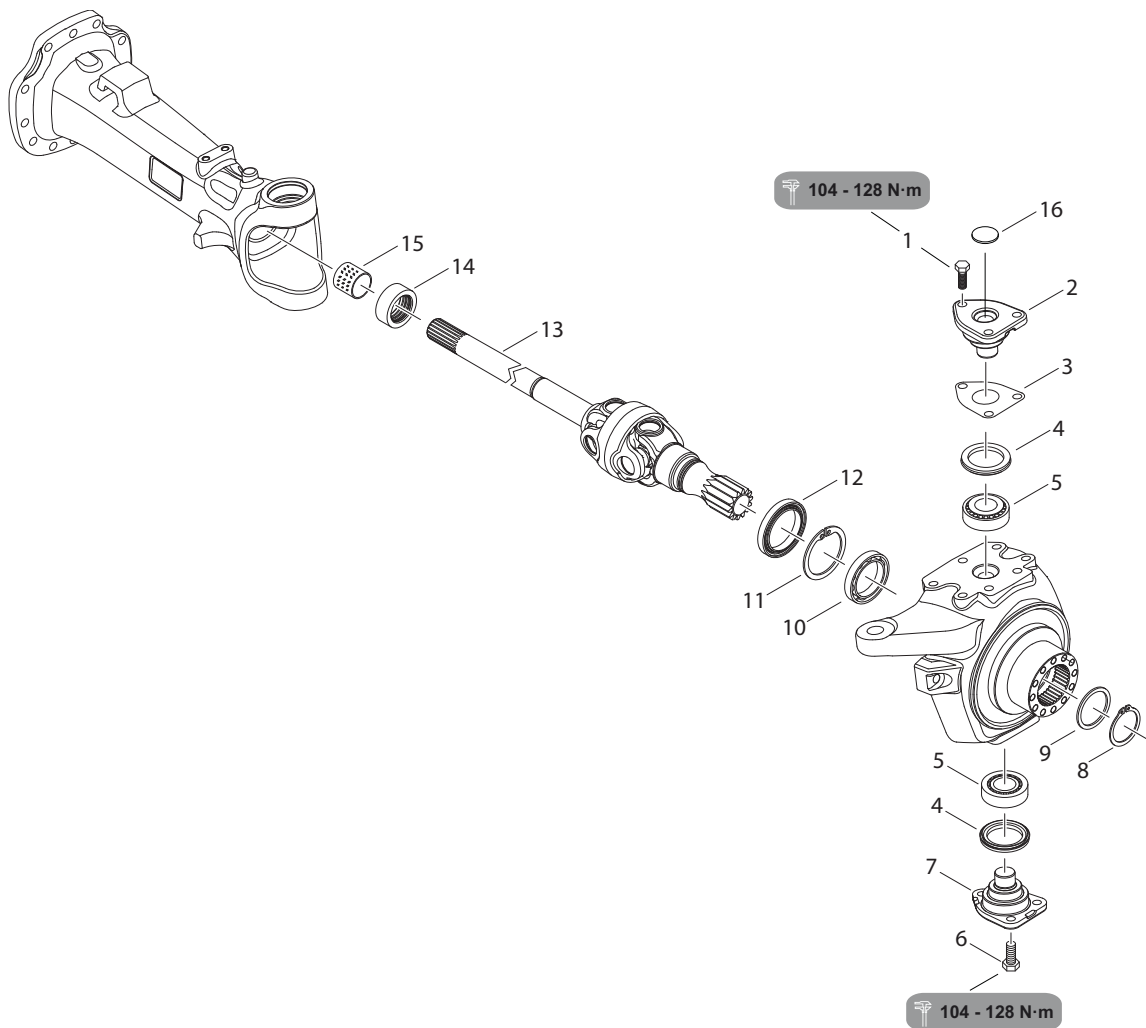
**FIGURE 32:** Install the oil level plug (1).

Torque wrench setting for screws: 80 - 95 N·m.



# STEERING KNUCKLE

## EXPLODED VIEW



# DISASSEMBLY

## DISASSEMBLY



**FIGURE 1:** Remove the complete crown flange.  
For details, see PLANETARY REDUCTION GEAR p. 15.



**FIGURE 2:** Remove the tie rod nuts.



**FIGURE 3:** Disconnect the tapered pins of the tie rod from the steering knuckle using a puller.



**FIGURE 4:** Loosen and remove the capscrews (1) from the kingpin (2).

**NOTE:**

**Screws cannot be re-used.**



**FIGURE 5:** Remove the upper kingpin (2) complete with front seal (4) and shims (3).



**FIGURE 6:** Loosen and remove the capscrews (6) from the kingpin (7).  
Remove the bottom kingpin (7).

**NOTE:**

**Screws cannot be re-used.**





**FIGURE 7:** Remove the bearing (5) from the knuckle post (2, 7).  
Remove the sealing ring (4) from the knuckle post (2, 7).



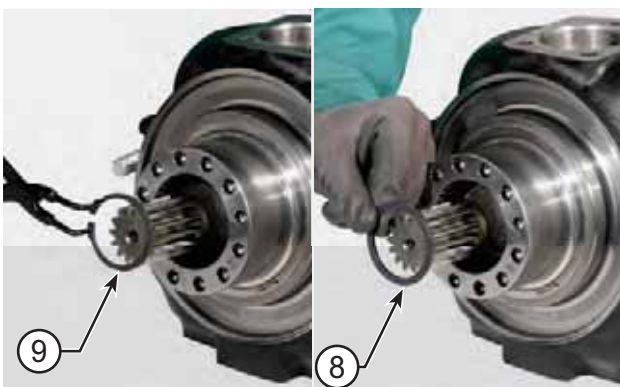
**FIGURE 10:** Remove the u-joint (13).



**FIGURE 8:** Remove the complete steering knuckle.



**FIGURE 11:** Using a puller, remove the sealing ring (12) from the steering knuckle.



**FIGURE 9:** Remove snap ring (8) and the shim (9) from the steering knuckle.

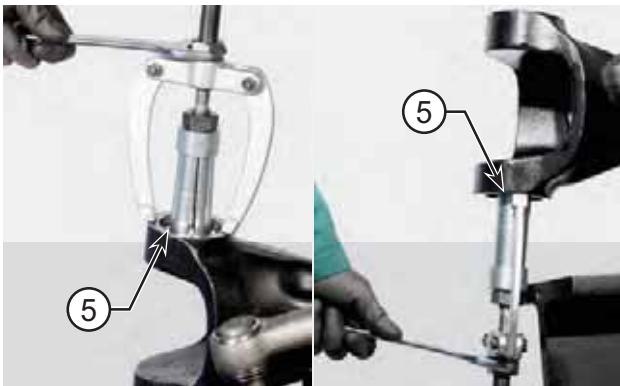


**FIGURE 12:** Remove the snap ring (11) from the steering knuckle.

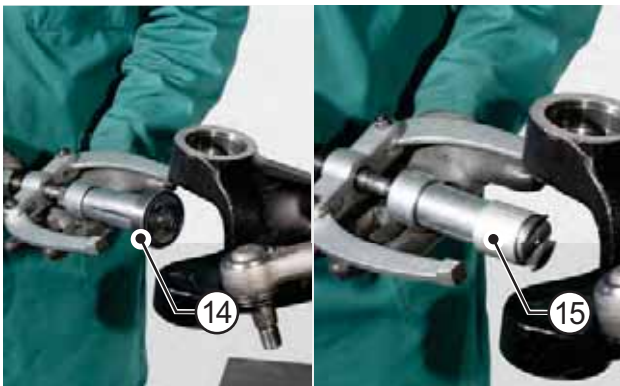
# DISASSEMBLY



**FIGURE 13:** Using a puller, remove the bearing (10) from the steering knuckle.



**FIGURE 14:** Using an extractor for inner parts, remove the top and bottom thrust blocks (5).

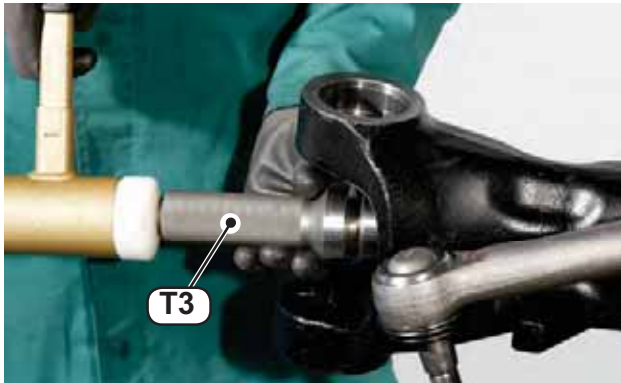


**FIGURE 15:** Using an extractor for inner parts, remove the seal ring (14) and subsequently the bushing (15).

**NOTE:**

**Write down the direction of assembly of seal ring.**  
**Write down the assembly side of the connection notch.**

## ASSEMBLY



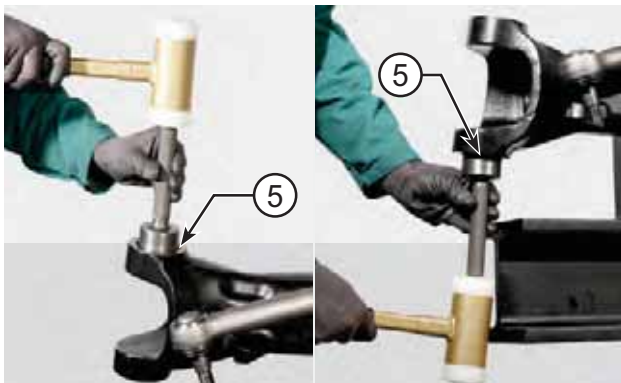
**FIGURE 16:** Lubricate the bushing (15) and the seat. Install the bushing (15), using tool T3 (See drawing T3 p. 68).



**FIGURE 17:** Lubricate and fit the sealing ring (14) onto tool T4 (See drawing T4 p. 69); install the rings into the arm.

### ⚠ CAUTION

Pay particular attention to the direction of assembly of the rings.



**FIGURE 18:** Lubricate the top and bottom thrust blocks (5) and fit them into the fulcrum holes of the arm.

### 📌 NOTE:

**Verify at end of stroke.**



**FIGURE 19:** Insert the bearing (10) in the steering knuckle.



**FIGURE 20:** Fit the snap ring (11) of the bearing (10). Carefully check that snap ring (11) is completely inserted

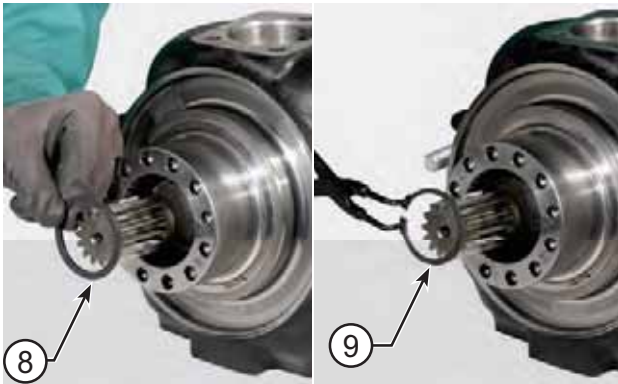


**FIGURE 21:** Lubricate the outer surface of the sealing ring (12) and assemble it into its position.

# ASSEMBLY



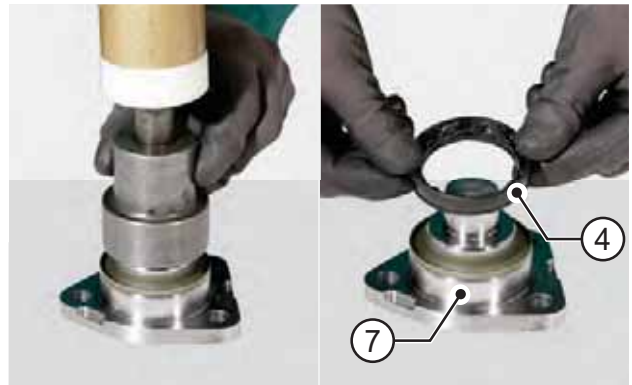
**FIGURE 22:** Lubricate the terminal of the u-joint (13) and install in the steering knuckle.



**FIGURE 23:** Install the shim (8) and snap ring (9) of the steering knuckle.



**FIGURE 24:** Tighten fully into the hole provided two double joint lifting eyes size M16, connect to suitable lifting gear and tighten. Pay attention not to damage the dust cover rings and the sealing rings. Install the steering knuckle.



**FIGURE 25:** Using a drift, insert the front seal thrust plate (4). Lubricate the surface of the sealing ring (4) and assemble it into position. Carefully check that the rings (4) are properly oriented.

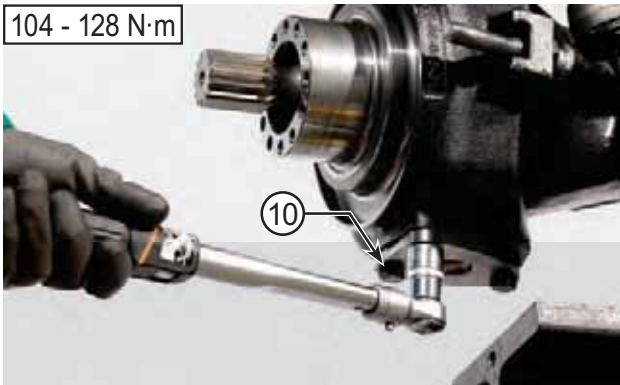


**FIGURE 26:** Install the bearing (5).



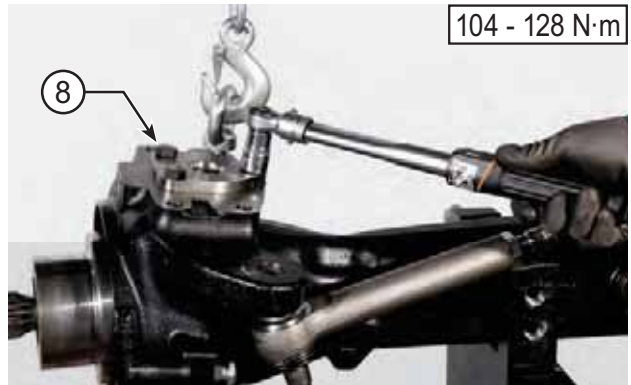
**FIGURE 27:** Grease generously the bearing (5) and the thrust block (5). Lubricate with OPTIMOIL grease the contact surfaces of the kingpin and steering knuckle.

104 - 128 N·m



**FIGURE 28:** Install the kingpin (7). Tighten the new cap screws (6) of bottom articulation pins in sequence using the criss-cross method. Torque wrench setting: 104 - 128 N·m.

104 - 128 N·m



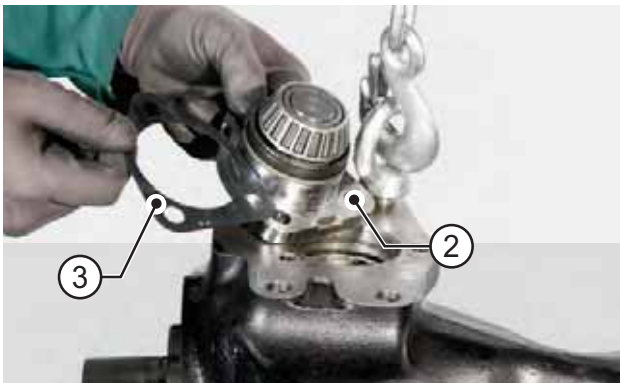
**FIGURE 31:** Tighten the new cap screws (1) of top kingpin (2) in sequence using the cross tightening method.



**FIGURE 29:** Install the bearing (5).



**FIGURE 32:** Position dial indicator, preset it to 1 mm and reset it to zero.



**FIGURE 30:** Prepare a series of shims (3) of 2,5 mm to be assembled above the upper kingpin (2).



**FIGURE 33:** Check the vertical gap using a lever.

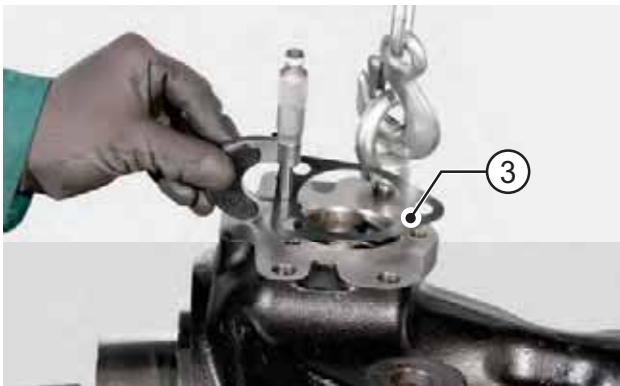
# ASSEMBLY



**FIGURE 34:** Loosen and remove the capscrews (1) from the kingpin (2).

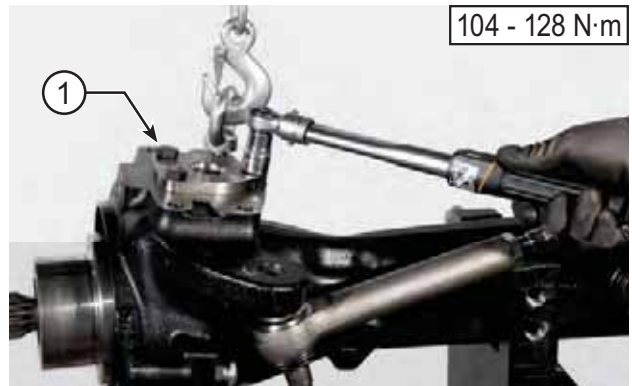


**FIGURE 37:** Grease generously the bearing (5) and the thrust block (5).



**FIGURE 35:** Calculate the difference between sizes “First step shim”, “Measured Backlash” and “Preload Draw” so as to obtain the size “S” of the shim (3) that will go under the king pin.

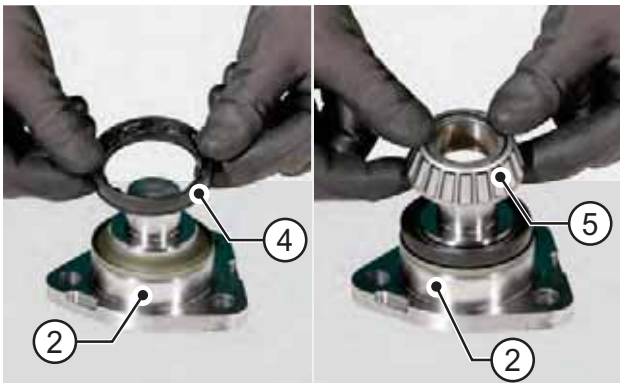
King pin Preload Draw = 0,5 - 0,6 mm  
 $S = \text{First step shim} - \text{Measured Backlash} - \text{Preload Draw} =$   
**EXAMPLE**  
 First step Shim = 2,5 mm  
 Measured Backlash = 1 mm  
 $S = 2,5 \text{ mm} - 1 \text{ mm} - 0,5 \text{ mm} = 1 \text{ mm}$



**FIGURE 38:** Tighten the new capscrews (1) of articulation pins (2) in sequence using the criss-cross method. Torque wrench setting: 104 - 128 N·m.



**FIGURE 39:** Install the tie rod nuts and lock into position using a torque wrench setting of 200 - 220 N·m.



**FIGURE 36:** Lubricate the surface of the sealing ring (4) and assemble it into position. Carefully check that the rings (4) are properly oriented. Install the bearing (5).

**⚠ CAUTION**  
 Check that rubber guards are intact.



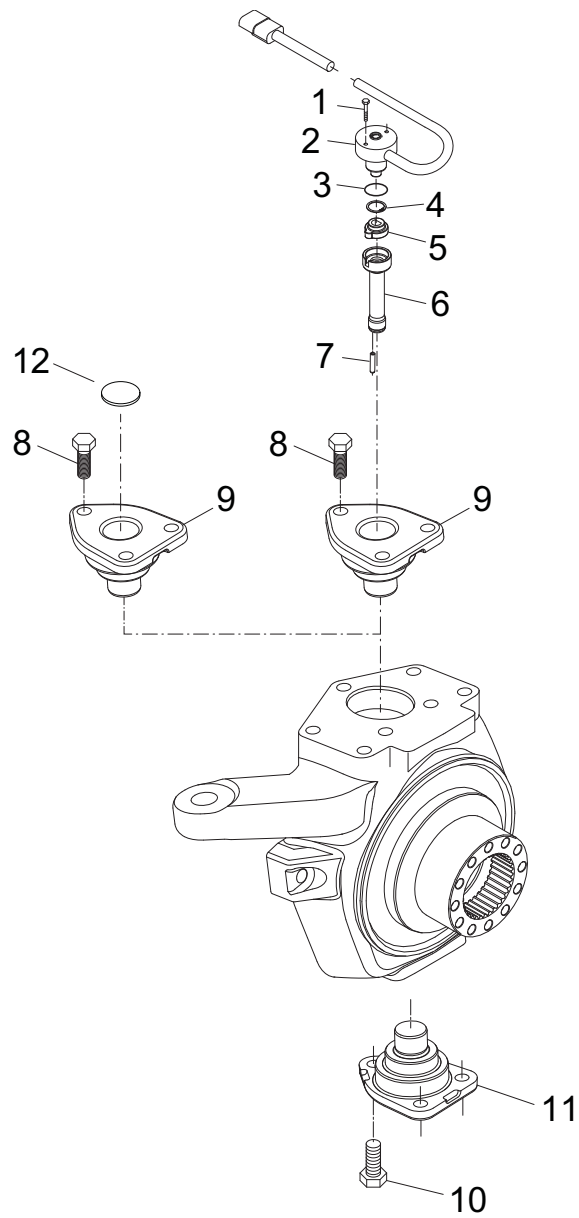
**FIGURE 40:** Fit the planetary gear cover onto the wheel hub.  
For details, see PLANETARY REDUCTION GEAR p. 15.





# STEERING SENSOR

## EXPLODED VIEW



# DISASSEMBLY

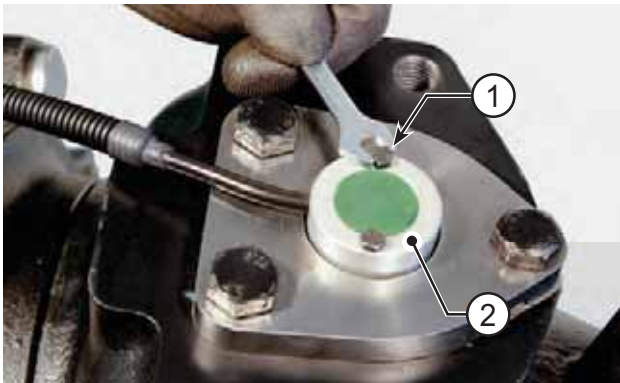
## DISASSEMBLY



**FIGURE 1:** Remove the tie rod nuts.



**FIGURE 2:** Disconnect the tapered pins of the tie rod from the steering knuckle using a puller.



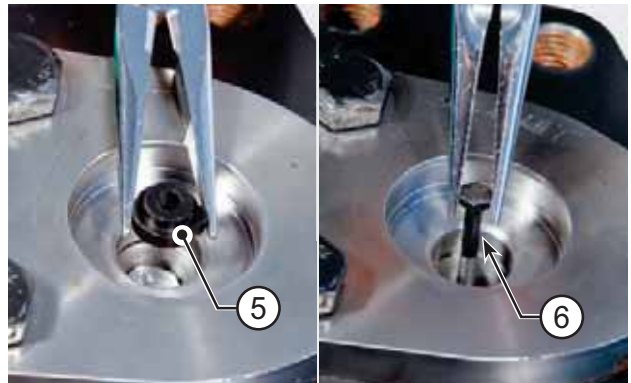
**FIGURE 3:** Remove the steering sensor (2).



**FIGURE 4:** Remove the o-ring (3).



**FIGURE 5:** Remove the snap ring (4).



**FIGURE 6:** Remove the drag shaft of the sensor (6) and the rubber joint (5).



**FIGURE 7:** Loosen and remove the capscrews (8) from the kingpin (9).

**NOTE:**

**Screws cannot be re-used.**



**FIGURE 10:** Remove the complete steering knuckle.



**FIGURE 8:** Remove the upper kingpin (9) complete with front seal ring and shims.



**FIGURE 11:** Remove the pin (7).



**FIGURE 9:** Loosen and remove the capscrews (10) from the kingpin (11).  
Remove the bottom kingpin (11).

**NOTE:**

**Screws cannot be re-used.**

# ASSEMBLY

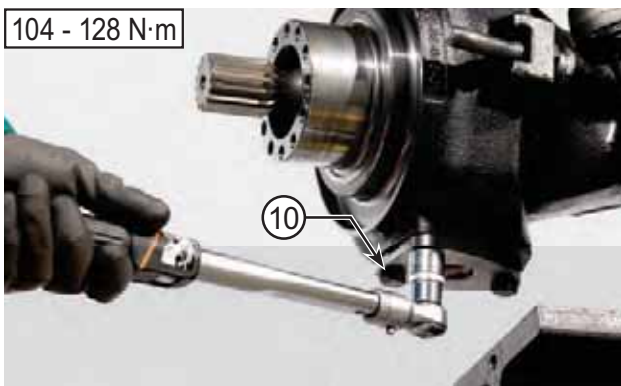
## ASSEMBLY



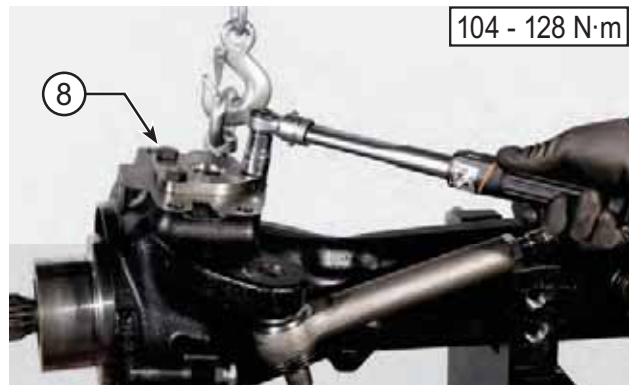
**FIGURE 12:** Insert the pin (7) in its seat.



**FIGURE 13:** Tighten fully into the hole provided two double joint lifting eyes size M16, connect to suitable lifting gear and tighten.  
Pay attention not to damage the dust cover rings and the sealing rings. Install the steering knuckle.



**FIGURE 14:** Install the kingpin (11).  
Tighten the new capscrews (10) of bottom articulation pins in sequence using the criss-cross method.  
Torque wrench setting: 104 - 128 N·m.



**FIGURE 15:** Install the kingpin (9).  
Tighten the new capscrews (8) of top kingpin (9) in sequence using the cross tightening method.  
Torque wrench setting: 104 - 128 N·m.



**FIGURE 16:** FOR MODELS WITHOUT SENSOR  
Remove the cap (12) before installing sensor.



**FIGURE 17:** Insert the kingpins in the steering knuckle and lock into position using a torque wrench setting of 200 - 220 N·m.

**⚠ CAUTION**

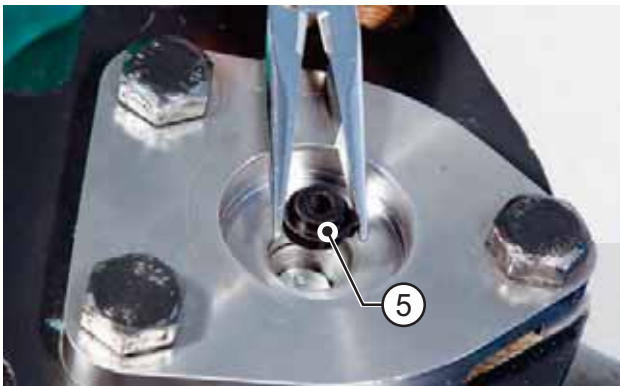
Check that rubber guards are intact.



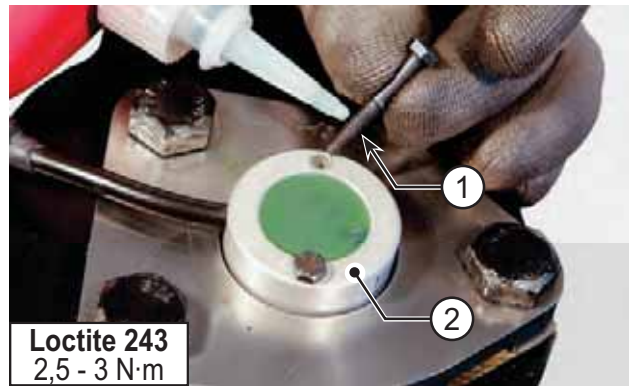
**FIGURE 18:** Lubricate and insert the sensor pin (6).



**FIGURE 21:** Place the sensor's o-ring (3).



**FIGURE 19:** Insert the rubber joint (5).



**FIGURE 22:** Apply Loctite 243 to the screws (1) and tighten. Fasten the sensor (2) in position, tightening the screws (1) to 2,5 - 3 N·m.



**FIGURE 20:** Install the snap ring (4).

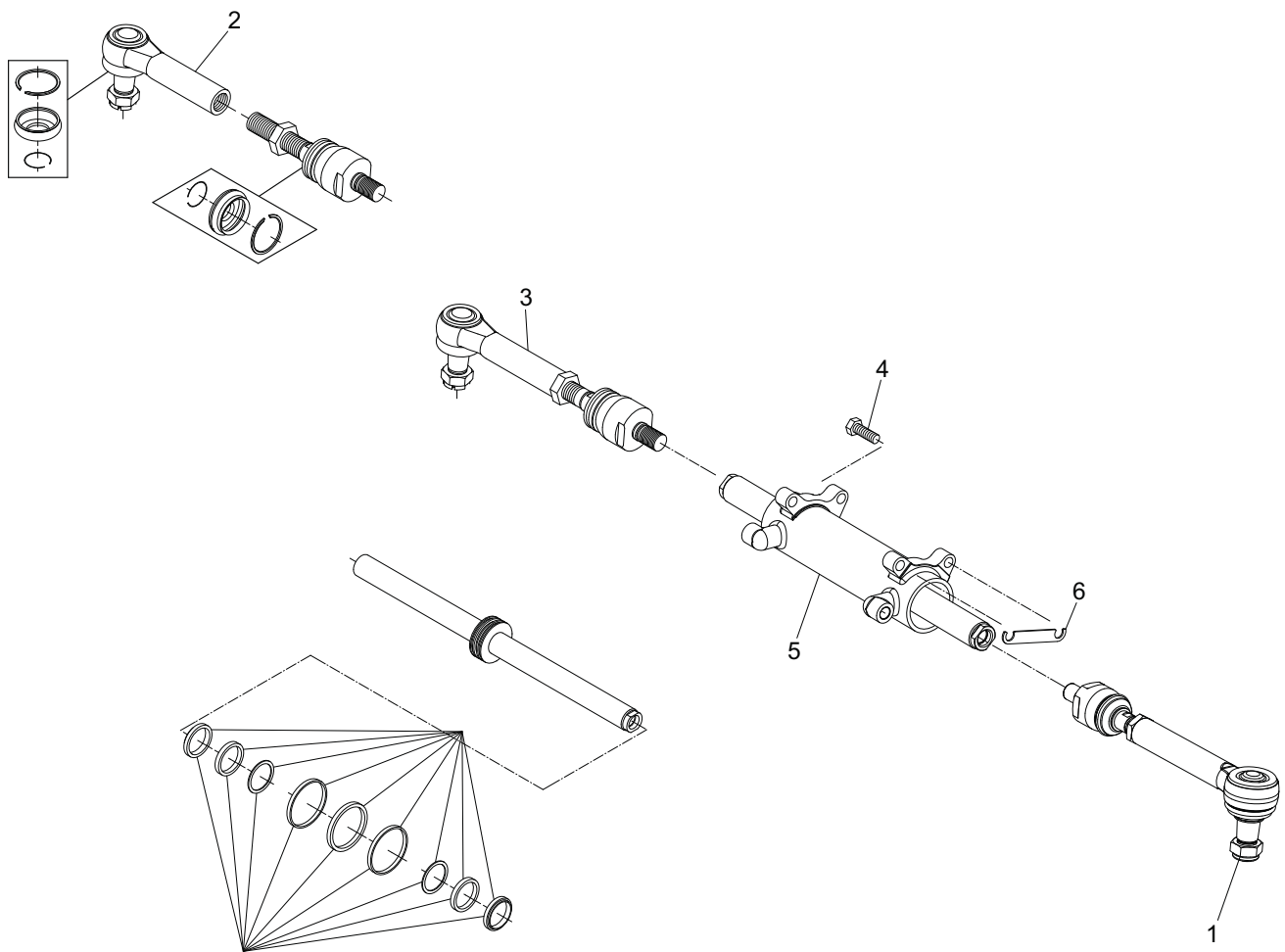
**NOTE:**

**Make sure that the ring is properly set in its seat.**



# STEERING CYLINDER

## EXPLODED VIEW



# DISASSEMBLY

## DISASSEMBLY



**FIGURE 1:** Remove the nuts (1) that lock the tie rods.



**FIGURE 2:** Disconnect the tapered pins of the tie rods (2) from the steering knuckle using a puller.



**FIGURE 3:** Disconnect steering bars (3) from the piston.



**FIGURE 4:** Remove the securing screws (4) from the steering cylinder.



**FIGURE 5:** Extract the cylinder (5) using a plastic hammer.

### **⚠ CAUTION**

Before attempting to disassemble the unit, drain the oil in the cylinder chambers completely.



**FIGURE 6:** Remove the snap ring of the cylinder head.





**FIGURE 7:** Hammer the piston on the rear of the head using a plastic hammer. Continue hammering until the head is ejected from the cylinder.



**FIGURE 8:** Remove the snap ring of the cylinder head.



**FIGURE 9:** Continue hammering until the head is ejected from the cylinder.



**FIGURE 10:** Remove all seals, anti-extrusion rings, and scraper rings from head, cylinder, and piston.

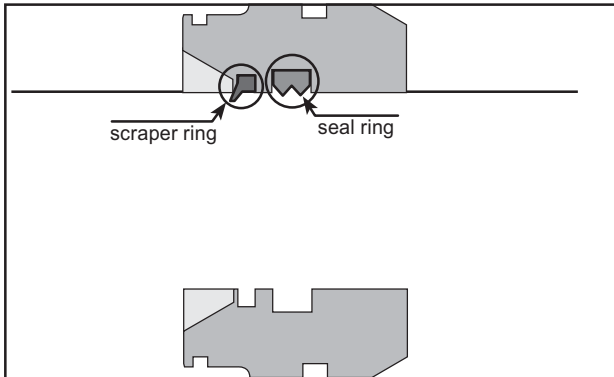
**NOTE:**

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

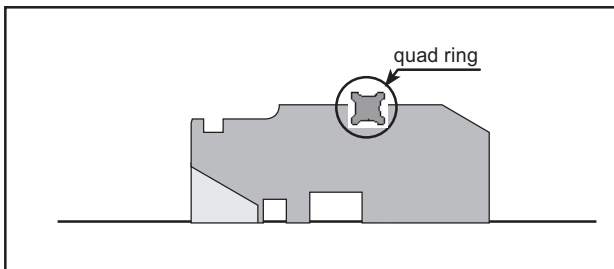
Particular attention must be paid not to damage the seats of both seals and piston slide.

# ASSEMBLY

## ASSEMBLY



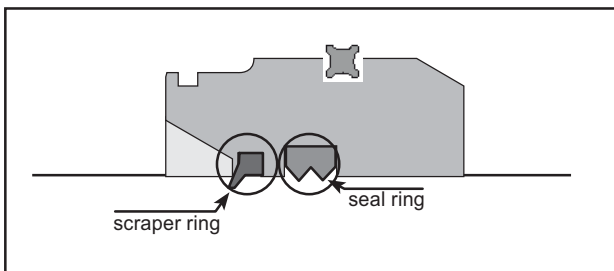
**FIGURE 11:** After applying grease, install the sealing ring of the shaft, the scraper ring, and the guide ring in the head.



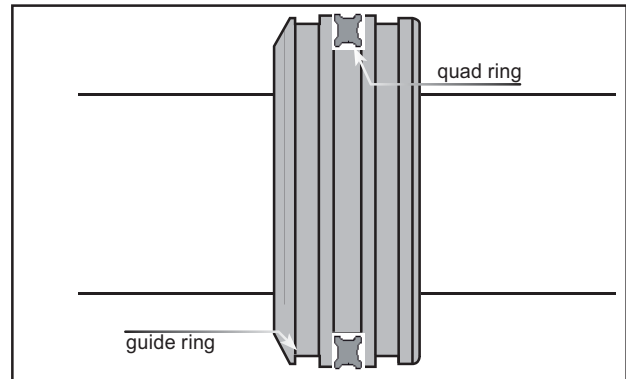
**FIGURE 12:** Fit the seal and the backup ring onto the outside of the head.

### ⚠ CAUTION

- 1 - In order to facilitate assembly, apply grease to the outer surface of the piston.
- 2 - Do not roll the seal up.
- 3 - Thoroughly check that positioning of the backup ring is correct.



**FIGURE 13:** After applying grease, install the sealing ring of the shaft and the scraper ring in the head.



**FIGURE 14:** Prepare the piston by fitting it with the o-ring and the seal.

### ⚠ CAUTION

In order to facilitate assembly, apply grease.



**FIGURE 15:** Apply grease to head seals, fit the head onto the piston and push it into the cylinder using a plastic hammer. Introduce the stop ring and ensure that it sets in the seat of cylinder.

### 🔧 NOTE:

**Insert the head to line it up with the edge of the cylinder.**



**FIGURE 16:** Push the piston into the cylinder using a plastic hammer.

### 🔧 NOTE:

**Apply a little grease to seals and cylinder.**



**FIGURE 17:** Lightly tap the cylinder head with a plastic hammer to push it inside the cylinder

**NOTE:**

**Insert the head to line it up with the edge of the cylinder.**



**FIGURE 18:** Introduce the stop ring and ensure that it sets in the seat of cylinder.



**FIGURE 19:** Fit the steering cylinder (5) into its seat.



**FIGURE 20:** Lock the cylinder (5) screws (4) using the criss-cross method.  
Apply Loctite 243 to the thread.  
Torque wrench setting: 240 - 270 N·m



**FIGURE 21:** Install the predefined quote shim (6) (0,3 mm) in its seat, as shown in figure.

**⚠ CAUTION**

Do not install the shim (6) if the gap between steering cylinder and arm is less than the shim (0,3 mm).

# ASSEMBLY



**Loctite 243**  
240 - 270 N·m

**FIGURE 22:** Lock the cylinder (5) screws (4) using the criss-cross method.  
Apply Loctite 243 to the thread.  
Torque wrench setting: 240 - 270 N·m



**FIGURE 25:** Center the piston by slowly moving it first in one direction then in the other and position it half way on the stroke.



**Loctite 270**  
240 - 270 N·m

**FIGURE 23:** Apply LOCTITE 270 to the thread and connect the steering bars (3) by tightening the terminals onto the piston stem.  
Torque wrench setting: 240 - 270 N·m



**FIGURE 26:** Apply tools T5 (See drawing T5 p. 70) to the hubs and lock them.  
Using a level, check that tools are perfectly flat.



200 - 220 N·m

**FIGURE 24:** Insert the pins (2) in the steering case and lock into position using a torque wrench setting of 200 - 220 N·m.



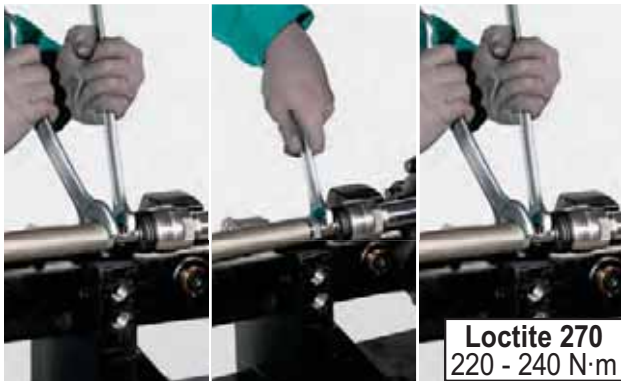
**FIGURE 27:** Without moving the piston, check front and rear distance at the edge of tools.  
Max. difference: = 2 mm

**NOTE:**

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

**CAUTION**

Check that rubber guards are intact.



**FIGURE 28: CONVERGENCY ADJUSTMENT**

Loosen the nuts and tighten them onto the ball-and-socket joints. Hold the articulations still and rotate the ball-and-socket joints. Once the convergency has been adjusted, lock the nuts.

Torque wrench setting for nuts: 220 - 240 N·m

**NOTE:**

**Adjust by the same amount on each steering rod.**



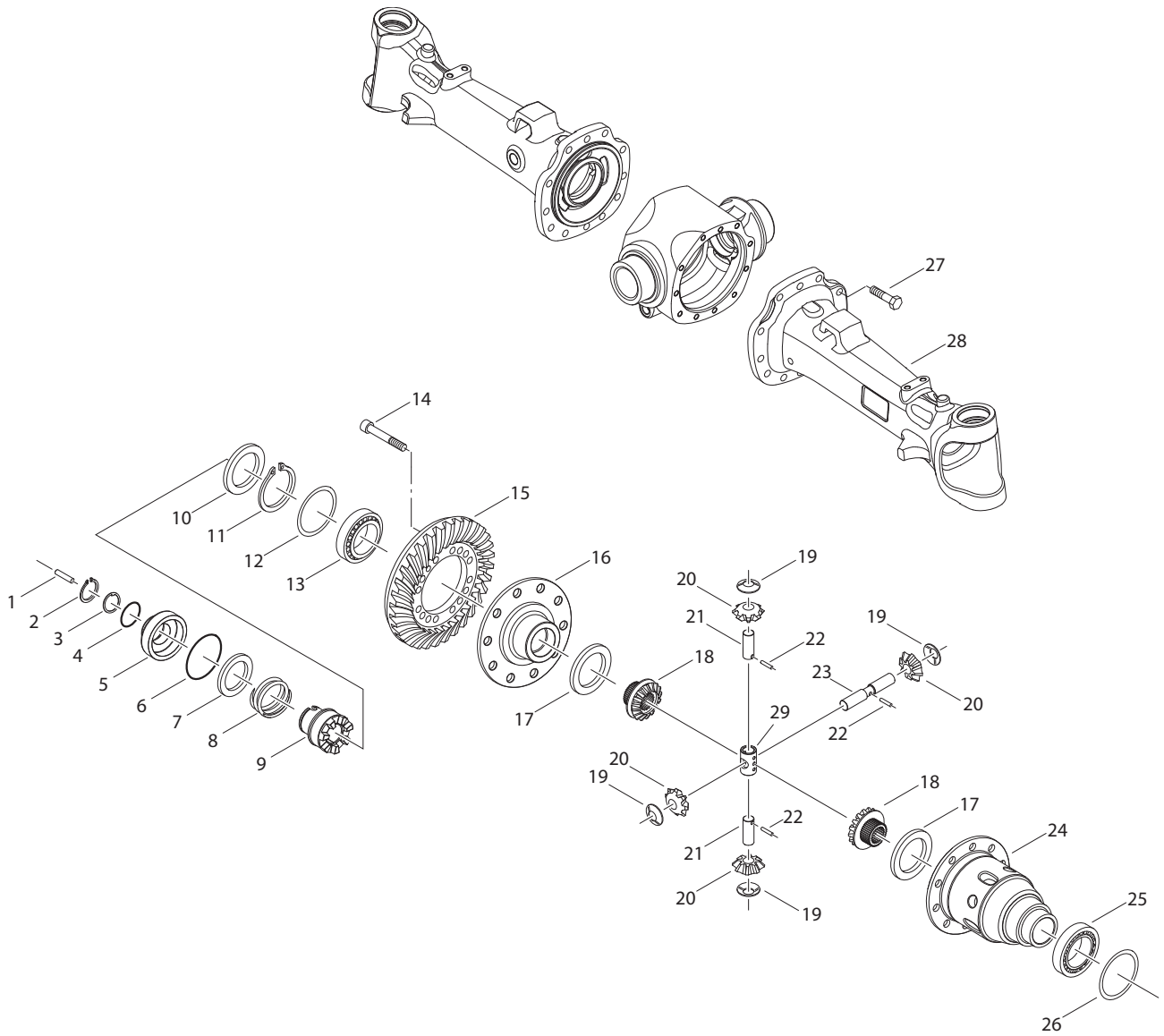
**FIGURE 29: ADJUSTING THE STEERING ANGLE**

Insert the end stroke screws and adjust to 59 mm.



# DIFFERENTIAL

## EXPLODED VIEW



# DISASSEMBLY

## DISASSEMBLY



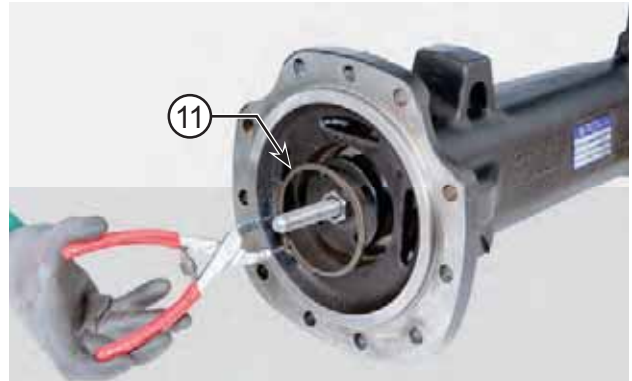
**FIGURE 1:** Connect a suitable lifting system. Loosen and remove the screws (27) securing the arm to the body. Remove the arm.



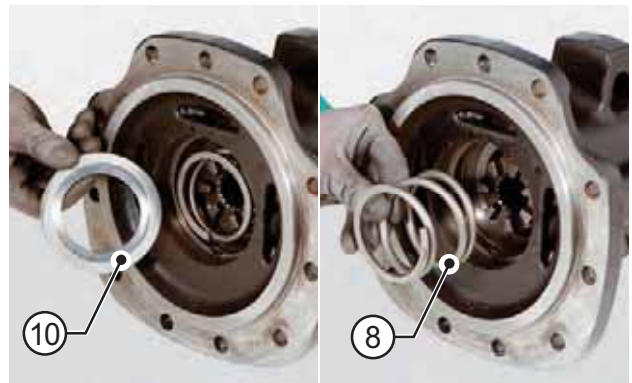
**FIGURE 2:** Insert an M14 threaded rod in the arm correlated with a swab from the appropriate diameter and a hard stop.



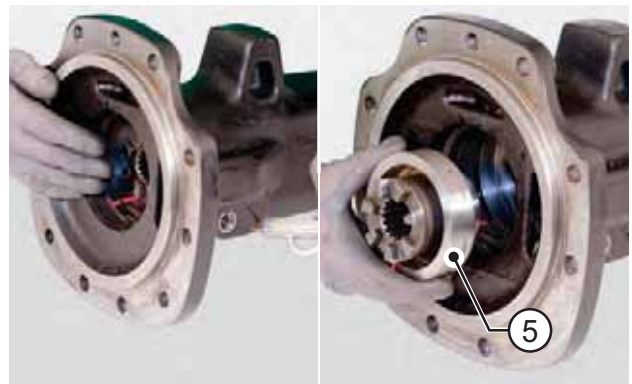
**FIGURE 3:** By acting on the buffer spring guide sleeve (10), tighten the nuts on the threaded rod, compressing the spring (8).



**FIGURE 4:** Remove the snap ring (11) and slowly loosen the nuts.



**FIGURE 5:** Remove the spring guide sleeve (10) and the piston return spring (8).

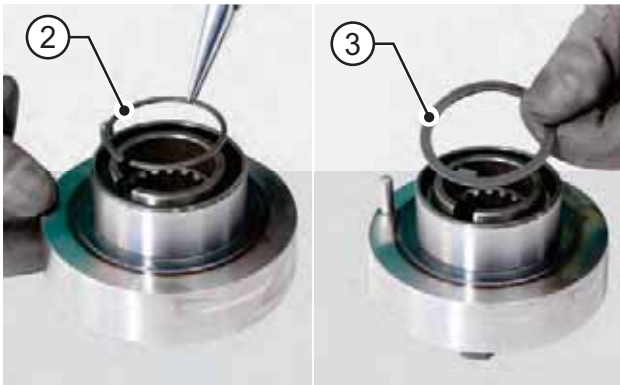


**FIGURE 6:** Note the position of assembly. Slowly introduce compressed air via the differential lock inlet to extract the piston (5).

### CAUTION

This operation is potentially dangerous. Retain the piston as it may be expelled rapidly and damaged.





**FIGURE 7:** Using a screwdriver, remove the stop ring (2) and the spacer (3).



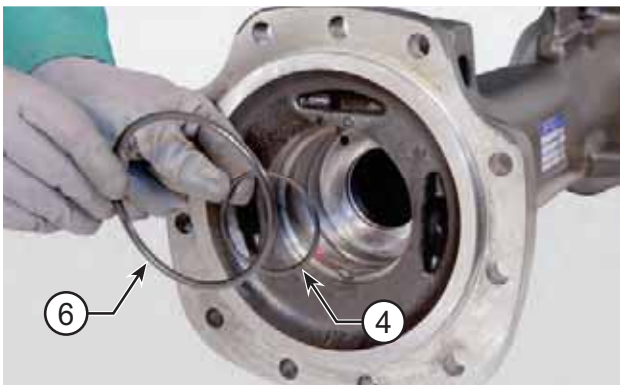
**FIGURE 10:** Extract the whole differential unit.



**FIGURE 8:** Remove the sleeve (9) and the relative ring (7).



**FIGURE 11:** Extract the bearings (13, 25) from the differential carrier.



**FIGURE 9:** Remove rings (4, 6) from cylinder.

**NOTE:**

- 1 - All seals must be replaced every time the unit is disassembled.
- 2 - Particular attention must be paid not to damage the seats of both seals and piston slide.

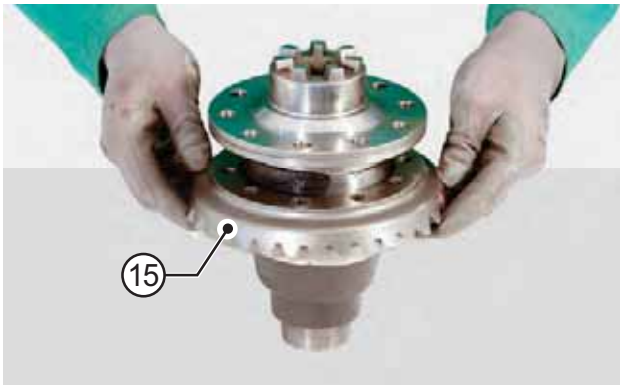
**CAUTION**

If disassembly is carried out in order to replace crown wheel and pinion, bearings, or planetary gear, break up distance washers and calculate clearances as indicated in the sections regarding removal, disassembly, assembly and installation of differential unit and bevel pinion.



**FIGURE 12:** Remove the capscrews (14) of the crown (15). Note the position of assembly.

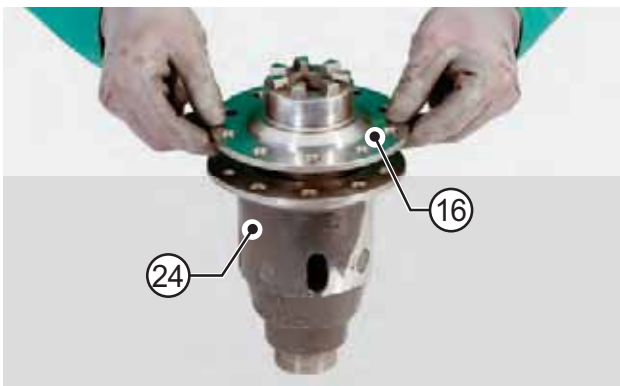
# DISASSEMBLY



**FIGURE 13:** Using a punch, remove the crown (15).



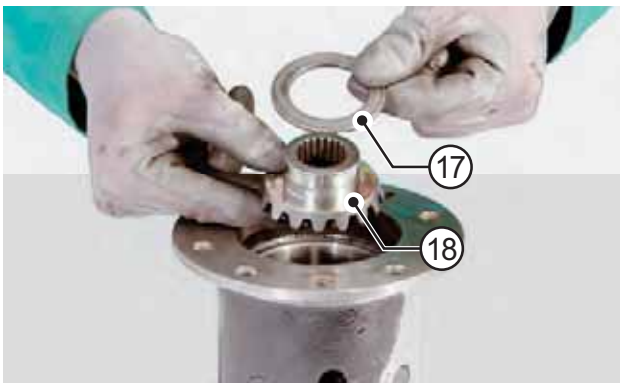
**FIGURE 16:** Remove the three spider blocking pins (22) by using a pin driver.



**FIGURE 14:** Using a plastic hammer, take the half box (16, 24) to pieces.



**FIGURE 17:** Move the two opposite mounted short bolts (21) to the outside of the box using the same pin driver.



**FIGURE 15:** Remove the shim washer (17) and the planetary gear (18).



**FIGURE 18:** Remove the bolts (21) with the help of a drift.



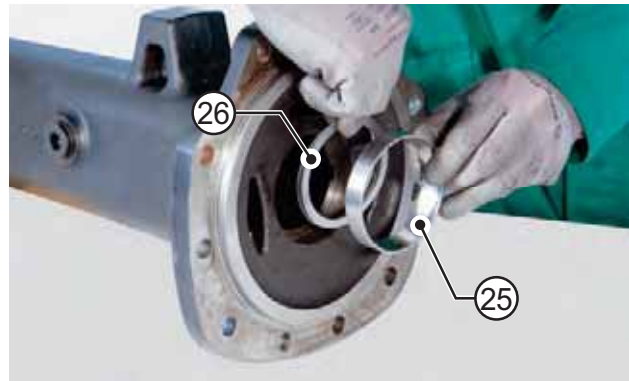
**FIGURE 19:** Remove the cross bolts (29).



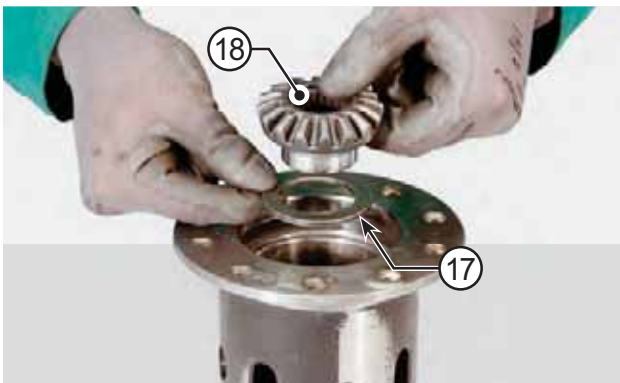
**FIGURE 22:** Connect a suitable lifting system. Loosen and remove the screws (27) securing the arm to the body. Remove the arm.



**FIGURE 20:** Remove the two half bolts (21), spherical washers (19) and satellite wheels (20).



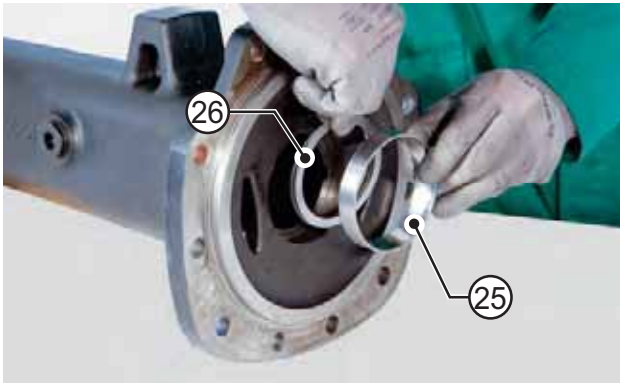
**FIGURE 23:** By means of a puller, remove the thrust block of the bearing (25). Remove the shims (26) located under the outer thrust block of the bearing (25).



**FIGURE 21:** Remove the shim washer (17) and the planetary gear (18).

# ASSEMBLY

## ASSEMBLY



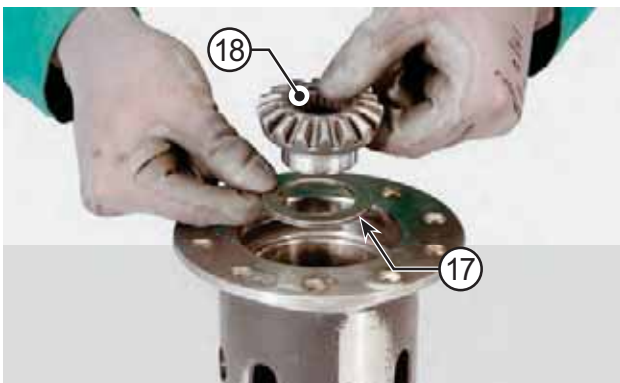
**FIGURE 24:** Insert the thrust block (25) and the shims (26).

### **NOTE:**

For the regulation of the pre-charge bearings, use the original shims pack distance.



**FIGURE 25:** Insert a new o-ring on the centering diameter of the arm.  
Position the arm on the central body.  
Tighten nuts (27) in two stages, using the criss-cross method.



**FIGURE 26:** Insert planetary gear (18) together with washer (17).



**FIGURE 27:** Insert the two half bolts (21), spherical washers (19) and satellite gears (20).



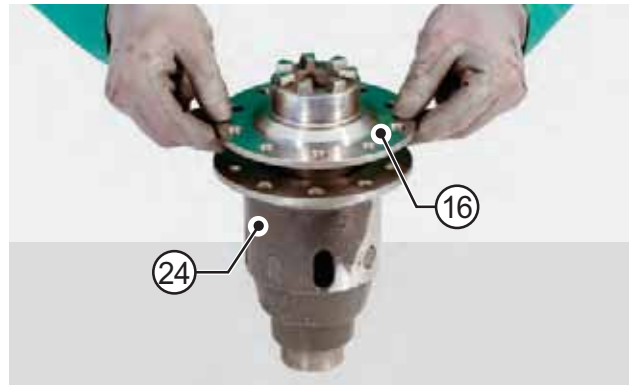
**FIGURE 28:** Partially insert the long bolt (23), satellite gears (20), and spherical washers (19).



**FIGURE 29:** Insert the crossbolt (29) in the correct position.



**FIGURE 30:** Satellite gears (20), spherical washers (19) and completely insert the long bolt (23).



**FIGURE 33:** Mount the locking half-box (16) onto the half-box (24).



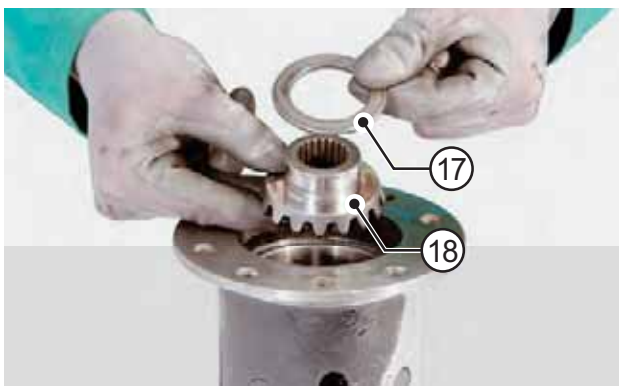
**FIGURE 31:** Bring the pin holes in line with the help of a pin-driver. Insert pins (22) to end of stroke.



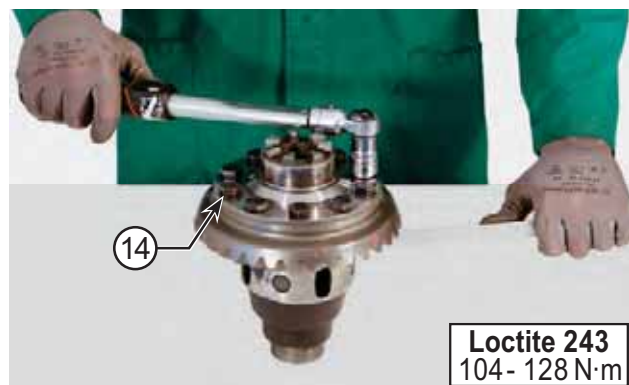
**FIGURE 34:** Position the crown (15) on the differential carrier and lock it with screws (14).

**NOTE:**

Secure the screws using the criss-cross method.

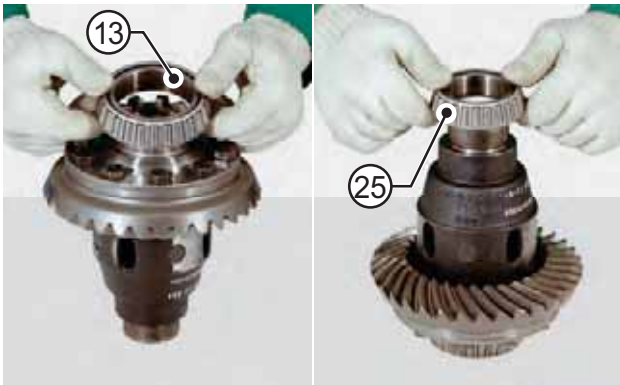


**FIGURE 32:** Insert planetary gear (18) together with washer (17).



**FIGURE 35:** Use only new screws (14) pre-treated with locking adhesive. Torque wrench setting: 104 - 128 N·m.

# ASSEMBLY



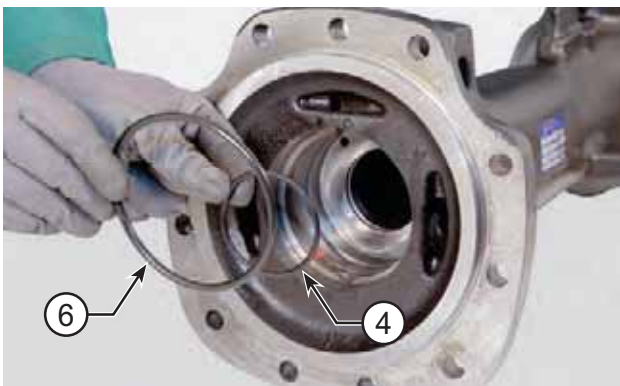
**FIGURE 36:** Heat the bearings (13, 25) to about 100°C and fit it to the differential box (16, 24).

**NOTE:**

Once the bearing has cooled down, lightly lubricate bearing (13, 25) with SAE85W90 oil.



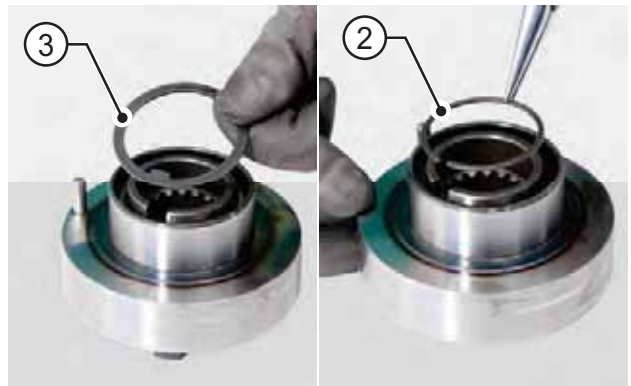
**FIGURE 37:** Install the whole differential unit.



**FIGURE 38:** After applying grease, install the o-ring (4, 6) inside the cylinder.



**FIGURE 39:** Fit in position the sleeve (9) complete with ring (7).



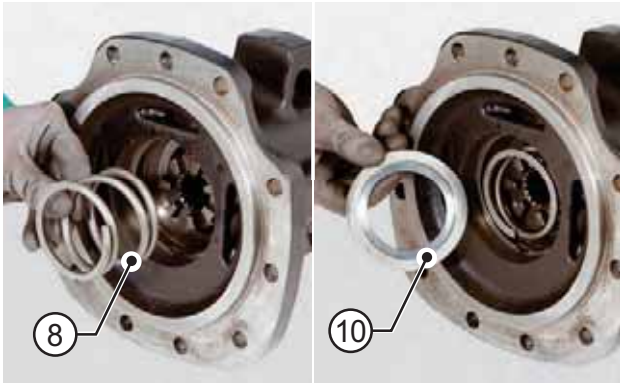
**FIGURE 40:** Fit in position the spacer (3) complete with stop rings (2).

**NOTE:**

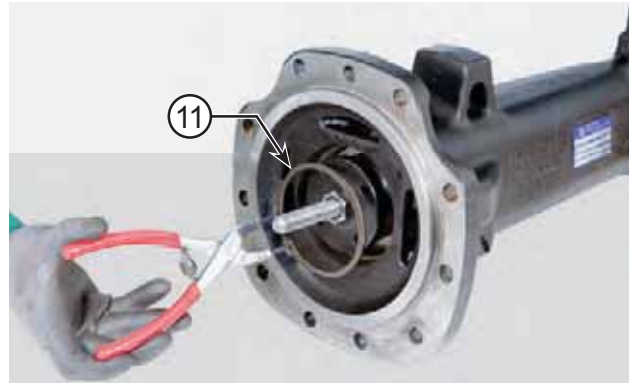
make sure the ring is inserted completely.



**FIGURE 41:** Lubricate the piston seating. Install the piston pack. Tap lightly with a mallet to seat the piston (5) completely. Mind the position of assembly.



**FIGURE 42:** Position the spring (8).  
Fit the spring guide sleeve (10) on the spring (8).



**FIGURE 45:** Insert the snap ring (11) and slowly loosen the nuts.



**FIGURE 43:** Insert an M14 threaded rod in the arm correlated with a swab from the appropriate diameter and a hard stop.



**FIGURE 46:** Insert a new o-ring on the centering diameter of the arm.  
Position the arm on the central body.  
Tighten nuts (27) in two stages, using the criss-cross method.



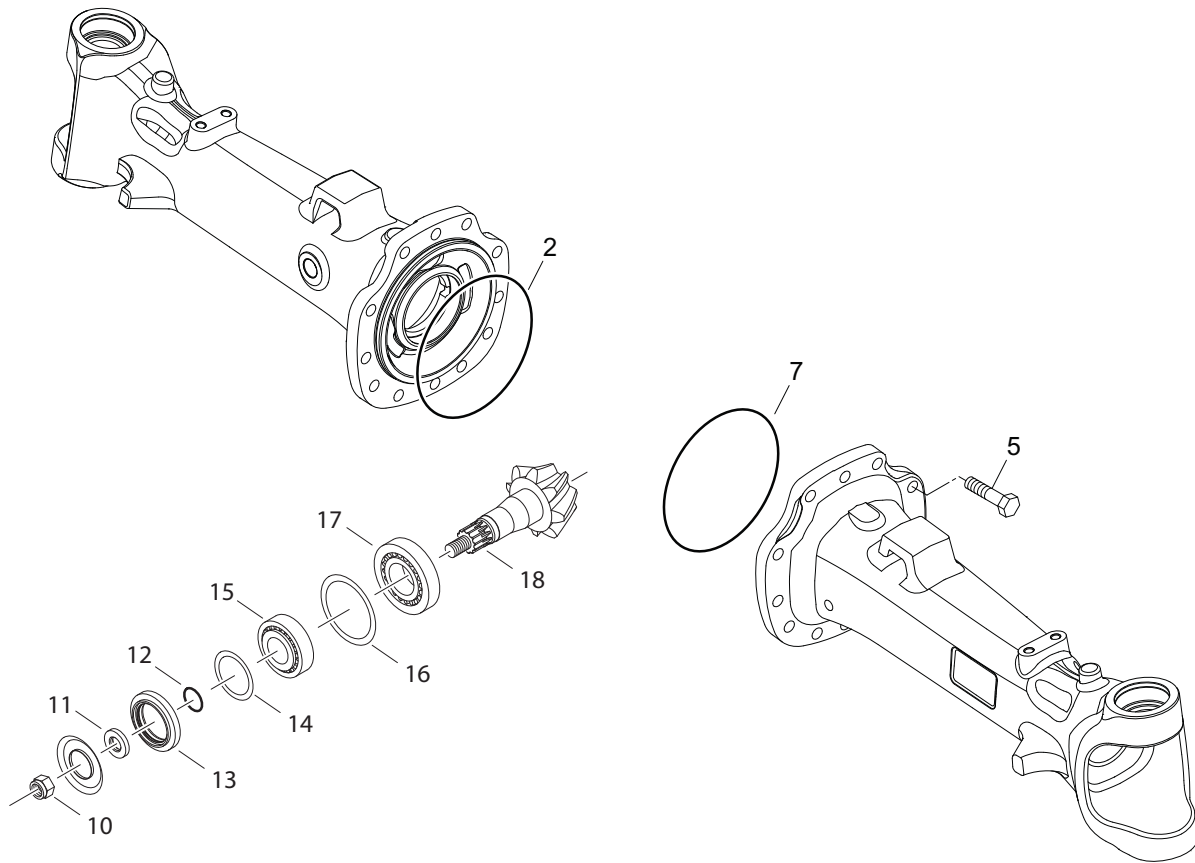
**FIGURE 44:** By acting on the buffer spring guide sleeve (10), tighten the nuts on the threaded rod, compressing the spring (8).





# BEVEL PINION

## EXPLODED VIEW

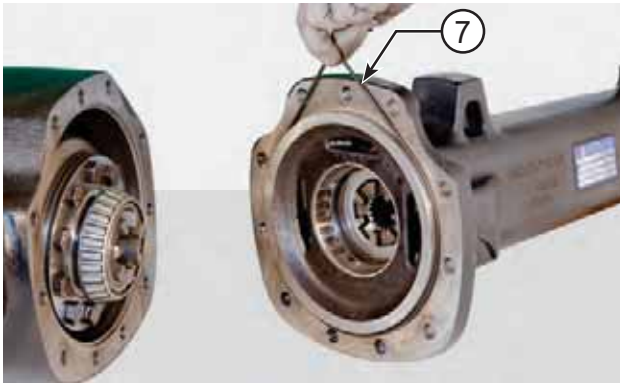


# DISASSEMBLY

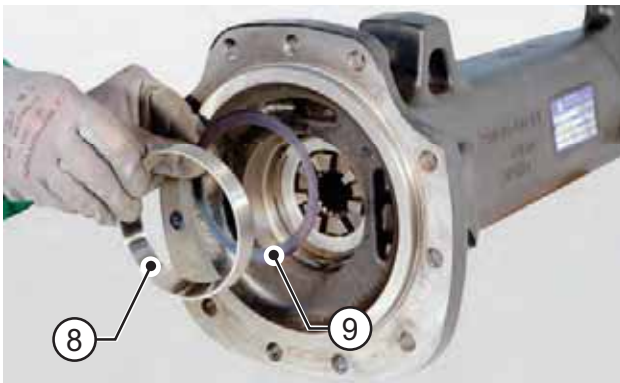
## DISASSEMBLY



**FIGURE 1:** Connect a suitable lifting system. Loosen and remove the screws (5) securing the arm to the body. Remove the arm.



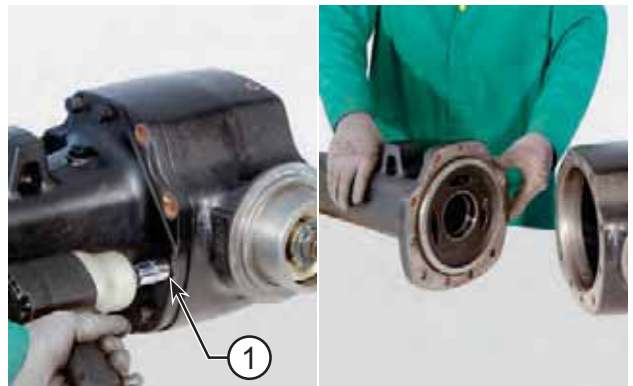
**FIGURE 2:** Use a screwdriver to remove the o-ring (7).



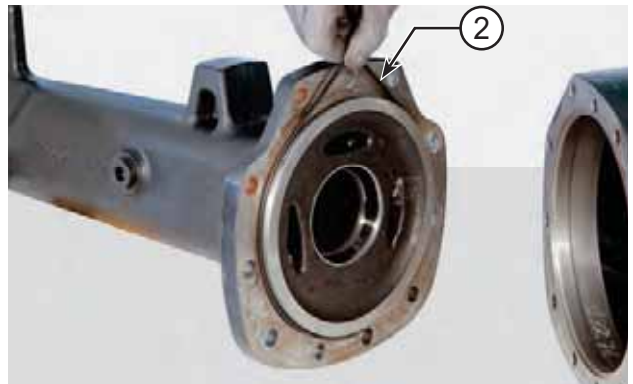
**FIGURE 3:** By means of a puller, remove the thrust block of the bearing (8) from the arm. Remove the shims (9) located under the outer thrust block of the bearing (8).



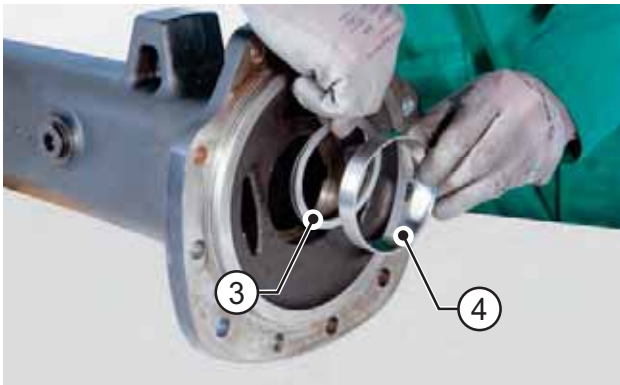
**FIGURE 4:** Extract the whole differential unit.



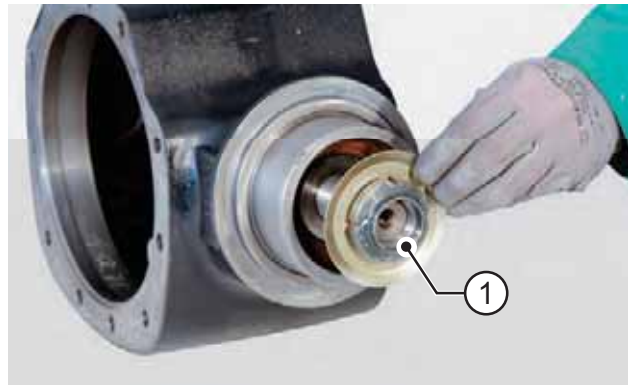
**FIGURE 5:** Connect a suitable lifting system. Loosen and remove the screws (1) securing the arm to the body. Remove the arm.



**FIGURE 6:** Use a screwdriver to remove the o-ring (2).



**FIGURE 7:** By means of a puller, remove the thrust block of the bearing (4) from the arm. Remove the shims (3) located under the outer thrust block of the bearing (4).



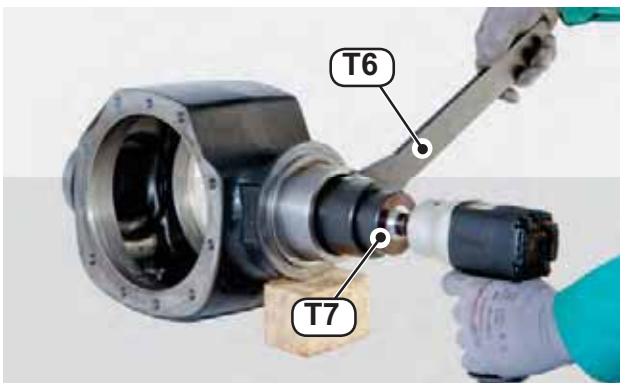
**FIGURE 10:** Do not reuse the used ring nut (10).



**FIGURE 8:** Remove the calking in order to preserve the screw cutting of the pinion during the ring nut (10) removal.



**FIGURE 11:** Remove spacer (11) and shims (14).



**FIGURE 9:** Position wrench T6 (See drawing T6 p. 71) onto the ring nut (3) and apply bar hold T7 (See drawing T7 p. 72) to the pinion (13). Stop wrench T6 (See drawing T6 p. 71) and rotate the pinion so as to release and remove the ring nut (3).



**FIGURE 12:** Use a screwdriver to remove the o-ring (12).

**NOTE:**

**If disassembly proves awkward, weld the ring nut at approximately 80 C°.**

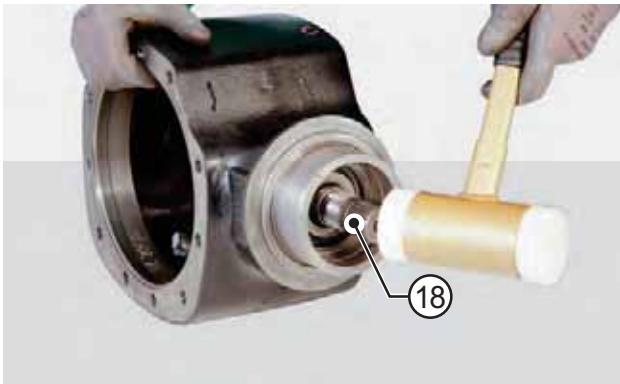
# DISASSEMBLY



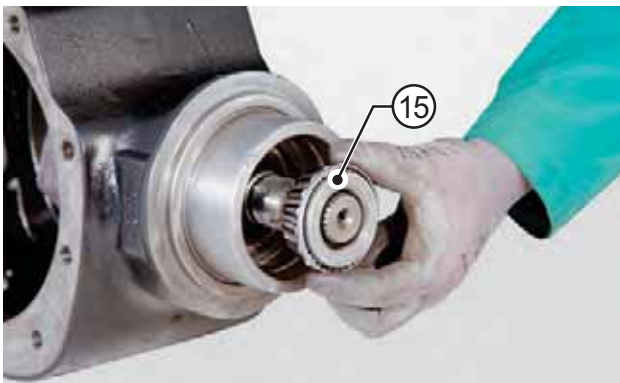
**FIGURE 13:** Using an internal extractor, remove the seal ring (13).

## CAUTION

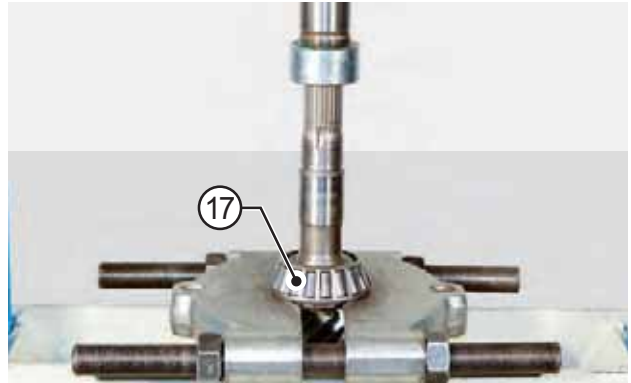
Take care not to damage the seal ring seating.



**FIGURE 14:** Using a plastic hammer, remove the pinion (18).



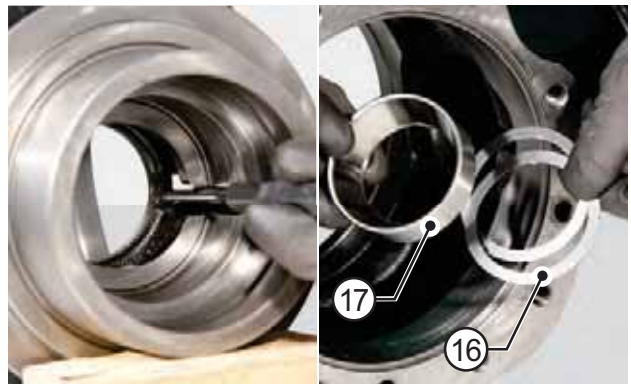
**FIGURE 15:** Extract the bearing (15).



**FIGURE 16:** Using a puller and a press, remove the inner bearing (17) from the pinion (18).



**FIGURE 17:** Using an internal extractor, remove the thrust blocks (15, 17).

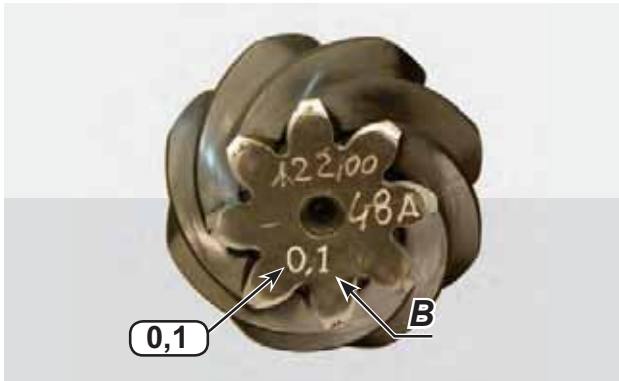


**FIGURE 18:** Using an internal extractor, remove the thrust block of the internal bearing (17) as well as the shim washers (16).

## ASSEMBLY



**FIGURE 19:** Check the thickness of first step pinion shims (16).  
Example:  $A = 1,1 \text{ mm}$



**FIGURE 20:** Check nominal dimension "B" as marked on the old pinion.  
Execute the calculation following the indicated formula to obtain the necessary value to the successive calculation.  
 $C = A \pm B$   
EXAMPLE:  $C = 1,1 - 0,1 = 1 \text{ mm}$   $C = 1 \text{ mm}$



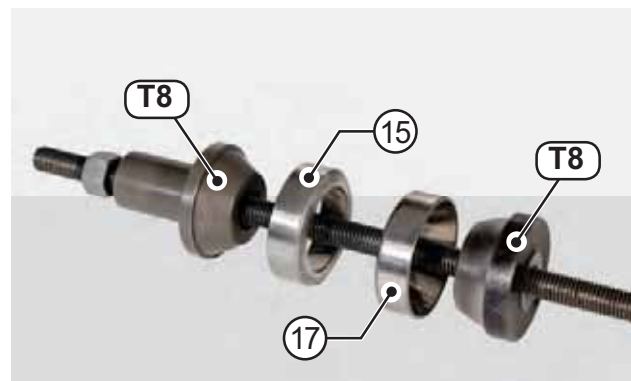
**FIGURE 21:** Check nominal dimension "D" as marked on the new pinion.  
Execute the calculation following the indicated formula to obtain the value of necessary shims.  
 $S = C - (D)$   
Example:  $S = 1 - (+0,1) = 0,9 \text{ mm}$   $S = 0,9 \text{ mm}$



**FIGURE 22:** Partially insert the thrust block of the bearings (15, 17).

**NOTE:**

The smaller shims (10) must be placed in between the thicker ones.



**FIGURE 23:** Install tension rod and guidetool T8 (See drawing T8 p. 72) on the thrust block of the external (15) and inner (17) bearing.

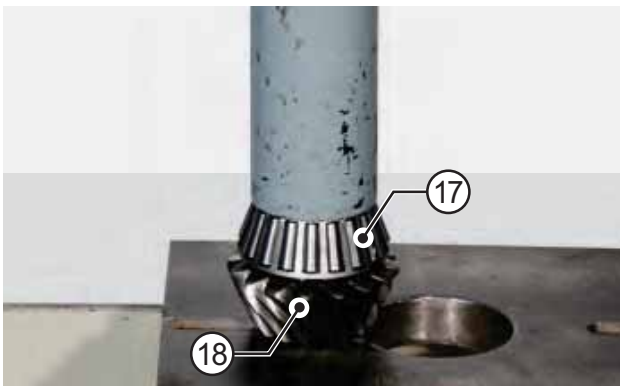
# ASSEMBLY



**FIGURE 24:** Connect the tension rod to the press and move the thrust block of the bearing (15, 17) into its seat. Disconnect the press and remove the tension rod.

**NOTE:**

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



**FIGURE 25:** Heat the inner bearing (17) to about 100 C° and fit it to the pinion (18).

**NOTE:**

Once the bearing has cooled down, lightly lubricate bearing (17) with SAE85W90 oil.



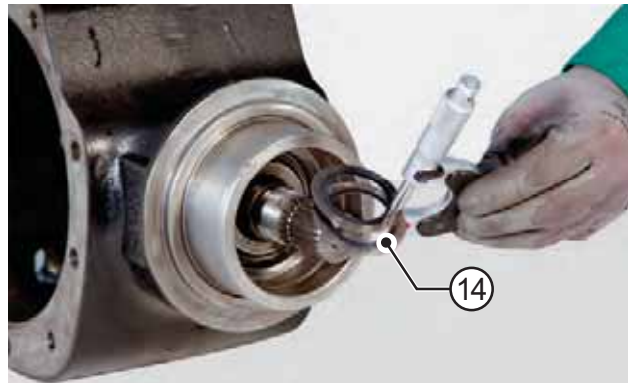
**FIGURE 26:** Fit the pinion (18) in the central body.



**FIGURE 27:** Heat the outer bearing (15) to a temperature of about 80C° and fit it on to the pinion (18).

**NOTE:**

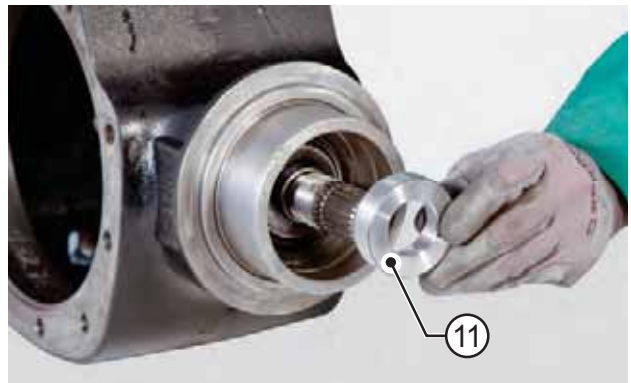
Lightly lubricate bearing (15) with SAE85W90 oil.



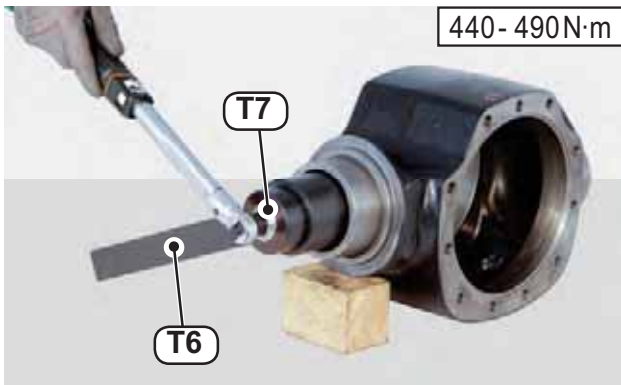
**FIGURE 28:** Install the first step pinion shims "S1" (14). Example: S1 = 0.75 mm

**NOTE:**

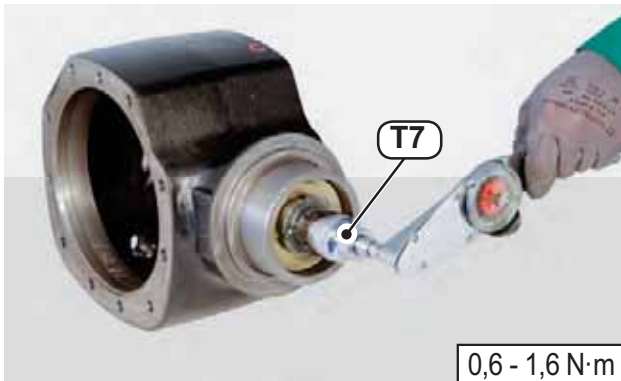
In order to hold the shim (14) in position, apply grease to it.



**FIGURE 29:** Install the complete spacer pack onto the pinion.



**FIGURE 30:** Position wrench T7 (See drawing T7 p. 72) onto the ring nut (1) and apply bar hold T6 (See drawing T6 p. 71) to the pinion (18). Stop wrench T6 (See drawing T6 p. 71) and rotate the nut to release it. Lock the wrench and tight the nut using a torque wrench, up to a minimum required torque setting of 440 - 490 N·m



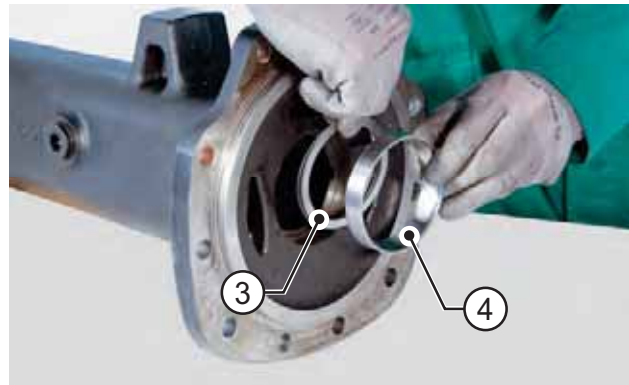
**FIGURE 31:** Apply onto the pinion (18) the bar-hold and with the help of a torque metre, check the torque of the pinion. Torque: 0,6 - 1.6 N·m.

## ⚠ CAUTION

If torque exceeds the maximum value, then the size of shim "S1" (14) needs to be increased.  
If torque does not reach the minimum value, then the size of shim "S1" (14) needs to be reduced.

### 📌 NOTE:

Make positional marks across ring nut (1) and pinion tail (18).



**FIGURE 32:** Fit the bearing disc (4), complete with shims (3) in the intermediate cover.

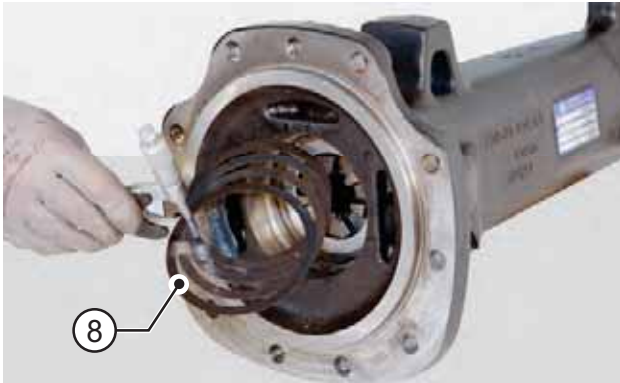


**FIGURE 33:** Insert a new o-ring (2) on the centering diameter of the arm. Position the arm on the central body. Tighten nuts (1) in two stages, using the criss-cross method.

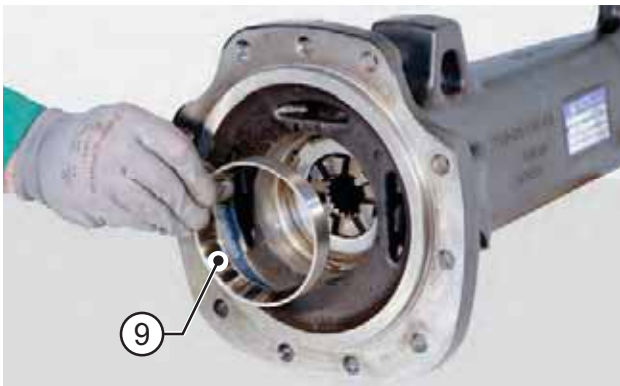


**FIGURE 34:** Install the whole differential unit.

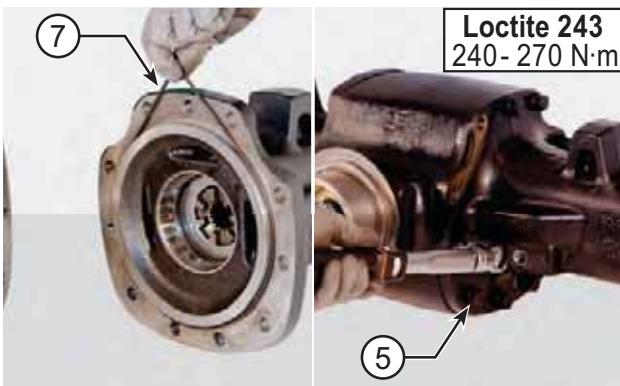
# ASSEMBLY



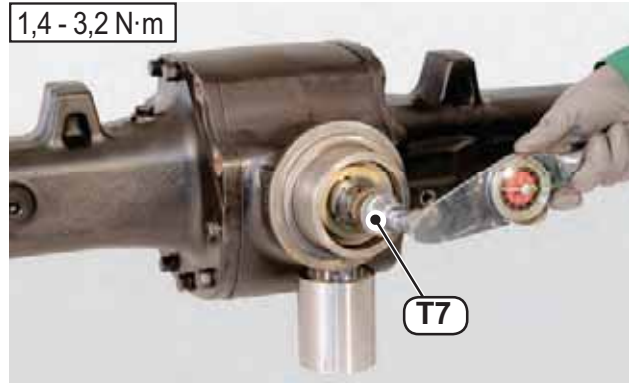
**FIGURE 35:** Insert thrust block (9) of the bearing shims (8) of an initial thickness of about 1,30 mm.



**FIGURE 36:** Fit the bearing disc (9), complete with shims (8) in the intermediate cover.



**FIGURE 37:** Insert a new o-ring (7) on the centering diameter of the arm.  
Position the arm on the central body.  
Tighten nuts (5) in two stages, using the criss-cross method.

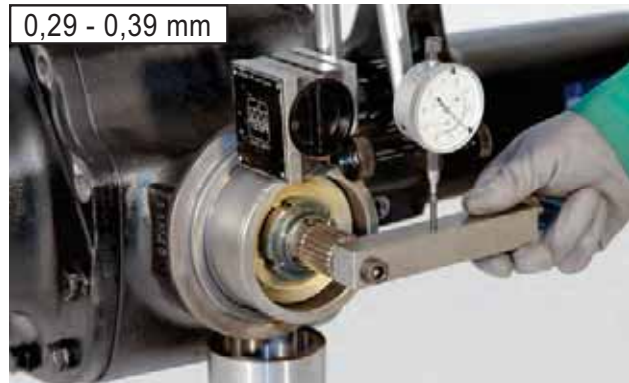


**FIGURE 38:** Apply onto the pinion a torque metre and check that torque will increase by 0,8 - 1,6 N·m as a result of differential bearing preload.

Example: pinion torque: 0.6 - 1.6 N·m  
Pinion + differential torque: 1,4 - 3,2 N·m.

## ⚠ CAUTION

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

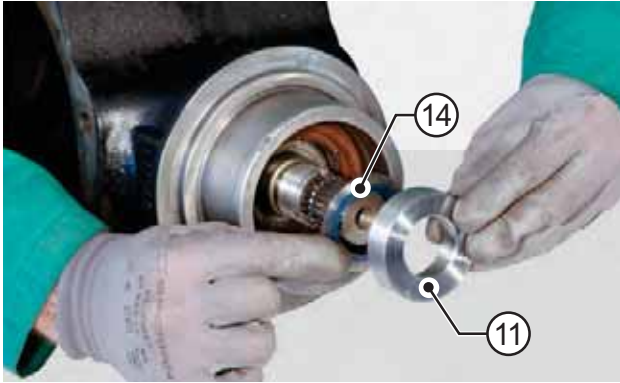


**FIGURE 39:** Install a dial indicator as shown and shift the flange to check the tolerance between the bevel gear teeth.  
Check the backlash at the input flange bolt hole. (B.C.D. 60 mm) Tolerance: 0,29 - 0,39 mm

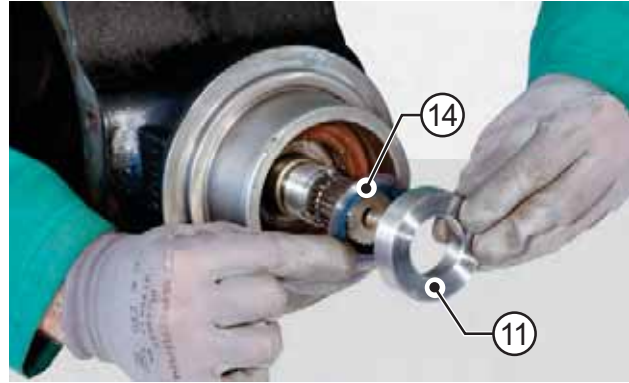


**FIGURE 40:** Apply tool T6 (See drawing T6 p. 71) and remove the ring nut (10).





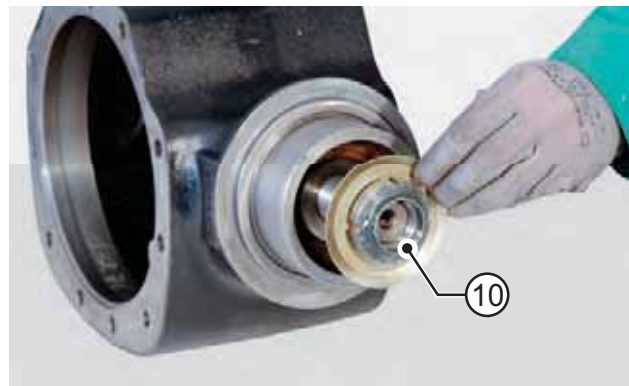
**FIGURE 41:** Remove spacers and shims.



**FIGURE 44:** Install the complete spacer pack onto the pinion.



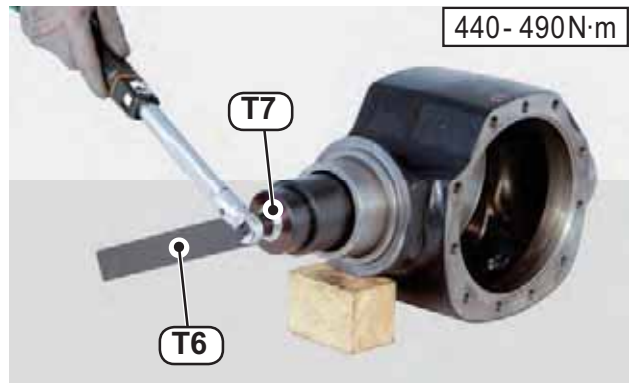
**FIGURE 42:** Lubricate and fit the sealing ring (13) onto tool T9 (See drawing T9 p. 73).  
Install the ring into the seat.



**FIGURE 45:** Apply Loctite 242 onto the threaded portion of the pinion (18).  
Screw the ring nut (10).



**FIGURE 43:** Lubricate with grease and replace the outer o-ring (12).



**FIGURE 46:** Position wrench T7 (See drawing T7 p. 72) onto the ring nut (10) and apply bar hold T6 (See drawing T6 p. 71) to the pinion (18). Stop wrench T6 (See drawing T6 p. 71) and rotate the nut to release it.  
Lock the wrench and tight the nut using a torque wrench, up to a minimum required torque setting of 440 - 490 N·m.

## ⚠ CAUTION

Make sure the match marks made previously line up.

## ASSEMBLY



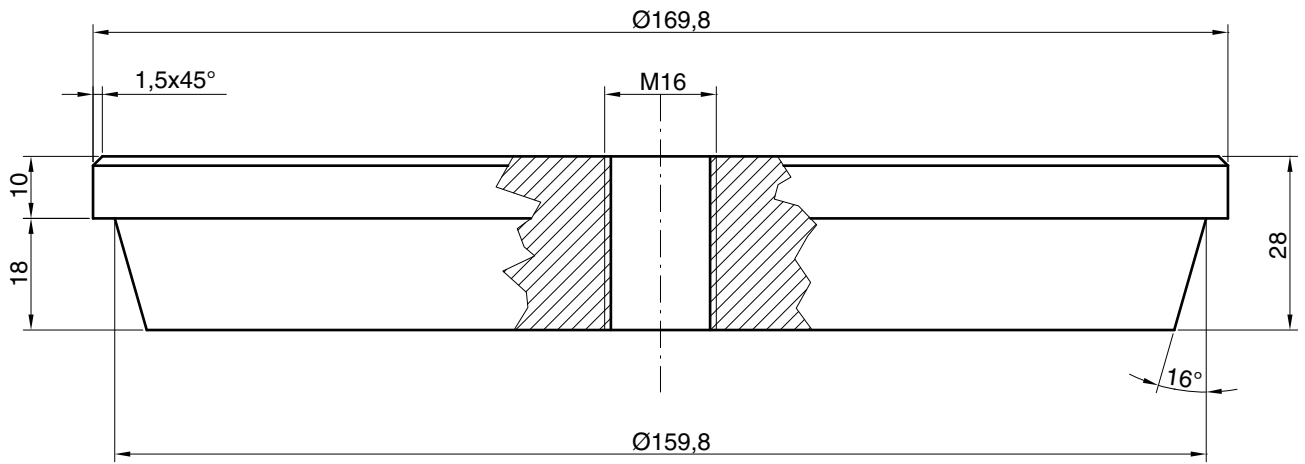
**FIGURE 47:** Caulk the ring nut (10).

### **CAUTION**

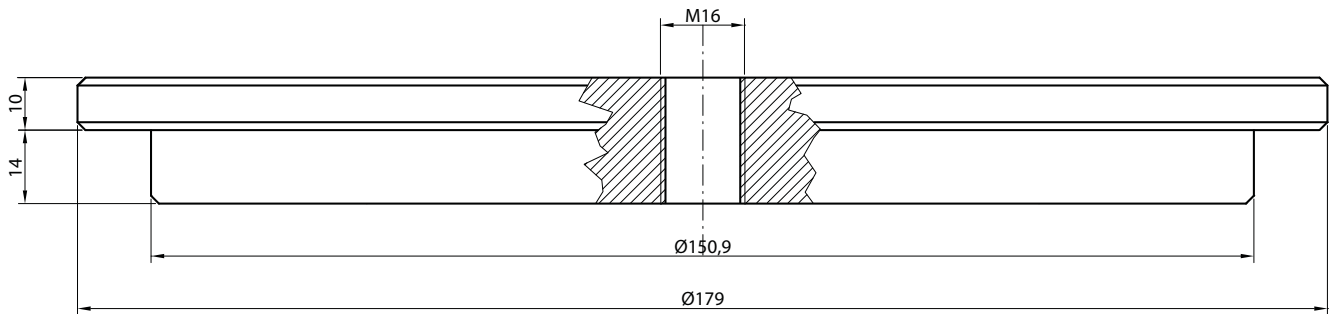
If the ring nut (10) is re-used, caulk the second position.  
Do not re-caulk the same portion.

# SPECIAL TOOLS

T1

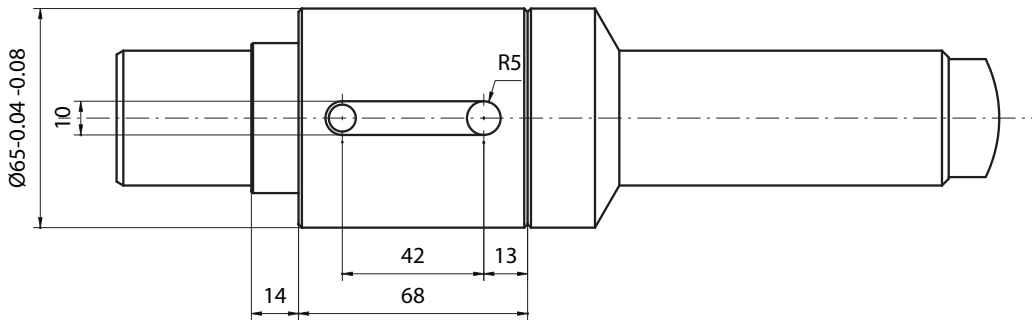
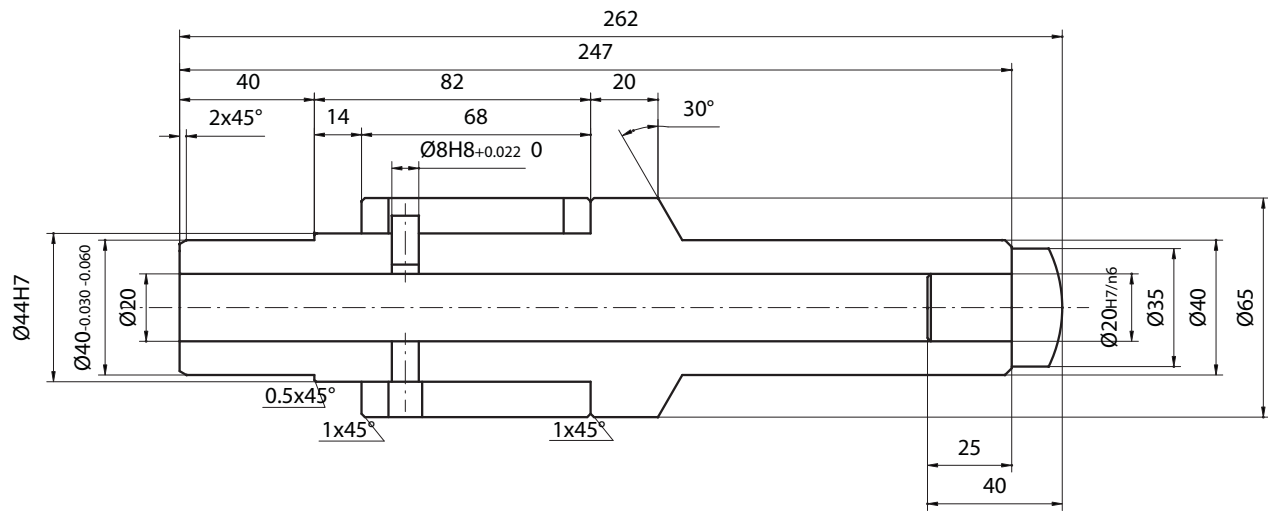


T2

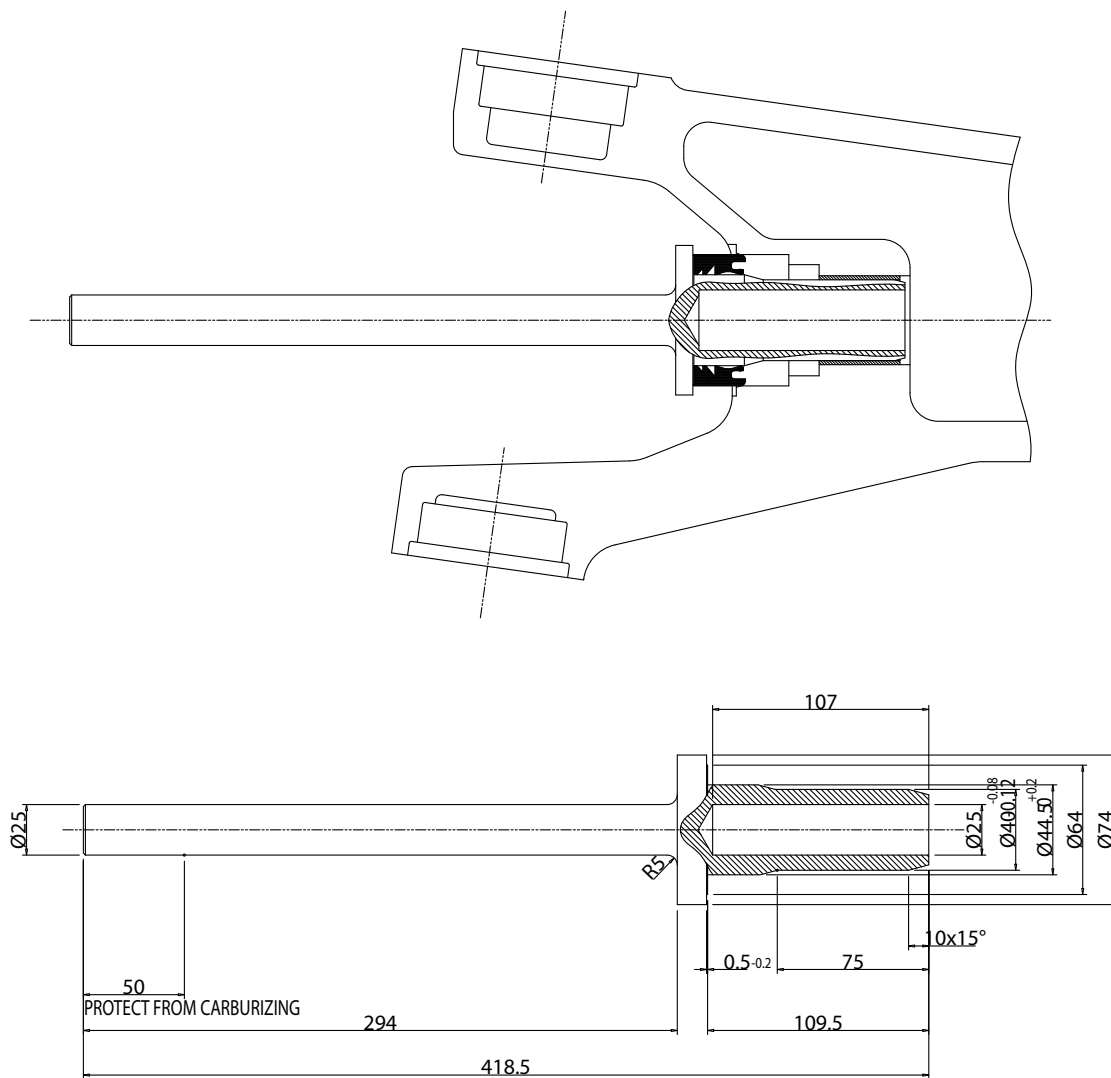


# SPECIAL TOOLS

T3

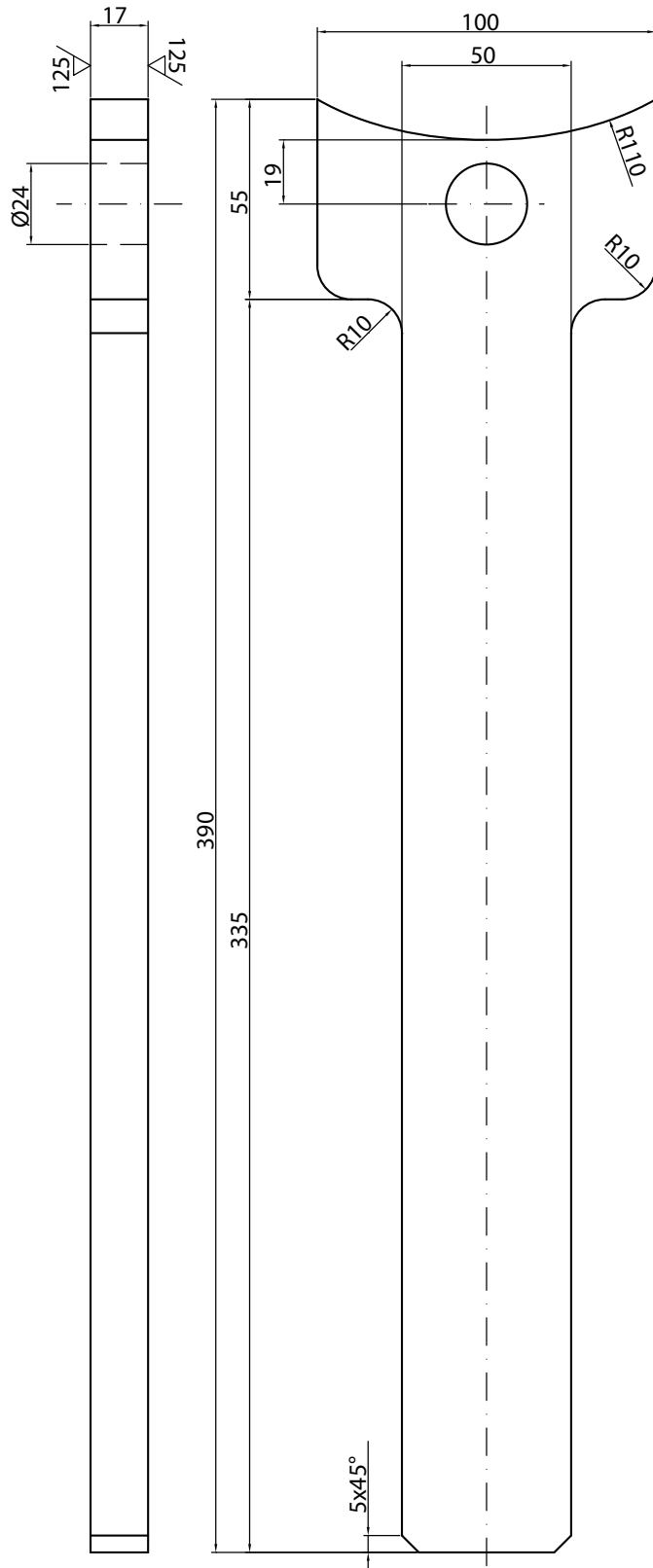


T4

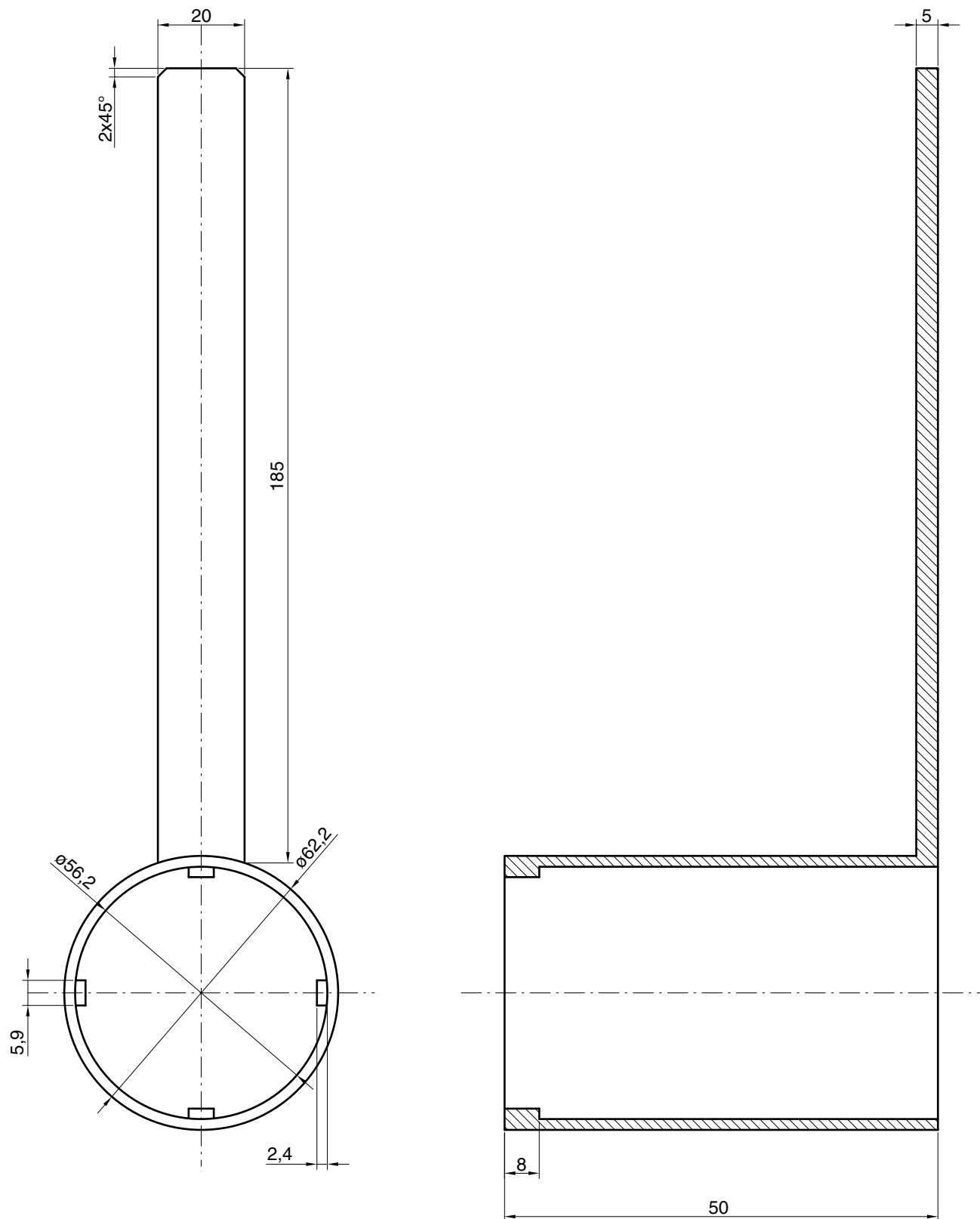


# SPECIAL TOOLS

T5

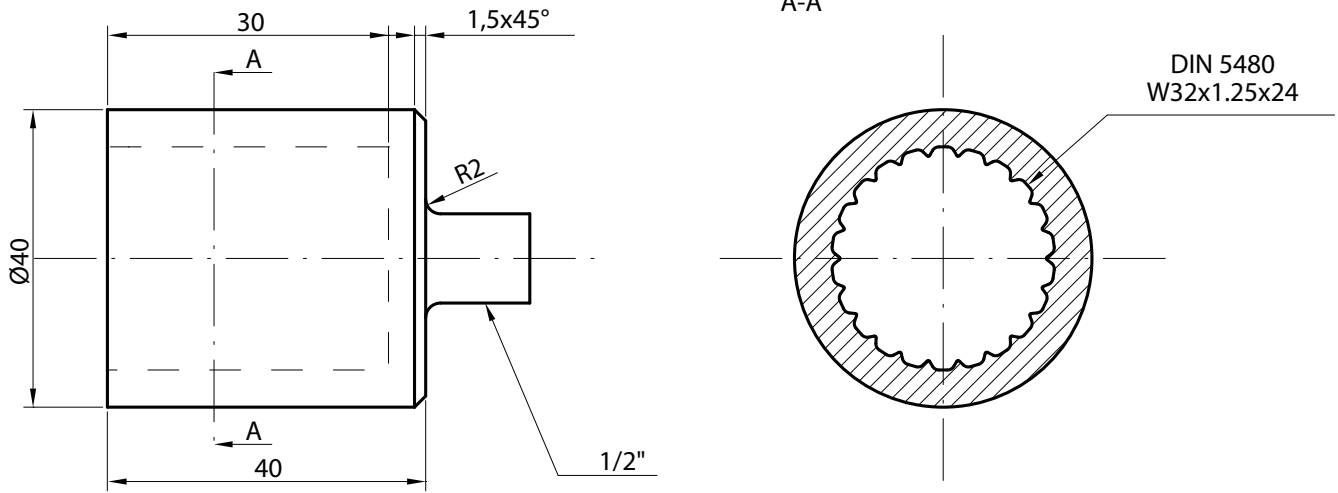


T6

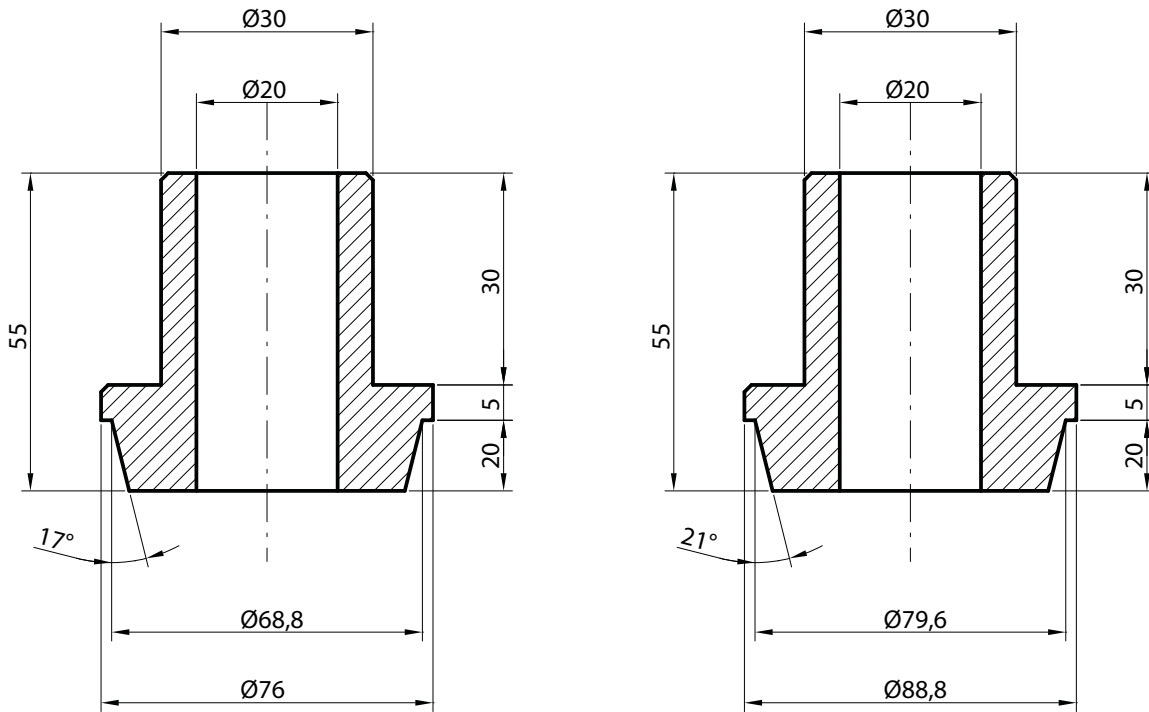


# SPECIAL TOOLS

T7

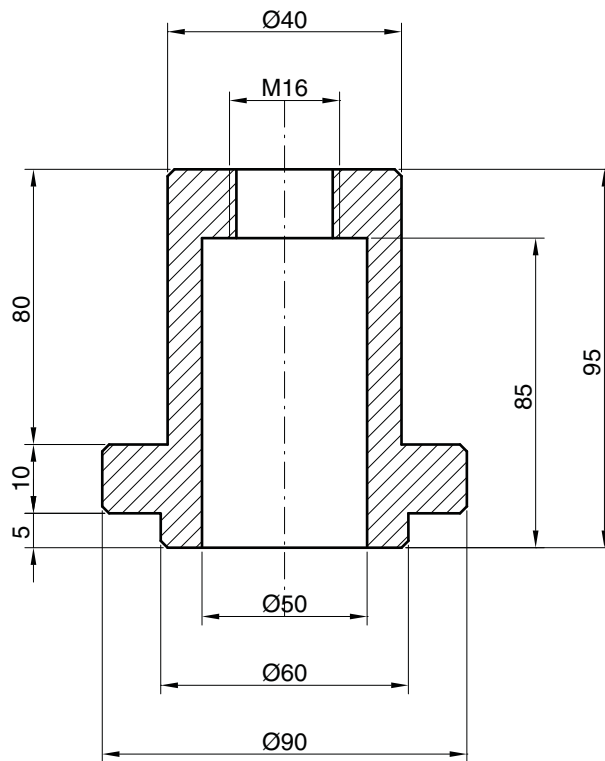


T8





T9



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