CATERPILLAR®

Axle Service Manual

Models
TH255,
TH255C, TH306D

SN TBS00100 to Present
SN JK200150 to Present
SN JK300150 to Present
SN TD200150 to Present
SN TA200150 to Present
SN TD300150 to Present
SN TA300150 to Present

31200451
UENR6268-02

Revised
January 18, 2018

DISCLAIMER: Information provided within (excluding Section 1) is supplied directly from the component manufacturer. Information within the machine Operation & Maintenance or Service Manuals supersedes any discrepancies which may be found within this manual. Due to continuous improvements, the component manufacturer reserves the right to make changes without prior notification.

EFFECTIVITY PAGE

August 29, 2008 - A - Original Issue Of Manual

September 3, 2014 - B - Revised Manual

January 18, 2018 - C - Update to include TH306D

EFFECTIVITY PAGE

SECTION CONTENTS

Section 1
Safety Practices

1.1 INTRODUCTION

This service manual provides general directions for accomplishing service and repair procedures. Following the procedures in this manual will help assure safety and equipment reliability.

Read, understand and follow the information in this manual, and obey all locally approved safety practices, procedures, rules, codes, regulations and laws.

These instructions cannot cover all details or variations in the equipment, procedures, or processes described, nor provide directions for meeting every possible contingency during operation, maintenance, or testing. When additional information is desired consult the local *Caterpillar* dealer.

Many factors contribute to unsafe conditions: carelessness, fatigue, overload, inattentiveness, unfamiliarity, even drugs and alcohol, among others. For optimal safety, encourage everyone to think, and to act safely.

Appropriate service methods and proper repair procedures are essential for the safety of the individual doing the work, for the safety of the operator, and for the safe, reliable operation of the machine. All references to the right side, left side, front and rear are given from the operator seat looking in a forward direction.

Supplementary information is available from the manufacturer in the form of Service Bulletins, Service Campaigns, Service Training Schools, the service website, other literature, and through updates to the manual itself.

1.2 DISCLAIMER

All information in this manual is based on the latest product information available at the time of publication. The manufacturer reserves the right to make changes and improvements to its products, and to discontinue the manufacture of any product, at its discretion at any time without public notice or obligation.

1.3 OPERATION & MAINTENANCE MANUAL

The mechanic must not operate the machine until the Operation & Maintenance Manual has been read and understood, training has been accomplished and operation of the machine has been completed under the supervision of an experienced and qualified operator.

An Operation & Maintenance Manual is supplied with each machine and must be kept in the manual holder located in the cab. In the event that the Operation & Maintenance Manual is missing, consult the local *Caterpillar* dealer before proceeding.

1.4 DO NOT OPERATE TAGS

Place Do Not Operate Tags on the ignition key switch and the steering wheel before attempting to perform any service or maintenance. Remove key and disconnect battery leads.

1.5 SAFETY INFORMATION

To avoid possible death or injury, carefully read, understand and comply with all safety messages.

In the event of an accident, know where to obtain medical assistance and how to use a first aid kit and fire extinguisher/ fire suppression system. Keep emergency telephone numbers (fire department, ambulance, rescue squad/ paramedics, police department, etc.) nearby. If working alone, check with another person routinely to help assure personal safety.

1.6 SAFETY ALERT SYSTEM AND SIGNAL WORDS

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

1.7 SAFETY INSTRUCTIONS

Following are general safety statements to consider ***before*** performing maintenance procedures on the telehandler. Additional statements related to specific tasks and procedures are located throughout this manual and are listed prior to any work instructions to provide safety information before the potential of a hazard occurs.

For all safety messages, carefully read, understand and follow the instructions ***before*** proceeding.

1.7.1 Personal Hazards

PERSONAL SAFETY GEAR: Wear all the protective clothing and personal safety gear necessary to perform the job safely. This might include heavy gloves, safety glasses or goggles, filter mask or respirator, safety shoes or a hard hat.

LIFTING: **NEVER** lift a heavy object without the help of at least one assistant or a suitable sling and hoist.

1.7.2 Equipment Hazards

LIFTING OF EQUIPMENT: Before using any lifting equipment (chains, slings, brackets, hooks, etc.), verify that it is of the proper capacity, in good working order, and is properly attached.

NEVER stand or otherwise become positioned under a suspended load or under raised equipment. The load or equipment could fall or tip.

DO NOT use a hoist, jack or jack stands only to support equipment. Always support equipment with the proper capacity blocks or stands properly rated for the load.

HAND TOOLS: Always use the proper tool for the job; keep tools clean and in good working order, and use special service tools only as recommended.

1.7.3 General Hazards

SOLVENTS: Only use approved solvents that are known to be safe for use.

HOUSEKEEPING: Keep the work area and operator cab clean, and remove all hazards (debris, oil, tools, etc.).

FIRST AID: Immediately clean, dress and report all injuries (cuts, abrasions, burns, etc.), no matter how minor the injury may seem. Know the location of a First Aid Kit, and know how to use it.

CLEANLINESS: Wear eye protection, and clean all components with a high pressure or steam cleaner before attempting service.

When removing hydraulic components, plug hose ends and connections to prevent excess leakage and contamination. Place a suitable catch basin beneath the machine to capture fluid run off.

It is good practice to avoid pressure-washing electrical/ electronic components. In the event pressure-washing the machine is needed, ensure the machine is shut down before pressure-washing. Should pressure-washing be utilized to wash areas containing electrical/electronic components, it is recommended a maximum pressure of 52 bar (750 psi) at a minimum distance of 30.5 cm (12 in) away from these components. If electrical/electronic components are sprayed, spraying must not be direct and for brief time periods to avoid heavy saturation.

Check and obey all Federal, State and/or Local regulations regarding waste storage, disposal and recycling.

1.7.4 Operational Hazards

ENGINE: Stop the engine before performing any service unless specifically instructed otherwise.

VENTILATION: Avoid prolonged engine operation in enclosed areas without adequate ventilation.

SOFT SURFACES AND SLOPES: **NEVER** work on a machine that is parked on a soft surface or slope. The machine must be on a hard level surface, with the wheels blocked before performing any service.

FLUID TEMPERATURE: **NEVER** work on a machine when the engine, cooling or hydraulic systems are hot. Hot components and fluids can cause severe burns. Allow systems to cool before proceeding.

FLUID PRESSURE: Before loosening any hydraulic or diesel fuel component, hose or tube, turn the engine OFF. Wear heavy, protective gloves and eye protection. **NEVER** check for leaks using any part of your body; use a piece of cardboard or wood instead. If injured, seek medical attention immediately. Diesel fluid leaking under pressure can explode. Hydraulic fluid and diesel fuel leaking under pressure can penetrate the skin, cause infection, gangrene and other serious personal injury.

Refer to the engine manufacturers manual for specific details concerning the fuel system.

Relieve all pressure before disconnecting any component, part, line or hose. Slowly loosen parts and allow release of residual pressure before removing any part or component. Before starting the engine or applying pressure, use components, parts, hoses and pipes that are in good condition, connected properly and are tightened to the proper torque. Capture fluid in an appropriate container and dispose of in accordance with prevailing environmental regulations.

COOLANT SYSTEM CAP: The cooling system is under pressure, and escaping coolant can cause severe burns and eye injury. To prevent personal injury, NEVER remove the coolant system cap while the cooling system is hot. Wear safety glasses. Turn the coolant system cap to the first stop and allow pressure to escape before removing the cap completely. Failure to follow the safety practices could result in death or serious injury.

Properly disconnect battery(s) prior to service the fuel or hydraulic systems.

FLUID FLAMABILTITY: **DO NOT** service the fuel or hydraulic systems near an open flame, sparks or smoking materials.

NEVER drain or store fluids in an open container. Engine fuel and hydraulic fluid are flammable and can cause a fire and/or explosion.

DO NOT mix gasoline or alcohol with diesel fuel. The mixture can cause an explosion.

PRESSURE TESTING: When conducting any test, only use test equipment that is correctly calibrated and in good condition. Use the correct equipment in the proper manner, and make changes or repairs as indicated by the test procedure to achieve the desired result.

LEAVING MACHINE: Lower the forks or attachment to the ground before leaving the machine.

TIRES: Always keep tires inflated to the proper pressure to help prevent tipover. **DO NOT** over inflate tires.

NEVER use mismatched tire types, sizes or ply ratings. Always use matched sets according to machine specifications.

MAJOR COMPONENTS: Never alter, remove, or substitute any items such as counterweights, tires, batteries or other items that may reduce or affect the overall weight or stability of the machine.

BATTERY: **DO NOT** charge a frozen battery. Charging a frozen battery may cause it to explode. Allow the battery to thaw before jump starting or connecting a battery charger.

1.8 SAFETY DECALS

Check that all safety decals are present and readable on the machine. Refer to the Operation & Maintenance Manual supplied with machine for information.

Section 2
General Information and Specifications

2.1 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. 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.

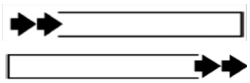
INTRODUCTORY REMARKS

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.

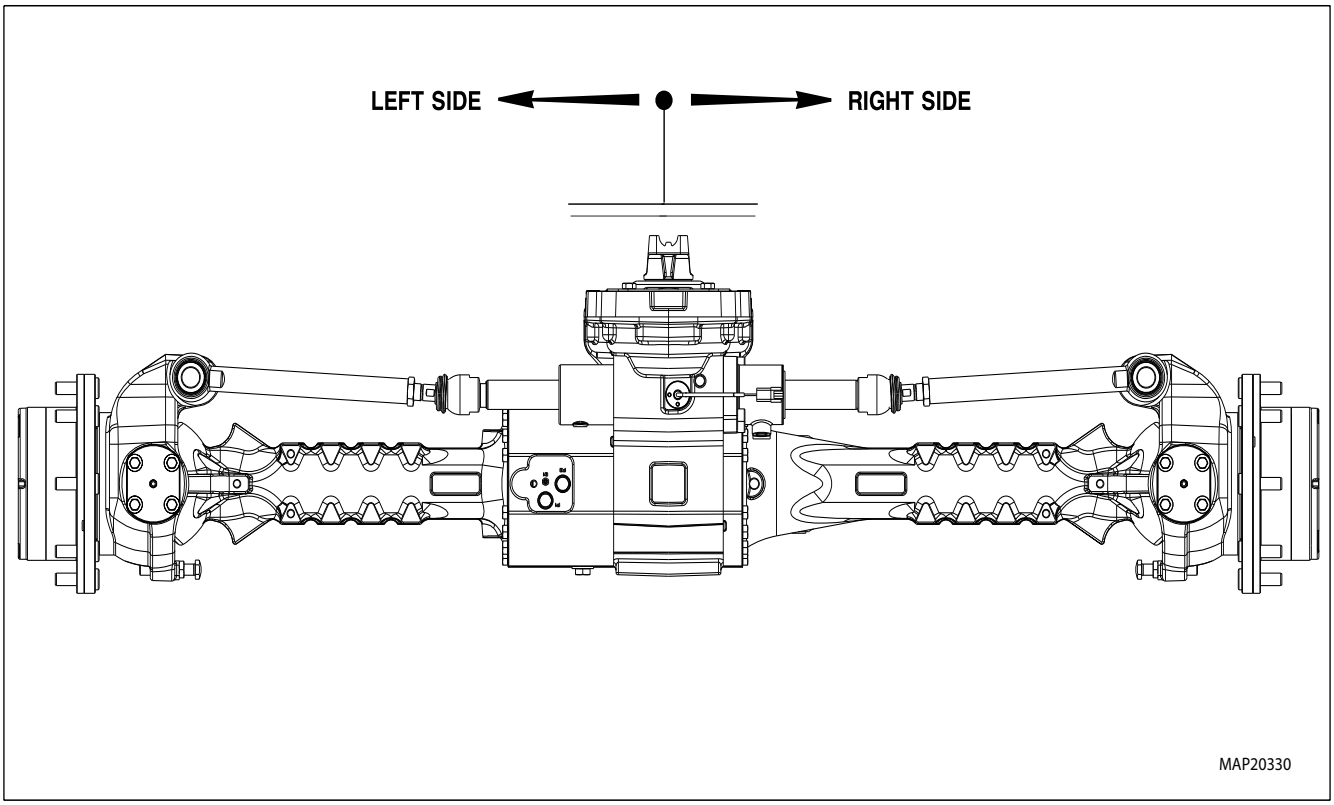
When no classification is given, disassembly and assembly operations are the same for all versions.

SPECIFIC EQUIPMENT AND SPARE PARTS

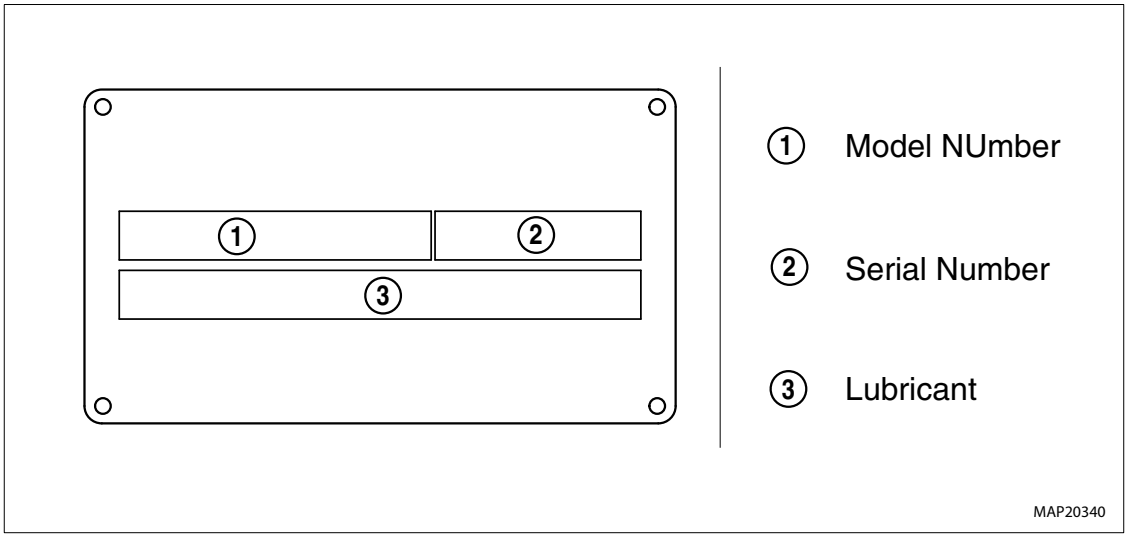
The drawings of all specific tools required for maintenance and repair work can be found at the end of this manual; spare parts may be ordered from your Caterpillar dealer.

2.2 SPECIFICATIONS

2.2.1 DEFINITION OF VIEWPOINTS



2.2.2 DATA PLATE



2.3 CONVERSION TABLES

2.3.1 UNITS OF PRESSURE

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

2.3.2 UNIT OF WEIGHT

UNIT	N	daN	kN	kg	lbs
1N	1	0.1	0.001	0.102	0.225
1daN	10	1	0.01	1.02	2.25
1kN	1000	100	1	102	225
1kg	9.81	0.981	0.00981	1	2.205

2.3.3 UNITS OF TORQUE

UNIT	Nm	daNm	kNm	kgm	lb-in
1Nm	1	0.1	0.001	0.102	8.854
1daNm	10	1	0.01	1.02	88.54
1kNm	1000	100	1	102	8854
1kgm	9.81	0.981	0.00981	1	86.8
1 lb-in	0.1129	0.01129	0.0001129	0.01152	1

2.4 TORQUE SPECIFICATIONS

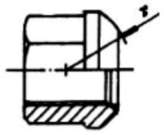
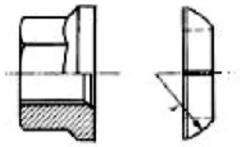
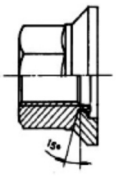
2.4.1 BOLT TIGHTENING TORQUES

Unit - Nm

SIZE OF BOLT		TYPE OF BOLT					
		8.8	8.8 + Loctite 270	10.9	10.9 + Loctite 270	12.9	12.9 + Loctite 270
COARSE PITCH	M6 X 1 mm	9.5 – 10.5	10.5 – 11.5	14.3 – 15.7	15.2 – 16.8	16.2 – 17.8	18.1 – 20
	M8 X 1.25 mm	23.8 – 26.2	25.6 – 28.4	34.2 – 37.8	36.7 – 40.5	39 – 43	43.7 – 48.3
	M10 X 1.5 mm	48 – 53	52 – 58	68 – 75	73 – 81	80 – 88	88 – 97
	M12 X 1.75 mm	82 – 91	90 – 100	116 – 128	126 – 139	139 – 153	152 – 168
	M14 X 2 mm	129 – 143	143 – 158	182 – 202	200 – 221	221 – 244	238 – 263
	M16 X 2 mm	200 – 221	219 – 242	283 – 312	309 – 341	337 – 373	371 – 410
	M18 X 2.5 mm	276 – 305	299 – 331	390 – 431	428 – 473	466 – 515	509 – 562
	M20 X 2.5 mm	390 – 431	428 – 473	553 – 611	603 – 667	660 – 730	722 – 798
	M22 X 2.5 mm	523 – 578	575 – 635	746 – 824	817 – 903	893 – 987	974 – 1076
	M24 X 3 mm	675 – 746	732 – 809	950 – 1050	1040 – 1150	1140 – 1260	1240 – 1370
	M27 X 3 mm	998 – 1103	1088 – 1202	1411 – 1559	1539 – 1701	1710 – 1890	1838 – 2032
	M30 X 3.5 mm	1378 – 1523	1473 – 1628	1914 – 2115	2085 – 2305	2280 – 2520	2494 – 2757
FINE PITCH	M8 X 1 mm	25.7 – 28.3	27.5 – 30.5	36.2 – 39.8	40 – 44	42.8 – 47.2	47.5 – 52.5
	M10 X 1.25 mm	49.4 – 54.6	55.2 – 61	71.5 – 78.5	78 – 86	86 – 94	93 – 103
	M12 X 1.25 mm	90 – 100	98 – 109	128 – 142	139 – 154	152 – 168	166 – 184
	M12 X 1.5 mm	86 – 95	94 – 104	120 – 132	133 – 147	143 – 158	159 – 175
	M14 X 1.5 mm	143 – 158	157 – 173	200 – 222	219 – 242	238 – 263	261 – 289
	M16 X 1.5 mm	214 – 236	233 – 257	302 – 334	333 – 368	361 – 399	394 – 436
	M18 X 1.5 mm	312 – 345	342 – 378	442 – 489	485 – 536	527 – 583	580 – 641
	M20 X 1.5 mm	437 – 483	475 – 525	613 – 677	674 – 745	736 – 814	808 – 893
	M22 X 1.5 mm	581 – 642	637 – 704	822 – 908	903 – 998	998 – 1103	1078 – 1191
	M24 X 2 mm	741 – 819	808 – 893	1045 – 1155	1140 – 1260	1235 – 1365	1363 – 1507
	M27 X 2 mm	1083 – 1197	1178 – 1302	1520 – 1680	1672 – 1848	1834 – 2027	2000 – 2210
	M30 X 2 mm	1511 – 1670	1648 – 1822	2138 – 2363	2332 – 2577	2565 – 2835	2788 – 3082

2.4.2 WHEEL NUT TIGHTENING TORQUES

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

WHEEL NUTS CHARACTERISTIC	WHEEL STUD THREAD	RECOMMENDED WHEEL NUTS TORQUE		NUT FIXING'S SOLUTION
		MATERIAL QUALITY		
		ST 37	**ST 52	
WHEEL NUTS WITH INTEGRATED SPHERICAL COLLAR	M18 X 1.5 mm	330 Nm (243 ft. lb.)	460 Nm (339 ft. lb.)	 MAP3930
	M20 X 1.5 mm	490 Nm (361 ft. lb.)	630 Nm (464 ft. lb.)	
	M22 X 1.5 mm	630 Nm (464 ft. lb.)	740 Nm (545 ft. lb.)	
FLAT COLLAR WHEEL NUTS WITH SEPARATE SPHERICAL LOCK WASHER	M18 X 1.5 mm	270 Nm (199 ft. lb.)	360 Nm (265 ft. lb.)	 MAP3940
	M20 X 1.5 mm	360 Nm (265 ft. lb.)	450 Nm (332 ft. lb.)	
	M22 X 1.5 mm	460 Nm (339 ft. lb.)	550 Nm (406 ft. lb.)	
WHEEL NUTS WITH INTEGRATED SEAT CAPTIVE WASHER	M18 X 1.5 mm	260 Nm (192 ft. lb.)	360 Nm (265 ft. lb.)	 MAP3950
	M20 X 1.5 mm	350 Nm (258 ft. lb.)	500 Nm (369 ft. lb.)	
	M22 X 1.5 mm	450 Nm (332 ft. lb.)	650 Nm (479 ft. lb.)	

IMPORTANT: ***Rim's material ST 52 is recommended by manufacturer on axle application. 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).*

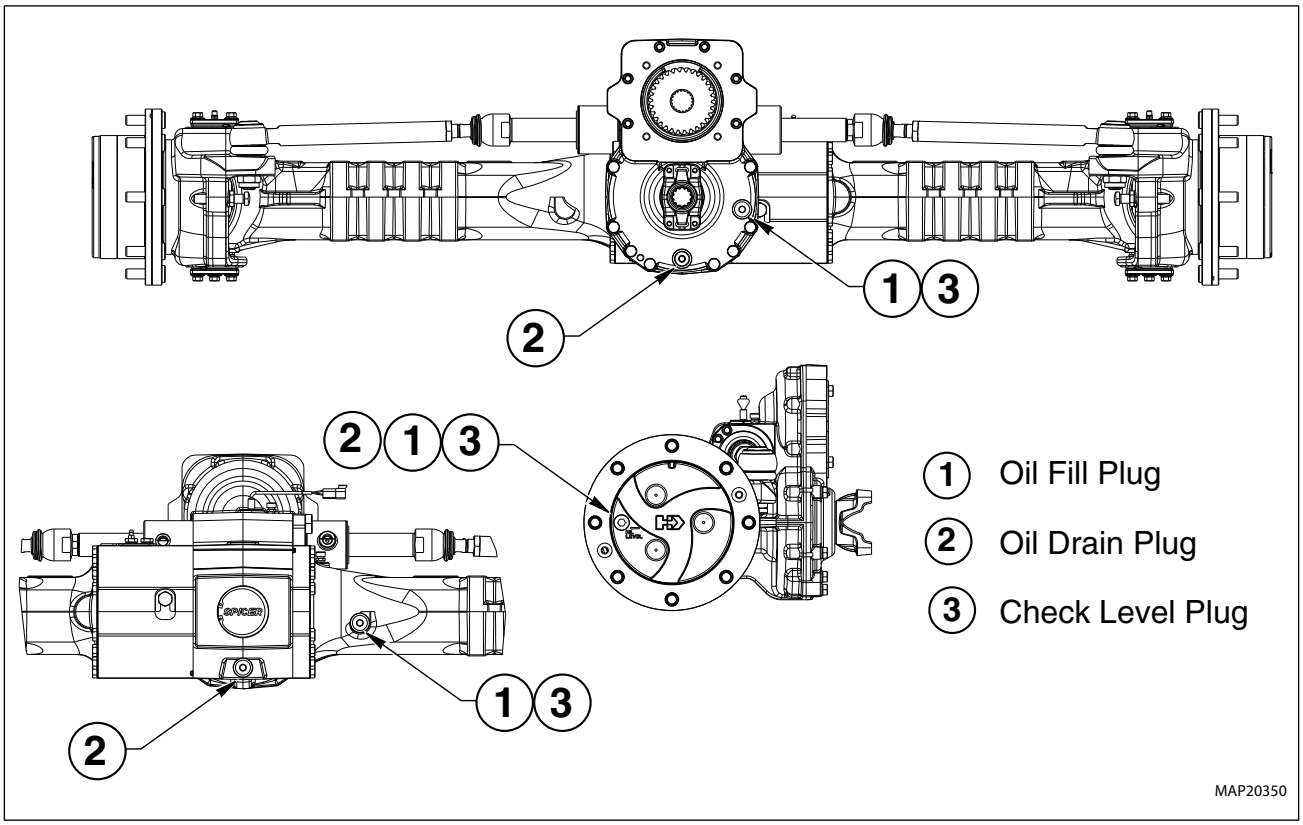
Note: *The wheel nut tightening torque takes into consideration not only the nut + stud characteristics, but also the quality of the rim material.*

TIGHTENING TORQUE TABLE, SHOWS THE TORQUE FIGURE RELATED TO THE BOLT CHARACTERISTIC ONLY.		
TIGHTENING TORQUE TABLE		
NUT MATERIAL QUALITY 8.8 & 10.9	STUD MATERIAL QUALITY	*TORQUE RANGE
M18 X1.5 mm	M18 X1.5 mm	442 - 489 Nm/ 326 - 360 ft.lb.
M20 X1.5 mm	M20 X1.5 mm	613 - 677 Nm/ 452 - 499 ft.lb.
M22 X1.5 mm	M22 X1.5 mm	822 - 908 Nm/ 606 - 669 ft.lb.

Note: *The torque figure on nut and stud coupling must be related on stud material quality*

2.5 MAINTENANCE

2.5.1 MAINTENANCE POINTS



2.5.2 MAINTENANCE INTERVALS

OPERATION		INTERVAL	LUBRICANT
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 800 hrs *	SAE85W90 (API GL5 - MIL 2105-B) With additives for oil-bath brakes, for units presenting hypoid crown wheel and pinion and/or self-locking differential gear
	Planetary reduction	Every 1000 hrs *	
	L.S. Differential	Every 700 hrs */***	
Adjustment	Negative brake	Every 1000 hours*	Only for mineral oil use e.g. ATF Dexron II. Make sure that master cylinder seals are suitable for mineral oil.
	Service brake	Every 500 hours	
Tightening	Wheel nuts	Every 200 hours**	
Greasing	King Pin Tapered Bearings	Normal work - Weekly	NLGI 2 EP or NLGI 3 EP ****
	Seals		
	King Pin Bushings	Severe duty - Daily	NLGI 2 EP or NLGI 3 EP **** w/Moly Additive
	Trunnion Bushings		

Note: *If working in severe duty conditions half intervals should be used.*

- * Initially after 100 working hours
- ** Initially after 10 working hours
- *** When it starts sounding noisy
- **** According to DIN 51825 level KP2K-30 (NLGI #2) or KP3K-20 (NLGI #3); ASTM D4950 NLGI #2 GC-LB

2.5.3 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.

TYPE	APPLICATION
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.
CAT RTV Silicone Adhesive Sealant	Semi-fluid adhesive material used for sealing and filling and to protect components from environmental and physical elements. Polymerises with non-corrosive dampness.
CAT Multi Purpose 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.
CAT Molybdenum Paste	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.
CAT White Assembly Grease	Applied to bearings, sliding parts and used to lubricate seals or parts during assembly.

2.6 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 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. For agricultural axles, the terms RIGHT and LEFT refer to the position from operator's seat. For construcition axle, the terms RIGHT and LEFT refer to the position outside facing the machine (with the input drive facing forward).
12. After repair work has been completed, accurately touch up any coated part that may have been damaged.
13. Follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

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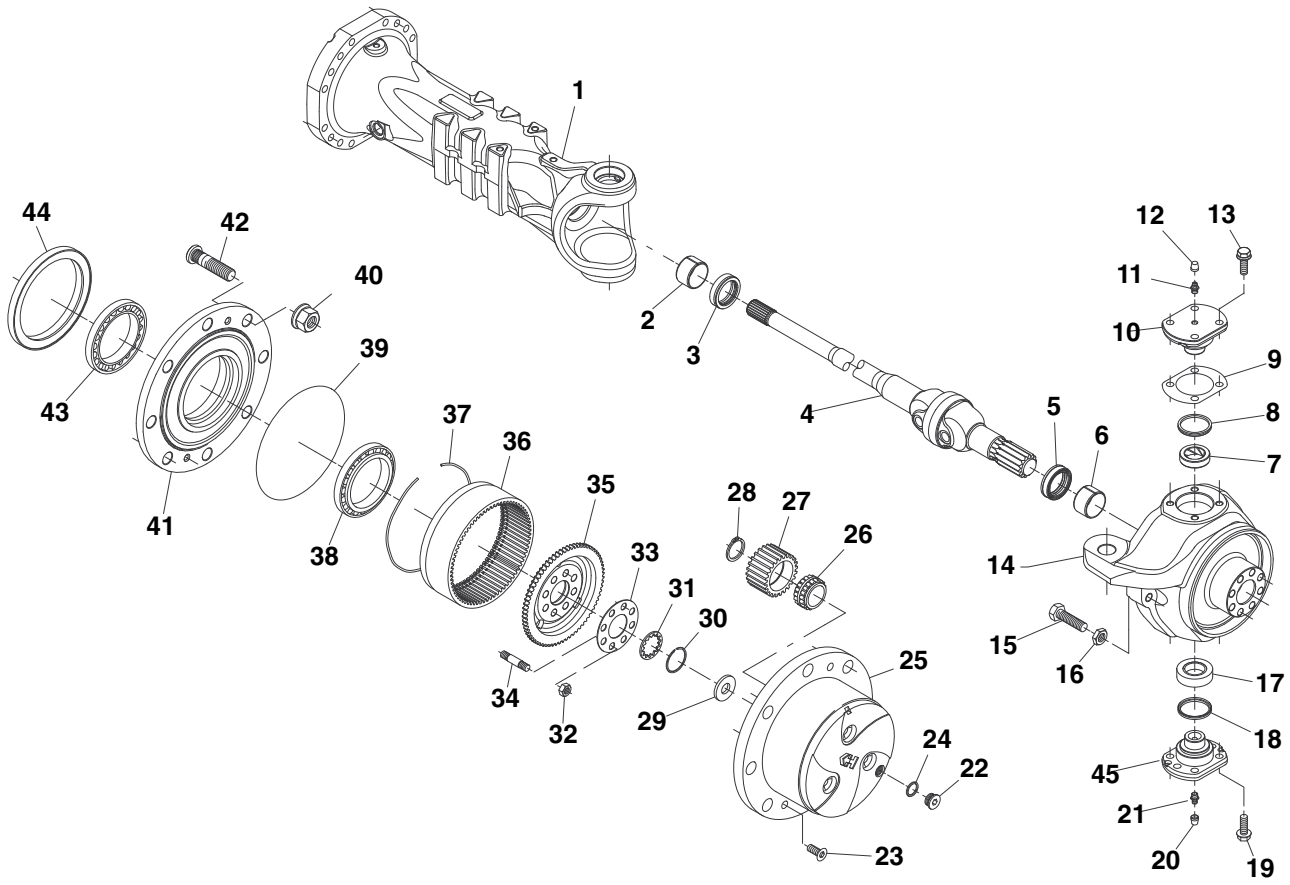
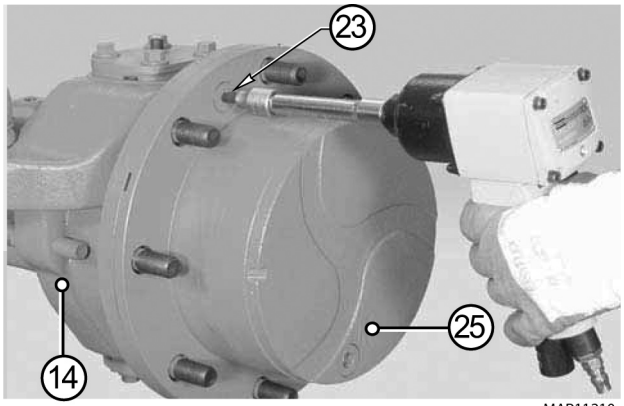
Section 3
Planetary Reduction 1:6 and Steering Case

3.1 EXPLODED VIEW



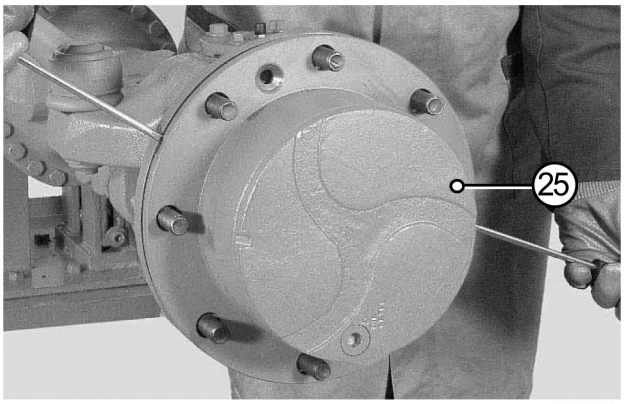
MAP11200

3.2 PLANETARY REDUCTION - 1.6 AND STEERING CASE - DISASSEMBLY



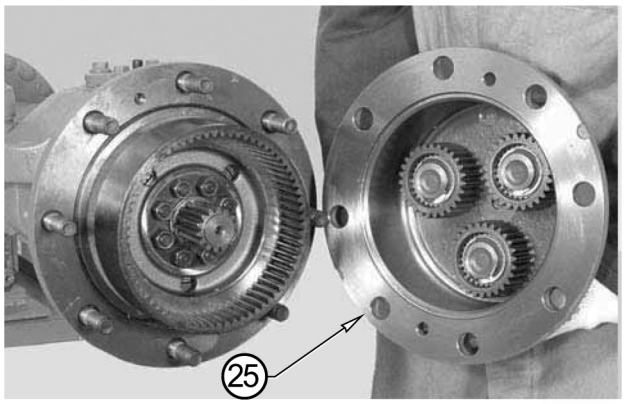
MAP11210

1. Remove the cap screws (**23**) from the planetary carrier cover (**25**).
2. Disconnect the steering bars from the steering case (**14**).



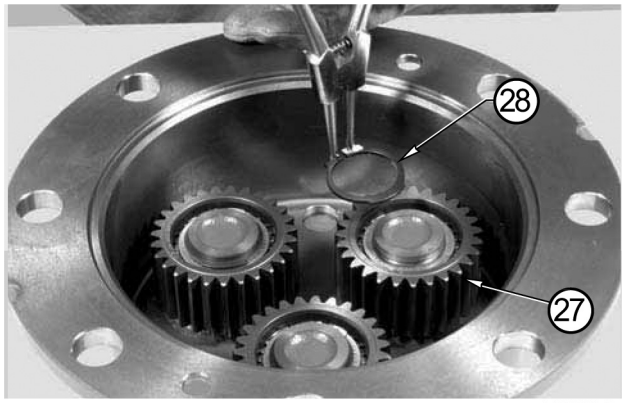
MAP11220

3. Disjoint the planetary carrier cover (**25**) from the steering case by alternatively forcing a screwdriver into the appropriate slots.



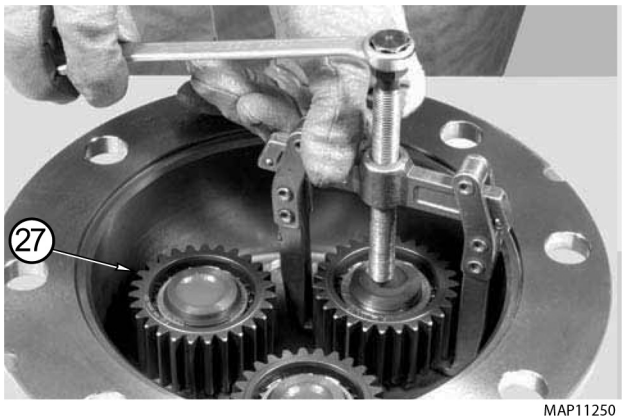
MAP11230

4. Remove the complete planetary carrier cover (**25**).



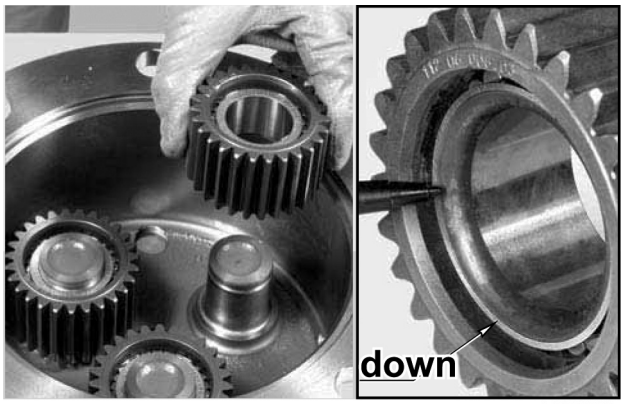
MAP11240

5. Remove the snap ring (**28**) of the planetary gears (**27**).



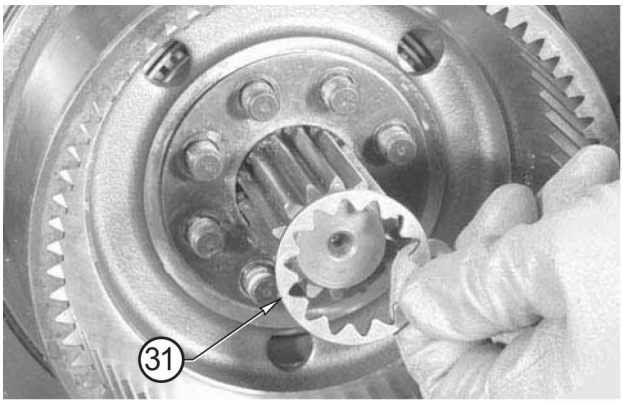
MAP11250

6. Remove the planetary gears (**27**).



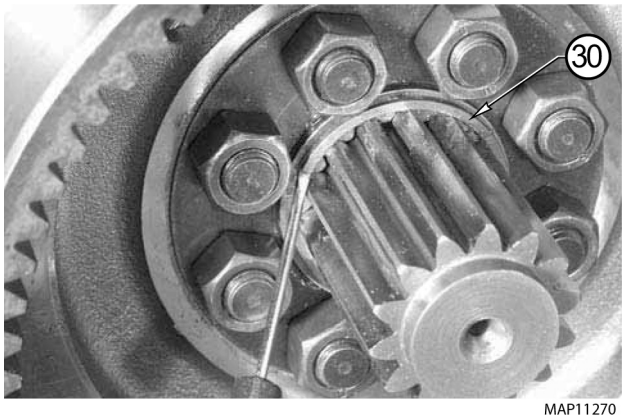
MAP11260

7. Write down direction of assembly of planetary gears.



MAP11290

10. Remove the shim washer (**31**).

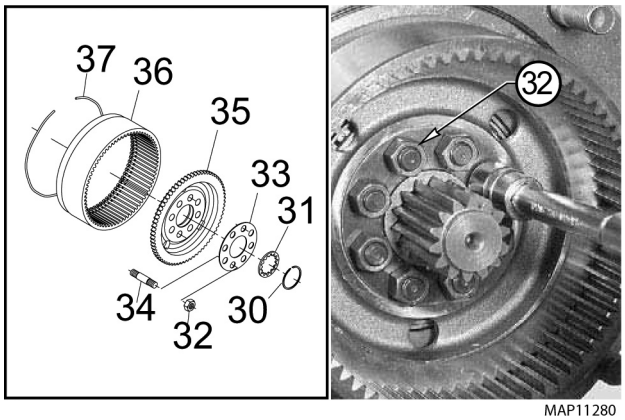


MAP11270

8. Remove the snap ring (**30**).

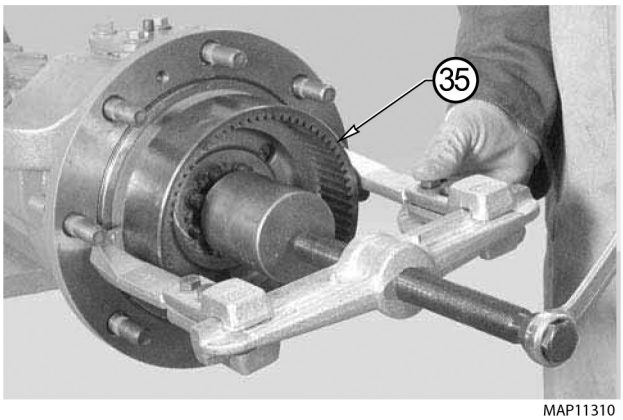
MAP11300

11. Remove the safety flange (**33**).



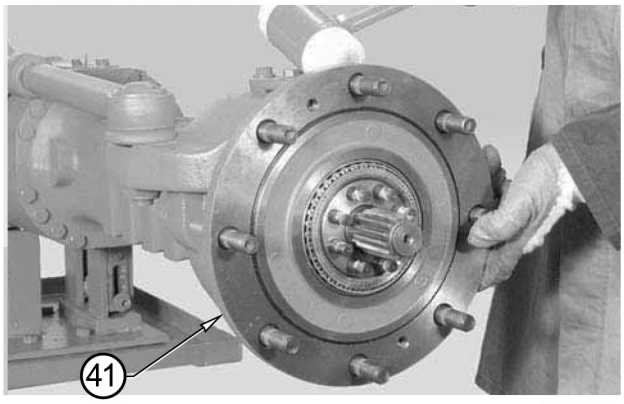
MAP11280

9. Loosen and remove the nuts (**32**) from the crown flange (**35**).



MAP11310

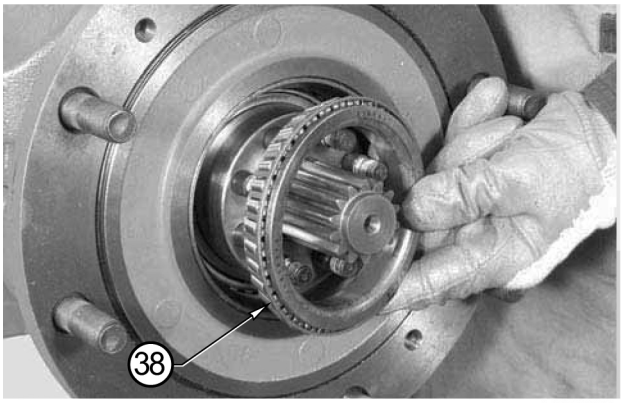
12. Using a puller, remove the complete crown flange (**35**) by acting on the stud bolts.



MAP11320

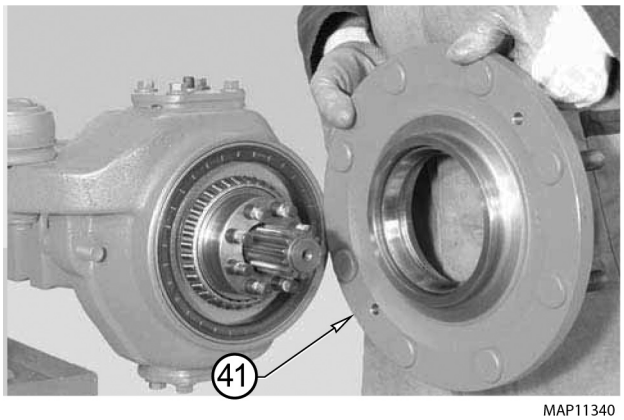
13. Partially extract the hub (**41**) using a plastic hammer.

Note: *Alternately hammer on several equidistant points.*



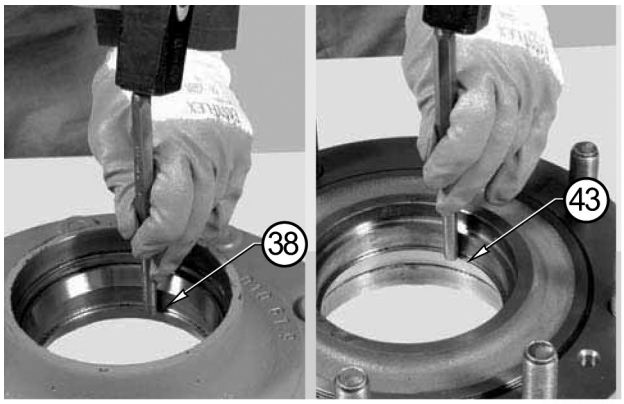
MAP11330

14. Remove the external bearing (**38**).



MAP11340

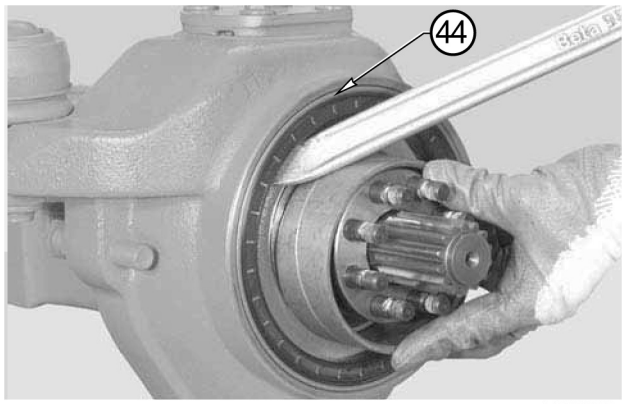
15. Remove the complete hub (**41**).



MAP11350

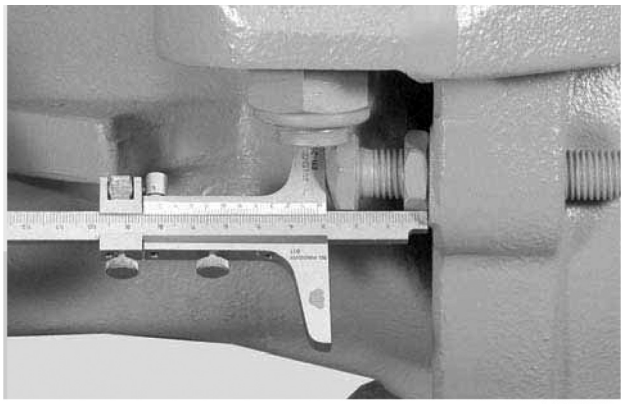
16. Remove the bearing external thrust blocks, using a pin driver.

Note: *Hammer in an alternate sequence to prevent clamping and deformation of the thrust blocks.*



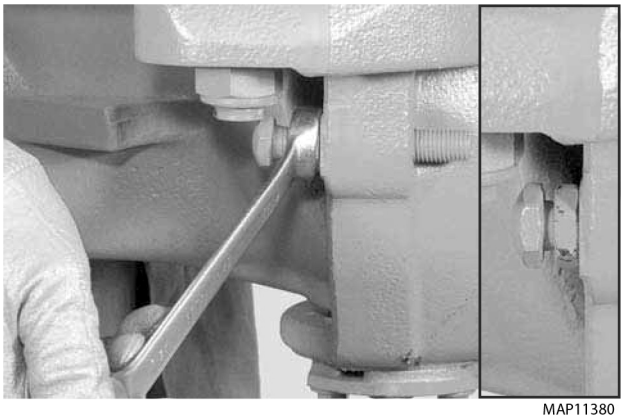
MAP11360

17. Remove the sealing ring from the steering case (**44**).
18. Pay attention not to damage the seat of bearing.



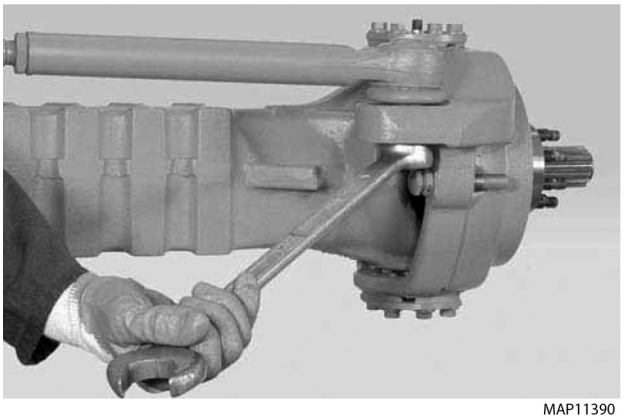
MAP11370

19. Write down the steering case screw length measurement.



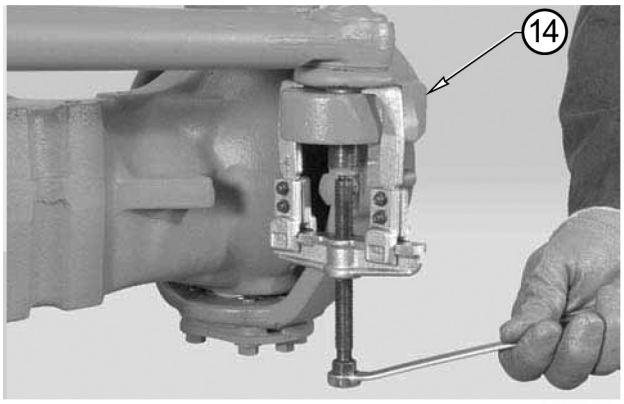
MAP11380

20. Loosen the lockscrew and insert it to allow the passage of tool.



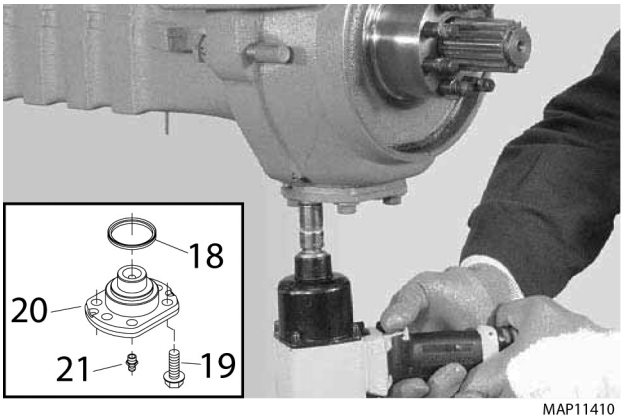
MAP11390

21. Remove the nuts that lock the articulation pins.



MAP11400

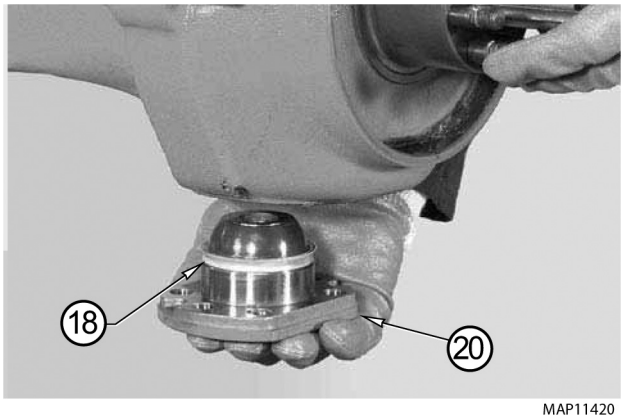
22. Disconnect the tapered pins of the articulation from the steering case (**14**) using a puller.



MAP11410

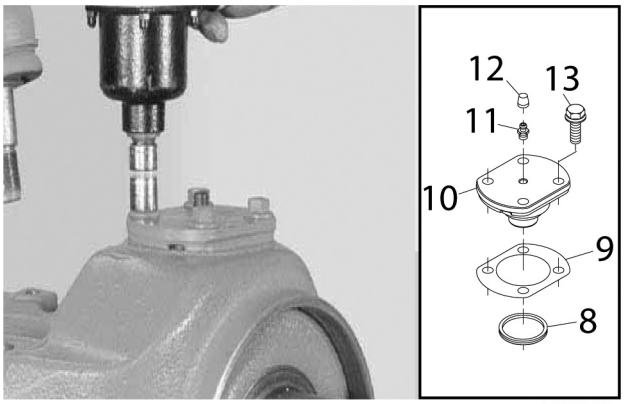
23. Loosen and remove the cap screws (**19**) from the bottom articulation pin (**20**).

Note: *Screws cannot be re-used.*



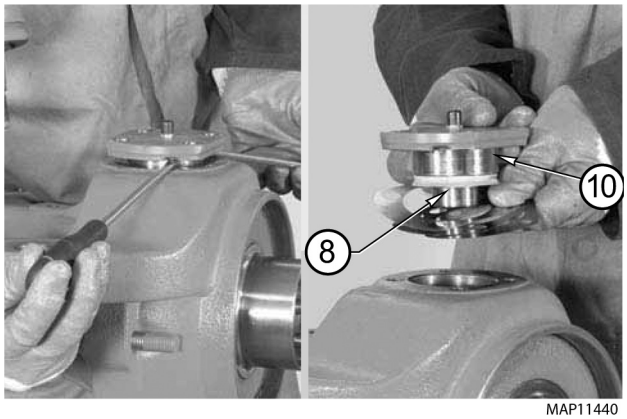
MAP11420

24. Remove the bottom articulation pin (**18**) complete with front sealing ring (**20**).



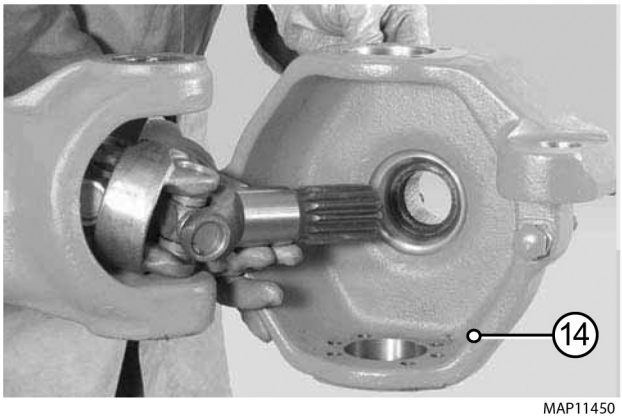
MAP11430

25. Loosen and remove the cap screws (**13**) from the top articulation pin (**10**).



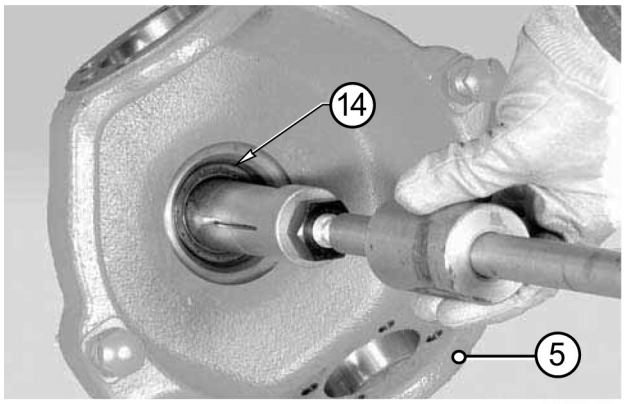
MAP11440

26. Using two levers, remove the top articulation pin (**10**) complete with front seal (**8**).
27. Pay attention not to damage the surfaces.



MAP11450

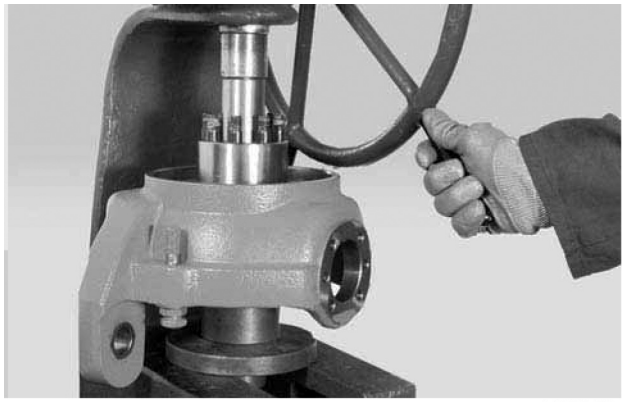
28. Remove the complete steering case (**14**).



MAP11460

29. Use a puller to remove the sealing ring from the steering case (**14**).

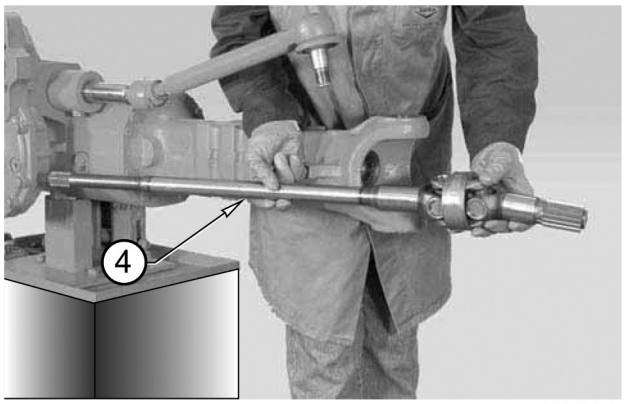
Note: *Write down the orientation of sealing ring (**5**).*



MAP11470

30. Remove the bushing (**6**) from the steering case (**14**).

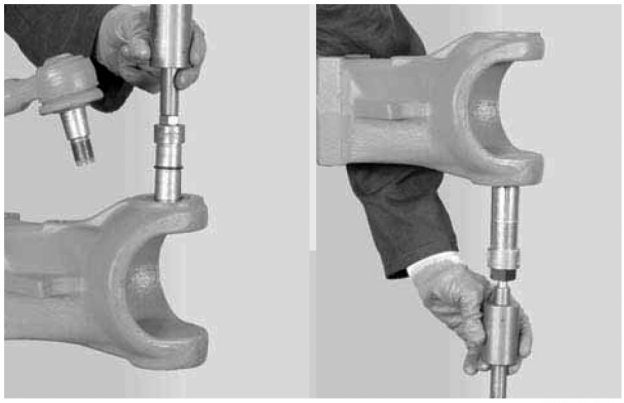
Note: *Write down the orientation of bushing.*



MAP11480

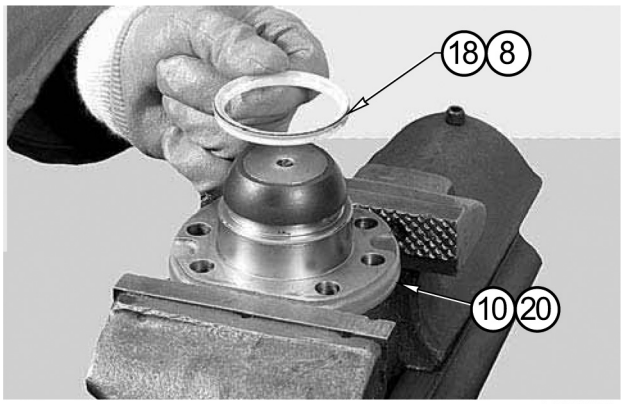
31. Remove the u-joint (**4**).

Note: *To remove the u-joint use, if necessary, a plastic hammer or a lever.*



MAP11490

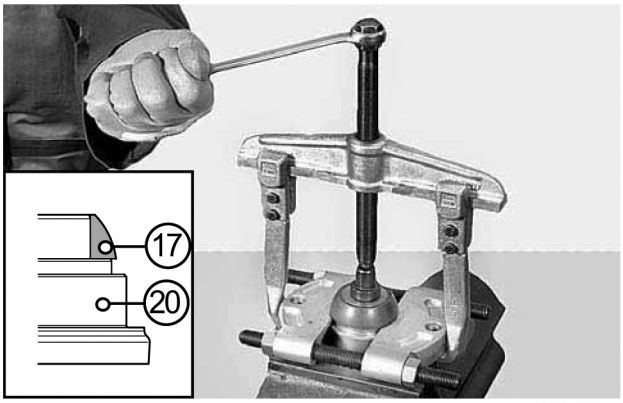
32. Using a puller for inner parts, remove the top bushing (**7**) and the bottom ball-bushing (**17**).



MAP11500

33. Remove the articulation pins (**10**) and (**20**) and the front sealing rings (**8**) and (**18**).

Note: *Write down the side for assembly.*



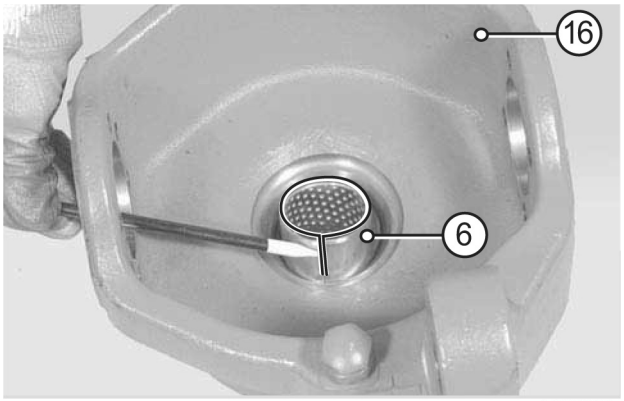
MAP11510

34. If the ball cover (**17**) needs replacing, remove it from the bottom articulation pin (**20**).

MAP11520

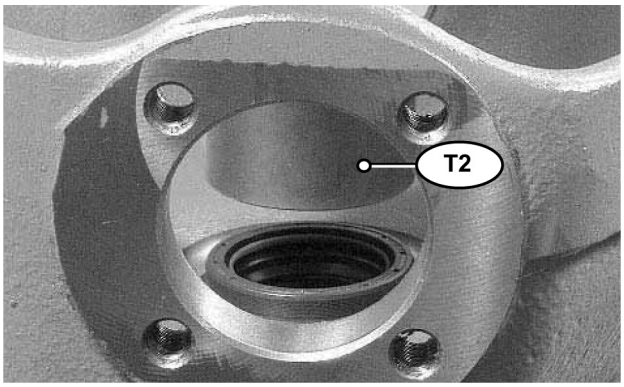
35. Remove seal ring (**3**) and the bushing (**2**) from the arm (**1**).

3.3 PLANETARY REDUCTION - 1.6 AND STEERING CASE - ASSEMBLY



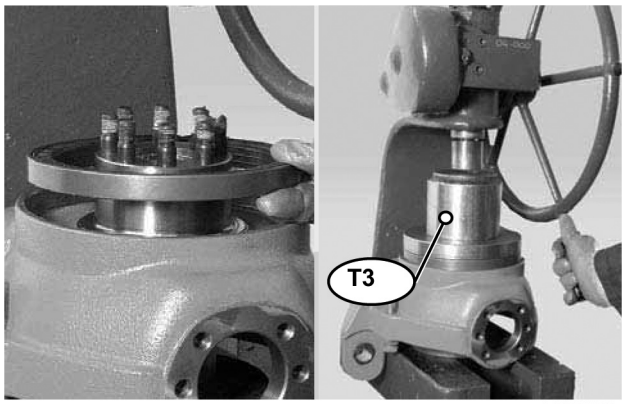
MAP11530

1. Lubricate the bushing (**6**) and the seat of the steering case (**14**)
2. Install the bushing (**6**), using tool (**T1**).



MAP11540

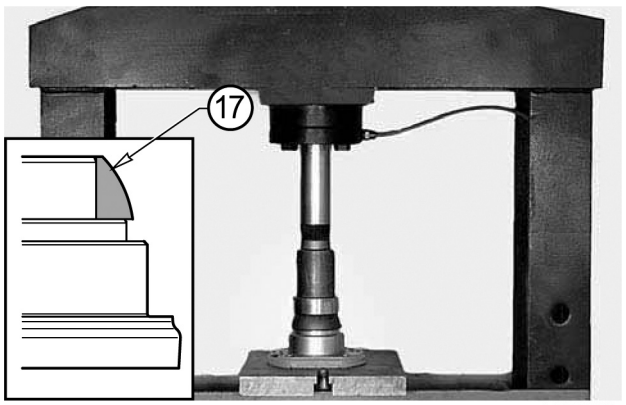
3. Lubricate the outer surface of the sealing ring (**5**); fit them into their seat using tool (**T2**).



MAP11550

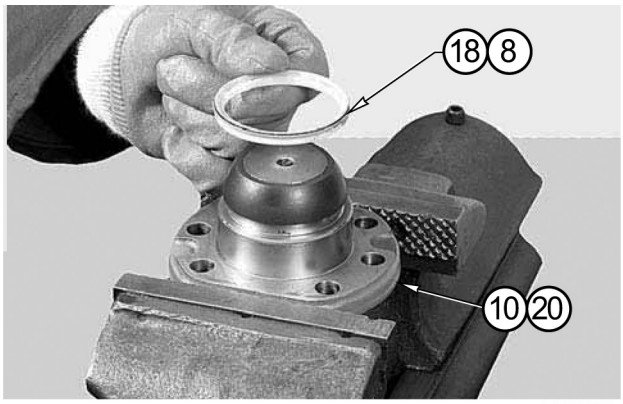
4. Using special tool (**T3**) apply a repositionable jointing compound for seals to the outer surface of the sealing ring (**44**).
5. Position the sealing ring (**44**) in the steering case (**14**).

Note: *Check that the ring (**44**) is correctly oriented.*



MAP11560

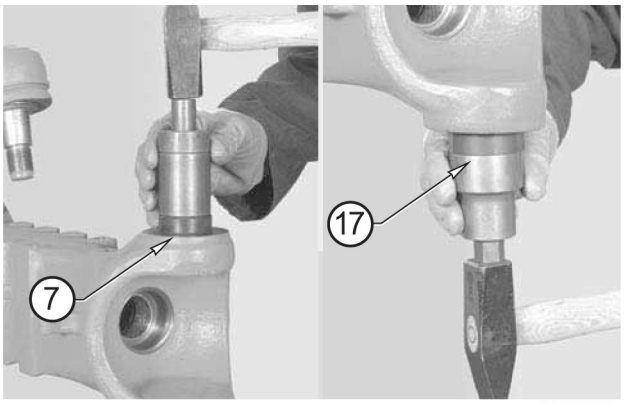
6. If the bottom articulation pin (**17**) has been extracted, position the pin under a press and fit the ball cover (**20**).



MAP11570

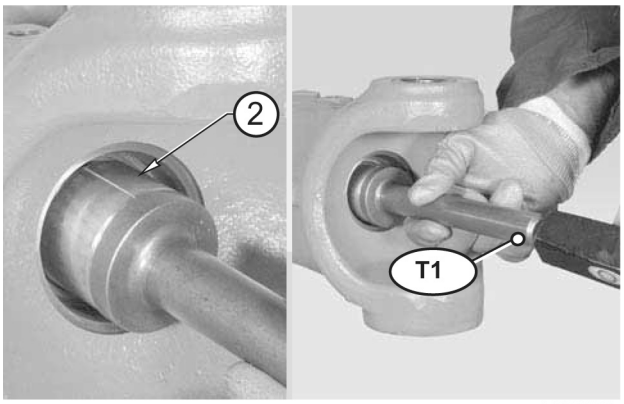
7. Fit the front sealing rings (**18**) and (**8**) onto the articulation pins (**10**) and (**20**).

Note: *Carefully check that the rings are properly oriented (**18**) and (**8**).*



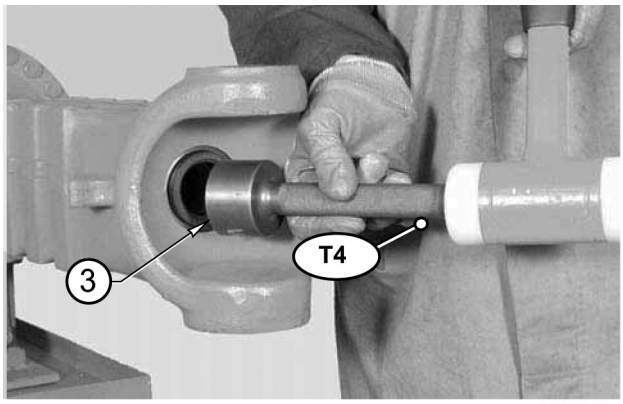
MAP11580

8. Lubricate the top bushing (**7**) or the bottom ball bushing (**17**) and fit them into the fulcrum holes of the arm.



MAP11590

9. Lubricate the bushing (**2**) and the seat of the steering case (**1**).
10. Install the bushing (**2**), using special tool (**T1**).

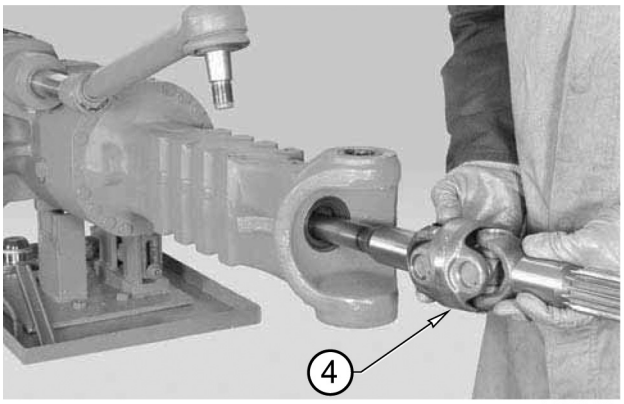


MAP11600

11. Lubricate and fit the sealing ring (**3**) onto tool (**T4**).
12. Install the rings into the arm.

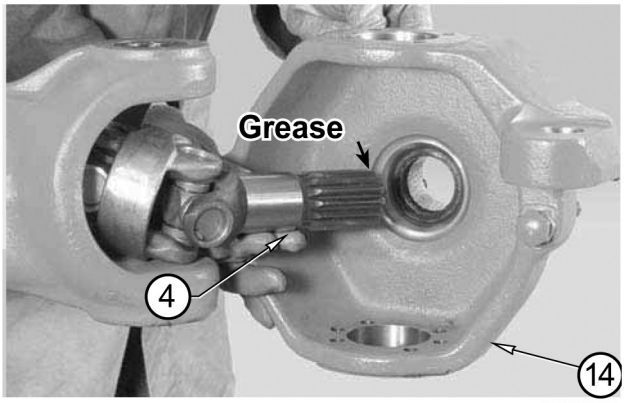
⚠ CAUTION

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



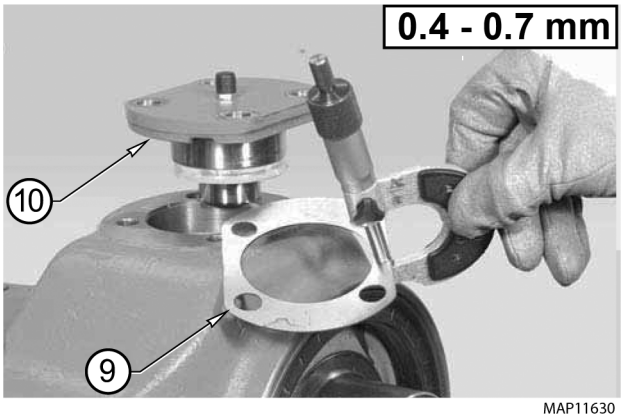
MAP11610

13. Insert the u-joint (**4**).



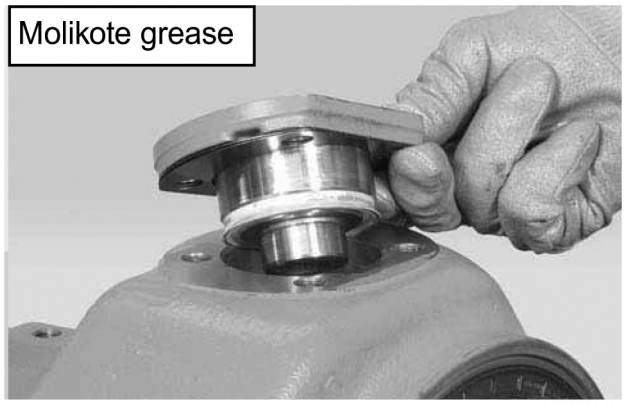
MAP11620

14. Lubricate the terminal of the u-joint (**4**) and install the steering case (**14**).
15. Pay attention not to damage the dust cover rings and sealing rings.



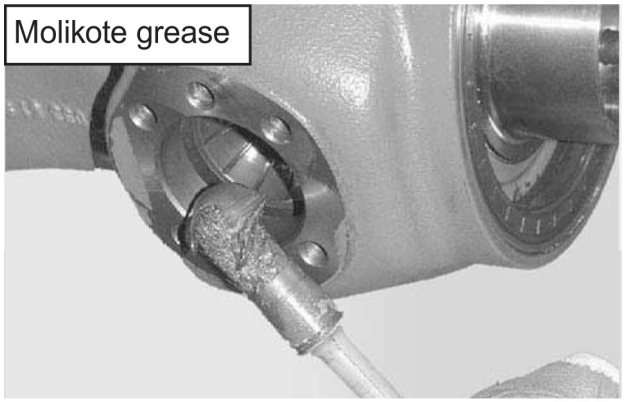
MAP11630

16. Prepare a series of shims (**9**) of 0.4 up to 0.7 mm to be assembled under the upper pin (**10**).



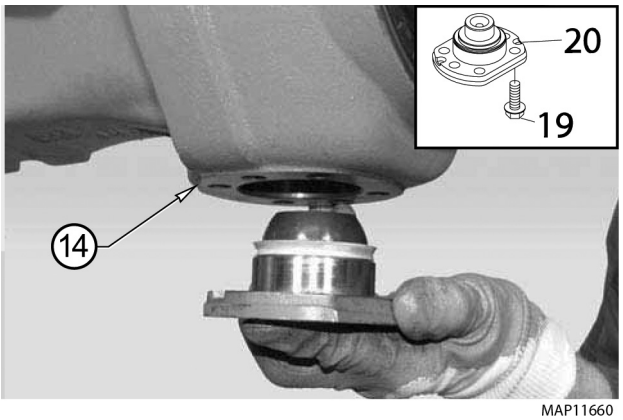
MAP11640

17. Lubricate and install the unit in the steering case.



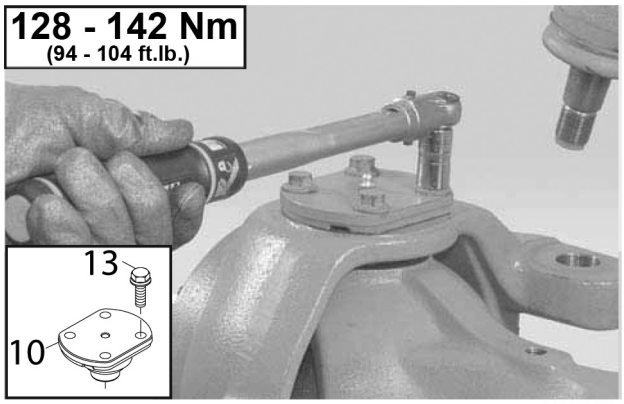
MAP11650

18. Lubricate the steering case.



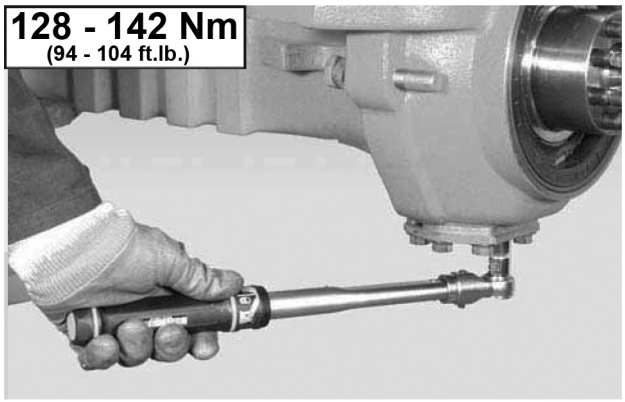
MAP11660

19. Fit the unit (**20**) in the steering case (**14**).
20. Position the screws (**19**) and tighten.



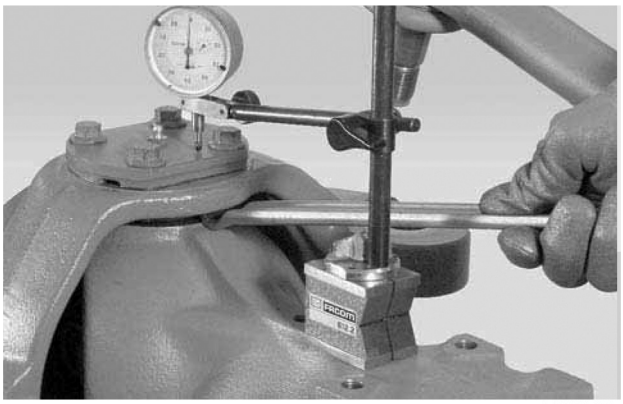
MAP11670

21. Tighten the new cap screws (**13**) of top articulation pins in sequence using the criss-cross method.
Torque wrench setting: 128 - 142 Nm (94 - 104 ft.lb.)

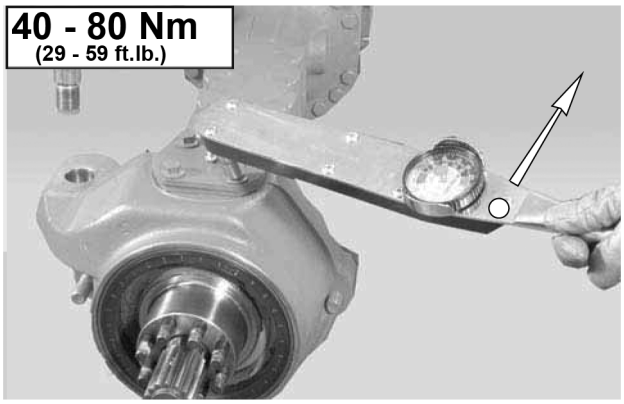


MAP11680

22. Tighten the new cap screws (**19**) of bottom articulation pins in sequence using the criss-cross method.
Torque wrench setting: 128 - 142 Nm (94 - 104 ft.lb.)

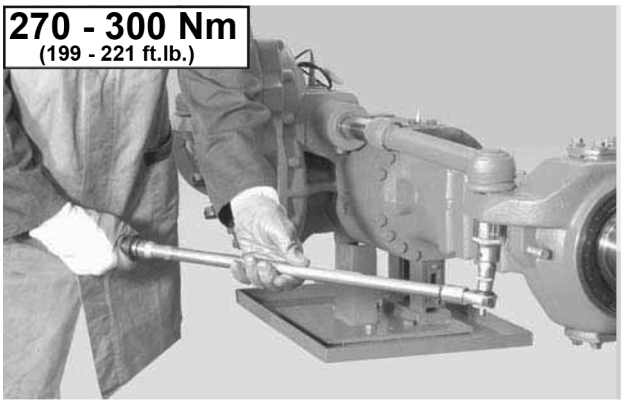

MAP11690

23. Check by means of a lever that there is no vertical gap.
24. In case there is any gap, determine the width and reduce it by removing shims.



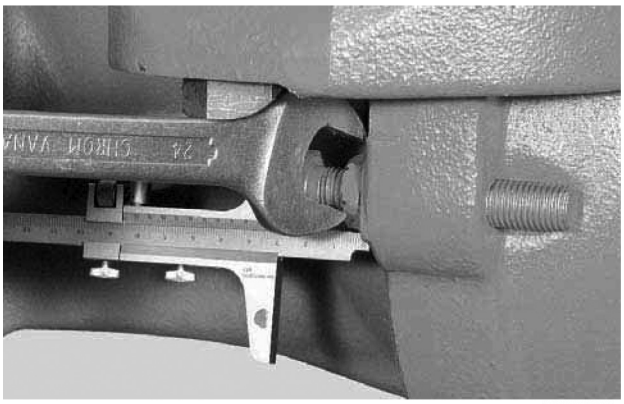
MAP11700

25. Check the torque of the pins, which has to be between 40 - 80 Nm (29 - 59 ft.lb.).
26. If the preliminary measurement value is too high, the shims have to be increased.



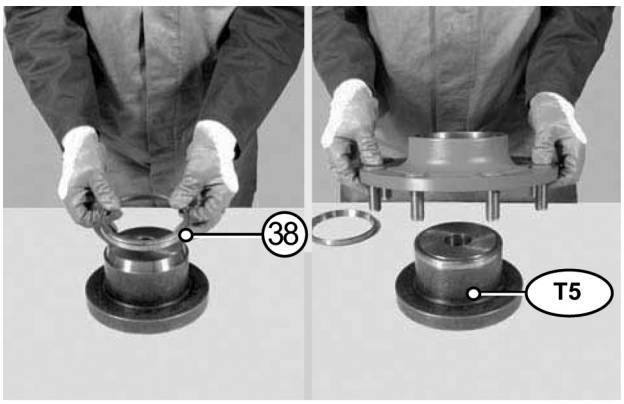
MAP11710

27. Look for the position of the notch regarding the safety cotter pin hole when the nut is locked to a maximum 300 Nm (221 ft.lb.).



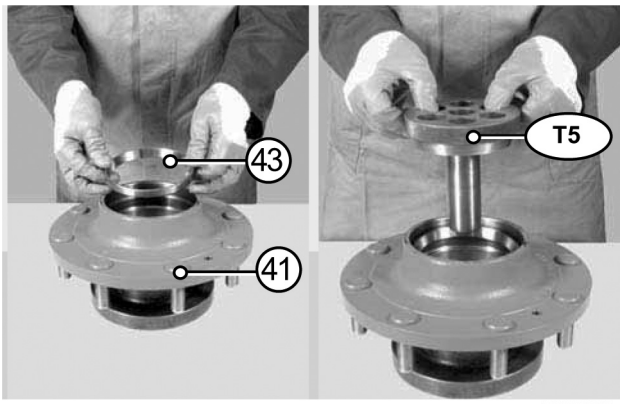
MAP11720

28. Bring the lockscrew to the value previously measured.



MAP11730

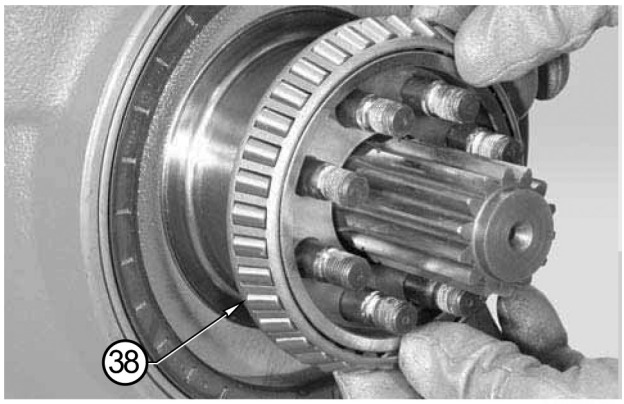
29. Position the lower part of tool (**T5**) and the thrust block of the external bearing (**38**).



MAP11740

30. Lubricate the seats of the bearings and position the hub (**41**) on tool (**T5**) position the thrust block of the internal bearing (**43**).

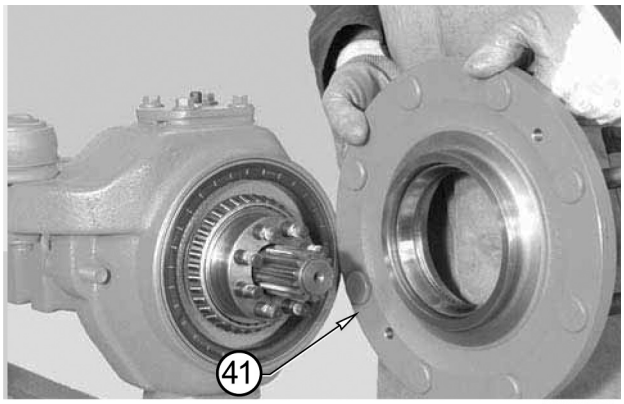
Note: *Check that the thrust block is correctly oriented.*



MAP11750

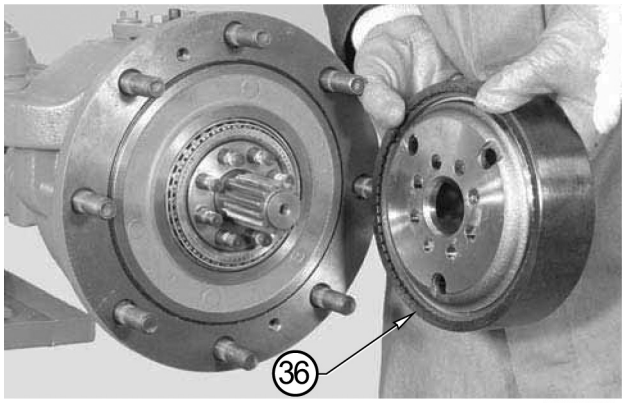
31. Install the external bearing (**38**).

Note: *Move the bearing to the limit stop by hammering lightly all around the edge.*



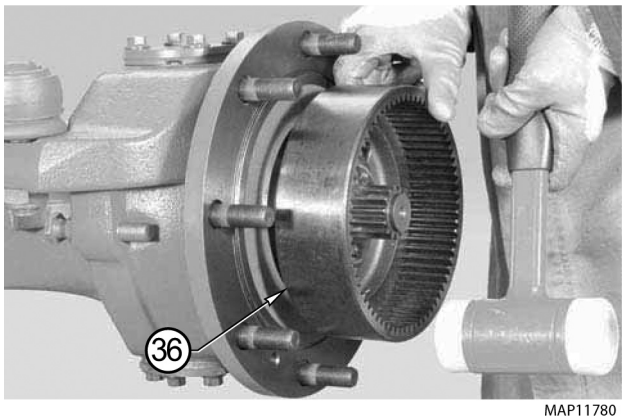
MAP11760

32. Install the wheel hub (**41**).



MAP11770

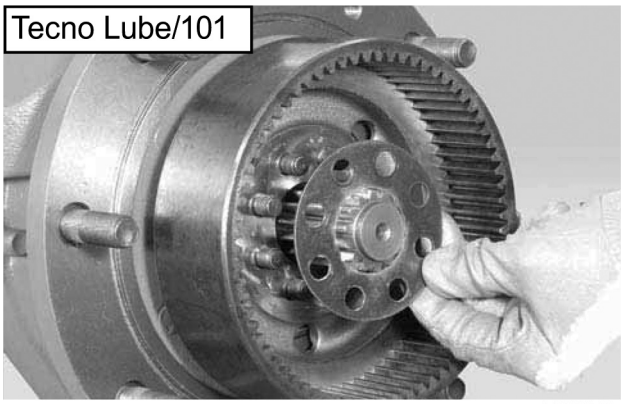
33. Install the ring gear (**36**).



MAP11780

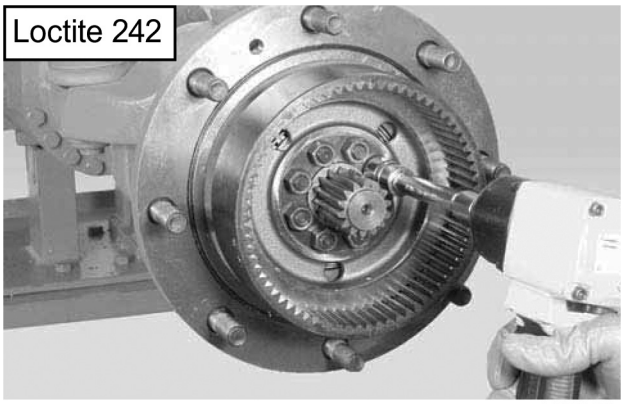
34. Install the complete ring crown flange (**36**).

Note: *In order to fasten the flange (**36**), use a plastic hammer and alternately hammer on several equidistant points.*



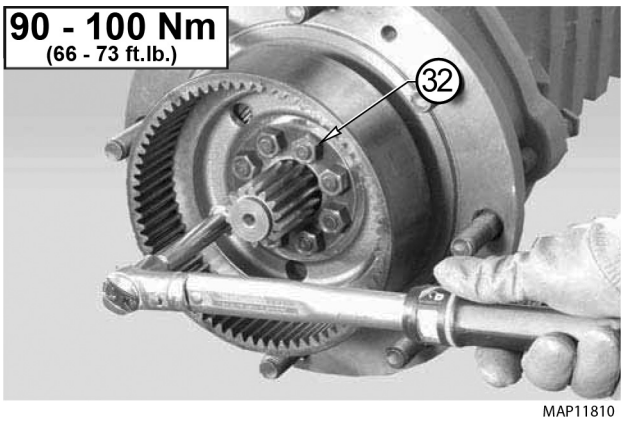
MAP11790

35. Install the security flange (**33**). Using Techno Lube/101, grease the surface of the safety flange (**33**) that touches the ring gear.



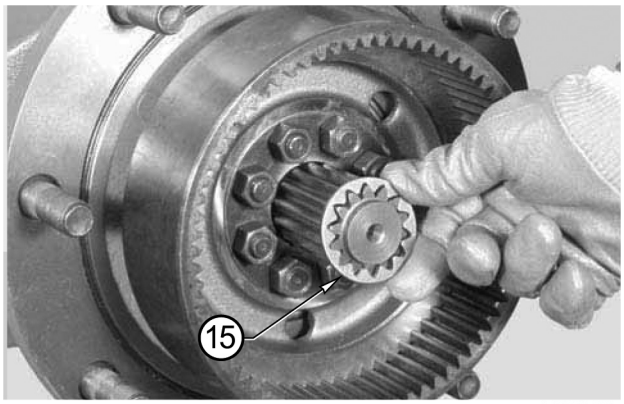
MAP11800

36. Coat the nuts (**23**) with Loctite 242 and tighten them.



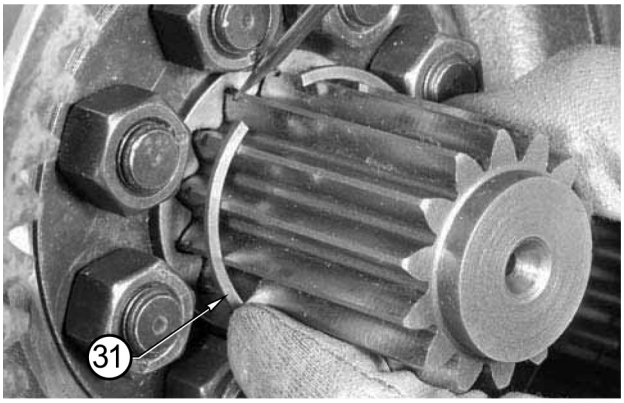
MAP11810

37. Tighten nuts (**32**) in two stages, using the criss-cross method.
    Initial torque wrench setting: 90 Nm (66 ft.lb.)
    Final torque wrench setting: 100 Nm (73 ft.lb.)



MAP11820

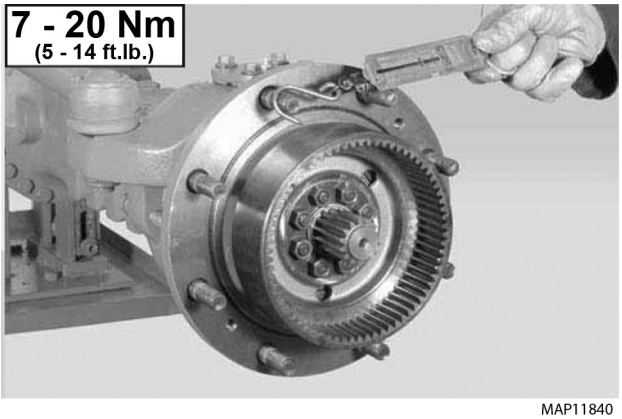
38. Install the spacer (**15**).



MAP11830

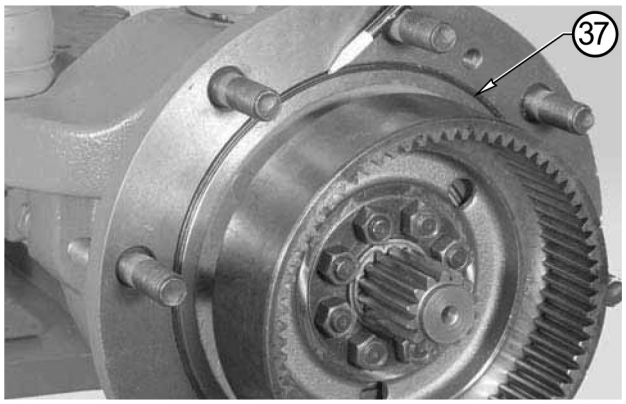
39. Fit the NEW safety snap ring (**31**).

Note: *Check that the snap ring is fitted correctly and safely in its seat.*



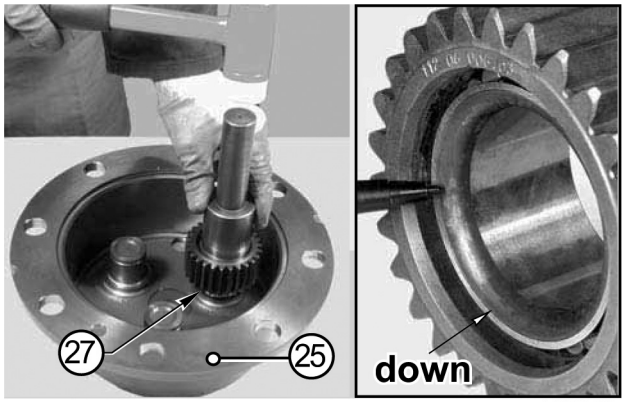
MAP11840

40. Check the continuous rolling torque on the hub. Torque 7 - 20 Nm (5 - 14 ft.lb.)



MAP11850

41. Check the condition and position of the o-ring (**37**).

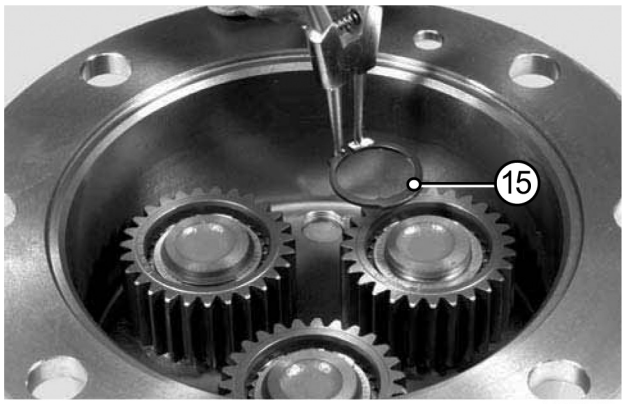


MAP11860

42. Fit the planetary gear (**27**) onto the planetary gear cover (**25**).

⚠ CAUTION

The jointed portion of the internal ring of the bearings must face the bottom of the pin.

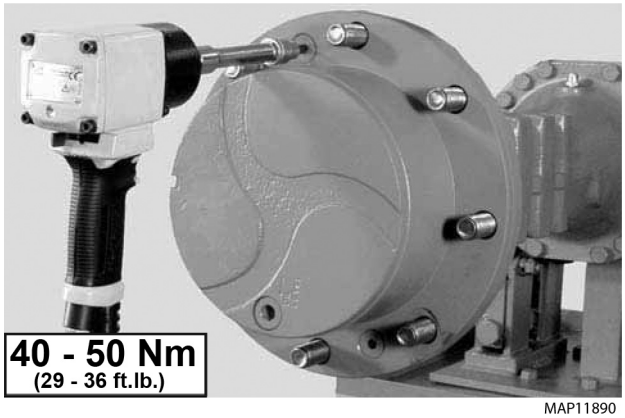


MAP11870

43. Lock into position the planetary gears (**16**) with the snap rings (**15**).

MAP11880

44. Fit the planetary gear cover (**18**) onto the wheel hub (**4**).



MAP11890

45. Tighten with a torque wrench to 40 - 50 Nm (29 - 36 ft.lb.).

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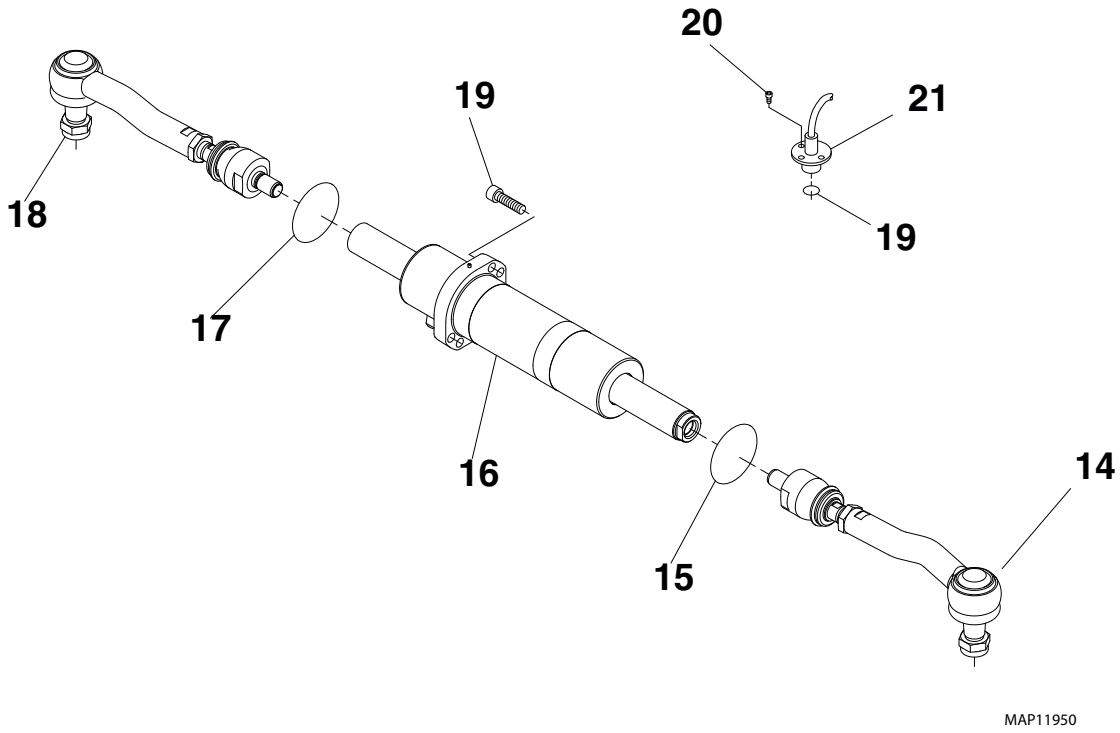
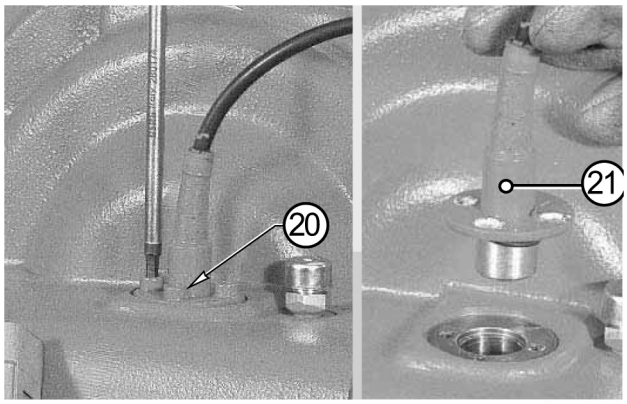
Section 4
Steering Cylinder

4.1 EXPLODED VIEW

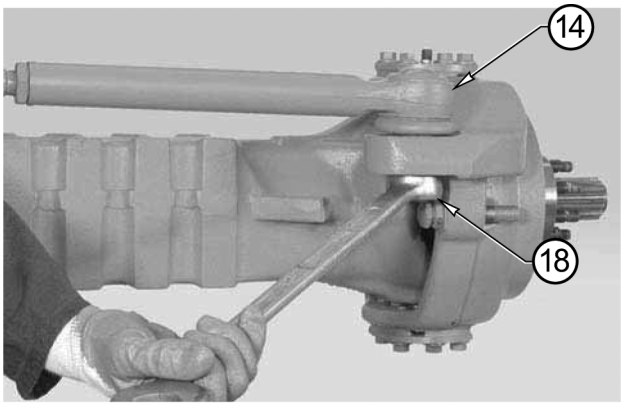


4.2 STEERING CYLINDER - DISASSEMBLY



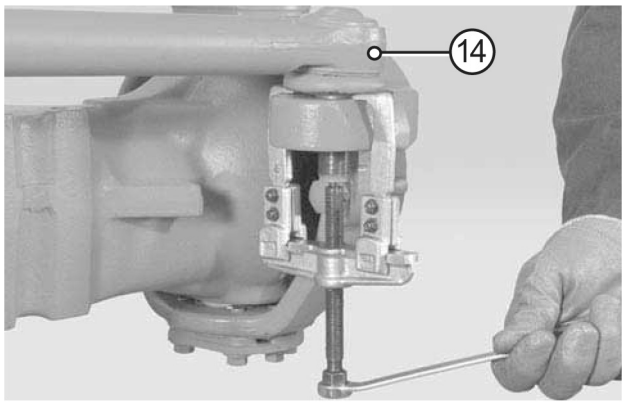
MAP11960

1. Remove the steering piston sensor (**21**).



MAP11970

2. Remove the nuts (**18**) that lock the articulation pins (**14**).

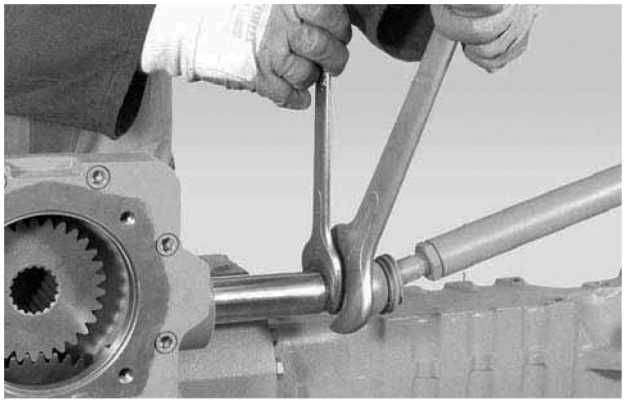


MAP11980

3. Disconnect the tapered pins of the articulation (**14**) from the steering case using a puller.

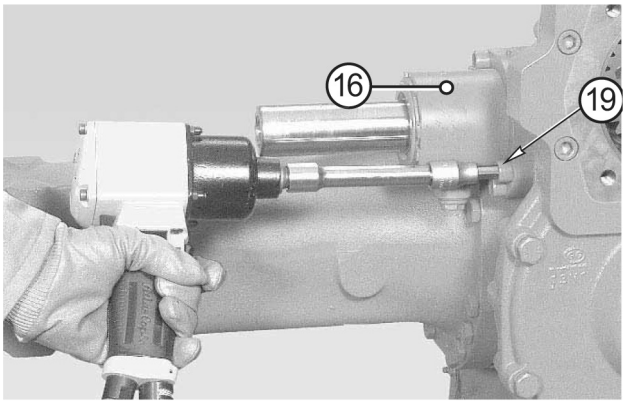
MAP11990

4. If the connection of the steering bars includes a safety collar, raise the border.



MAP12000

5. Disconnect left and right steering bars from the piston.



MAP12010

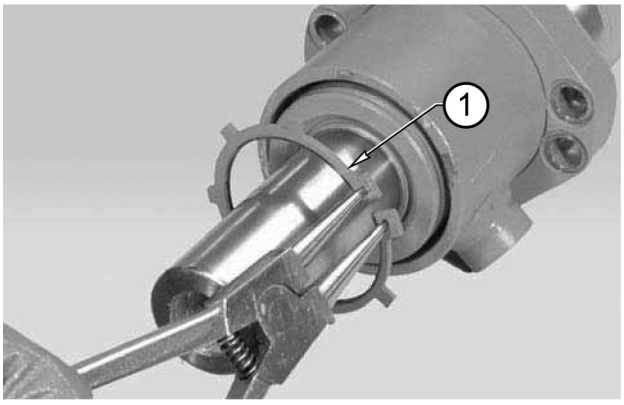
6. Remove the securing screws (**19**) from the steering cylinder (**16**).

MAP12020

7. Extract the cylinder (**16**) using a plastic hammer.

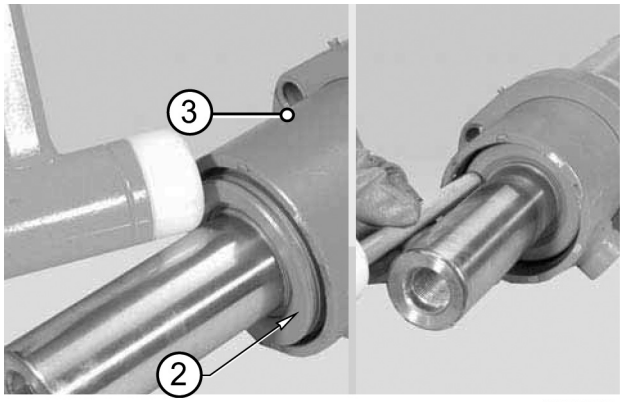
⚠ CAUTION

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



MAP12030

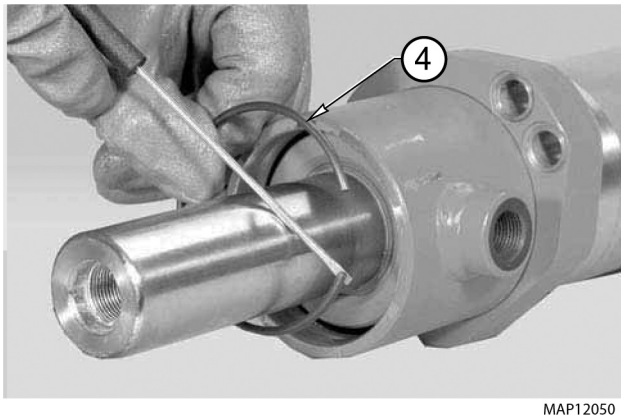
8. Using a snap ring plier, remove the snap ring (**1**) of the cylinder head.



MAP12040

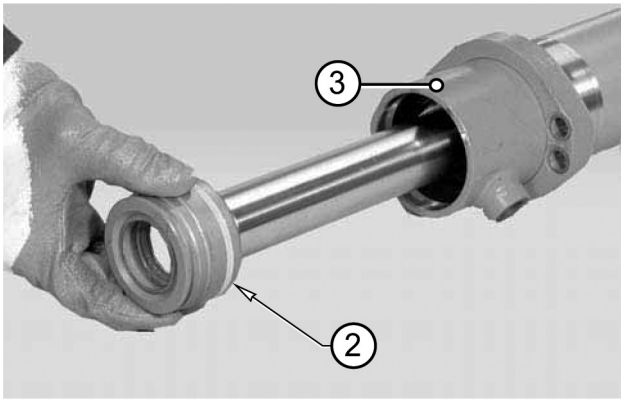
9. Lightly tap the cylinder head (**2**) with a plastic hammer so as to push it inside the cylinder (**3**).

Note: *Insert the cylinder head so it is flush with the cylinder.*



MAP12050

10. Using a punch, force the stop ring (**4**) located inside the cylinder (**3**) and extract ring using a screwdriver.



MAP12060

11. Take the cylinder unit a part by extracting the head first, followed by the piston.

MAP12070

12. Write down the direction of the piston seal ring that is towards cylinder head.

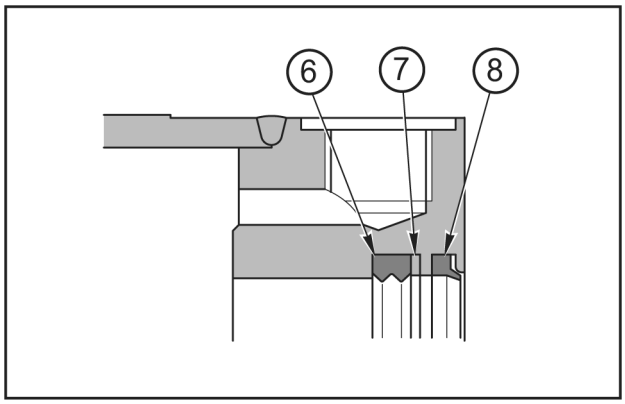
MAP12080

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

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

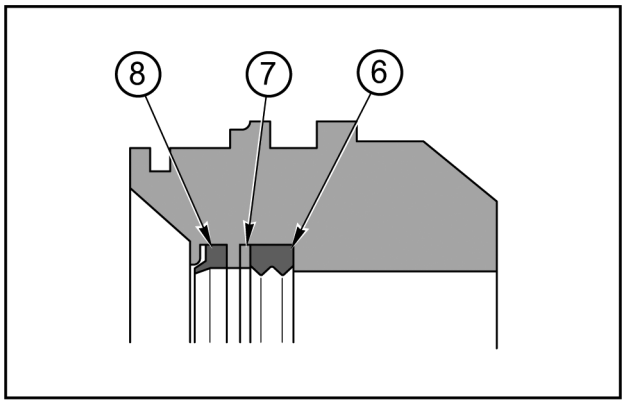
Note: *Particular attention must be paid not to damage the seats of both seals and piston slide.*

4.3 STEERING CYLINDER - ASSEMBLY



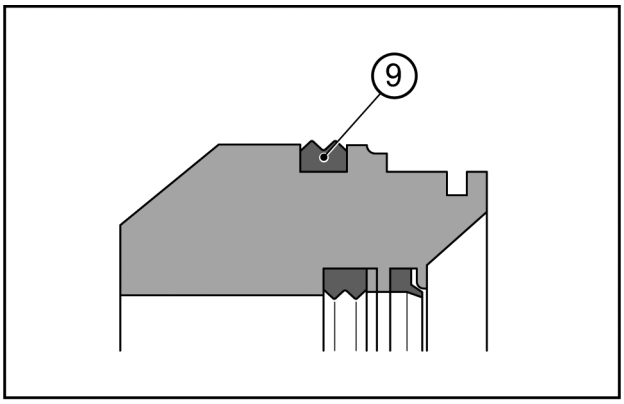
MAP12090

1. Grease and install the piston rod seal ring (**6**), rod wiper (**8**) and back up washer (**7**) into cylinder (**3**).



MAP12100

2. Grease and install the piston rod seal ring (**6**), rod wiper (**8**) and anti-extrusion ring (**7**) into the head (**2**).



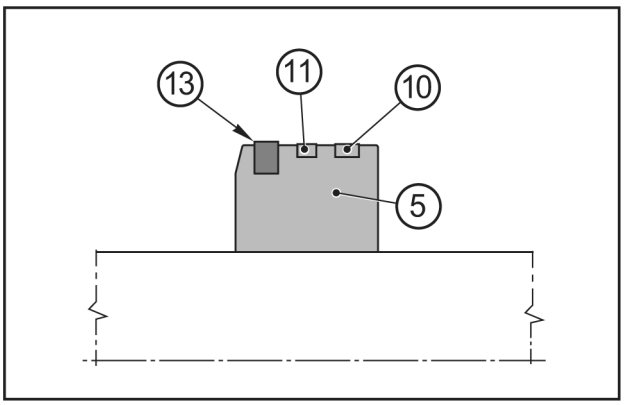
MAP12110

3. Fit seal (**9**) on the outside of the head (**2**).

⚠ CAUTION

To ease installation, grease the outer surface of the piston.

Do not roll the seal (**9**).

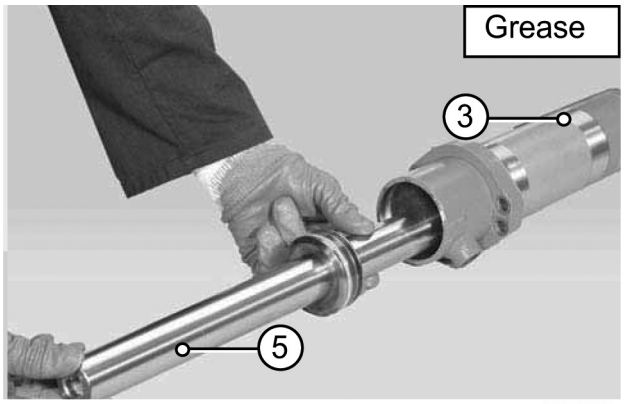


MAP12120

4. Prepare piston (**5**) by fitting it with magnetic ring (**11**), anti-extrusion ring (**10**) and piston seal (**13**).

⚠ CAUTION

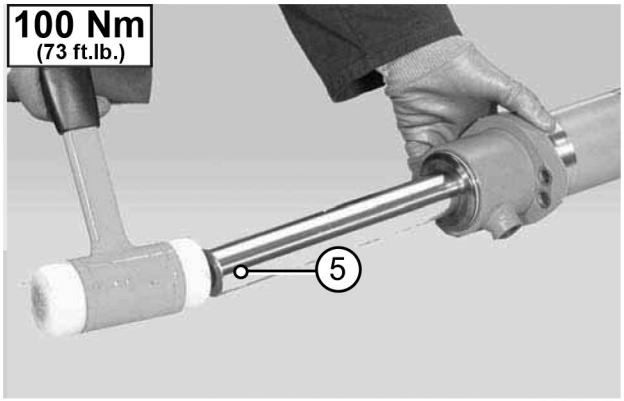
To ease installation, lubricate with grease.



MAP12130

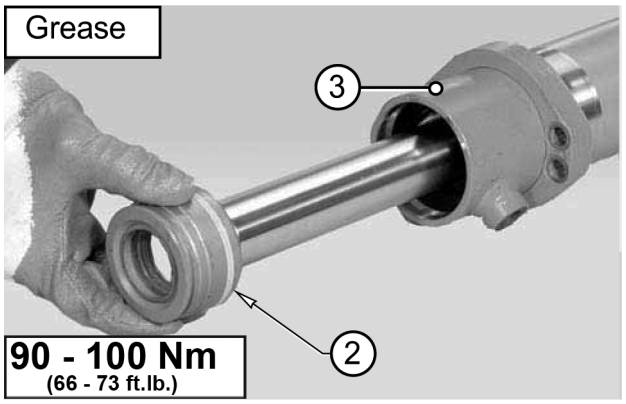
5. Center the shaft on the cylinder (**3**) so that it fits into the piston (**5**).

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



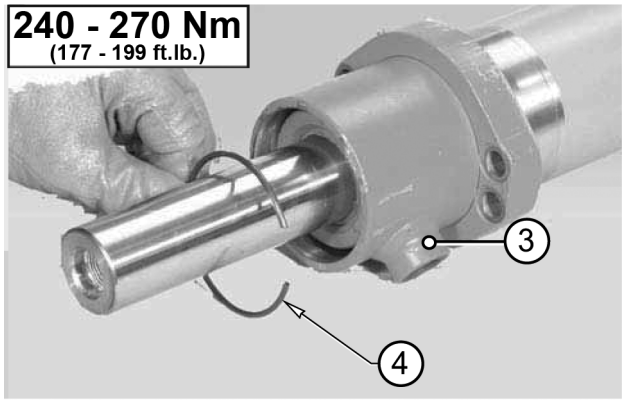
MAP12140

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



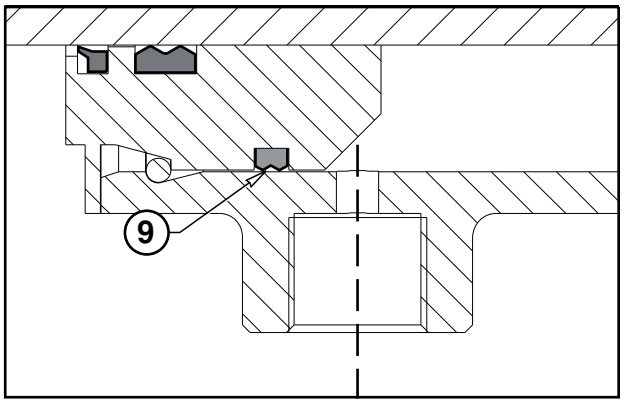
MAP12150

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



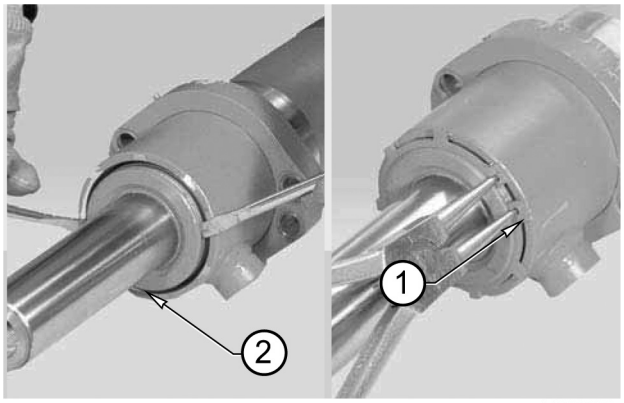
MAP12160

9. Install the stop ring (**4**) and ensure that it sets in the seat of cylinder (**3**).



MAP12170

10. Do not go beyond the ring of gasket the hole of feeding because it could be cut.



MAP12180

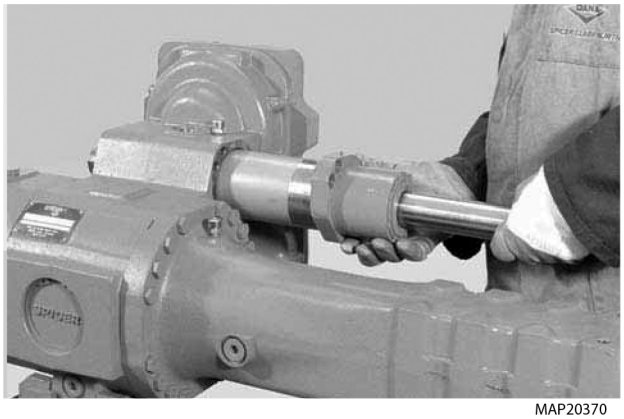
11. Using two screwdrivers or levers, force the head until it is seated against the stop ring (**4**). Fit the snap ring (**1**) on the head (**2**).

⚠ CAUTION

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.

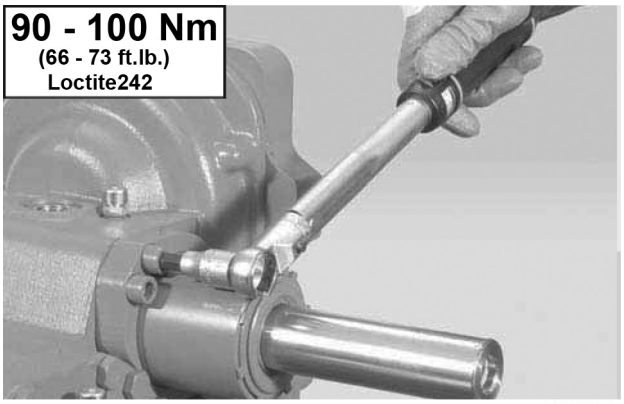
MAP12190

12. Replace at each reassembly.



MAP20370

13. Check that the o-rings (**17**) and (**15**) of the axle unit are in good condition; lubricate the seats of the seals and fit the steering cylinder (**3**).



MAP12200

14. Lock the cylinder by criss-cross method the screws (**3**).
    Torque wrench setting: 90 - 100 Nm (66 - 73 ft.lb.)

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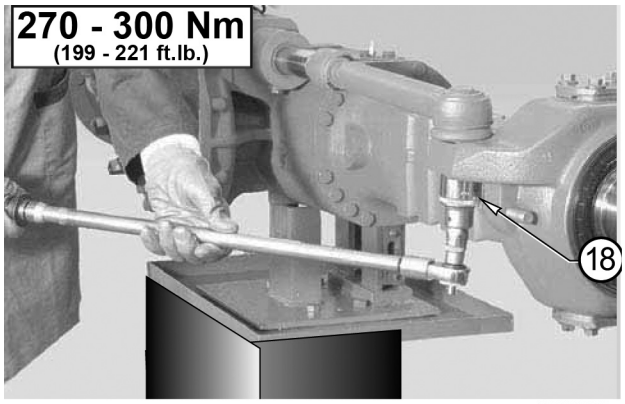
MAP12210

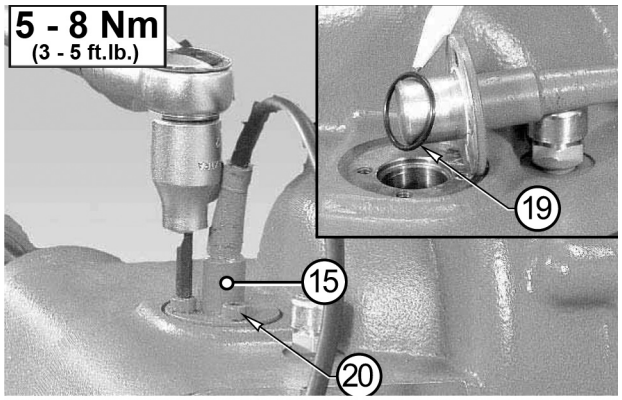
15. Apply Loctite 242 to the thread and connect the steering bars by tightening the terminals onto the piston stem.
    Torque wrench setting: 240 - 270 Nm (177 - 199 ft.lb.)

Note: *Versions with coupling require that the rim of the articulation is riveted onto the surfaces of the piston stem.*



MAP12220

16. Insert the pins (**18**) in the steering case and lock into position using a torque wrench setting of 270 - 300 Nm (199 - 221 ft.lb.).

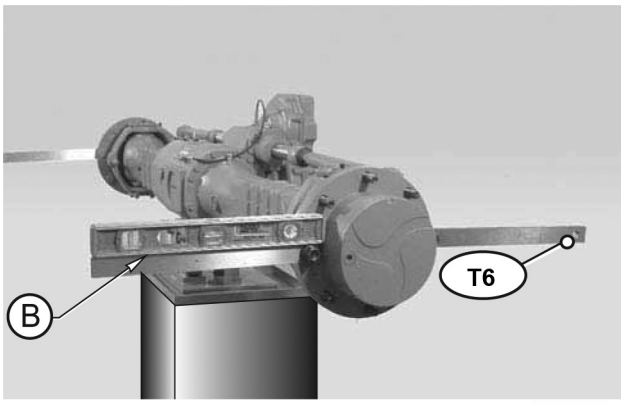


MAP12230

17. Install the steering piston sensor (**21**) for checking piston centering - if applicable - and tighten the screws (**20**).
    Torque wrench setting: 5 - 8 Nm (3 - 5 ft.lb.)

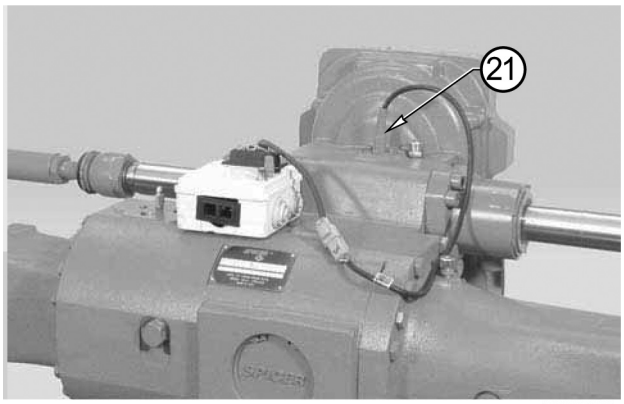
⚠ CAUTION

Eliminate the action of the negative brake, if fitted.



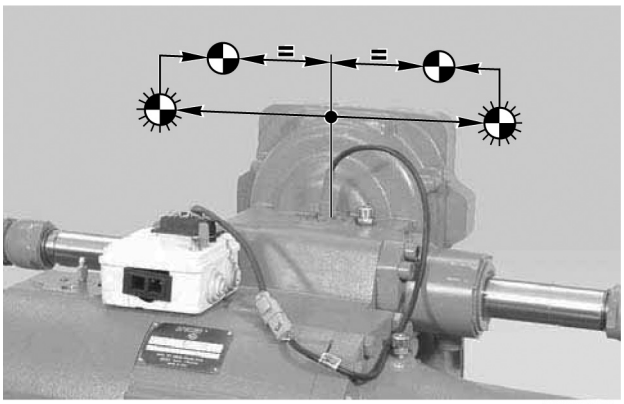
MAP12240

18. Apply tools (**T6**) to the hubs and lock them. Using a level "B", check that tools are perfectly flat and parallel to each other.



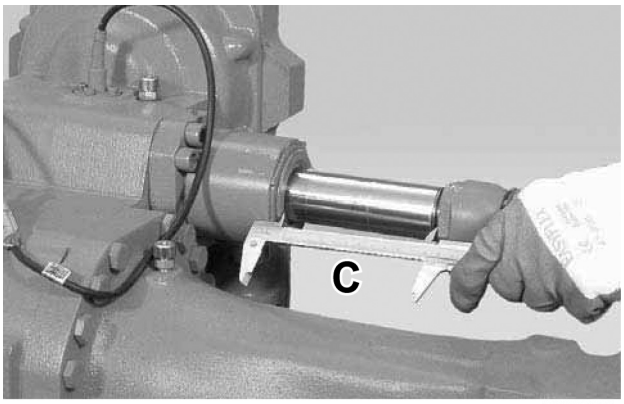
MAP12250

19. Connect the sensor (**21**) to the inspection device according to either diagram.



MAP12260

20. 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 the signal lamp of the inspection device in the reversal stage.



MAP12270

21. Inspect distance "C" on one side of the piston and write down the size for checking later adjustments.

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

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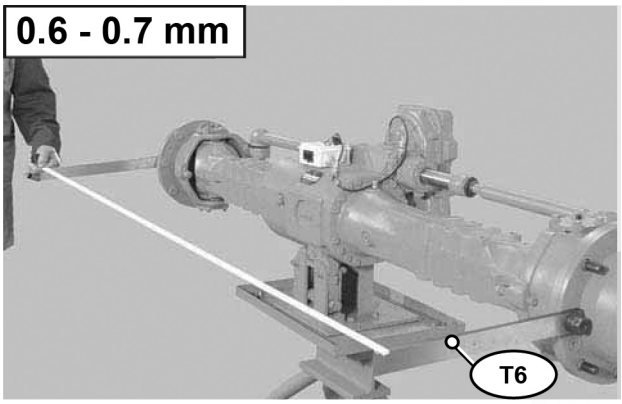
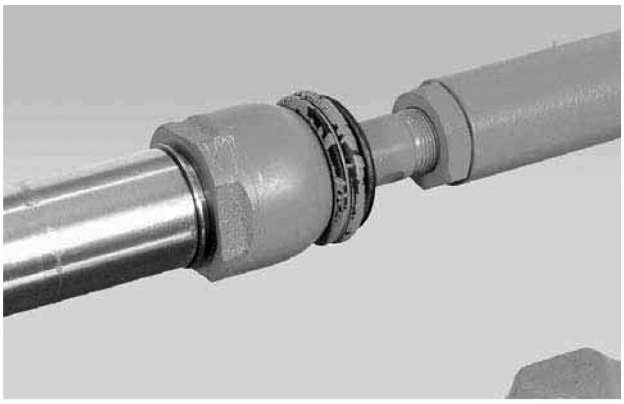


MAP12280

22. Without moving the piston, check front and rear size at the edge of tools (**T6**).
    Maximum difference: 0.6 - 0.7 mm.

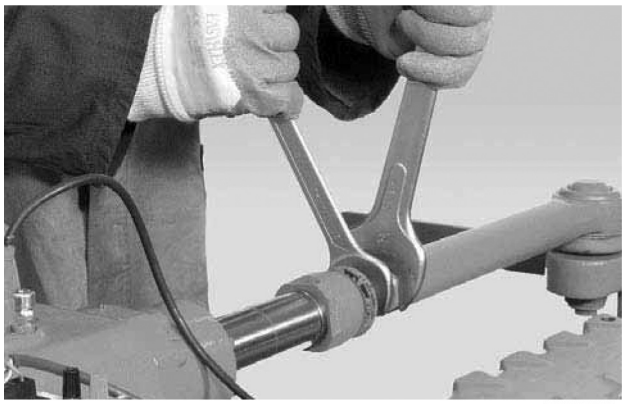
Note: *In order to check the rear size, rotate the bevel pinion and check that tools (***T6***) are flat.*



MAP12290

23. If necessary, adjust convergency without moving the centering of the piston and adjust the length of the steering bars (**14**).

Note: *With a half turn of screw, the front size is reduced by about 3 mm, whereas the rear one is increased by about 3 mm.*

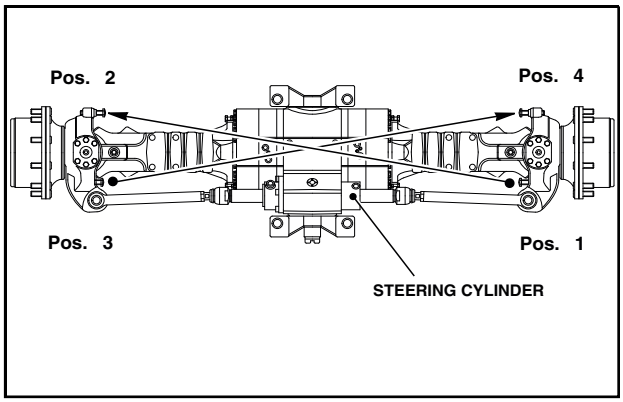


MAP12300

24. Loosen the nuts and tighten them onto the ball and socket joints.

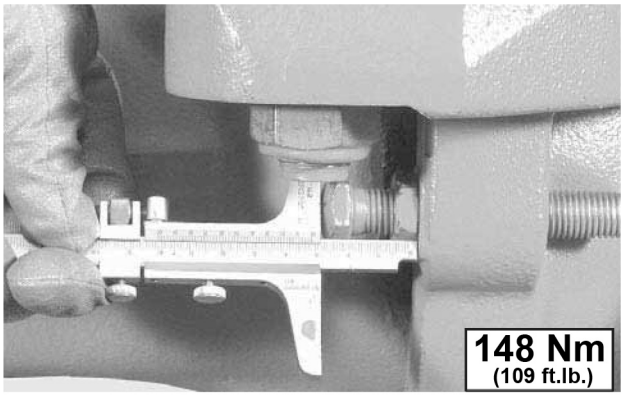
MAP12310

25. Hold the articulations still and rotate the ball and socket joints.
26. Once the convergency has been adjusted, lock the nuts.
    Torque wrench setting for nuts: 240 - 270 Nm
    (177 - 199 ft.lb.).



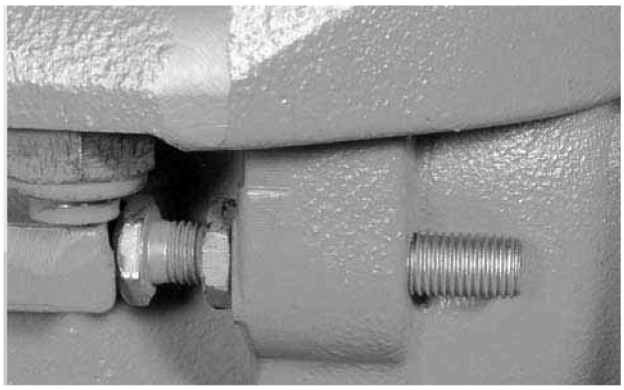
MAP12320

27. **ADJUSTING THE STEERING ANGLE** - Perform the same operations on both sides (see diagram). Loosen the nut of one of the adjusting screws on the cylinder side.



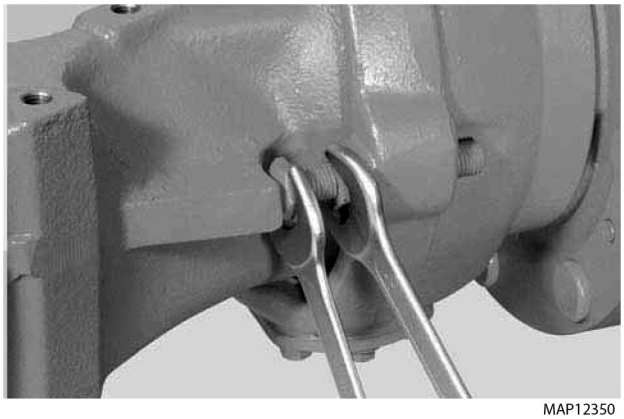
MAP12330

28. Adjust the distance portion of the screw according to data shown in the table. Lock into the position with nut tightened to maximum 148 Nm (109 ft.lb.).



MAP12340

29. Perform one full steering operation until the adjusted screw leans against the arm stop.



MAP12350

30. As you hold the adjusted screw in position against the arm stop, adjust the screw opposite, on noncylinder side, until it leans against the arm stop.

⚠ CAUTION

The screws must lean against the respective arm stops all at the same time.

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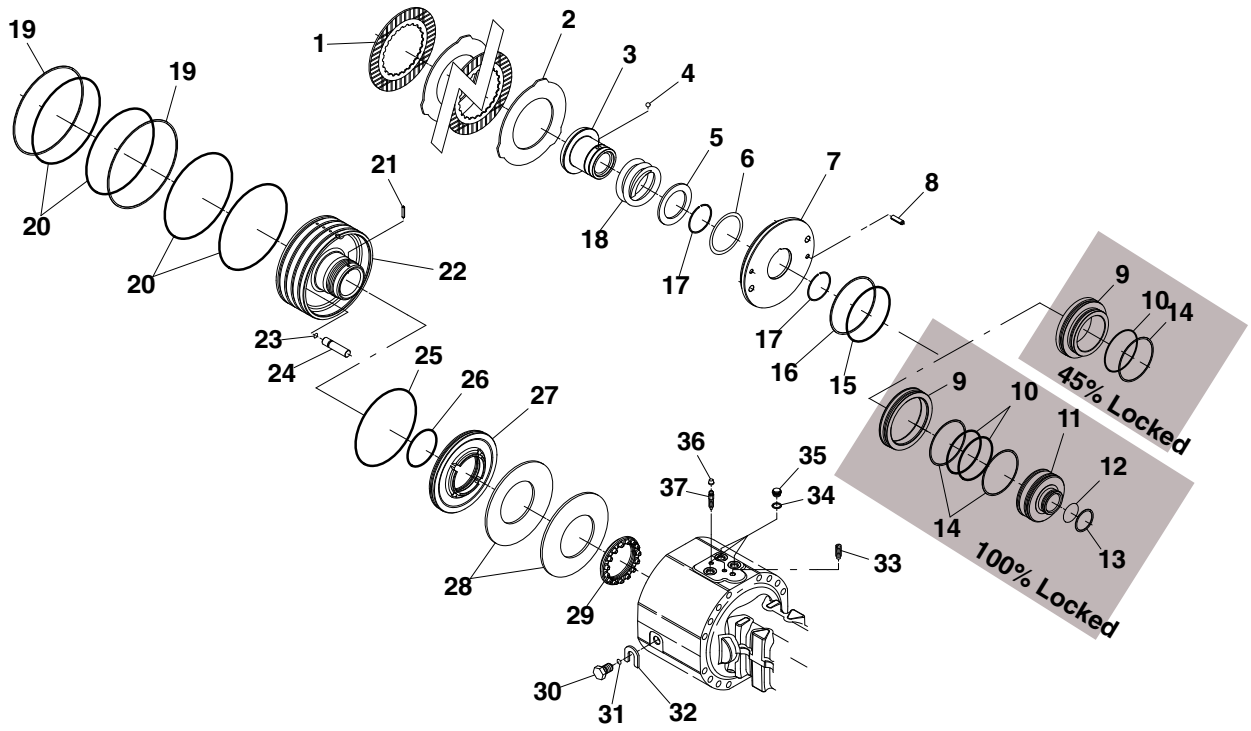
Section 5
Brake: Service Brake, Negative Brake, 45% Locked & 100% Locked

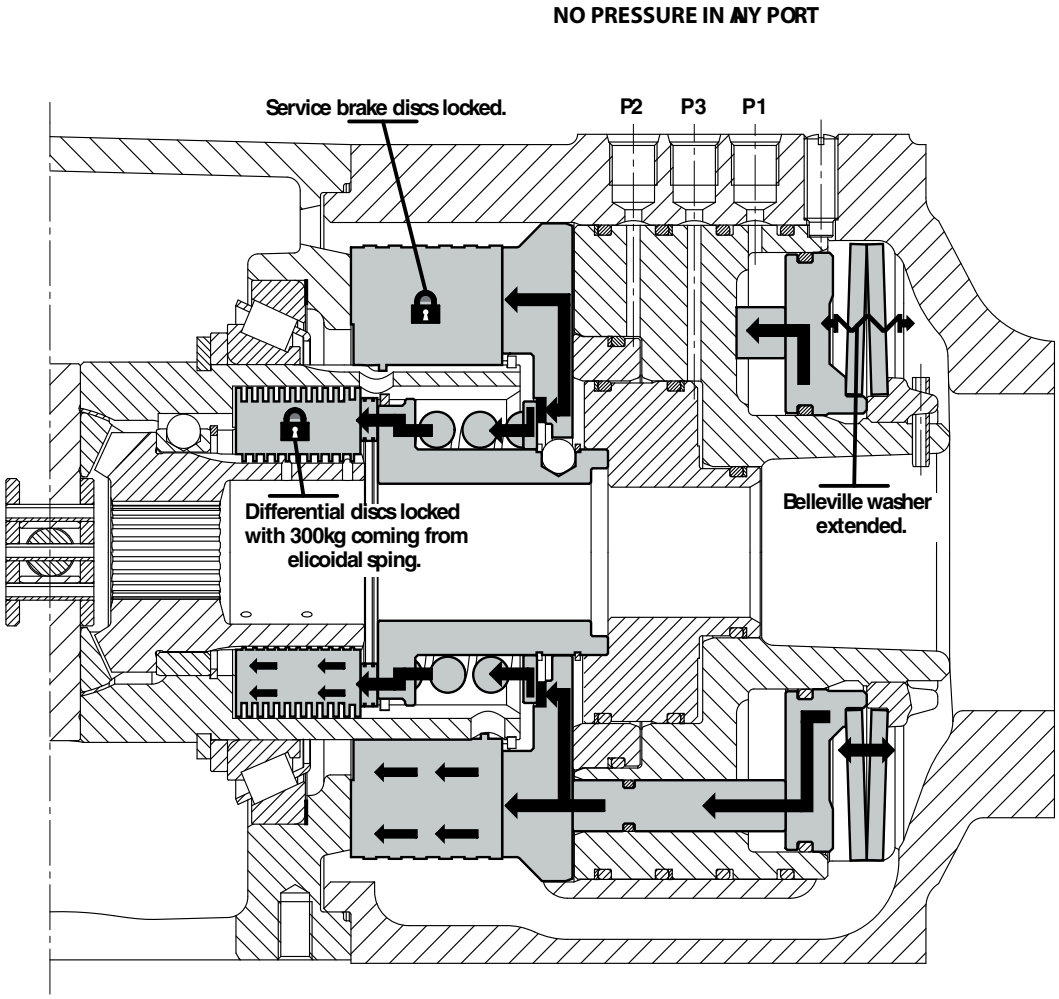
5.1 EXPLODED VIEW



MAP12370

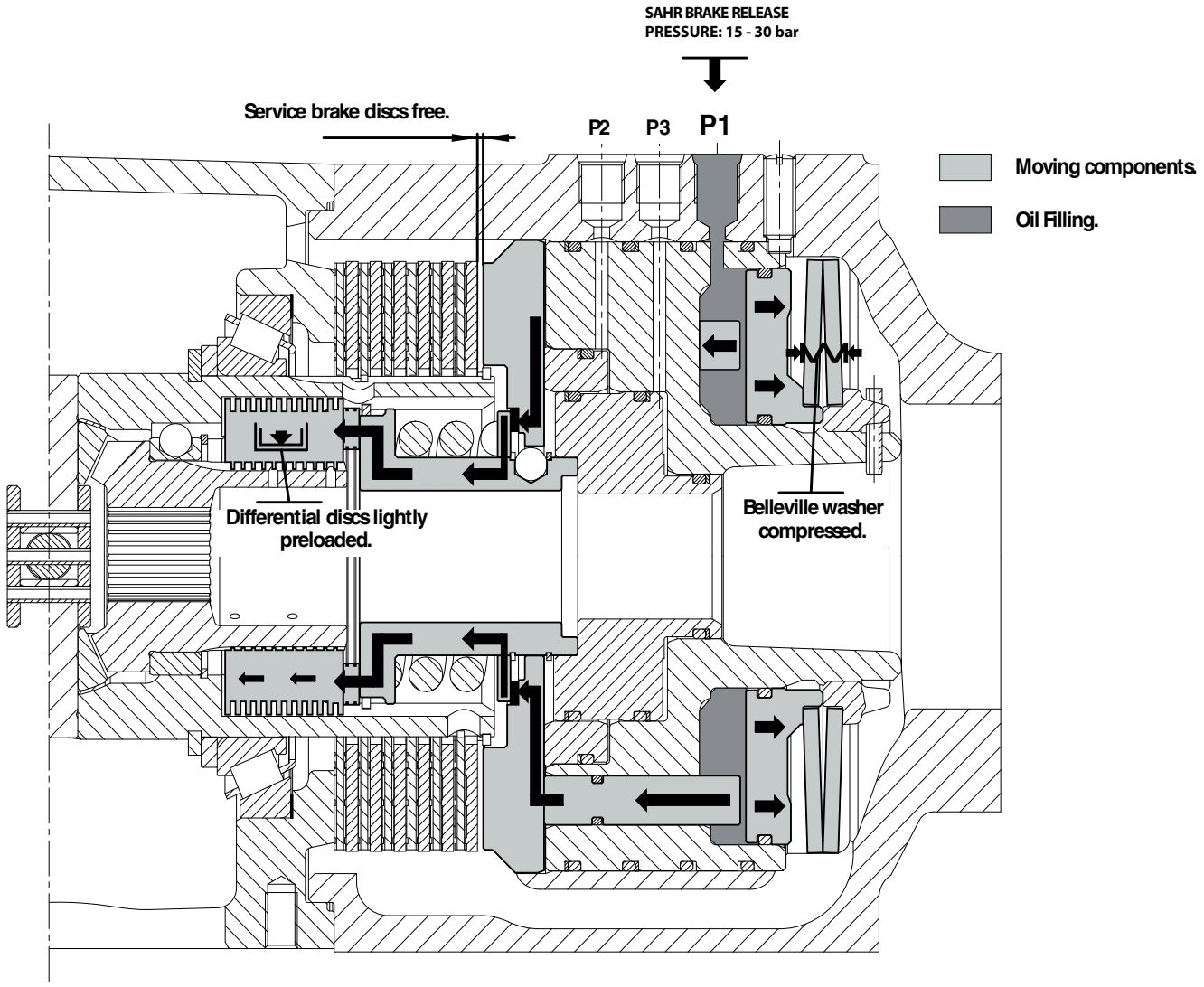
5.2 BRAKE WORKING CONDITIONS

5.2.1 SAHR BRAKE APPLIED



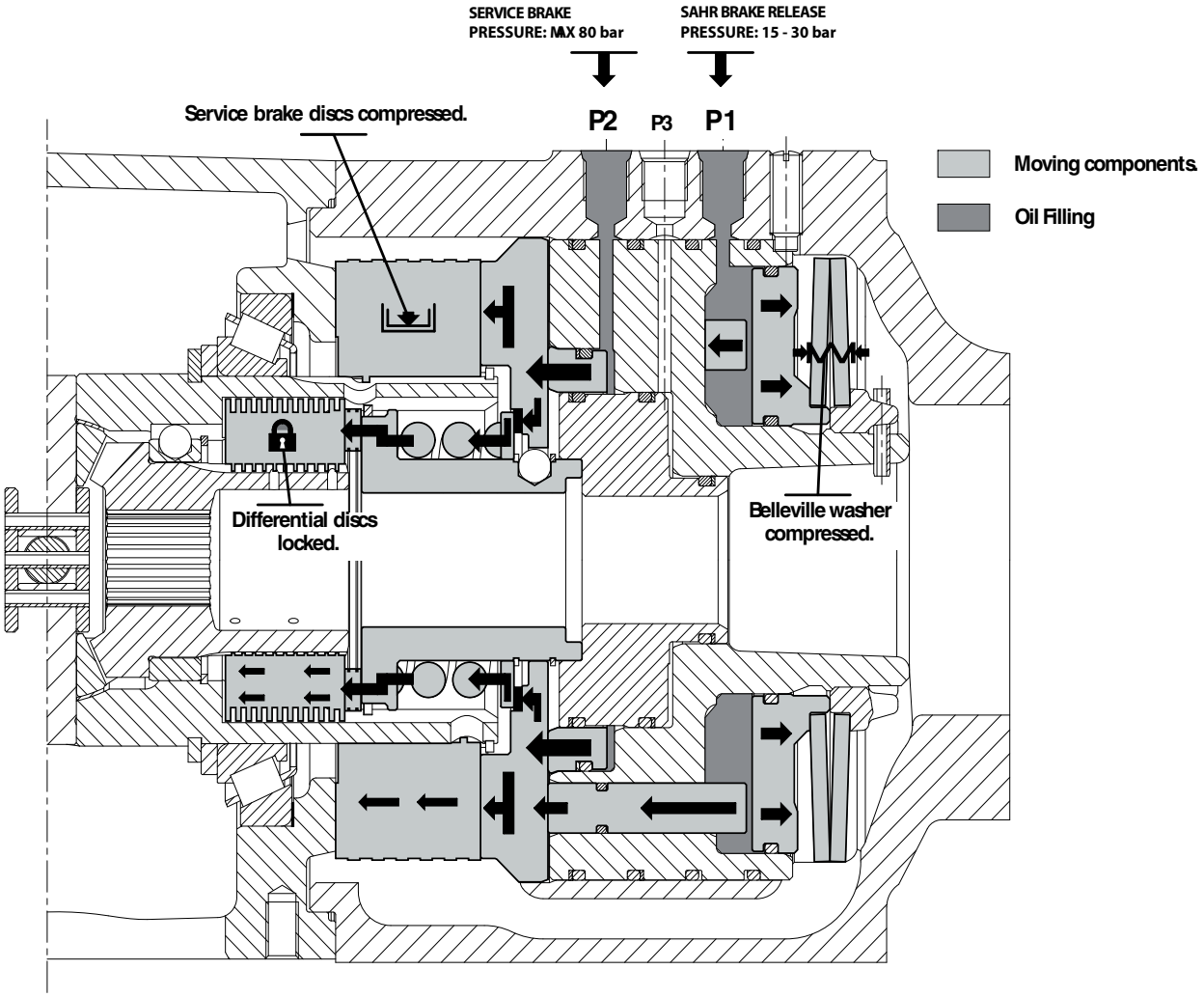
MAP12380

5.2.2 SAHR BRAKE RELEASED



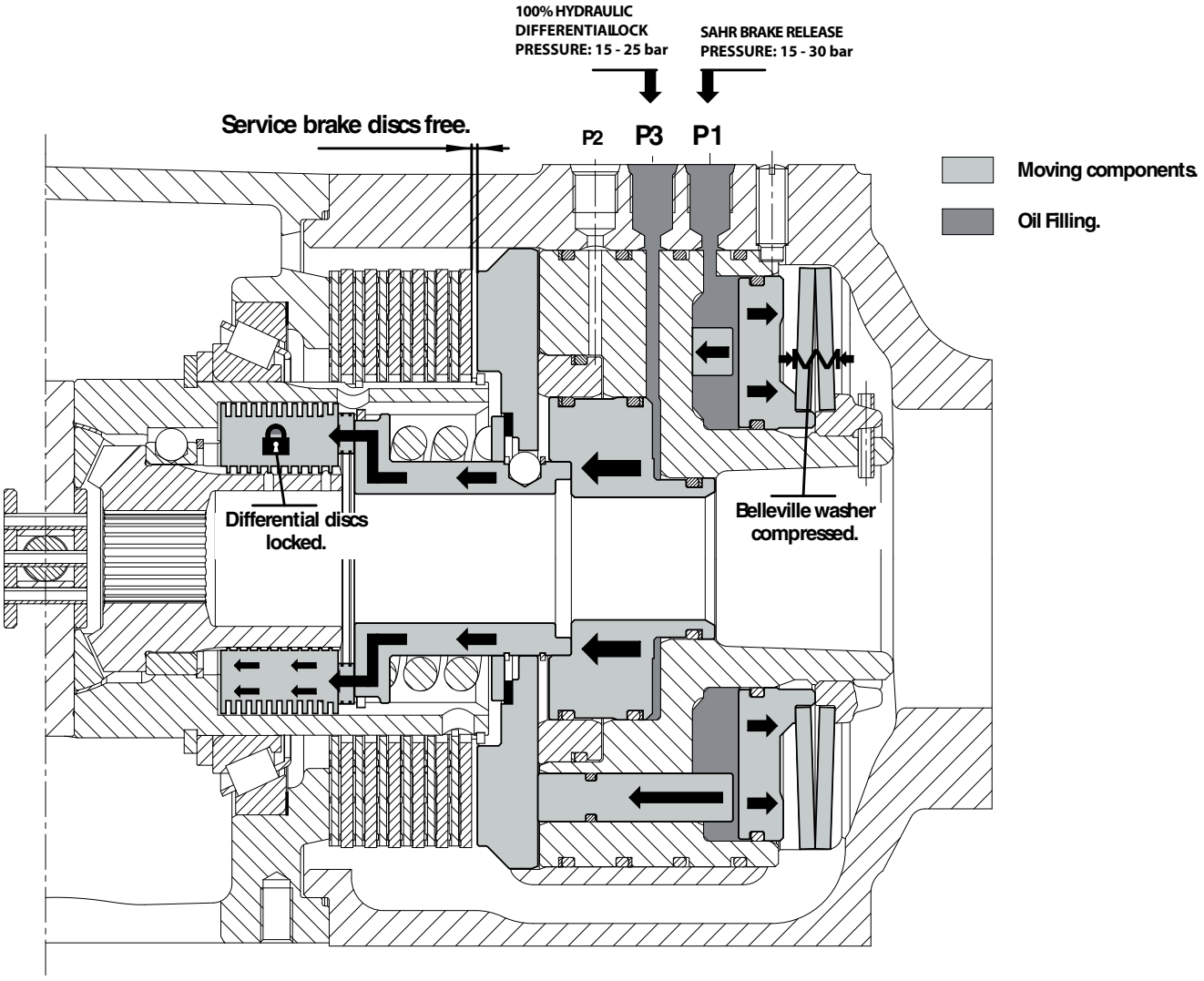
MAP12390

5.2.3 SERVICE BRAKE APPLIED



MAP12400

5.2.4 DIFFERENTIAL LOCK APPLIED



MAP12410

5.3 EMERGENCY RELEASE INSTRUCTIONS

DANGER

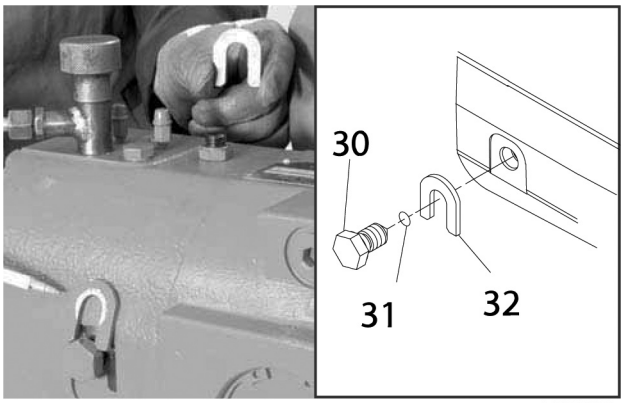
Before working on brakes, when the axle is installed on the vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

Note: *The below procedure is recommended only for emergency but never for moving the vehicle during the assembly phase, where hydraulic release must be applied.*

CAUTION

Refer to the blocking modes, in an emergency to the instruction handbook.

This procedure is needed only for emergency purposes if the engine fails and safety brake is applied in order to move the vehicle.



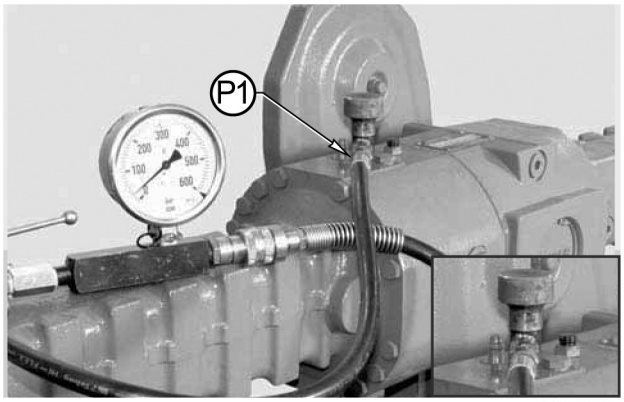
MAP12420

- Disconnect the pipe of the hydraulic connection from axle port of negative brake (Stamped P1)
- To release the negative brake, loosen the two screws (**30**) on the axle cover and remove the spacer (**32**).
- Tighten both screws (**30**) by hand until both are in contact the internal pusher plate. After tightening both screws, alternatively, for ¼ of turn on each side, with a wrench until they are completely tightened.

5.4 RESET OF FAILS SAFE BRAKE FUNCTION

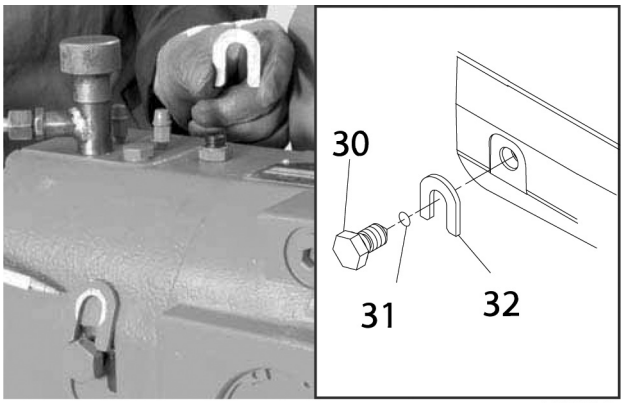
- Loosen again the screws (**30**) alternatively for ¼ of turn on each side and fit in the spacer (**32**) between the screw head and the axle cover.
- Tighten the screws (**30**) completely against the spacer with torque of 95 - 115 Nm (70.0 - 84.8 ft.lb).

5.5 BRAKE: SERVICE BRAKE, NEGATIVE BRAKE, 45% LOCKED & 100% LOCKED-DISASSEMBLY



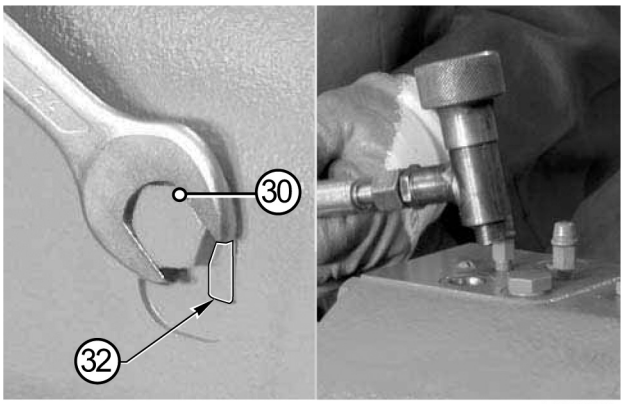
MAP12430

1. Connect an external pump to the union piece “P1“ of the negative brake and introduce a pressure of 15 ± 30 bar to eliminate the pressure of the Belleville washers.



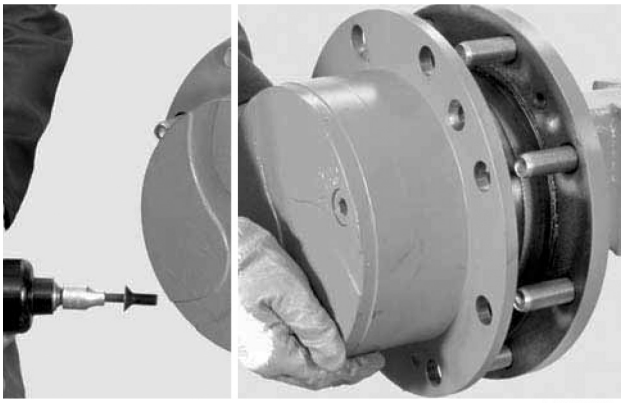
MAP12440

2. Loosen the unlocking screws (**30**) and remove both stop washers (**32**).



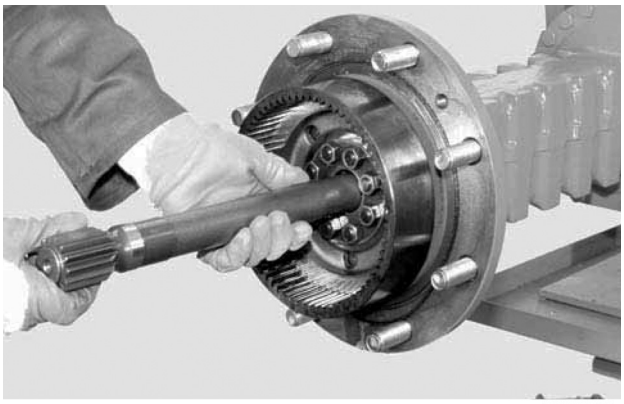
MAP12450

3. Insert block screws to end stroke and release pressure.



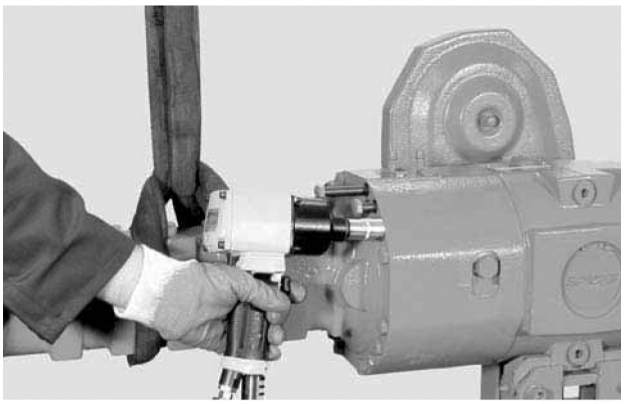
MAP12460

4. Remove the screws of the planetary gearbox cover on the brake side.
5. Remove the planetary gearbox cover.



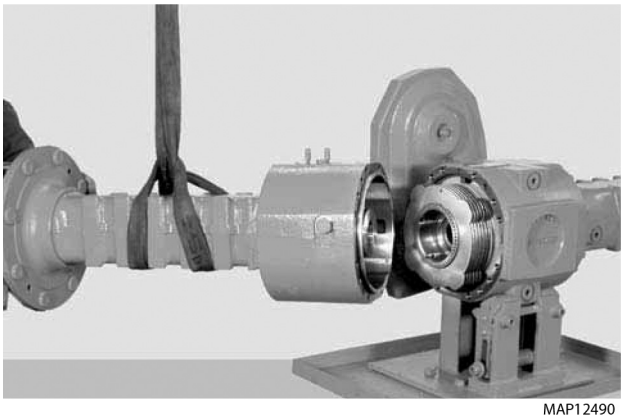
MAP12470

6. Remove the axle half shaft.



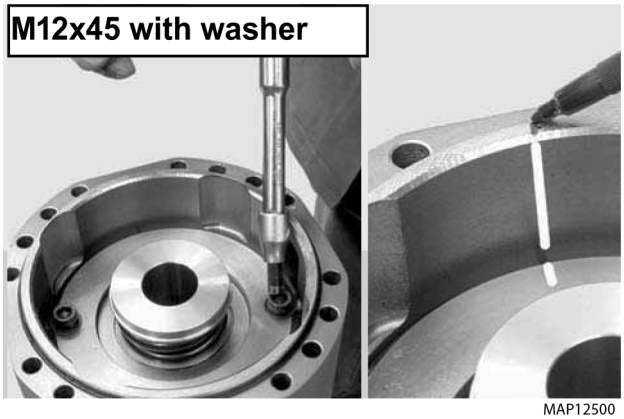
MAP12480

7. Sling the arm to be removed and connect it to a hoist. Remove screws.



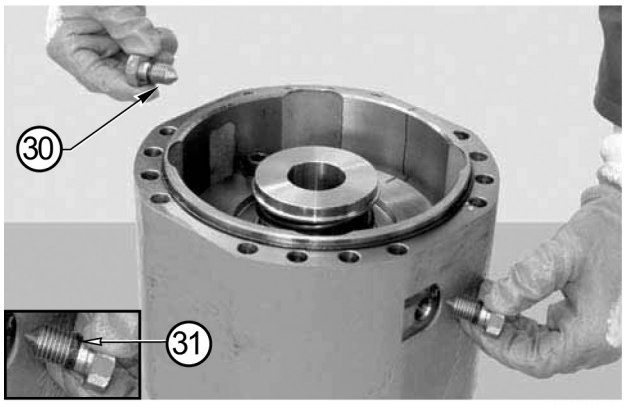
MAP12490

8. Take off the arm and lay it down vertically.



MAP12500

9. In order to keep the disc springs of the negative brake preloaded, tighten the screws with washers to the end stop.

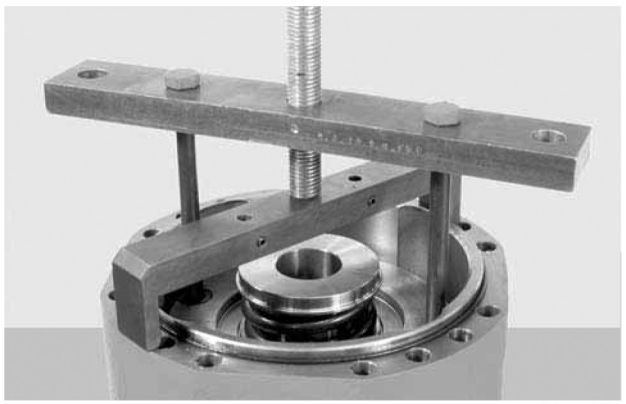


MAP12510

10. Remove the negative brake locking screws (**30**). Always replace the o-ring (**31**).

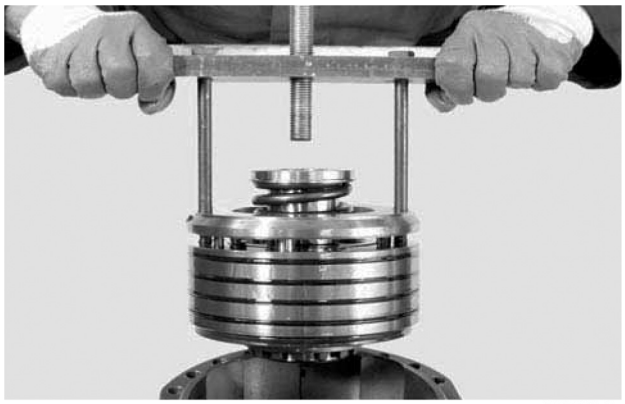
MAP12520

11. Loosen the before installed provisional screws in the same sequence and same measure.



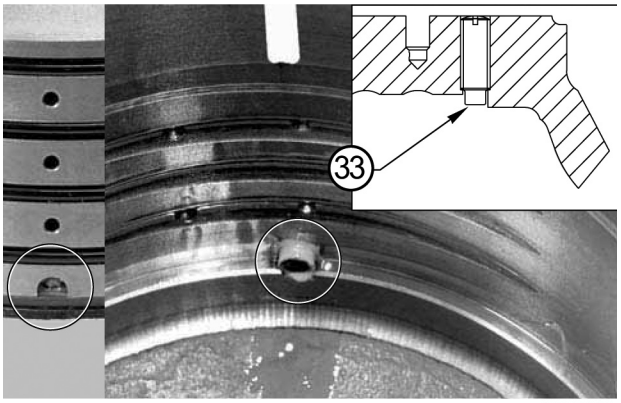
MAP12530

12. Insert the screws of the puller (**M12**) into the tap holes of the negative brake and remove the pistons of the brake.



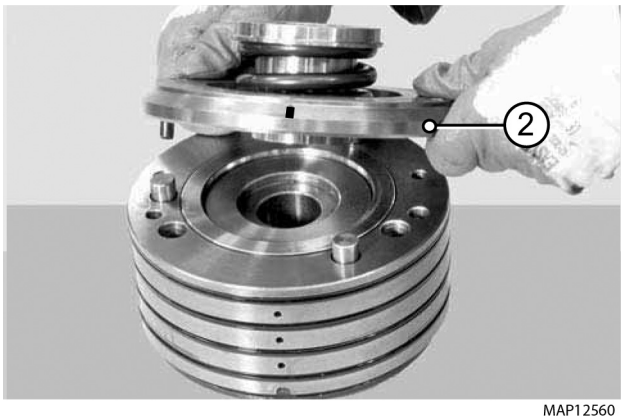
MAP12540

13. Pull out brake piston assembly module.



MAP12550

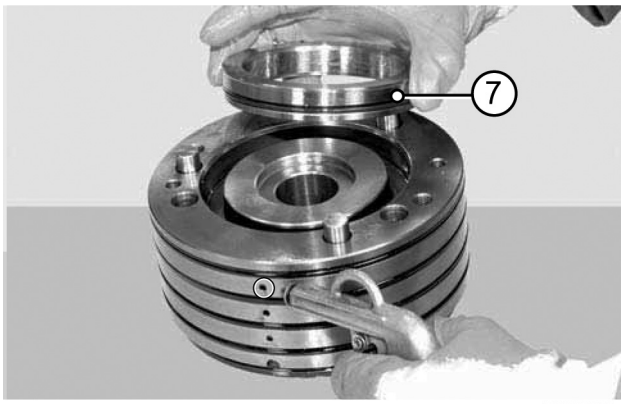
14. Check locking screw (**33**) of the brake piston module.



MAP12560

15. Remove intermediate disc (**2**).

Note: *Mark the assembly position.*



MAP12570

16. Applying pressure to the first hole, remove the service brake piston (**7**).

MAP12580

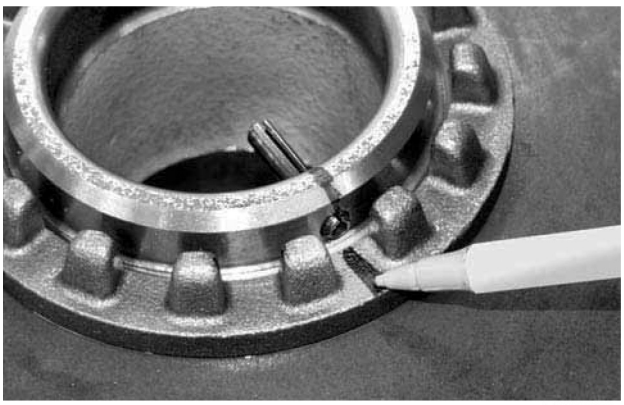
17. Applying pressure to the second hole, remove the hydraulic block piston (**12**).

MAP12590

18. Applying pressure to the third hole, remove the three bolts (**24**).

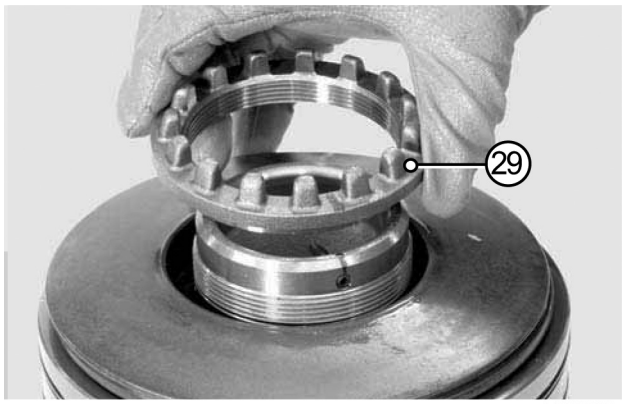
MAP12600

19. Turn upside down the brake module and with a pin driver remove the locking pin of the slotted nut.



MAP12610

20. Mark the position of the slotted nut.



MAP12620

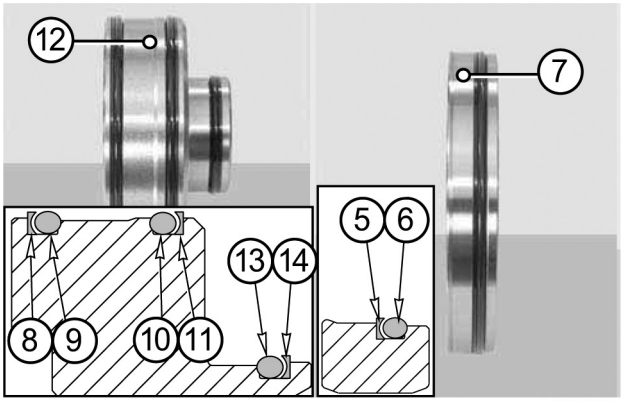
21. Unscrew the slotted nut (**29**).

MAP12630

22. Remove the disc springs (**28**).

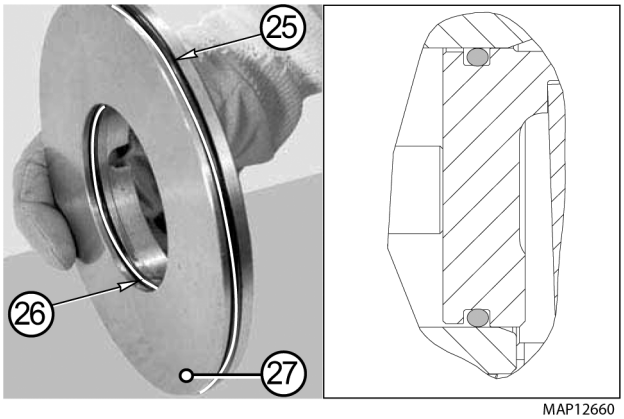
MAP12640

23. Applying pressure, remove the piston (**27**) of the negative brake.



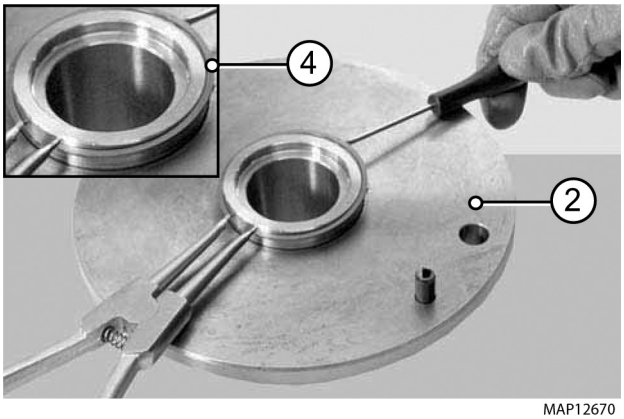
MAP12650

24. Check the position of the anti-extrusion (**8**), (**10**), (**14**) and (**5**) and o-rings (**9**), (**10**), (**13**) and (**6**).



MAP12660

25. Check the position of the o-rings (**25**) and (**26**).



MAP12670

26. Remove the snap ring (**4**) from the intermediate disc (**2**).

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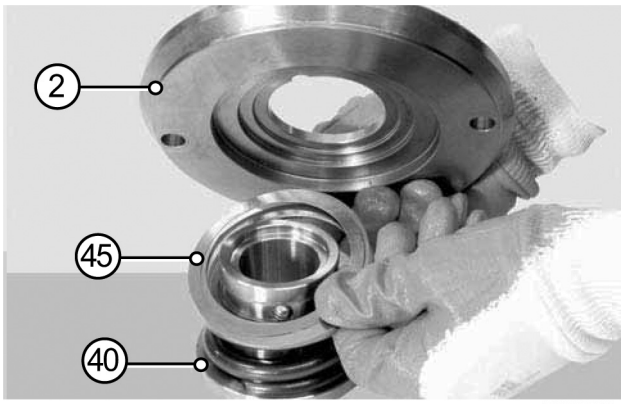


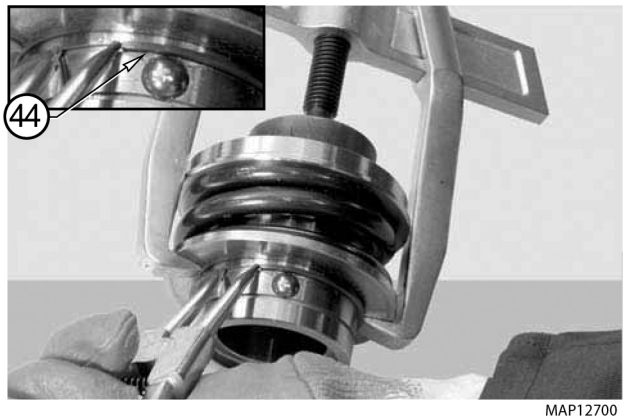
MAP12680

27. Remove coupling (**40**) and washers (**45**).

Note: *Build a stack of washers and check the measurement.*

MAP12690

28. Using a puller, preload the spring (**42**).

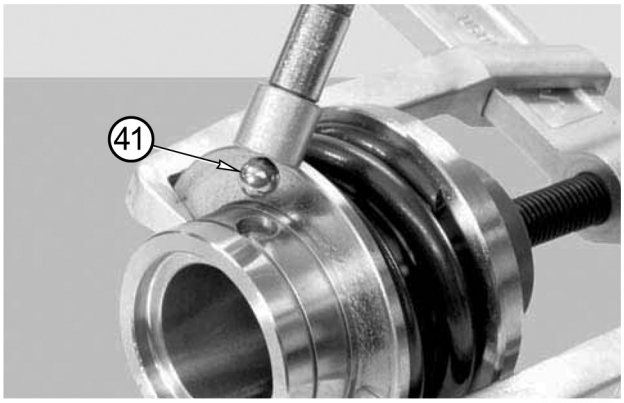


MAP12700

29. Remove the snap ring (**44**).

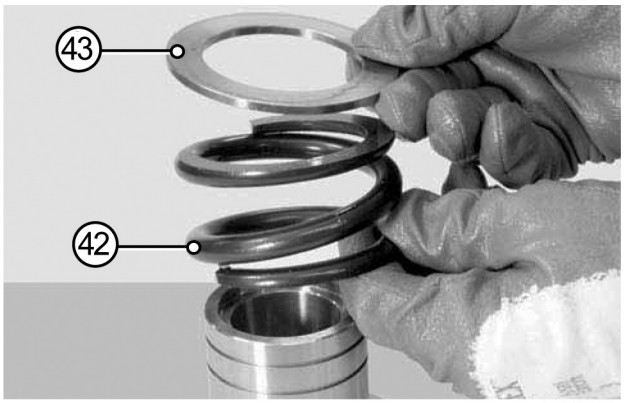
CAUTION

Spring preloaded.



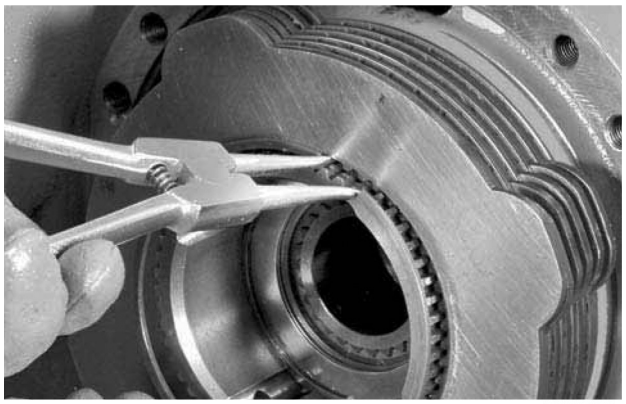
MAP12710

30. Remove the fixing ball (**41**).



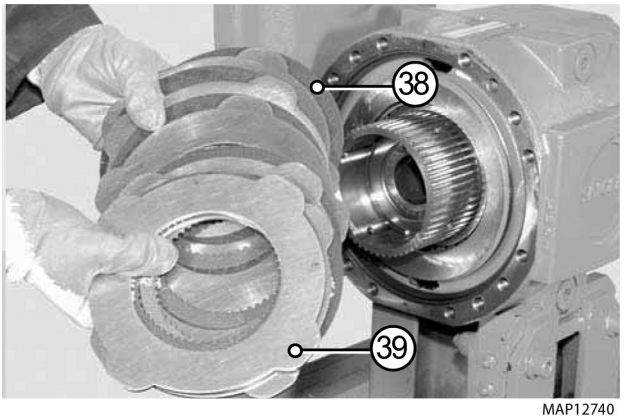
MAP12720

31. Remove the spring (**42**) and washer (**43**).



MAP12730

32. Remove the snap ring of the brake stack.

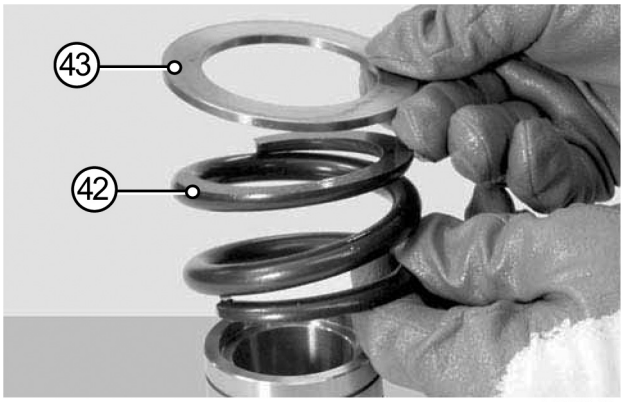


MAP12740

33. Remove the brake discs one after the other (**39**) and (**38**).

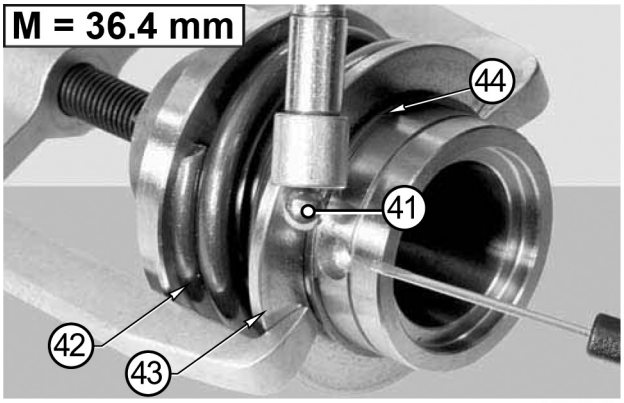
Note: *If they are not to being replaced, do not mix up the sequence.*

5.6 BRAKE: SERVICE BRAKE, NEGATIVE BRAKE, 45% LOCKED & 100% LOCKED - ASSEMBLY



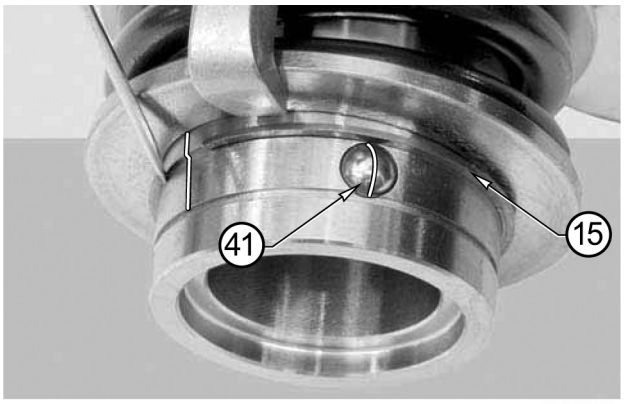
MAP12750

1. Insert spring (**43**) and washer (**42**) onto the hydraulic block coupling.



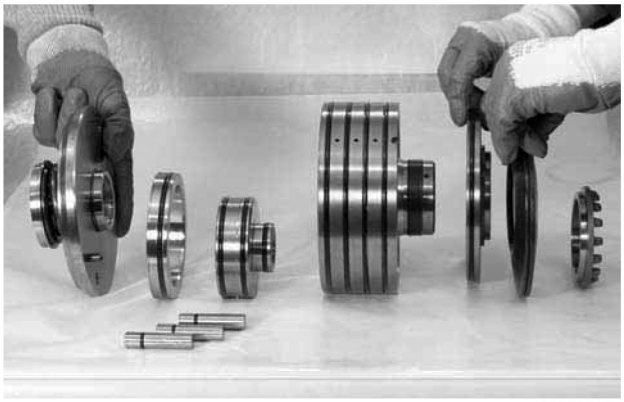
MAP12760

2. Preload the spring (**42**) by using a puller acting on the washer (**43**).
3. Insert the snap ring (**44**) and the fixing ball (**41**).



MAP12770

4. Shift the cut of the snap ring (**15**) according to the ball (**41**).

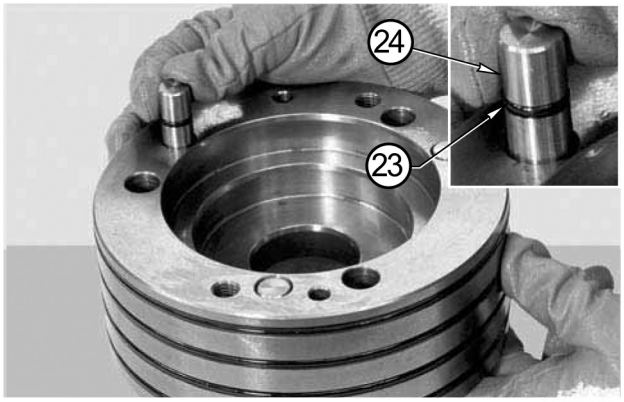


MAP12780

5. Complete installing the o-rings and anti-extrusion rings on all pistons.

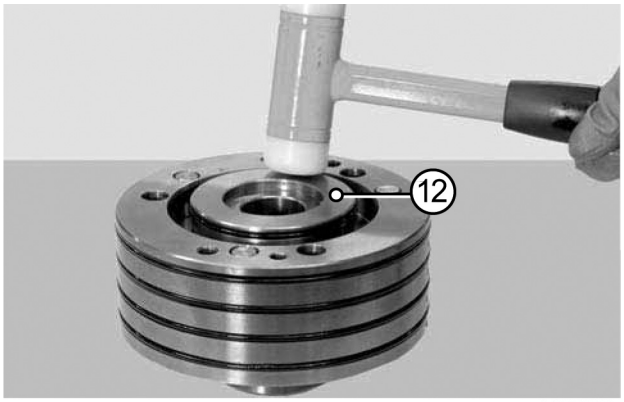
⚠ CAUTION

The o-rings always have to be assembled from the pressure facing side.



MAP12790

6. Insert the bolts (**24**).

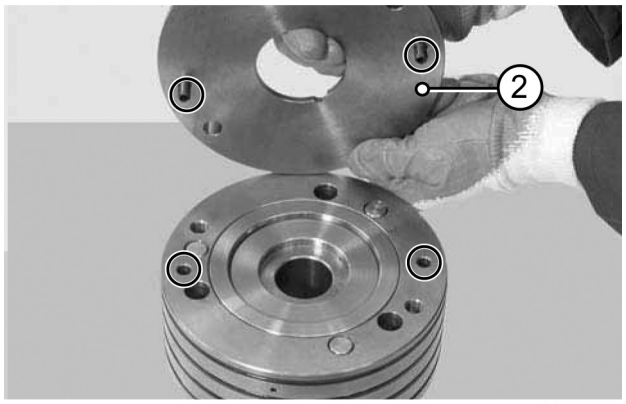


MAP12800

7. Insert the hydraulic block piston (**12**).

MAP12810

8. Insert the service brake piston (**7**) hammering alternately with a plastic hammer.

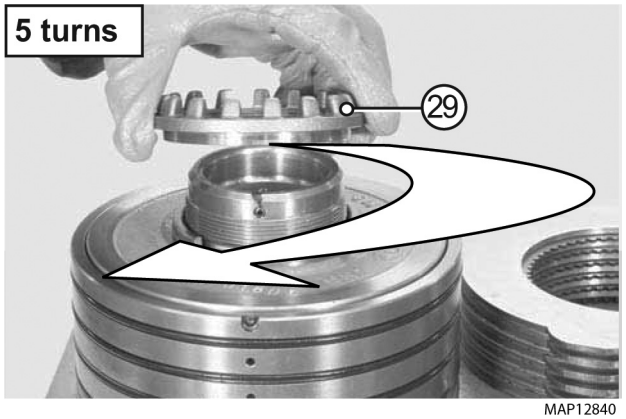


MAP12820

9. Insert the intermediate disc (**2**) observing the previously signed position.

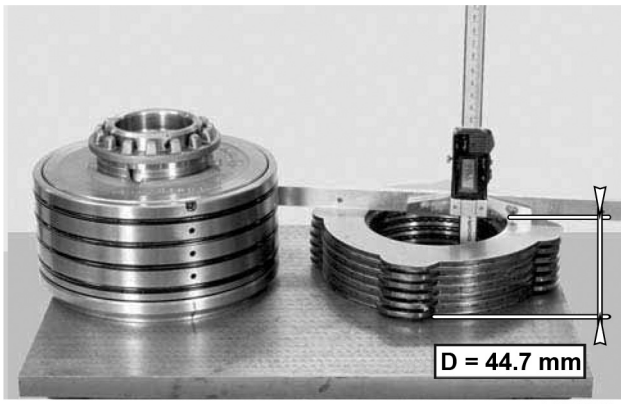
MAP12830

10. Turn upside down and insert the negative brake piston (**27**).



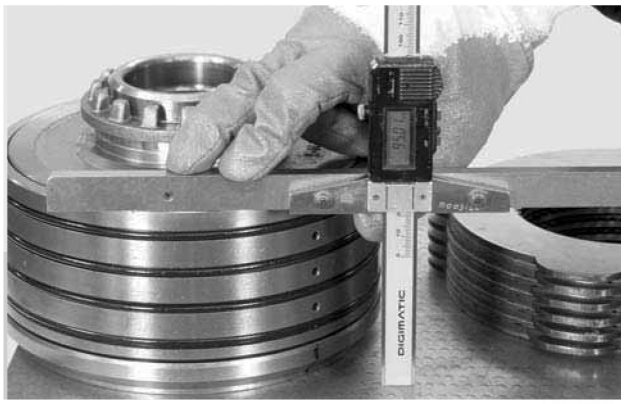
MAP12840

11. Tighten the slotted nut (**29**) for about 5 turns.



MAP12850

12. Find out the height of the brake discs “D”.
    E.g. D=44.7 mm
    Add to D the value G = brake clearance (e.g. 1.4 mm).
    D + G = 44.7 + 1.4 = 46.1



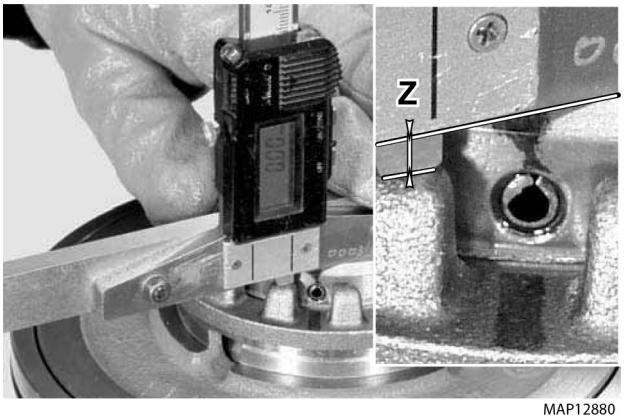
MAP12860

13. Determine the level “A” between external plane and the brake plate by the adjustment of the slotted nut.
    A = 141 - (D+G) = 141 - 46,1 = 94,9 mm
    X = constant value 141 mm

Note: *To define the level A adjust the slotted nut always to the smaller value by driving to the closer notch.*

MAP12870

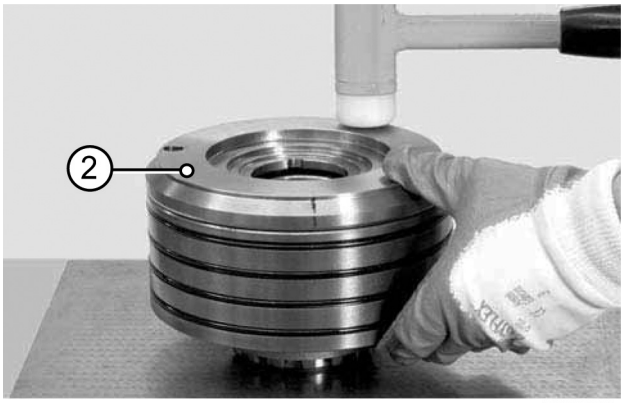
14. To determine the level A the slotted nut has to be operated without spring mounted.



MAP12880

15. Before removing the slotted nut in order to insert the springs, write down the distance Z from the plane to the tooth near the pin.

Note: *Write down measurement.*

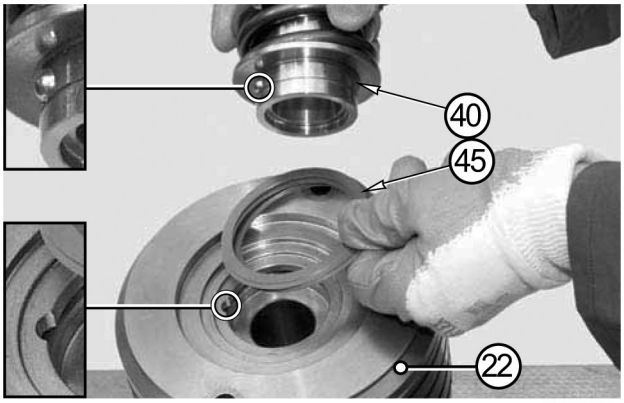


MAP12890

16. Turn upside down and fit on the intermediate disc (**2**).

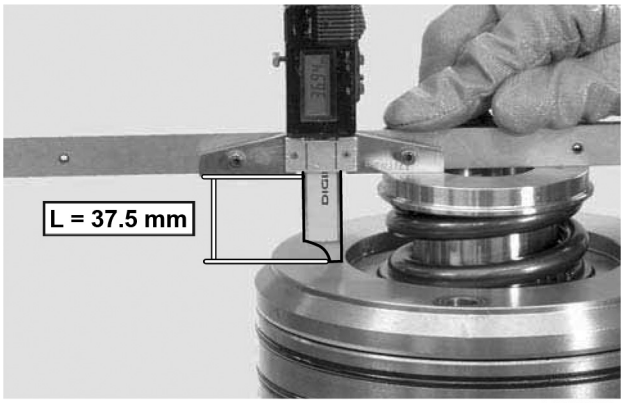
MAP12900

17. Select a pack of washers (**20**) of 1.5 mm S4=1.5 mm.



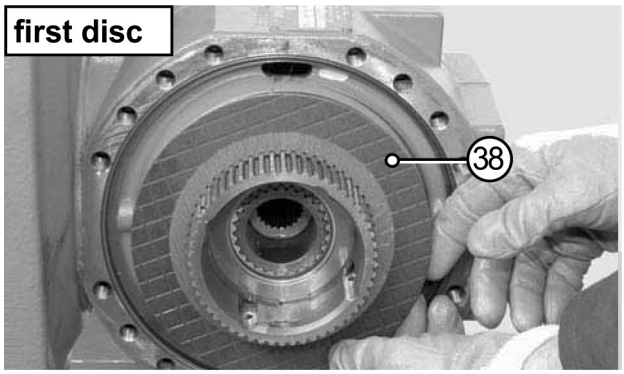
MAP12910

18. Insert and bring into position washers (**45**) and coupling (**40**) into the brake module (**22**).



MAP12920

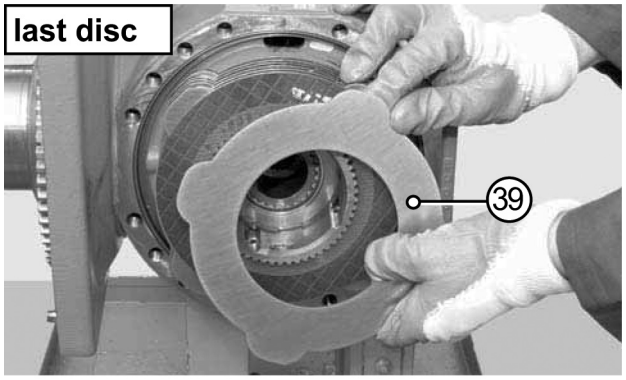
19. With the positioned pack determine the distance L between coupling and brake disc surface.
E.g. L=37.5 mm



MAP12930

20. Insert the brake discs (**38**) in the right sequence.

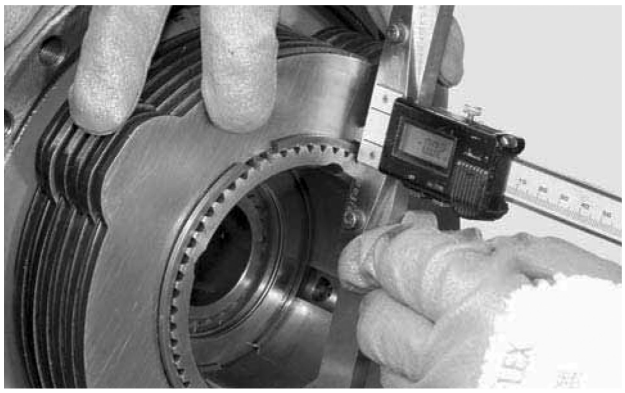
Note: *The first brake disc to be inserted must be of friction material.*



MAP12940

21. Insert the brake discs (**39**) in the right sequence.

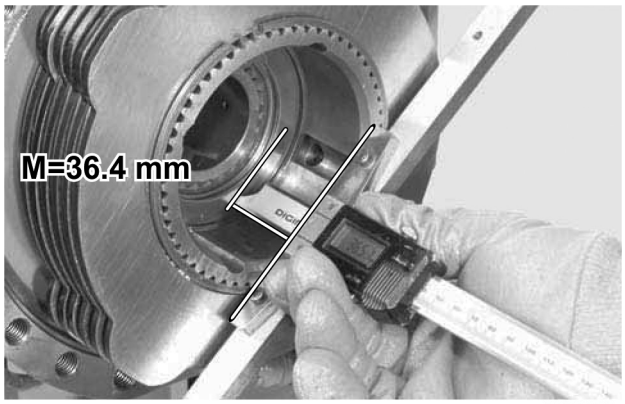
Note: *The last brake disc must be of metal material.*



MAP12950

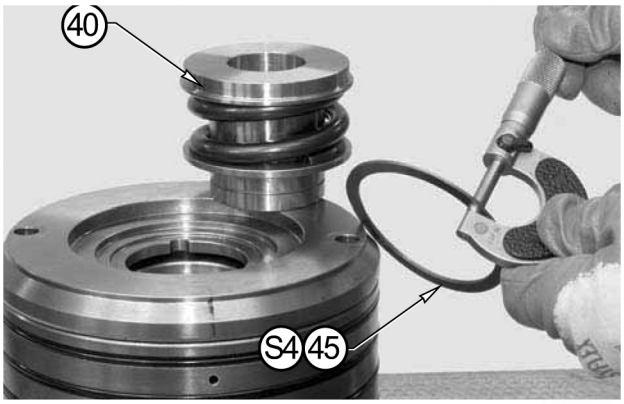
22. Zero the depth gage from the plane of the splined coupling to the surface of the brake discs.

Note: *Press the brake disc pack before zeroing, execute the measurement in some points and take an average.*



MAP12960

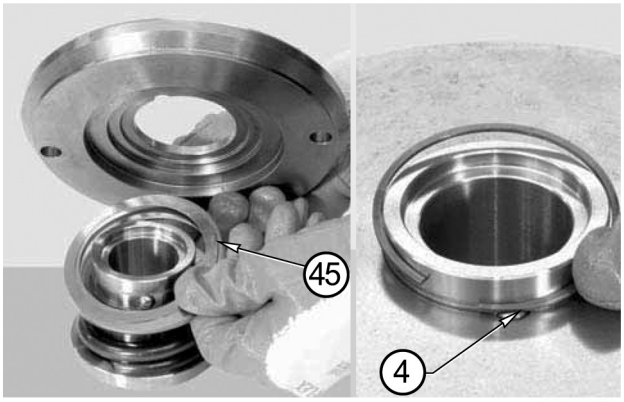
23. Check the clearance “r” between coupling and thrust bearing.
24. Find out the distance “M” between the brake discs surface and thrust bearing.
    E.g. M=36.4mm Brake discs clearance G = 1.4 R =(M+G)-L=(36.4+1.4)-37.5=0.3mm



MAP12970

25. Correction of the shims s4 depending on the calculation of the value “R”.

Note: *The value of “R” has always to result in 0.1 mm. in case it is not so, the shims **S4** (**45**) under the coupling (**40**) have to be modified.*

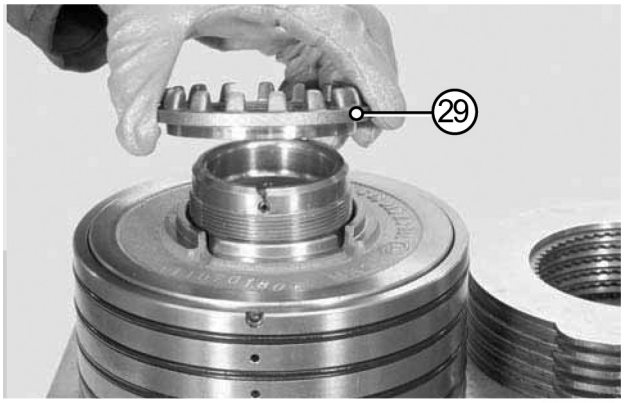


MAP12980

26. Depending on the calculation assemble the exact shims to arrive at R=0.1 mm.
27. Assemble all with safety ring.
    Shims S4 z.B.: S4= 1.5+(0.3-0.1)= 1.5+0.2= 1.7mm where 1.5 const.
    0.3mm = R calculated clearance
    0.1mm = R wanted clearance

MAP12990

28. Insert the complete intermediate disc (**2**).

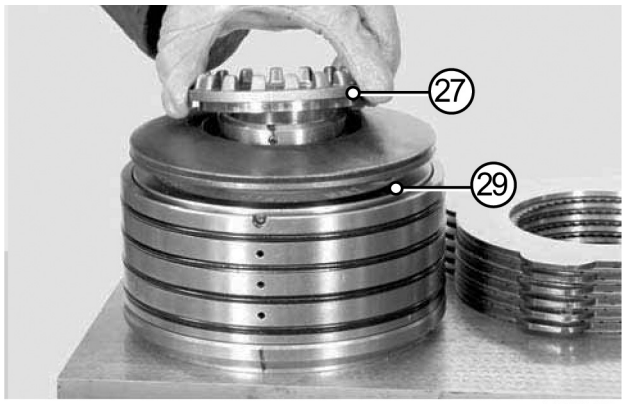


MAP13000

29. Turn upside down and unscrew the slotted nut (**29**).

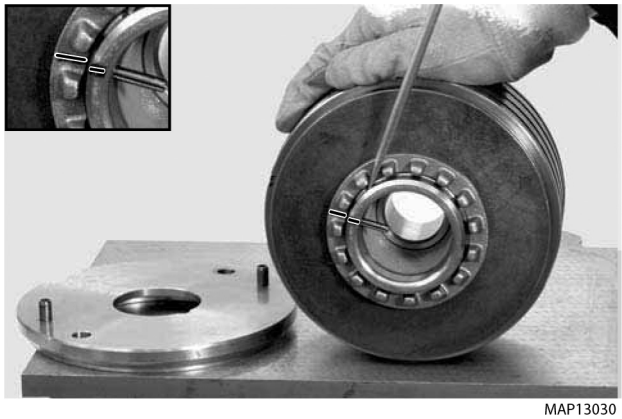
MAP13010

30. Insert the disc springs in the right position (**28**).



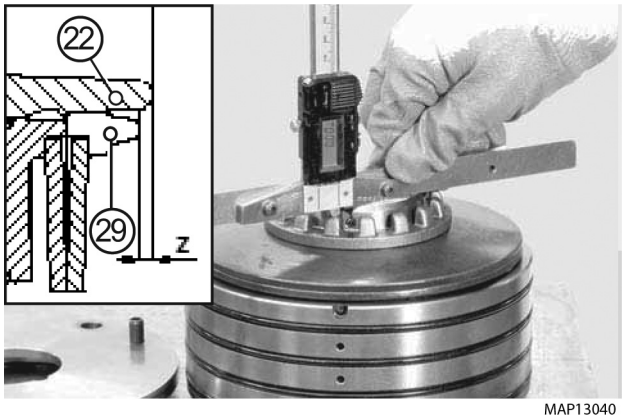
MAP13020

31. Insert at the bottom the piston of the negative brake (**27**) and tighten the slotted nut (**29**).



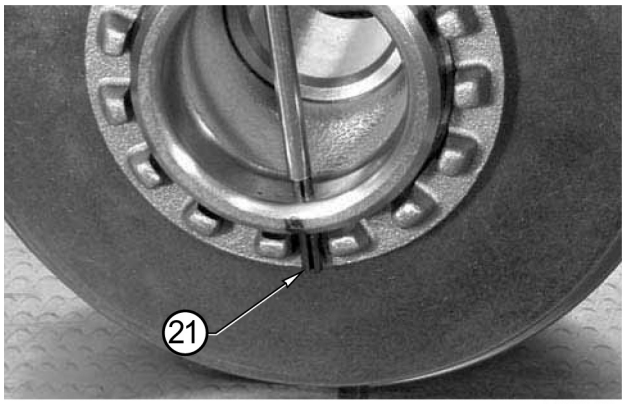
MAP13030

32. Tighten the slotted nut to the earlier determined position.



MAP13040

33. Check the earlier measured distance Z from the plane to the tooth next to the pin.



MAP13050

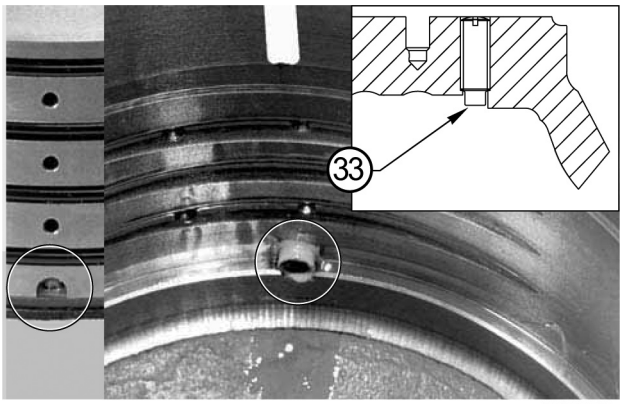
34. Put the pin in locking (**21**) position.

MAP13060

35. Insert two screws of M12 to fix the break arm.

MAP13070

36. Position the groove of the brake module in line with the lock screw in the arm.

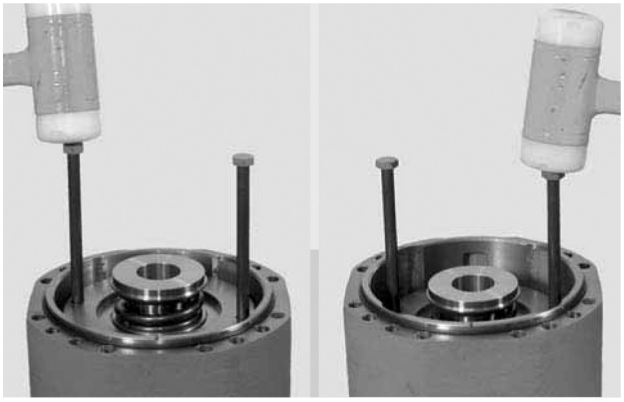


MAP13080

37. Check locking screw (**33**) of the brake piston module.

MAP13090

38. Insert the brake module facing the input holes to the top.

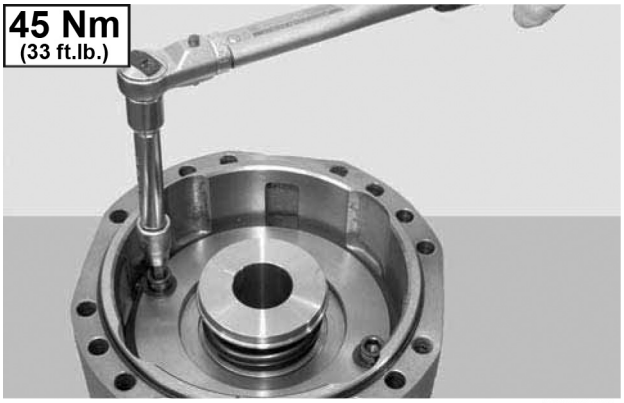


MAP13100

39. Insert the piston to the end stop by alternating light strokes and remove the screws.

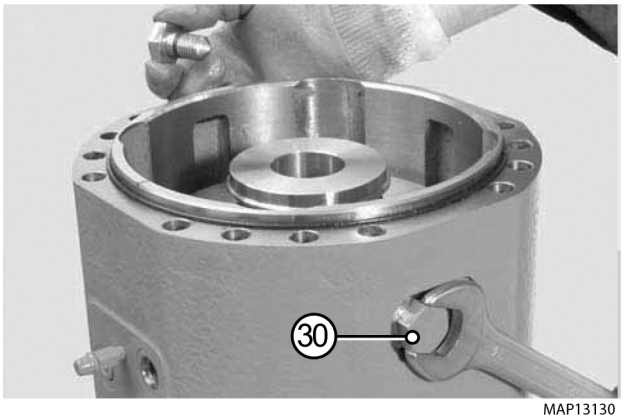
MAP13110

40. Temporary insert screws M12x45.



MAP13120

41. Alternately tighten with a torque wrench setting of maximum 45 Nm (33 ft. lb).

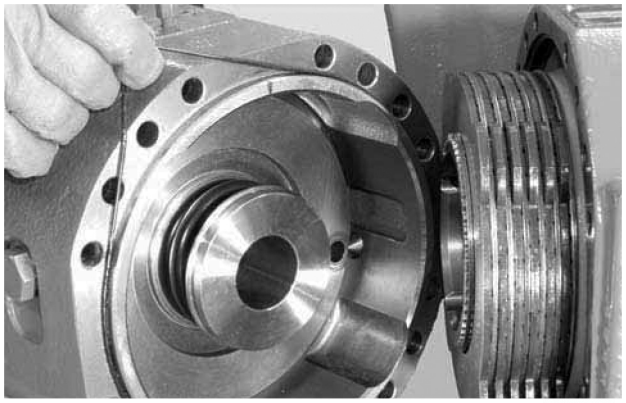


MAP13130

42. Insert the negative brake unlocking screw (**30**) up to the end stop.

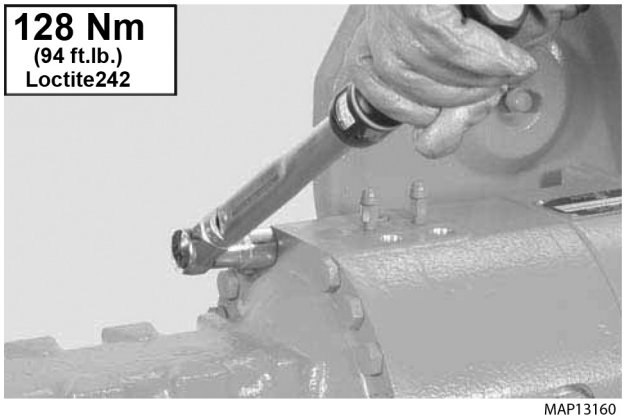
MAP13140

43. Remove the two auxiliary screws.



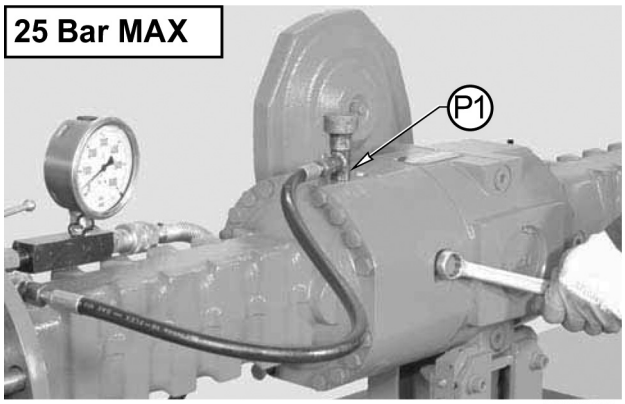
MAP13150

44. Replace and lubricate the o-ring and insert the arm to the box.



MAP13160

45. Insert the screws and tighten them alternately.



MAP13170

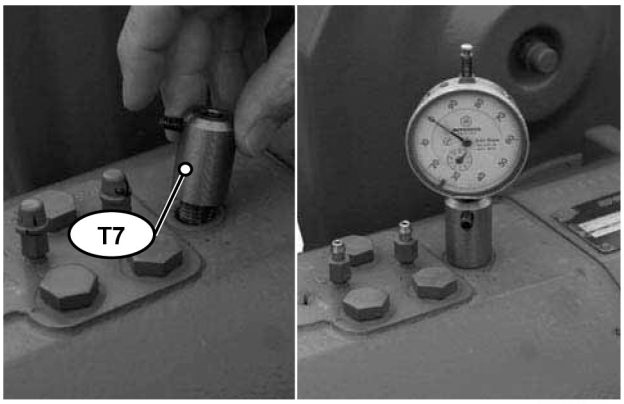
46. Introduce a pressure of maximum 25 bar and loosen the unlocking screws.

MAP13180

47. Insert the two "U"-shaped shims and tighten the screws with a torque wrench setting of 95-115 Nm (70 - 84 ft.lb).

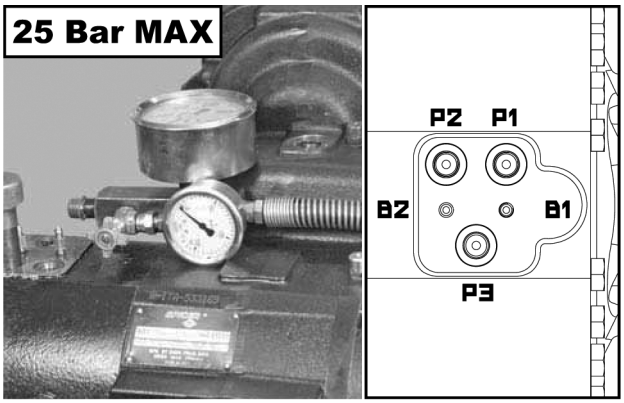
Note: *The position of the negative brake is unlocked.*

5.7 BRAKE PISTON GAP CHECK



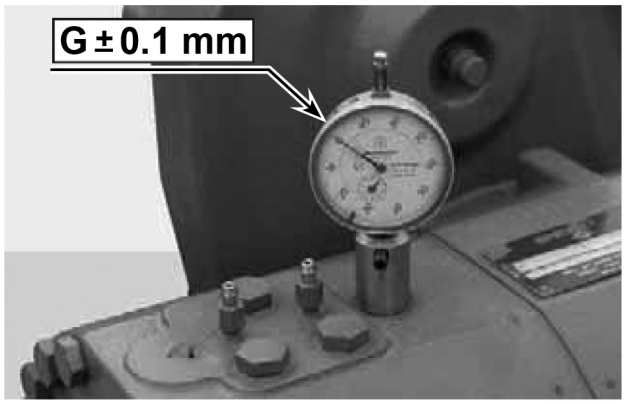
MAP13190

1. Remove the negative brake locking screws (**30**).Fit the special tool (**T7**) into the seat of the manual release of the screws. Insert a depth gauge and pre-load it with 1 mm.



MAP13200

2. Introduce a pressure of maximum 25 bar.
   P1 = SAHR brake port
   P2 = Service brake port
   For drawings, see Brake Working Conditions.

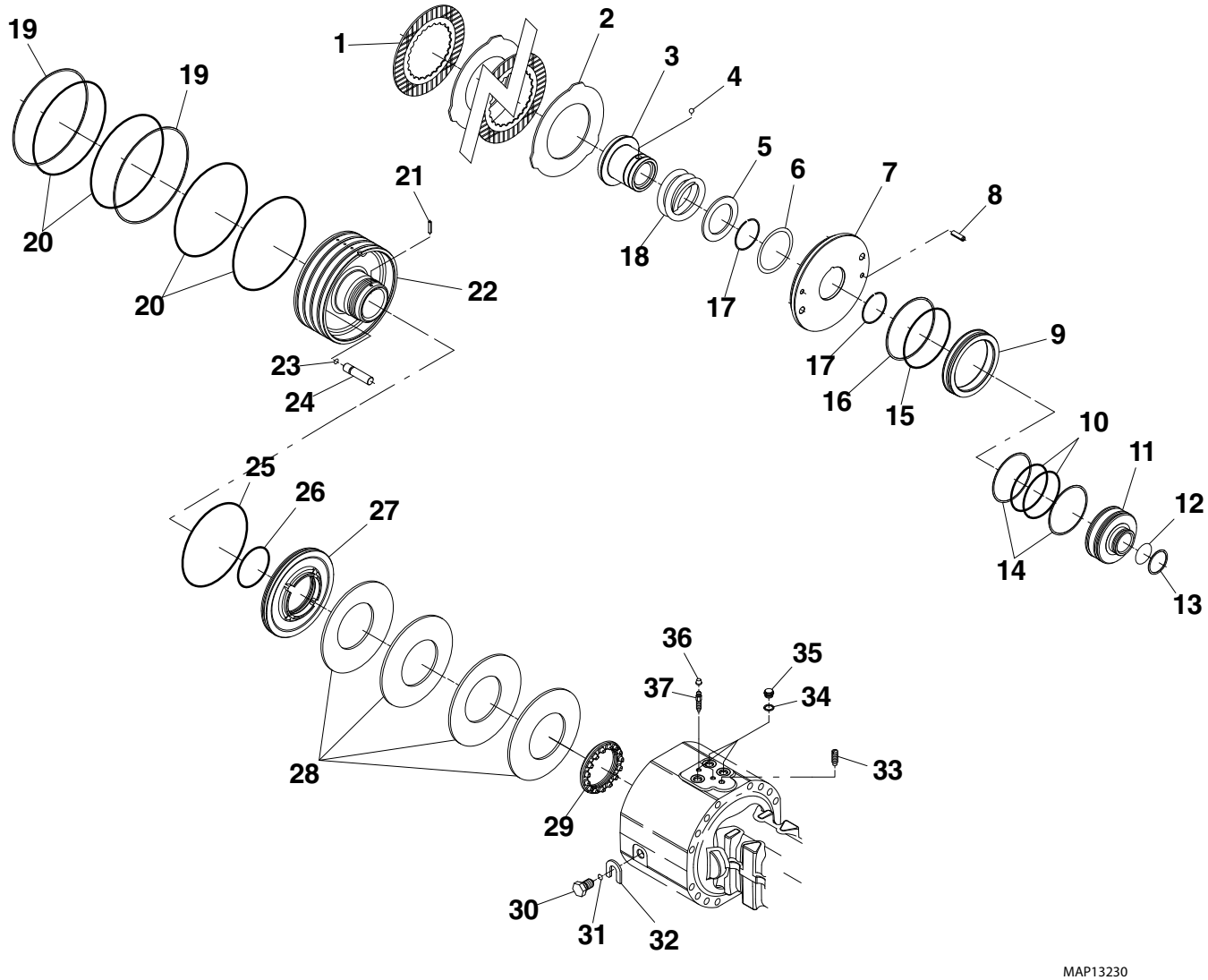


MAP13210

3. Once the pressure is inserted into the circuit the depth gauge must give a measurement equal to G ± 0.1 mm.

Section 6
Brake: Negative Brake 4 Cup Springs Version

6.1 EXPLODED VIEW



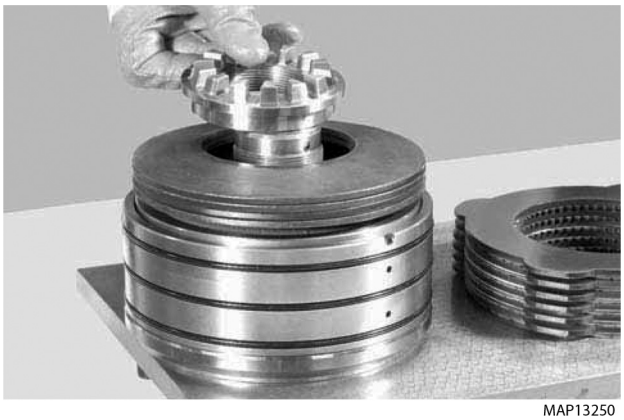
6.2 BRAKE: NEGATIVE BRAKE 4 CUP SPRINGS VERSION - DISASSEMBLY

DANGER

Before working on brakes, when the axle is installed on the vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

MAP13240

1. For details, see Brake: Service Brake, Negative Brake, 45% Locked & 100% Locked. Turn upside down the brake module and with a pin driver remove the locking pin of the slotted nut. Write down the position of the slotted nut.

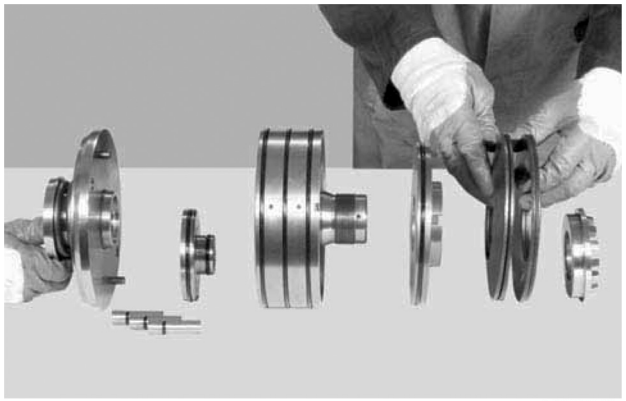


MAP13250

2. Unscrew the slotted nut (**26**).

MAP13260

3. Remove the disc springs (**28**).



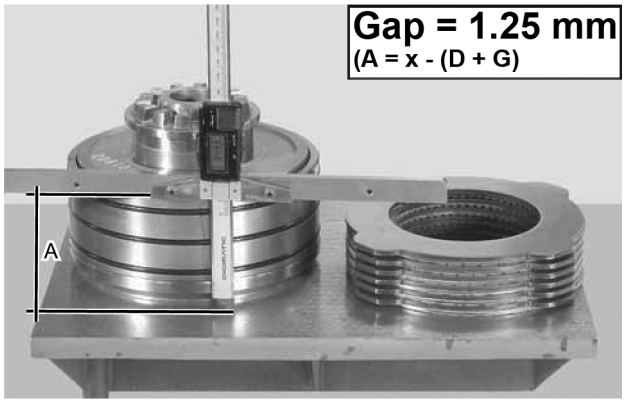
MAP13270

4. For details, see Brake: Service Brake, Negative Brake, 45% Locked & 100% Locked.
5. Inspect the o-rings and anti-extrusion rings on all pistons.

CAUTION

The o-rings always have to be assembled from the pressure facing side.

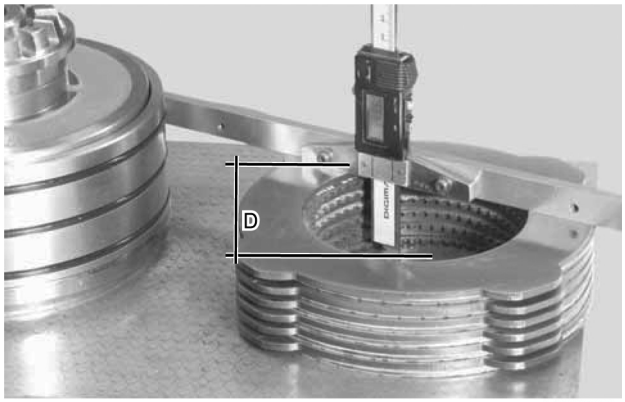
6.3 BRAKE: NEGATIVE BRAKE 4 CUP SPRINGS VERSION - ASSEMBLY



MAP13280

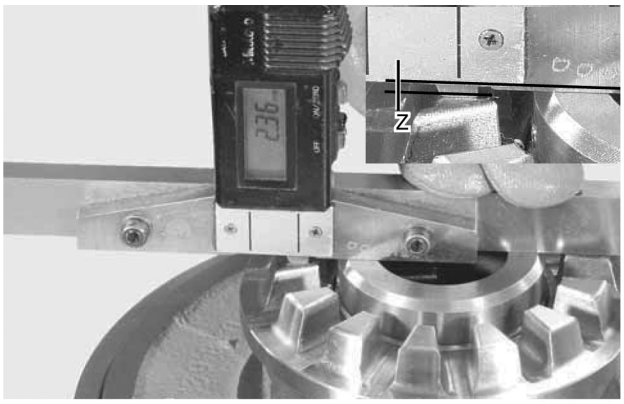
6. Determine the level "A" between external plane and the brake plate by the adjustment of the slotted nut.
   A = 131.5 - (D+G) = 131.5 - (44.95 + 1.25) = 85.3 mm
   X = constant value 131.5 mm

Note: *To define the level A adjust the slotted nut always to the smaller value by driving to the closer notch.*



MAP13290

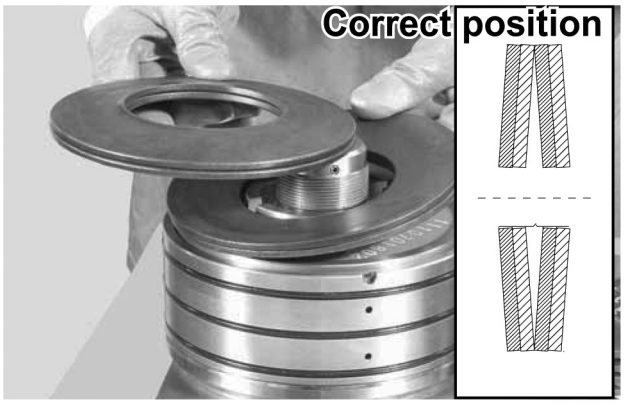
7. Find out the level of the brake discs "D".
   E.g. D=44.7 mm
8. Add to D the value G = brake clearance (e.g. 1.25 mm).
   D + G = 44.9 + 1.25 = 46.2 mm



MAP13300

9. Before removing the slotted nut in order to insert the springs, write down the distance Z from the plane to the tooth near the pin.

Note: *Sign.*



MAP13310

10. Insert the disc springs in the right position.

MAP13320

11. Tighten the slotted nut.

MAP13330

12. Check the earlier measured distance Z from the plane to the tooth next to the pin.

MAP13340

13. Put the pin (**21**) in locking position.

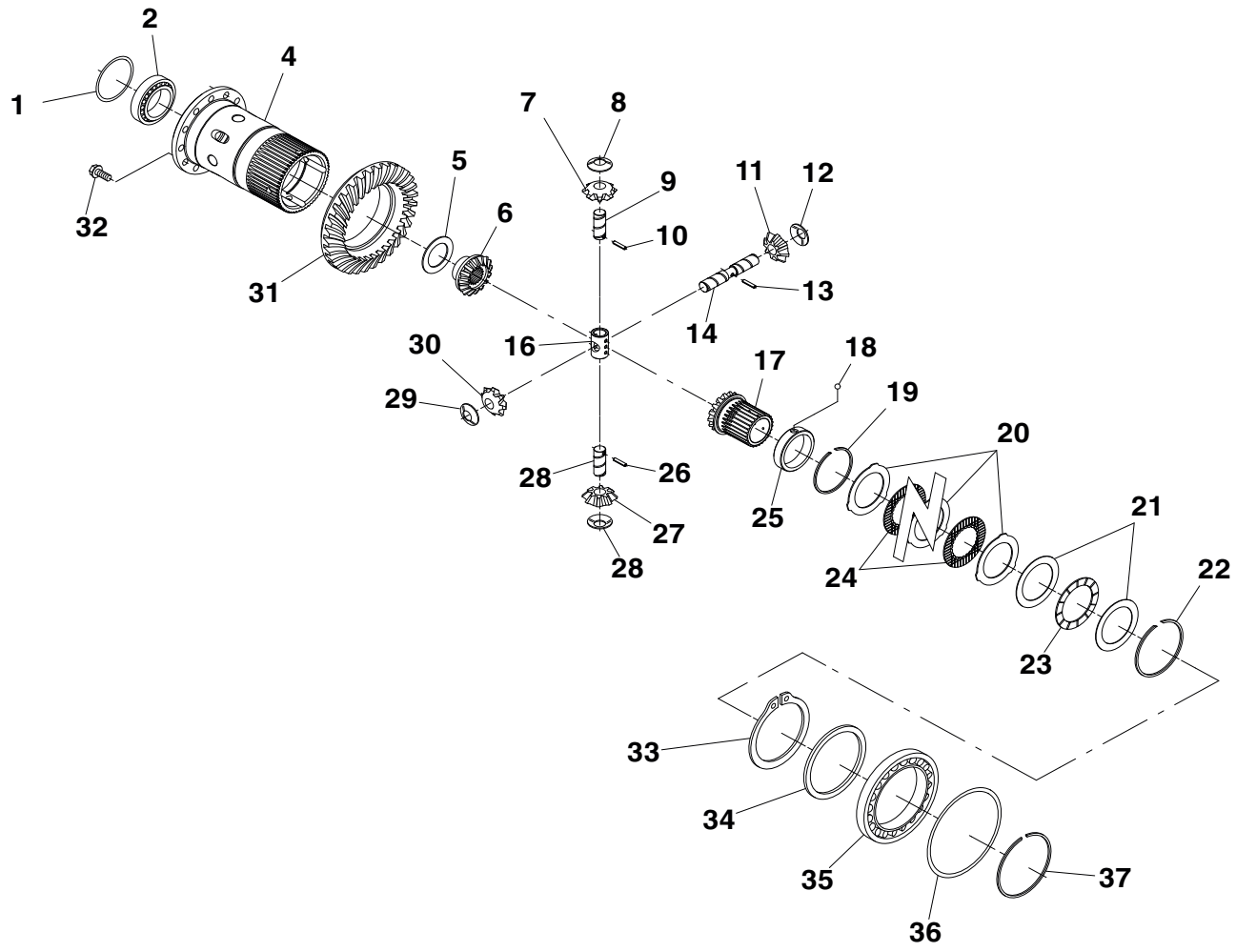
⚠ CAUTION

MANDATORY PROCEDURE:

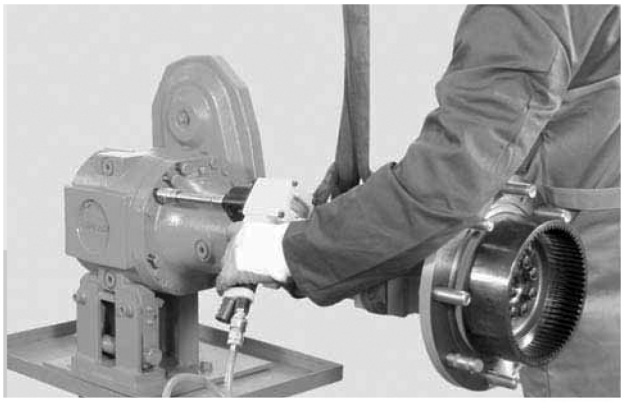
Check brake piston gap, see Brake Piston Gap Check.

Section 7
Normal Preloaded Differential Unit (Old Version)

7.1 EXPLODED VIEW

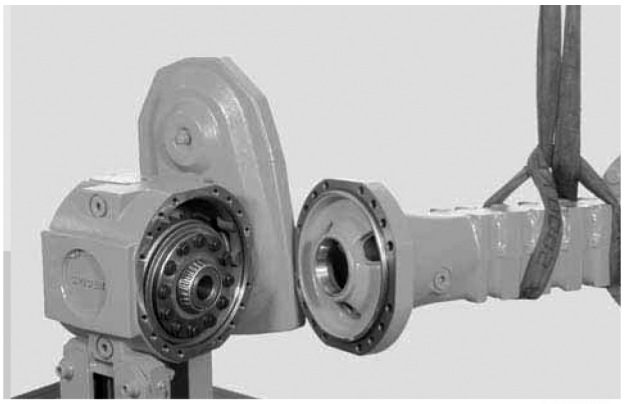


7.2 NORMAL PRELOADED DIFFERENTIAL UNIT (OLD VERSION) - DISASSEMBLY



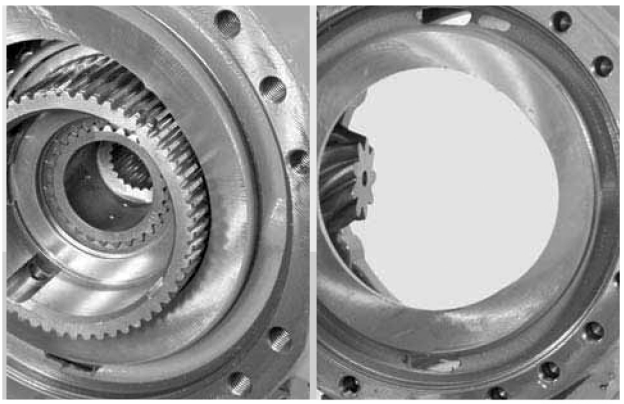
MAP13360

1. Remove the brake side arm and the brake discs pack. Sling the arm to be removed and connect it to a hoist. Remove screws of the ring gear side arm.



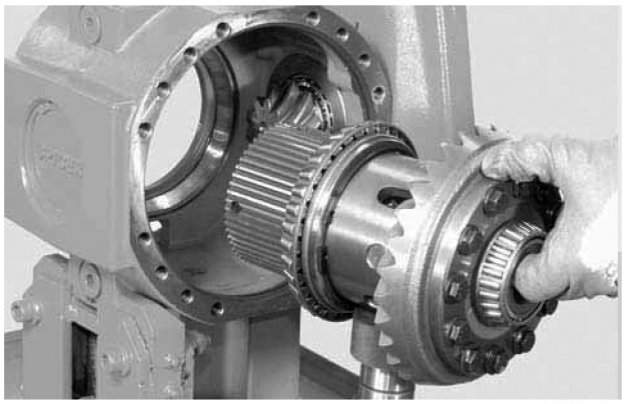
MAP13370

2. Place the arm on a bench.



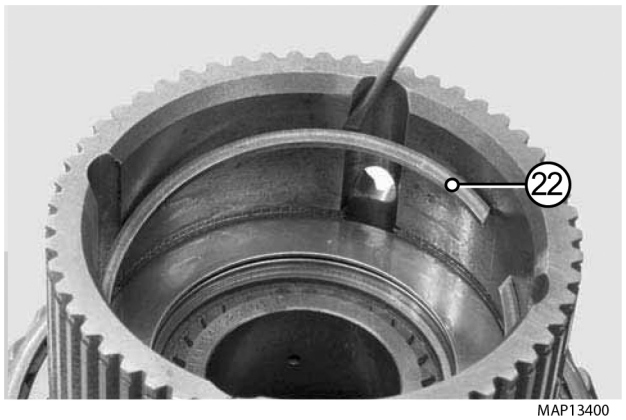
MAP13380

3. Position the differential gear sideways into the recess in order to be able to pull it out.



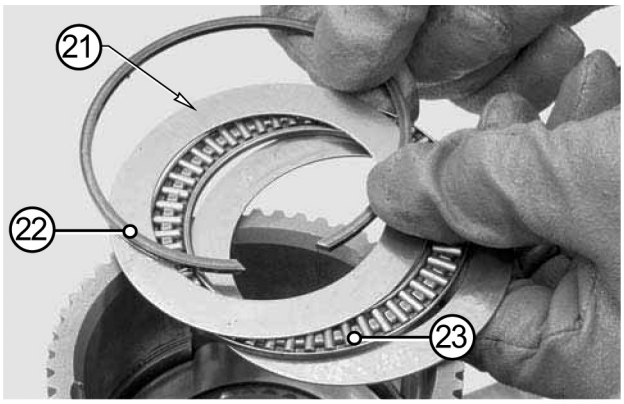
MAP13390

4. Pull out the differential.



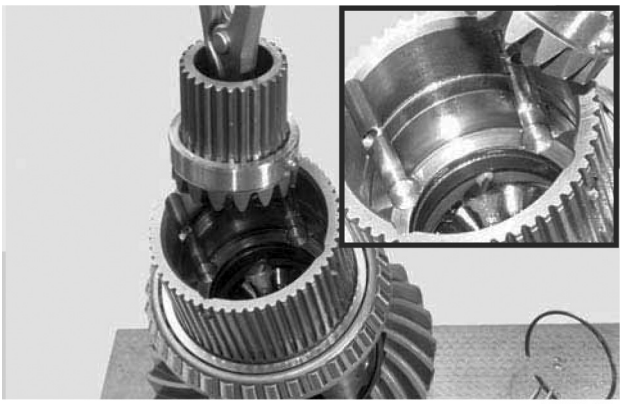
MAP13400

5. Remove the snap ring (**22**) that secures the thrust bearing (**23**).

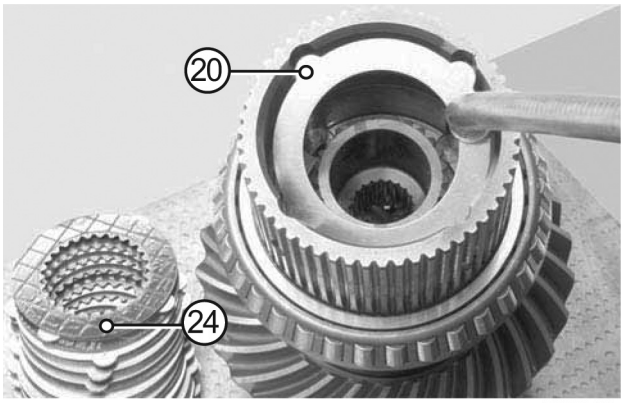


MAP13410

6. Remove the snap ring (**22**) and thrust bearing (**23**).

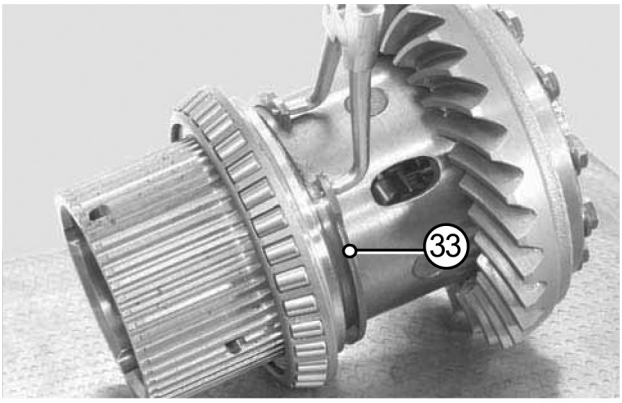

MAP13440

9. Remove the brake side planetary gear.



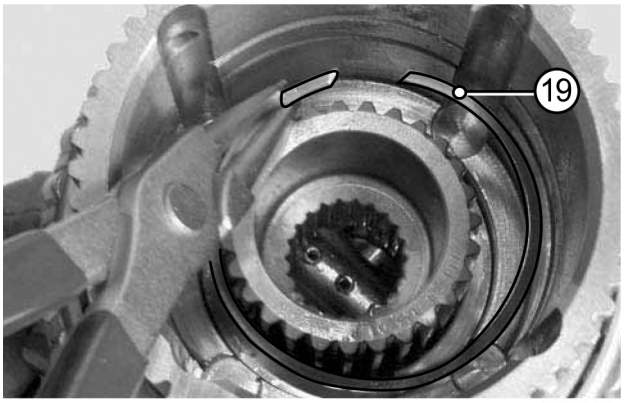
MAP13420

7. Remove the hydraulic block discs (**20**) and (**24**) one after the other.



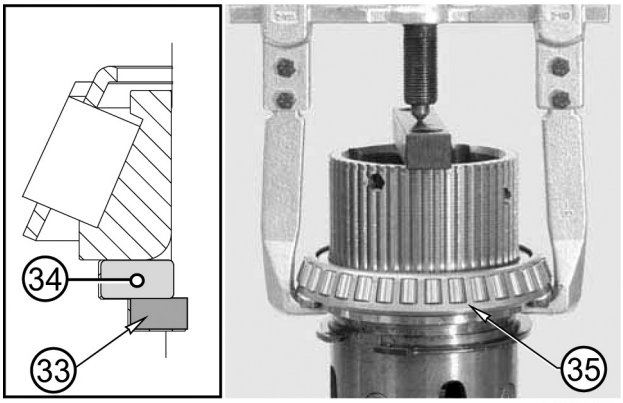
MAP13450

10. Remove the snap ring (**33**) out of its seat by moving it sideways.



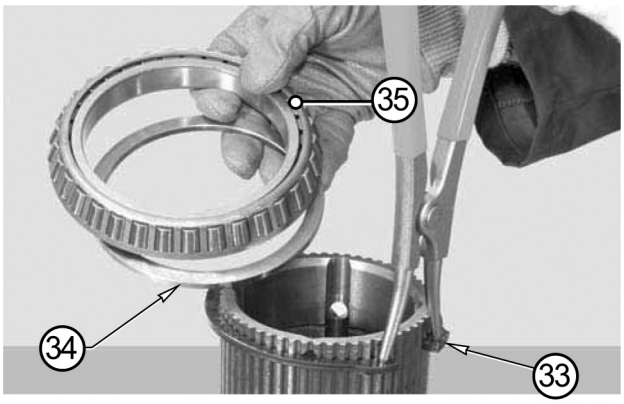
MAP13430

8. Remove the snap ring (**19**) that secures the planetary gear.



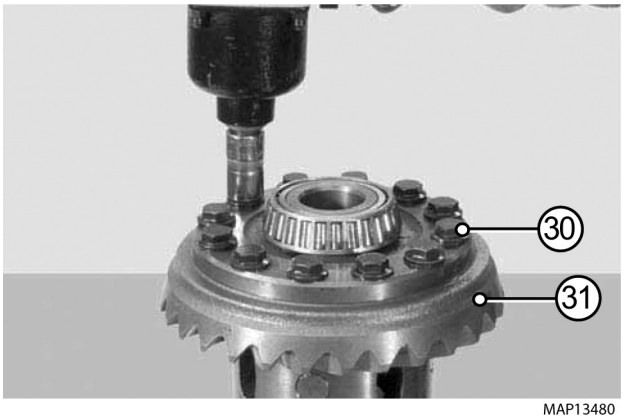
MAP13460

11. Using a puller, extract the bearing (**35**) and the washer (**34**).



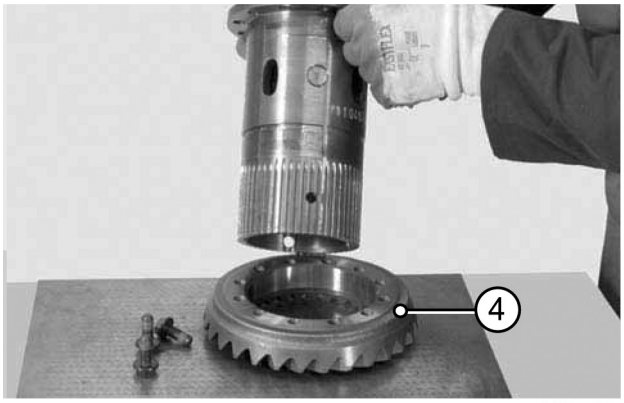
MAP13470

12. Remove the bearing (**35**), washer (**34**) and snap ring (**33**).



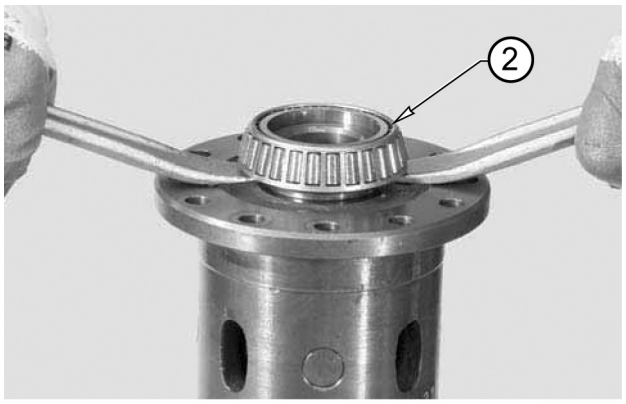
MAP13480

13. Remove cap screws (**32**) of the ring gear (**31**); exchange each time when removed.



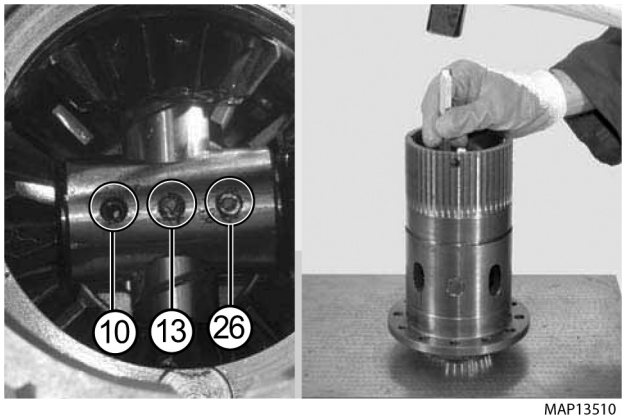
MAP13490

14. Extract the ring gear (**4**).



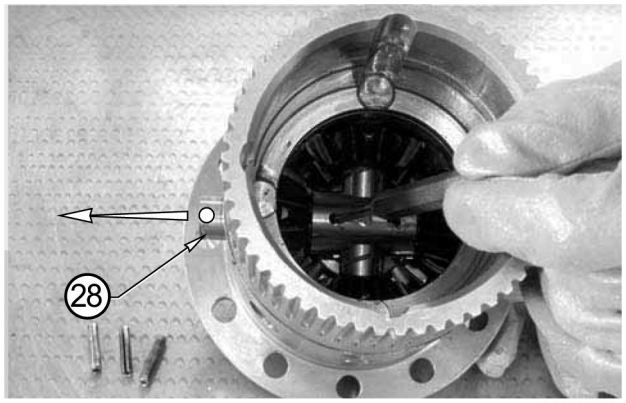
MAP13500

15. Remove the tapered roller bearing (**2**) of the ring gear side, using two levers.



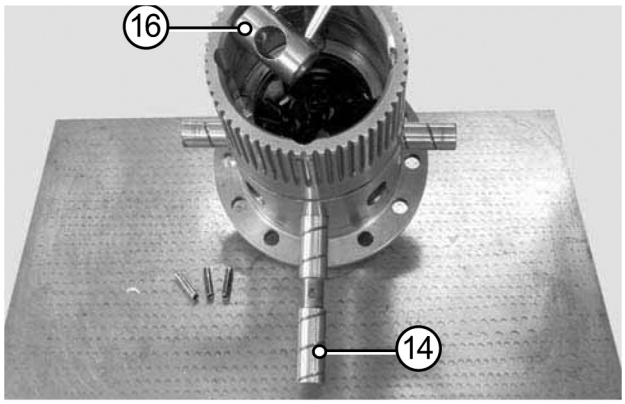
MAP13510

16. Remove the three spider blocking pins (**10**), (**13**) and (**26**) using a pin driver.



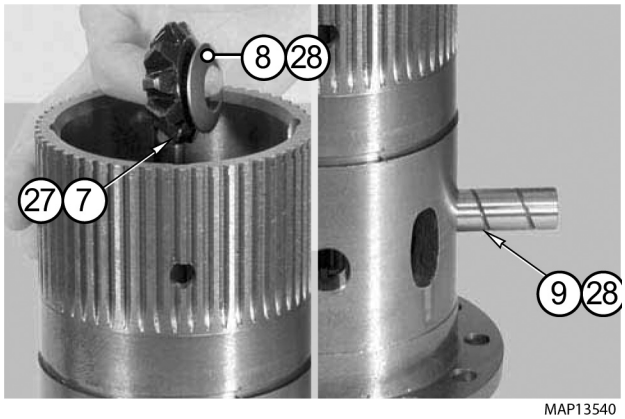
MAP13520

17. Move the two opposite mounted short bolts (**9**) and (**28**) to the outside of the box using the same pin driver.



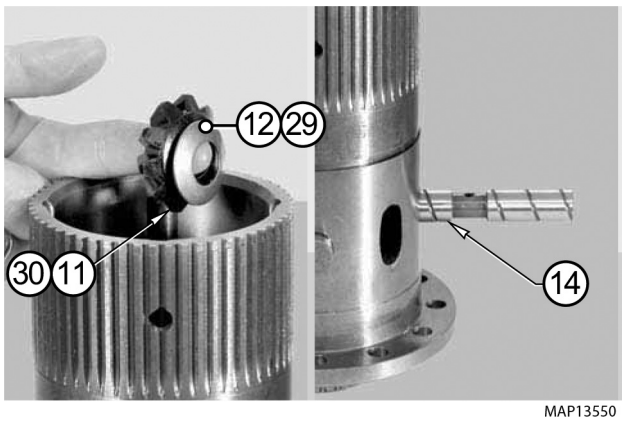
MAP13530

18. Drive out the long bolt (**14**) and pull out the spider (**16**) from the center.



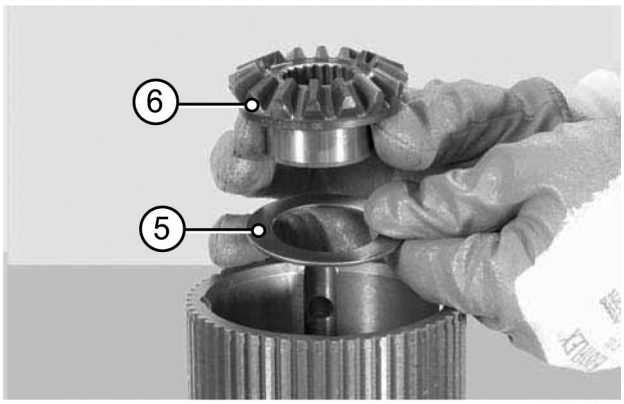
MAP13540

19. Remove the two half bolts (**9**) and (**28**), spherical washers (**8**) and (**28**) and satellite gears (**27**) and (**7**).



MAP13550

20. Remove long bolt (**14**), spherical washers (**12**) and (**29**) and satellite gears (**30**) and (**11**).



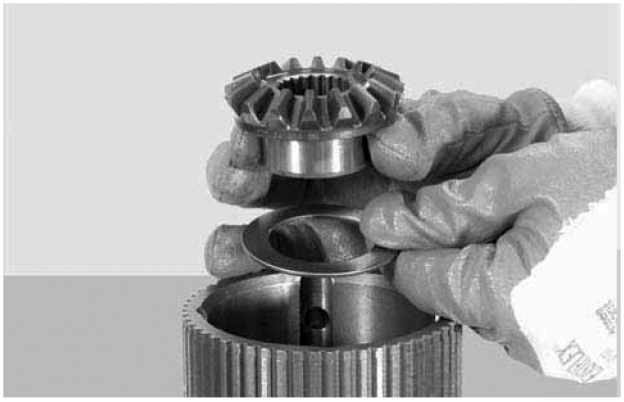
MAP13560

21. Remove the planetary gear (**6**).

7.3 NORMAL PRELOADED DIFFERENTIAL UNIT (OLD VERSION) - ASSEMBLY

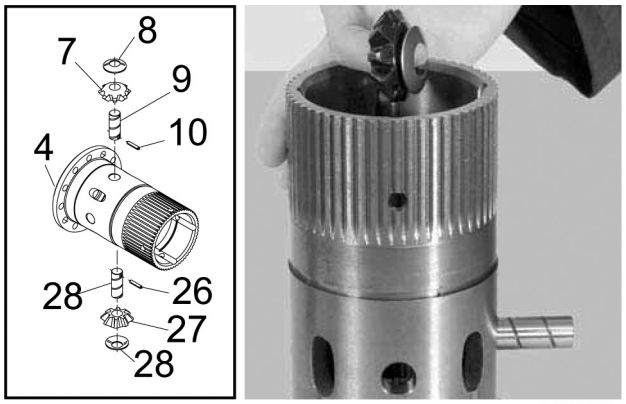
MAP13570

1. Differential module assembled.



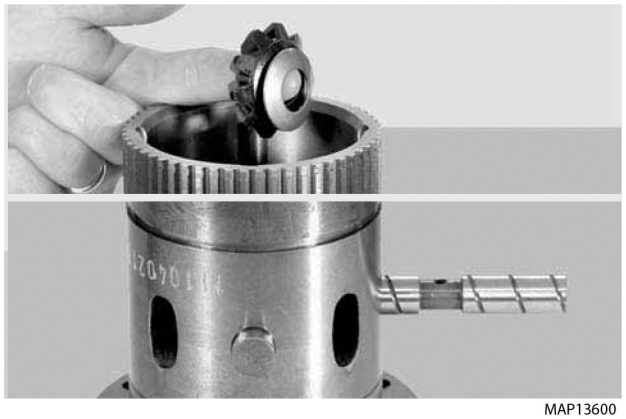
MAP13580

2. Lubricate and insert washer and planetary gear.



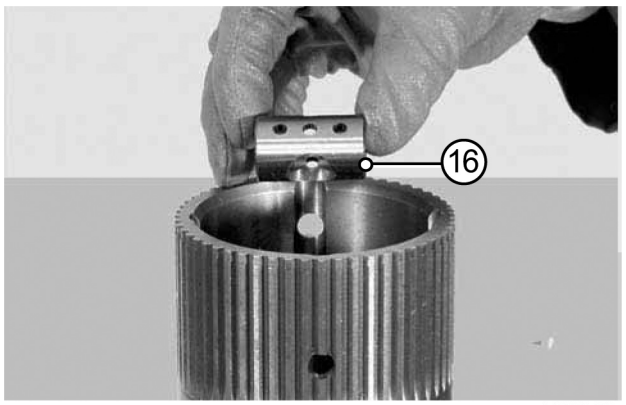
MAP13590

3. Insert the two half bolts (**28**) and (**9**), spherical washers (**8**) and (**28**) and satellite gears (**7**) and (**27**).



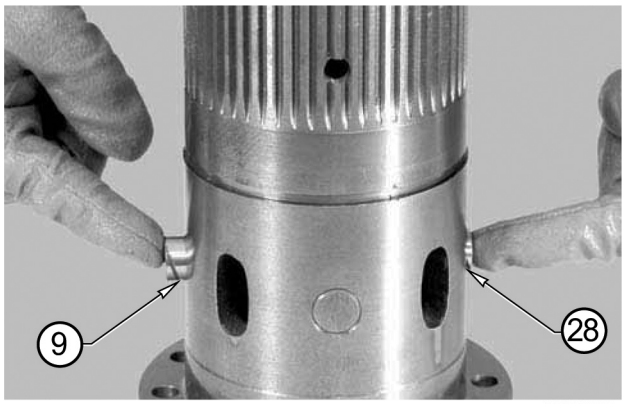
MAP13600

4. Partially insert the long bolt (**14**), satellite gears (**11**) and (**30**) and spherical washers (**29**) and (**12**).



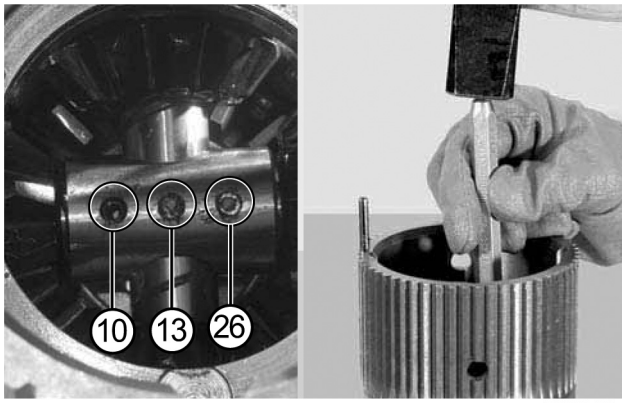
MAP13610

5. Insert spider (**16**) and completely insert the long bolt (**14**).



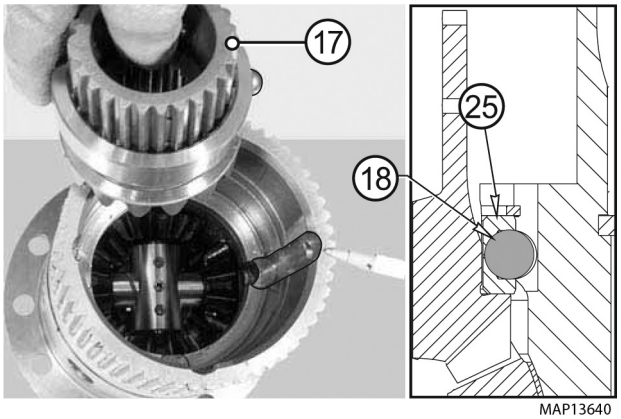
MAP13620

6. Insert completely the half bolts (**9**) and (**28**).



MAP13630

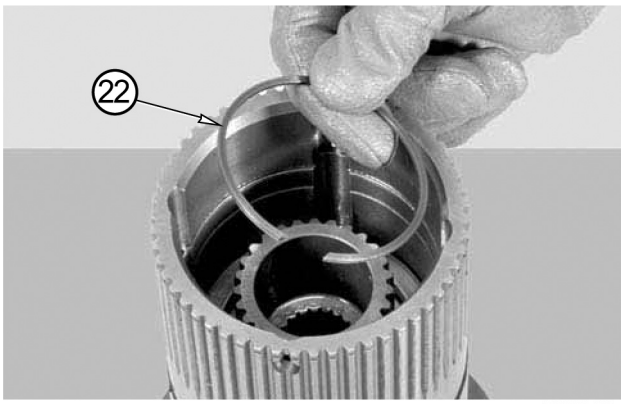
7. Center the pin holes and insert the 3 pins (**10**), (**13**) and (**26**).



MAP13640

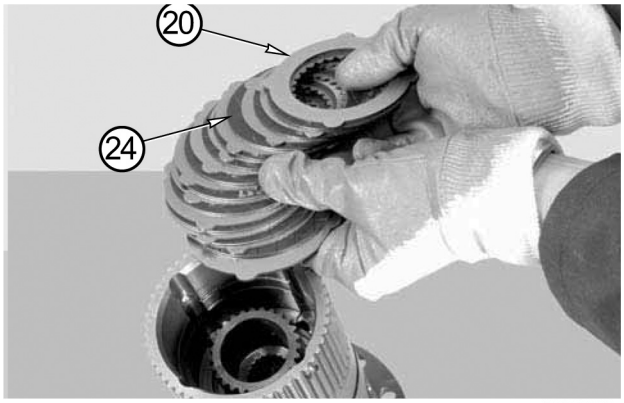
8. Insert the planetary wheel together (**17**) with the centering sleeve (**25**).

Note: *The centering sleeve must have the fixing ball (**18**) assembled.*



MAP13650

9. Insert snap ring (**22**) of the planetary wheel.

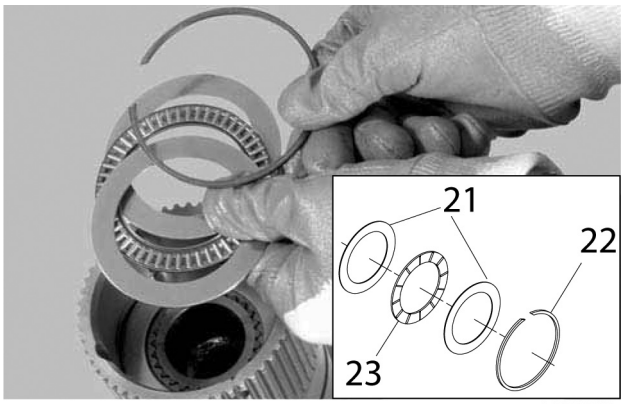


MAP13660

10. Insert and substitute, if necessary, the discs (**20**) and (**24**) of the differential lock.

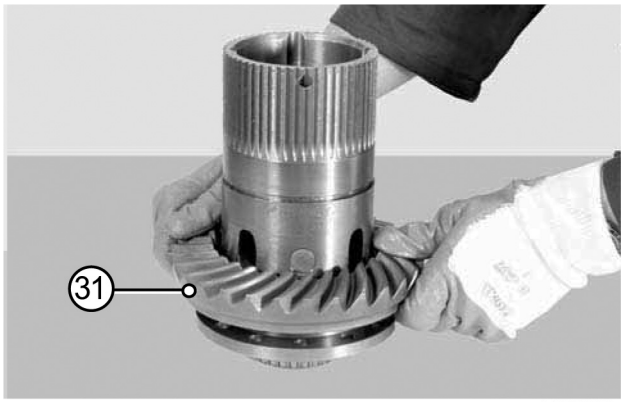
⚠ CAUTION

First and last disc have to be of steel material.



MAP13670

11. Insert thrust bearing (**23**) and snap ring (**22**).



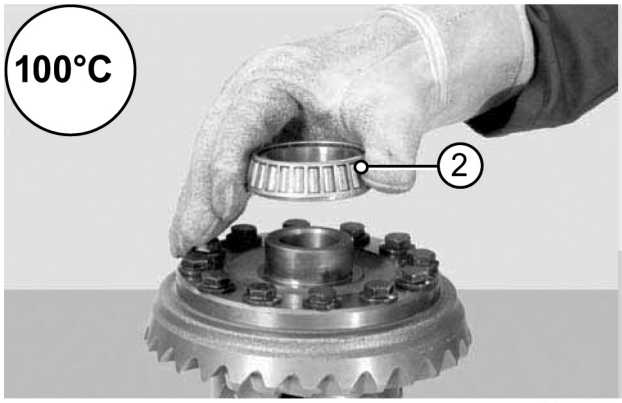
MAP13680

12. Insert ring gear (**31**).

MAP13690

13. Insert the screws (**32**).
14. Tighten screws with a torque wrench setting of 78-86 Nm (57 - 63 ft.lb).

Note: *Always use new screws to fix the ring gear. In case the screws are not thread locking pretreated, use Loctite 270.*



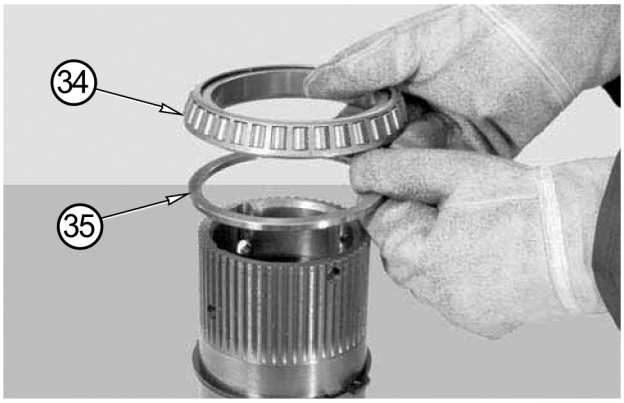
MAP13700

15. Assemble the bearing (**2**).

Note: *Heat the bearing to 100 °C before assembling.*

MAP13710

16. Assemble the snap ring (**33**) in its seat.



MAP13720

17. Assemble shim (**34**) and bearing (**35**).

Note: *Heat the bearing as well as the shim to 100 °C before assembling.*

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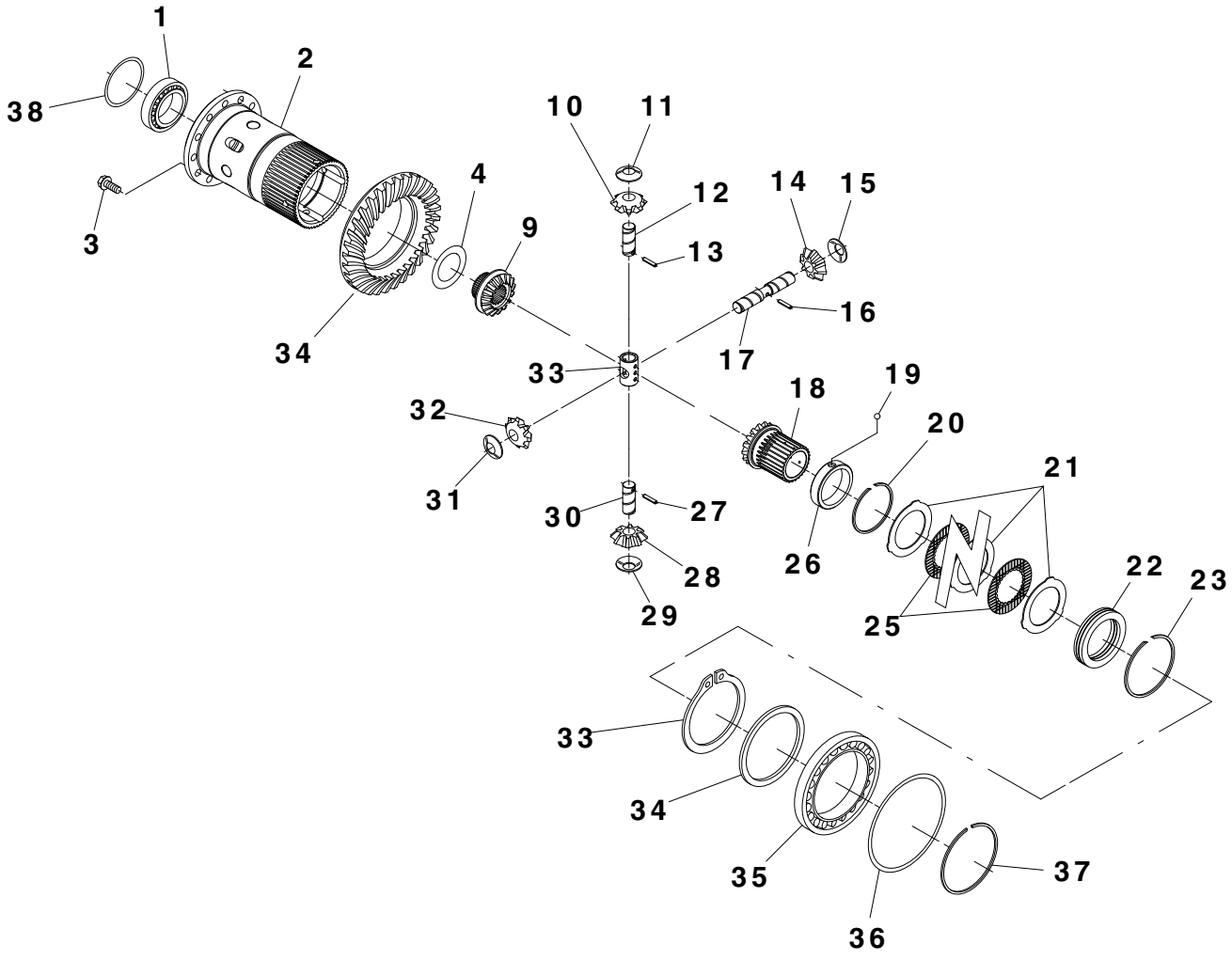
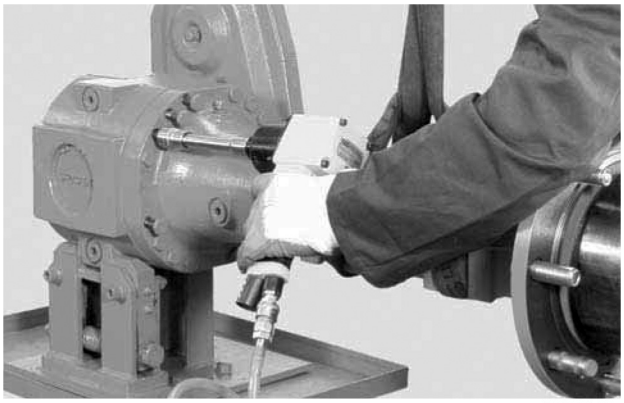
Section 8
Normal Preloaded Differential Unit (Intermediate Version)

8.1 EXPLODED VIEW

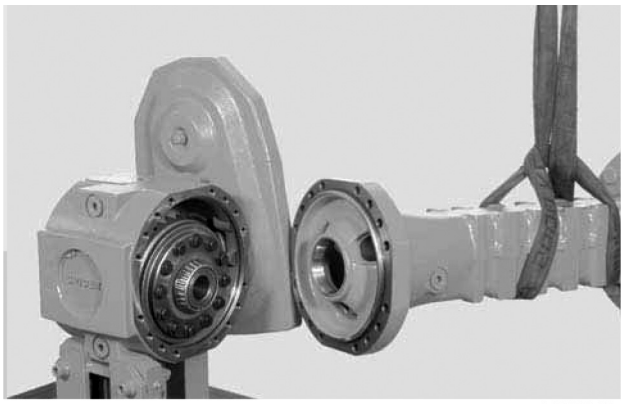


8.2 NORMAL PRELOADED DIFFERENTIAL UNIT (INTERMEDIATE VERSION) - DISASSEMBLY



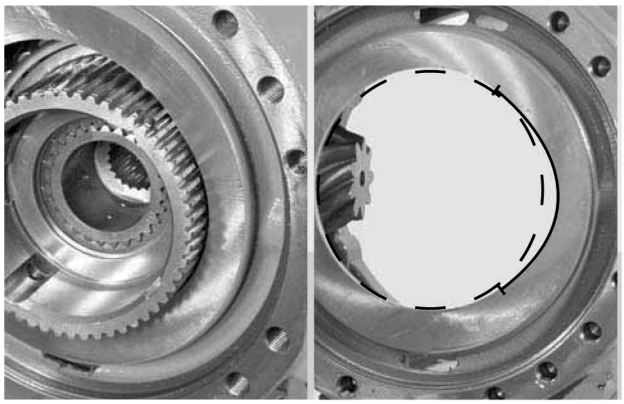
MAP13740

1. Remove the brake side arm and the brake discs pack. Sling the arm to be removed and connect it to a hoist. Remove screws of the ring gear side arm.



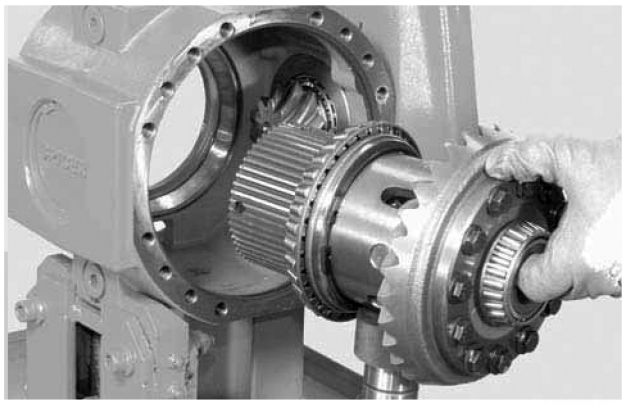
MAP13750

2. Place the arm on a bench.



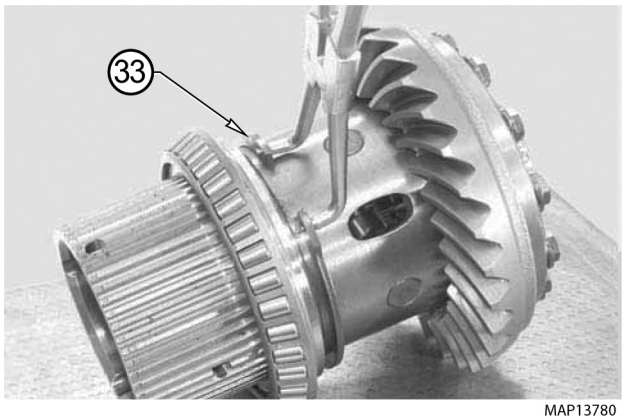
MAP13760

3. Position the differential gear sideways into the recess in order to be able to pull it out.



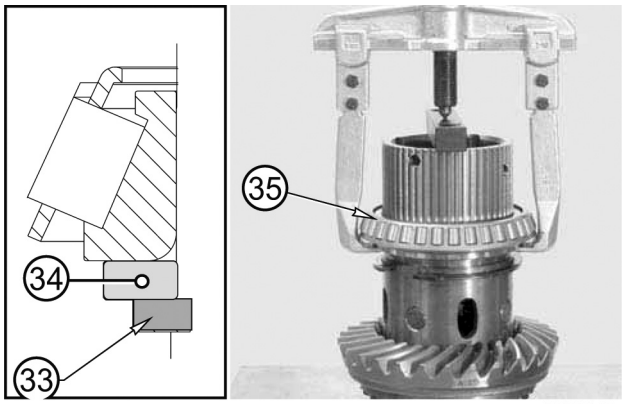
MAP13770

4. Pull out the differential.



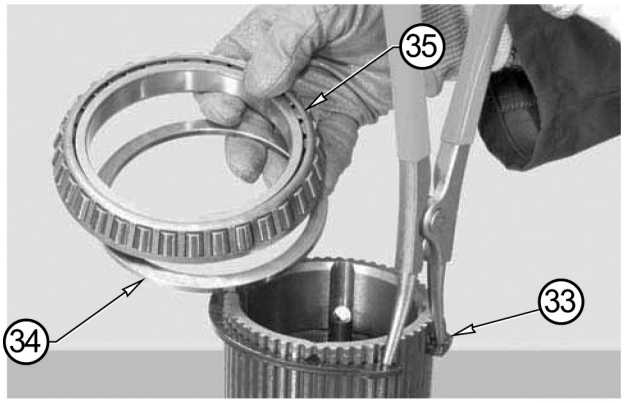
MAP13780

5. Remove the snap ring (**33**) out of its seat by moving it sideways.



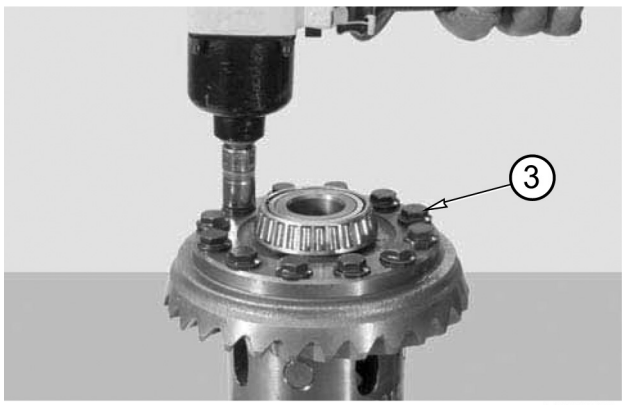
MAP13790

6. Using a puller, extract the bearing (**35**) and the washer (**34**).



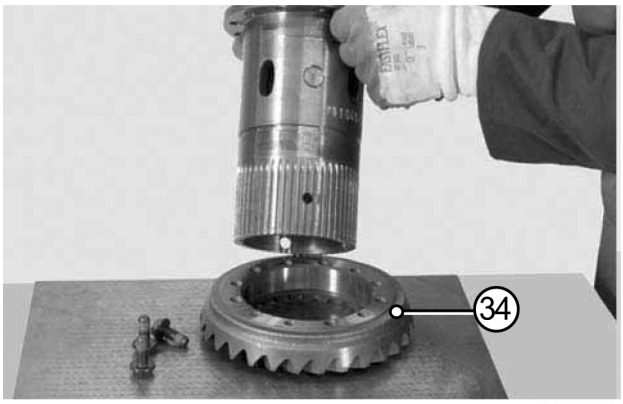
MAP13800

7. Remove completely bearing (**35**), washer (**34**) and snap ring (**33**).



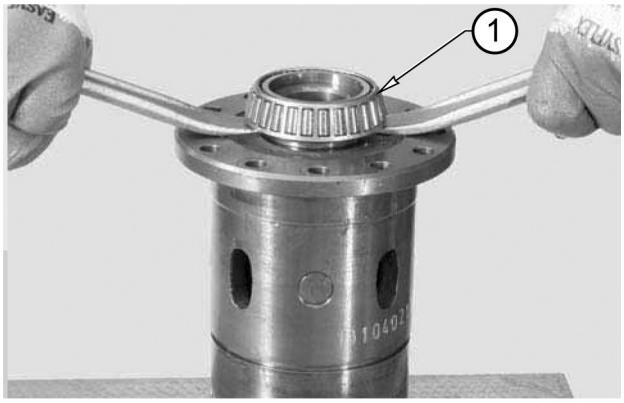
MAP13810

8. Remove the cap screws (**3**) of crown. Renew the screws (**3**) at each reassembly.



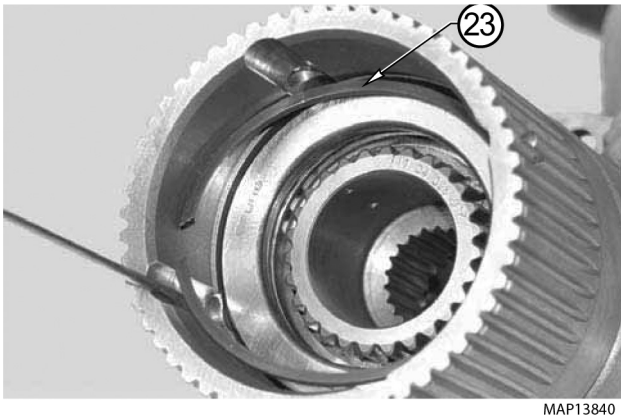
MAP13820

9. Extract the ring gear (**34**).



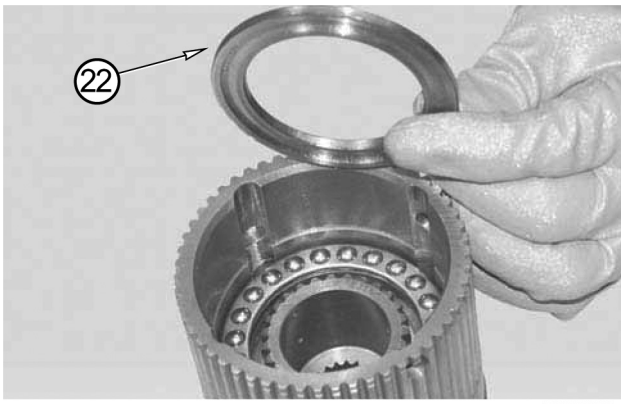
MAP13830

10. Remove the tapered roller bearing (**1**) of the ring gear side, using two levers.



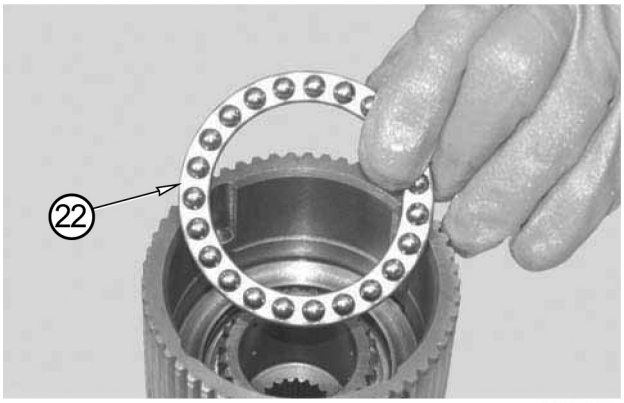
MAP13840

11. Remove the snap ring (**23**) that secures the thrust bearing.



MAP13850

12. Remove the thrust block (**22**).

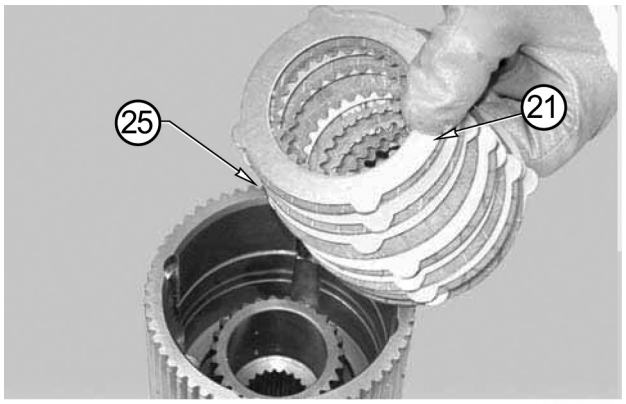


MAP13860

13. Remove the thrust bearing (**22**).

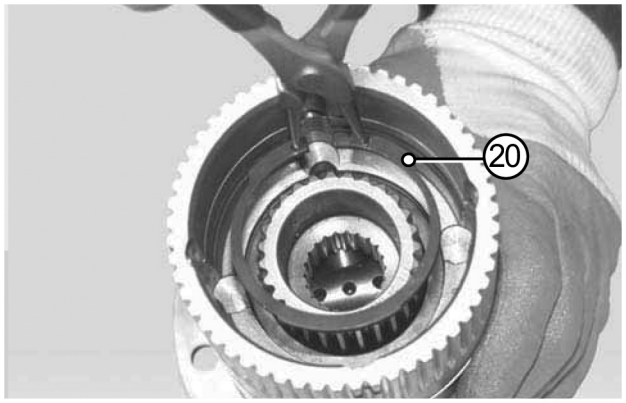
MAP13870

14. Remove the thrust block (**22**).



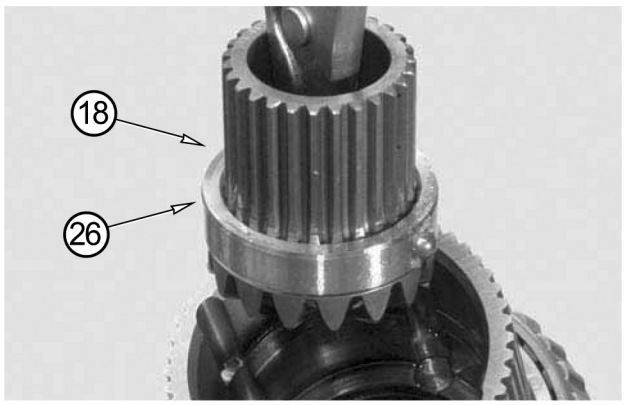
MAP13880

15. Remove the hydraulic block discs (**21**) and (**25**) one after the other.



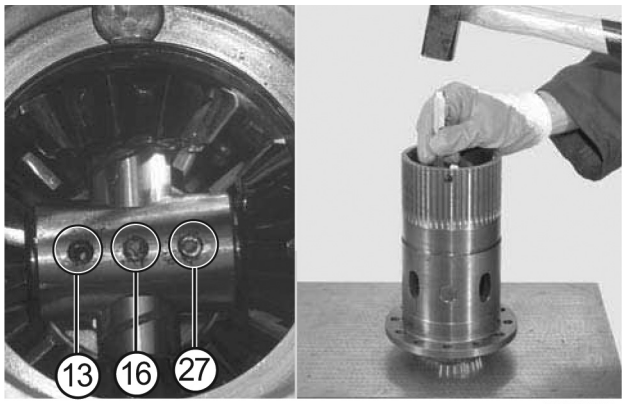
MAP13900

16. Remove the snap ring (**20**) that secures the planetary gear.



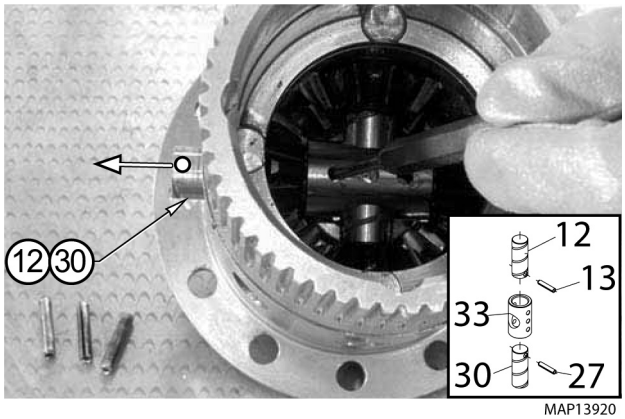
MAP13890

17. Remove the brake side planetary gear (**18**).



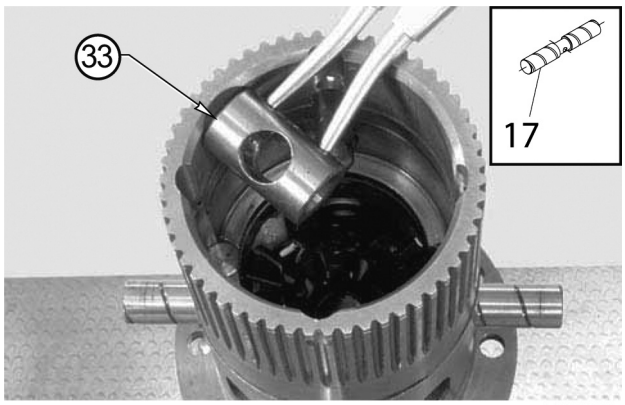
MAP13910

18. Remove the three spider blocking pins (**13**), (**16**) and (**27**) by using a pin driver.



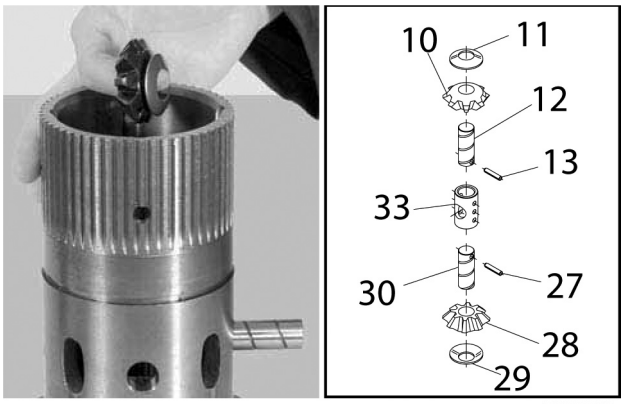
MAP13920

19. Move the two opposite mounted short bolts (**12**) and (**30**) to the outside of the box using the same pin driver.



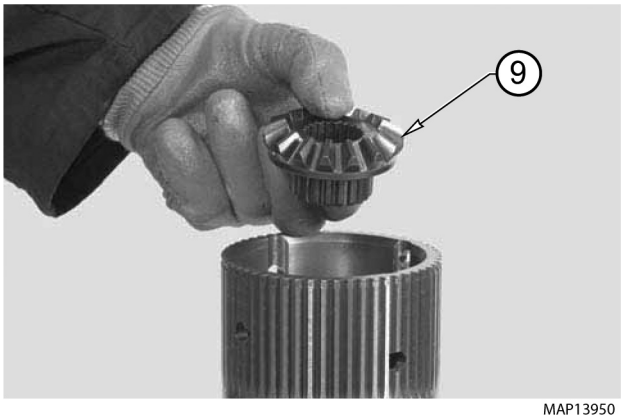
MAP13930

20. Drive out the long bolt (**17**) and pull out the spider (**33**) from the center.



MAP13940

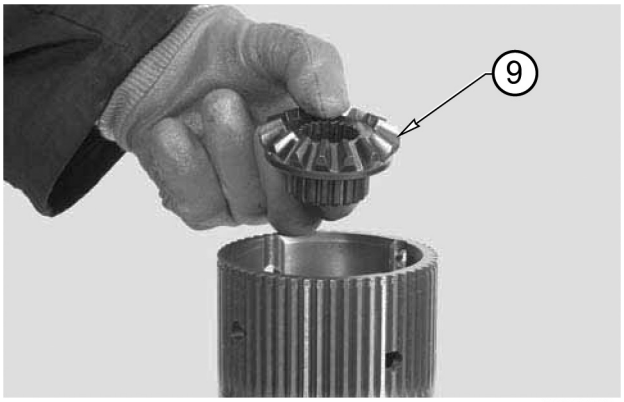
21. Remove long bolt (**17**) and spherical washers (**11**) and (**29**).



MAP13950

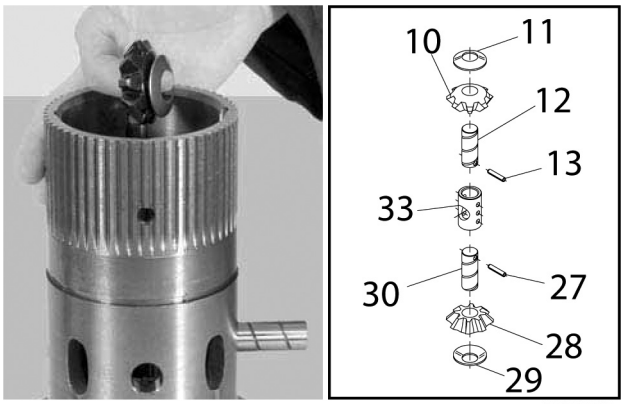
22. Remove the planetary gear (**9**).

8.3 NORMAL PRELOADED DIFFERENTIAL UNIT (INTERMEDIATE VERSION) - ASSEMBLY



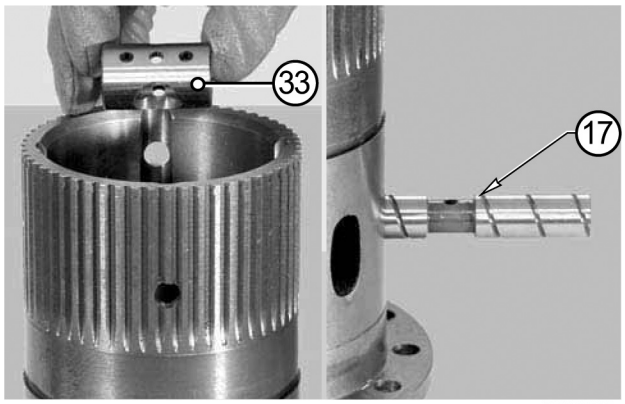
MAP13960

1. Install the planetary gear (**9**).



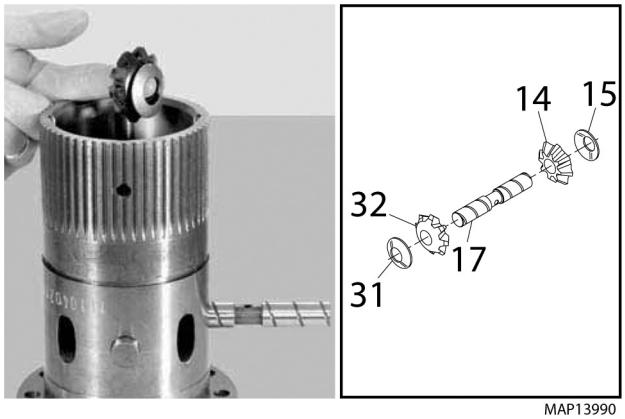
MAP13970

2. Install the planetary gears (**10**) and (**28**), spherical washers (**11**) and (**29**) onto the shafts (**12**) and (**30**).



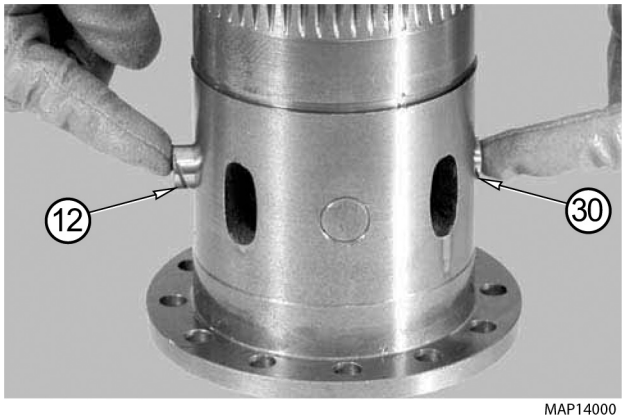
MAP13980

3. Insert spider (**33**) and partially insert the long bolt (**17**).



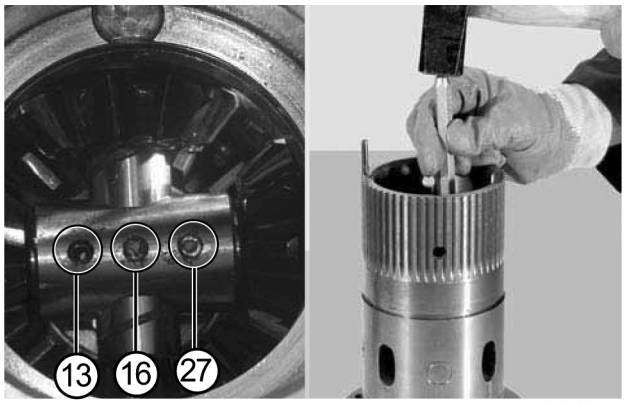
MAP13990

4. Install satellite gears (**32**) and (**14**), spherical washers (**15**) and (**31**) and completely insert the long bolt (**17**).



MAP14000

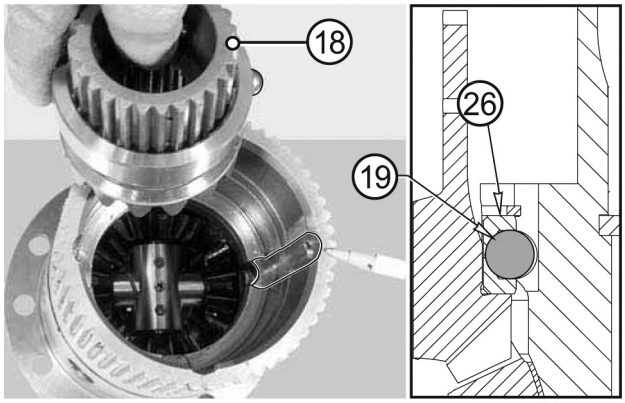
5. Insert completely the half bolts (**30**) and (**12**).



MAP14010

6. Center the pin holes and insert the 3 pins (**13**), (**16**) and (**27**).

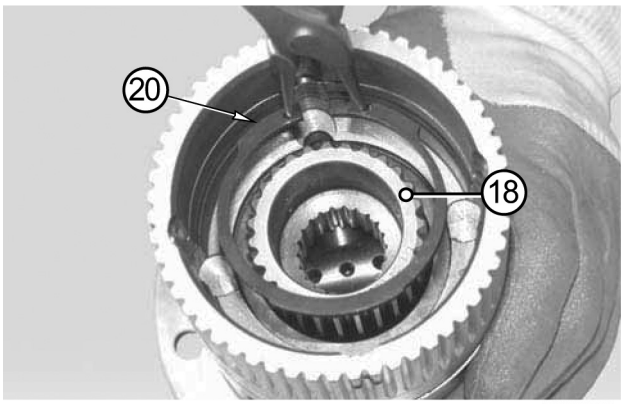
Note: *Check the free rotation of the satellite gears on the bolts.*



MAP14020

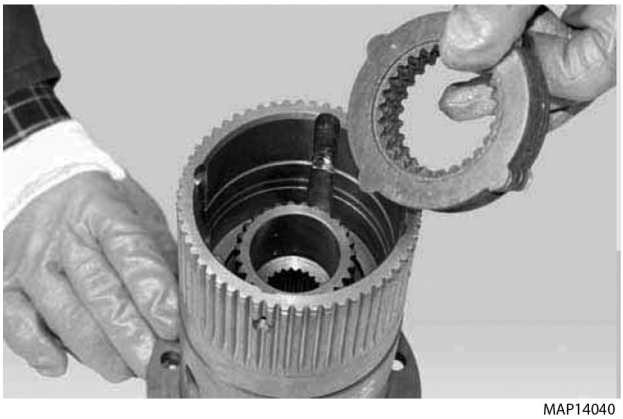
7. Insert the planetary wheel (**18**) together with the centering sleeve (**26**).

Note: *The centering sleeve must have the fixing ball (**19**) assembled.*



MAP14030

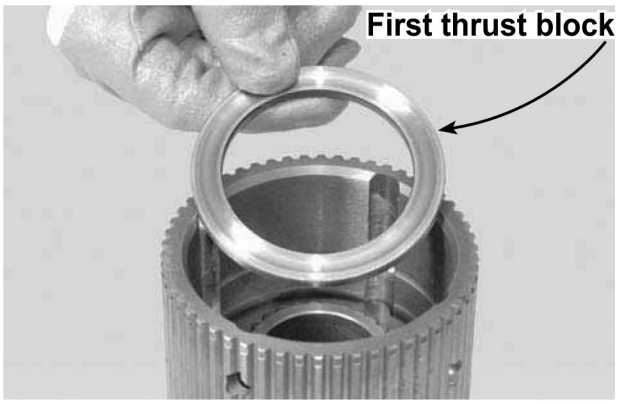
8. Insert snap ring (**20**) of the planetary wheel (**18**).


MAP14040

9. Insert and replace, if necessary, the discs of the differential lock.

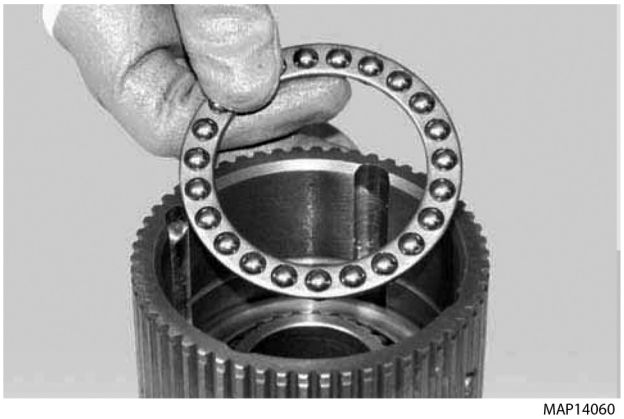
⚠ CAUTION

First and last disc have to be of steel material.



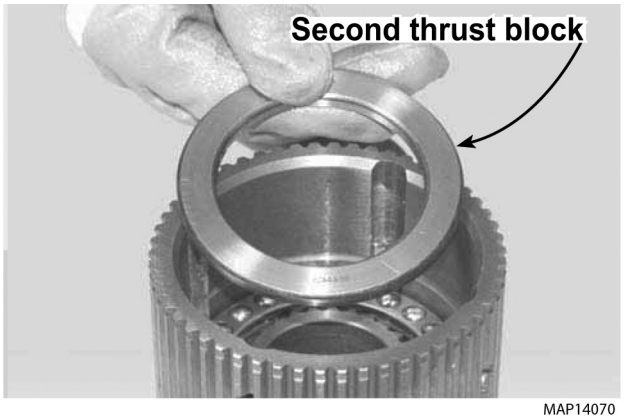
MAP14050

10. Install the thrust block with maximum internal diameter.



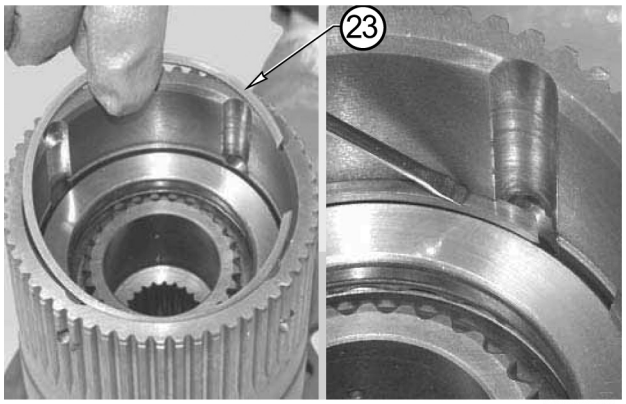
MAP14060

11. Position the bearing (**22**) in the differential unit.



MAP14070

12. Install the thrust block with minimum internal diameter.



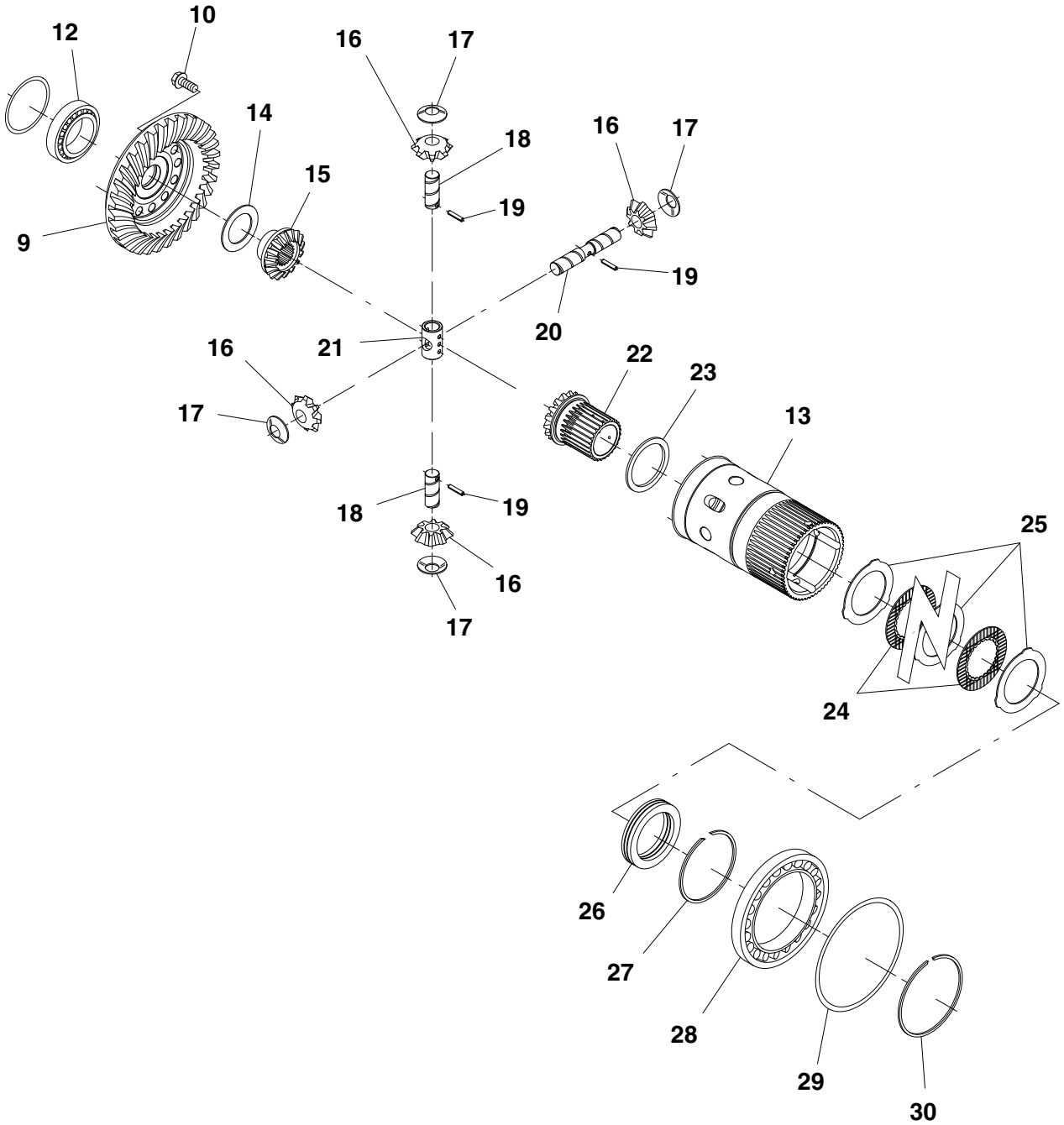
MAP14080

13. Install the snap ring (**23**).

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

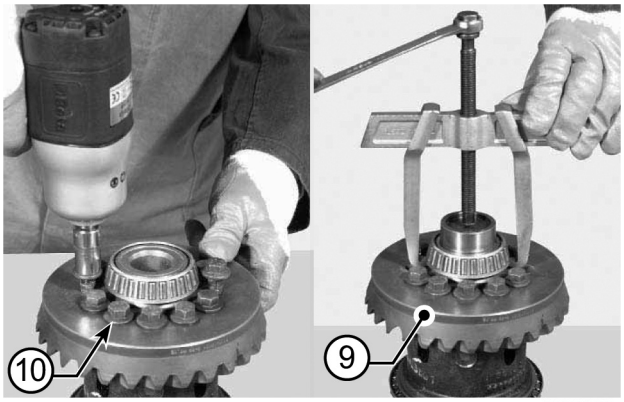
Section 9
Normal Preloaded Differential Unit (Last Version)

9.1 EXPLODED VIEW



MAP14090

9.2 NORMAL PRELOADED DIFFERENTIAL UNIT (LAST VERSION) - DISASSEMBLY

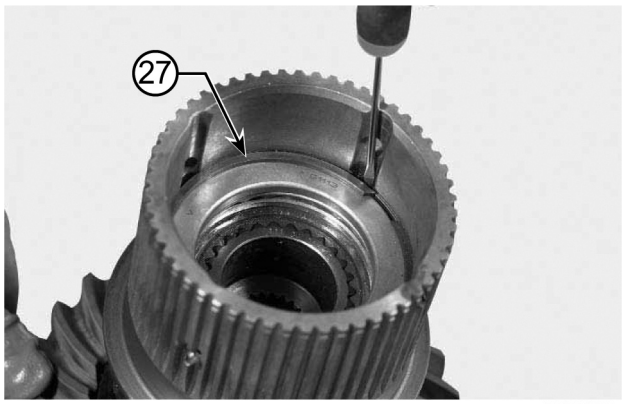


MAP14100

1. If the bearing (**12**) has to be replaced, remove two retaining screws (**10**) from the crown and, using an extractor, remove the crown bearing (**9**).

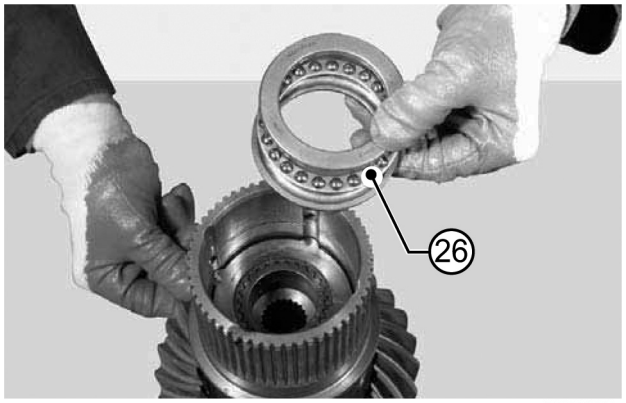
MAP14110

2. If the bearing need replacing, extract the bearing (**28**) from the differential carrier.



MAP14120

3. Remove the snap ring (**27**).

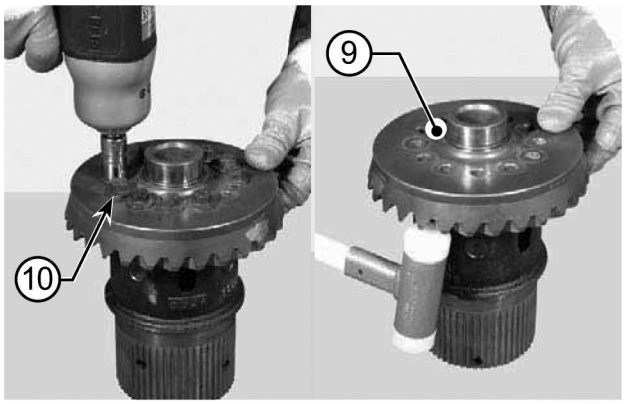


MAP14130

4. Remove the thrust block (**26**).
5. Remove the thrust bearing (**26**).
6. Remove the thrust block (**26**).

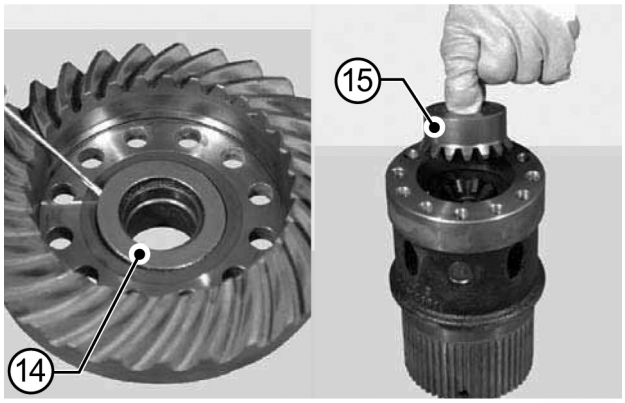
MAP14140

7. Remove the hydraulic block discs (**24** and **25**) one after the other.



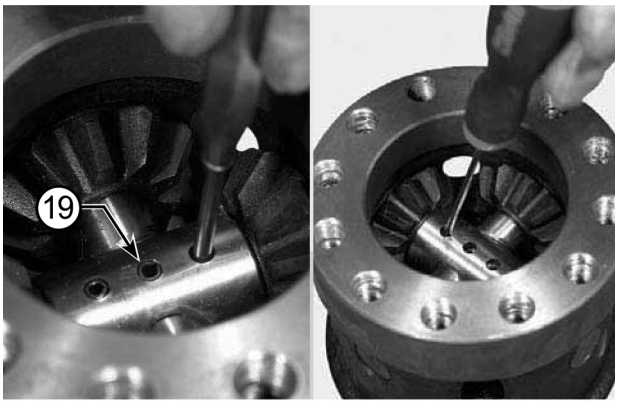
MAP14150

8. Remove fixing screws (**10**) of the ring gear (**9**); exchange each time when removed.
9. Extract the ring gear (**9**).



MAP14160

10. Remove the shim washer (**14**).
11. Remove the planetary gear (**15**).

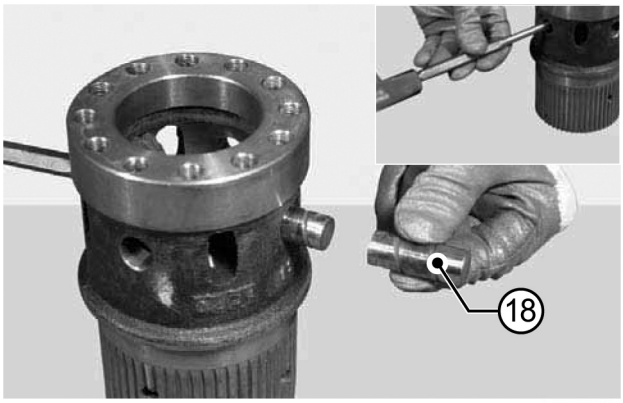


MAP14170

12. Remove the three spider blocking pins (**19**) by using a pin driver. Move the two opposite mounted short bolts (**18**) to the outside of the box using the same pin driver.

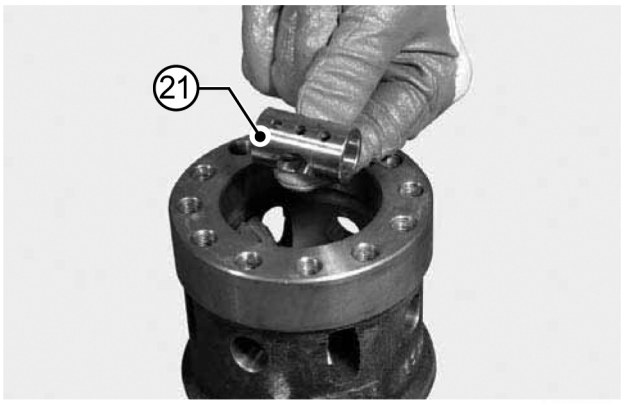
MAP14180

13. Remove the bolts with the help of a drift (**20**).



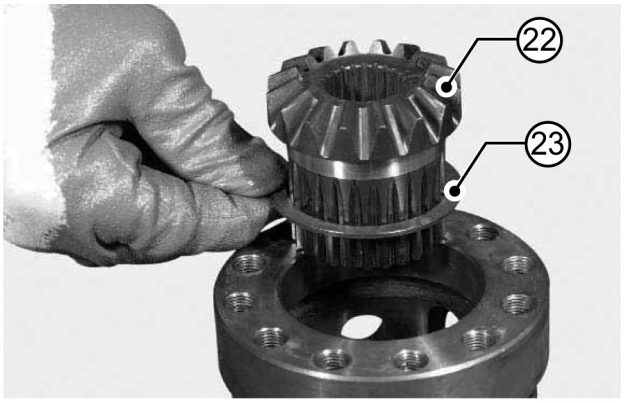
MAP14190

14. Remove the two half bolts (**18**), spherical washers (**17**) and satellite gears (**16**).



MAP14200

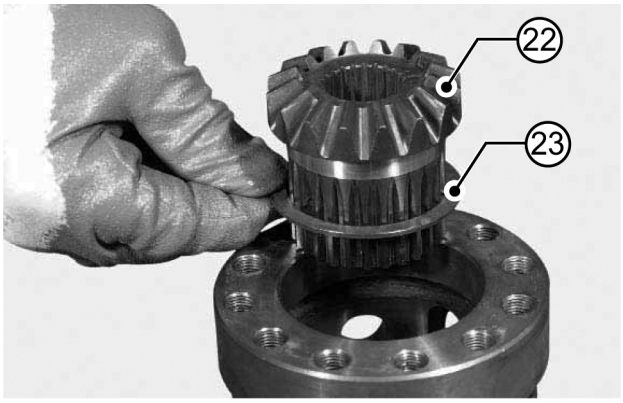
15. Remove the cross bolts (**21**).



MAP14210

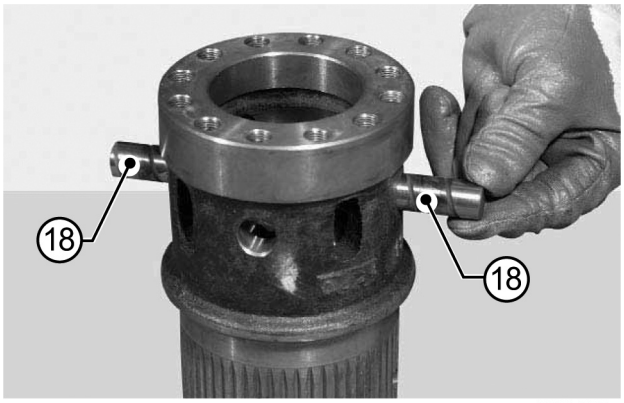
16. Remove the planetary gear (**22**) with washer (**23**).

9.3 NORMAL PRELOADED DIFFERENTIAL UNIT (LAST VERSION) - ASSEMBLY



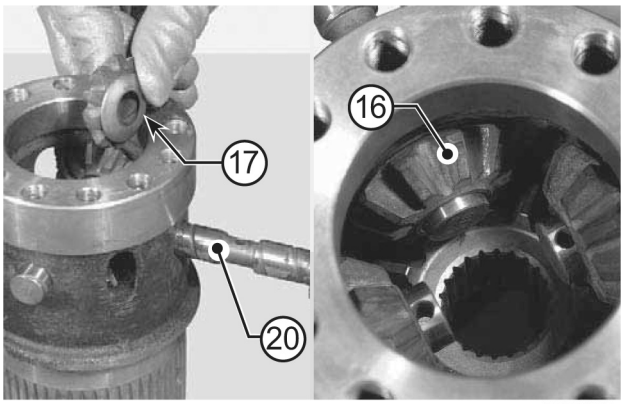
MAP14210

1. Lubricate and insert washer (**23**) and planetary gear (**22**).



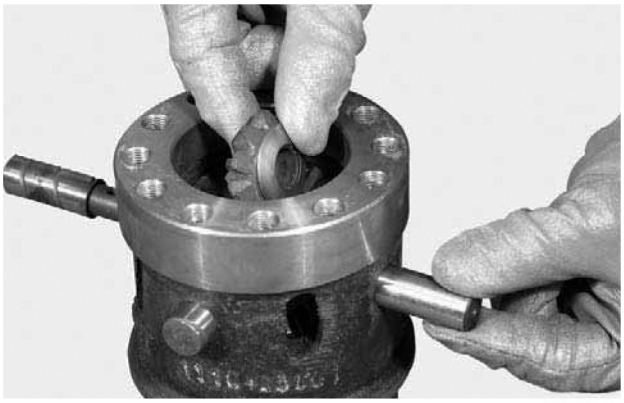
MAP14220

2. Insert the two half bolts (**18**), spherical washers (**17**) and satellite gears (**16**).



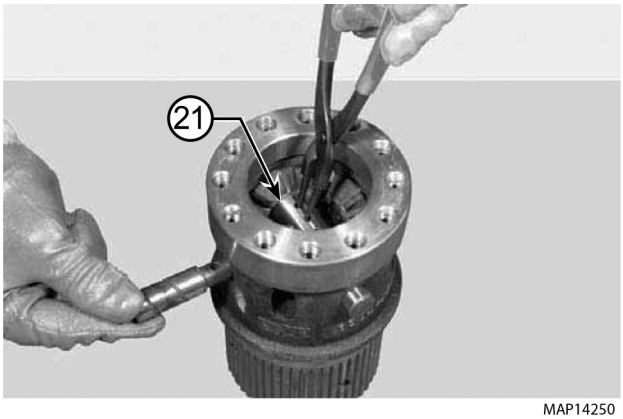
MAP14230

3. Partially insert the long bolt (**20**), satellite gears (**16**) and spherical washers (**17**).



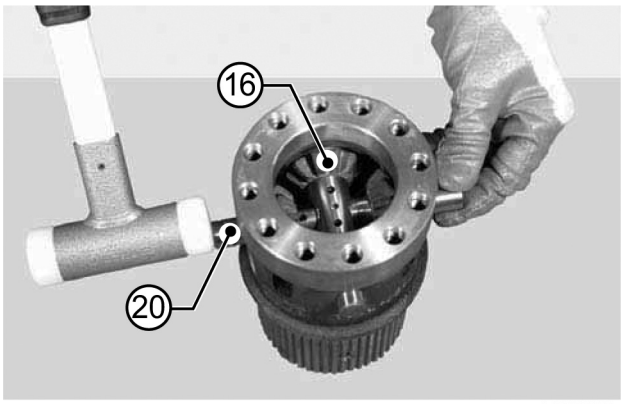
MAP14240

4. Place the satellite gear (**16**) and the spherical washer (**17**) in the box and fix with a fake pin of suitable diameter.



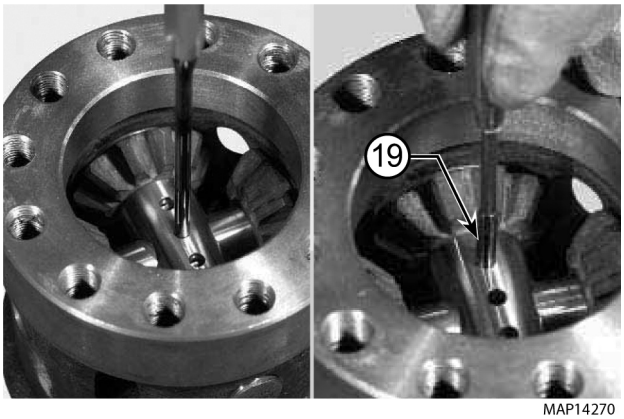
MAP14250

5. Insert the cross bolt (**21**) in the correct position.



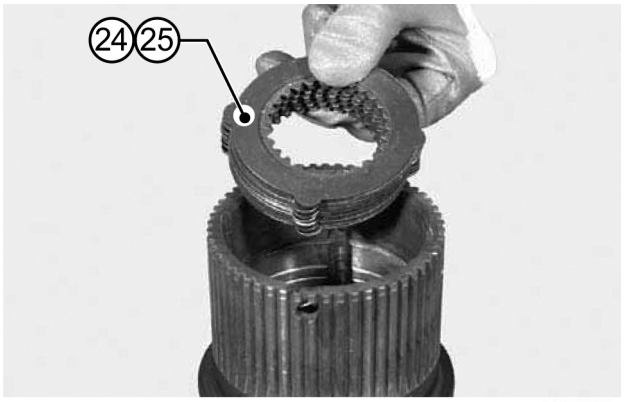
MAP14260

6. Secure the satellite gears (16) and spherical washers (**17**) by completely inserting the long bolt (**20**).



MAP14270

7. Bring the pin holes in line with the help of a pin driver.
8. Insert pins (**19**) to end of stroke.

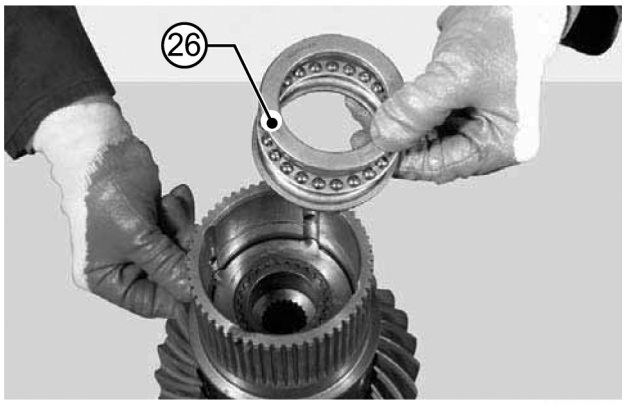


MAP14280

9. Insert and substitute, if necessary, the discs of the differential lock (**24** and **25**).

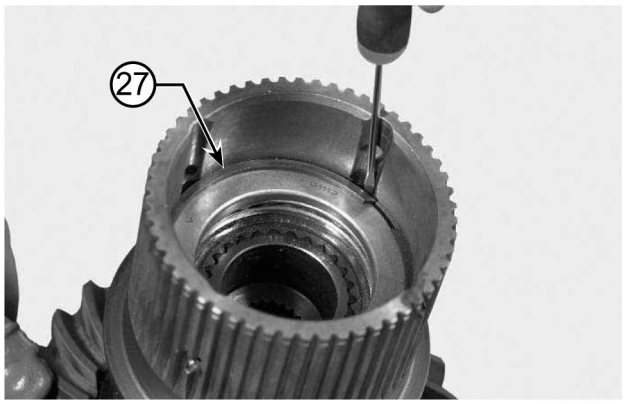
⚠ CAUTION

First and last disc have to be of steel material (**25**).



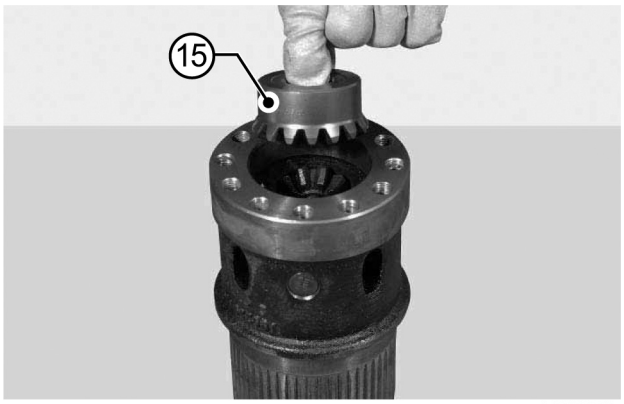
MAP14290

10. Install the thrust block with maximum internal diameter.
11. Position the bearing (**26**) in the differential unit.
12. Install the thrust block with minimum internal diameter.



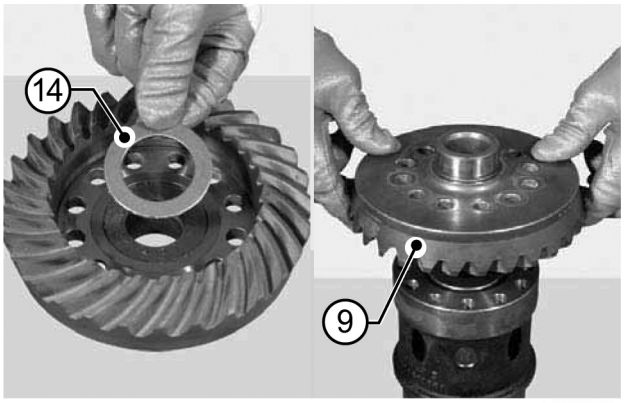
MAP14300

13. Insert the snap ring (**27**).



MAP14310

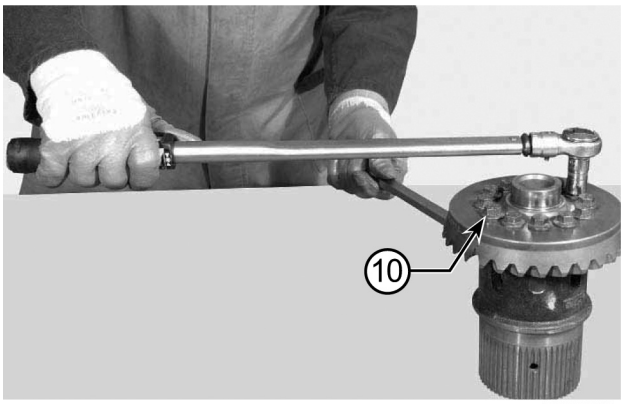
14. Insert planetary gear wheel (**15**).



MAP14320

15. Position the shim washer (**14**) on the crown (**9**).
16. Install the ring gear (**9**).

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

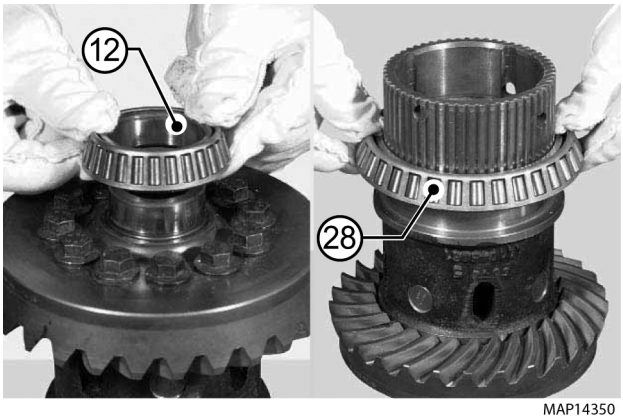


MAP14340

17. Mount the gear ring (**9**) and fasten it to the differential box with screws (**10**).

⚠ CAUTION

Use only new screws pre-treated with locking adhesive.



MAP14350

18. Heat the bearings (**12** and **28**) at 100° and insert them on the differential.

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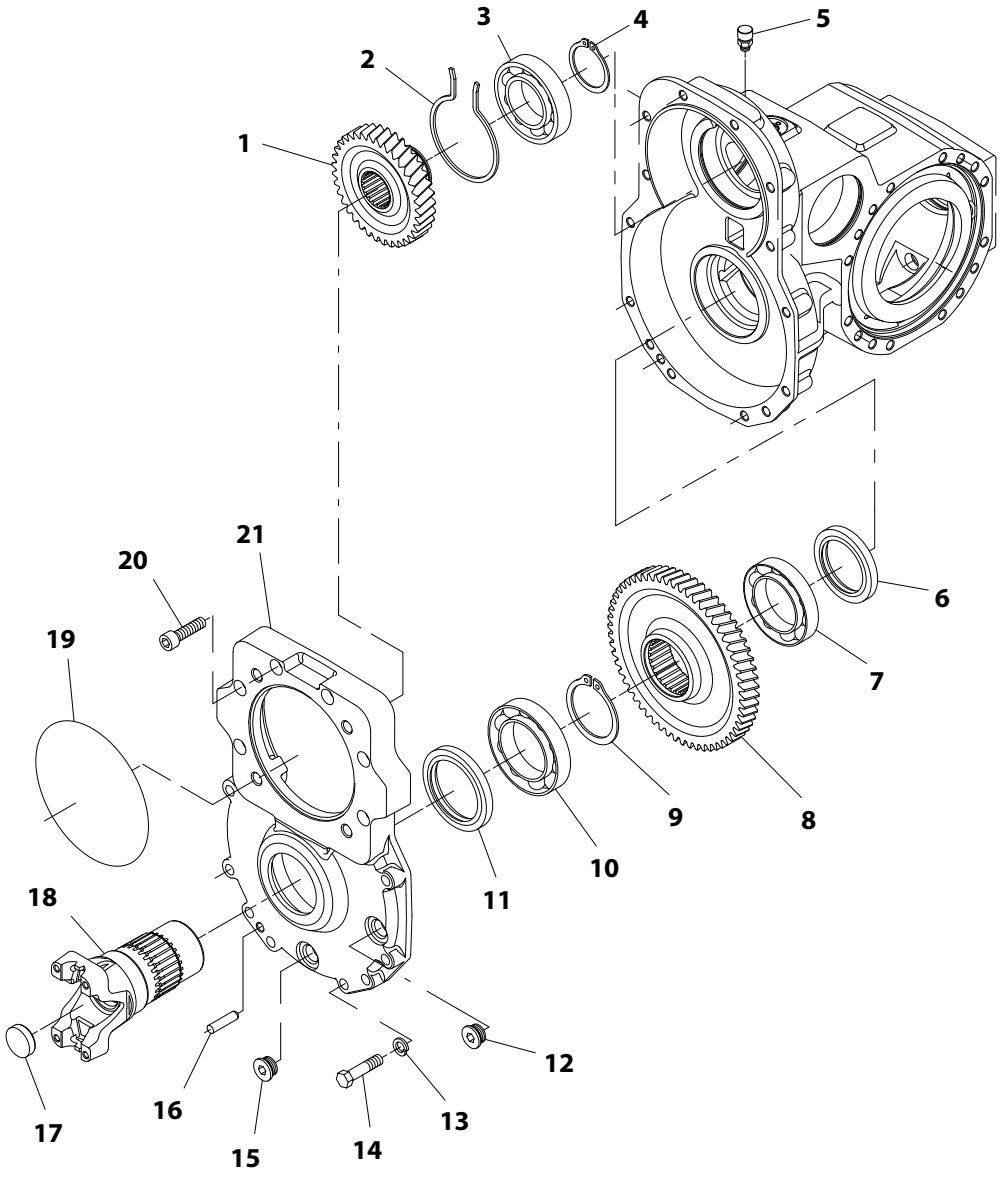
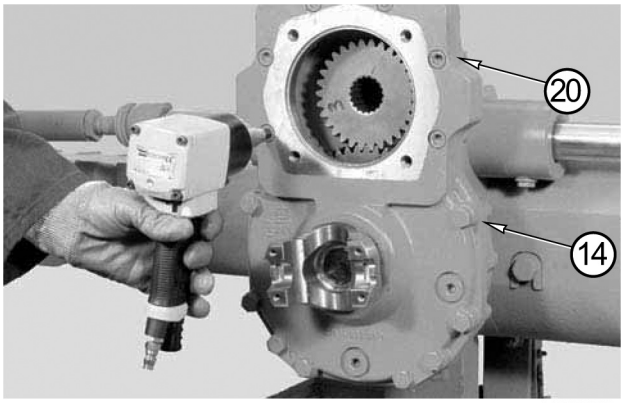
Section 10
Flanged Reduction Gear 603 Type: Integral 603 Input Gear

10.1 EXPLODED VIEW



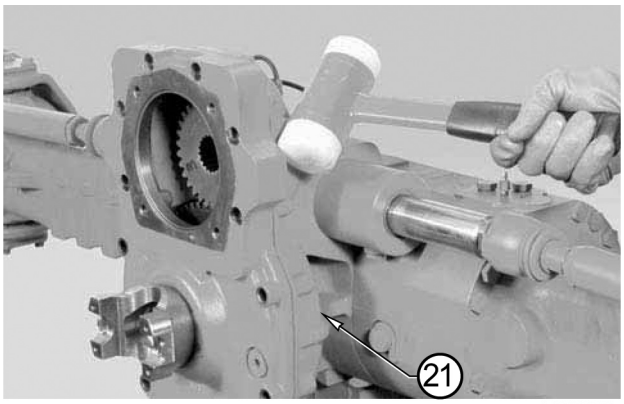
MAP14360

10.2 FLANGED REDUCTION GEAR 603 TYPE: INTEGRAL 603 INPUT GEAR - DISASSEMBLY



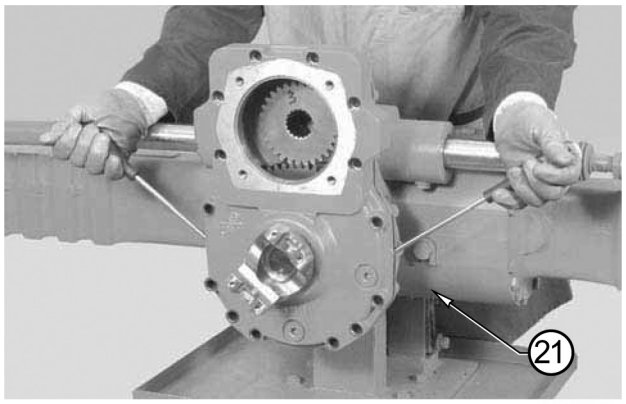
MAP14370

1. Remove screws (**14**) and (**20**) of the drive side flange cover.



MAP14380

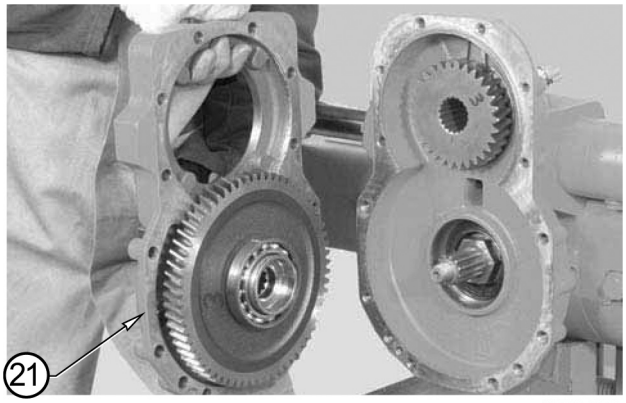
2. Remove the drive side flange cover (**21**).



MAP14390

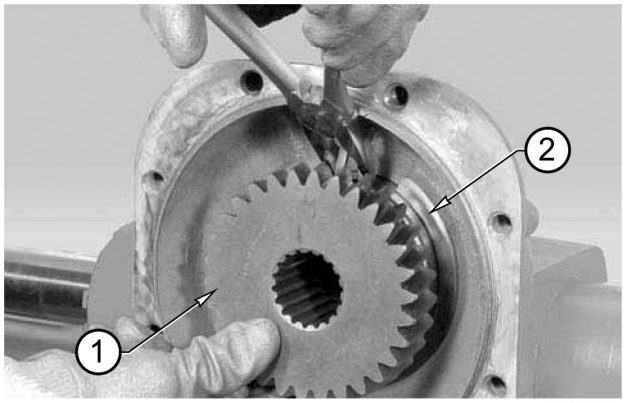
3. Place two levers into the appropriate slots.

Note: *Be careful not to damage the surfaces.*



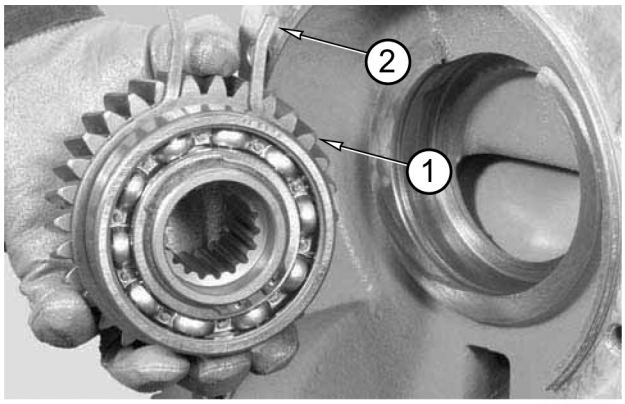
MAP14400

4. Remove the cover (**21**).



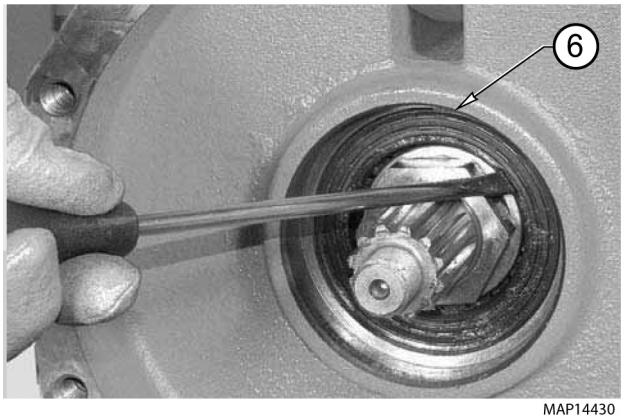
MAP14410

5. To remove the drive side shaft (**1**), remove the snap ring (**2**).



MAP14420

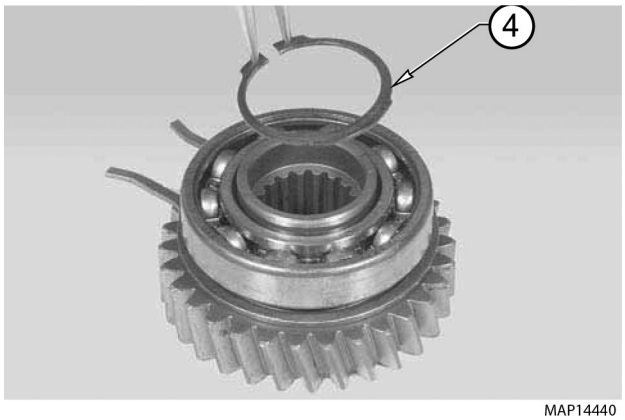
6. Using two levers, remove the drive side shaft (**1**).



MAP14430

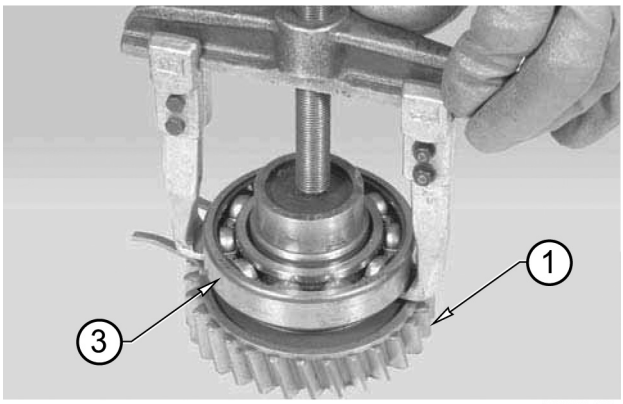
7. Using a screwdriver, remove the flange sealing ring (**6**).

Note: *Be careful not to damage the surfaces.*



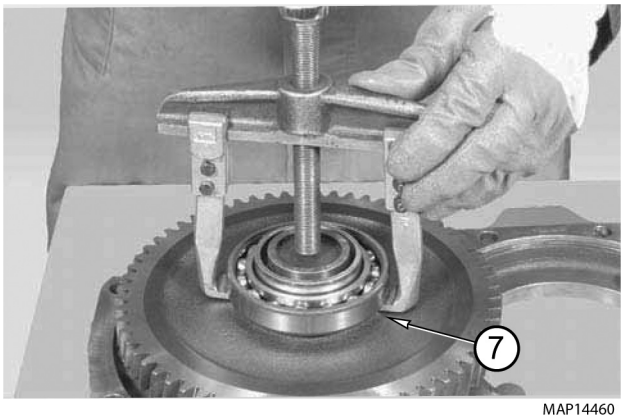
MAP14440

8. Remove the snap ring (**4**).



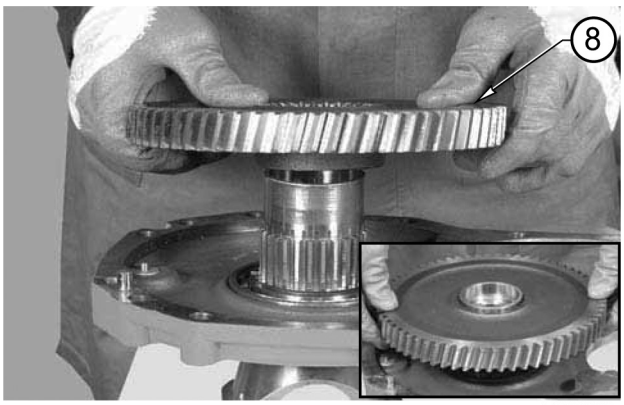
MAP14450

9. With a puller, remove the bearing (**3**) from the input shaft (**1**).



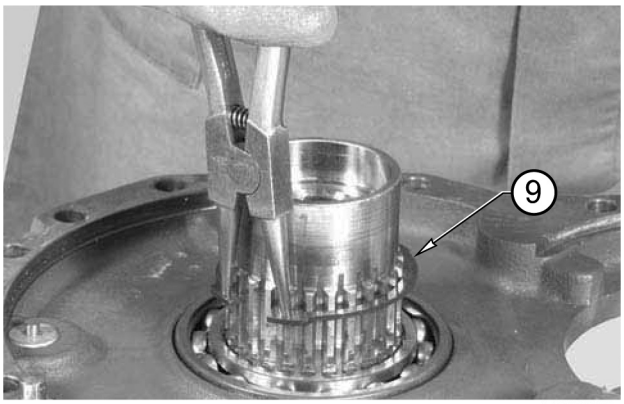
MAP14460

10. With a puller, remove the bearing (**7**) from the lower shaft (**8**).



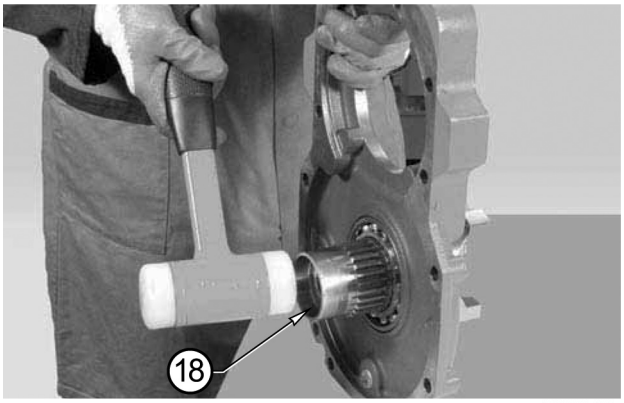
MAP14470

11. Remove the secondary gear wheel (**8**), if necessary use two levers.



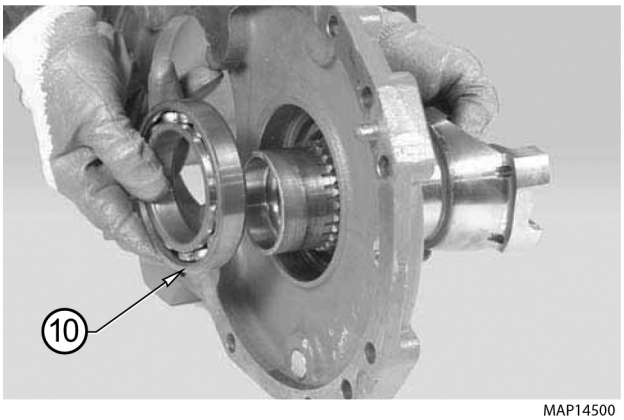
MAP14480

12. Remove the snap ring (**9**).



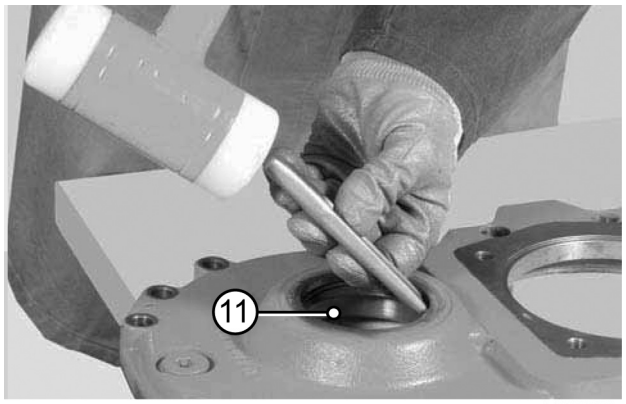
MAP14490

13. Remove the flange (**18**) using a plastic hammer.



MAP14500

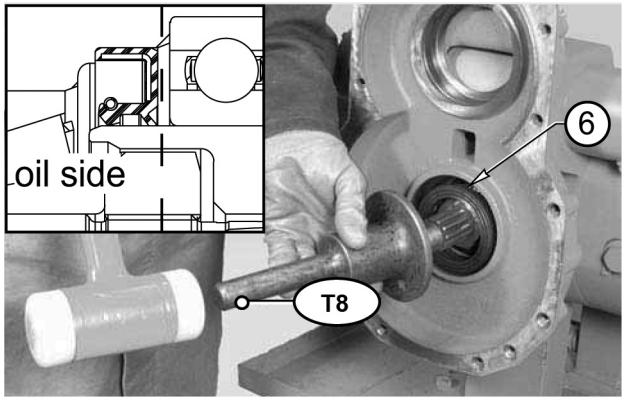
14. Remove the internal bearing (**10**).



MAP14510

15. Remove the sealing ring cup (**11**) by using a drift.

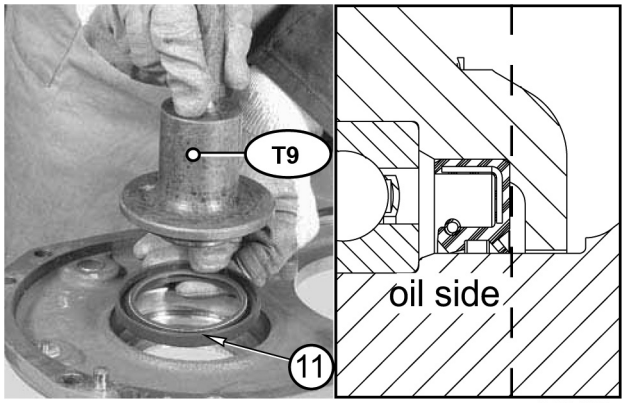
10.3 FLANGED REDUCTION GEAR 603 TYPE: INTEGRAL 603 INPUT GEAR - ASSEMBLY



MAP14520

1. Insert the sealing ring (6) with special tool **(T8)**.

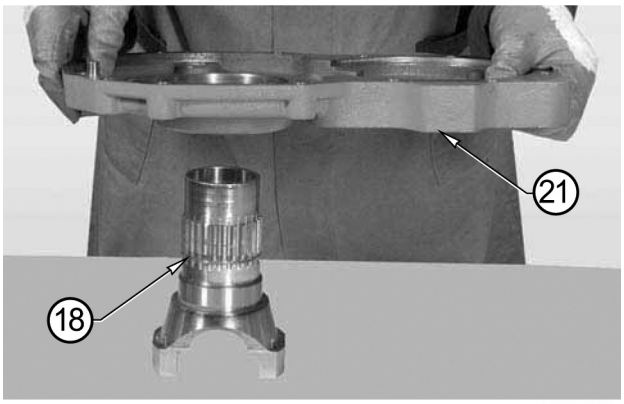
Note: *Bring the sealing ring just to the end stop. Apply grease to the sealing lips.*



MAP14530

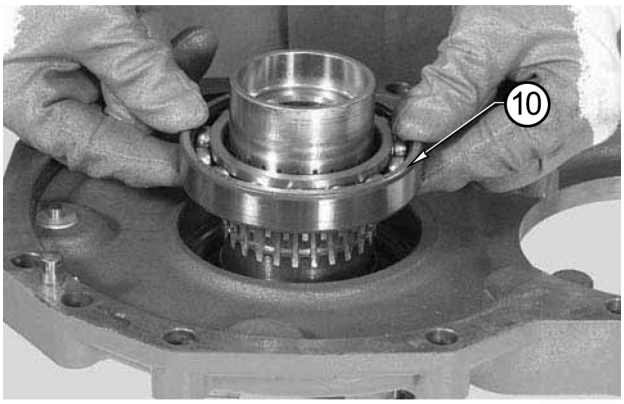
2. Insert the sealing ring (11) with special tool (**T9**)

Note: *Bring the sealing ring just to the end stop. Apply grease to the sealing lips.*



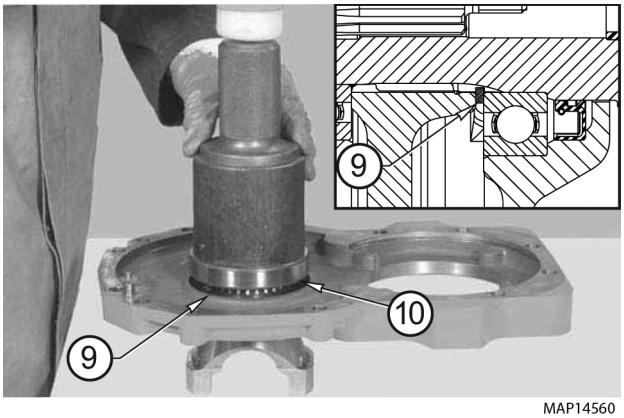
MAP14540

3. Fit the flange (**18**) and fasten it.
4. For keying the flange (**18**), use a plastic hammer if necessary.



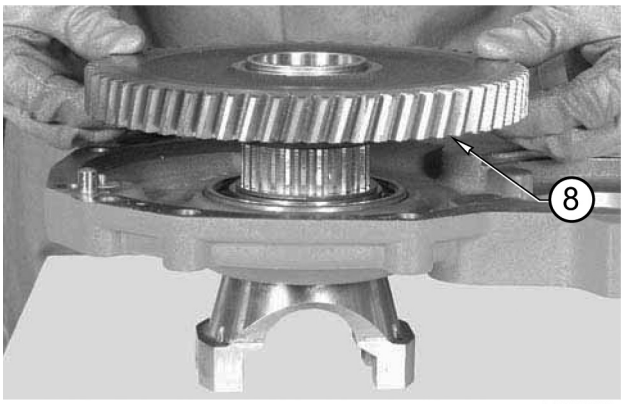
MAP14550

5. Insert the bearing (**10**).



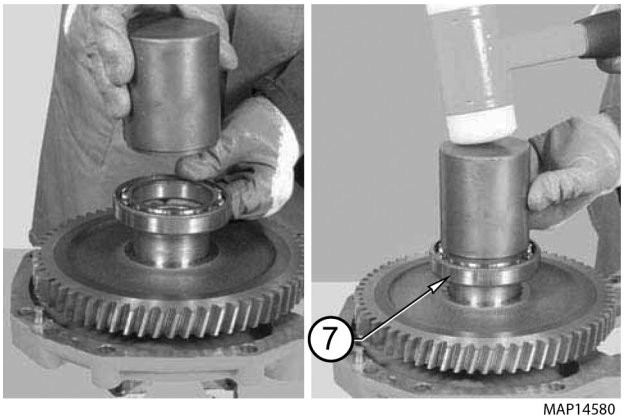
MAP14560

6. Using a driver insert the bearing (**10**) and snap ring (**9**).



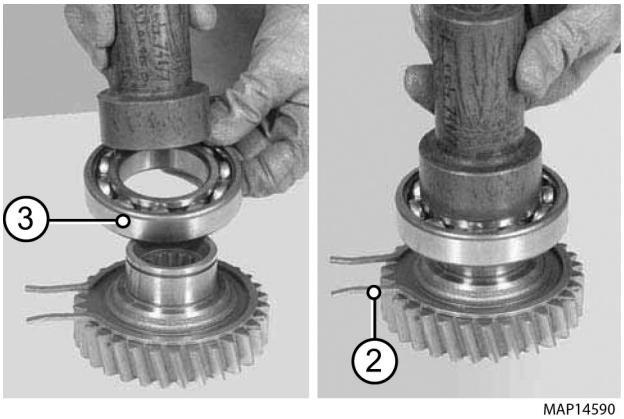
MAP14570

7. Install the secondary gear wheel (**8**) with a plastic hammer.



MAP14580

8. Using a driver insert the bearing (**7**).

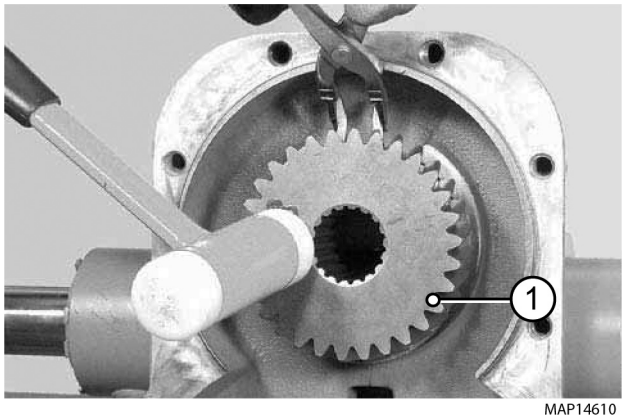


MAP14590

9. Insert the snap ring (**2**) and using a driver insert the bearing (**3**).

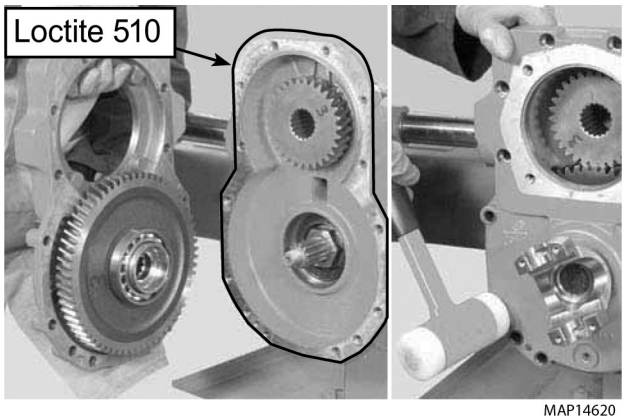
MAP14600

10. Fix the bearing with the snap ring (**4**).



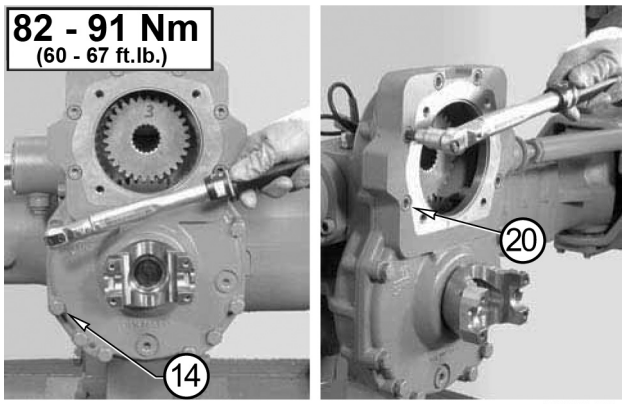
MAP14610

11. Install the drive side shaft (**1**) with a plastic hammer.



MAP14620

12. Install drive side flange cover. Apply Loctite 510 to the short screws.



MAP14630

13. Tighten screws with a torque wrench setting of 82-91 Nm (60 - 67 ft.lb).

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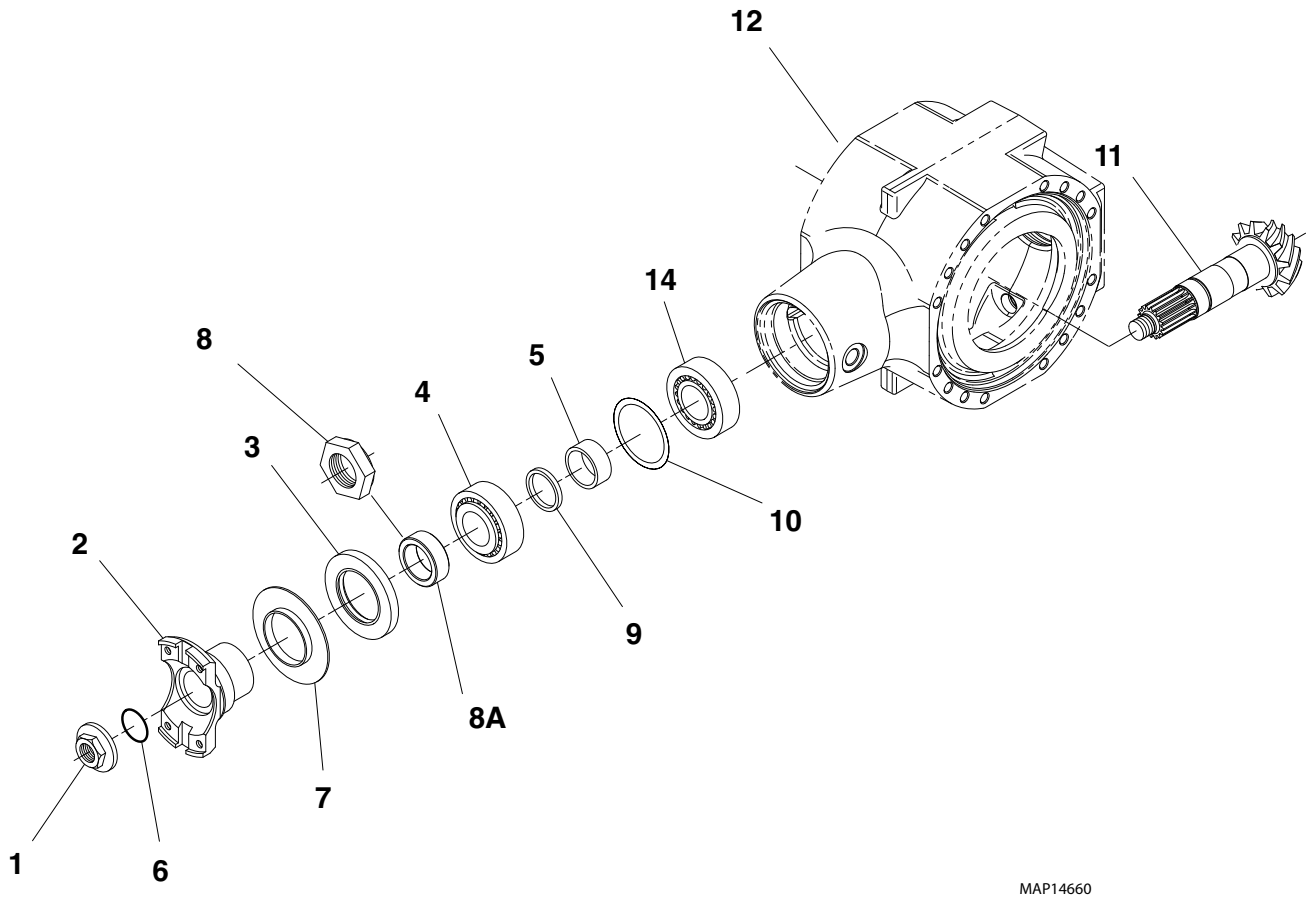
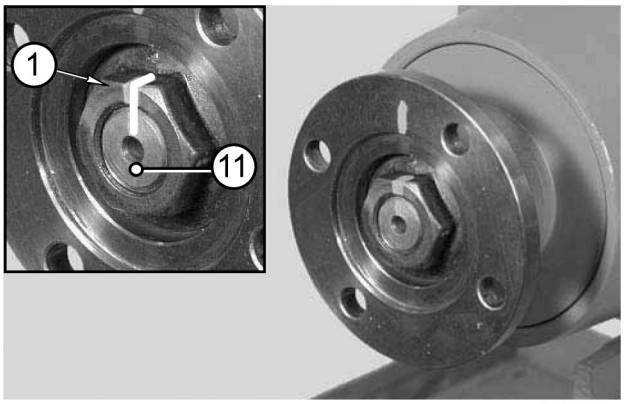
Section 11
Bevel Pinion: Normal Flange and Nut Revolution Counter Version

11.1 EXPLODED VIEW



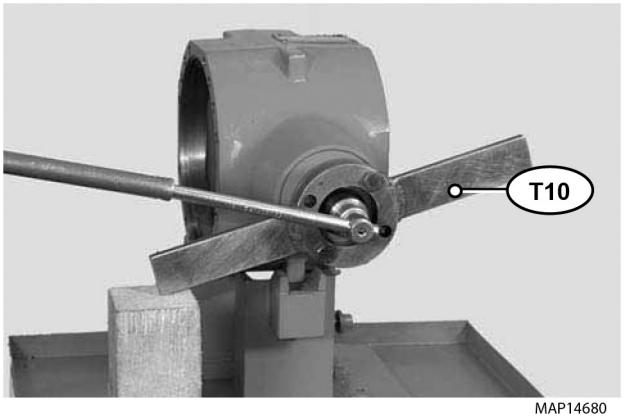
11.2 BEVEL PINION: NORMAL FLANGE AND NUT REVOLUTION COUNTER VERSION- DISASSEMBLY



MAP14670

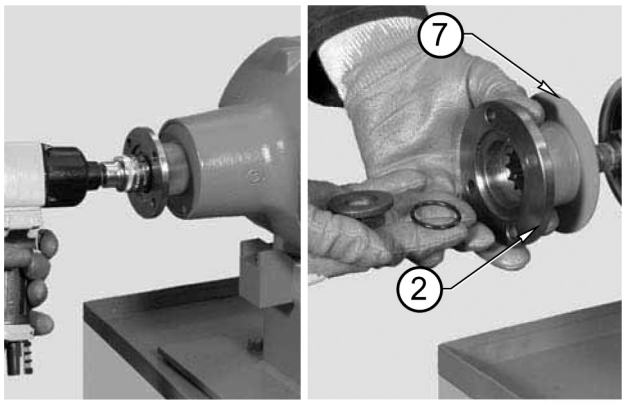
1. Make marks across nut (**1**) and pinion (**11**) tang; If disassembly is difficult, heat the check nut (**1**) of the flange (**2**) at 80C°.

Note: *Heating is meant to loosen the setting of Loctite on the nut (**1**).*



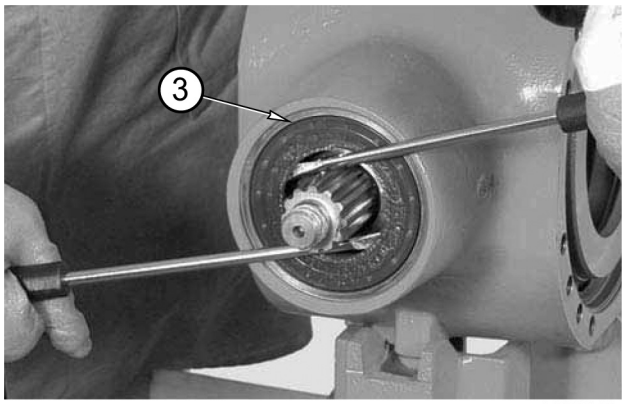
MAP14680

2. Position tool (**T10**), so as to avoid pinion rotation.
3. Loosen and remove the nut (**1**); also remove the o-ring (**6**).



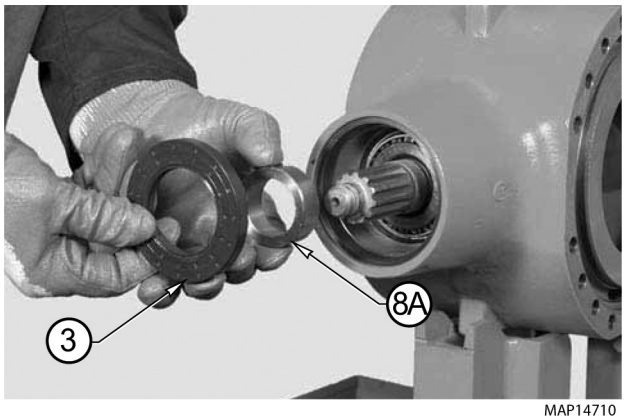
MAP14690

4. Remove the flange (**2**) complete with guard (**7**) using a puller.



MAP14700

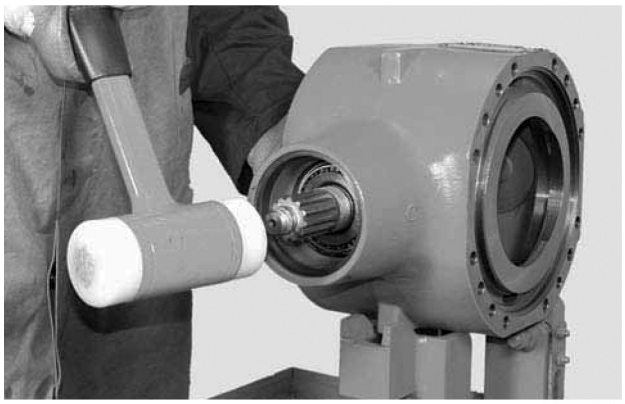
5. Loosen the sealing ring (**3**).



MAP14710

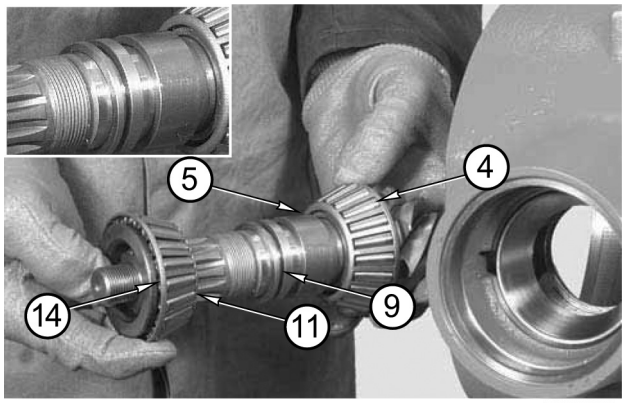
6. Remove the sealing ring (**3**) and spacer (**8A**).

Note: *Sealing rings (3) must be replaced each time the unit is disassembled.*



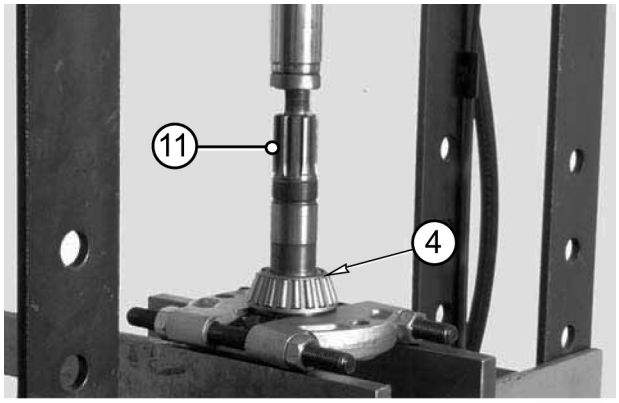
MAP14720

7. Remove the pinion (**11**), shims and spacer.



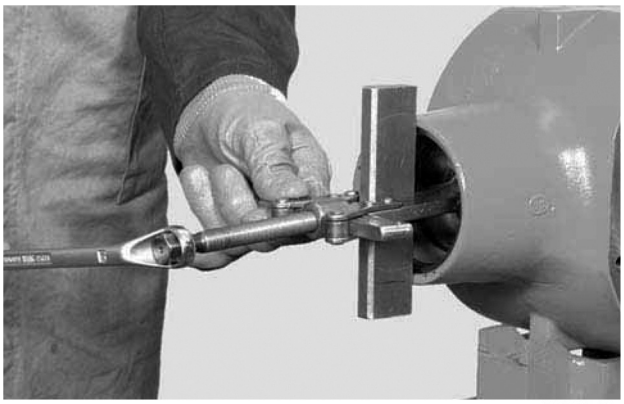
MAP14730

8. Refer and keep to the positions marked during disassembly.



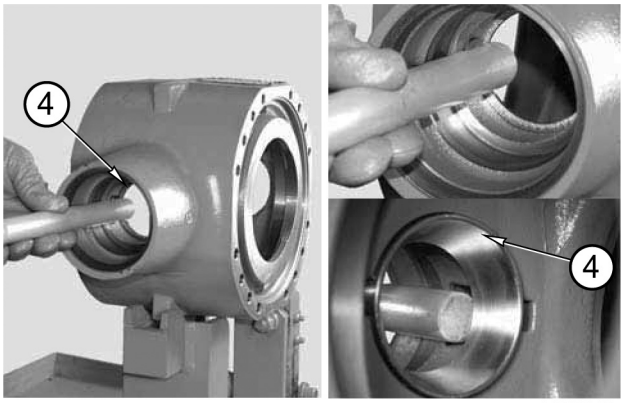
MAP14740

9. Using a puller and a press, remove the inner bearing (**4**) from the pinion (**11**).



MAP14750

10. Remove the thrust block of the external bearing (**14**).

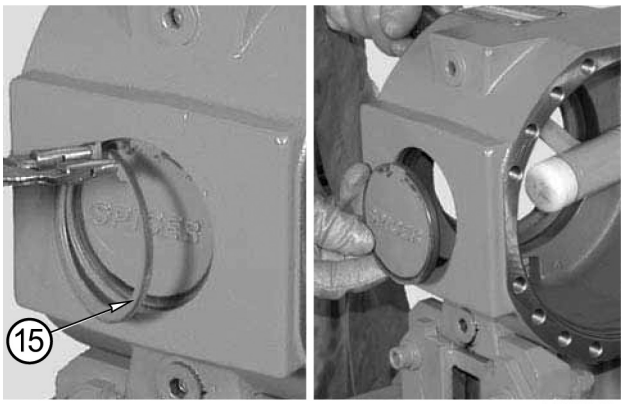


MAP14760

11. Insert a drift in the appropriate holes.

MAP14770

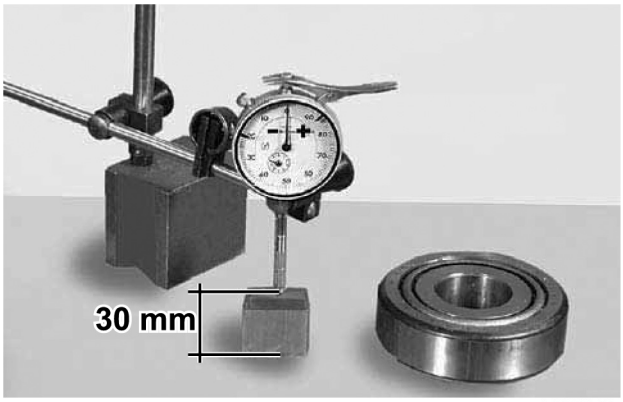
12. Remove the thrust block of the internal bearing (**4**) as well as the shim washers (**10**) and (**S**).



MAP14780

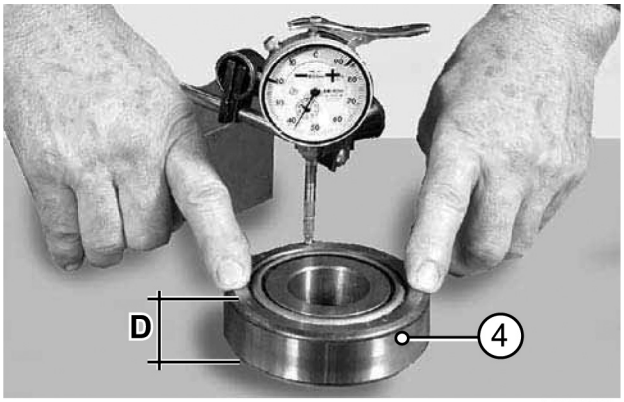
13. Remove the snap ring (**15**)
14. Remove the cap (**14**).

11.3 BEVEL PINION: NORMAL FLANGE AND NUT REVOLUTION COUNTER VERSION - ASSEMBLY



MAP14790

1. **CALCULATING PINION CENTER DISTANCE:** Using a faceplate, reset a dial indicator "DG" on a calibrated block (whose known thickness is 30 mm.). Preload the depth gauge by about 3 mm.

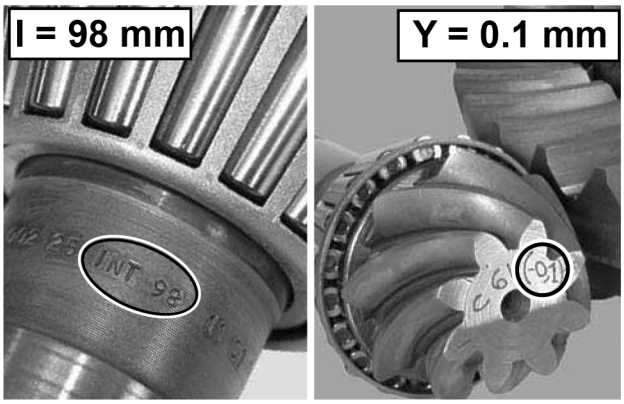


MAP14800

2. Bring inner bearing (**4**), complete with thrust block, under depth gauge "DG".
   EXAMPLE: 30 - 0.55 = 29.45 = "D".

⚠ CAUTION

Press the thrust block centrally and carry out several measurements by rotating the thrust block.

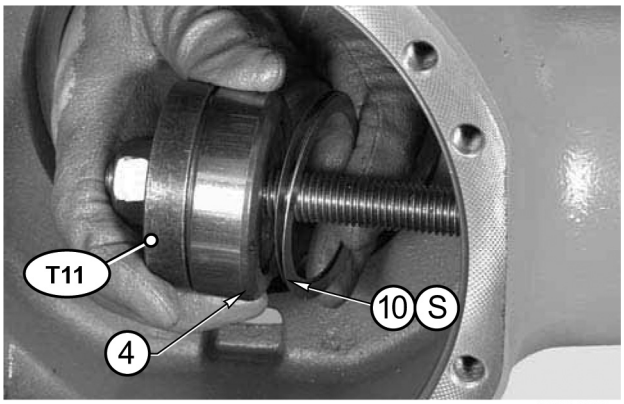


MAP14810

3. Check nominal dimension "I" as marked on the pinion. Add or subtract from "I" the variation indicated as "Y " to obtain the actual center distance "I".
   EXAMPLE: I = INT ± Y = 98-0.1=97.9mm
   C61 =Match part number

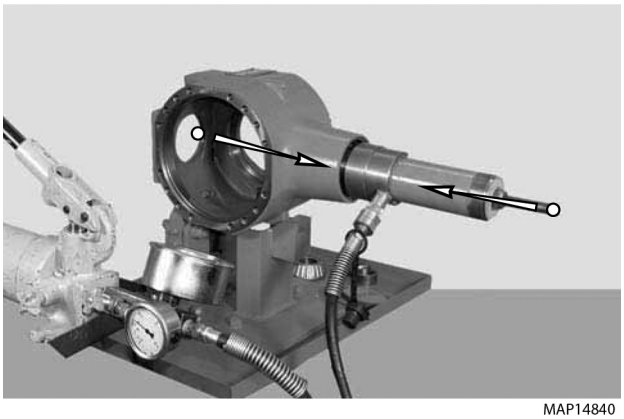
MAP14820

4. Calculate shims "S" for insertion under the thrust block of the inner bearing using the following formula:
   S = X - (I + D) where: X = fixed dimension
   I = actual pinion center distance
   D = Total bearing thickness;
   EXAMPLE: S = 128 - (97.9+29.45) = 0.65 mm



MAP14830

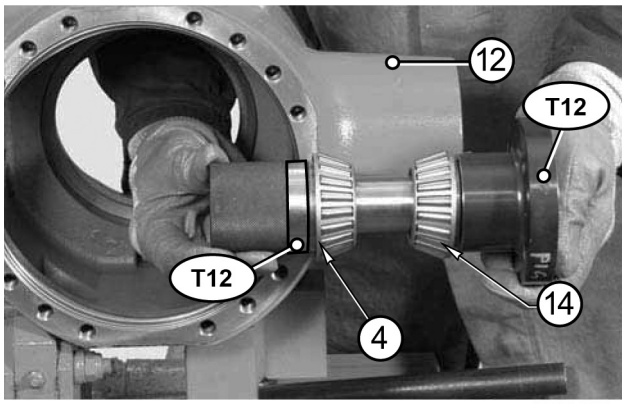
5. Using special tool (**T11**) partially insert the thrust block of the bearings (**4**) and shims (**10**).



MAP14840

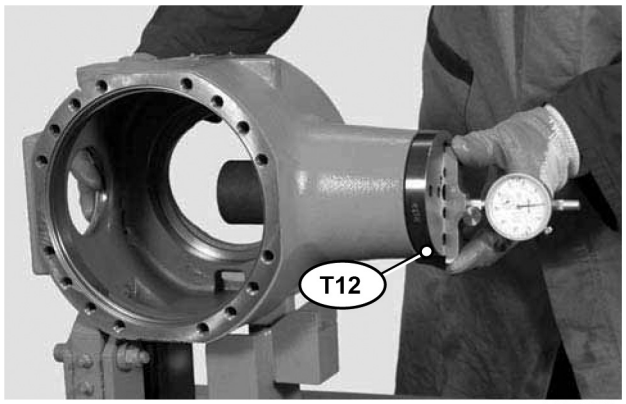
6. Connect the tension rod to the press and move the thrust block of bearings (**4**) and (**14**) into the seats.
7. Disconnect the press and remove the tension rod.

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



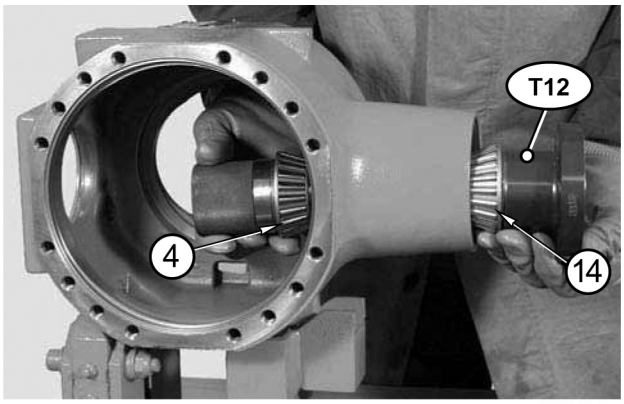
MAP14850

8. **CALCULATING PINION BEARINGS ROLLING TORQUE:** Introduce tool (**T12**) complete with bearings (**4**) and (**14**) into the main body (**12**); tighten by hand until a rolling torque is definitely obtained.



MAP14860

9. Introduce the tracer of a depth gauge “DDG” into either side hole of tool (**T12**). Reset the dial indicator with a preload of about 3 mm.

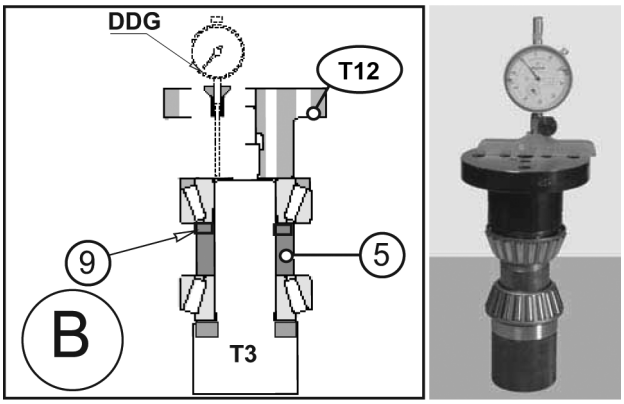


MAP14870

10. Remove the depth gauge and take out tool and bearing kits from the main body.
11. Reinstall every part, also introduce a spacer between bearings (**4**) and (**14**). Tighten the entire pack by hand.

MAP14880

12. Assemble on top of the tool (**T12**) and between the two bearings the shim (**5**) and the largest calibrated shim (**9**).



MAP14890

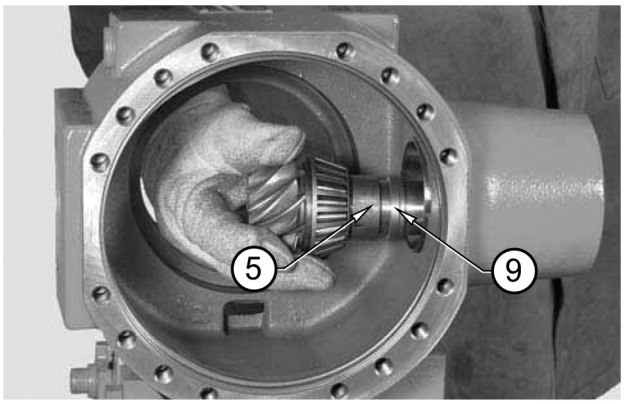
13. Measure the difference H using a dial indicator DDG.
E.g. H = A -B = 2.93 mm

MAP14900

14. Calculate the shim S2 to be inserted.
E.g. S2 = H + X = 3.01 mm
where X = fixed value to obtain = 0.07 ÷ 0.08 mm

MAP14910

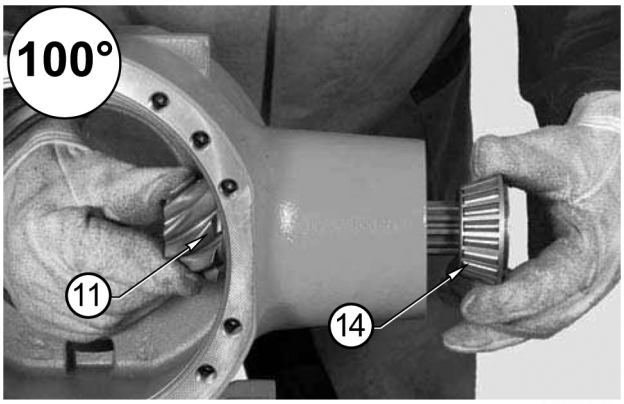
15. Measure the difference H using a dial indicator DDG.
E.g. H = A -B = 2.93 mm



MAP14920

16. Fit the pinion (**11**), shim "S1" (**10**) and spacer (**5**) and (**9**) in the main body (**12**)

Note: *The thin shims must be placed in- between the thick ones.).*

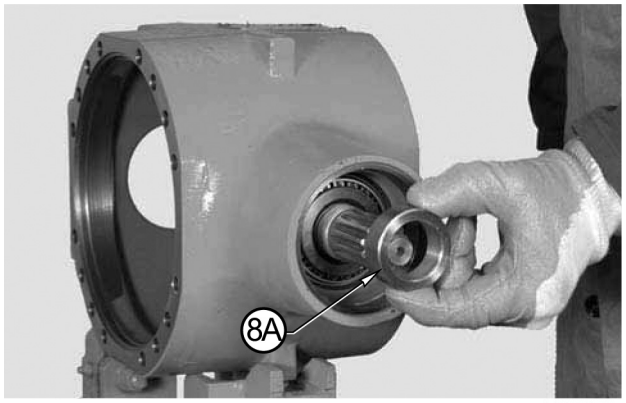


MAP14930

17. Heat the external bearing (**14**) to a temperature of about 100 C° and fit it on to the pinion (**11**) so as to complete the pack as shown in the figure.

Note: *Lightly lubricate bearing with SAE85W90 oil.*

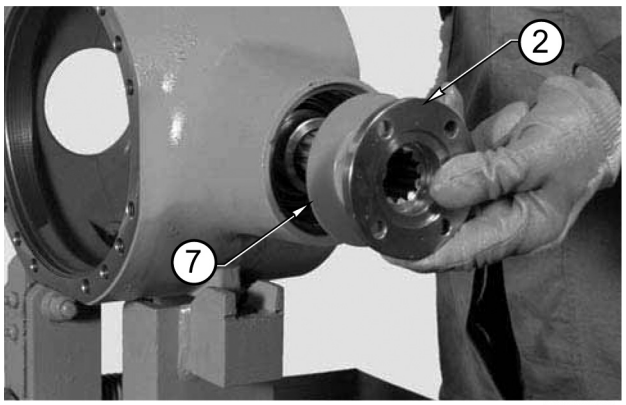
11.3.1 NORMAL FLANGE VERSION



MAP14940

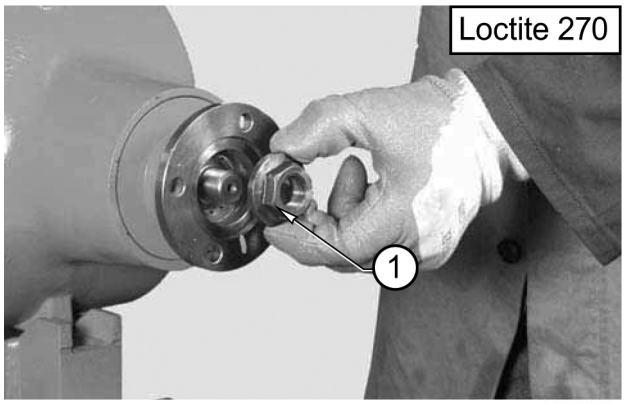
1. Insert the spacer (**8A**).

Note: *Verify the use of the friction washers.*



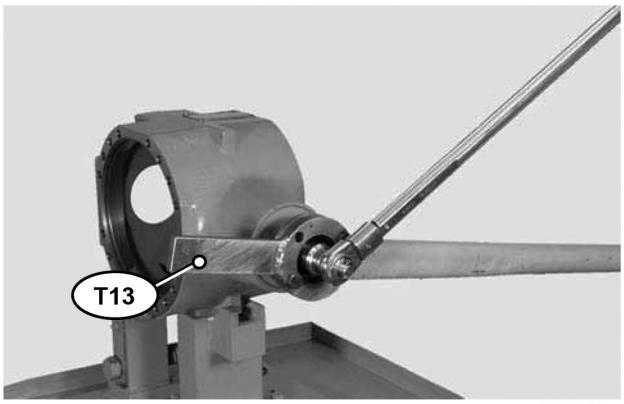
MAP14950

2. Install the flange (**2**) onto the pinion (**11**) without sealing ring.



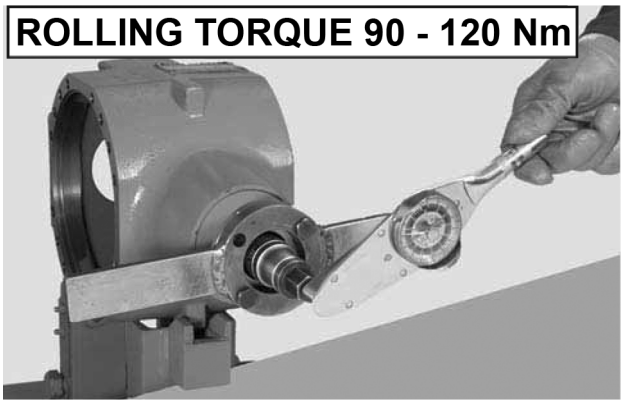
MAP14960

3. Install the nut (**1**) without LOCTITE 270.



MAP14970

4. Lock the wrench (**T13**), rotate the pinion using a torque wrench, up to a minimum required torque setting of 260 Nm (191.8 ft.lb.).



MAP14980

5. Apply onto the pinion (**1**) the bar-hold and with the help of a torque meter, check the torque of the pinion (1). Torque: 80-120 Nm (59.0 - 88.5 ft.lb.).

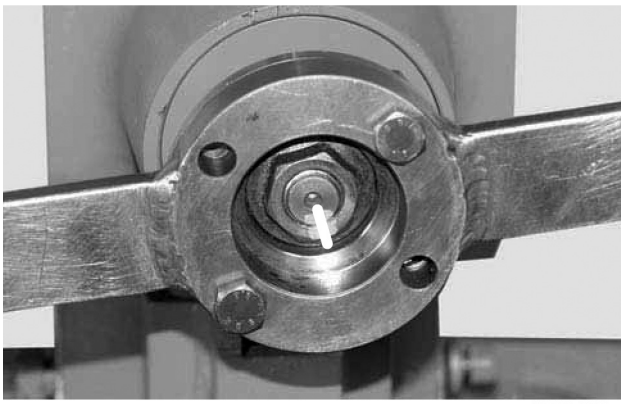
⚠ CAUTION

If torque exceeds the maximum value, then the size of shim "S1"f (**4**) between the bearing (**9**) and the spacer (**3**) needs to be increased.

If torque does not reach the set value, increase the torque setting of the ring nut (**10**) in different stages to obtain a maximum value of 300 Nm (221.2 ft.lb.).

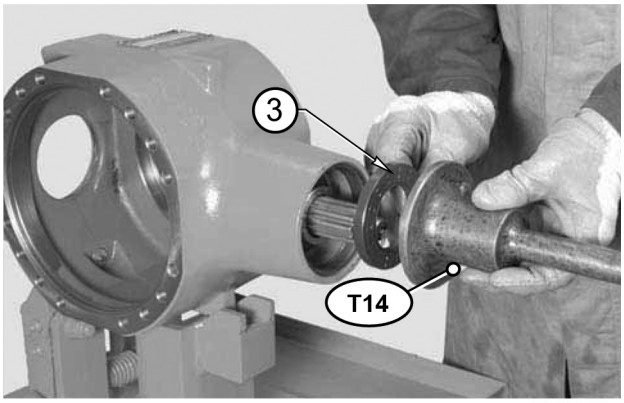
If torque does not reach the minimum value, then the size of shim "S1" (**4**) needs to be reduced.

When calculating the increase or decrease in size of shim "S1", bear in mind that a variation of shim of 0.01 mm corresponds to a variation of 60 Nm (44.2 ft. lb.) in the torque of the pinion (**1**).



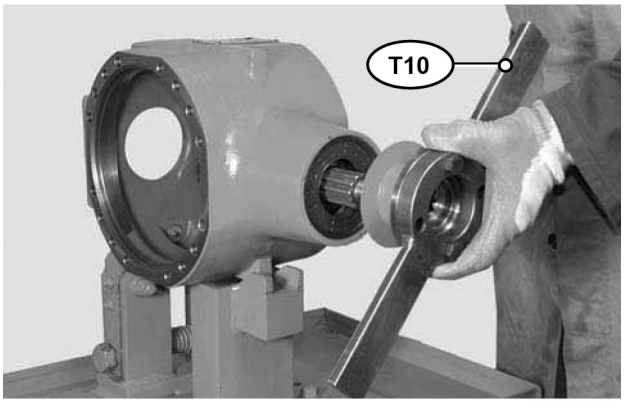
MAP14990

6. Make marks across nut (**1**) and pinion (**11**) tang; then remove nut and flange (**2**)



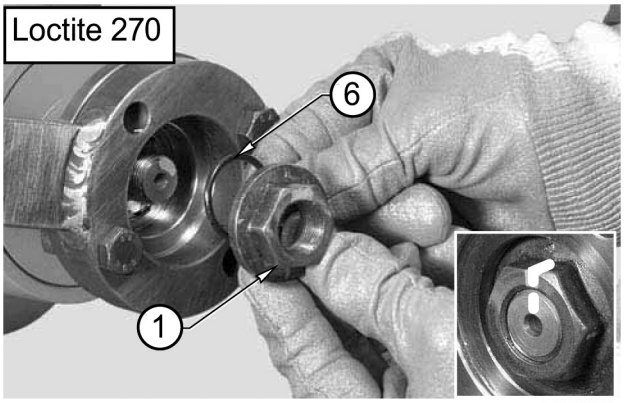
MAP15000

7. Apply Arexons rubber cement to the outer surface of the new seal ring (**3**) and fit ring in the main body (**12**) using driver (**T14**).



MAP15010

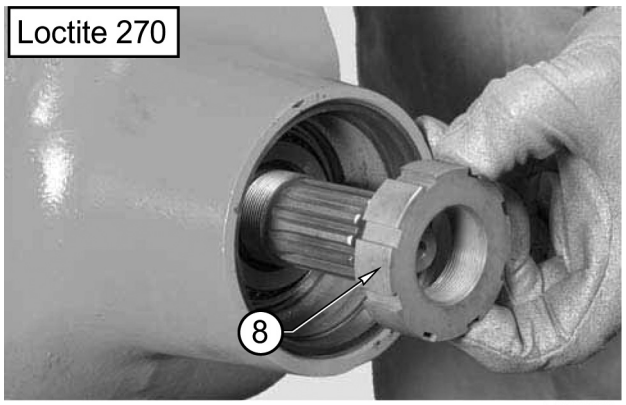
8. Oil seal ring lips and install flange (**2**).
9. Mount o-ring (**6**) and apply Loctite 270 to pinion tang; tighten nut (**1**).



MAP15020

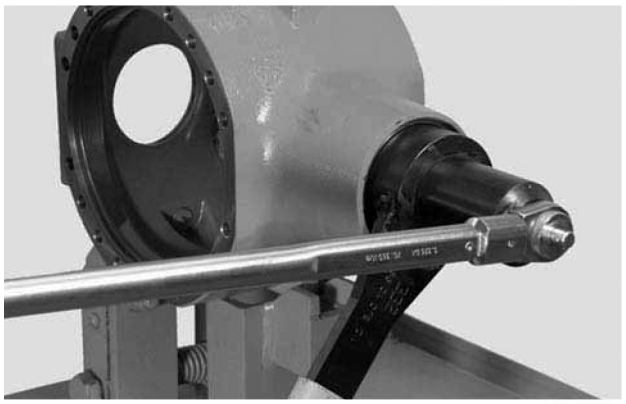
10. Tighten the nut until the match marks made at Figure 33 line up.

11.3.2 REVOLUTION COUNTER VERSION



MAP15030

1. Apply Loctite 270 to the thread of the ring nut (**8**) and screw the nut onto the pinion.



MAP15040

2. Apply onto the pinion (**11**) the bar-hold and with the help of a torque wrench, check the torque of the pinion (**11**). Torque: 400 Nm (295.0 ft.lb.).

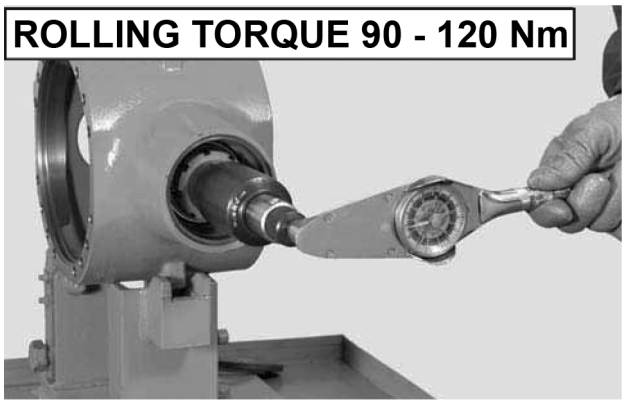
⚠ CAUTION

If torque exceeds the maximum value, then the size of shim "S1" (**4**) between the bearing (**9**) and the spacer (**3**) needs to be increased.

If torque does not reach the set value, increase the torque setting of the ring nut (**10**) in different stages to obtain a maximum value of 500 Nm (368.8 ft.lb.).

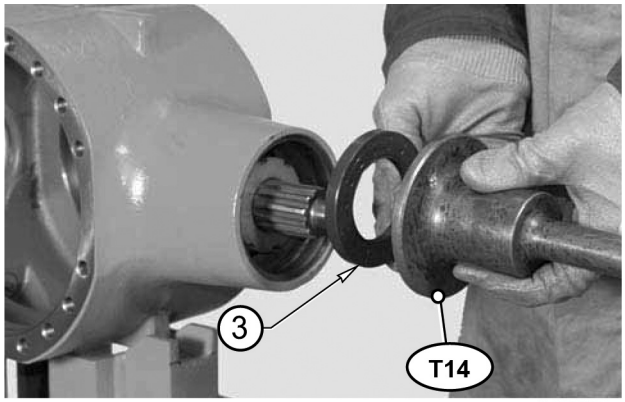
If torque does not reach the minimum value, then the size of shim "S1" (**4**) needs to be reduced.

When calculating the increase or decrease in size of shim "S1", bear in mind that a variation of shim of 0.01 mm corresponds to a variation of 60 Nm (44.2 ft. lb.) in the torque of the pinion (**1**).



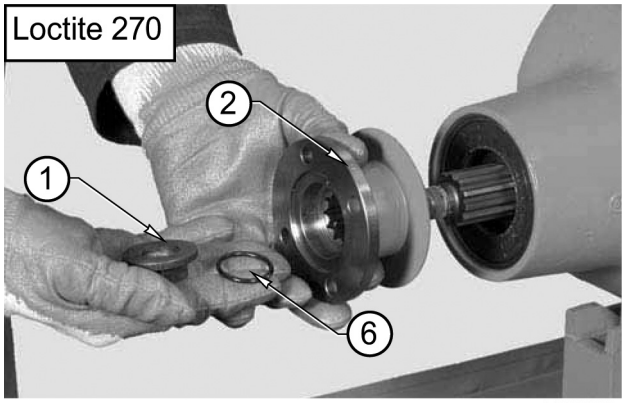
MAP15050

3. Using a torque meter, verify rolling torque.



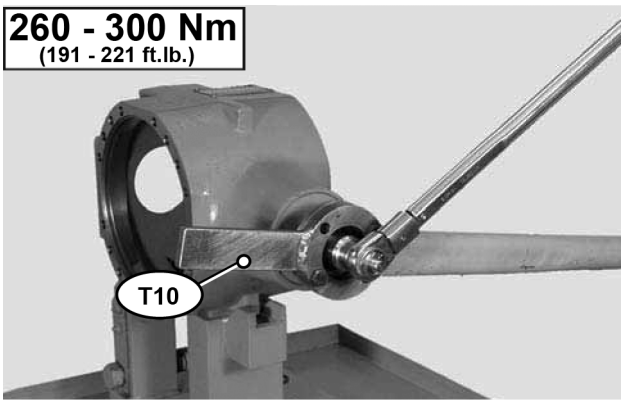
MAP15060

4. Apply Arexons rubber cement to the outer surface of the new seal ring (**3**) and fit ring in the main body (**12**) using driver (**T14**).



MAP15070

5. Oil seal ring lips and install flange (**2**).
6. Mount o-ring (**6**) and apply Loctite 270 to pinion tang; tighten nut (**1**).



MAP15080

7. Lock the wrench (**T10**), rotate the pinion using a torque wrench, up to a minimum required torque setting of 260-300 Nm (191- 221 ft.lb.)

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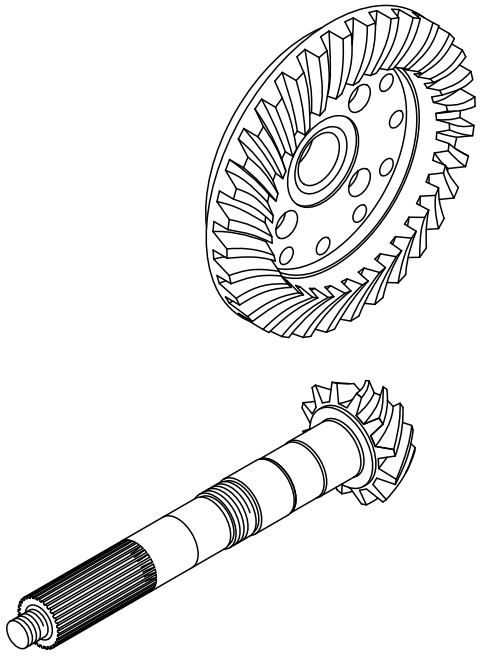
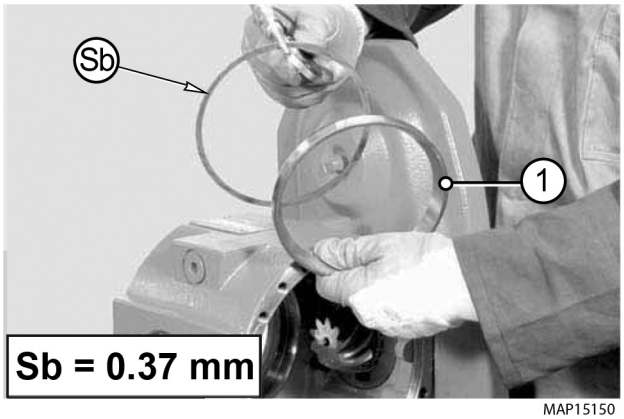
Section 12
Ring and Pinion Adjusting: Step for Preloaded Differential

12.1 EXPLODED VIEW



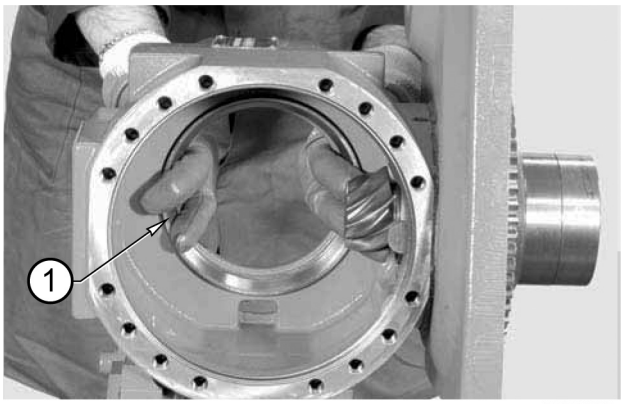
MAP15140

12.2 RING AND PINION ADJUSTING: STEP FOR PRELOADED DIFFERENTIAL - INSTALL AND ADJUST



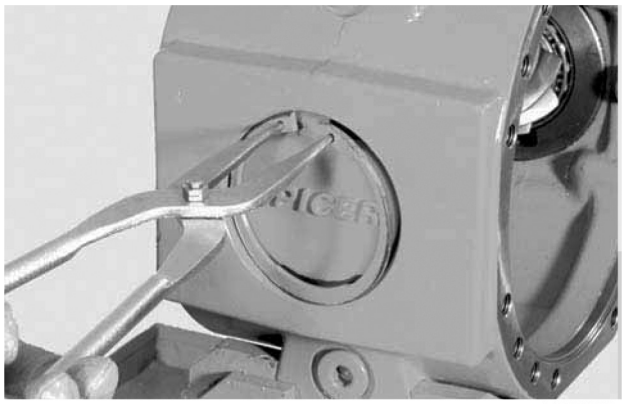
MAP15150

1. Choose a pack of shims (**Sb**) with an initial value of about 0.37mm to place under the brake side bearings cup.

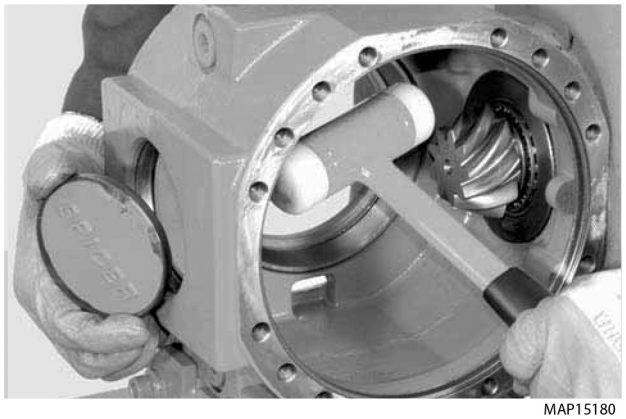


MAP15160

2. Assemble the shims (**Sb**), the cup (**1**) and level.


MAP15170

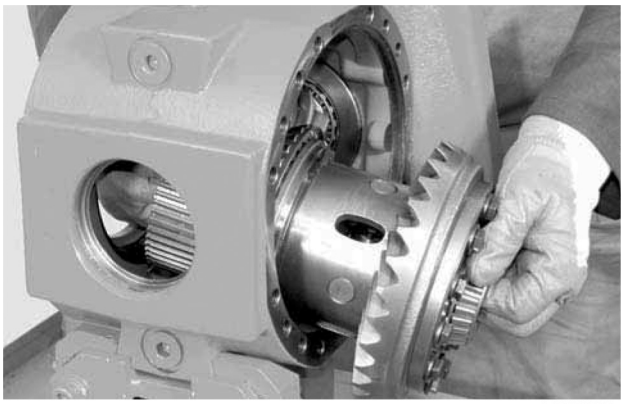
3. Remove the snap ring.


MAP15180

4. Remove cap.

⚠ CAUTION

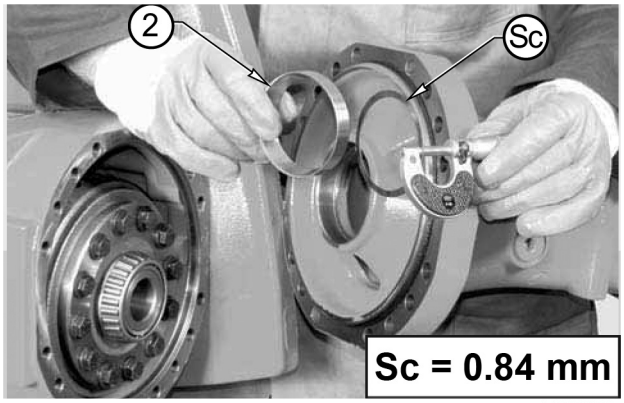
Do not bend the cap.



MAP15190

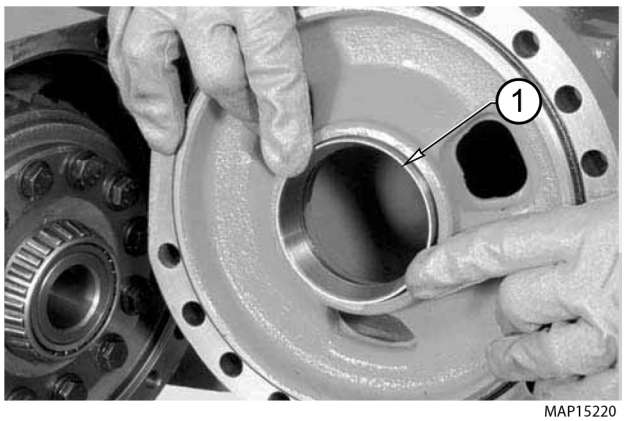
5. Insert the complete differential.

Note: *Attention do not damage the sealing surface of the o-ring.*



MAP15200

6. Choose a pack of shims (**Sc**) with an initial value of about 0.84 mm to place under the ring gear side bearings cup.

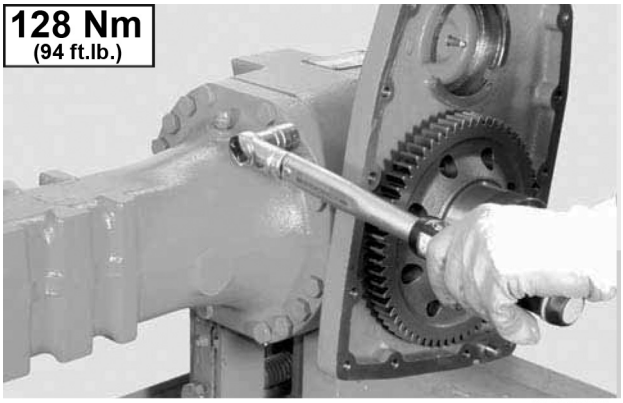


MAP15220

7. Assemble the shims (**Sc**), the (**1**) cup and level.

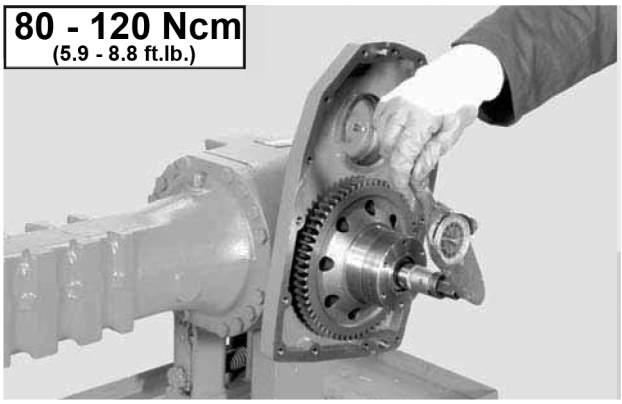
MAP15210

8. Always replace the o-ring of the arm.



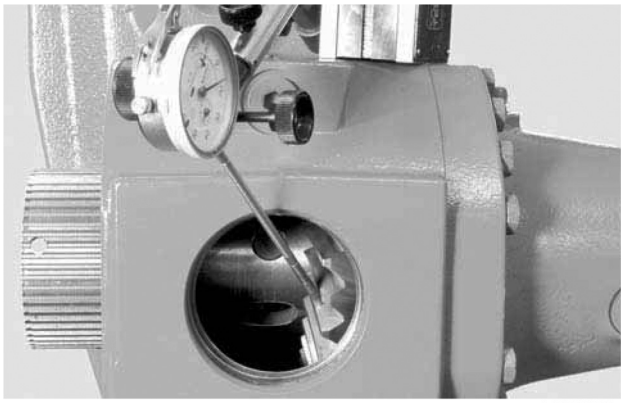
MAP15230

9. Assemble the arm and tighten temporarily with a torque wrench setting of 128 Nm (94 ft.lb) at least 6 screws equally distributed.



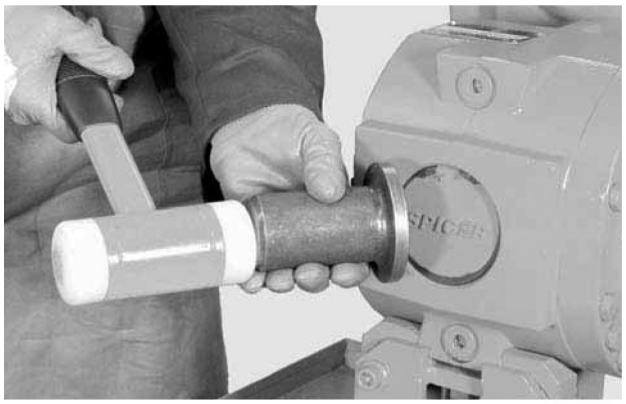
MAP15240

10. Apply torque meter (**TM**) to pinion nut and check that torque will increase by 40-60 Ncm (2.9 - 4.4 ft. lb) as a result of differential bearing preload.
    Example: pinion torque: 80-120 Ncm (5.9 - 8.8 ft.lb)
    Pinion + differential torque: 120-180 Ncm
    (8.8-4.4 - 132.7 ft.lb)



MAP15250

11. Introduce a depth gauge with rotary key through the rear cap hole. Position depth gauge on the center of one of the crown teeth, preset it to 1 mm and reset it to zero. Manually move the crown in both directions to check the existing clearance between pinion and crown.
    Gap= 0.13-0.20 mm
    In order to increase the gap while keeping the load on the bearing unchanged, take off shims from the ring gear side and insert them on the opposite side.
    In order to decrease the gap, do the opposite.

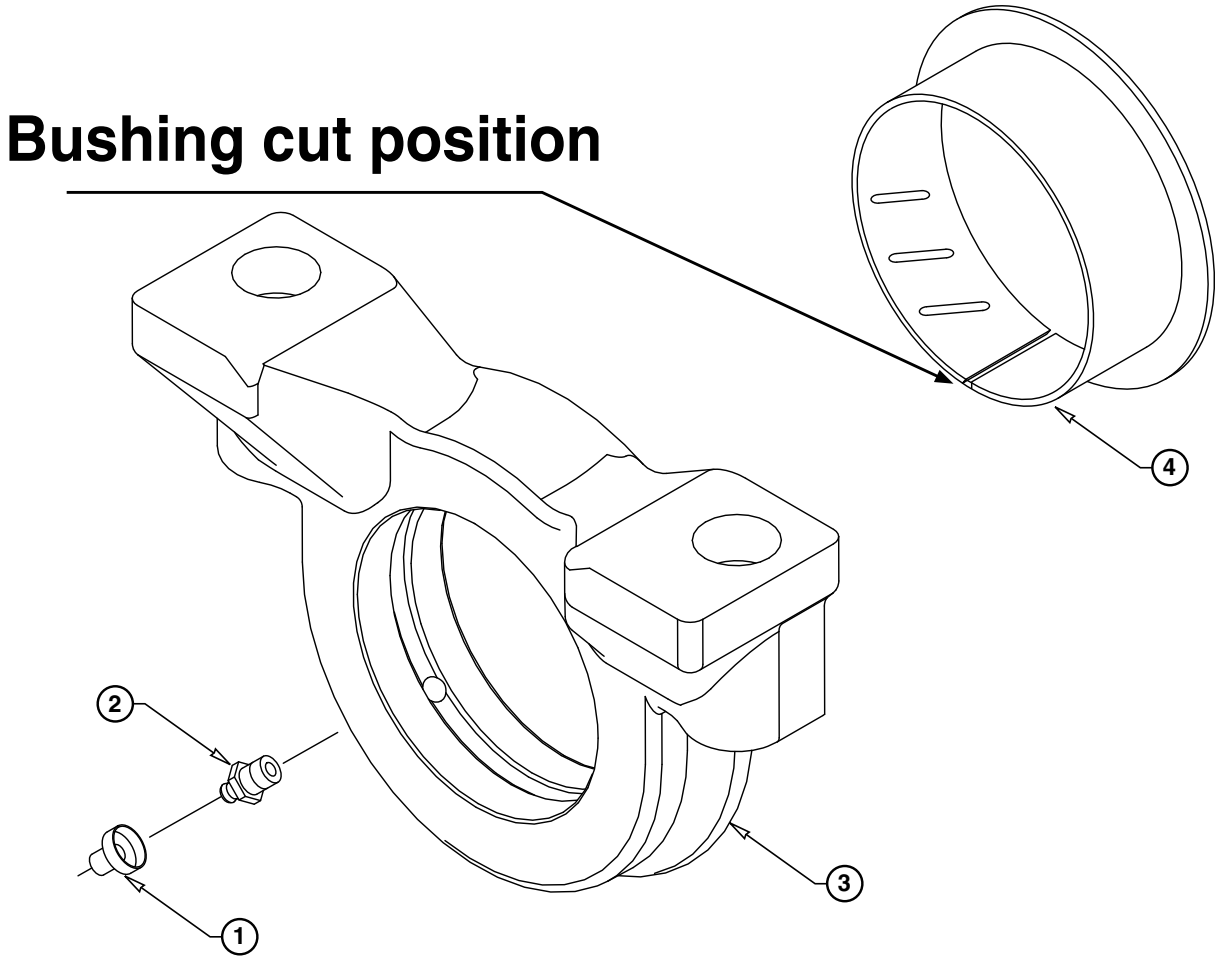


MAP15260

12. Assemble rubber cap and snap ring.

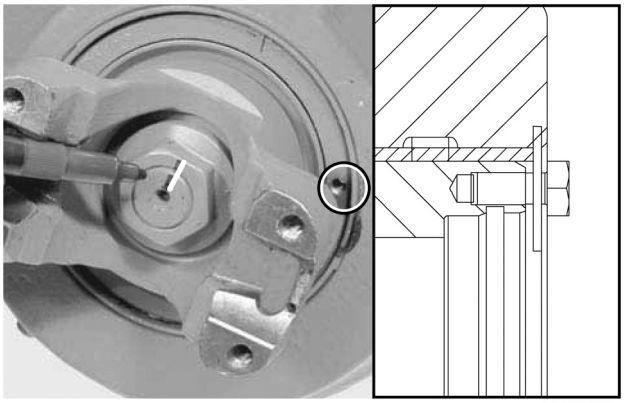
Section 13
Swinging Support

13.1 EXPLODED VIEW



MAP15270

13.2 SWINGING SUPPORT - DISASSEMBLY



MAP15280

1. Make marks across nut and pinion tang; If disassembly is difficult, heat the check nut of the flange at 80C°.

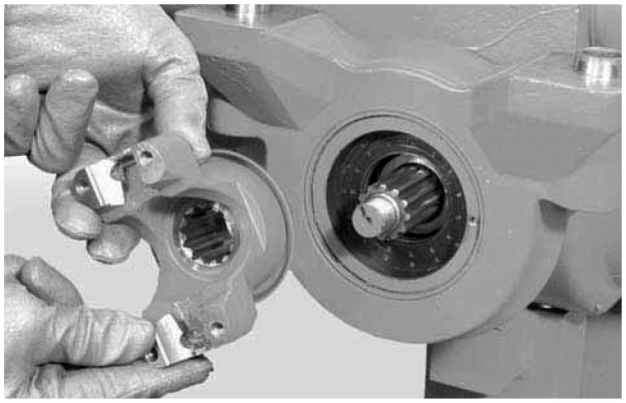
Note: *Heating is meant to loosen the setting of Loctite on the nut.*

MAP15290

2. Loosen the nut.

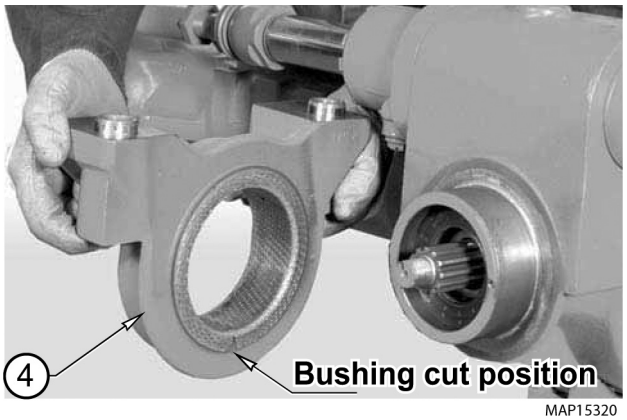
MAP15300

3. Remove the nut and the o-ring.



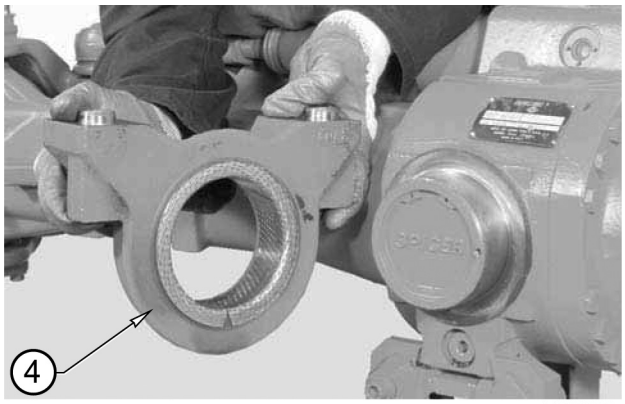
MAP15310

4. Remove the flange complete with guard using a puller.



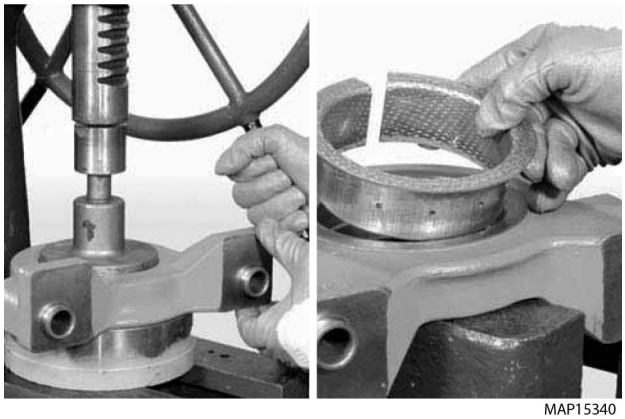
MAP15320

5. Remove the swinging support (**4**).



MAP15330

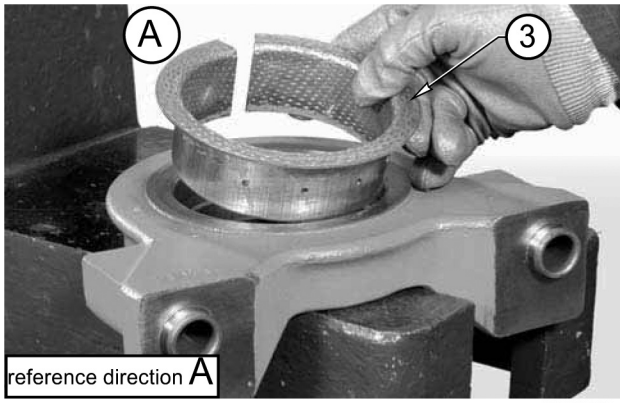
6. Remove the swinging support (**4**) on the side opposite the drive.



MAP15340

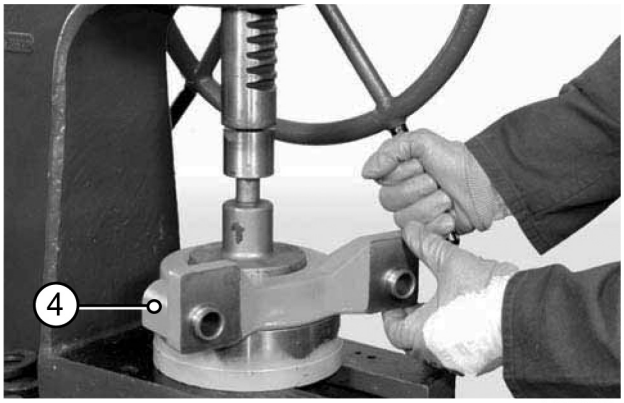
7. Position the swinging support (**4**) under a press and remove the complete bushing (**3**).

13.3 SWINGING SUPPORT - ASSEMBLY



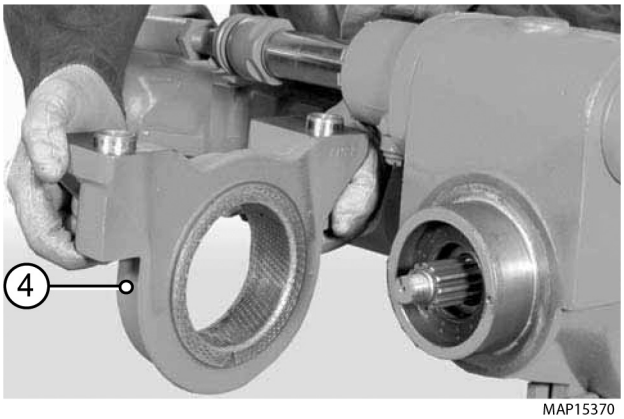
MAP15350

8. If the bushing (**3**) is worn and needs replacing, write down the assembly side of the connection notch "A".



MAP15360

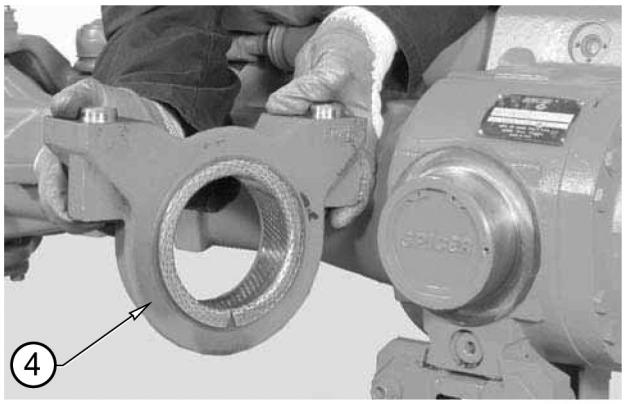
9. Position the swinging support (**4**) under a press and insert the complete bushing (**3**).



MAP15370

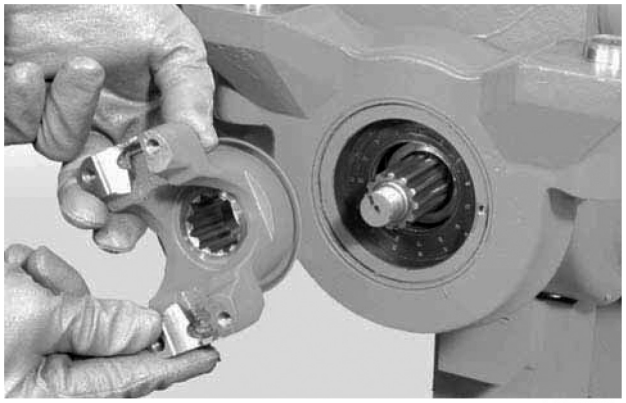
10. Install the swinging support (**4**).

Note: *Check that it is properly oriented.*

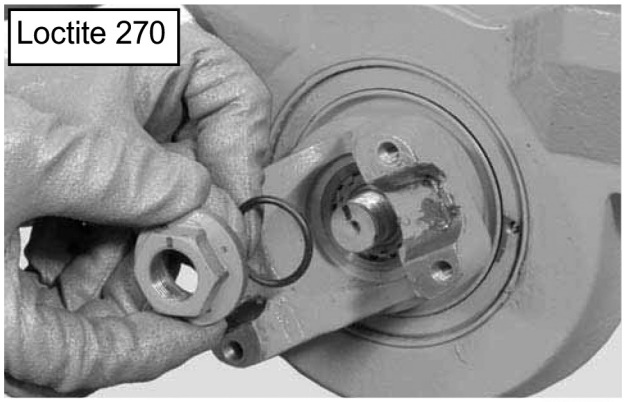


MAP15380

11. Install the swinging support (**4**) on the side opposite the drive.

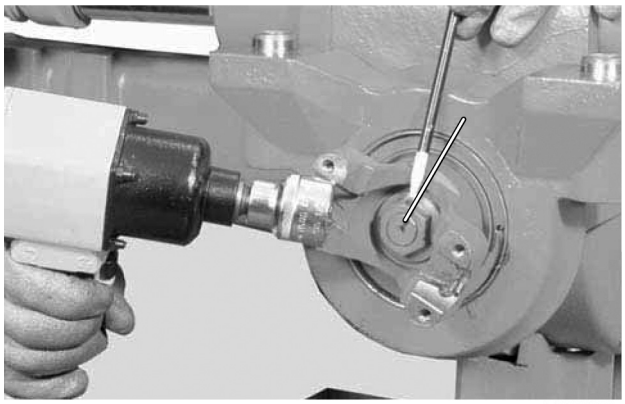

MAP15390

12. Fit the flange and fasten it.
13. For keying the flange, use a plastic hammer if necessary.



MAP15400

14. Install flange.
15. Mount o-ring and apply Loctite 270 to pinion tang; tighten nut.



MAP15410

1. Tighten the nut until the marks line up.

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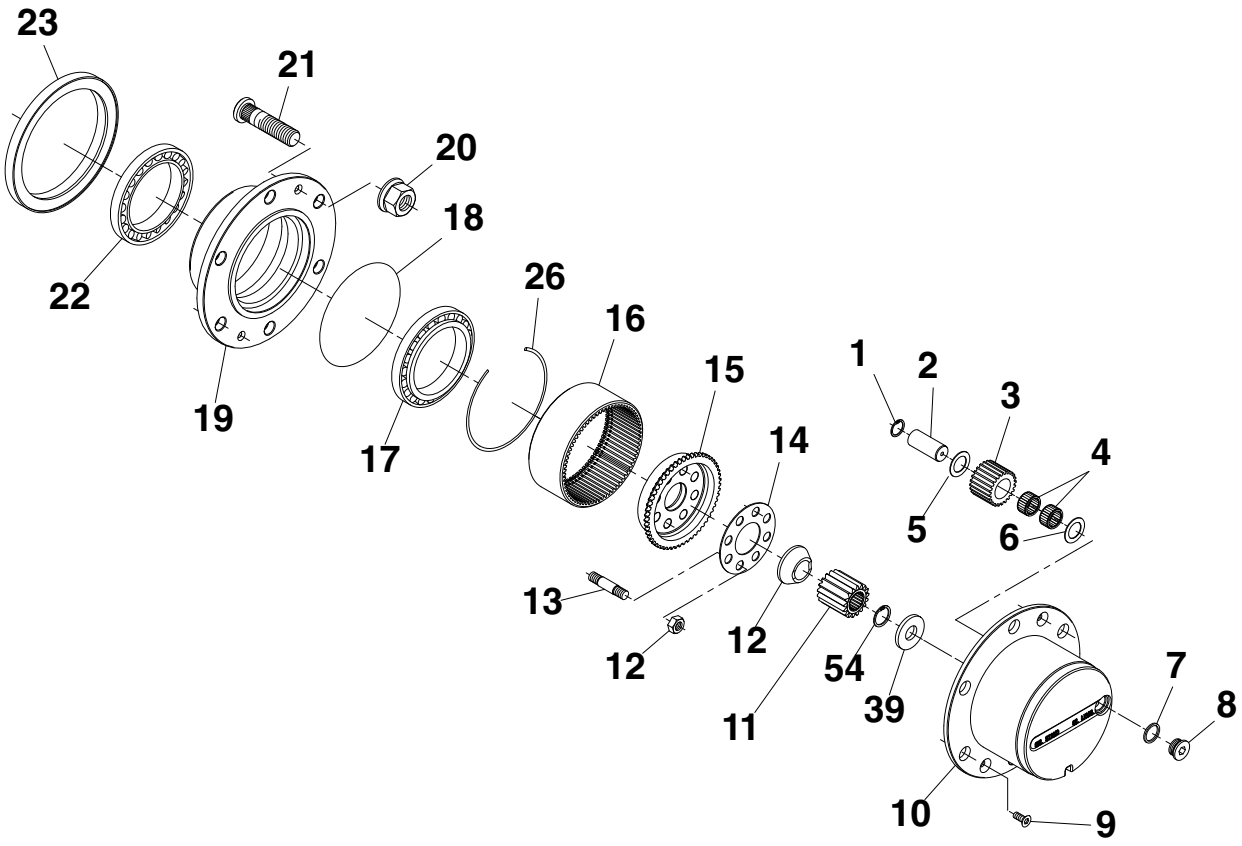
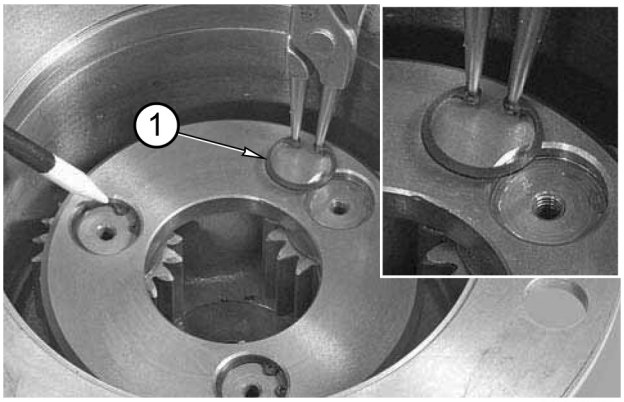
Section 14
Planetary Reduction: 1:4, 23

14.1 EXPLODED VIEW



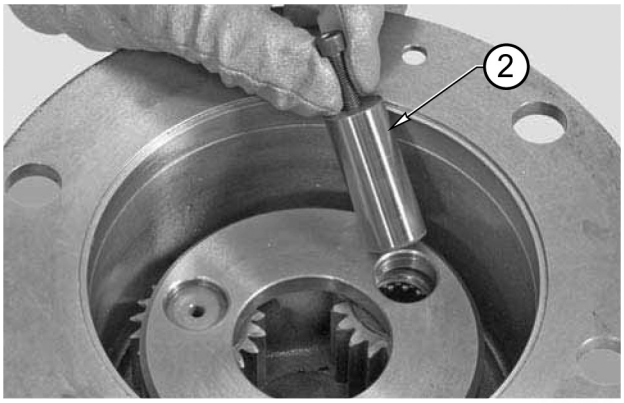
MAP15420

14.2 PLANETARY REDUCTION: 1:4, 23 - DISASSEMBLY



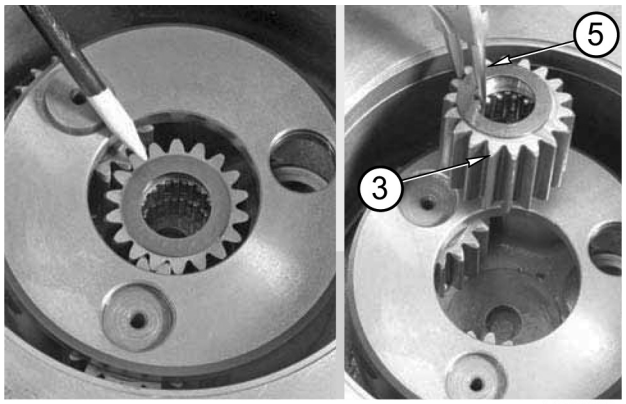
MAP15430

1. Remove snap ring (**1**).



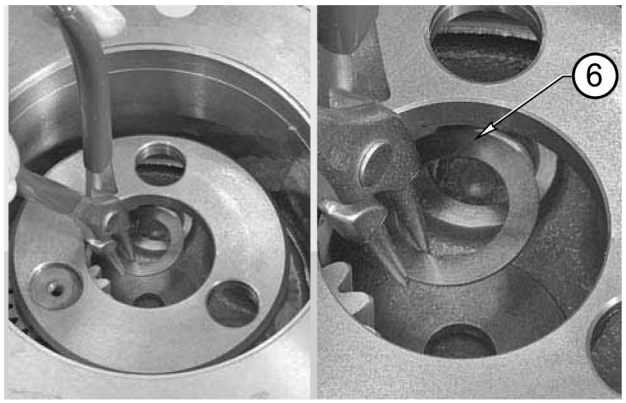
MAP15440

2. Using a screw M6 remove all bolts (**2**).



MAP15450

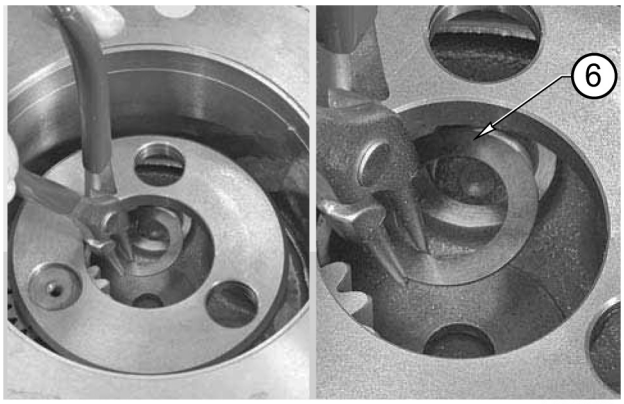
3. Positioning the planetary wheel gear (**3**) in center of the spider cover and remove, complete with outer shim washer (**6**).



MAP15460

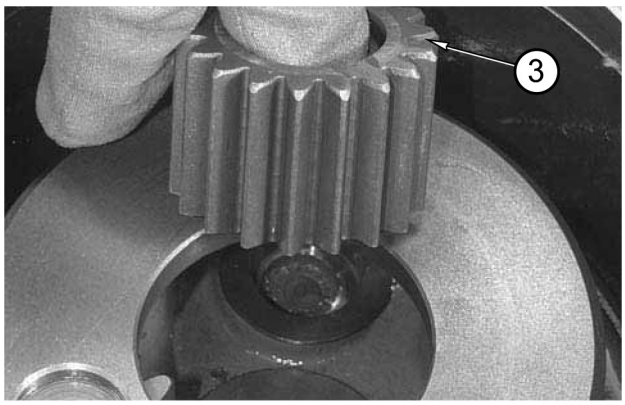
4. Remove the inner shim washer (**6**).

14.3 PLANETARY REDUCTION: 1:4, 23 - ASSEMBLY



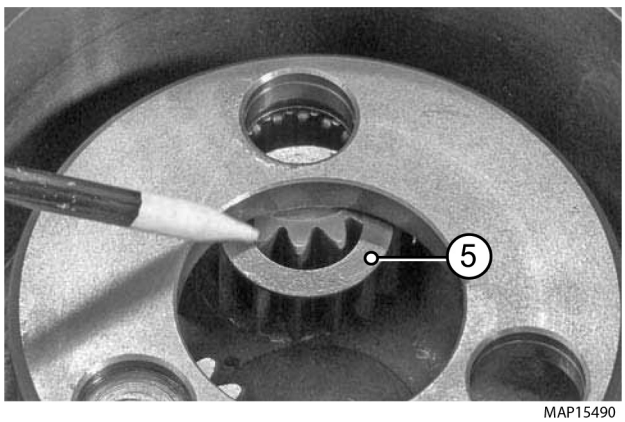
MAP15470

5. Install the shim washer (**6**).



MAP15480

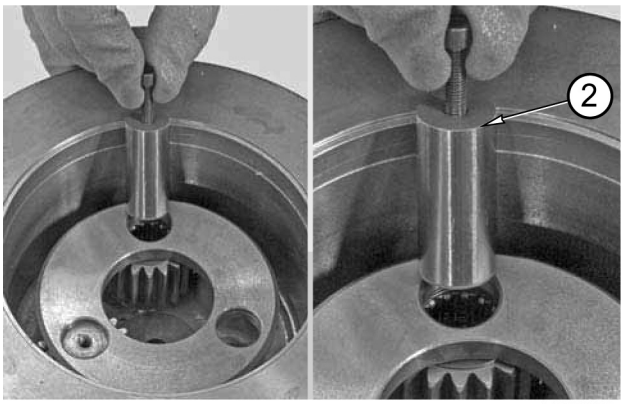
6. Install planetary gears complete with roller bearing (**3**).



MAP15490

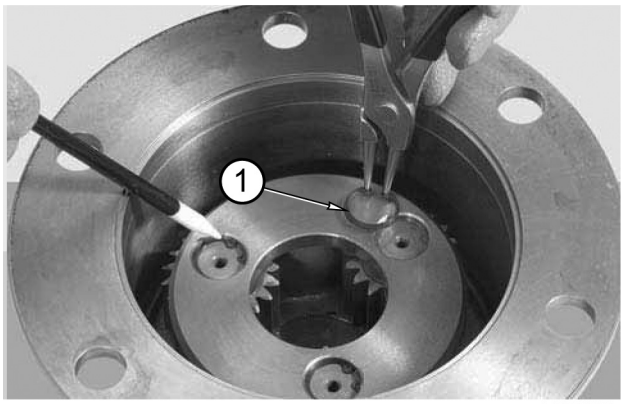
7. Install the others friction washers.

Note: *Two friction washers for every planetary gear.*



MAP15500

8. Check the concentricity of the planetary gear, the seat and friction washers. Using a screw M6 install the pin (**2**).



MAP15510

9. Carefully check that pin is completely inserted and install the snap rings (**1**).

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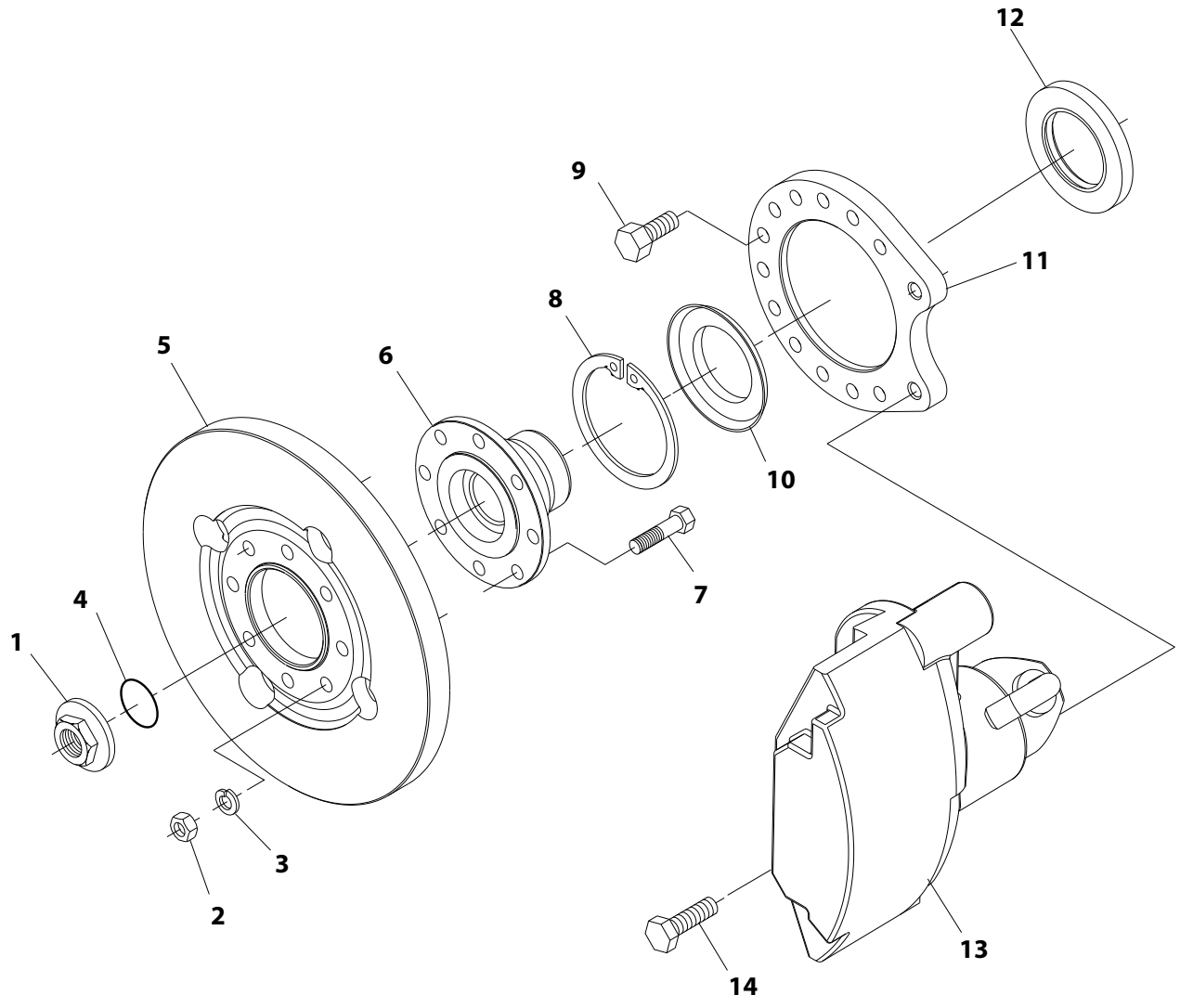
Section 15
Brake: Incoming Disc Brake

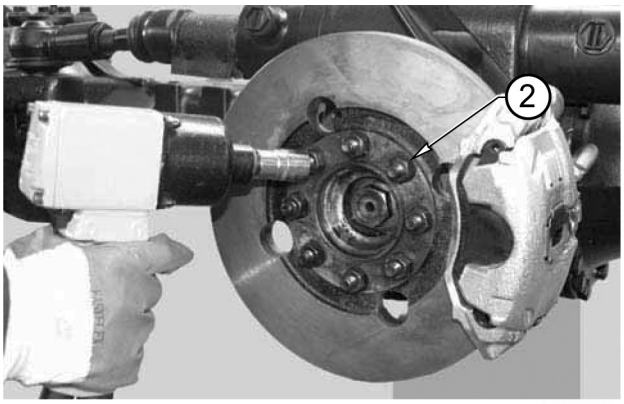
15.1 EXPLODED VIEW



15.2 BRAKE: INCOMING DISC BRAKE - DISASSEMBLY

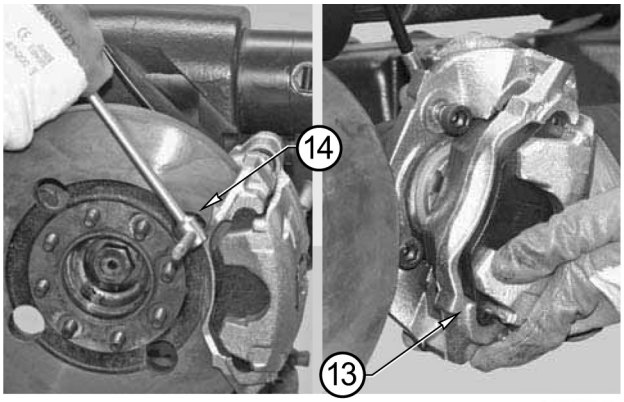
DANGER

Before working on brakes, when the axle is installed on the vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.



MAP15530

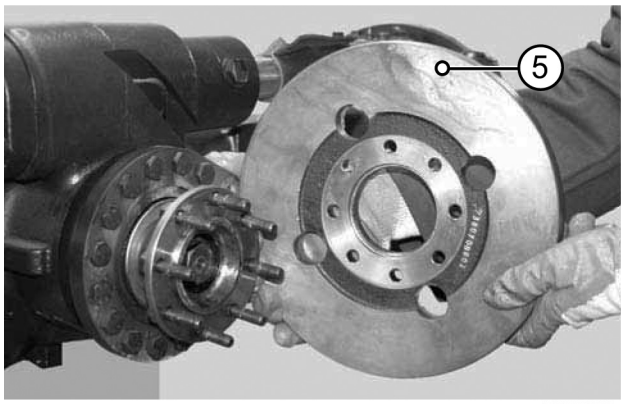
1. Remove nuts (**2**) and washers (**3**).



MAP15540

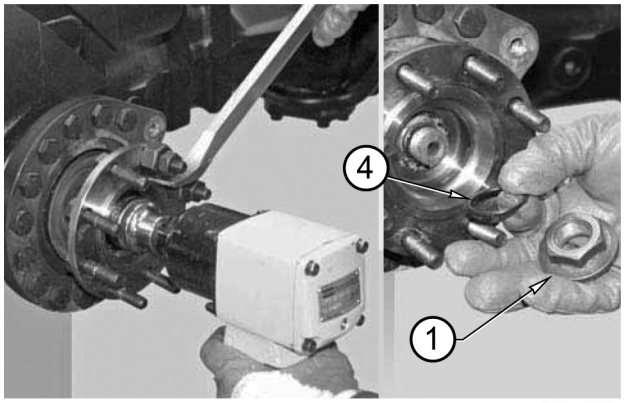
2. Remove screws (**14**) and caliper unit (**13**).

Note: *Access to screws (**14**) is gained through the holes on the disc (**5**).*



MAP15550

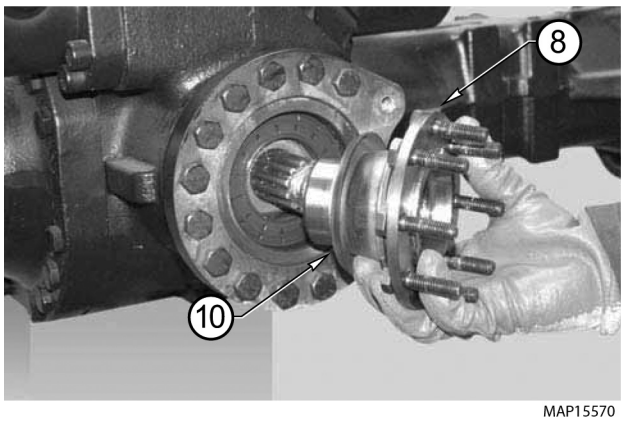
3. Remove the disc (**5**).



MAP15560

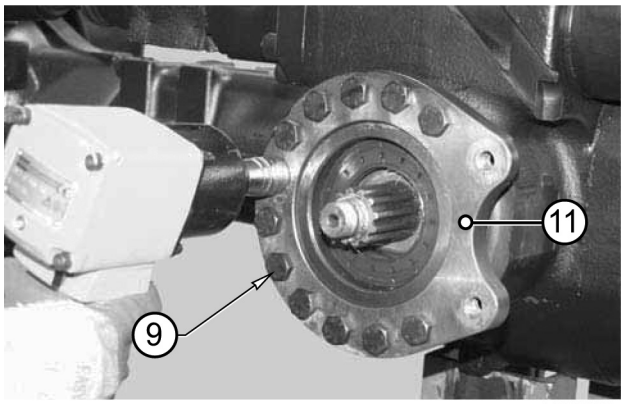
4. Loosen and remove the nut (**1**) and the o-ring (**4)**.

Note: *If necessary, apply a lever to the flange (**6**), so as to prevent pinion rotation.*



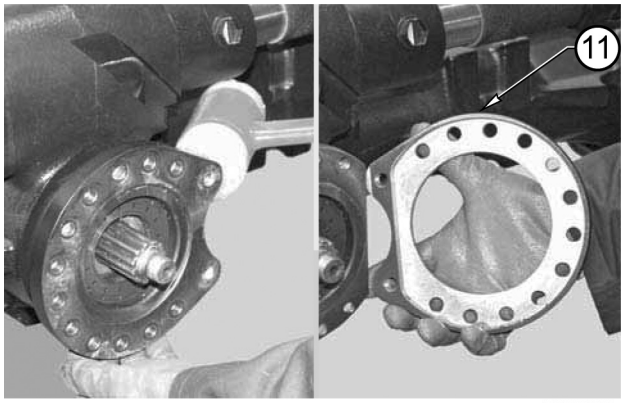
MAP15570

5. Remove the flange (**6**) complete with dust seal ring (**10**).



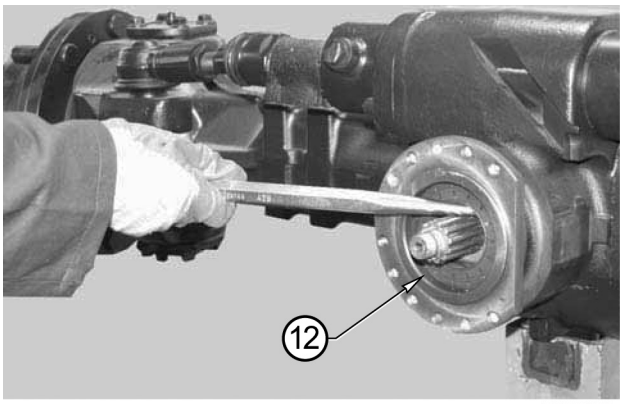
MAP15580

6. Remove the securing screws (**9**) from brake support (**11**).



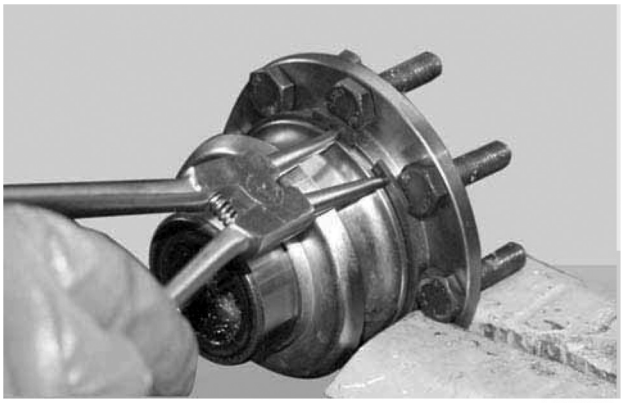
MAP15590

7. Remove brake support (**11**).

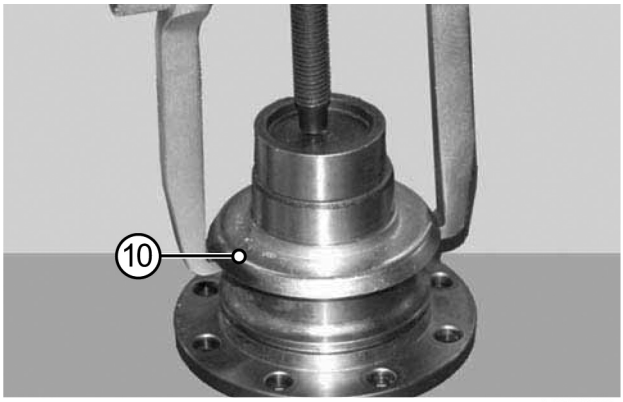


MAP15600

8. Remove the seal ring (**12**).


MAP15610

9. Remove the snap ring (**8**) from its seat around the screws (**7**).
10. Remove the screws (**7**).



MAP15620

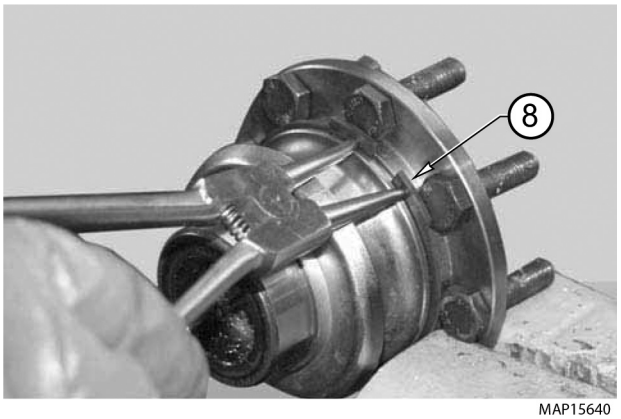
11. Remove the dust seal ring (**10**) by means of a puller.

15.3 BRAKE: INCOMING DISC BRAKE - ASSEMBLY

MAP15630

1. Lubricate the outer part of the seal (**12**) and insert it into the brake support (**11**) using tool (**T15**).

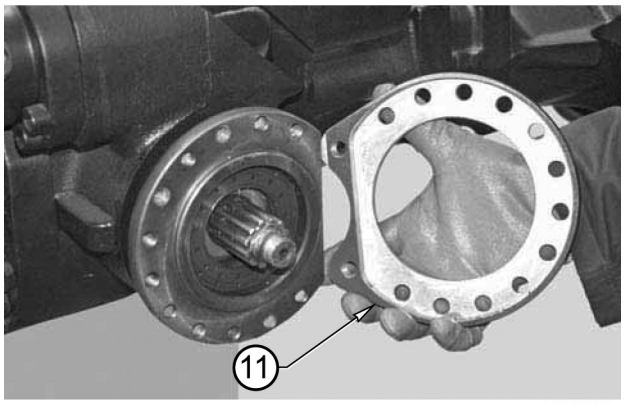
Note: *Carefully check assembly direction.*



MAP15640

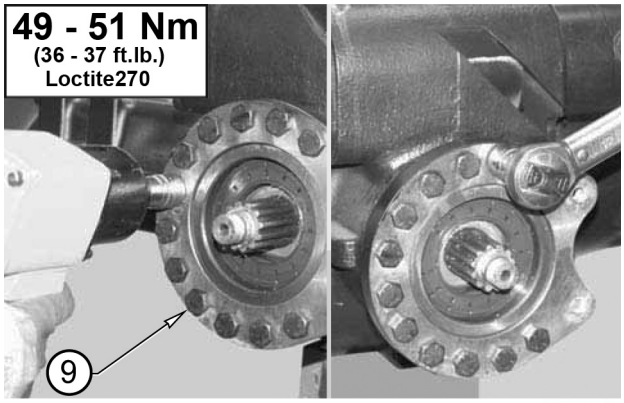
2. Insert the screws (**7**) and hold them in position with the snap ring (**8**).

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



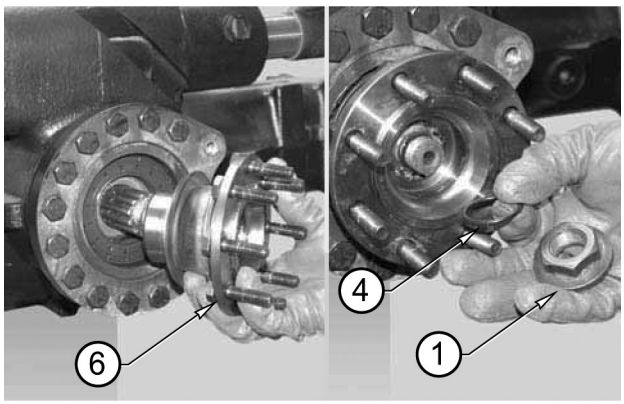
MAP15650

3. Lubricate the coupling surfaces and position brake support (**11**).



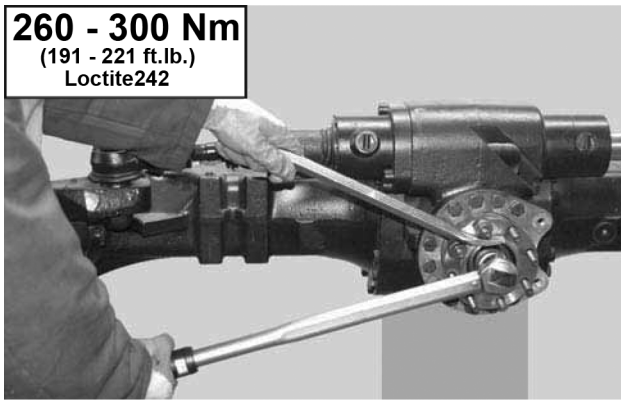
MAP15660

4. Apply Loctite 270 to the screws (**9**) and tighten using the criss-cross method.
   Torque wrench setting: 49 - 51 Nm (36-38 ft.lb.)



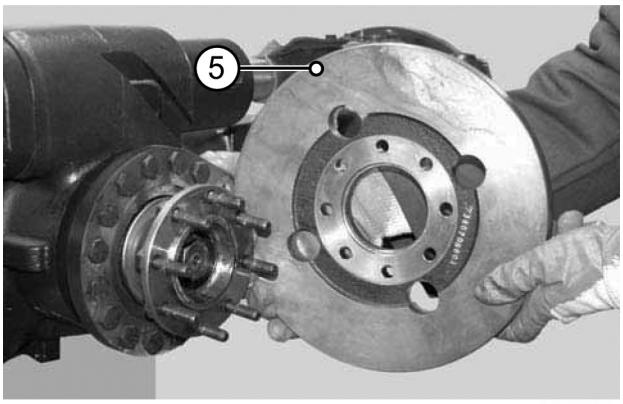
MAP15670

5. Install parts in the following sequence: flange (**6**), o-ring (**4**) and nut (**1**).
6. Spread Loctite 242 on the threaded portion of the pinion.



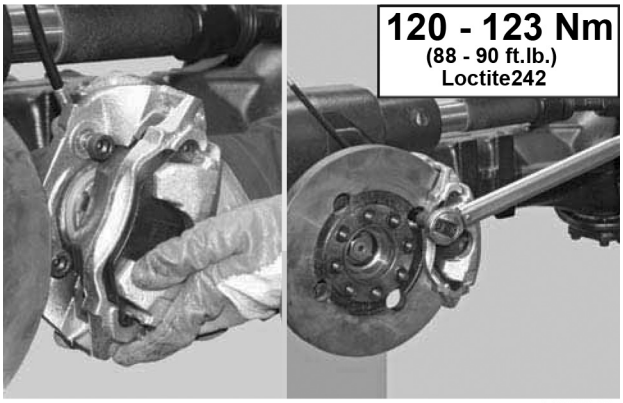
MAP15680

7. Engage the stop rod and tighten the nut (**9**).
   Torque wrench setting: 260 - 300 Nm (192-221 ft.lb.)



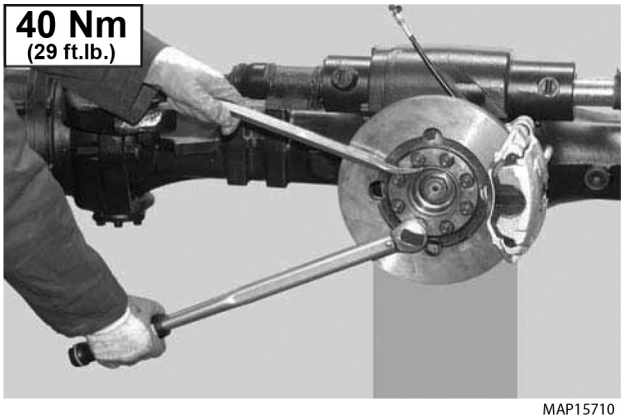
MAP15690

8. Install disc (**5**) and keep it into position with screws (**7**).



MAP15700

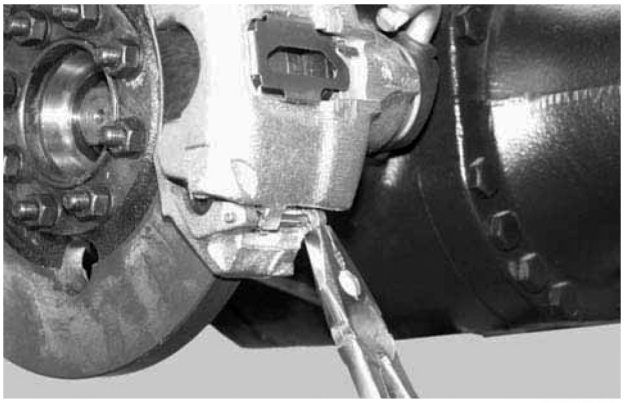
9. Install the caliper unit (**13**) and block with screws (**14**) coated with Loctite 242.
   Tighten using a torque wrench to a tightening torque of 120 -123 Nm (88-90 ft.lb.)



MAP15710

10. Tighten using a torque wrench to a tightening torque of 40 Nm (29 ft.lb.).

15.4 CHECKING WEAR AND REPLACING THE BRAKING PADS

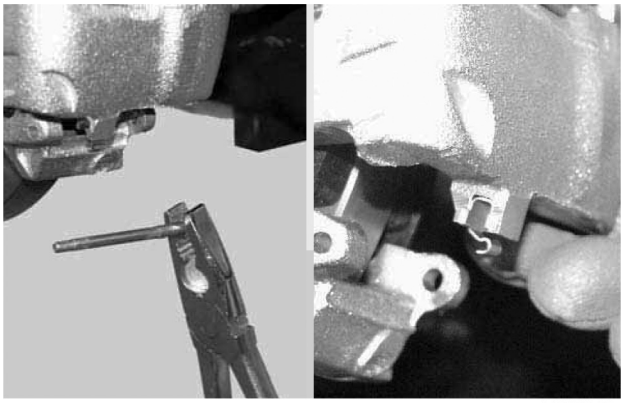


MAP15720

11. Remove the safety cotter pin.

⚠ CAUTION

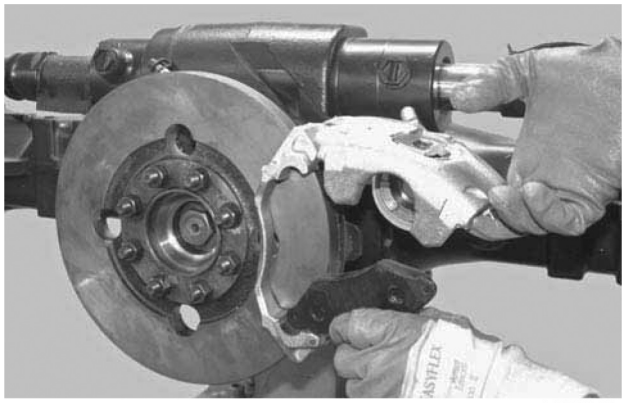
Dispose of used cotter pins.



MAP15730

12. Using a pin driver remove the guide pin.

.

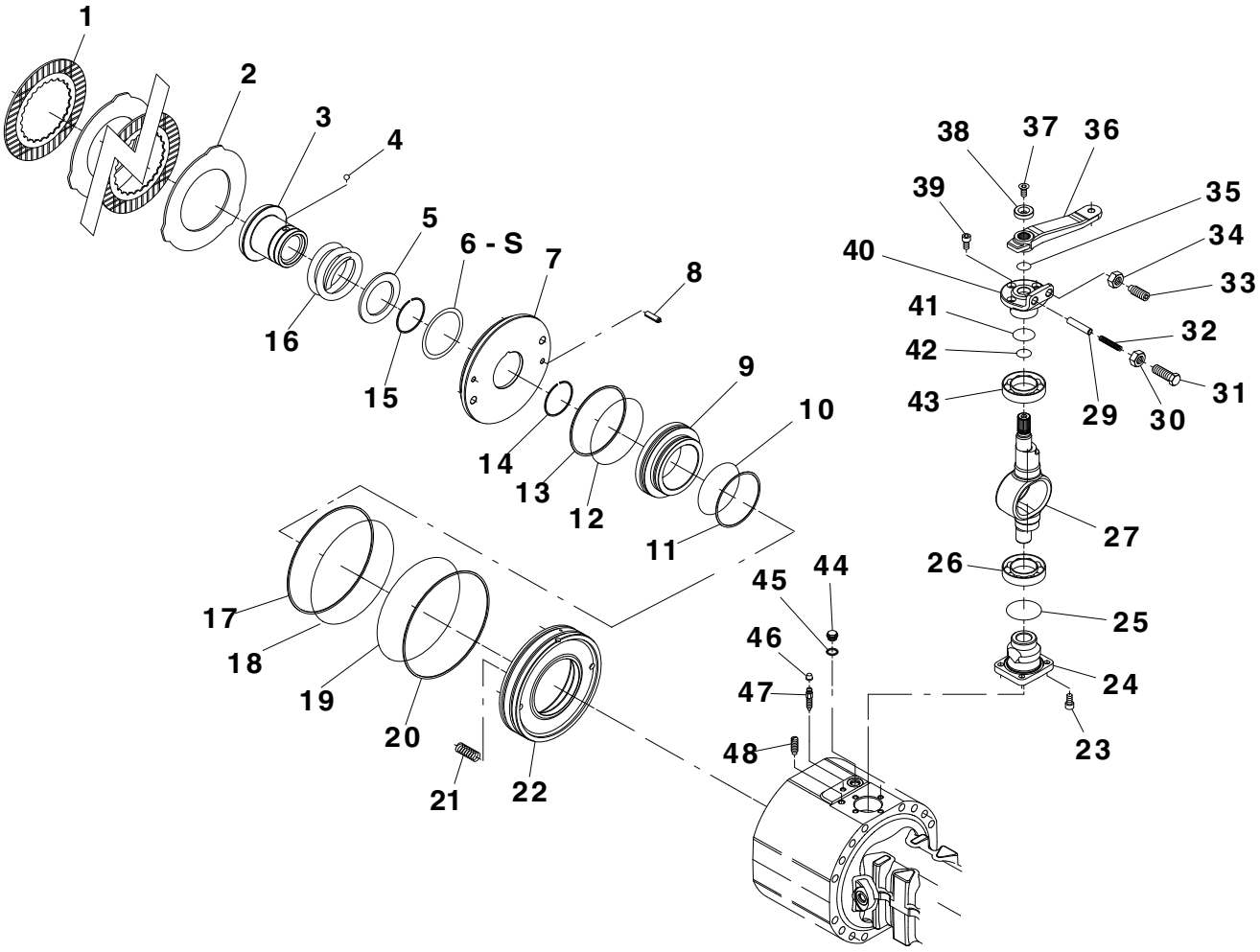


MAP15740

13. Remove the brake pads.

Section 16
Brake: Service and Mechanical Parking Brake

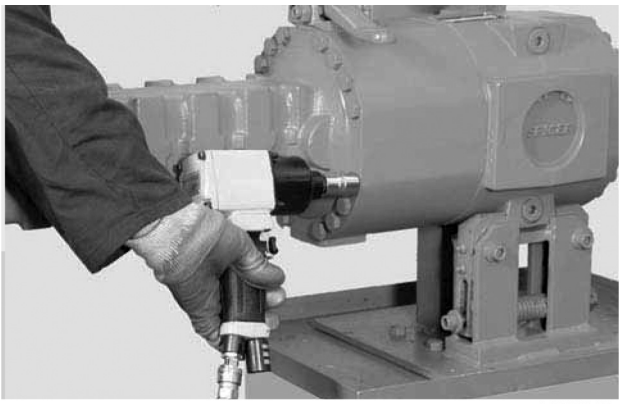
16.1 EXPLODED VIEW



16.2 BRAKE: INCOMING DISC BRAKE - DISASSEMBLY

DANGER

Before working on brakes, when the axle is installed on the vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle

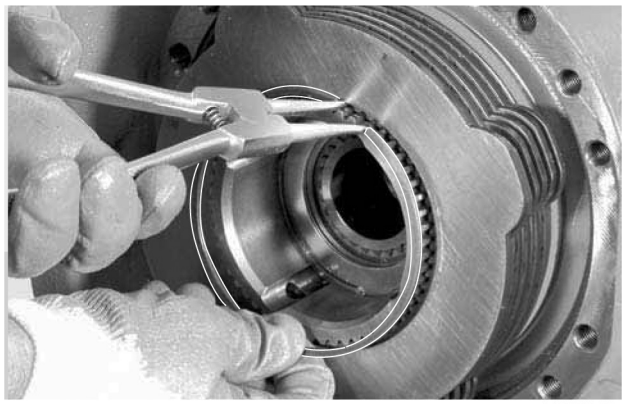


MAP15760

1. Sling the arm to be removed and connect it to a hoist. Remove screws.

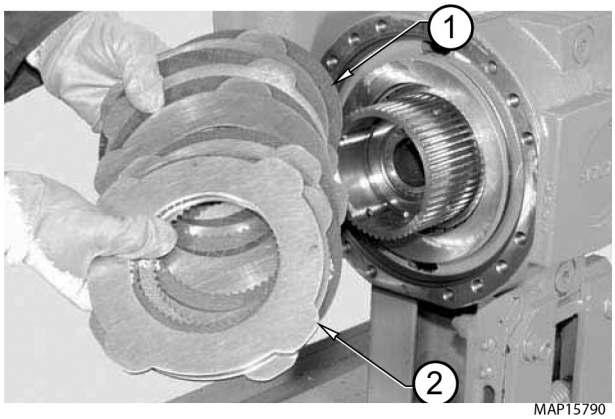
MAP15770

2. Remove the arm and lay it down vertically.



MAP15780

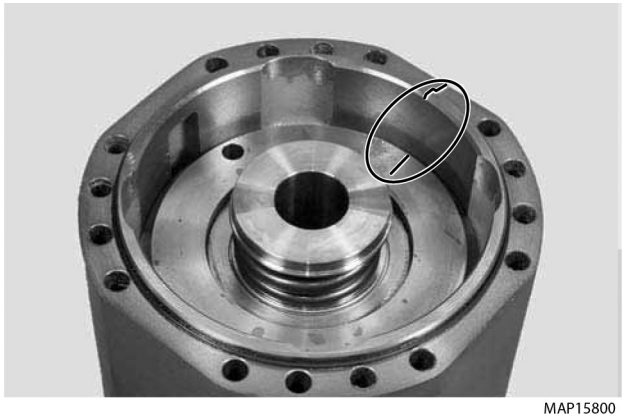
3. Remove the snap ring of the brake stack.



MAP15790

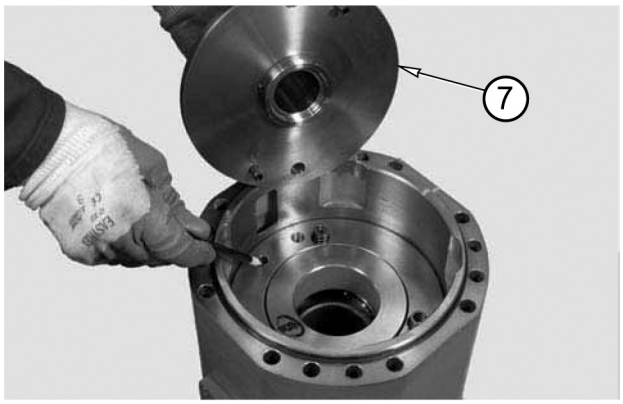
4. Remove the brake discs (**1**) and (**2**) one after the other.

Note: *If they are not going to be replaced, do not mix up the sequence.*



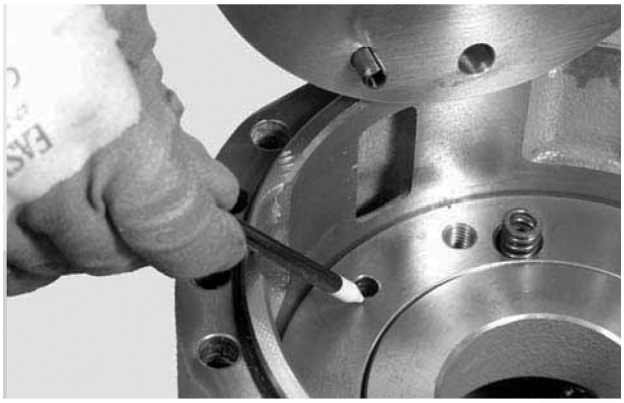
MAP15800

5. Mark the assembly position.



MAP15810

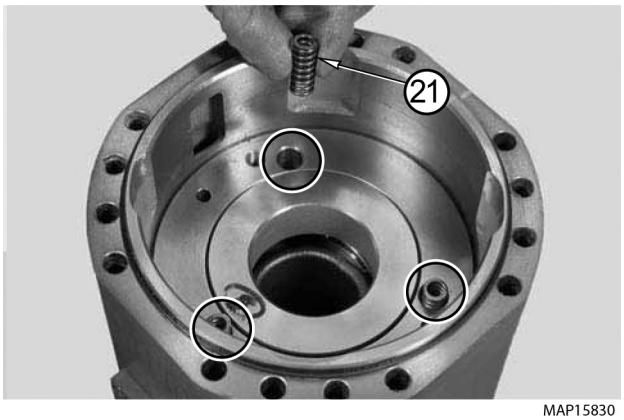
6. Remove intermediate disc (**7**).



MAP15820

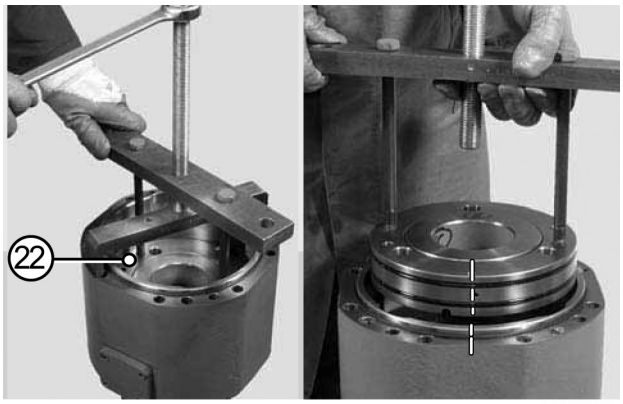
7. Mark the assembly position.

.



MAP15830

8. Remove the springs (**21**).

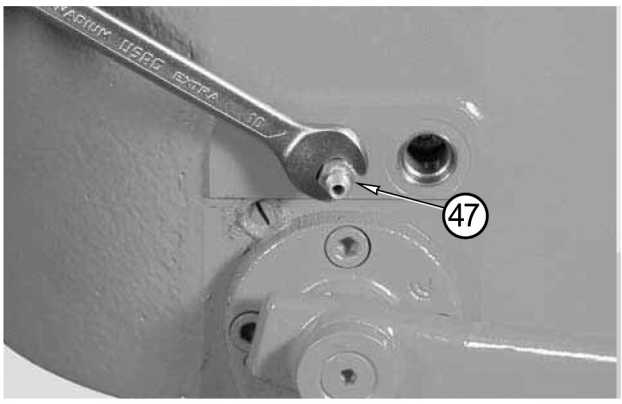


MAP15840

9. Insert the screws of the puller (M12) into the tap holes of the negative brake (**22**) and remove the pistons of the brake.

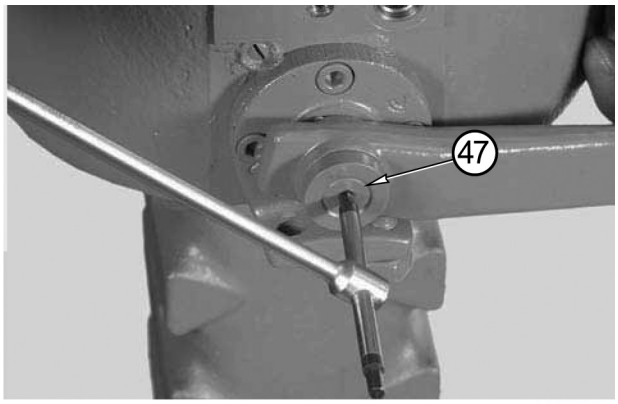
MAP15850

10. Pull out brake piston assembly module.



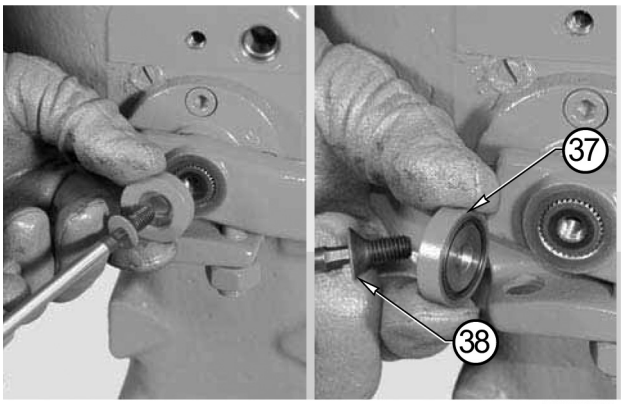
MAP15860

11. Remove the breather (**47**).



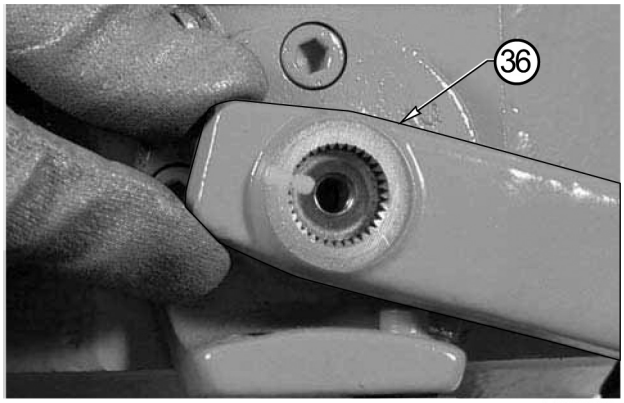
MAP15870

12. Remove the locking screw of the lever brake.



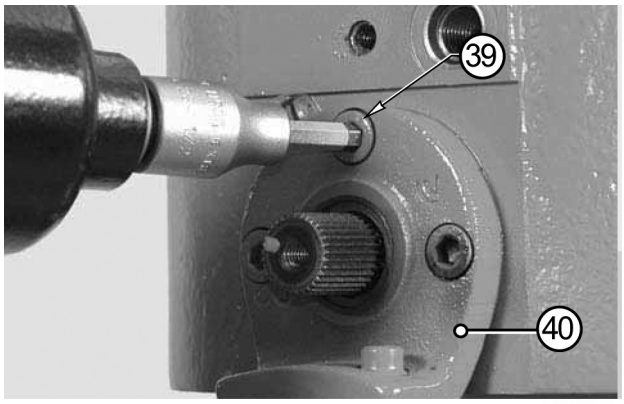
MAP15880

13. Remove the locking screw (**38**) lever brake complete with conical washer (**37**).



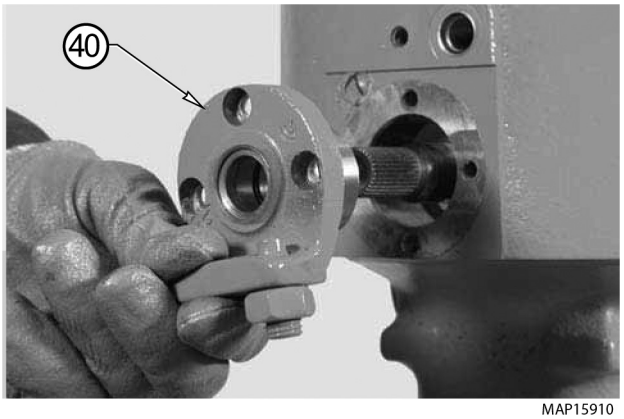
MAP15890

14. Mark the lever (**36**) position.



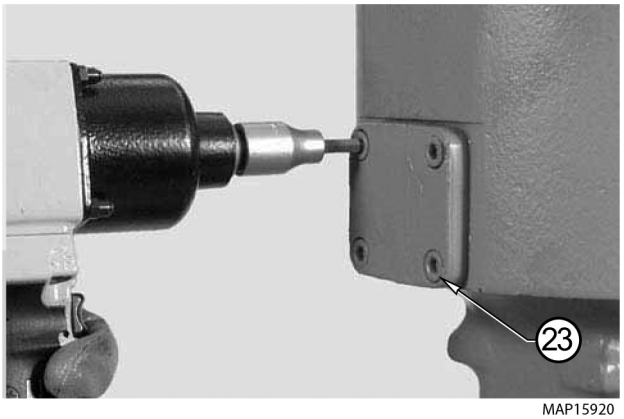
MAP15900

15. Remove the screw (**39**) of the thrust bushing (**40**).



MAP15910

16. Remove the thrust bushing (**40**) complete with the o-rings.

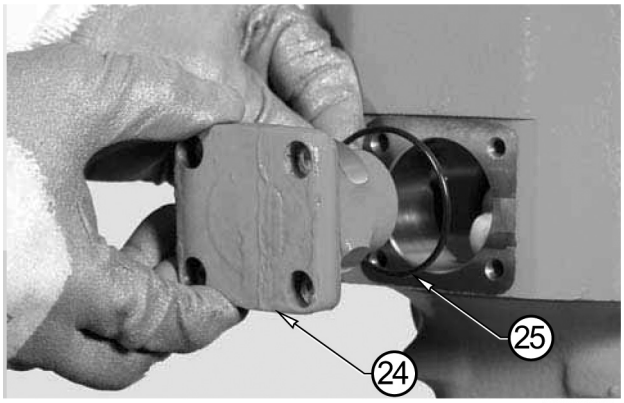


MAP15920

17. Remove the screw (**23**) of the thrust bushing.

MAP15930

18. With a plastic hammer, hammer on the internal lever (**27**).

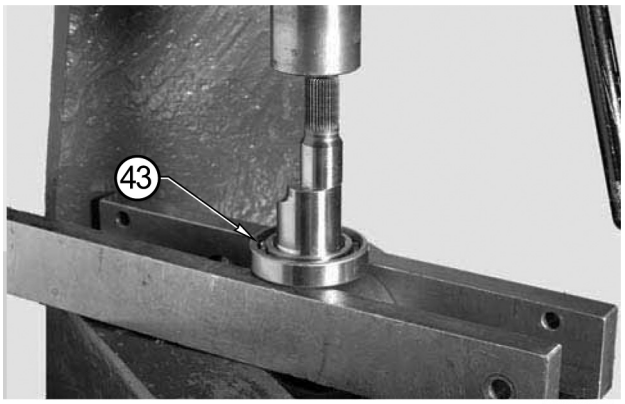


MAP15940

19. Remove the thrust bushing (**24**) complete the o-rings (**25)**.

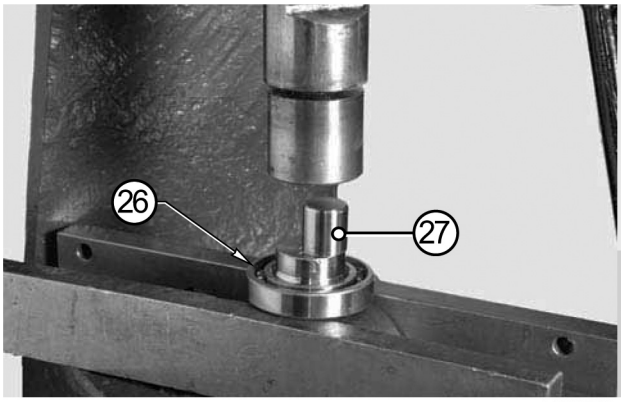
MAP15950

20. Remove the internal lever complete with bearings.



MAP15960

21. Place the lever (**27**) under a press and remove the bearings (**43**).

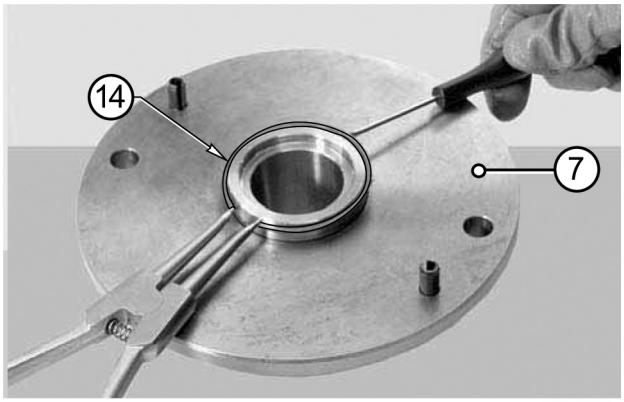


MAP15970

22. Place the lever under a press and remove the bearing (**26**).

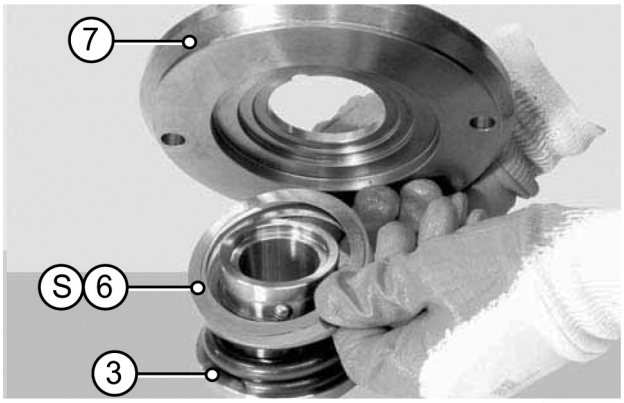
MAP15980

23. Applying pressure to the hole, remove the hydraulic piston (**9**).



MAP15990

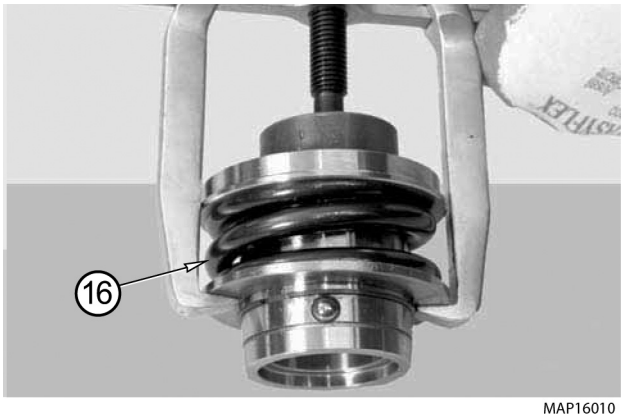
24. Remove the snap ring (**14**) from the intermediate disc (**7**).



MAP16000

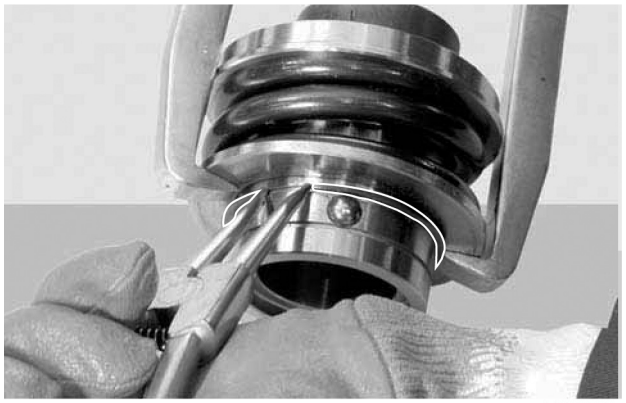
25. Remove coupling (**3**) and washers (**6**).

Note: *Build a stack of washers and check the measure.*



MAP16010

26. Using a puller, preload the spring (**16**).

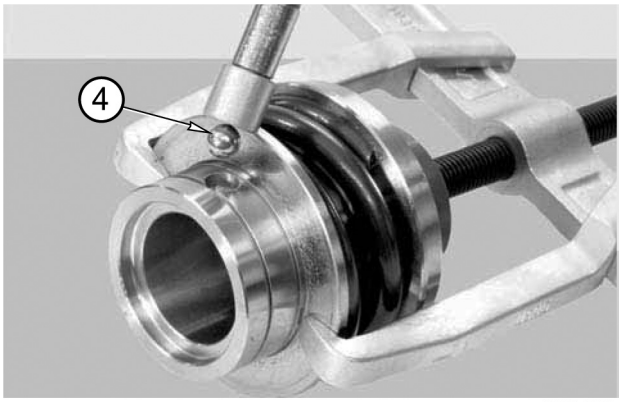


MAP16020

27. Remove the snap ring (**15**).

⚠ CAUTION

Spring preloaded.



MAP16030

28. Remove the fixing ball (**4**).

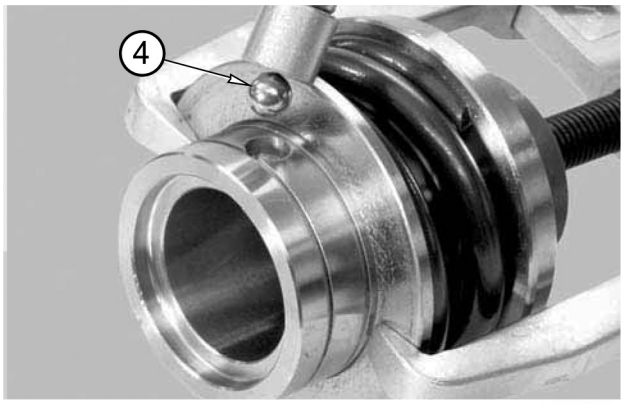
MAP16040

29. Remove washer (**5**) and spring (**16**).

16.3 BRAKE: INCOMING DISC BRAKE - ASSEMBLY

MAP16050

30. Insert spring (**16**) and washer (**5**) onto the hydraulic block coupling (**3**).

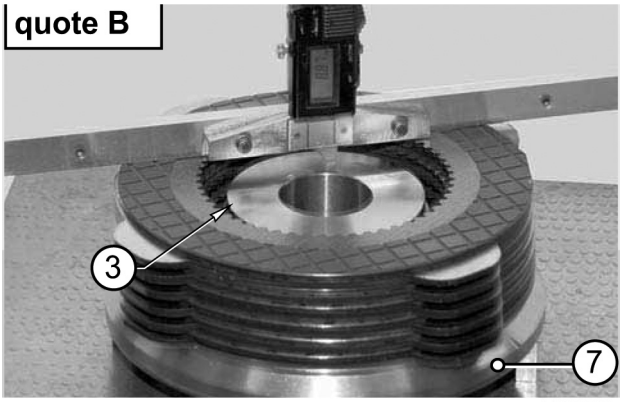


MAP16060

31. Preload the spring by using a puller acting on the washer. Insert the snap ring (**15**) and the fixing ball (**4**).

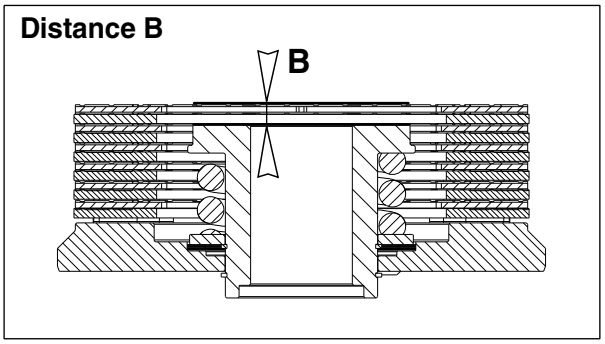
MAP16070

32. Shift the cut of the snap ring (**15**) according to the ball (**4**). The o-rings always have to be assembled from the pressure facing side.



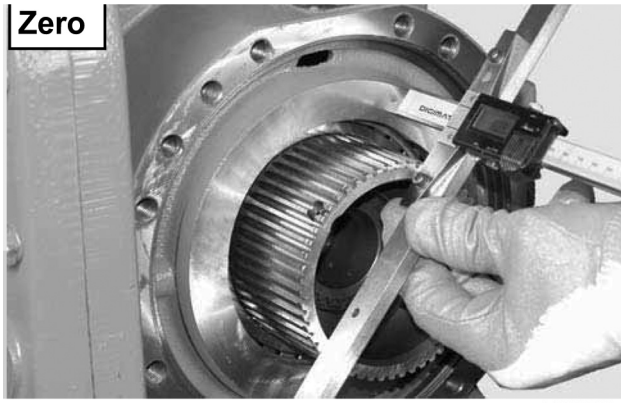
MAP16080

33. Using a surface plate, positioning disc (**7**), the coupling (**3**) and brake discs.



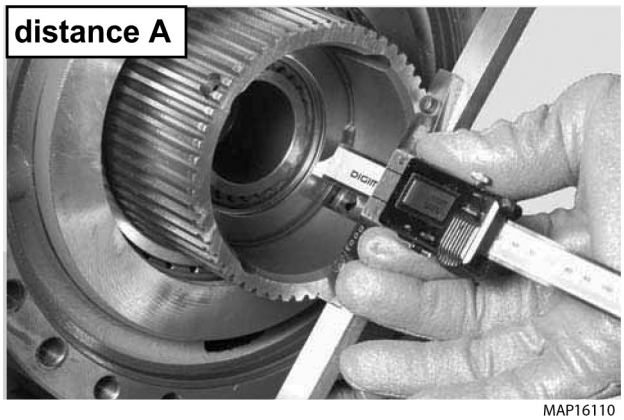
MAP16090

34. Measure distance B between the sleeve and first disk brake. Es: 8.6mm



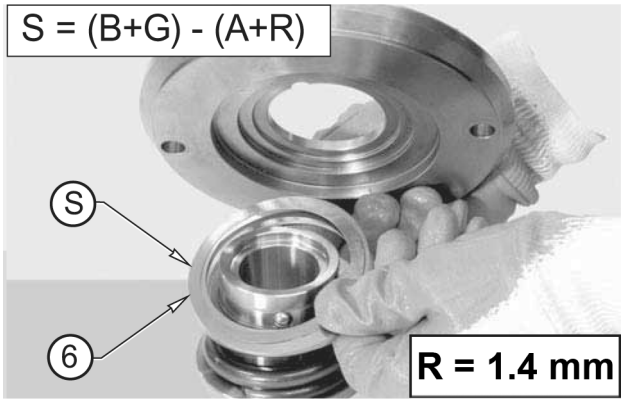
MAP16100

35. Zero the depth gage from the plane of the splined coupling to the surface of the brake discs.



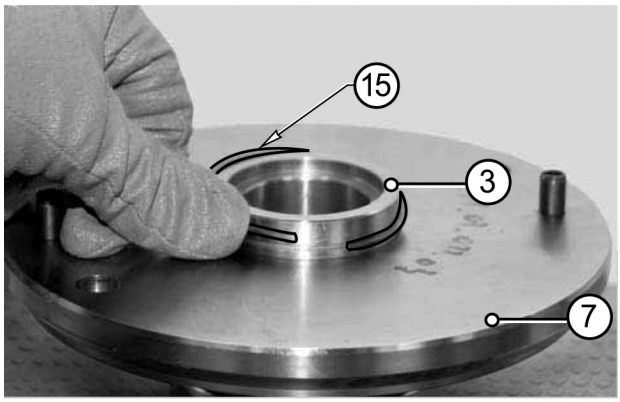
MAP16110

36. Measure distance A between the spline and bearing.



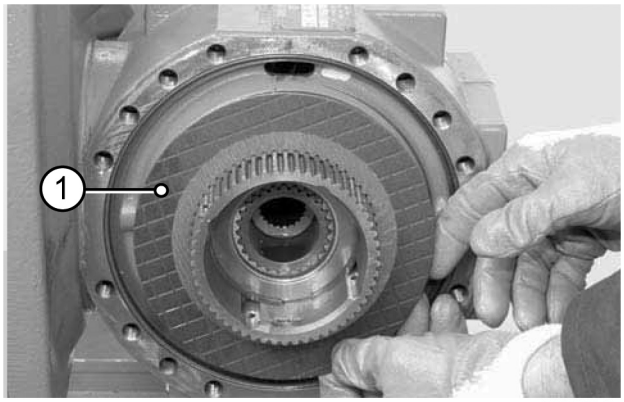
MAP16120

37. Calculation of shims S to be inserted.
    S = (B+G)-(A+R)
    G= brake disc gap= 0.1mm
    R = fi x gap = 1.4mm
    S = (8.6+1.4) - (8+0.1) = 1.9mm



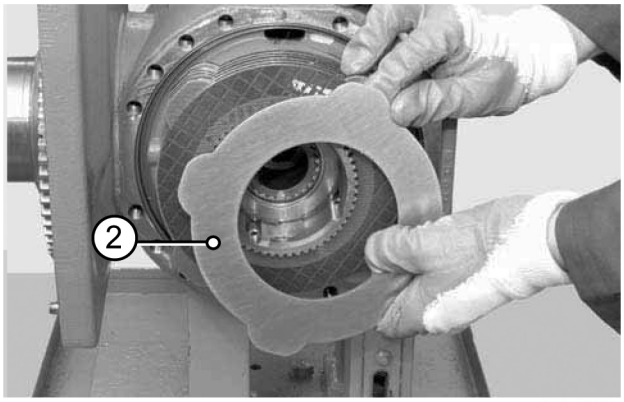
MAP16130

38. Insert and bring into position shims S (**6**) and coupling into the brake module.
39. Install the intermediary disk (**7**) on sleeve (**3**) starting with the snap ring (**15**).



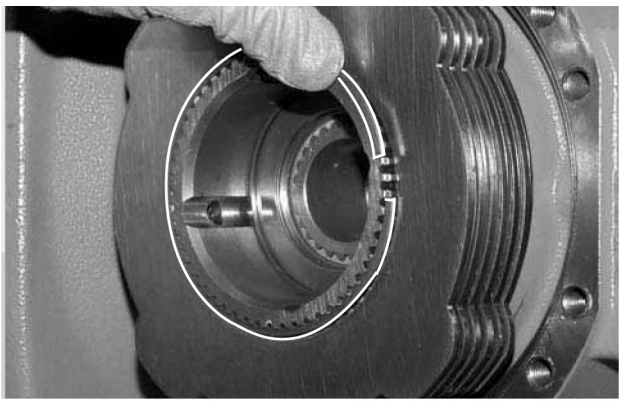
MAP16140

40. Install the first friction disc.



MAP16150

41. Install last disk brake of metallic material.

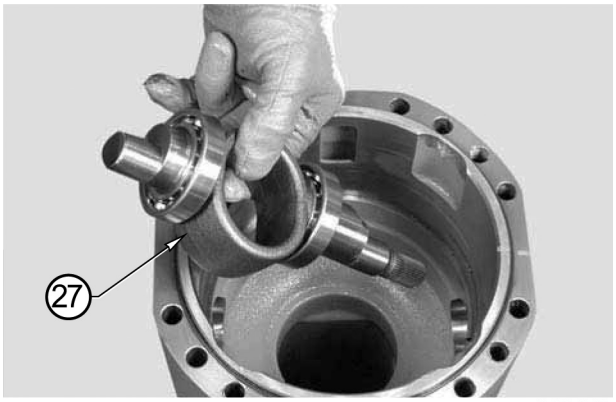


MAP16160

42. Install the snap ring of brake discs.

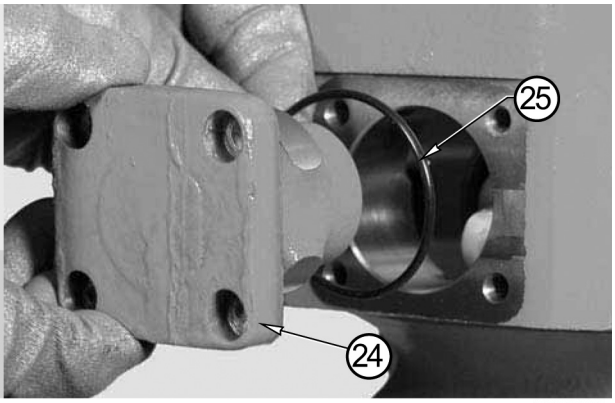
MAP16170

43. Insert the service brake piston (**9**) hammering alternately with a plastic hammer.



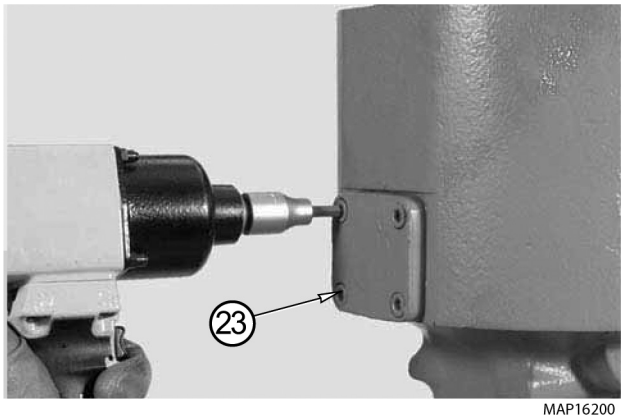
MAP16180

44. Insert the lever brake (**27**).



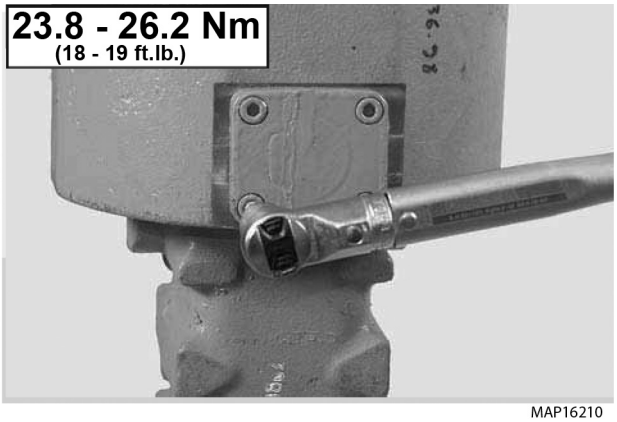
MAP16190

45. Install the thrust bushing (**24**) complete with new o-ring (**25**).



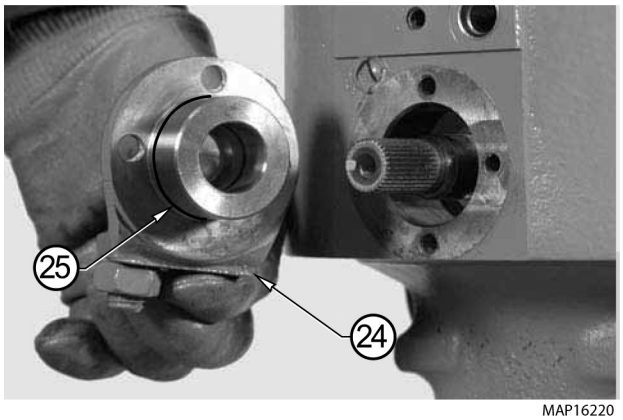
MAP16200

46. Insert screws (**23**).



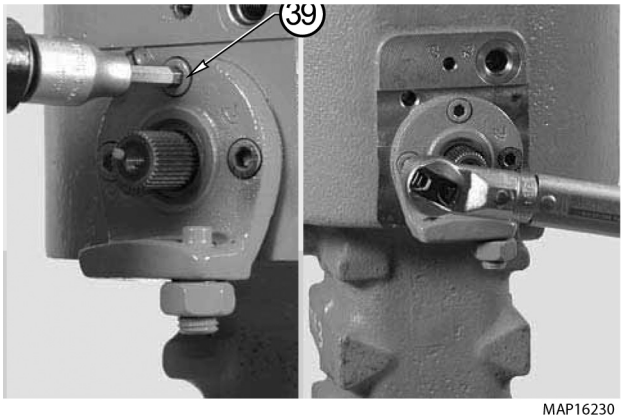
MAP16210

47. Tighten the screws to 23.8 - 26.2 Nm (18-19 ft.lb.).



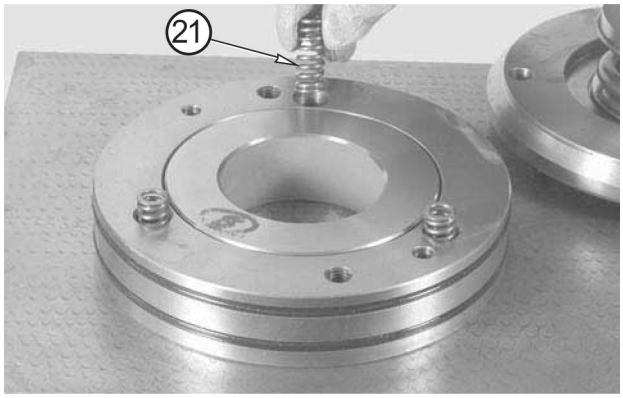
MAP16220

48. Insert the thrust bushing (**24**).



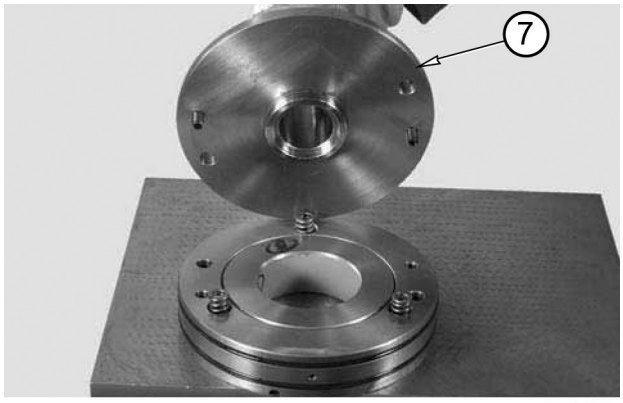
MAP16230

49. Insert screws (**39**).
    Tighten the screws to 23.8 - 26.2 Nm (18-19 ft.lb)



MAP16240

50. Insert the springs (**21**) in the piston.

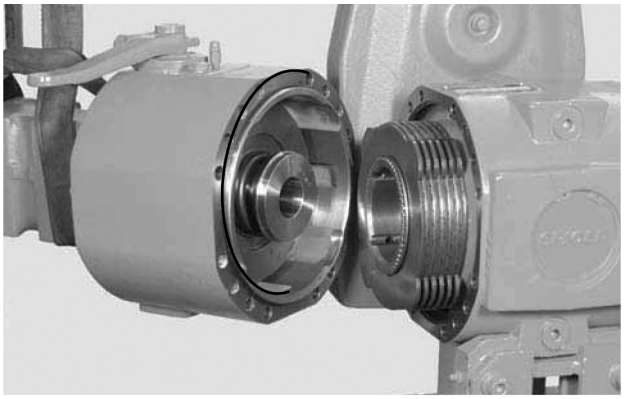


MAP16250

51. Install the intermediate brake disk (**7**) on the piston.
52. Verify assembly is in the correct position.

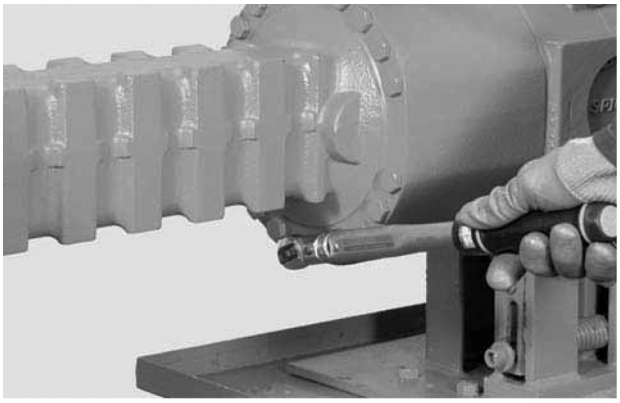
MAP16260

53. Install the piston pack.



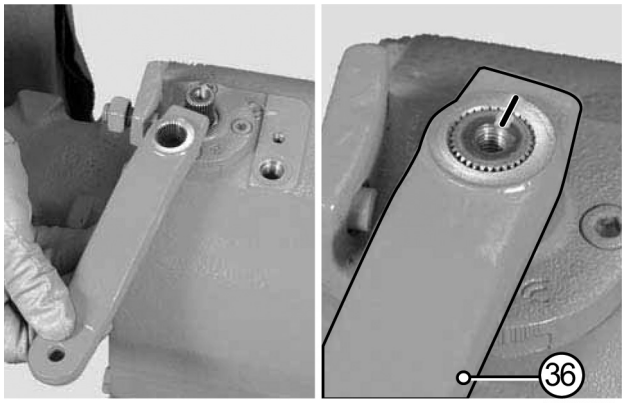
MAP16270

54. Exchange and lubricate the o-ring and insert the arm to the box.



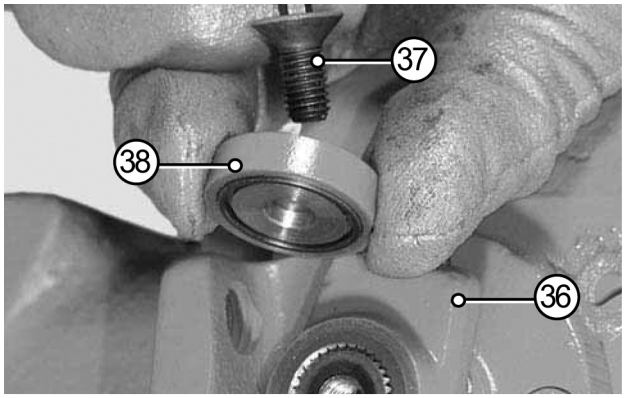
MAP16280

55. Insert the screws and tighten them alternately.



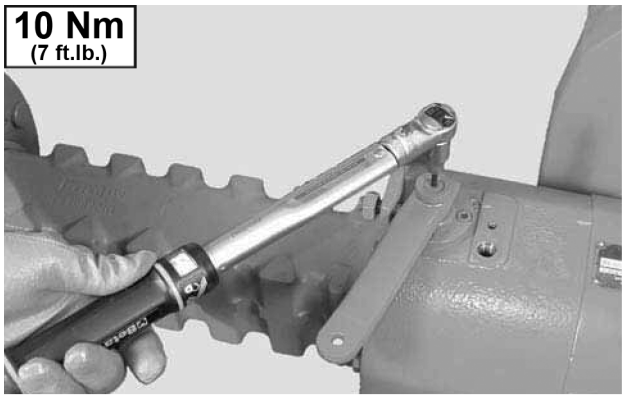
MAP16290

56. Install the brake lever (**36**).
57. Note the position previously marked.



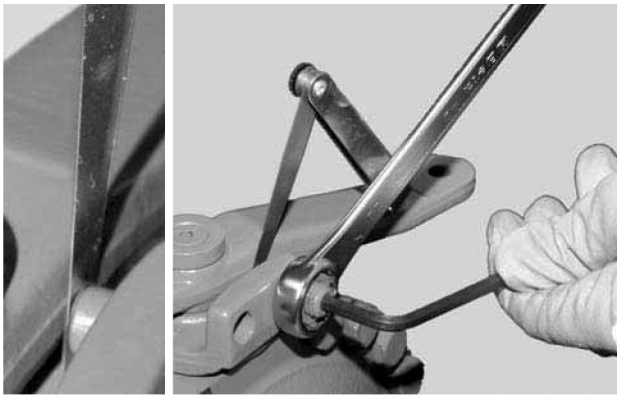
MAP16300

58. Lock the lever (**36**) with the screw (**37**) and washer (**38**).



MAP16310

59. Tighten screws to a torque wrench setting: 10 Nm (7.3 ft.lb.).



MAP16320

60. Applying light pressure to bring the lever brake to the piston, without preloading the inside spring. With the register screw (**33**) to draw near to the lever (**36**) leaving a gap of 0.1 - 0.2 mm.

CAUTION

MANDATORY PROCEDURE:
Check brake piston gap, see Brake Piston Gap Check.

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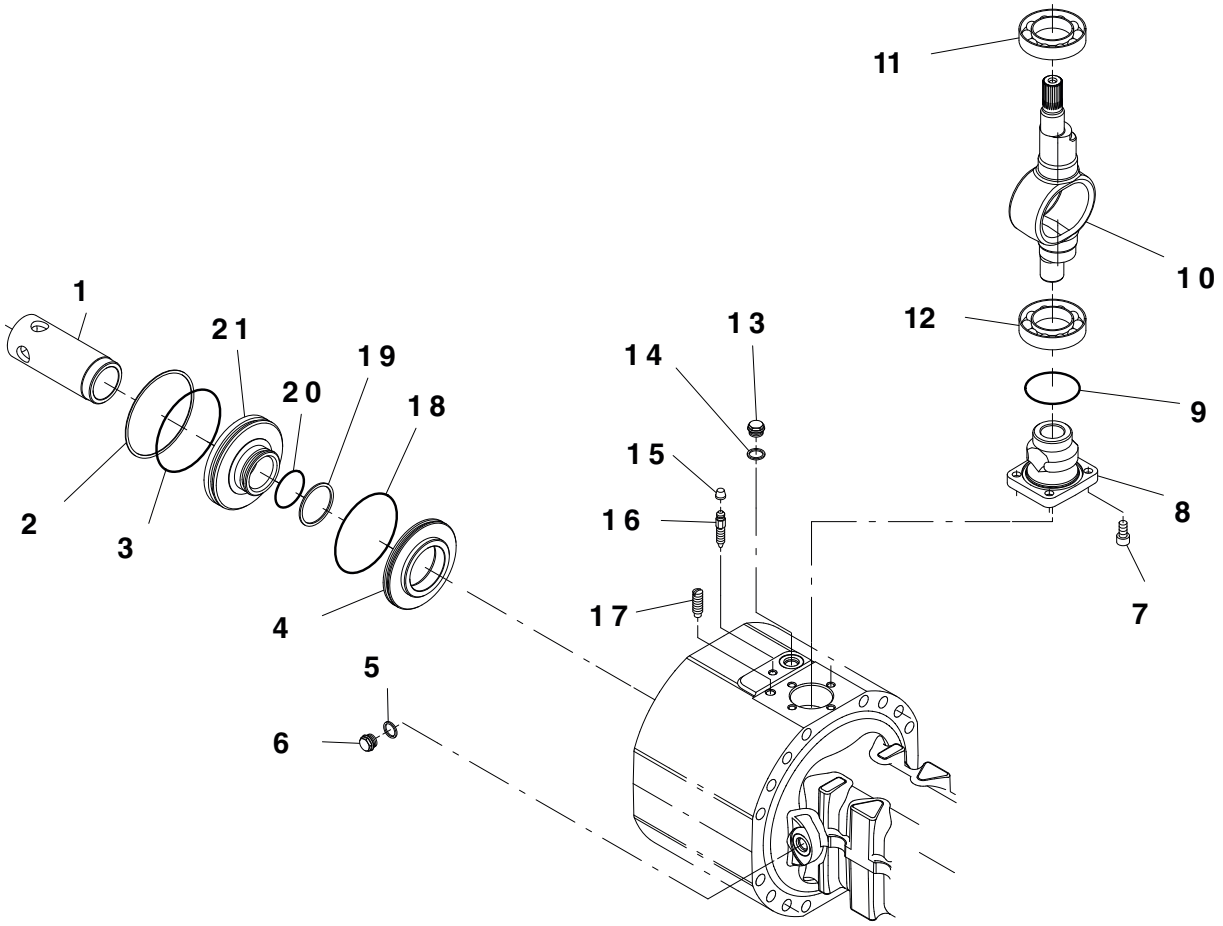
Section 17
Brake: Parking Brake and Differential Hydraulic 100%

17.1 EXPLODED VIEW



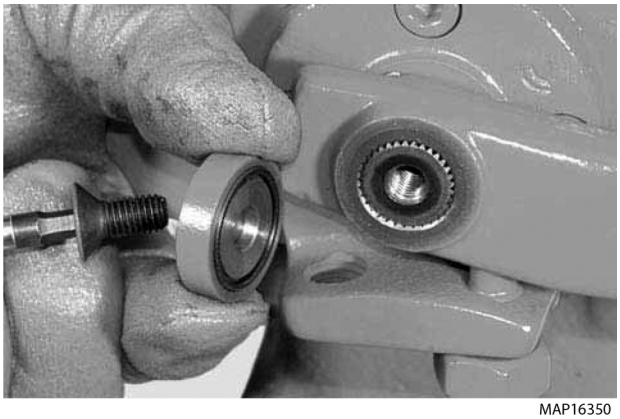
17.2 BRAKE: INCOMING DISC BRAKE-DISASSEMBLY

DANGER

Before working on brakes, when the axle is installed on the vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

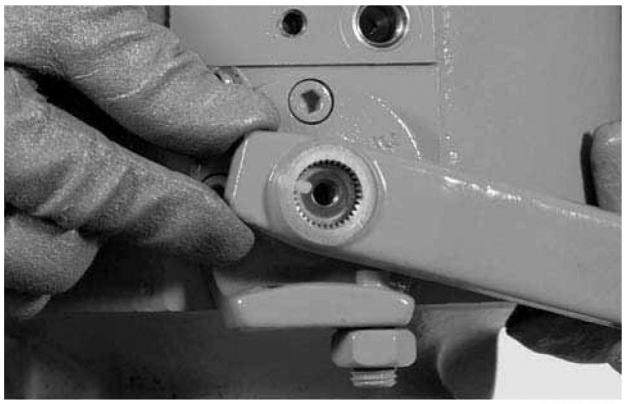
MAP16340

1. Remove the spacer (**1**).



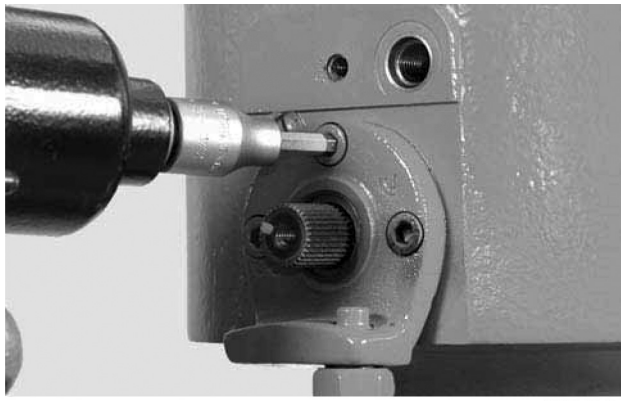
MAP16350

2. Remove the brake lever locking screw complete with the conical washer.



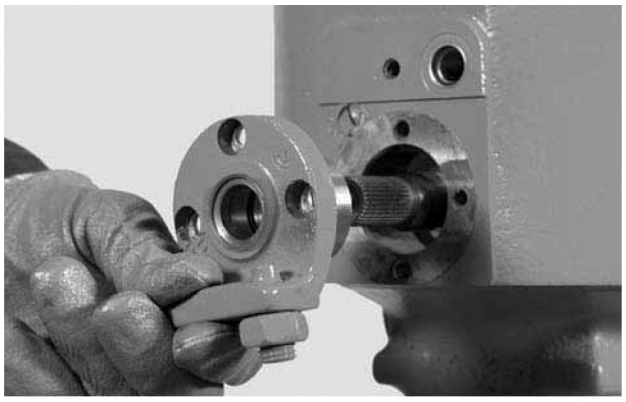
MAP16360

3. Mark before disassembly the brake lever, and remove.



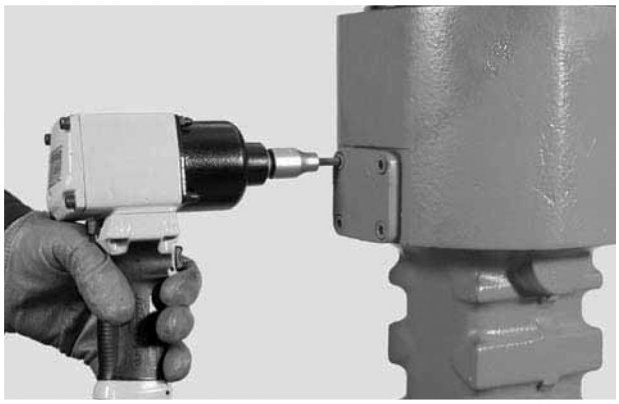
MAP16370

4. Remove the cap screw of the thrust bushing.



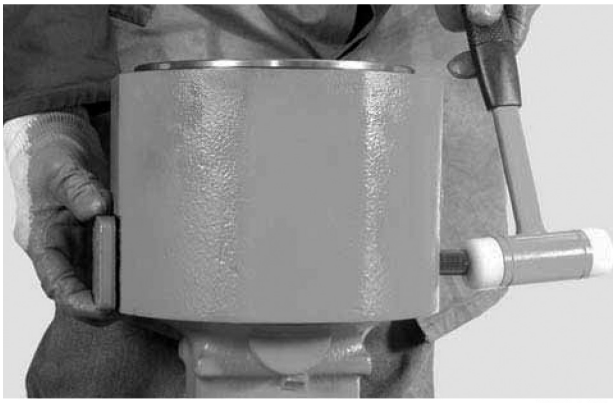
MAP16380

5. Remove the thrust bushing complete with the o-rings.



MAP16390

6. Remove the cap screw of the thrust bushing.



MAP16400

7. With a plastic hammer, hammer on the internal lever (**10**).

MAP16410

8. Remove the thrust bushing complete with the o-rings.

MAP16420

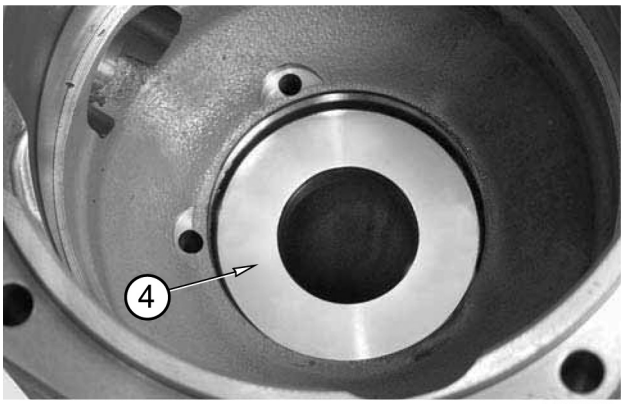
9. Remove the internal lever complete with bearings.

MAP16430

10. Applying pressure to the hole and remove the piston differential block.

MAP16440

11. Piston differential block.

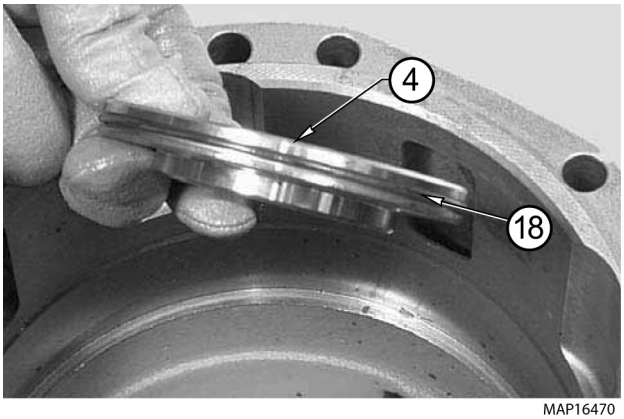


MAP16450

12. Remove the plug.

MAP16460

13. Using an extractor, remove the plug (**4**).



MAP16470

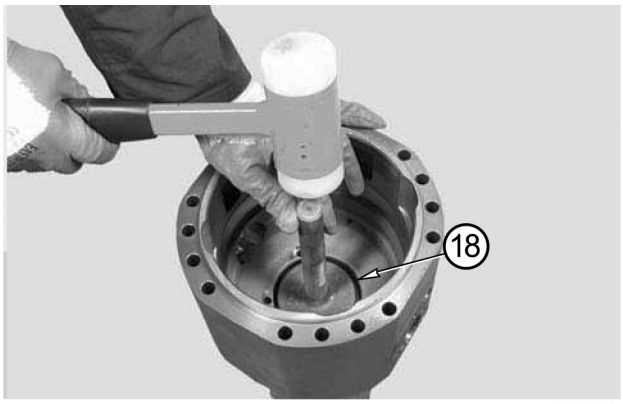
14. Remove o-ring (**18**) from the plug (**4**).

Note: *The o-ring (**18**) must be replaced each time the unit is disassembled.*

17.3 BRAKE: INCOMING DISC BRAKE-ASSEMBLY

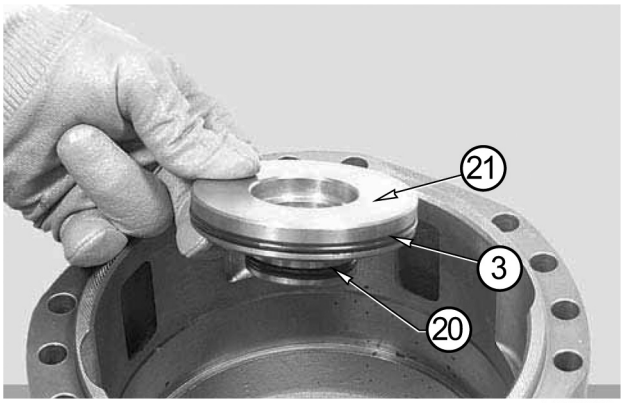
MAP16480

1. Fit o-rings (**18**) and onto the plug (**4**).
2. Lubricate the plug and the o-rings and install the unit into the arm.



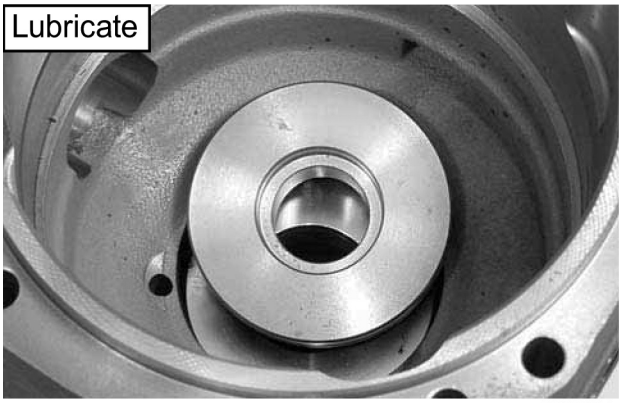
MAP16490

3. Using a plastic hammer, press the plug (**18**) into the arm.



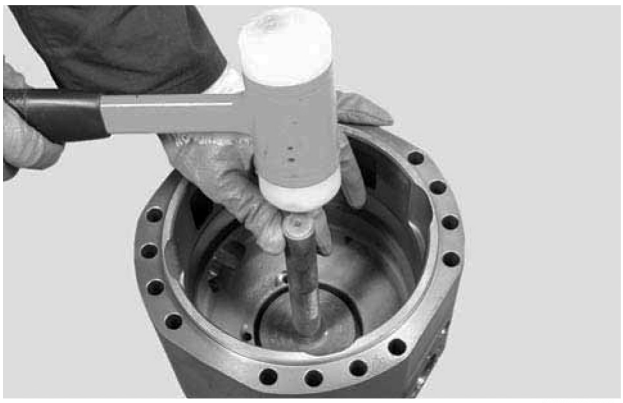
MAP16500

4. Fit o-rings (**3**) and (**20**) onto the piston (**21**).
5. Lubricate the piston and the o-rings and install the unit into the cylinder.



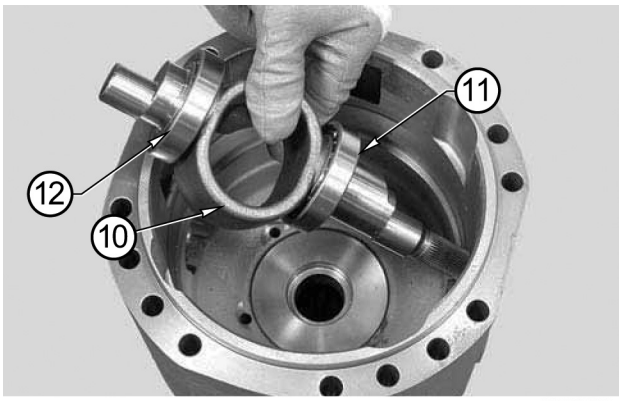
MAP16510

6. Before installing, lubricate the piston and o-ring.



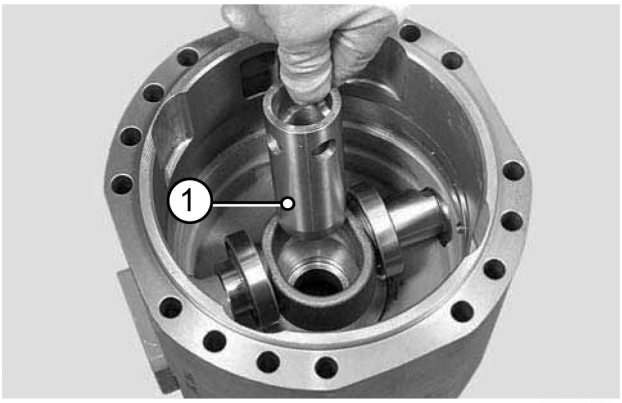
MAP16520

7. Using a plastic hammer, press the piston into the arm.



MAP16530

8. Install the lever (**10**) complete with bearings (**11**) and (**12**).



MAP16540

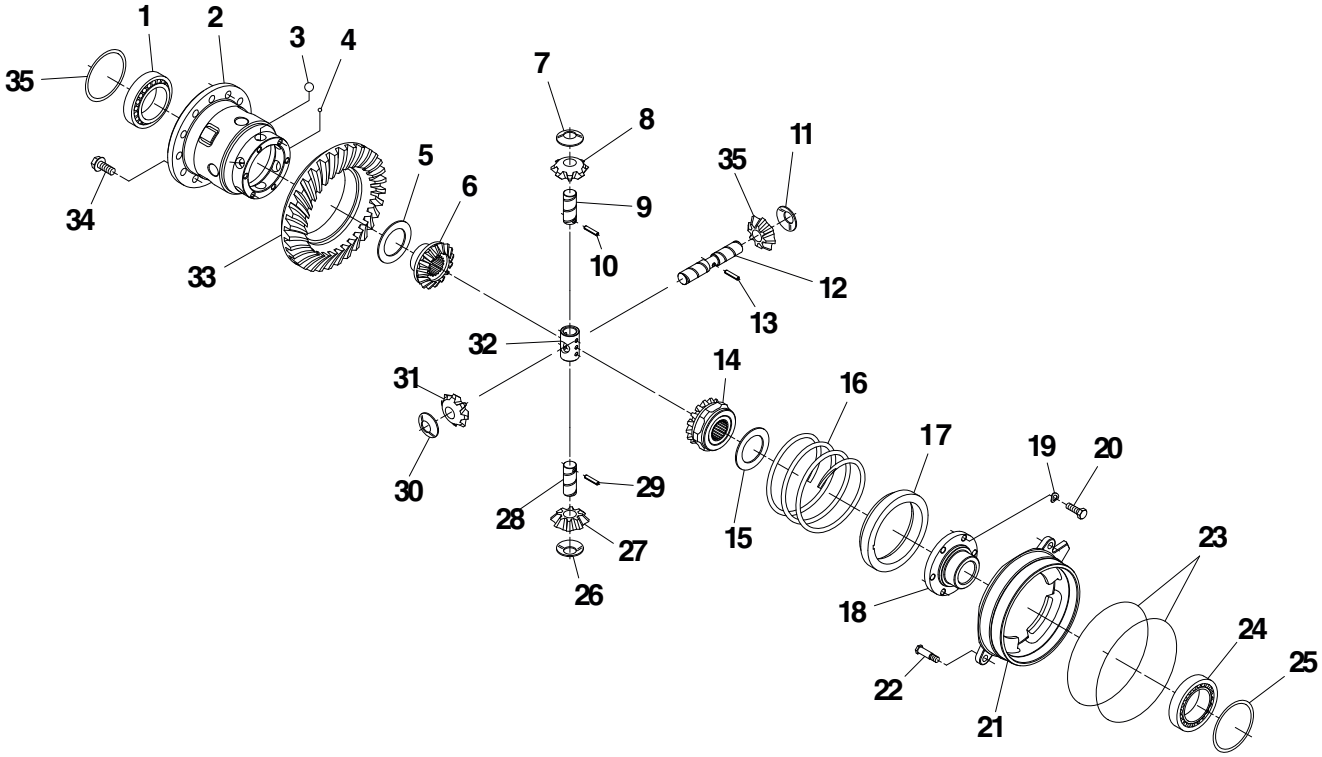
9. Insert the spacer (**1**).

CAUTION

MANDATORY PROCEDURE:
Check brake piston gap, see Brake Piston Gap Check.

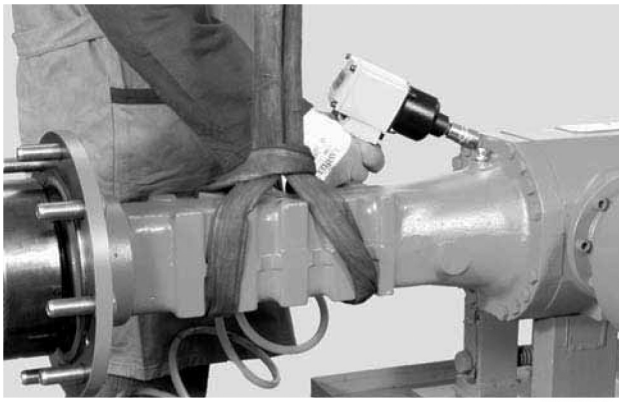
Section 18
Differential With Block to Spheres 100% (Old Version)

18.1 EXPLODED VIEW



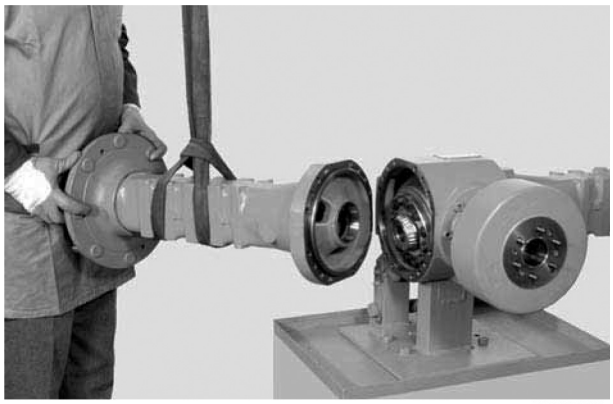
MAP16550

18.2 DIFFERENTIAL WITH BLOCK TO SPHERES 100% (OLD VERSION) - DISASSEMBLY



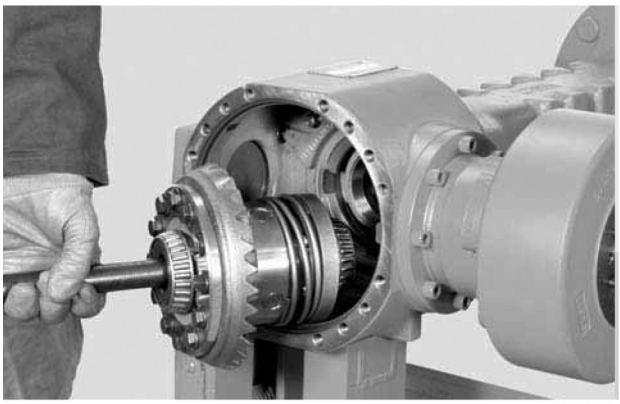
MAP16560

1. Sling the arm to be removed and connect it to a hoist. Loosen and remove screws and nuts.



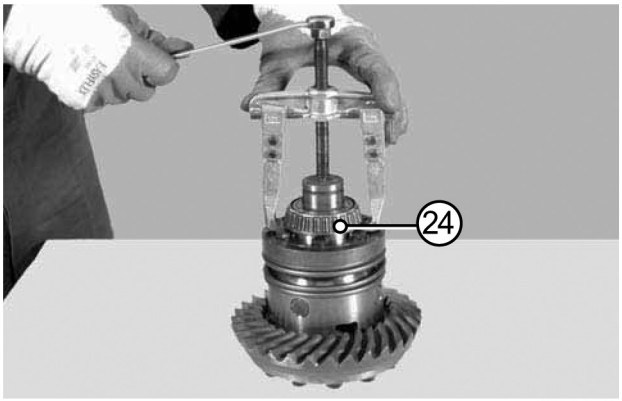
MAP16570

2. Remove arm together with brakes and axle shafts; lay down the arm vertically.



MAP16580

3. Extract the whole differential unit.



MAP16590

4. Extract the bearing (**24**) from the differential carrier.

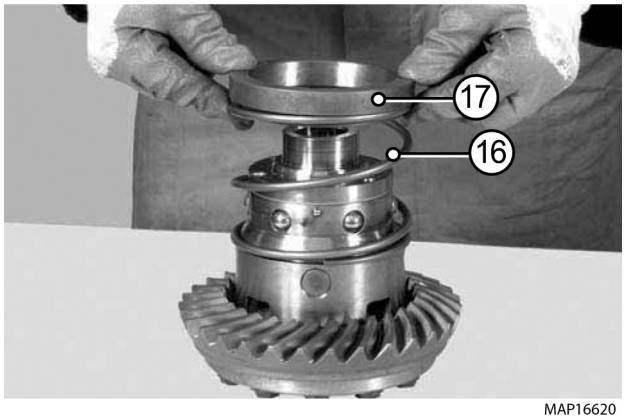
MAP16600

5. Remove 4 cap screws of the coupling of the cover.

Note: *Mark the position of the coupling.*

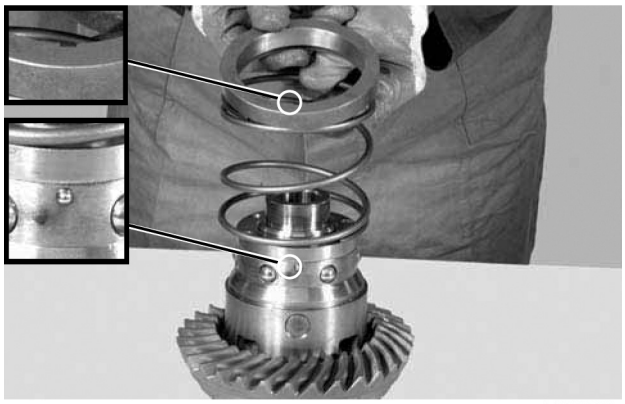
MAP16610

6. Hold down the spring to avoid the coupling from jumping off, then remove the remaining two screws.



MAP16620

7. Remove the coupling (**17**) and the spring (**16**).



MAP16630

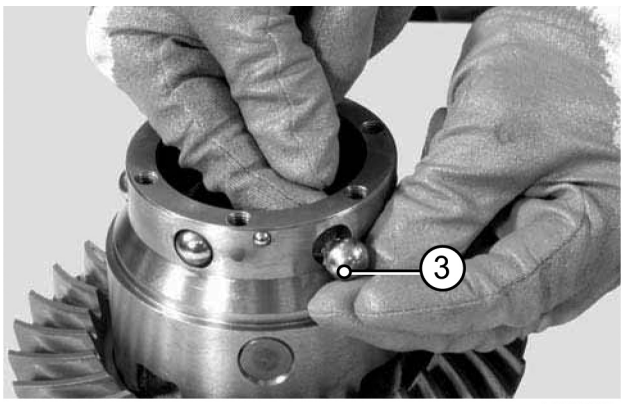
8. Remove the cover (**18**) from the blocking side of the differential unit.

MAP16640

9. Remove the cover (**18**) from the blocking side of the differential unit.

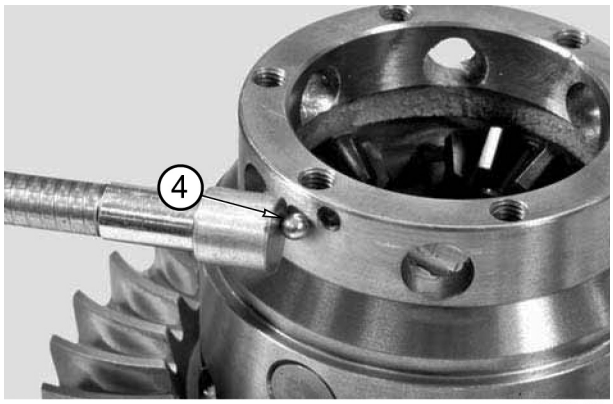
MAP16650

10. Remove the shim washer (**15**) and the planetary gear (**14**).



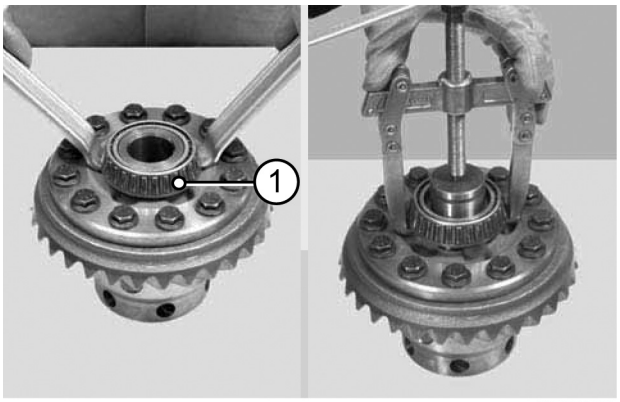
MAP16660

11. Remove the blocking balls (**3**).



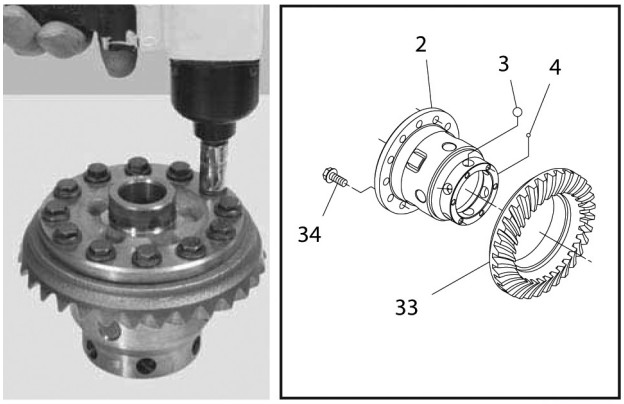
MAP16670

12. Remove the fixing ball (**4**) from the differential box by using a magnetic tool.



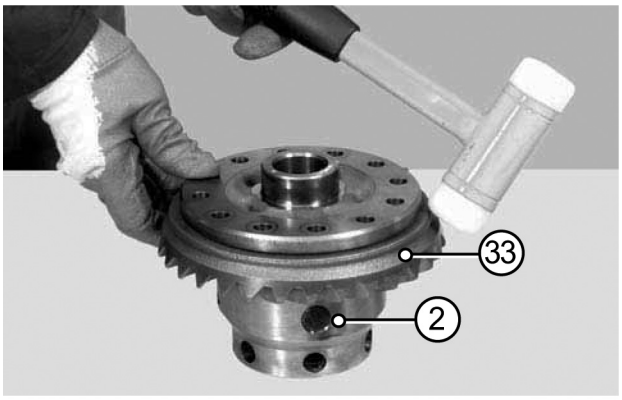
MAP16680

13. Extract the bearing (**1**) partially and using a puller, remove the bearing (**1**) of the ring gear side (**33).**



MAP16690

14. Remove the ring gear fixing screws (**34**).



MAP16700

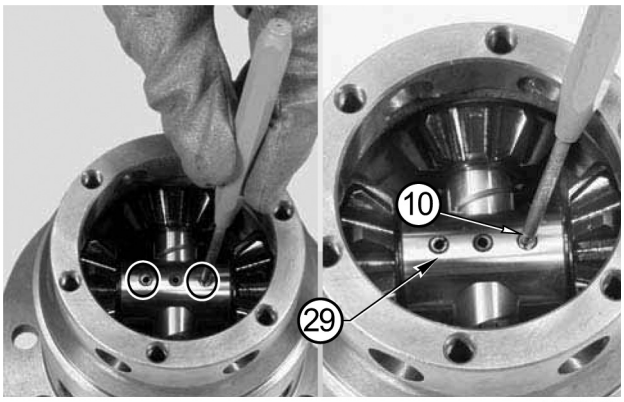
15. Separate the ring gear (**33**) from the differential box (**2**).

MAP16710

16. Replace the cap screws every disassembly.

MAP16720

17. Use a correctly sized pin driver to remove the pins.

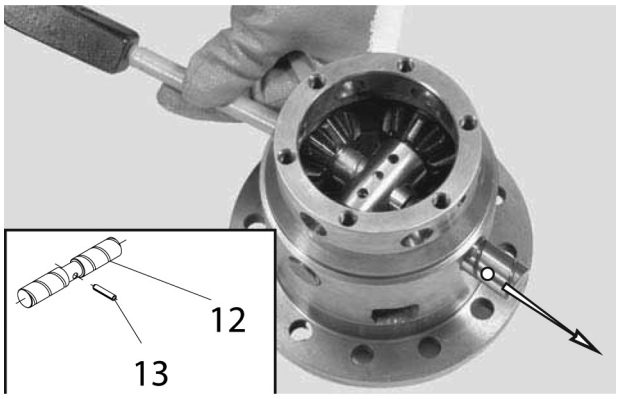


MAP16730

18. Remove the fixing pins (**10**) and (**29**) of the differential cross bolts.

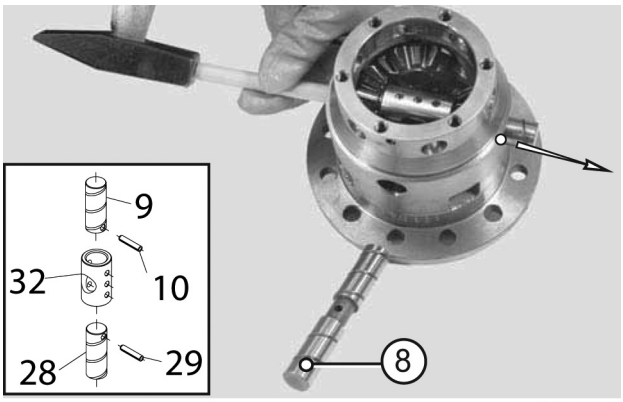
MAP16740

19. With a pin driver push the two bolts (**9**) and (**28**) to the outside.



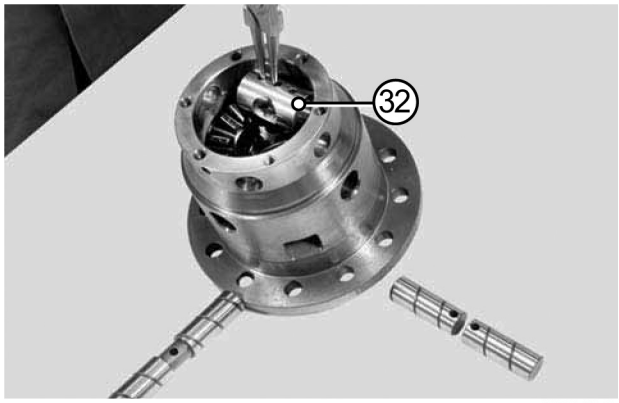
MAP16750

20. Remove the bolts with the help of a drift (**12**).



MAP16760

21. Remove the two halves of the cross bolts (**9**) and (**28**) with the help of a drift.

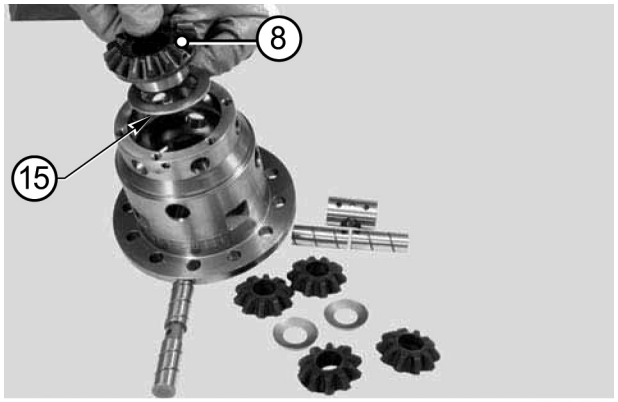


MAP16770

22. Remove the cross bolts (**32**).

MAP16780

23. Remove the satellite gears and the spherical washers.

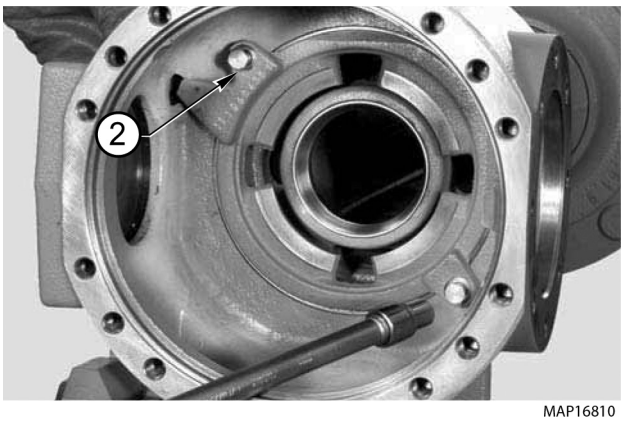


MAP16790

24. Remove the planetary gear (**8**) with washer.

MAP16800

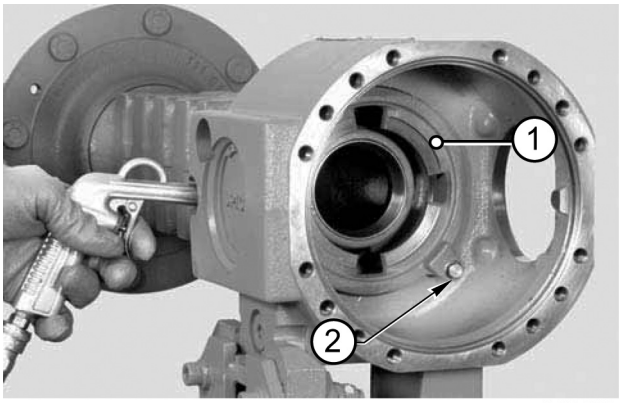
25. Remove the circuit breaker of the hydraulic block.



MAP16810

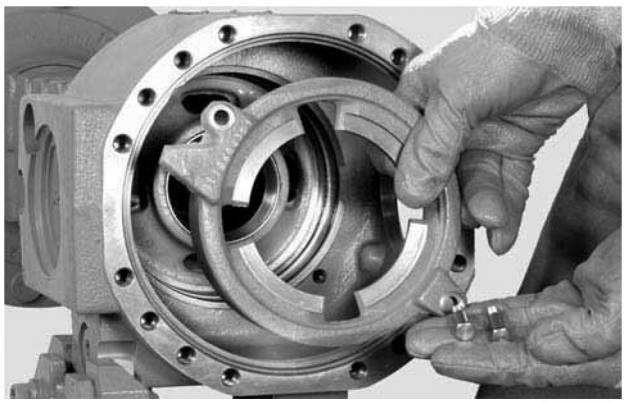
26. Loosen the two caps crews (**2**) with 4 turns.

.



MAP16820

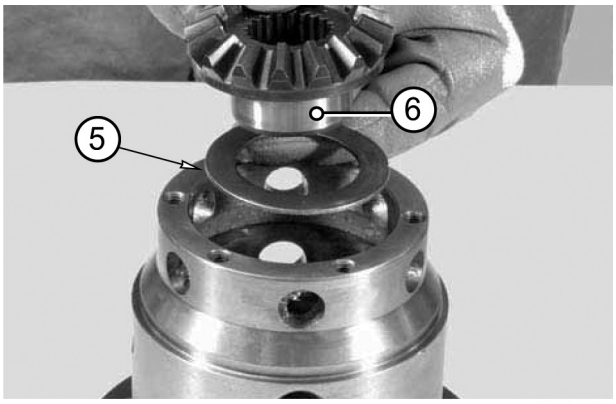
27. With pressurized air push out the piston (**1**) together until the head of caps crews (**2**).



MAP16830

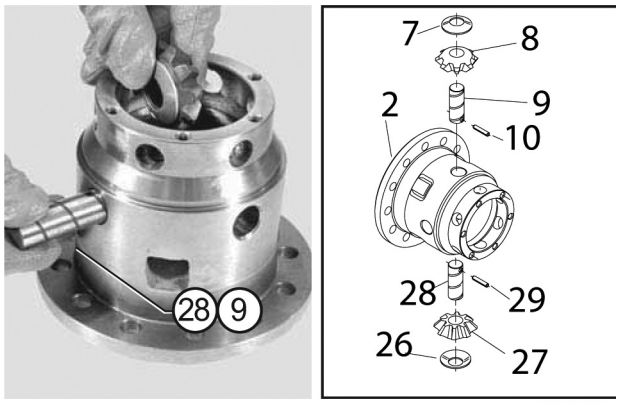
28. Remove piston.

18.3 DIFFERENTIAL WITH BLOCK TO SPHERES 100% (OLD VERSION) - ASSEMBLY



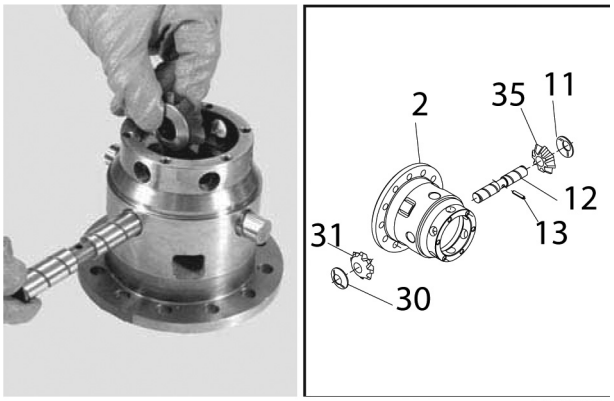
MAP16840

1. Insert the washer (**5**) and the planetary gear (**6**) on the ring gear side.



MAP16850

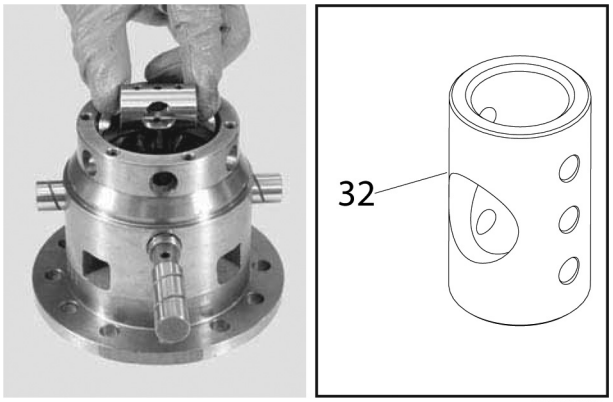
2. Insert the satellite gears (**27**) and (**8**) with the spherical washers (**26**) and (**7**) and the bolts (**28**) and (**9**) to keep them in position.



MAP16860

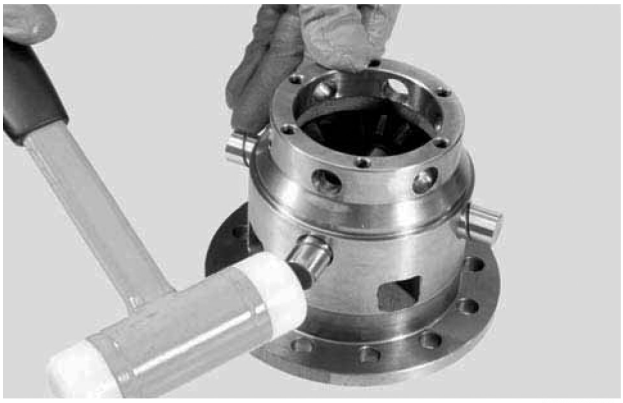
3. Insert the satellite gears (**31**) and (**35**) with the spherical washers (**30**) and (**11**) and the bolt (**12**).

.



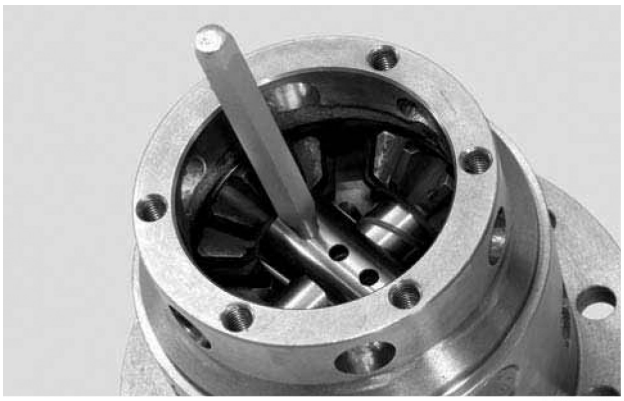
MAP16870

4. Insert the cross bolt (**32**) in the correct position.



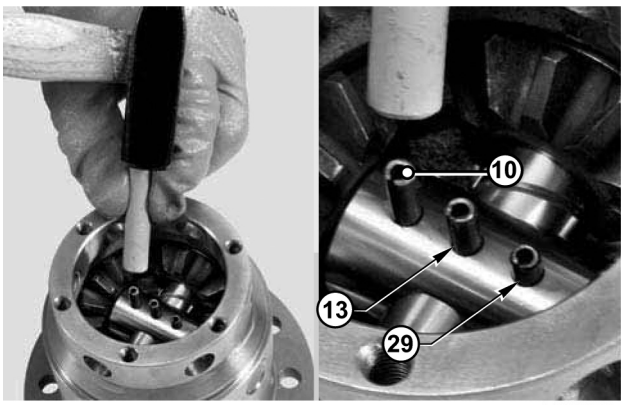
MAP16880

5. Insert the bolts in their position.



MAP16890

6. Bring the pin holes in line with the help of a pin driver.

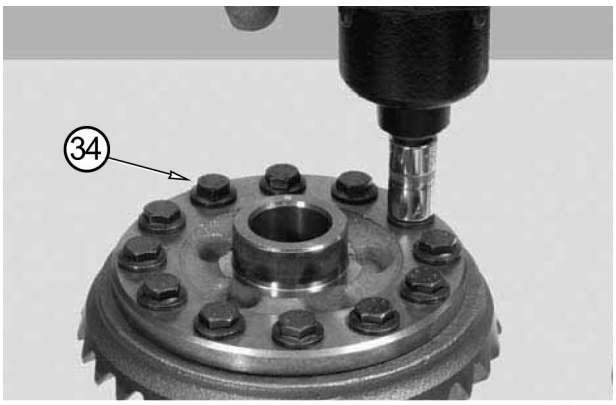


MAP16900

7. Insert pins to end of stroke.

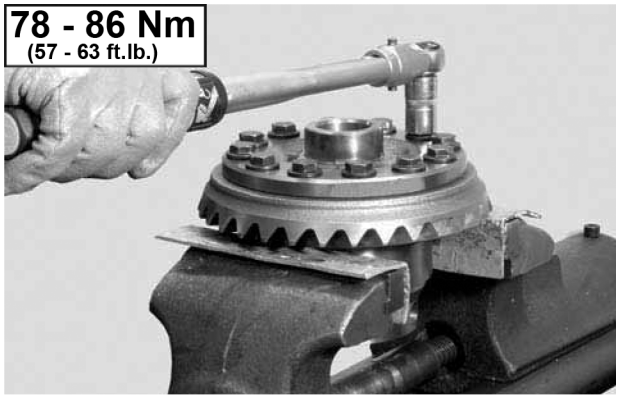
MAP16910

8. Install the ring gear (**33**).



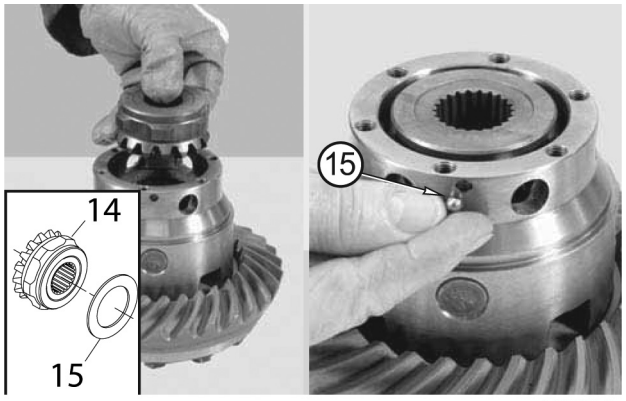
MAP16920

9. Tighten the cap screws (**34**) of the ring gear.



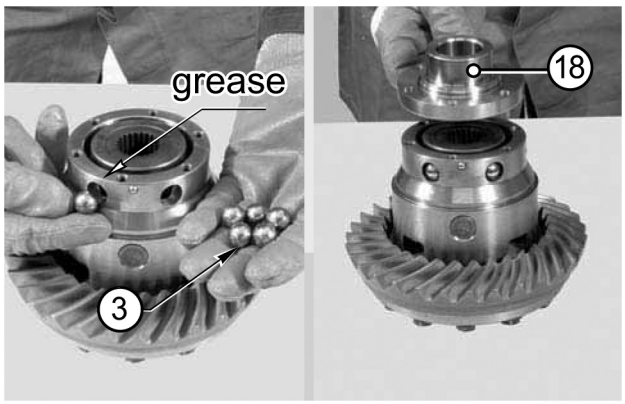
MAP16930

10. Tighten the cap screws of the ring gear using the criss-cross method.
    Torque wrench setting: 78 - 86 Nm (57-63 ft.lb.)



MAP16940

11. Insert planetary gear (**14**) (together with washer). Insert the fixing ball (**15**) of the coupling.



MAP16950

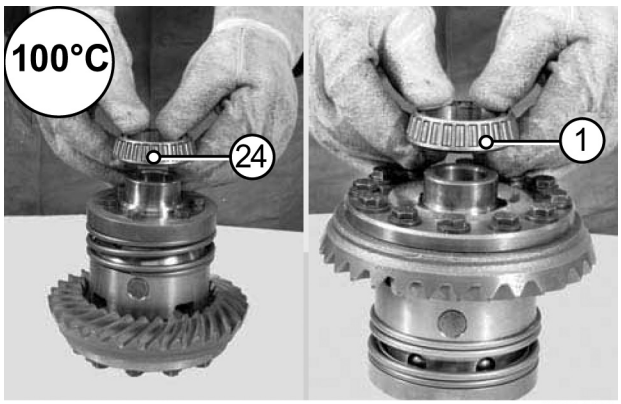
12. Grease and insert balls (**3**).
13. Install the cover (**18**) of the blocking side.

MAP16960

14. Load the spring and the coupling and insert screws.

MAP16970

15. Tighten to torque wrench setting of 26.2 Nm (19 ft.lb.).

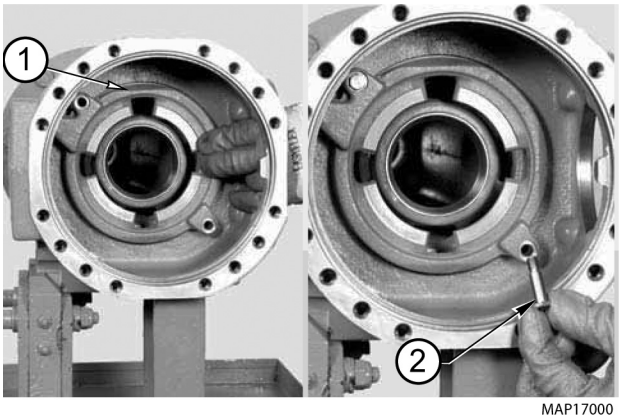


MAP16980

16. Heat up the roller bearings to 100° C and insert onto the differential.

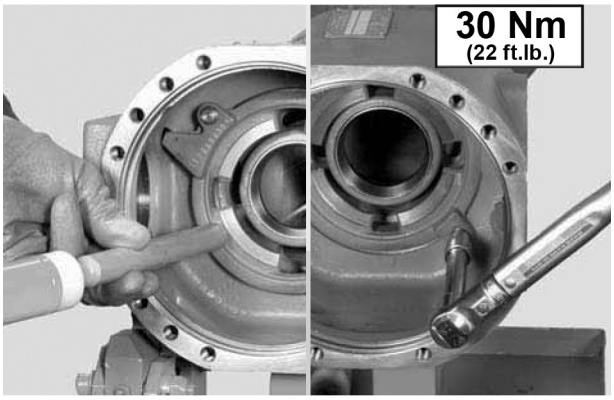
MAP16990

17. Press on the roller bearing.



MAP17000

18. Place the piston (**1**) in position inside the box and tighten screw (**2**) partially. Pay attention to the correct position.

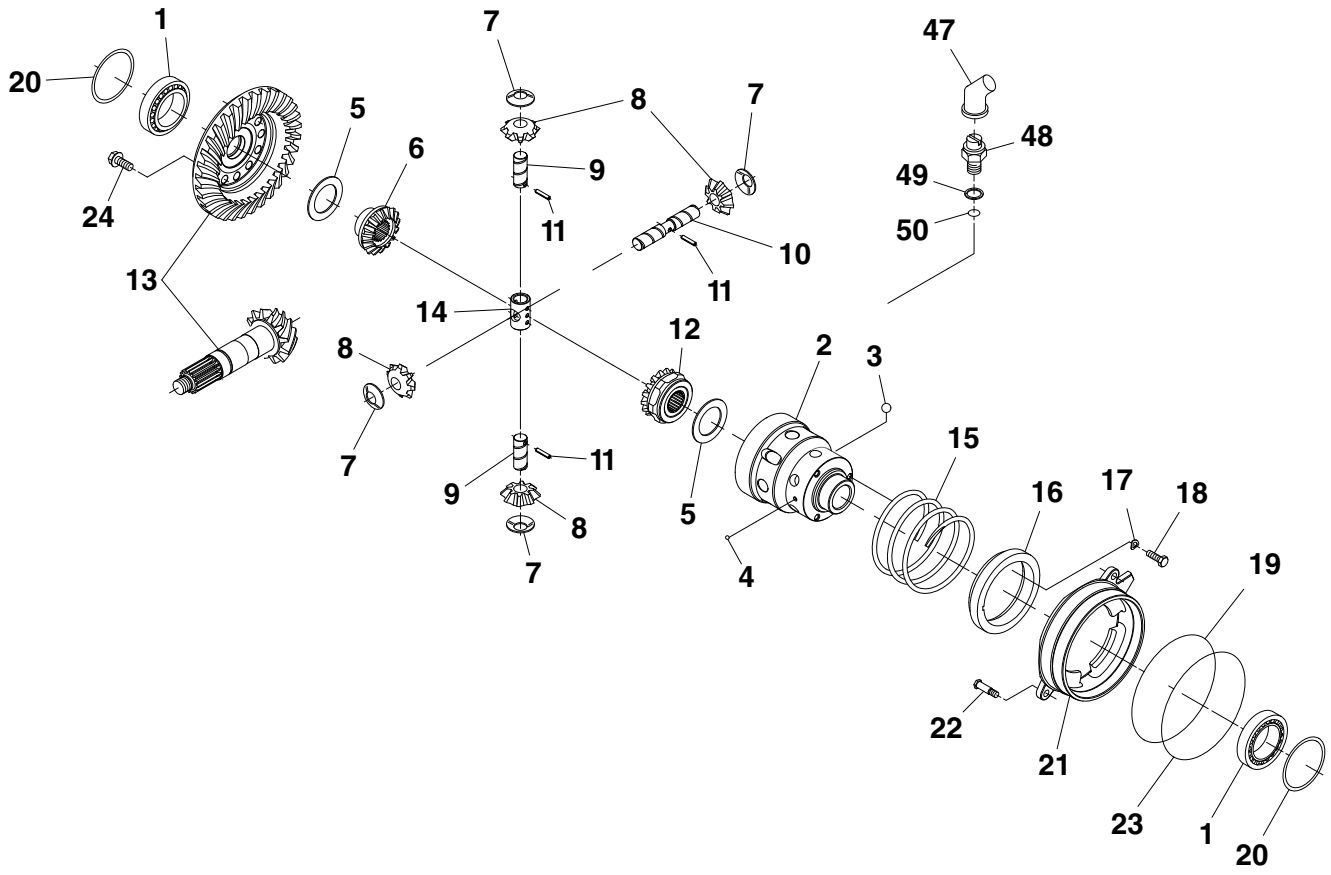


MAP17010

19. Hammering lightly on alterning points bring the piston to the end of stroke.
    Tighten with a torque wrench setting of 30 Nm (22 ft.lb.).

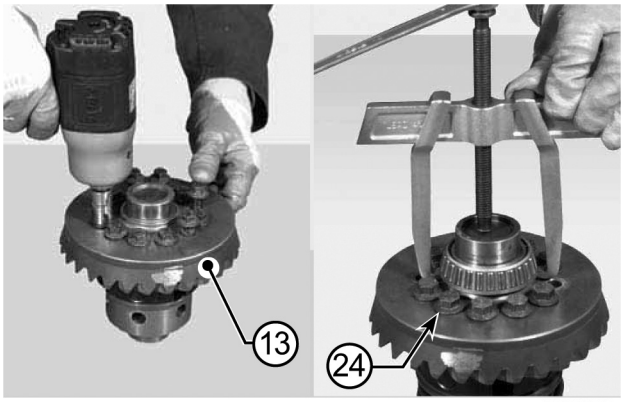
Section 19
Differential With Block to Spheres 100% (Last Version)

19.1 EXPLODED VIEW



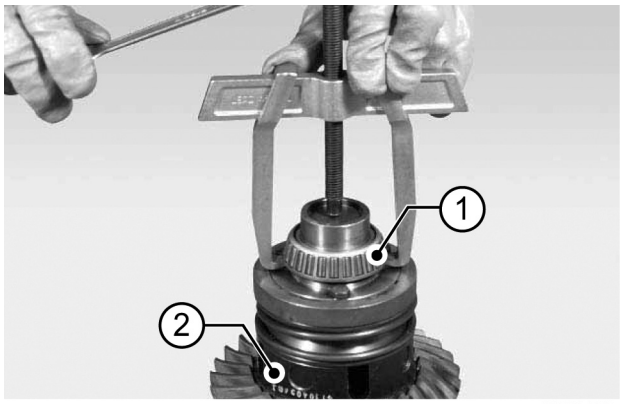
MAP17020

19.2 DIFFERENTIAL WITH BLOCK TO SPHERES 100% (LAST VERSION)- DISASSEMBLY



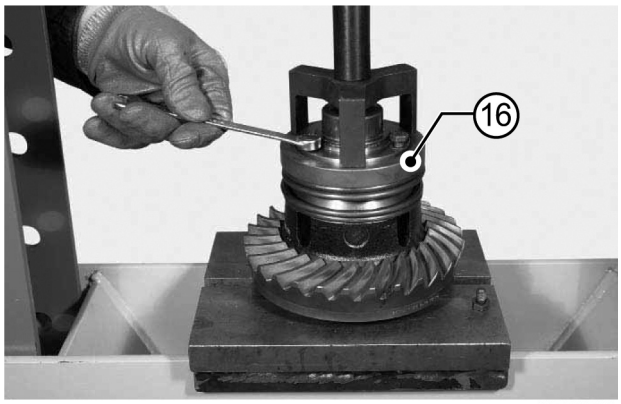
MAP17030

1. If the bearing has to be replaced, remove two retaining screws (**24**) from the crown and, using an extractor, remove the crown bearing (**1**).



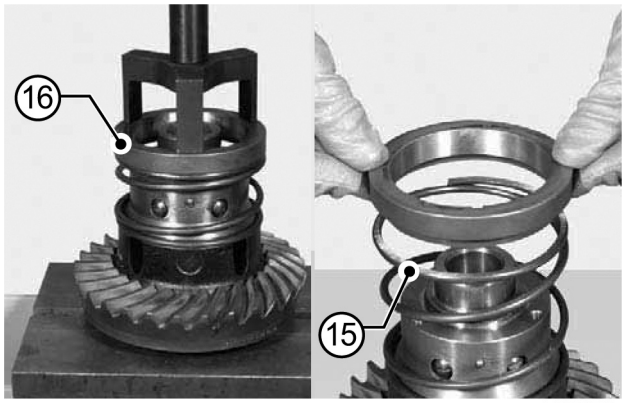
MAP17040

2. If the bearing needs replacing, extract the bearing (**1**) from the differential carrier (**2**).



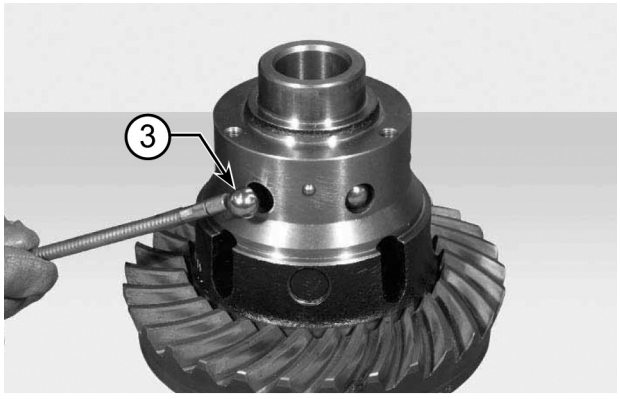
MAP17050

3. Remove 3 cap screws (**18**) of the coupling (**16**) of the cover.
4. Verify for the position of the slot that fits the coupling (**16**) to the fixing ball (**4**).



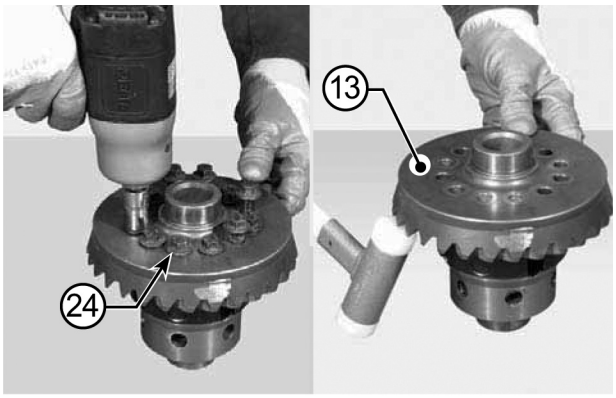
MAP17060

5. Pull off the coupling (**16**) and the spring (**15**).



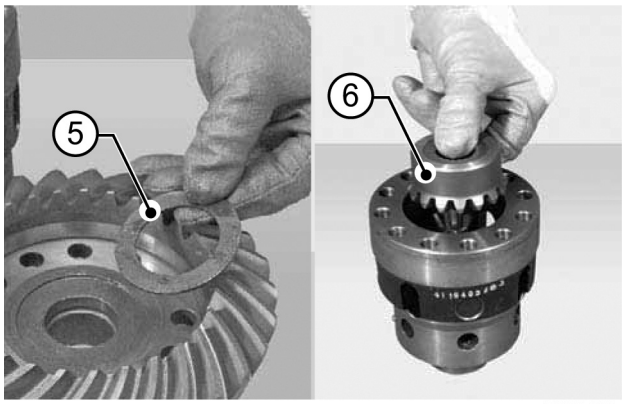
MAP17070

6. Remove the blocking balls (**3**).



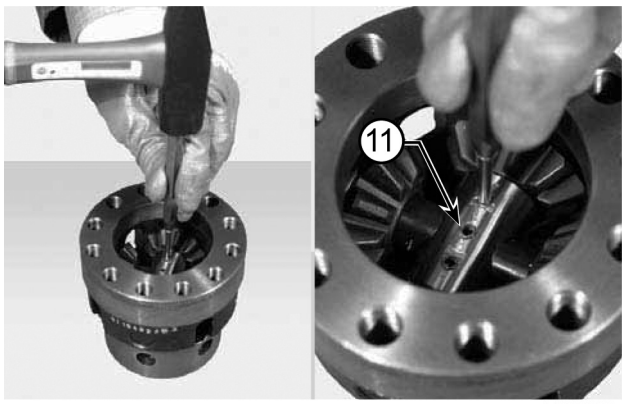
MAP17080

7. Remove cap screws (**24**) of the ring gear (**13**); replace each time when removed.
8. Extract the ring gear (**13**).



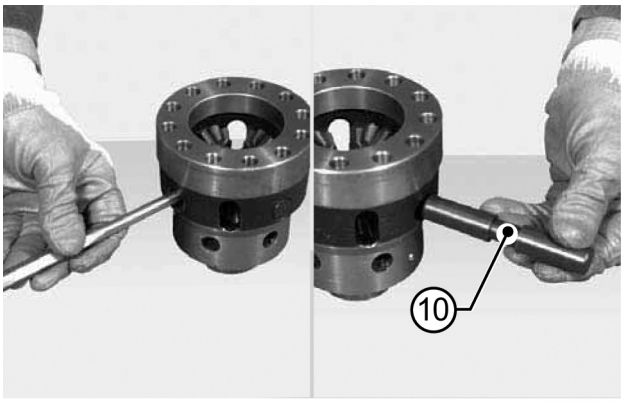
MAP17090

9. Remove the shim washer (**5**) and the planetary gear (**6**).



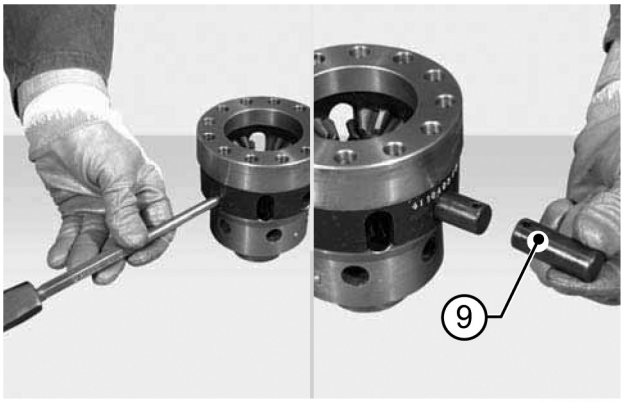
MAP17100

10. Remove the three spider blocking pins (**11**) by using a pin driver. Move the two opposite mounted short bolts (**9**) to the outside of the box using the same pin driver.



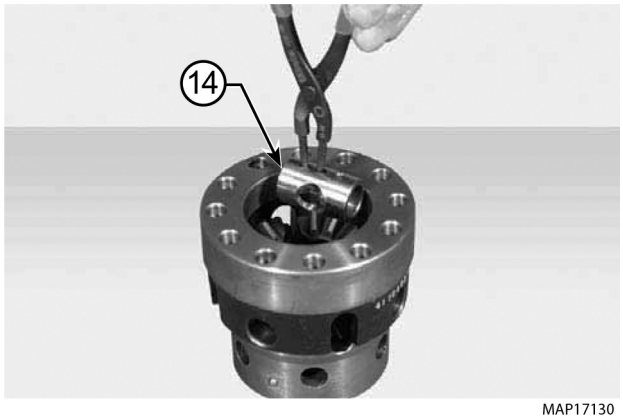
MAP17110

11. Remove the bolts (**10**) with the help of a drift.



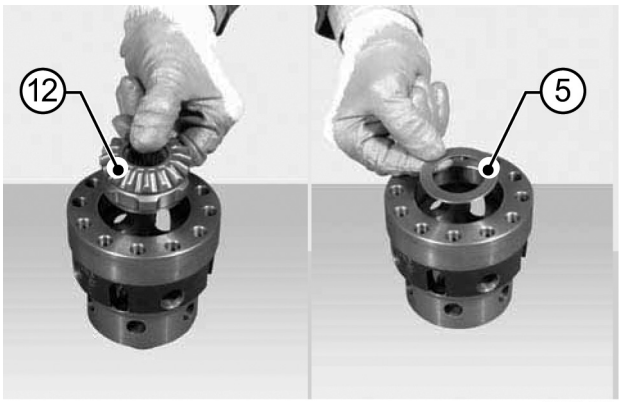
MAP17120

12. Remove the two half bolts (**9**), spherical washers (**7**), and satellite gears (**8**).



MAP17130

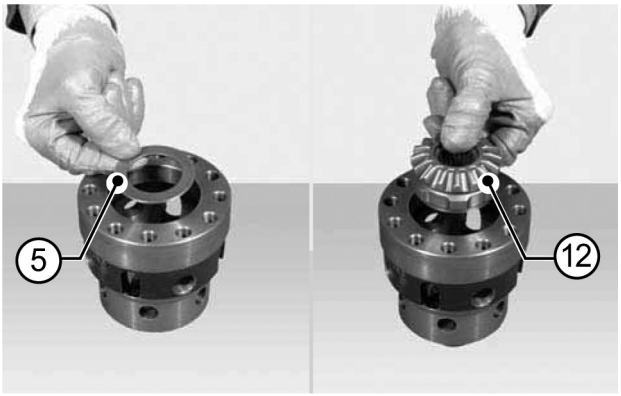
13. Remove the cross bolts (**14**).



MAP17140

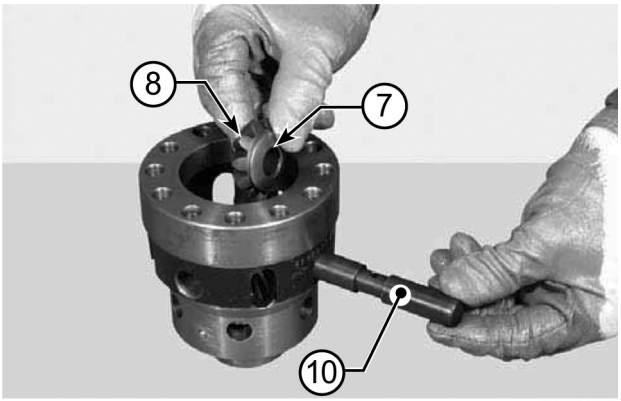
14. Remove the planetary gear (**12**).
15. Remove the shim washer (**5**).

19.3 DIFFERENTIAL WITH BLOCK TO SPHERES 100% (LAST VERSION)- ASSEMBLY



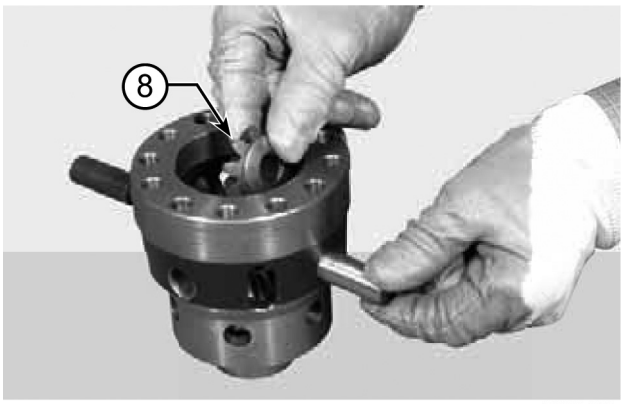
MAP17150

1. Lubricate and insert washer (**5**) and planetary gear (**12**).



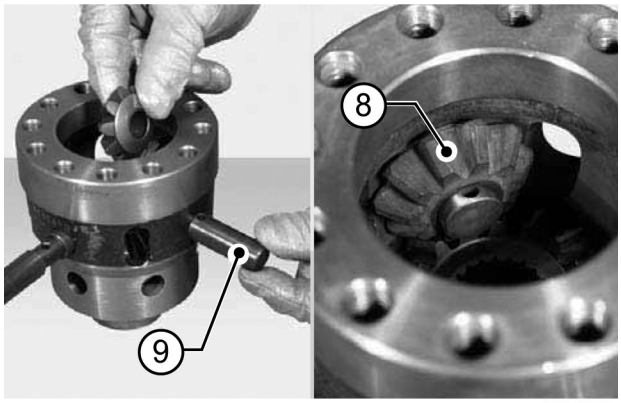
MAP17160

2. Partially insert the long bolt (**10**), satellite gears (**8**) and spherical washers (**7**).



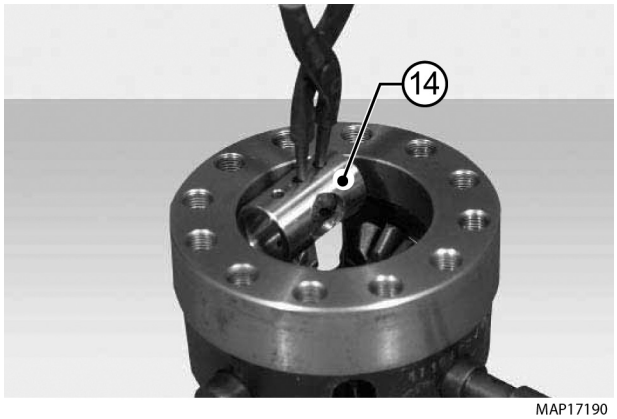
MAP17170

3. Place the satellite gear (**8**) and the spherical washer (**7**) in the box and fix with a fake pin of suitable diameter.



MAP17180

4. Insert the two half bolts (**9**), spherical washers (**7**) and satellite gears (**8**).

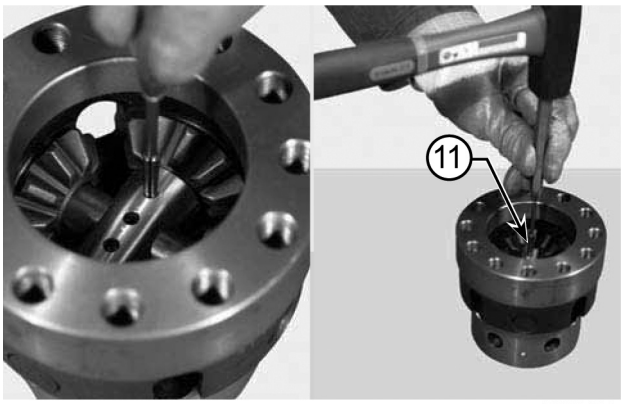


MAP17190

5. Insert the cross bolt (**14**) in the correct position.

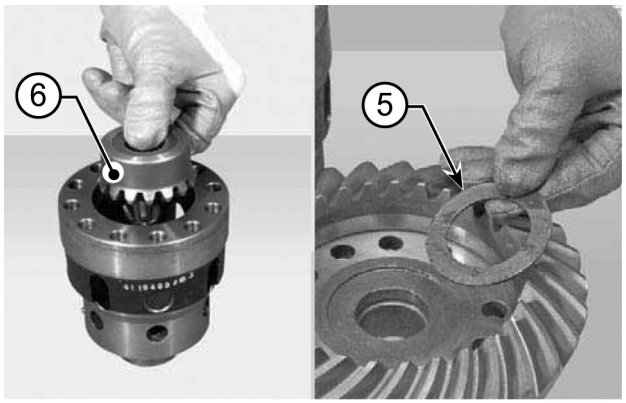
MAP17200

6. Satellite gears (**8**), spherical washers (**7**) and completely insert the long bolt (**10**).



MAP17210

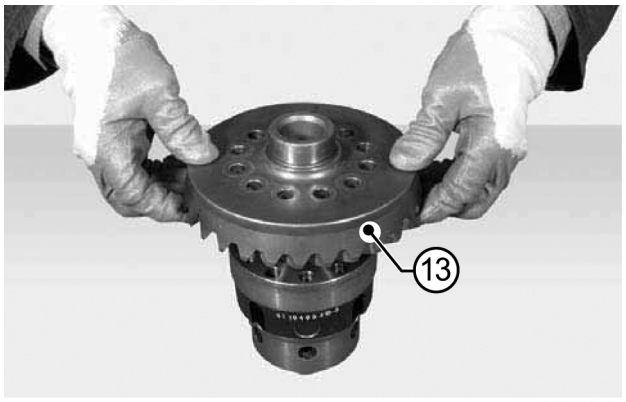
7. Bring the pin holes in line with the help of a pin-driver. Insert pins (**11**) to end of stroke.



MAP17220

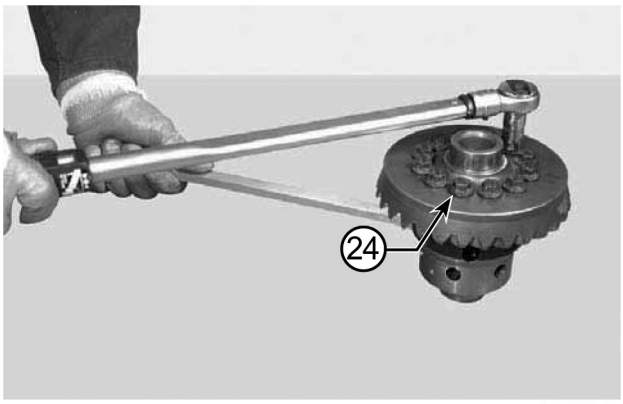
8. Insert planetary gear wheel (**6**).
9. Position the shim washer (**5**) on the crown (**13**).

Note: *In order to hold the shim washer (5) in position, apply grease to it.*



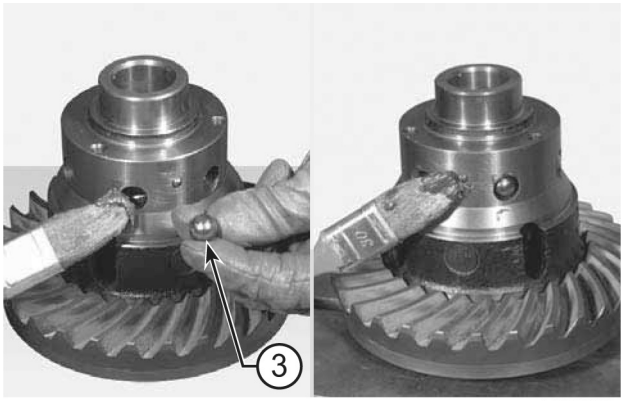
MAP17230

10. Install the ring gear (**13**).



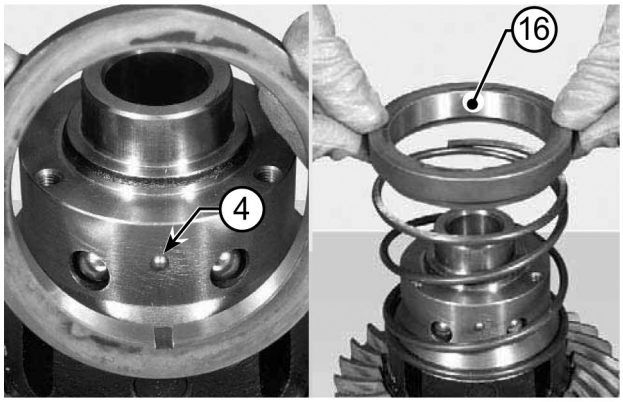
MAP17240

11. Tighten the cap screws of the ring gear using the criss-cross method.
    Torque wrench setting: 78 - 86 Nm (58-63 ft.lb.).



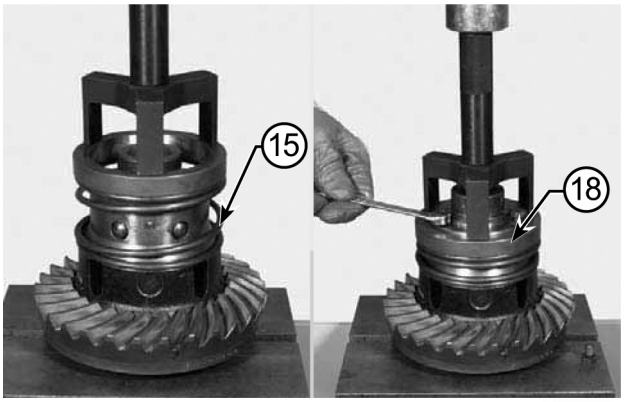
MAP17250

12. Grease and insert balls (**3**).



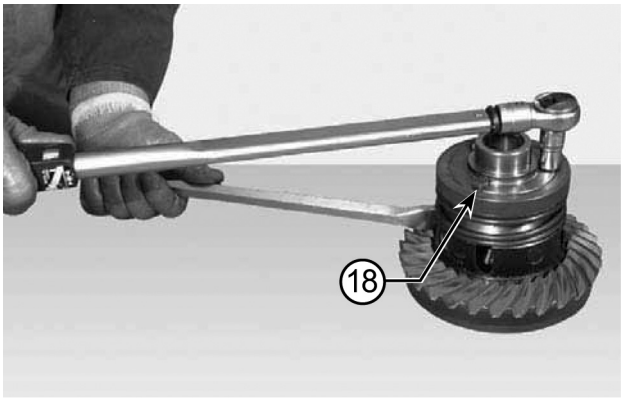
MAP17260

13. Verify the position of the slot that fits the coupling (**16**) to the fixing ball (**4**).



MAP17270

14. Place the differential carrier under a press.
15. Load the spring (**15**) and the coupling (**16**) and insert screws (**18**).

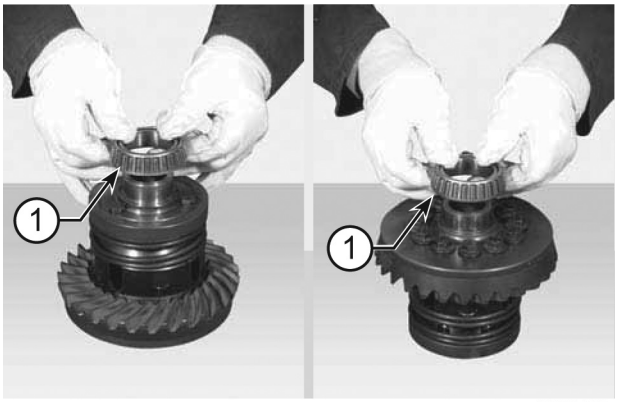


MAP17280

16. Mount the ring gear (**13**) and fasten it to the differential box with screws (**24**).

CAUTION

Use only new screws pre-treated with locking adhesive

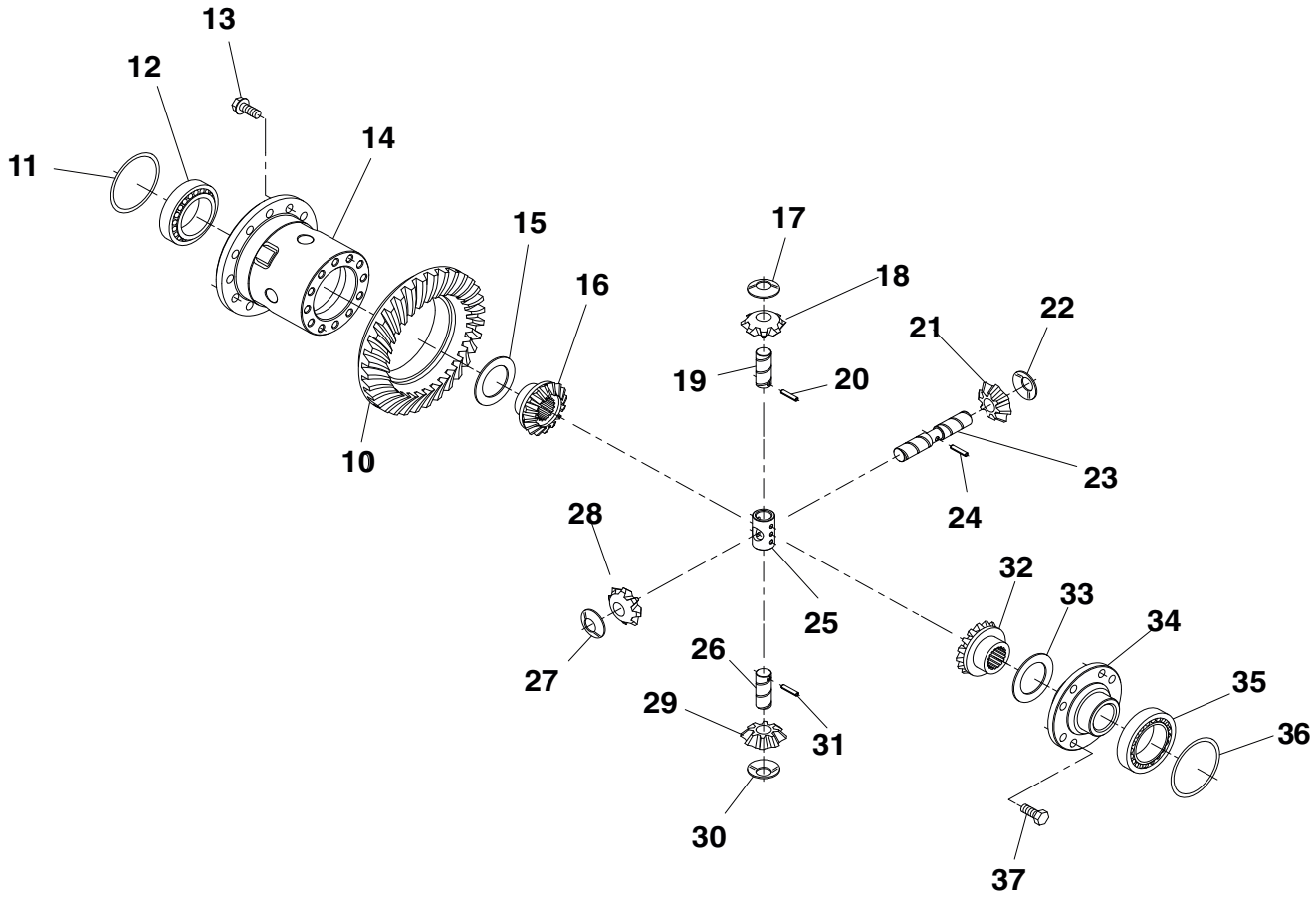


MAP17290

17. Heat the bearings (**1**) at 100° and insert them on the differential.

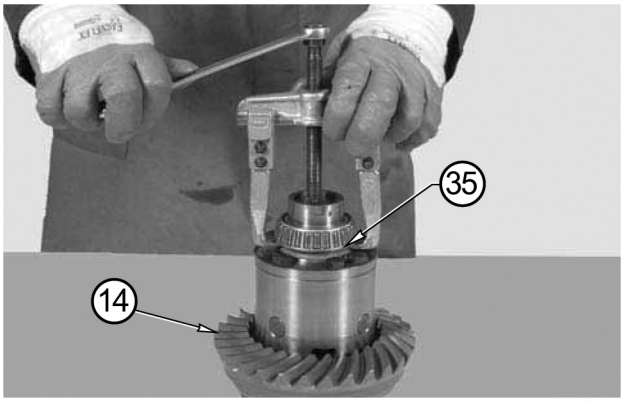
Section 20
Normal Differential (Old Version)

20.1 EXPLODED VIEW



MAP17300

20.2 NORMAL DIFFERENTIAL (OLD VERSION) - DISASSEMBLY

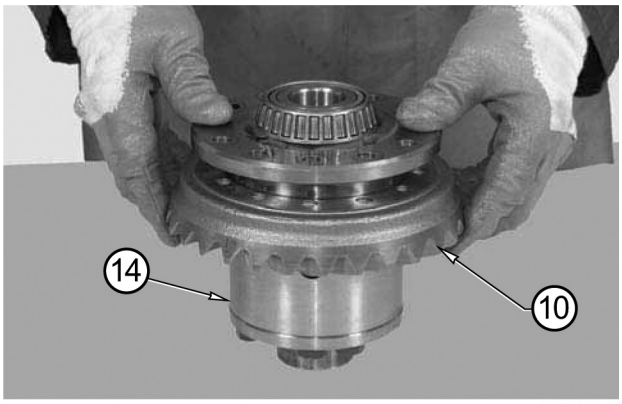


MAP17310

1. Extract the bearing (**35**) from the differential carrier (**14**).

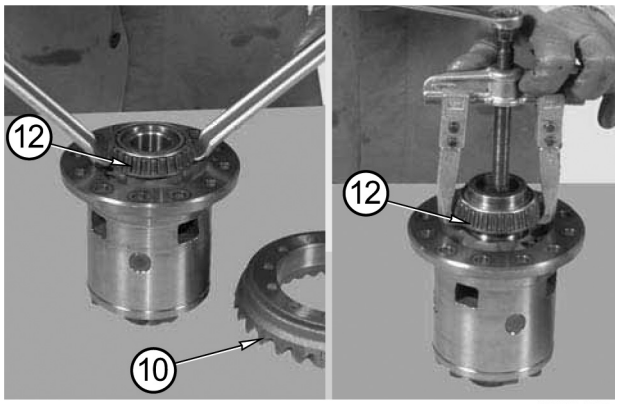
MAP17320

2. Remove the ring gear cap screws (**13**).



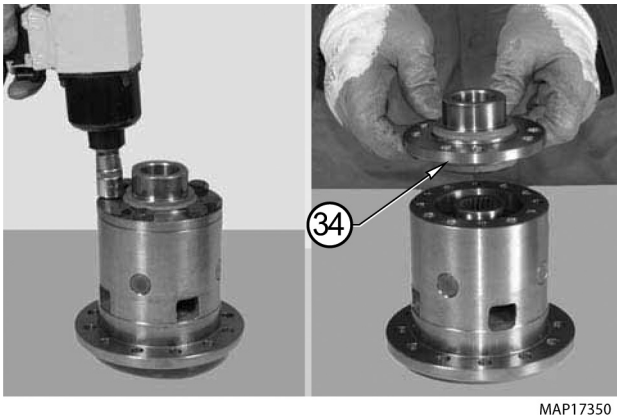
MAP17330

3. Separate the ring gear (**10**) from the differential box (**14**).



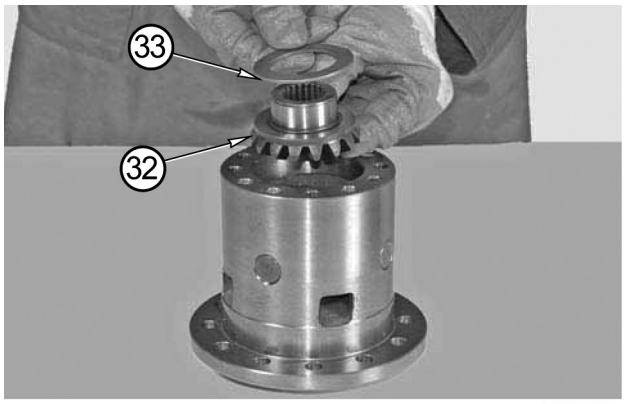
MAP17340

4. Extract the bearing (**12**) partially and using a puller, remove the bearing (**12**) of the ring gear side (**10**).



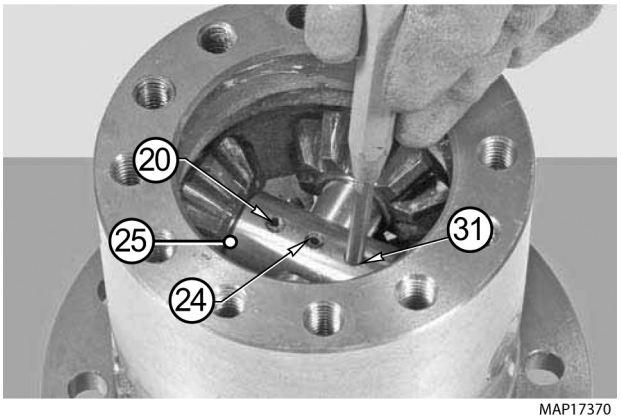
MAP17350

5. Remove the cover (**34**) from the blocking side of the differential unit.



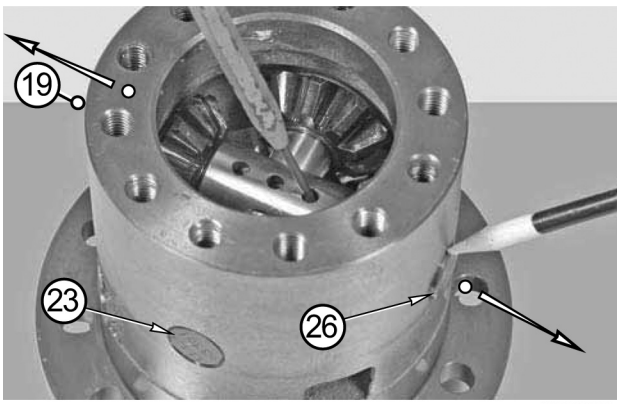
MAP17360

6. Remove the shim washer (**33**) and the planetary gear (**32**).



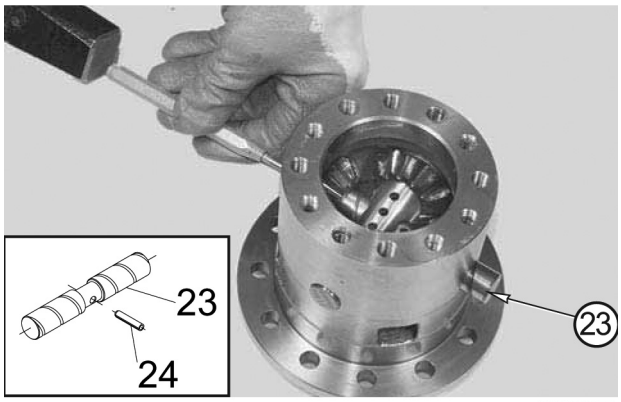
MAP17370

7. Remove the fixing pins (**20**), (**24**) and (**31**) of the differential cross bolts (**25**).



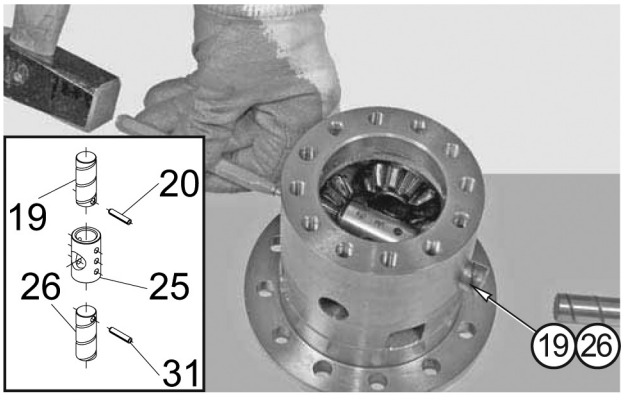
MAP17380

8. With a pin driver push the two bolts (**19**) and (**26**) to the outside.



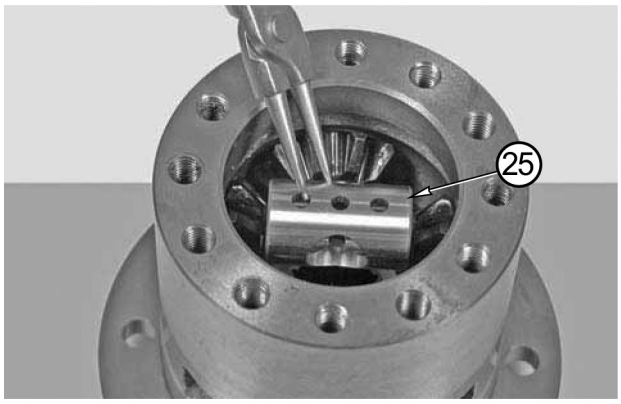
MAP17390

9. Remove the bolts with the help of a drift (**23**).



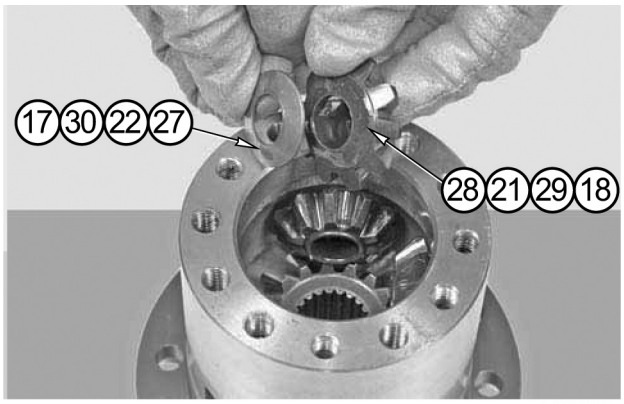
MAP17400

10. Remove the two halves of the cross bolts (**19**) and (**26**) with the help of a drift.



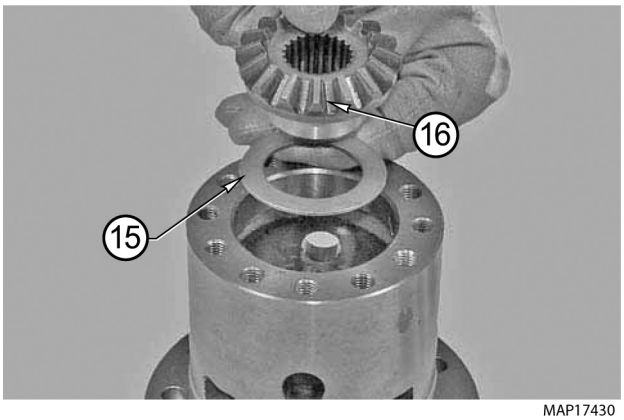
MAP17410

11. Remove the cross bolts (**25**).



MAP17420

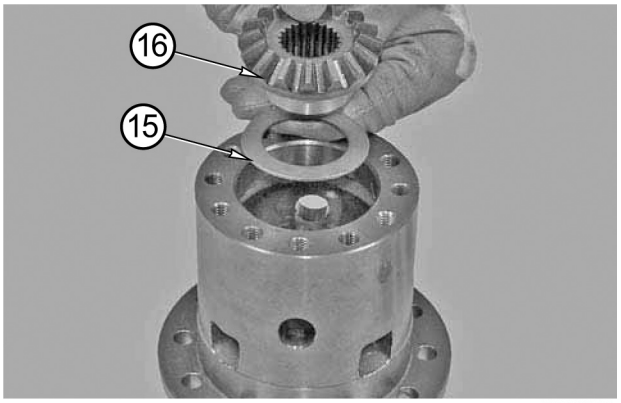
12. Remove the gear wheels (**28**), (**21**), (**29**) and (**18**) and the spherical washers (**17**), (**30**), (**22**) and (**27**).



MAP17430

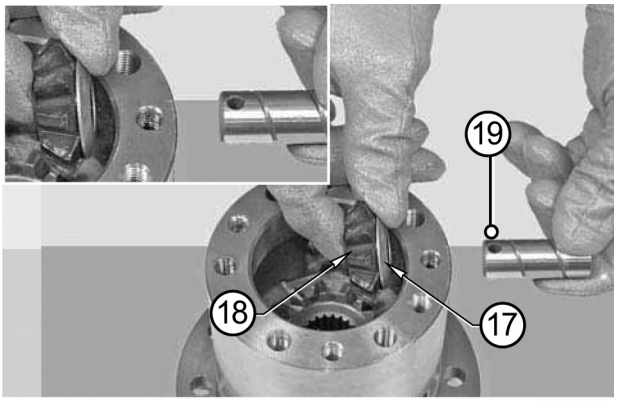
13. Remove the shim washer (**15**) and the planetary gear (**16**).

20.3 NORMAL DIFFERENTIAL (OLD VERSION) - ASSEMBLY



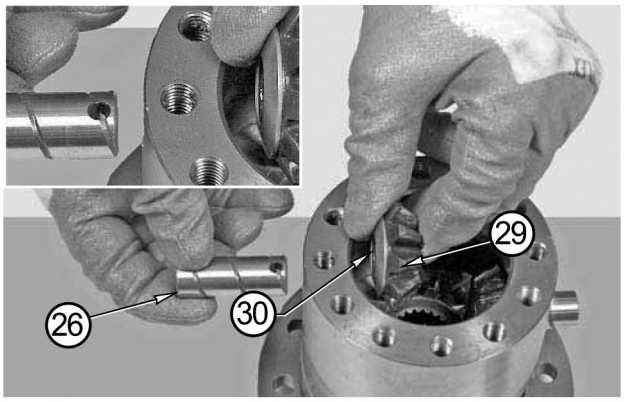
MAP17440

1. Insert the washer (**15**) and the planetary gear (**16**) on the ring gear side.



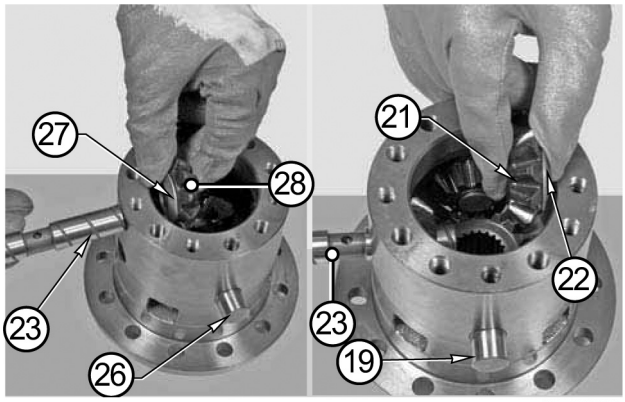
MAP17450

2. Insert the satellite gear (**18**) with the spherical washer (**17**) and the bolt (**19**) to keep them in position.



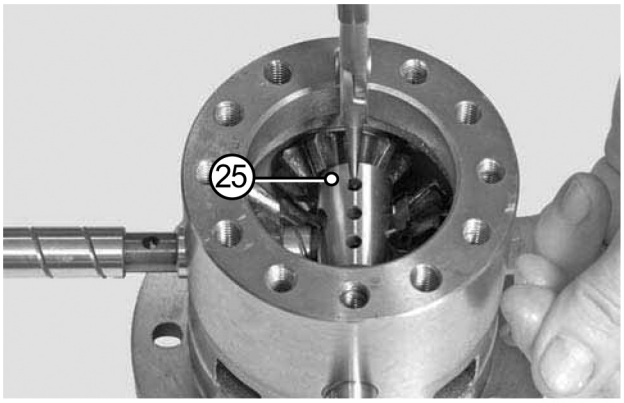
MAP17460

3. Insert the satellite gear (**29**) with the spherical washer (**30**) and the bolt (**26**) to keep them in position.



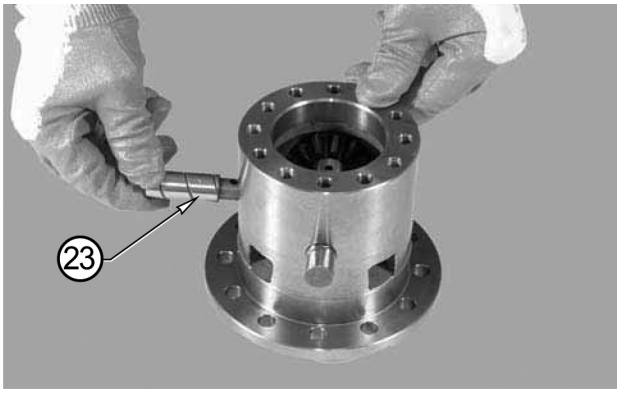
MAP17470

4. Insert the satellite gears (**28**) and (**21**) with the spherical washers (**27**) and (**22**) and the bolt (**26**) and (**19**).



MAP17480

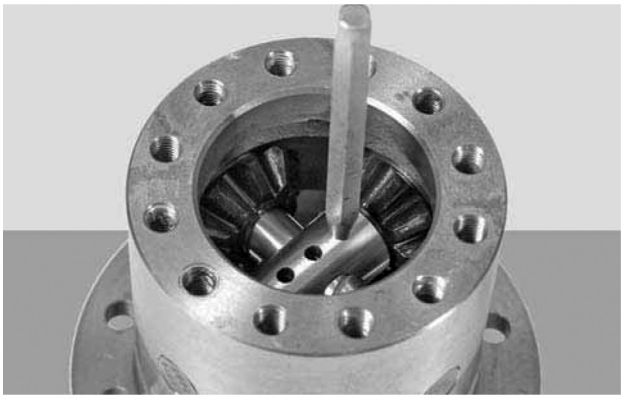
5. Insert the cross bolt (**25**) in the correct position.



MAP17490

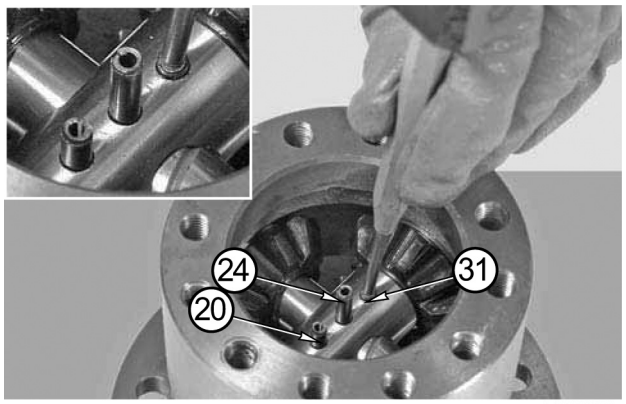
6. Insert the bolts in their position.

.



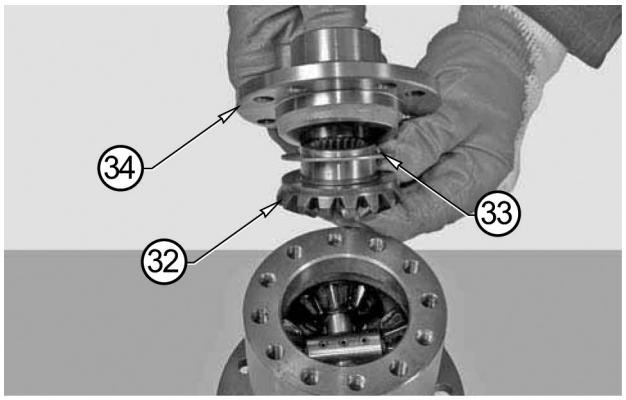
MAP17500

7. Bring the pin holes in line with the help of a pin driver.



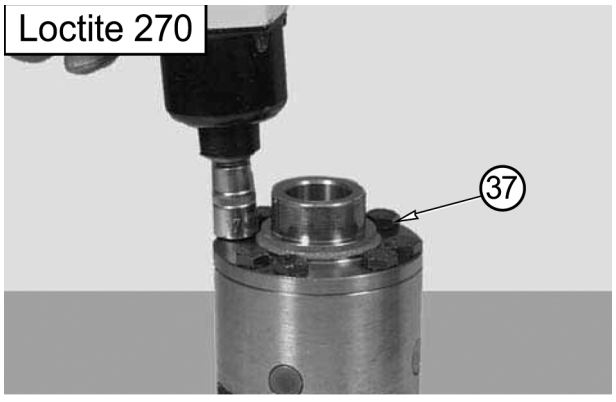
MAP17510

8. Insert pins (**20**), (**24**) and (**31**) to end of stroke.



MAP17520

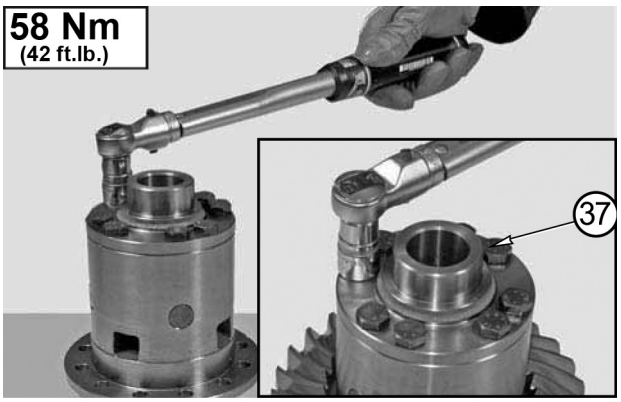
9. Insert planetary gear (**32**) together with washer (**33**).



MAP17530

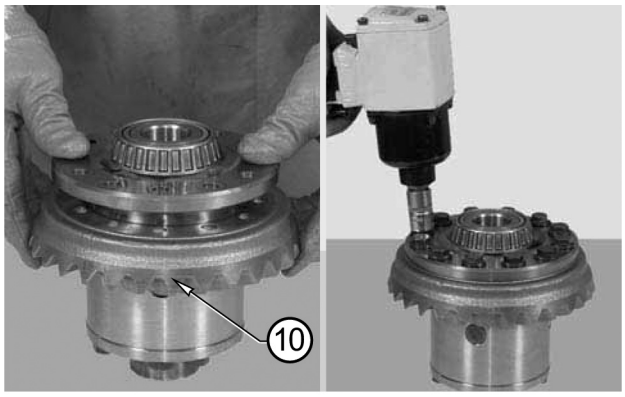
10. Coat the nuts (**37**) with Loctite **270** and tighten.

.



MAP17540

11. Torque wrench setting: 58 Nm (42 ft.lb.).

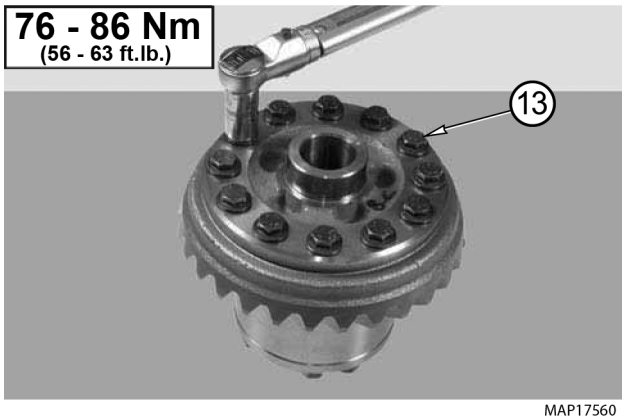


MAP17550

12. Install the ring gear (**10**).
13. Tighten the cap screws (**13**).

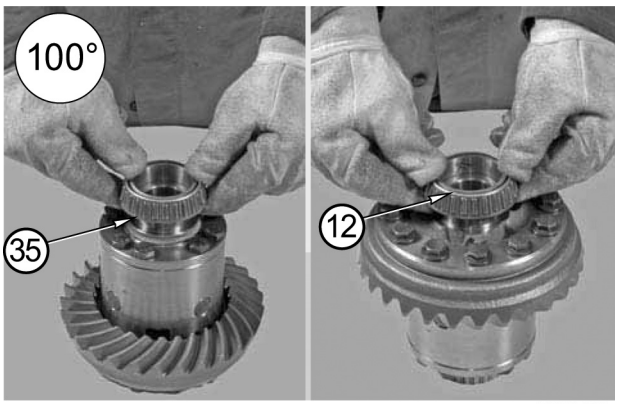
Note: *Use LOCTITE 270 on screws not treated with DRILOC.*

.



MAP17560

14. Tighten the screws of the ring gear using the criss-cross method 76-86 N-m (56-63 ft.lb.)



MAP17570

15. Heat up the roll bearings (**12**) and (**35**) to 100°C and insert it onto the differential.

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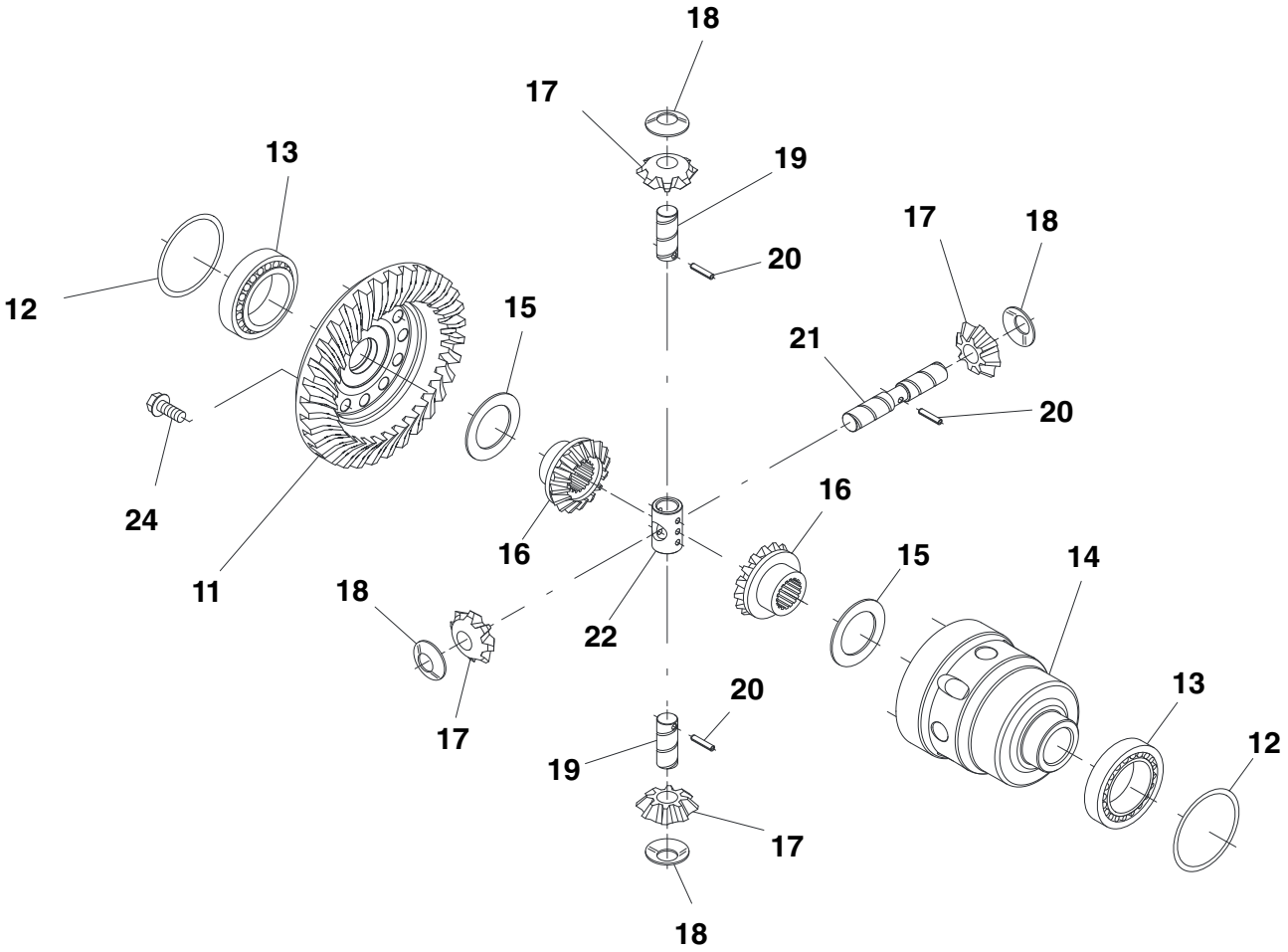
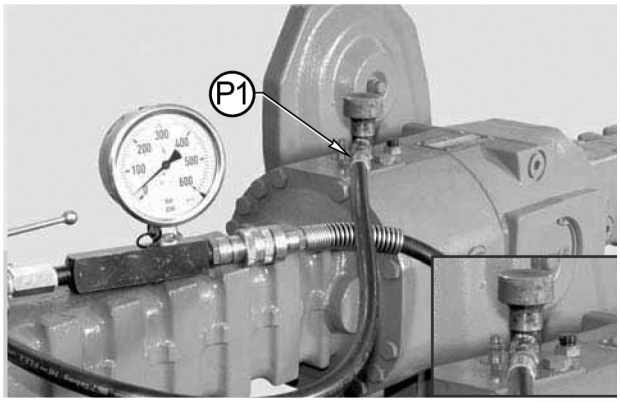
Section 21
Normal Differential (Last Version)

21.1 EXPLODED VIEW



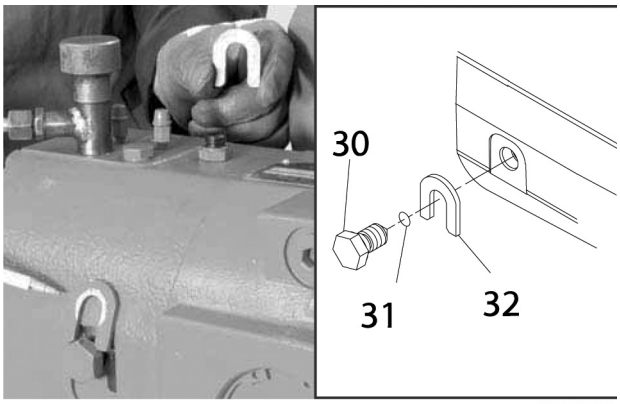
MAP17580

21.2 NORMAL DIFFERENTIAL (LAST VERSION) - DISASSEMBLY



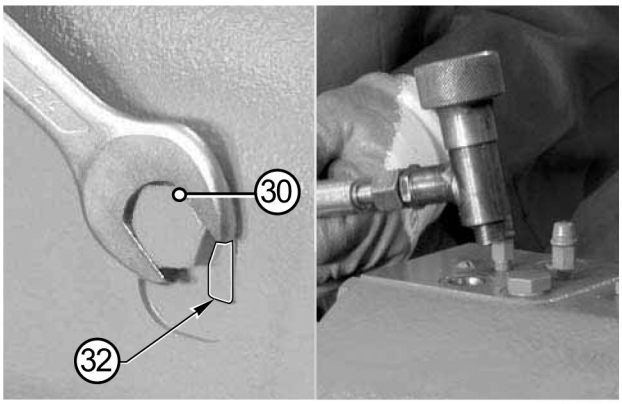
MAP17590

1. Connect an external pump to the union piece “P1“ of the negative brake and introduce a pressure of 15 ± 30 bar to eliminate the pressure of the Belleville washers.



MAP17600

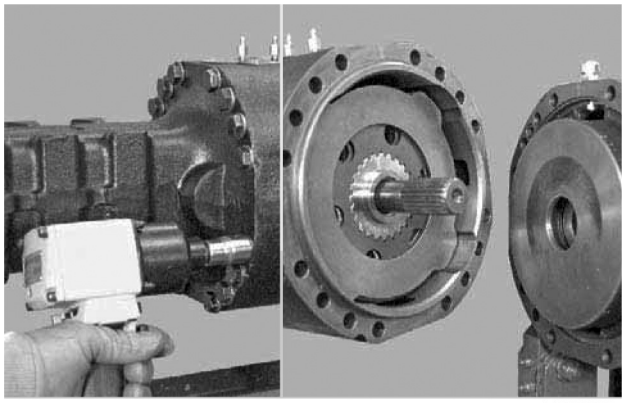
2. Loosen the unlocking screws (**30**) and remove both U-shaped spacers (**32**).



MAP17610

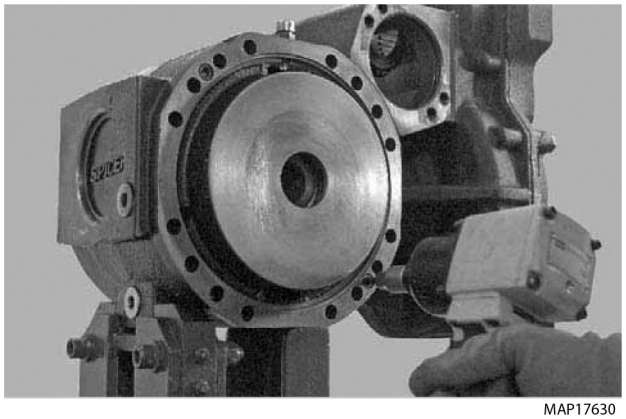
3. Insert block screws to end stroke and release pressure.

.



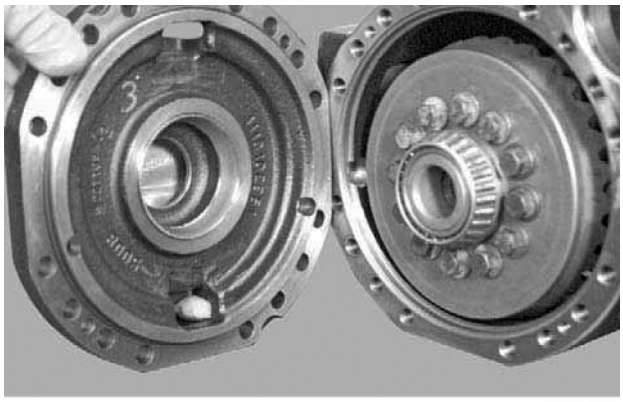
MAP17620

4. Remove the brake side arm and the brake discs pack.
5. Sling the arm to be removed and connect it to a hoist. Remove screws of the ring gear side arm.
6. Remove the arm together with the pack of the braking disks. Place the arm on a bench.



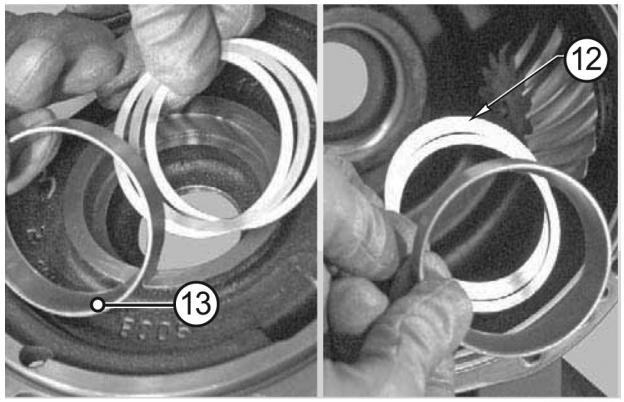
MAP17630

7. Remove the screws from the middle cover.



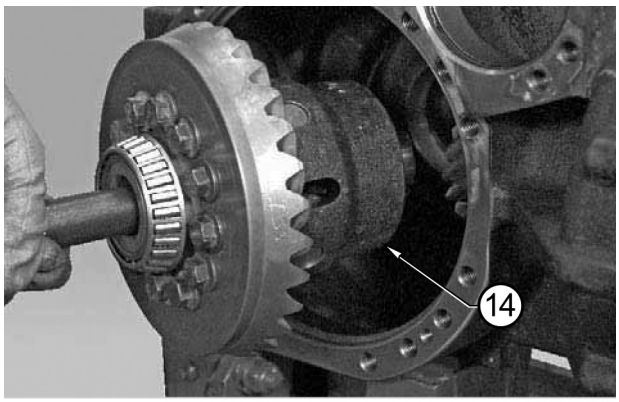
MAP17640

8. Insert a screwdriver in the opposing slots then force and remove the middle cover.



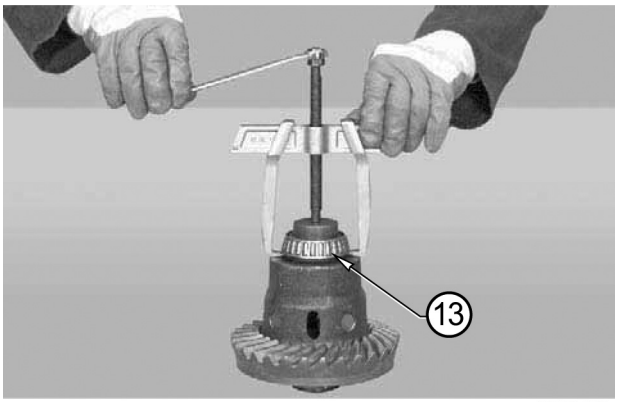
MAP17650

9. If the bearings need replacing (**13**), extract the external thrust blocks of the bearings (**13**) from middle cover and central body.



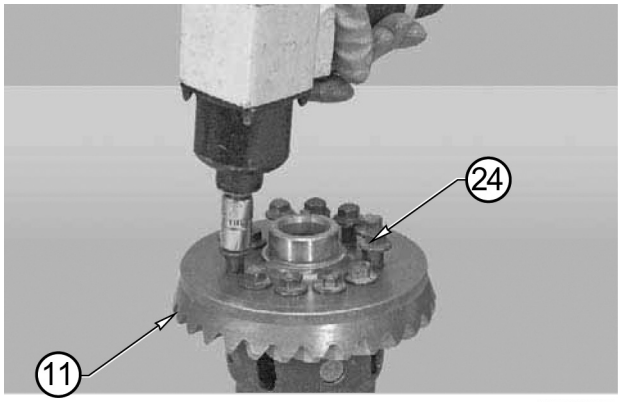
MAP17660

10. Pull out the differential (**14**).



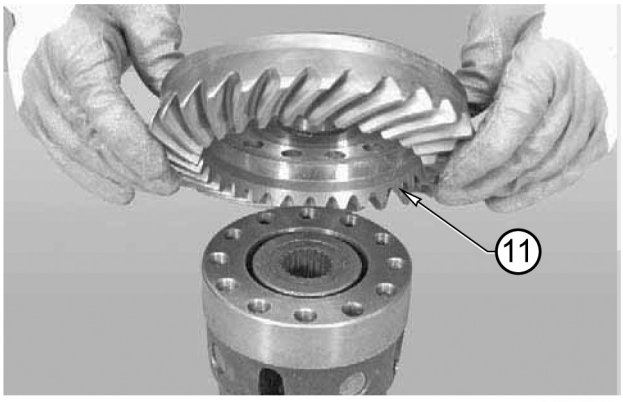
MAP17670

11. If the bearing needs replacing, extract the bearing (**13**) from the differential carrier.



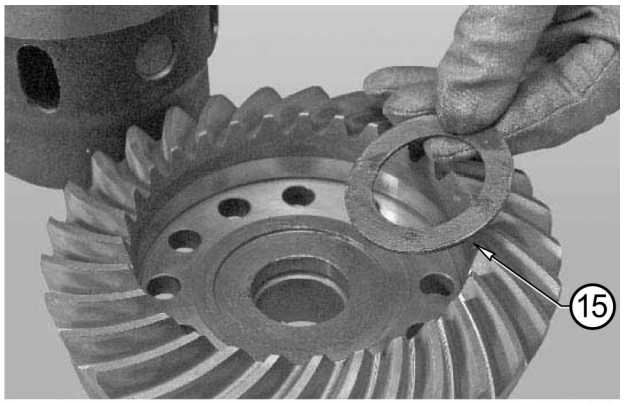
MAP17680

12. Remove cap screws (**24**) of the ring gear (**11**); exchange each time when removed. with the help of a drift.



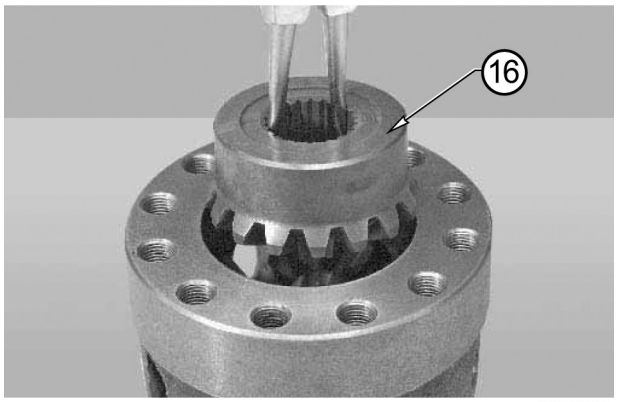
MAP17690

13. Extract the ring gear (**11**).



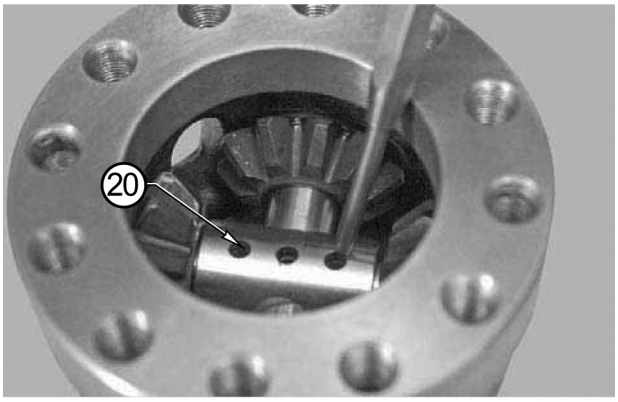
MAP17700

14. Remove the shim washer (**15**).



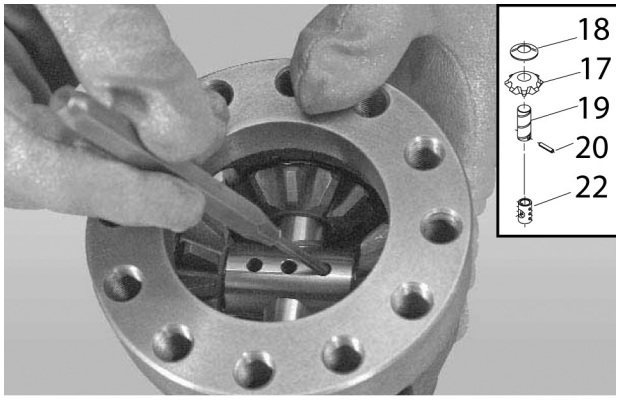
MAP17860

15. Remove the planetary gear (**16**).



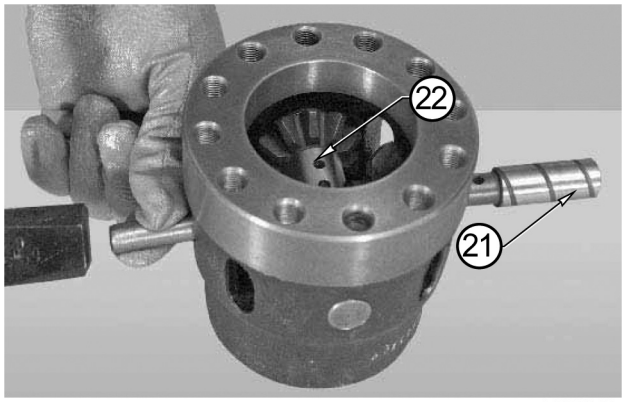
MAP17710

16. Remove the three spider blocking pins (**20**) by using a pin driver



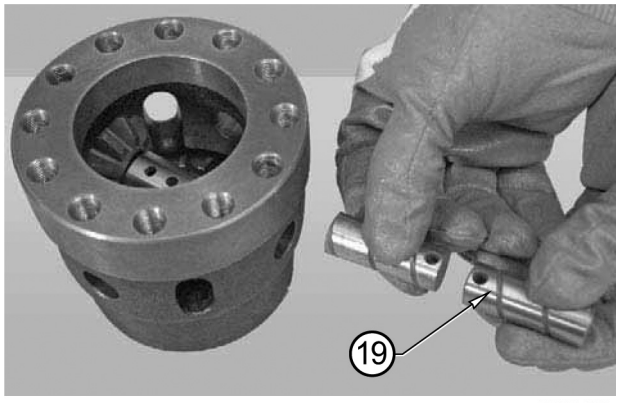
MAP17720

17. Move the two opposite mounted short bolts (**19**) to the outside of the box using the same pin driver.



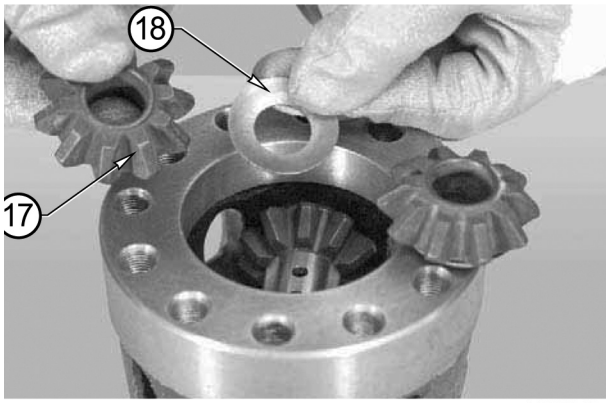
MAP17730

18. Drive out the long bolt (**21**) and pull out the spider (**22**) from the center.



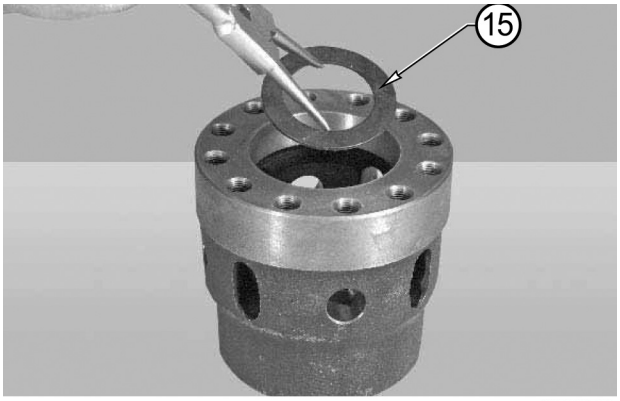
MAP17740

19. Remove the two half bolts (**19**), spherical washers and satellite gears.



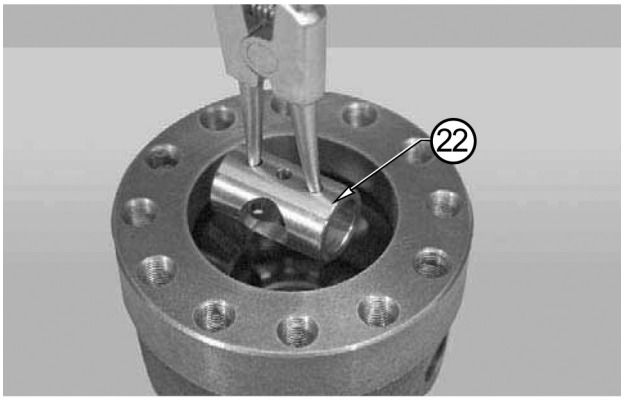
MAP17750

20. Remove long bolt, spherical washers (**18**) and satellite gears (**17**).



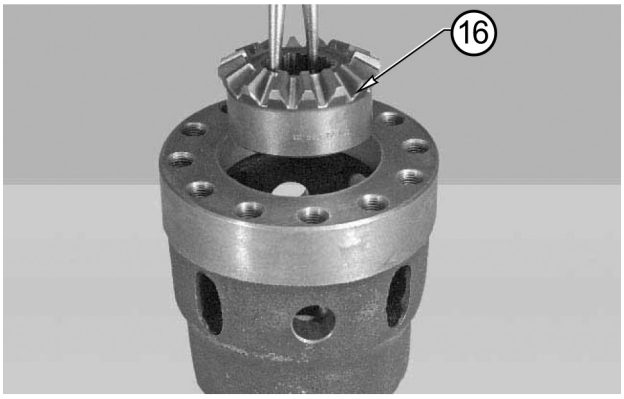
MAP17780

23. Remove the shim washer (**15**)



MAP17760

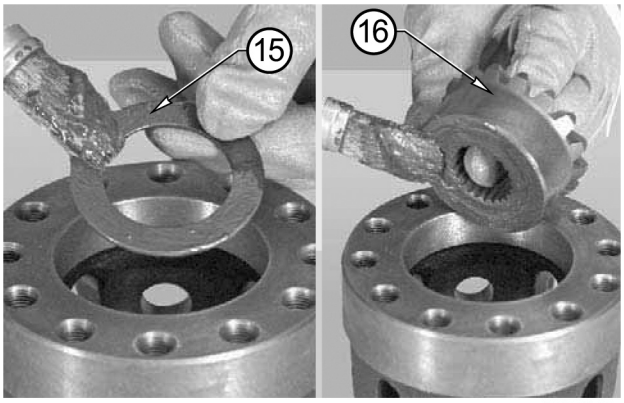
21. Remove the spider (**22**) from the center.



MAP17770

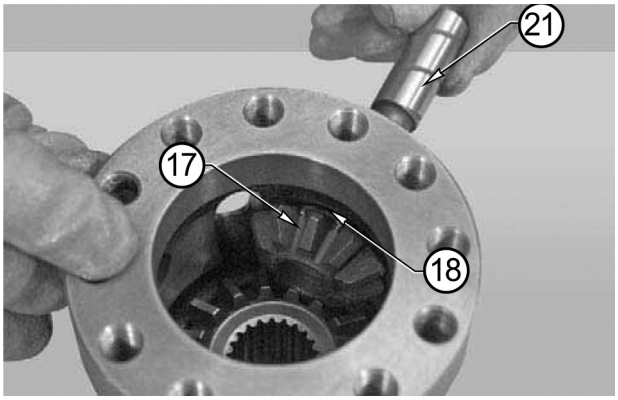
22. Remove the planetary gear (**16**).

21.3 NORMAL DIFFERENTIAL (LAST VERSION) - ASSEMBLY



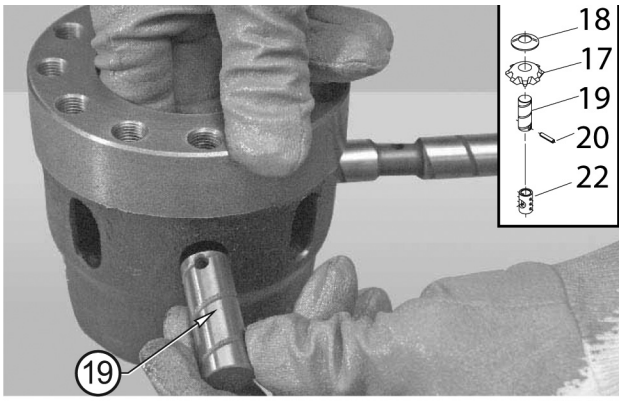
MAP17790

1. Lubricate and insert washer (**15**) and planetary gear (**16**).



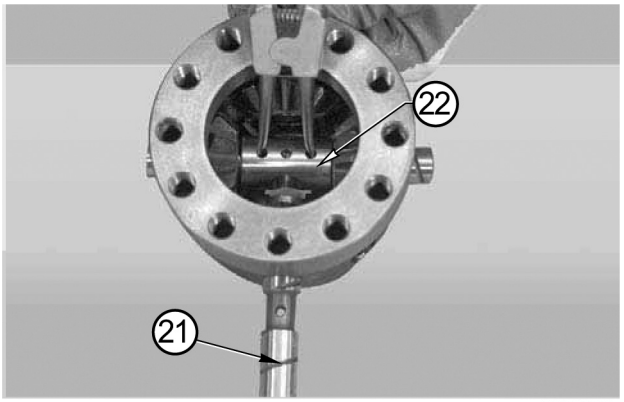
MAP17800

2. Partially insert the long bolt (**21**), satellite gears (**17**) and spherical washers (**21**).



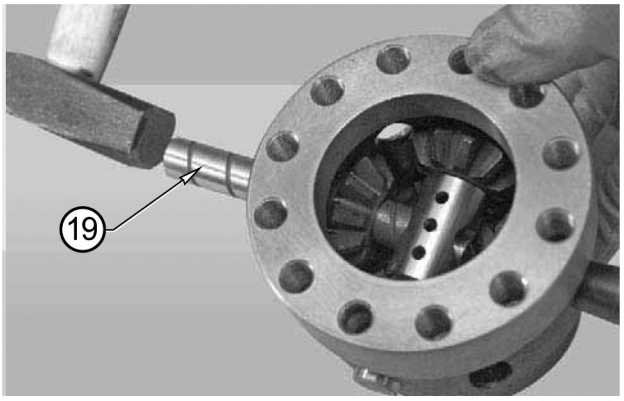
MAP17810

3. Insert the two half bolts (**19**), spherical washers (**18**) and satellite gears (**17**).



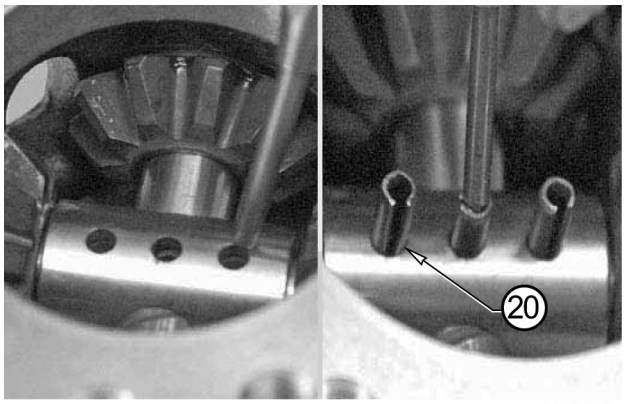
MAP17820

4. Insert spider (**22**) and completely insert the long bolt (**21**).



MAP17830

5. Insert completely the bolts (**19**).

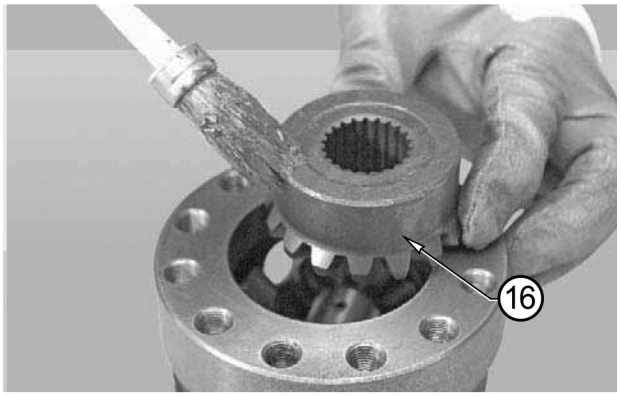


MAP17840

6. Center the pin holes and insert the 3V pins (**20**).

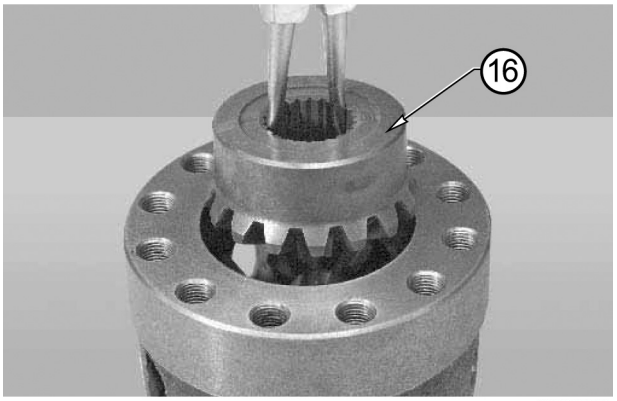
Note: *Check the free rotation of the satellite wheels on the bolts.*

.



MAP17850

7. Lubricate planetary gear (**16**).

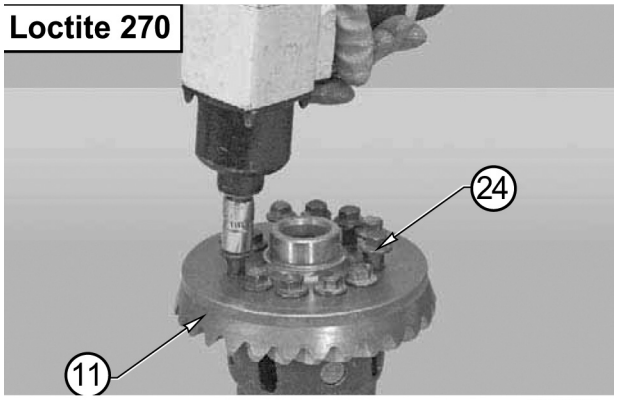


MAP17860

8. Insert planetary gear (**16**).

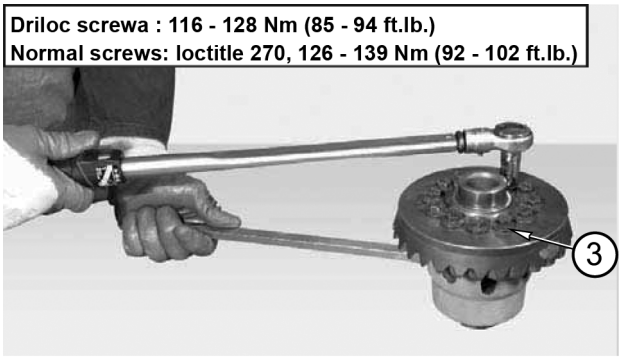
MAP17870

9. Position the shim (**15**) on the crown (**11**).



MAP20320

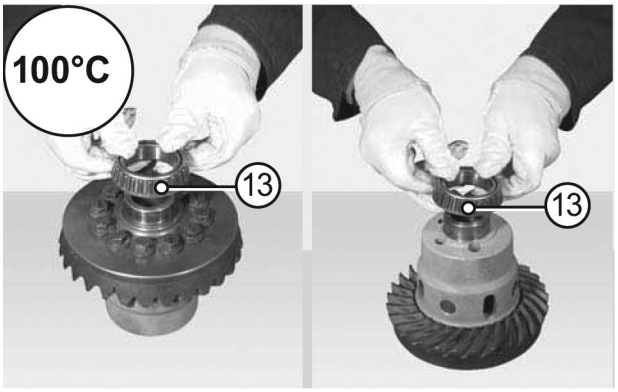
10. Position the crown (**11**) on the differential carrier and tighten cap screws (**24**) applied with Loctite 270.



MAP17880

11. Tighten screws with a torque wrench: see table

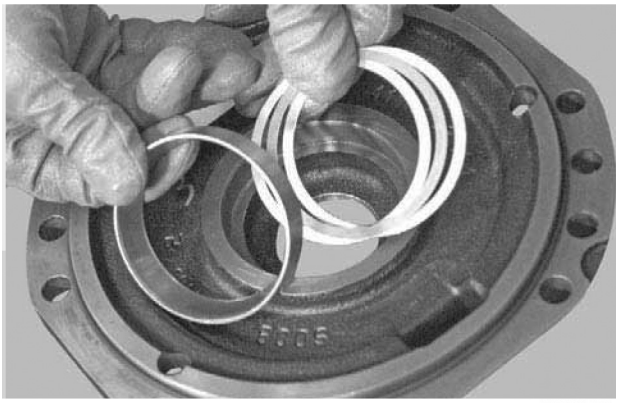
Note: *Always use new screws to attach the ring gear. In case the screws are not thread locking pretreated, use Loctite **270**.*



MAP17890

12. Assemble the bearing (**13**).

Note: *Heat the bearing to 100 °C before assembling.*



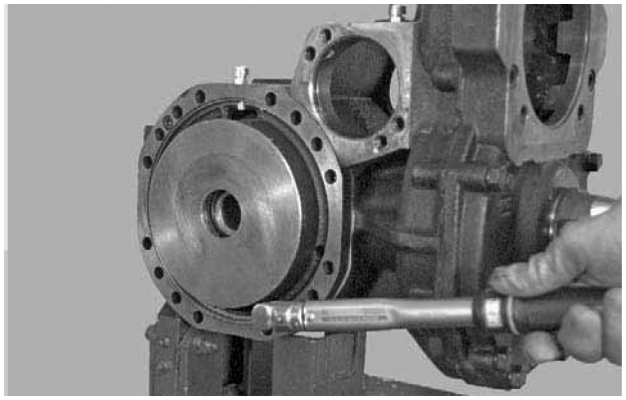
MAP17900

13. If the bearings are replaced, insert the external thrust blocks in the middle cover and in the central body.

MAP17910

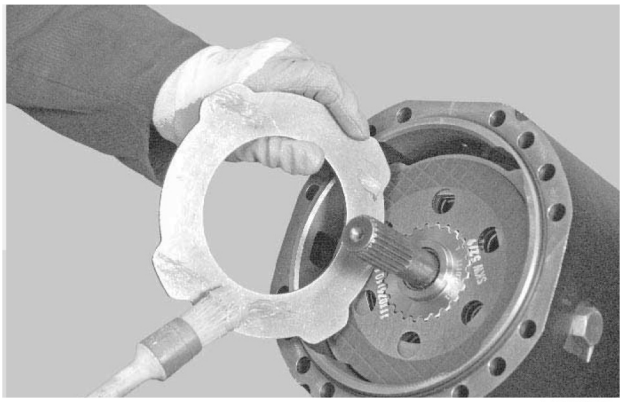
14. Position the differential unit in the central body with the help of a bar and fit the middle cover.

Note: *Thoroughly check the state of the o-ring and make sure that the cover is fitted with the oil discharge in the lower position.*



MAP17920

15. Lock the middle cover with screws. Torque wrench setting for screw: 24-26 Nm (17.5 - 19.3 ft.lb).

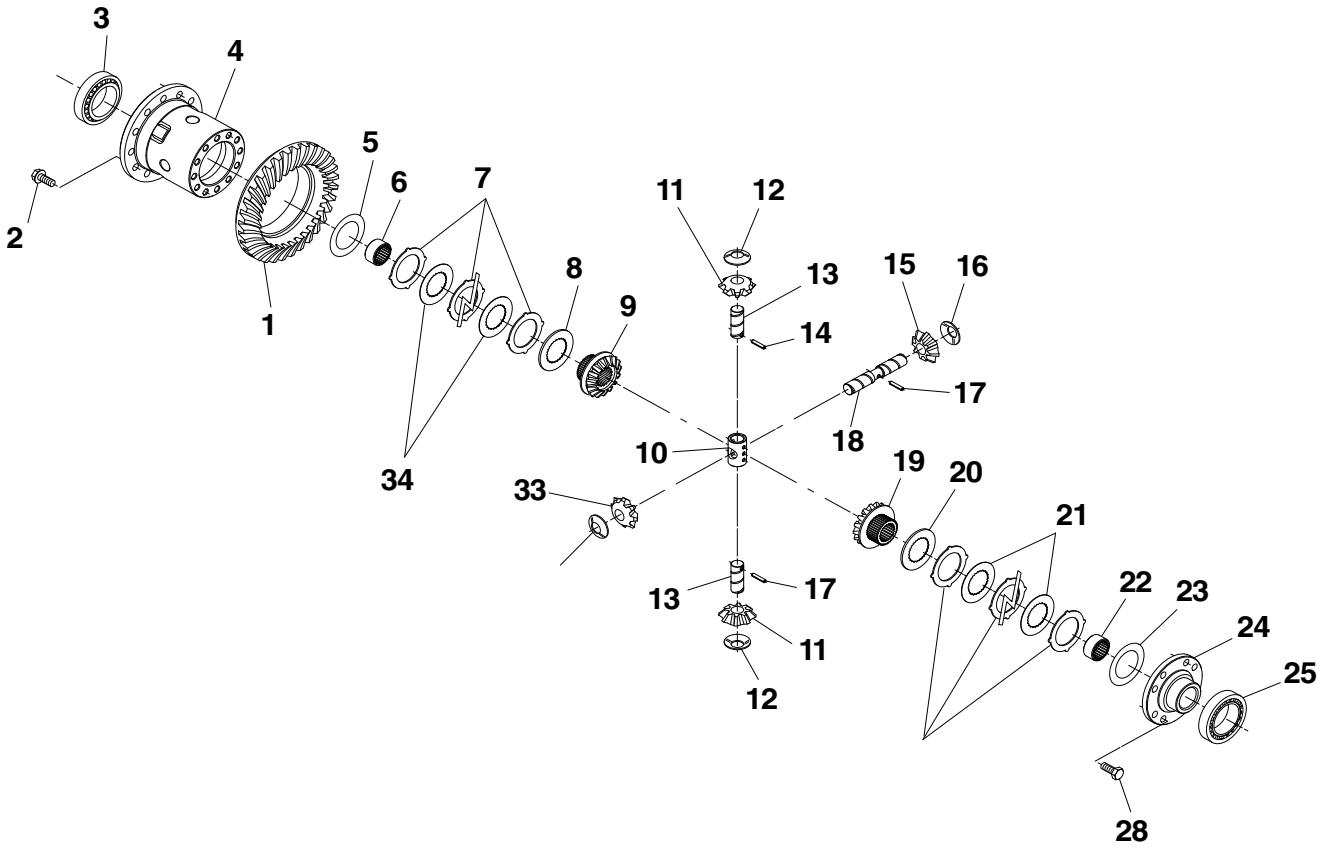


MAP17930

16. Check that the positioning of the sealing ring on the arm is intact; install the complete arm.
17. Lock it into position using two facing screws and washers.

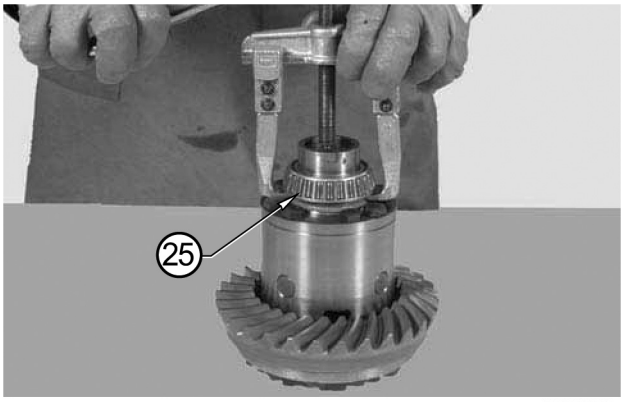
Section 22
Limited Slip Differential Unit 45% (Old Version)

22.1 EXPLODED VIEW



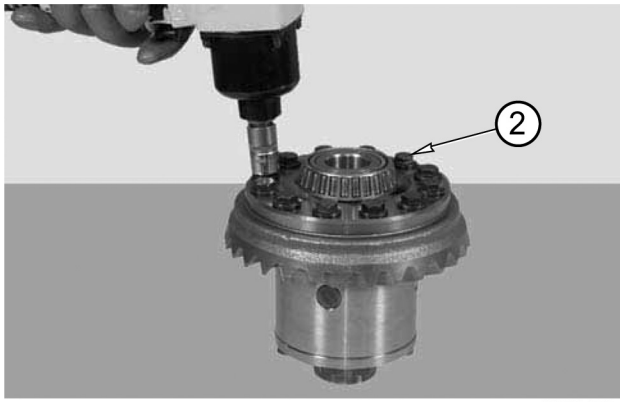
MAP17940

22.2 LIMITED SLIP DIFFERENTIAL UNIT 45% (OLD VERSION) - DISASSEMBLY



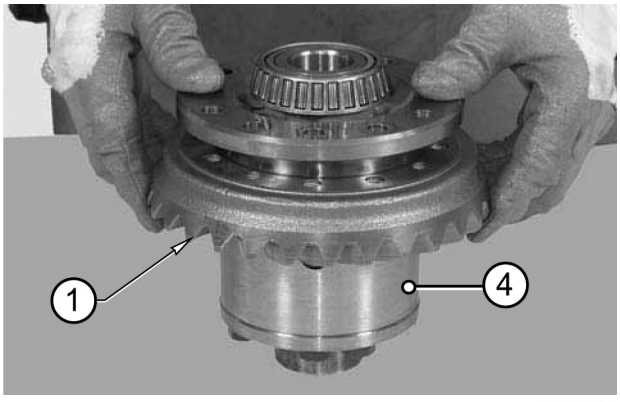
MAP17950

1. Extract the bearing (**25**) from the differential carrier.



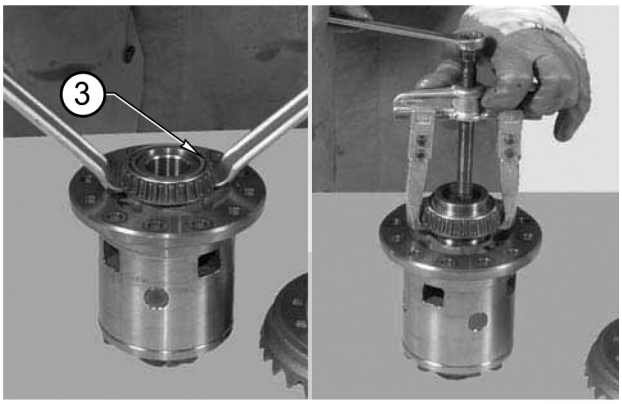
MAP17960

2. Remove the ring gear cap screws (**2**).



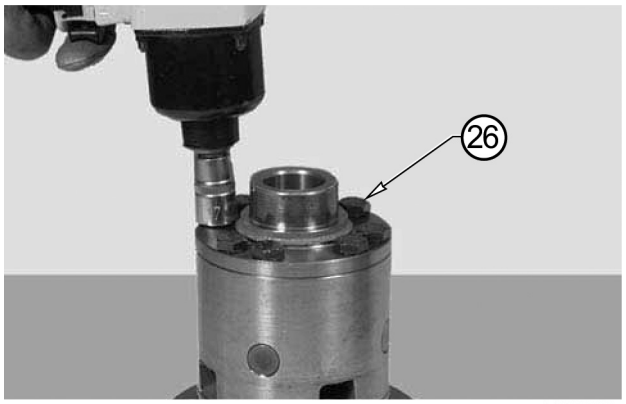
MAP17970

3. Separate the ring gear (**1**) from the differential (**4**).



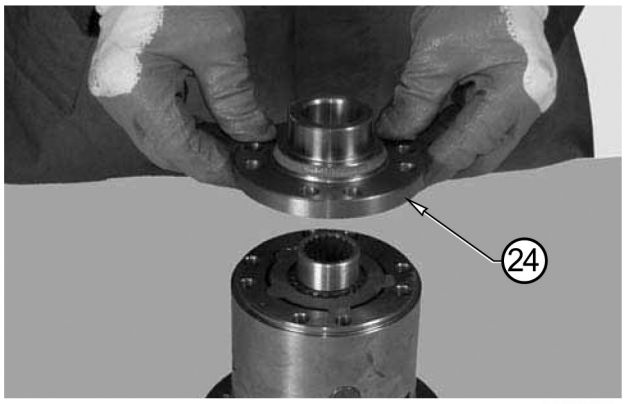
MAP17980

4. Extract the bearing (**3**) partially and using a puller, remove the bearing (**3**) of the ring gear side (**1**).



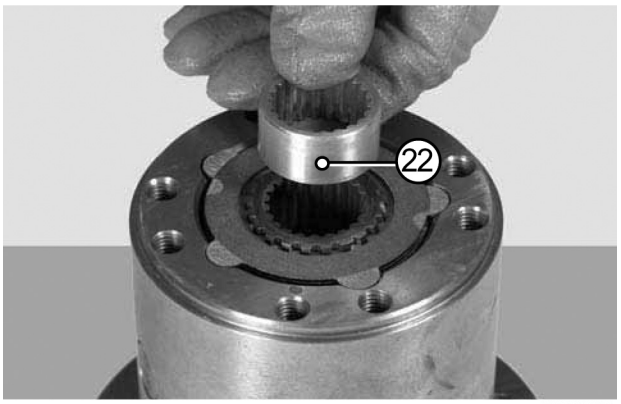
MAP18000

5. Remove the screws (**26**) jointing the differential unit.



MAP17990

6. Remove the differential cover (**24**).

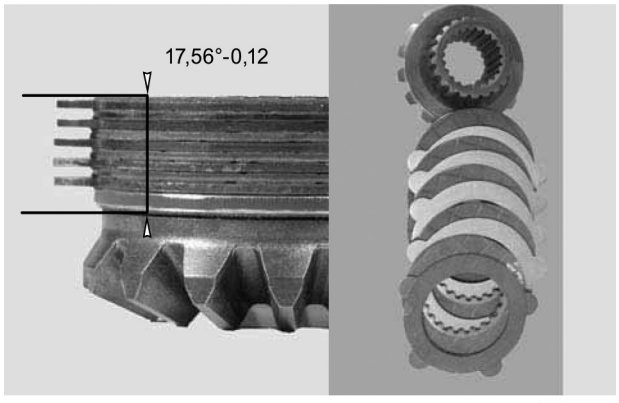


MAP18010

7. Remove the bushing (**22**).

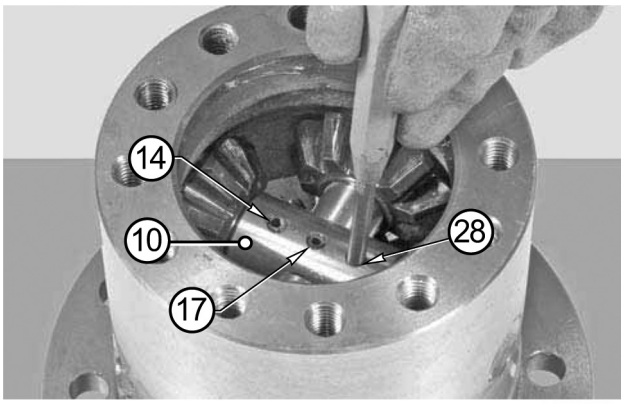
MAP18020

8. Remove the planetary gear (**19**) and the whole friction unit (**20**), (**27**) and (**21**).



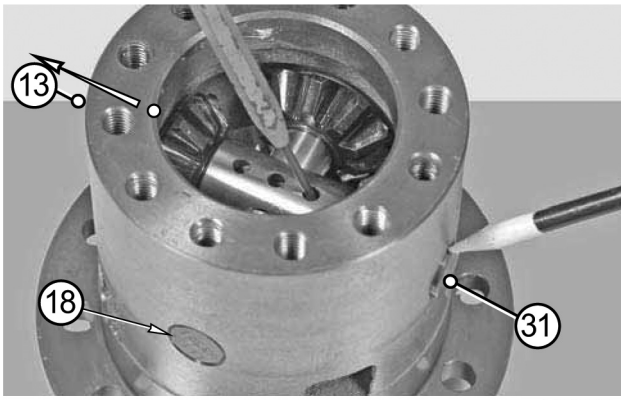
MAP18030

9. Replace the whole pack to 17.10 mm.



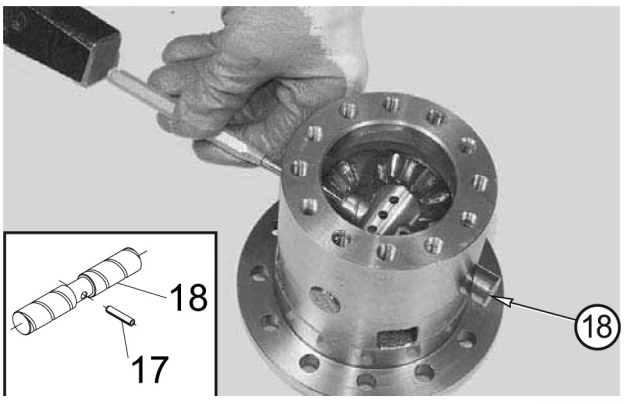
MAP18040

10. Remove the fixing pins (**14**), (**17**) and (**28**) of the differential cross bolts (**10**).



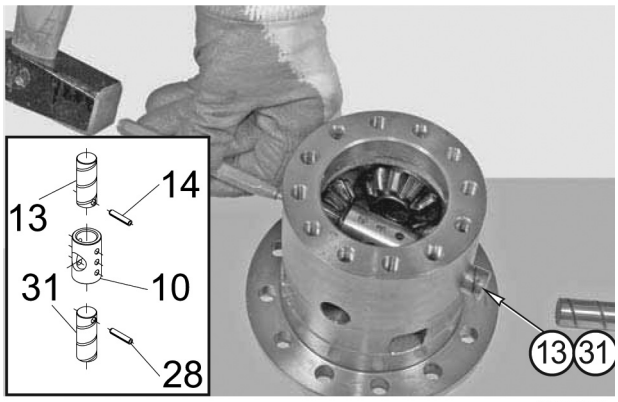
MAP18050

11. With a pin driver push the two bolts (**31**) and (**13**) to the outside.



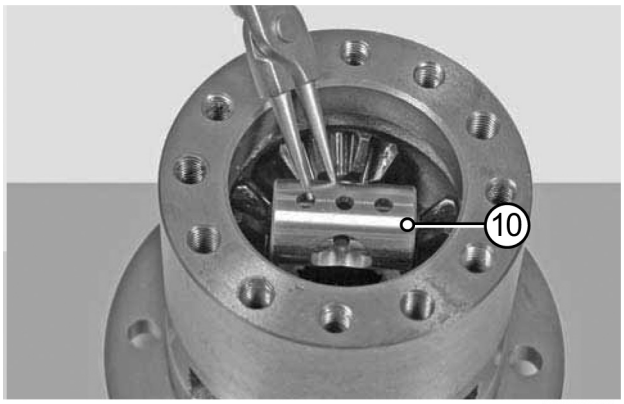
MAP18060

12. Remove the bolts with the help of a drift (**18**).



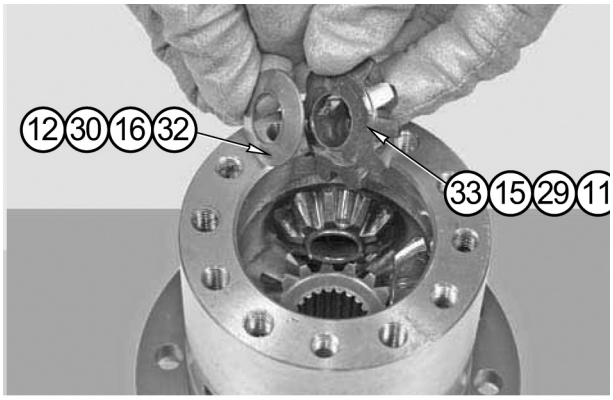
MAP18070

13. Remove the two halves of the cross bolts (**13**) and (**31**) with the help of a drift.



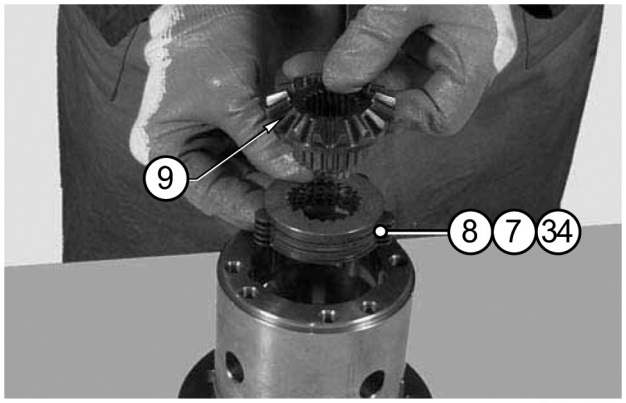
MAP18080

14. Remove the cross bolts (**10**).



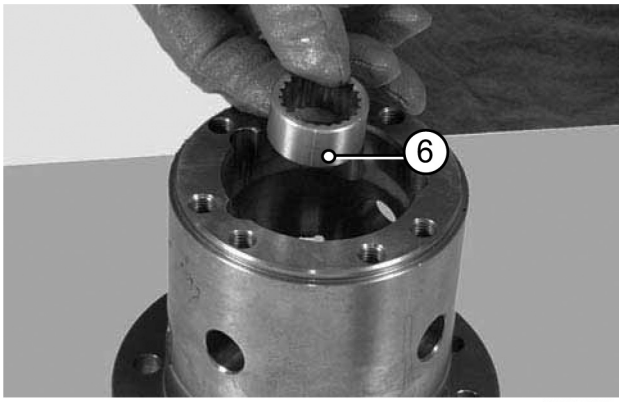
MAP18090

15. Remove the satellite gears (**11),** (**29**), (**15**) and (**33**) and the spherical washers (**32**), (**16**), (**30**) and (**12**).



MAP18100

16. Remove the planetary gear (**9**) and limited slip package (**8**), (**7**) and (**34**).



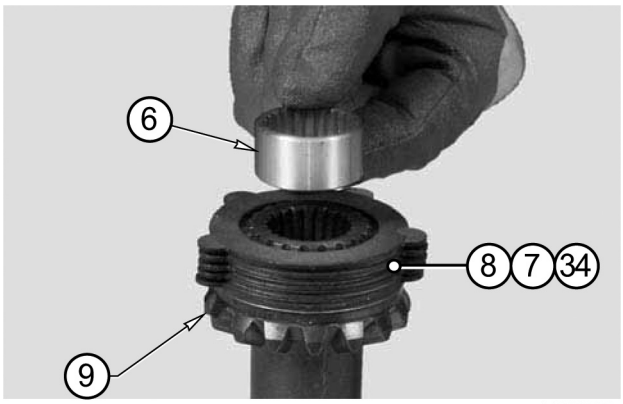
MAP18110

17. Remove the bushing (**6**).

22.3 LIMITED SLIP DIFFERENTIAL UNIT 45% (OLD VERSION) - ASSEMBLY

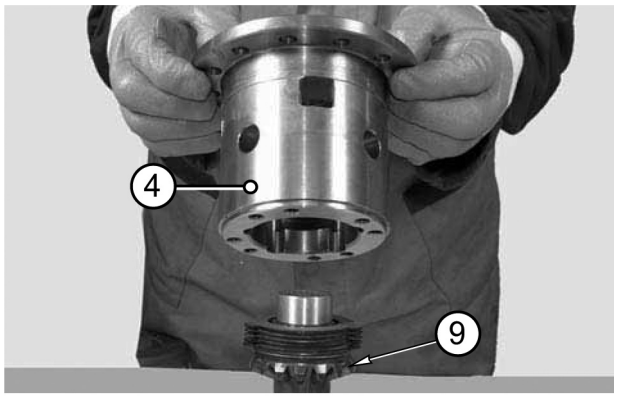
MAP18120

1. L.S. differential components.



MAP18130

2. Align disks (**8**), (**7**) and (**34**) and bushing (**6**) on the planetary gear (**9**) in the correct position.

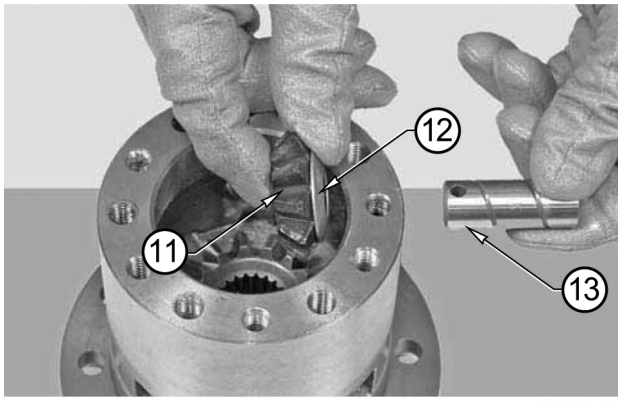


MAP18140

3. Insert the planetary gear (**9**) into the differential housing (**4**).

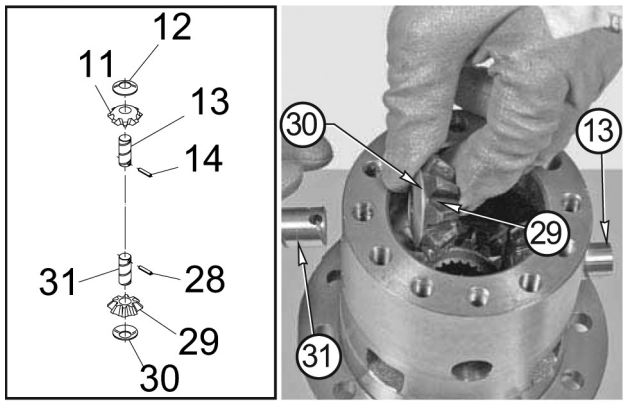
MAP18150

4. Check for correct position.



MAP18160

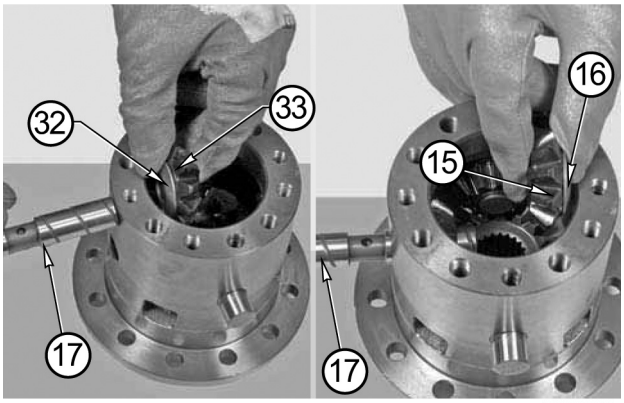
5. Insert the satellite gears (**11**) and (**29**) with the spherical washers (**12**) and (**30**) and the bolts (**13**) and (**31**) to keep them in position.



MAP18170

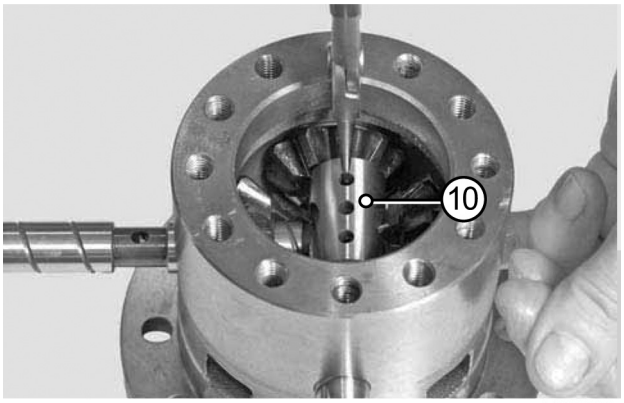
6. Insert the satellite gears (**11**) and (**29**) with the spherical washers (**12**) and (**30**) and the bolts (**13**) and (**31**) to keep them in position.

.



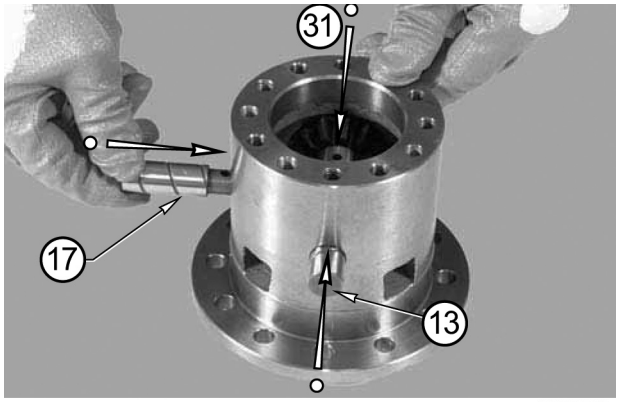
MAP18180

7. Insert the satellite gears (**33**) and (**15**) with the spherical washers (**32**)and (**16**) and the bolt (**17**).



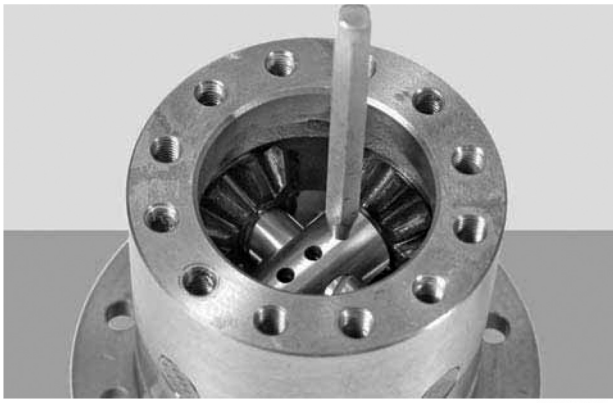
MAP18190

8. Insert the cross bolt (**10**) in the correct position.



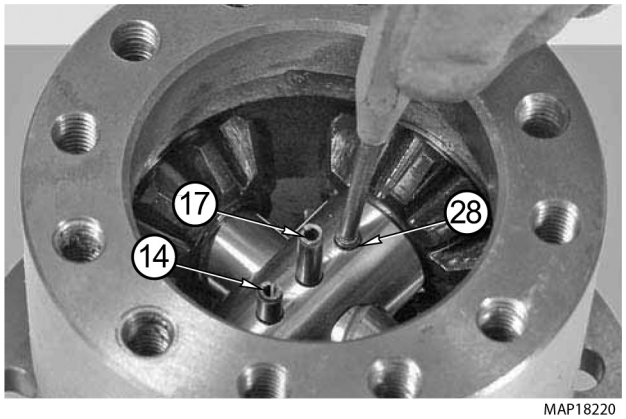
MAP18200

9. Insert the bolts in their position (**17**), (**13**) and (**31**).



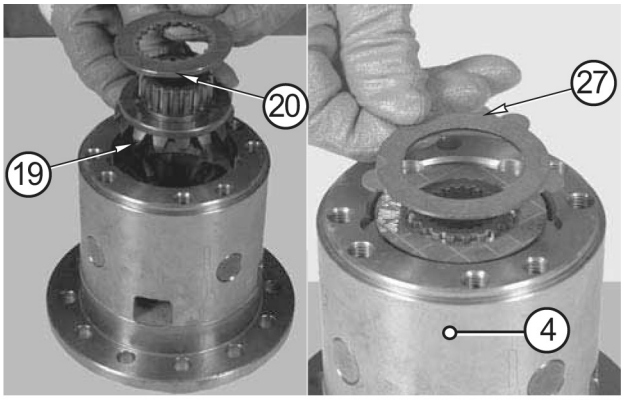
MAP18210

10. Bring the pin holes in line with the help of a pin driver.



MAP18220

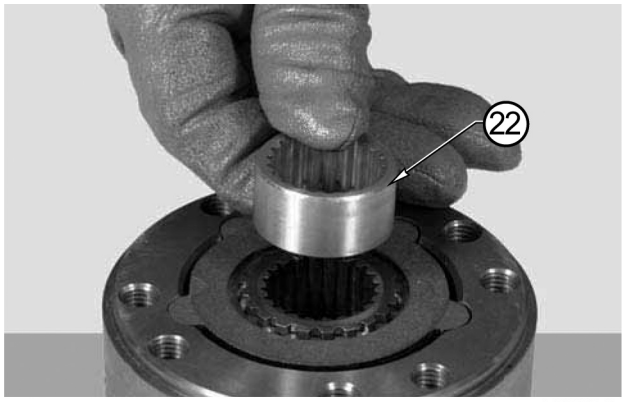
11. Insert pins to end of stroke (**14**), (**17**) and (**28**).



MAP18230

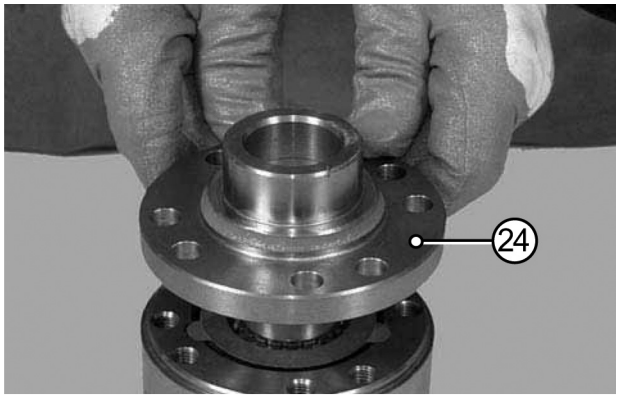
12. Insert the planetary gear (**19**) and the whole friction unit (**20**), (**27**) and (**21**).

.



MAP18240

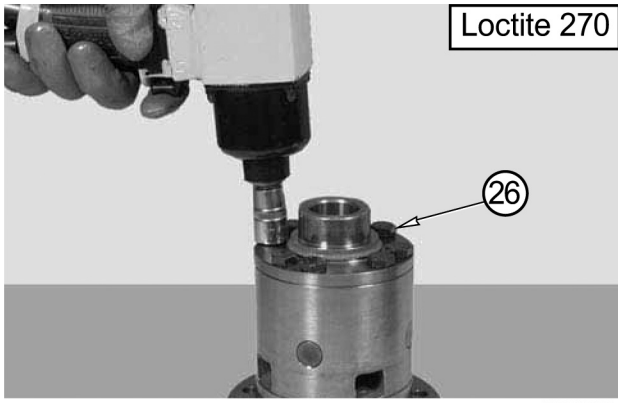
13. Install the bushing (**22**).



MAP18250

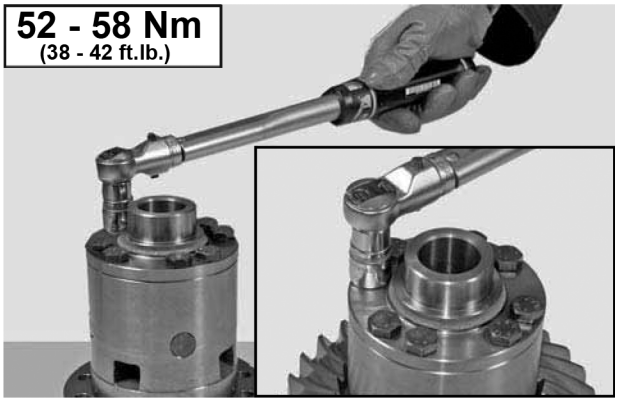
14. Install the differential cover (**24**)

.



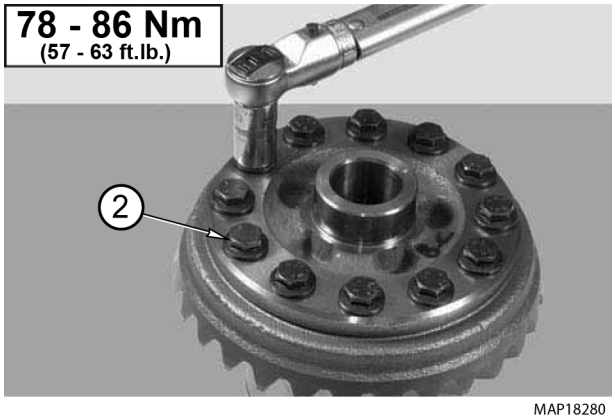
MAP18260

15. Apply Loctite 270 to the cap screws (**26**).



MAP18270

16. Torque wrench setting: 52 - 58 Nm (38-42 ft.lb)

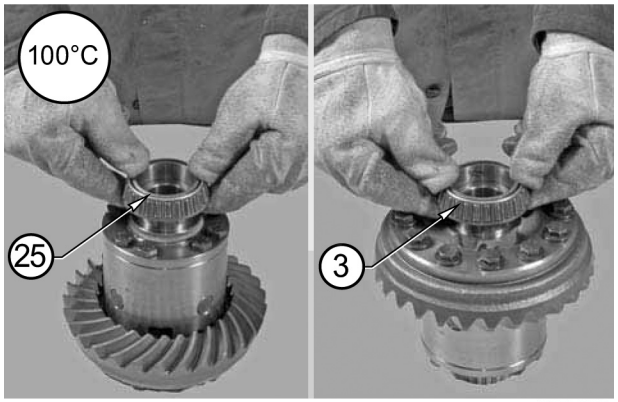


MAP18280

17. Tighten the cap screws (**2**) of the ring gear using the criss-cross method 78-86 Nm. (57-63 ft.lb.).

Note: *Use LOCTITE 270 on screws not treated with DRILOC.*

.

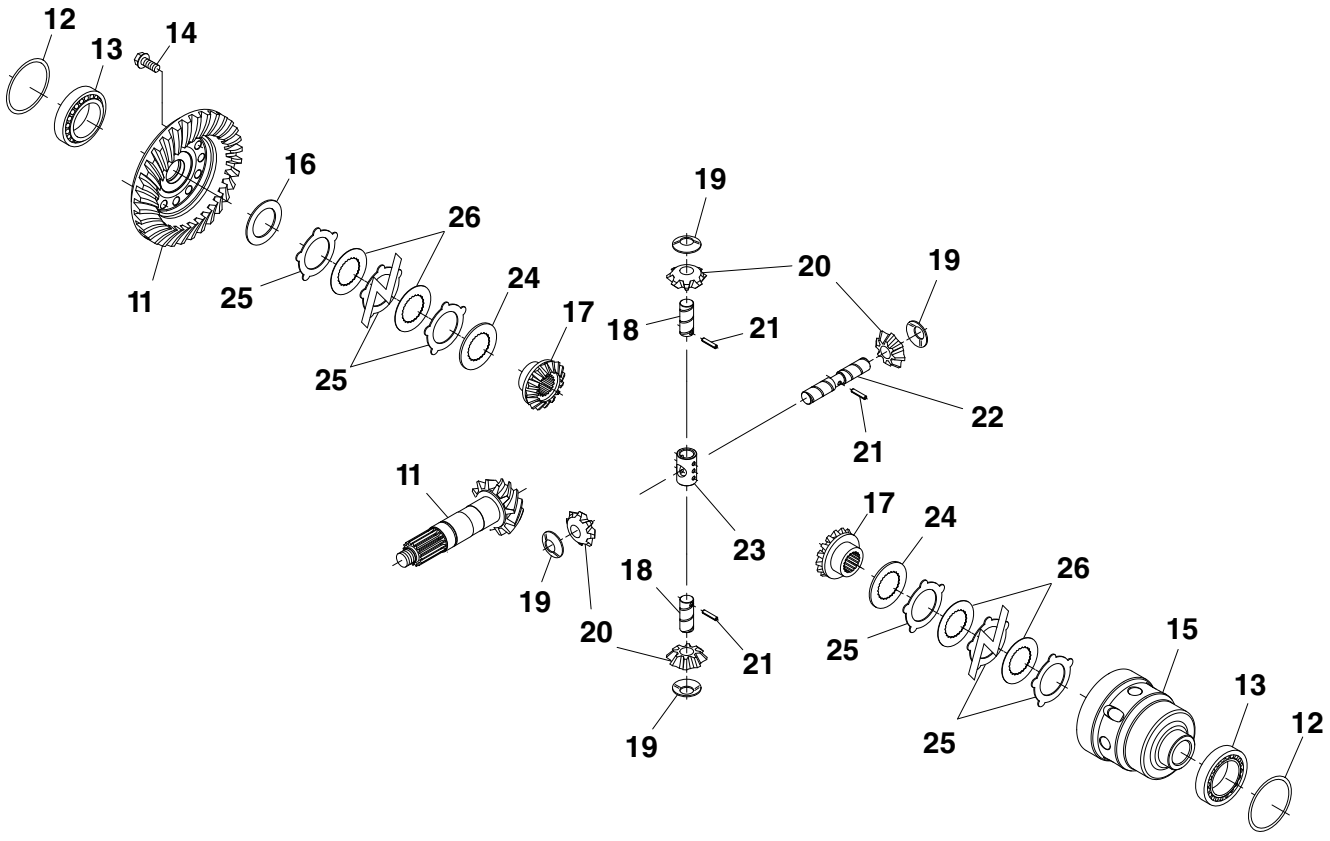


MAP18290

18. Heat up the roller bearings (**25**) and (**3**) to 100°C and insert onto the differential.

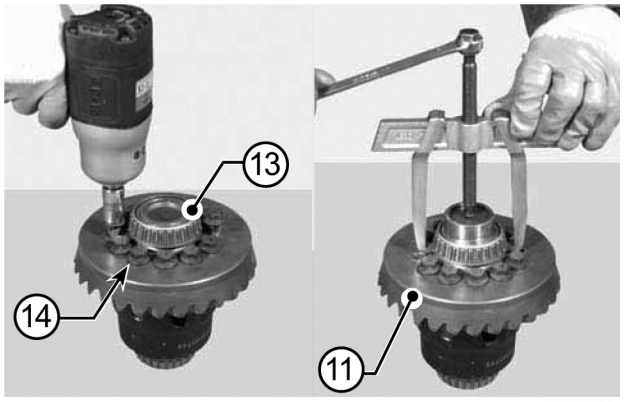
Section 23
Limited Slip Differential Unit 45% (Last Version)

23.1 EXPLODED VIEW



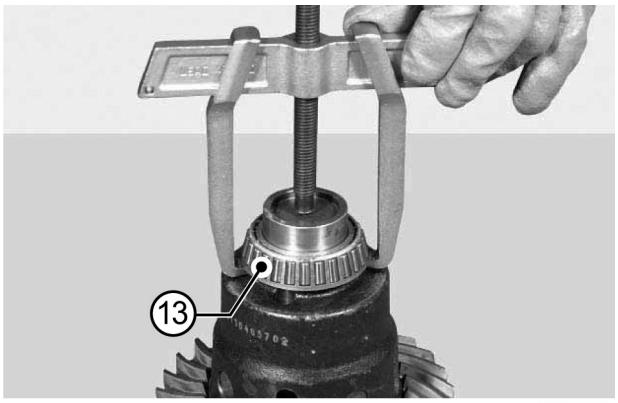
MAP18300

23.2 LIMITED SLIP DIFFERENTIAL UNIT 45% (LAST VERSION) - DISASSEMBLY



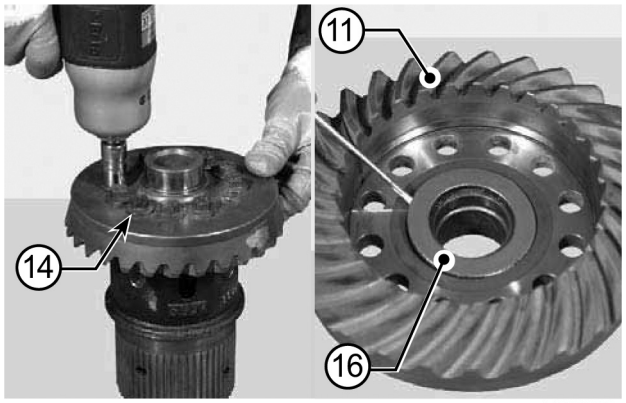
MAP18310

1. If the bearing (**12**) has to be replaced, remove two retaining screws (**10**) from the crown and, using an extractor, remove the crown bearing (**9**).



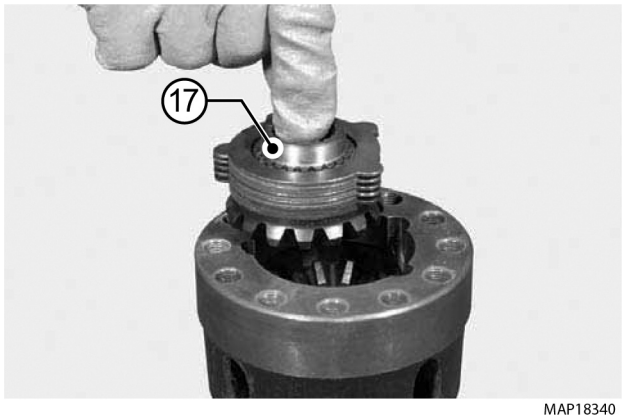
MAP18320

2. If the bearing need replacing, extract the bearing (**13**) from the differential carrier.



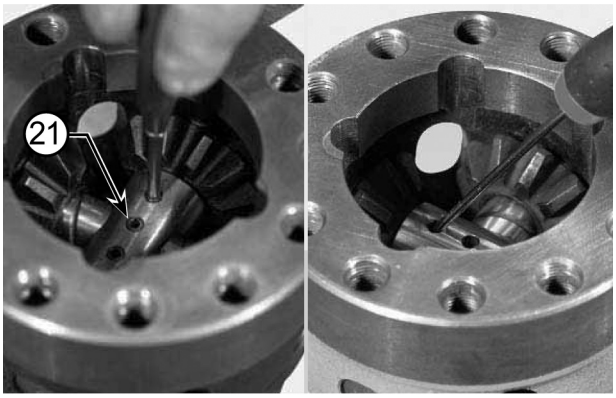
MAP18330

3. Remove cap screws (**14**) of the ring gear (**11**); replace each time when removed.
4. Extract the ring gear (**11**).
5. Remove the shim washer (**16**).



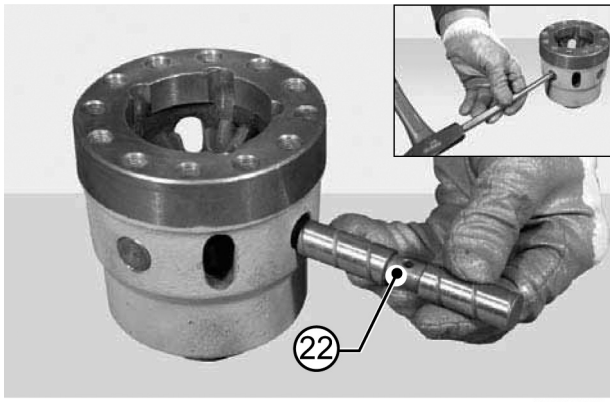
MAP18340

6. Remove the planetary gear (**17**) and the whole friction assembly.



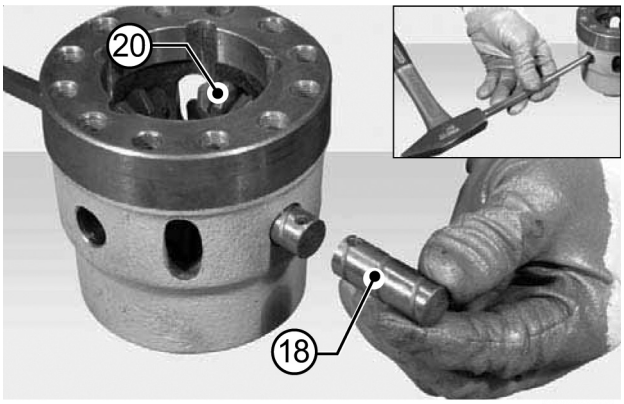
MAP18350

7. Remove the three spider blocking pins (**21**) by using a pin driver. Move the two opposite mounted short bolts (**18**) to the outside of the box using the same pin driver.



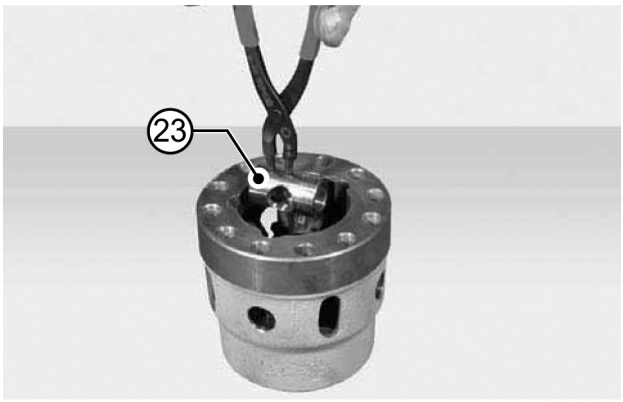
MAP18360

8. Remove the bolts (**22**) with the help of a drift.



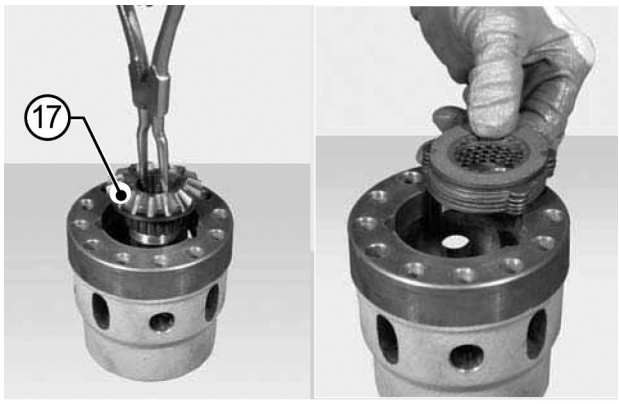
MAP18370

9. Remove the two half bolts (**18**), spherical washers (**19**) and satellite gears (**20**).



MAP18380

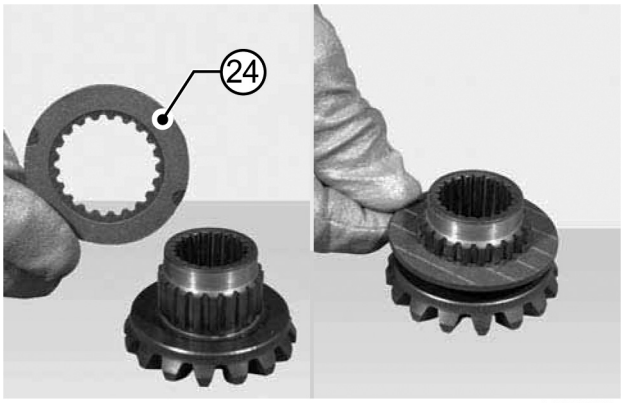
10. Remove the cross bolts (**23**).



MAP18390

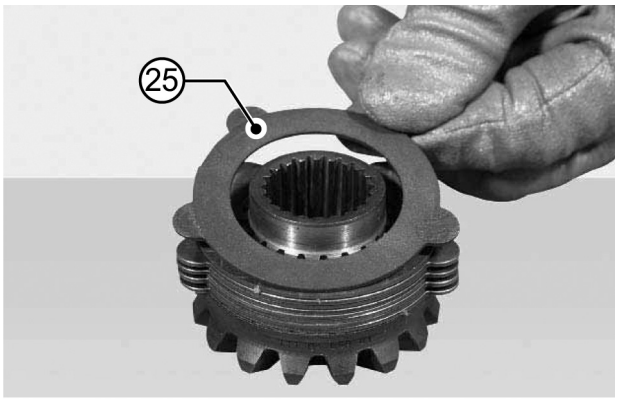
11. Remove the planetary gear (**17**) and the whole friction assembly.

23.3 LIMITED SLIP DIFFERENTIAL UNIT 45% (LAST VERSION) - ASSEMBLY



MAP18460

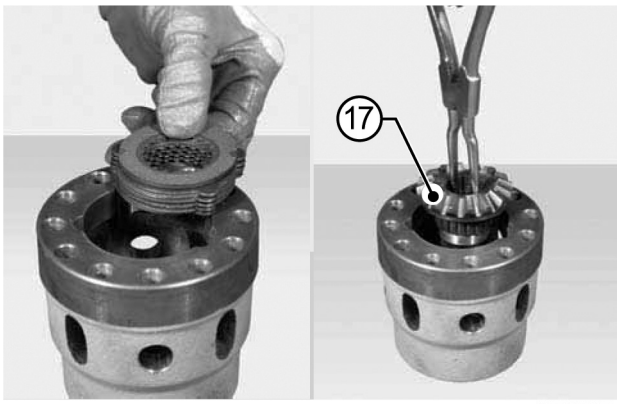
1. As to ring (**24**), the side without notches must face outwards.



MAP18470

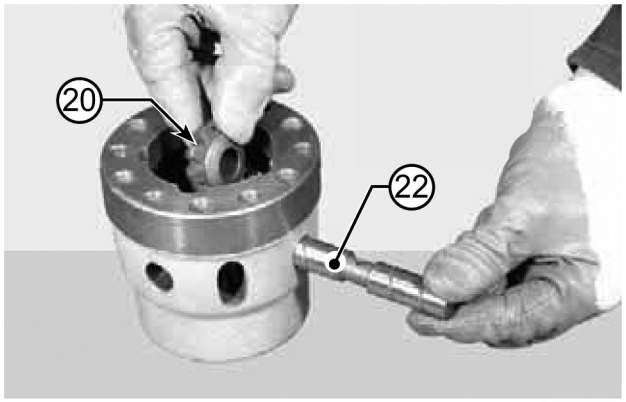
2. **35% FRICTION UNIT COMPOSITION:**
   Friction discs with increased shim (**24**), steel discs (**25**) and friction discs (**26**) alternated, and end disc (**25**).

.



MAP18480

3. Place a friction unit and planetary gear (**17**) into the half-box (**15**).

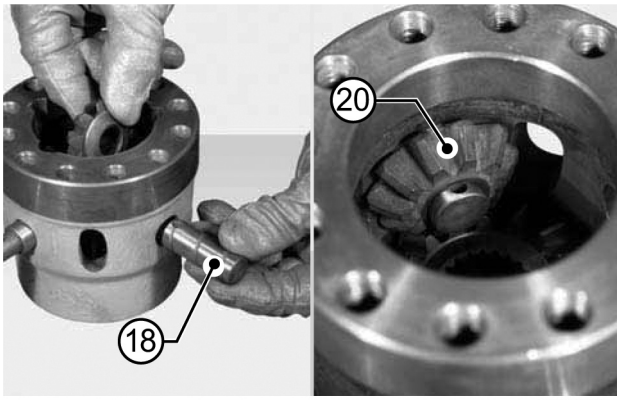


MAP18490

4. Partially insert the long bolt (**22**), satellite wheels (**20**) and spherical washers (**19**).

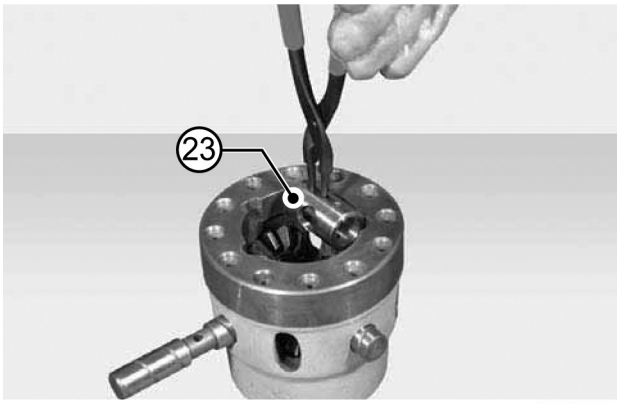
MAP18500

5. Place the satellite gear (**20**) and the spherical washer (**19**) in the box and fix with a fake pin of suitable diameter.



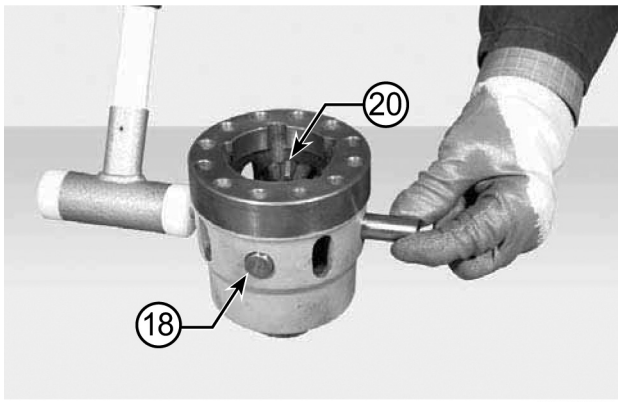
MAP18510

6. Insert the two half bolts (**18**), spherical washers (**19**) and satellite gears (**20**).



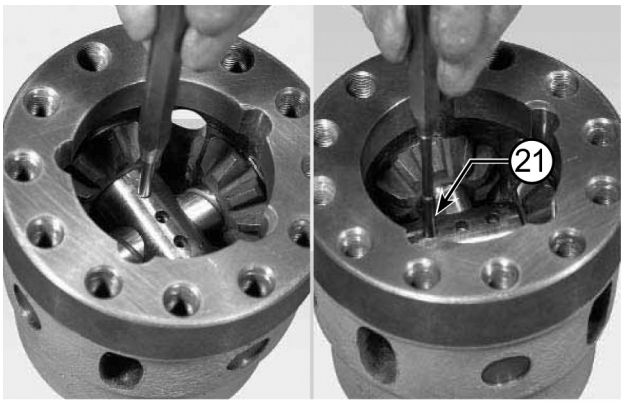
MAP18400

7. Insert the cross bolt (**23**) in the correct position.



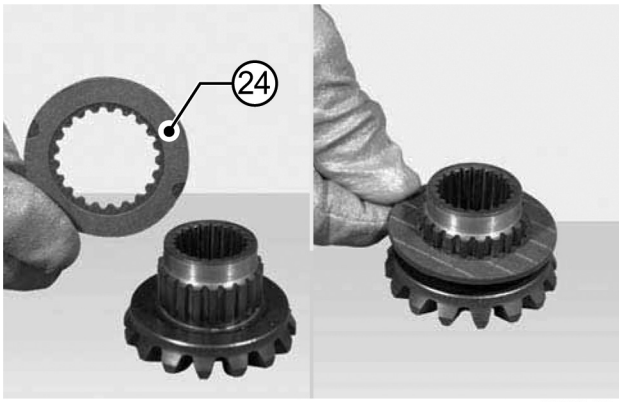
MAP18410

8. Satellite gears (**20**), spherical washers (**19**) and completely insert the long bolt (**22**).



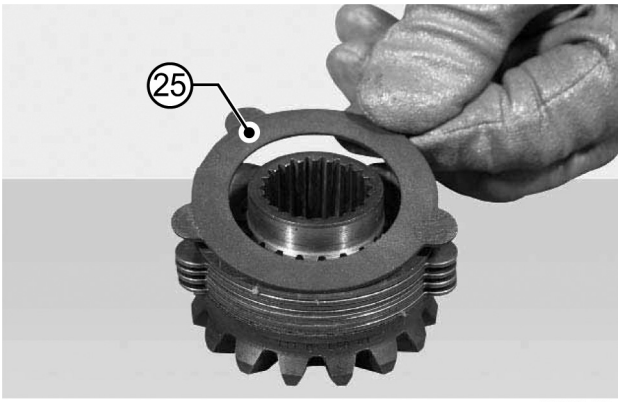
MAP18420

9. Bring the pin holes in line with the help of a pin driver.
10. Insert pins (**21**) to end of stroke.



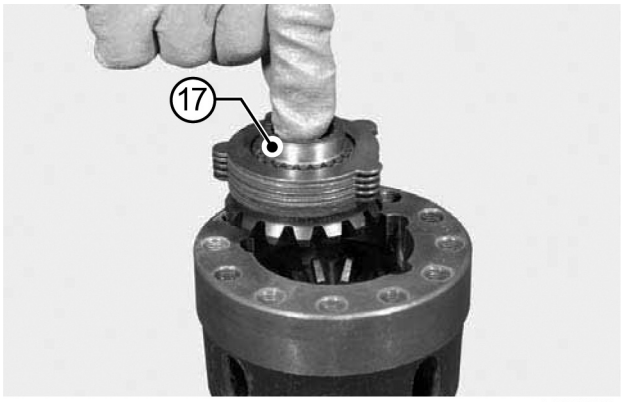
MAP18430

11. As to ring (**24**), the side without notches must face outwards.



MAP18440

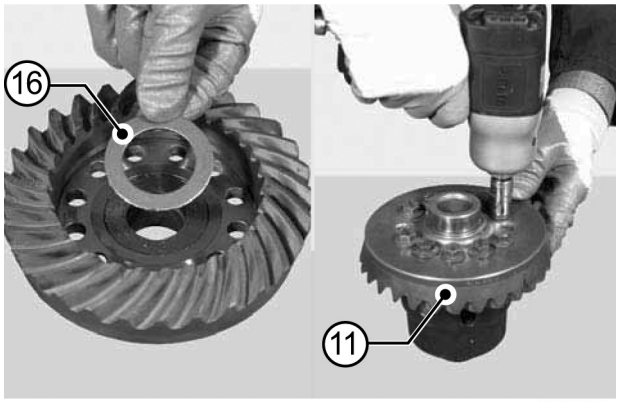
12. 35% FRICTION UNIT COMPOSITION:
Friction discs with increased shim (**24**), steel discs (**25**) and friction discs (**26**) alternated, and end disc (**25)**.



MAP18450

13. Place a friction unit and planetary gear (**17**) into the half-box (**15**).

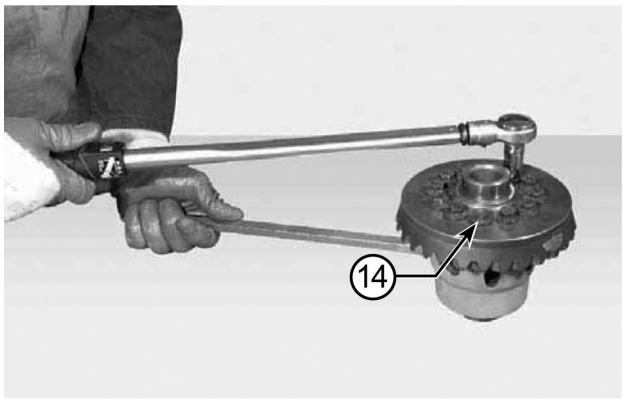
.



MAP18520

14. Position the shim washer (**16**) on the crown (**11**).
15. Install the ring gear (**11**).

Note: *In order to hold the shim washer (**16**) in position, apply grease to it.*

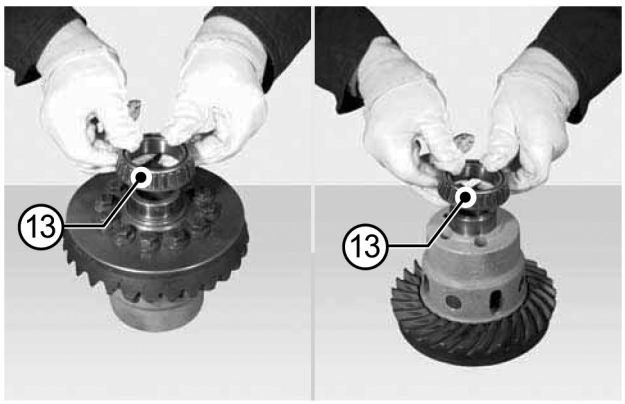


MAP18530

16. Mount the gear ring (**11**) and fasten it to the differential box with screws (**14**).

⚠ CAUTION

Use only new screws pre-treated with locking adhesive.



MAP18540

17. Heat the bearings (**13**) at 100° and insert them on the differential.

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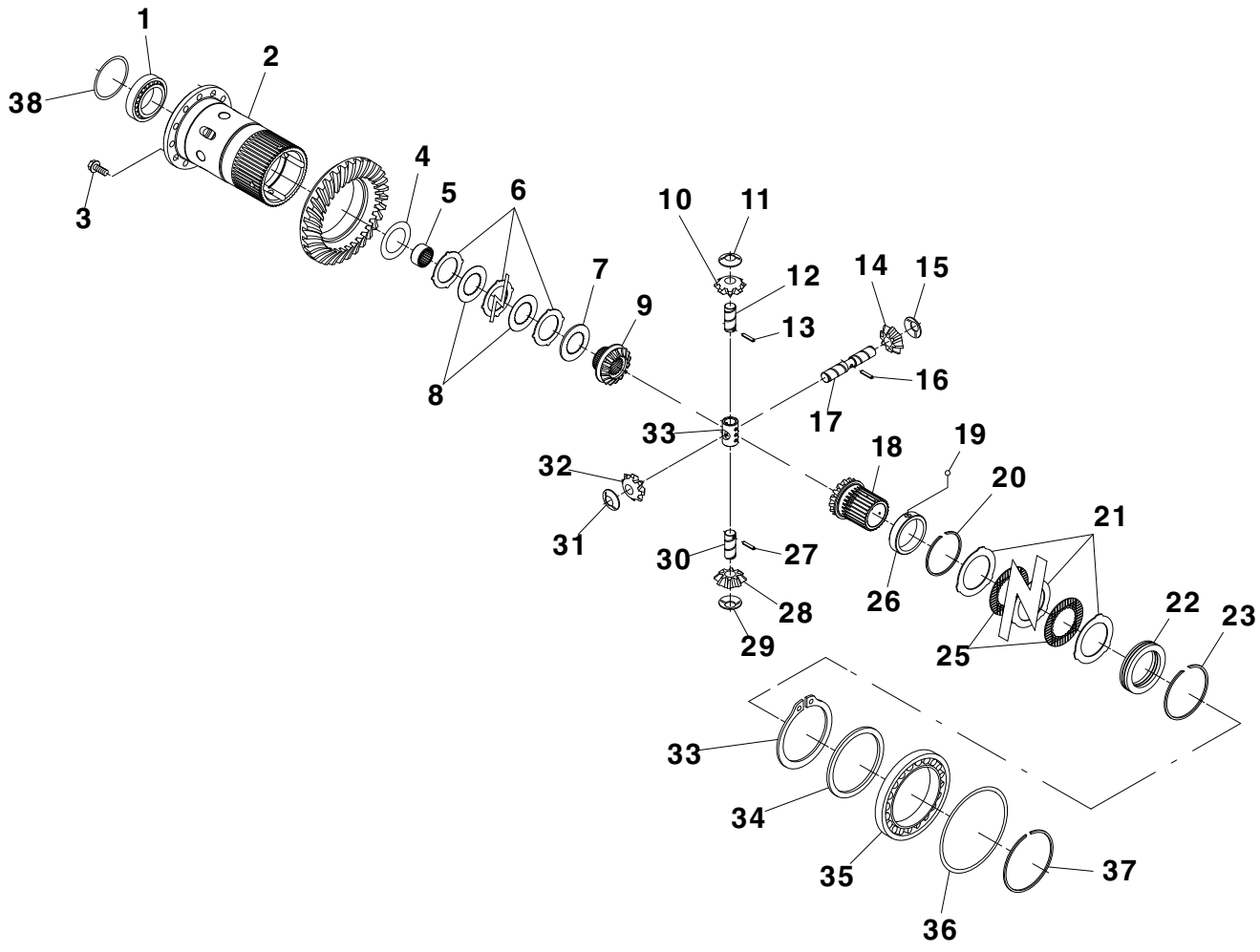
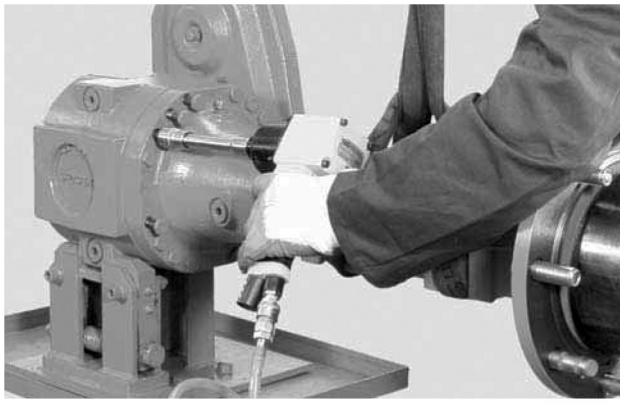
Section 24
Preloaded Limited Slip Differential Unit 45% Unit (Old Version)

24.1 EXPLODED VIEW



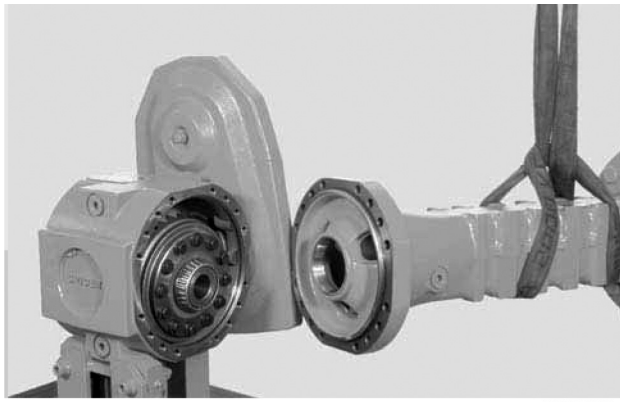
MAP18550

24.2 PRELOADED LIMITED SLIP DIFFERENTIAL UNIT 45% UNIT (OLD VERSION) - DISASSEMBLY



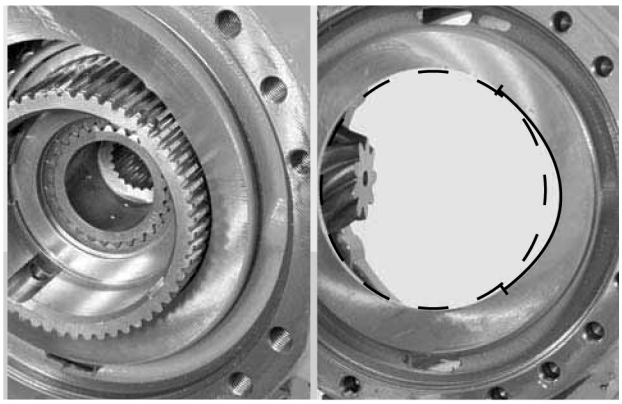
MAP18560

1. Remove the brake side arm and the brake discs pack.
2. Sling the arm to be removed and connect it to a hoist. Remove screws of the ring gear side arm.



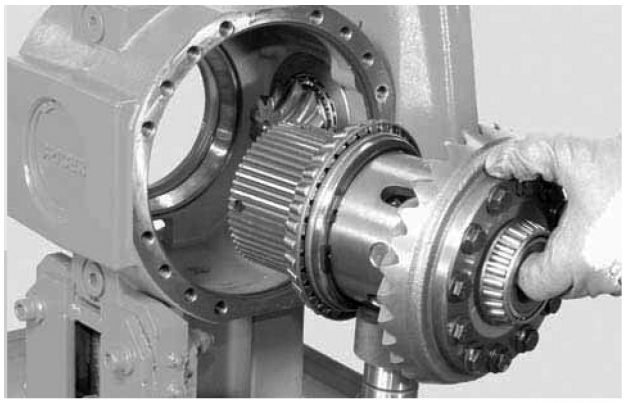
MAP18570

3. Place the arm on a bench.



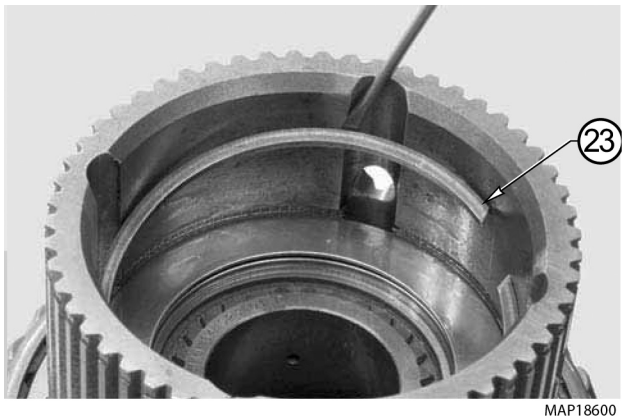
MAP18580

4. Position the differential gear sideways into the recess in order to be able to pull it out.



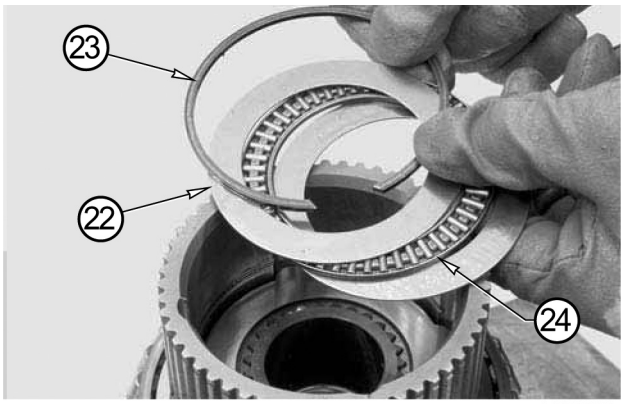
MAP18590

5. Pull out the differential.



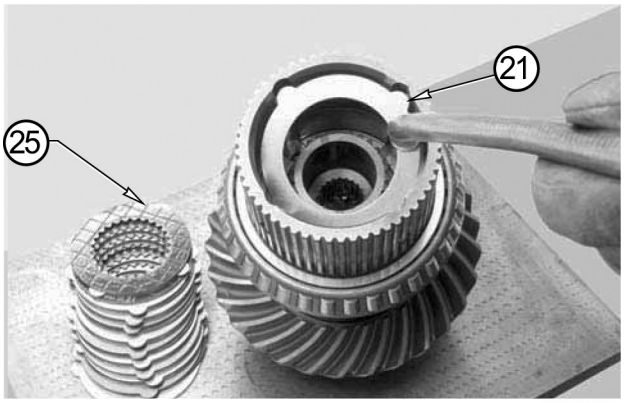
MAP18600

6. Remove the snap ring (**23**) that secures the thrust bearing.



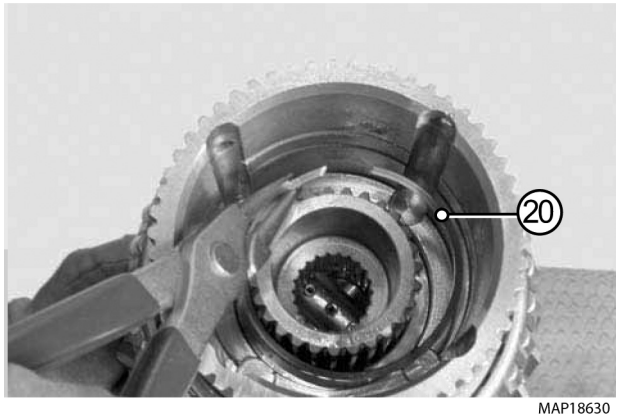
MAP18610

7. Remove the snap ring (**23**) and thrust bearing (**24**).



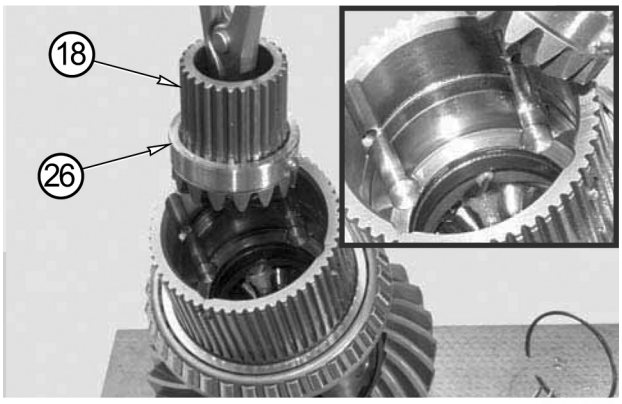
MAP18620

8. Remove the hydraulic block discs (**21**) and (**25**) one after the other.



MAP18630

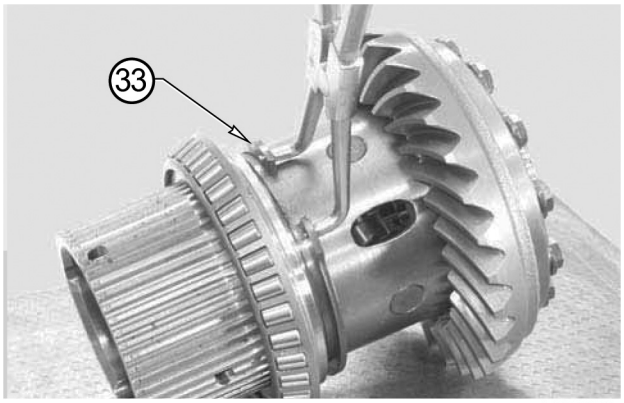
9. Remove the snap ring (20) that secures the planetary gear.



MAP18640

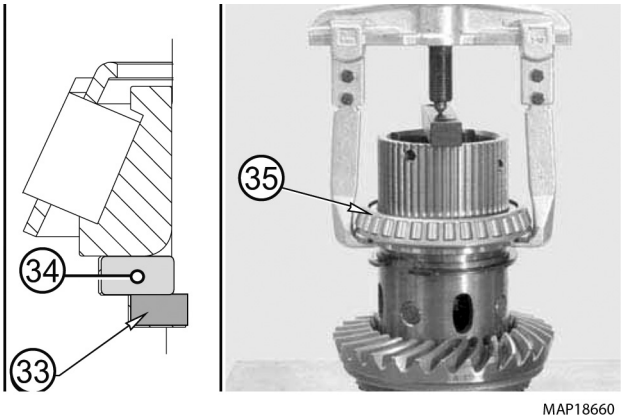
10. Remove the brake side planetary gear (**18**)

.



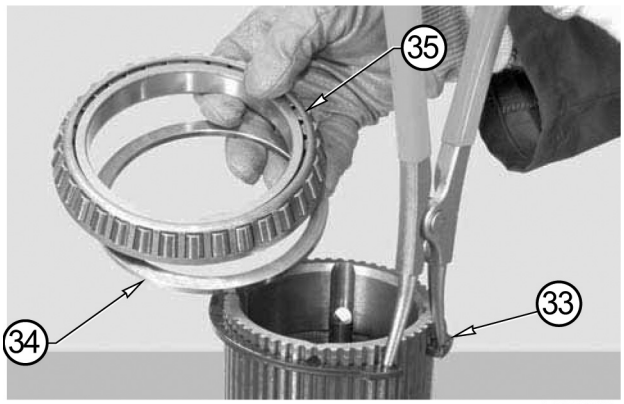
MAP18650

11. Remove the snap ring (**33**) out of its seat by moving it sideways.



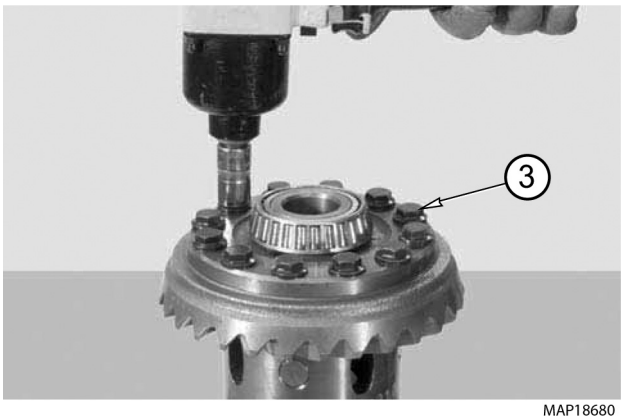
MAP18660

12. Using a puller, extract the bearing (**35**) and the washer (**34**).



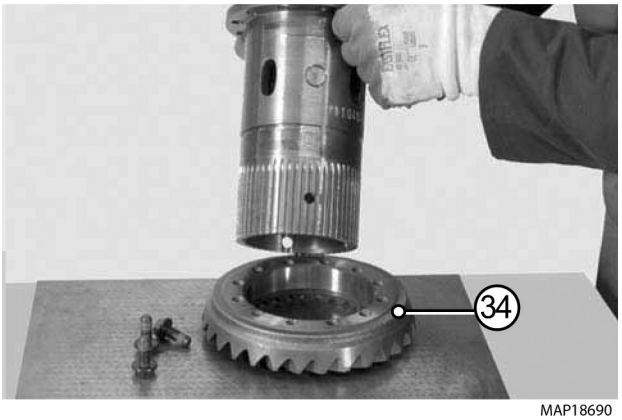
MAP18670

13. Remove completely the bearing (**35**), washer (**34**) and snap ring (**33**).



MAP18680

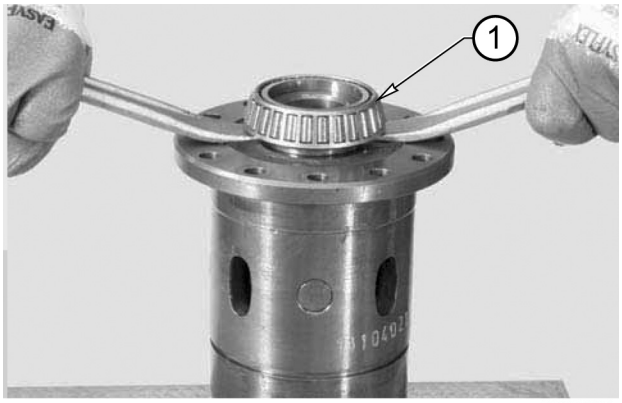
14. Remove the cap screws (**3**) of crown. Replace the screws (**3**) at each reassembly.



MAP18690

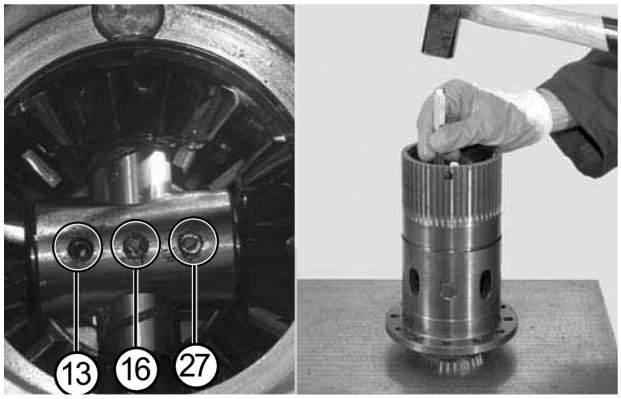
15. Extract the ring gear (**34**)

.



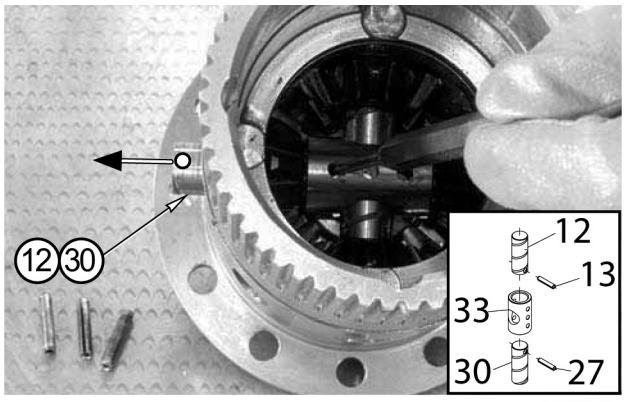
MAP18700

16. Remove the tapered roller bearing (**1**) of the ring gear side, using two levers.



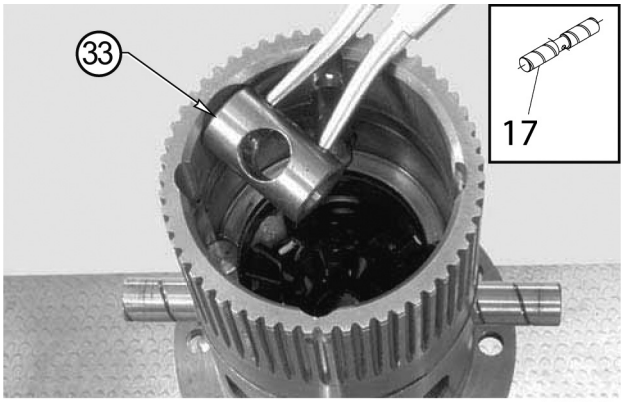
MAP18710

17. Remove the three spider blocking pins (**13**), (**16**) and a (**27**) using a pin driver.



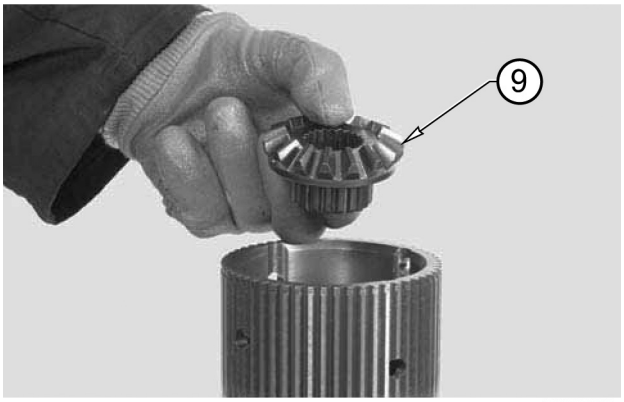
MAP18720

18. Move the two opposite mounted short bolts (**12**) and (**30**) to the outside of the box using the same pin driver.



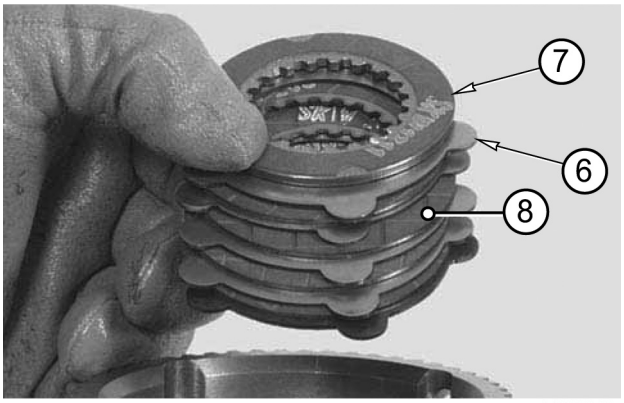
MAP18730

19. Drive out the long bolt (**17**) and pull out the spider (**33**) from the center.



MAP18740

20. Remove the planetary gear (**9**).

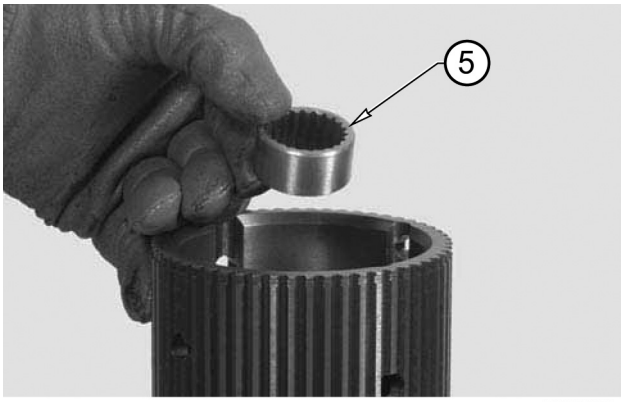


MAP18750

21. Remove the limited slip discs friction (**6**)(**7**)(**8**).

CAUTION

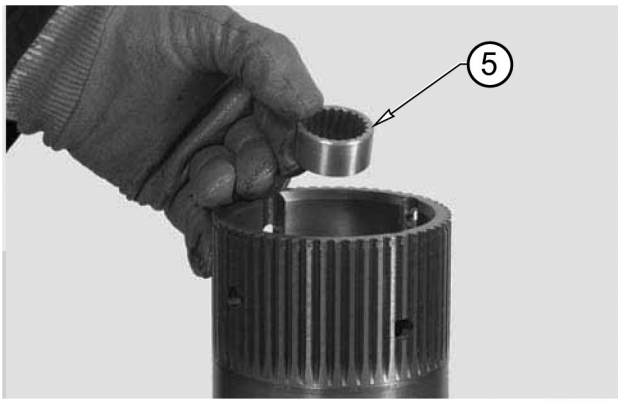
Do not change the position of the friction disks.



MAP18760

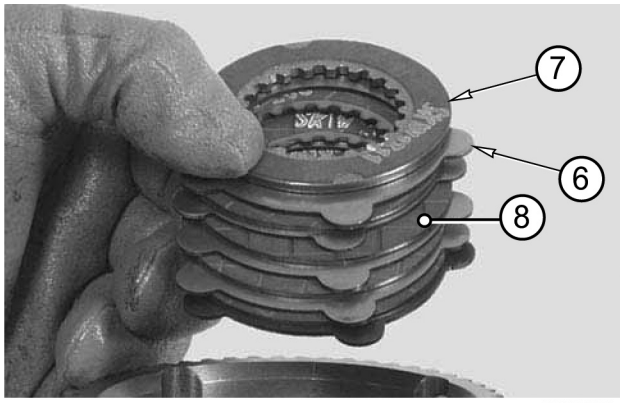
22. Remove the half shaft bushing (**5**).

24.3 PRELOADED LIMITED SLIP DIFFERENTIAL UNIT 45% UNIT (OLD VERSION) - DISASSEMBLY



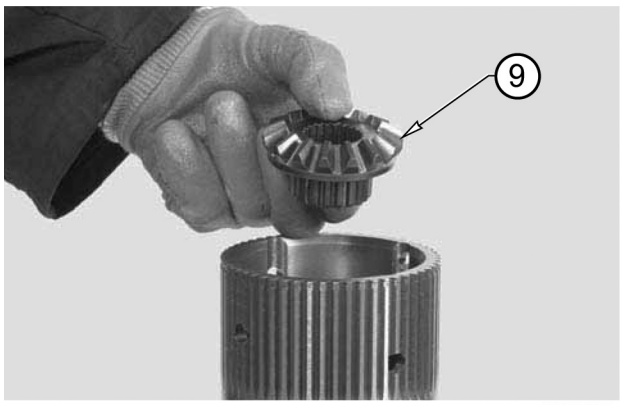
MAP18770

1. Install the half shaft bushing (**5**).



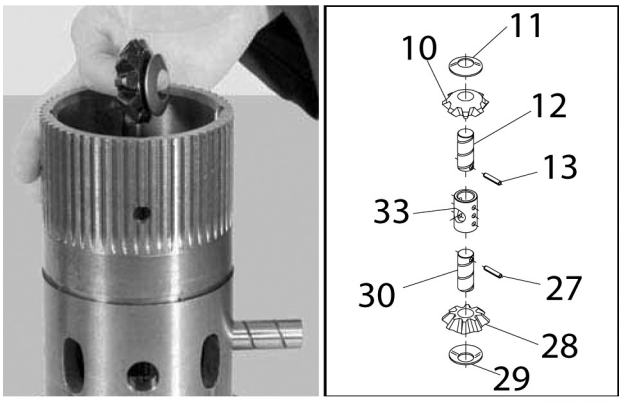
MAP18780

2. Insert in the body of the differential unit any required shims and the friction disks (**6**), (**7**) and (**8**)



MAP18790

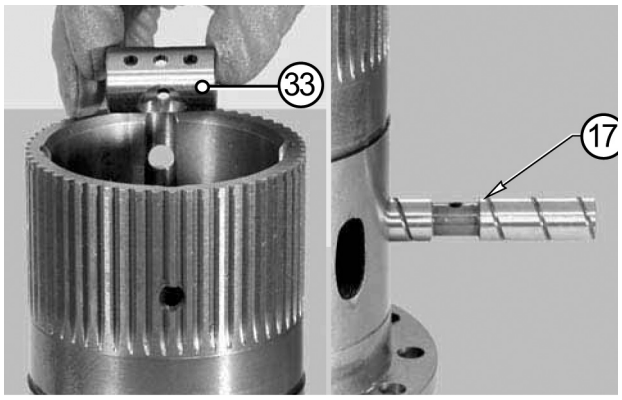
3. Install the planetary gear (**9**).



MAP18800

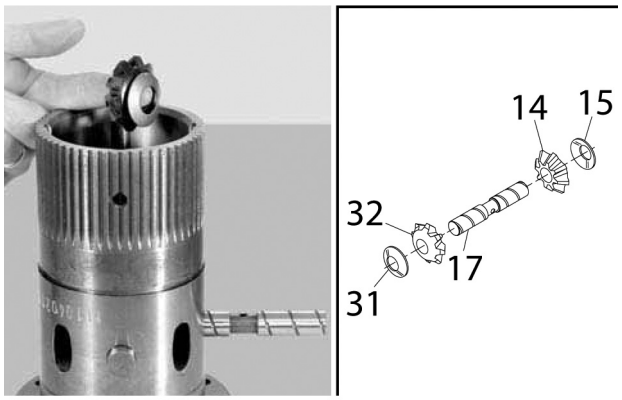
4. Install the planetary gears (**10**), (**28**) and spherical washers (**11**) and (**29**) onto the shafts (**12**) and (**30**).

.



MAP18810

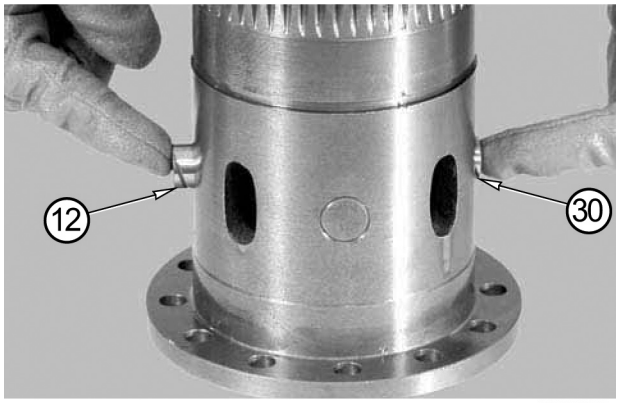
5. Insert spider (**33**) and partially insert the long bolt (**17**).



MAP18820

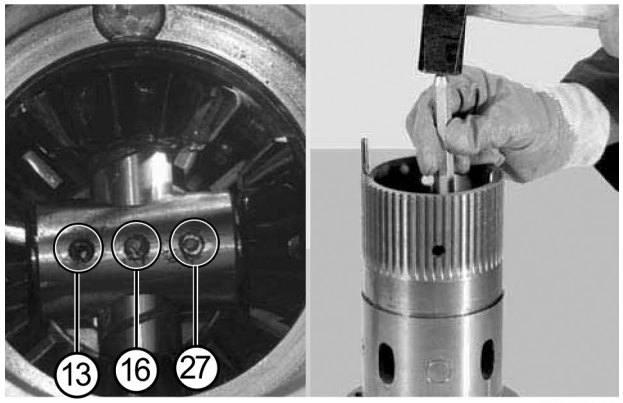
6. Satellite gears (**32**) and (**14**), spherical washers (**15**) and (**31**) and completely insert the long bolt (**17**).

.



MAP18830

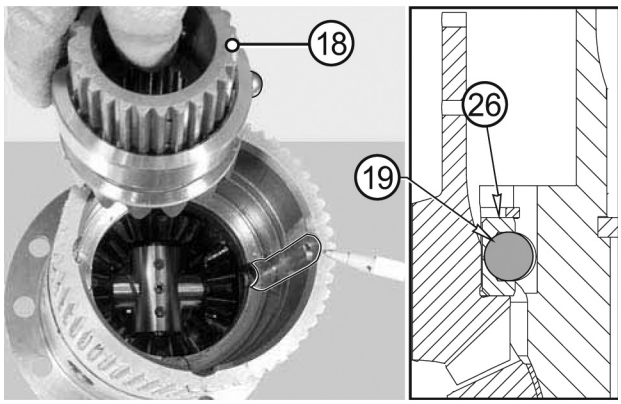
7. Insert completely the half bolts (**30**) and (**12**).



MAP18840

8. Center the pin holes and insert the 3 pins (**13**), (**16**) and (**27**).

Note: *Check the free rotation of the satellite wheels on the bolts.*

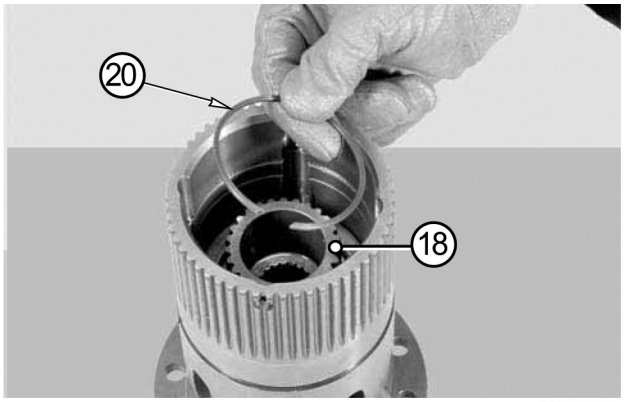


MAP18850

9. Insert the planetary wheel (**18**) together with the centering sleeve (**26**).

Note: *The centering sleeve must have the fixing ball (**19**) assembled.*

.



MAP18860

10. Insert snap ring (**20**) of the planetary wheel (**18**).

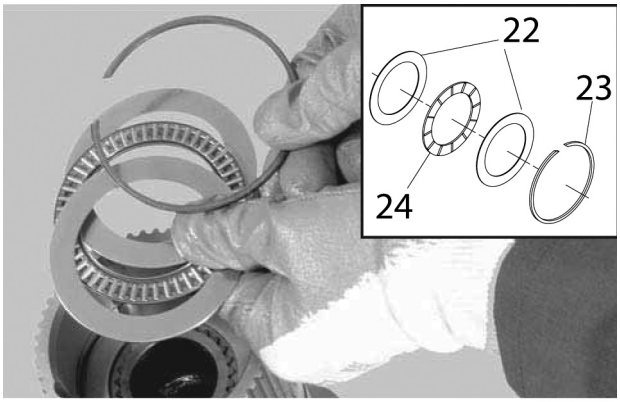
MAP18870

11. Insert and substitute, if necessary, the discs of the differential lock.

CAUTION

First and last disc have to be of steel material.

.I



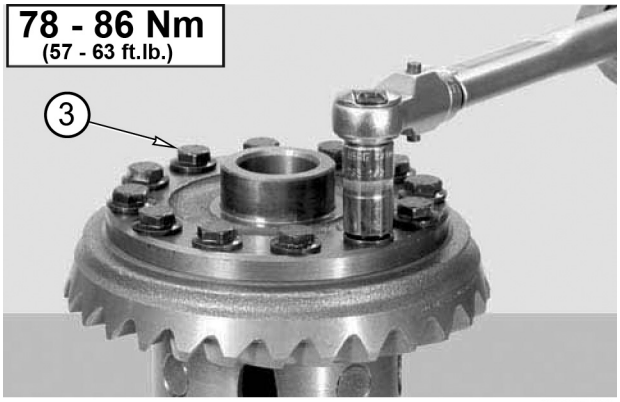
MAP18880

12. .Insert thrust (**24**) bearing and snap ring (**23**).

.

MAP18890

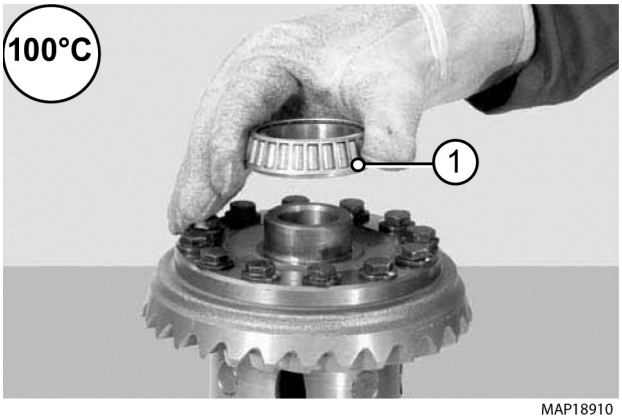
13. Insert ring gear (**34**).



MAP18900

14. Insert the screws (**3**) and tighten to a torque wrench setting of 78-86 Nm (57-63 ft.lb.).

Note: *Always use new screws to fix the ring gear. In case the screws are not thread locking pretreated, use Loctite 270.*



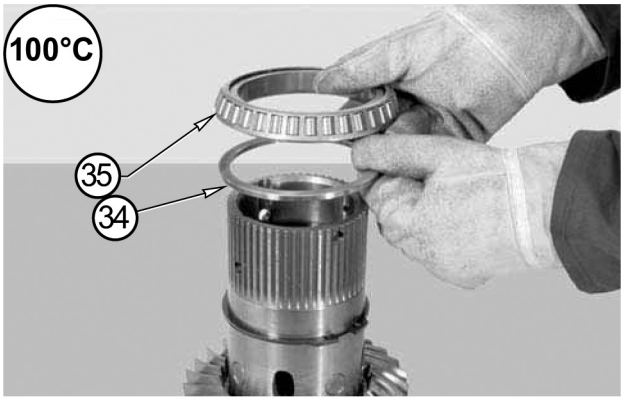
MAP18910

15. Assemble the bearing (**1**)

Note: *Heat the bearing to 100 °C before assembling.*

MAP18920

16. Assemble the snap ring (**33**) in its seat.



MAP18930

17. Assemble shim (**34**) and bearing (**35**).

Note: *Heat the bearing as well as the shim to 100 °C before assembling.*

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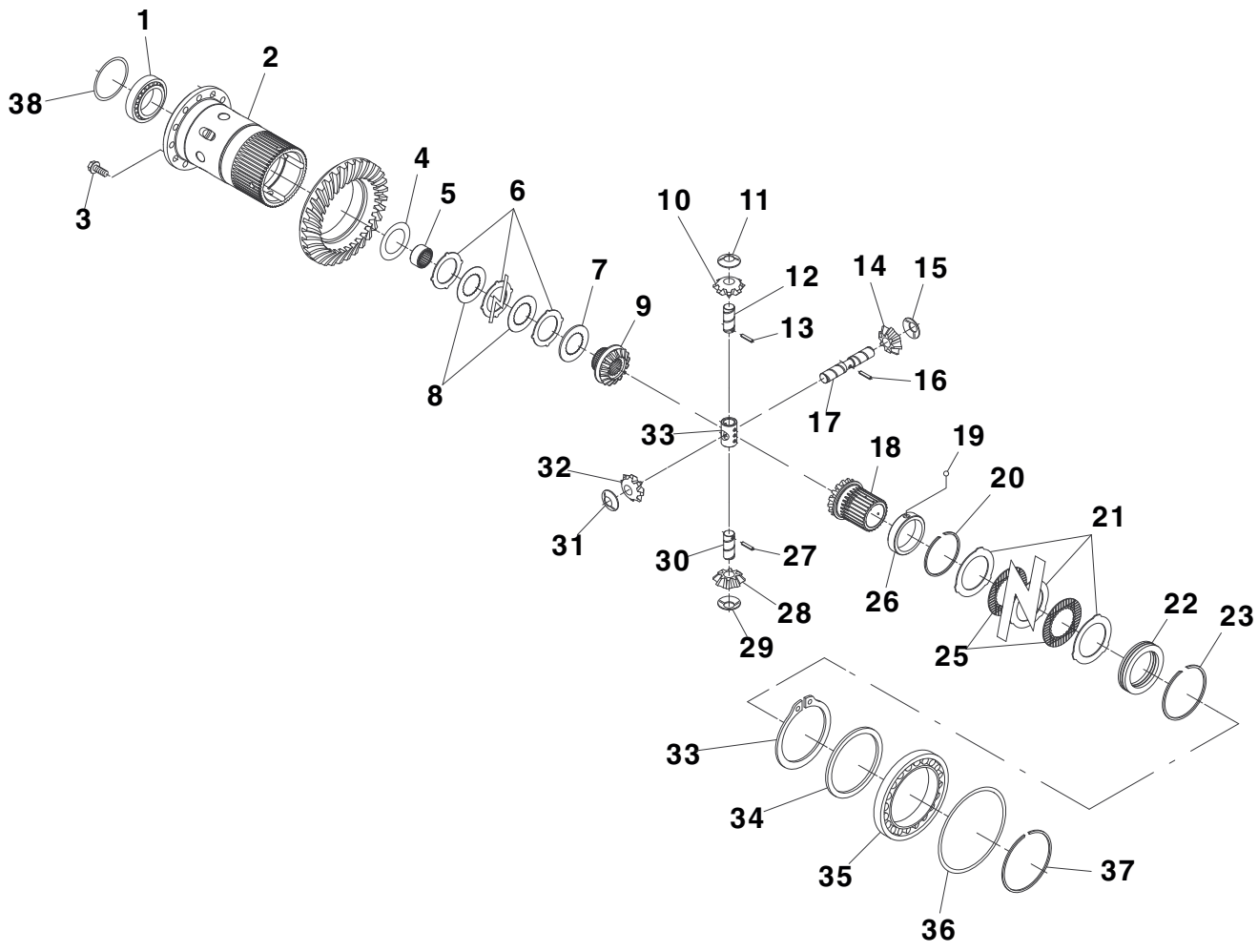
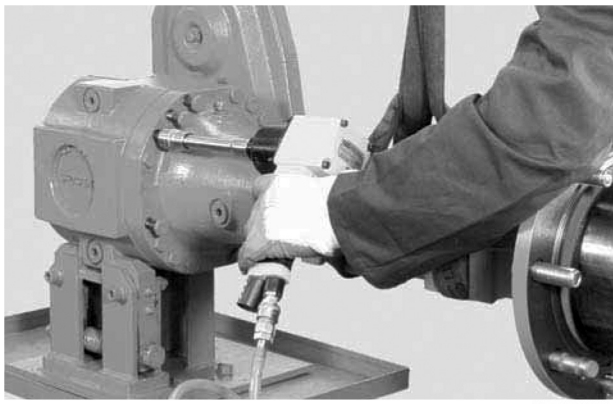
Section 25
Preloaded Limited Slip Differential Unit 45%(Intermediate Version)

25.1 EXPLODED VIEW



MAP18940

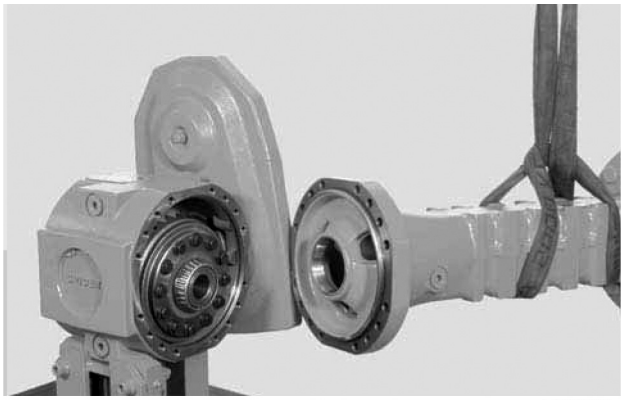
25.2 PRELOADED LIMITED SLIP DIFFERENTIAL UNIT45% (INTERMEDIATE VERSION) - DISASSEMBLY



MAP18950

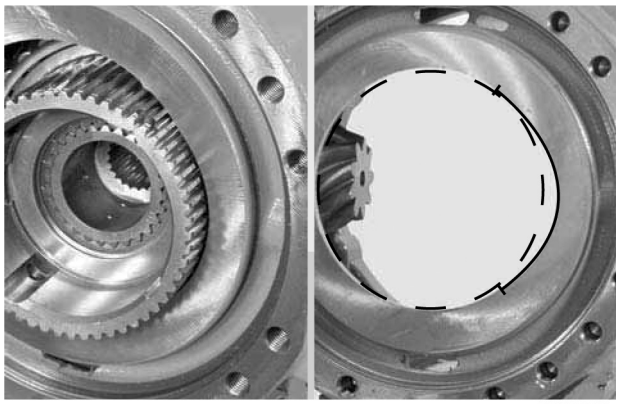
1. Remove the brake side arm and the brake discs pack. Sling the arm to be removed and connect it to a hoist. Remove screws of the ring gear side arm

.



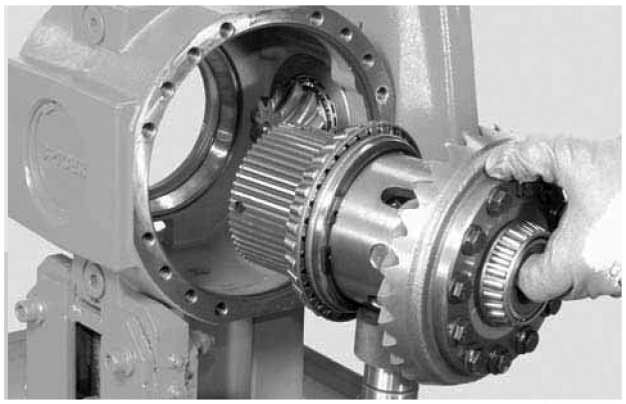
MAP18960

2. Place the arm on a bench.



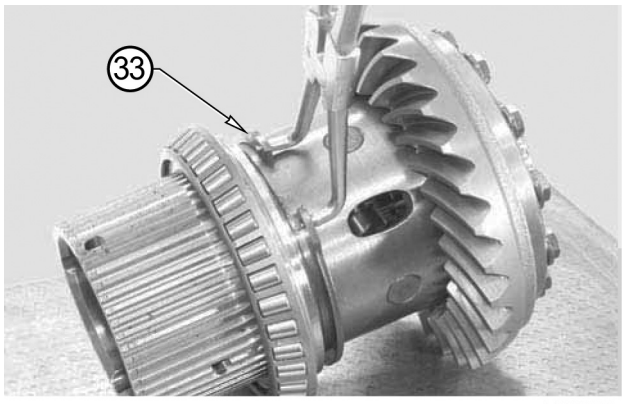
MAP18970

3. Position the differential gear sideways into the recess in order to be able to pull it out.



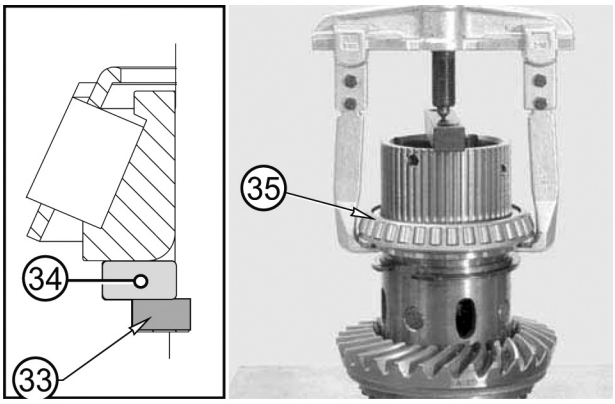
MAP18980

4. Pull out the differential.



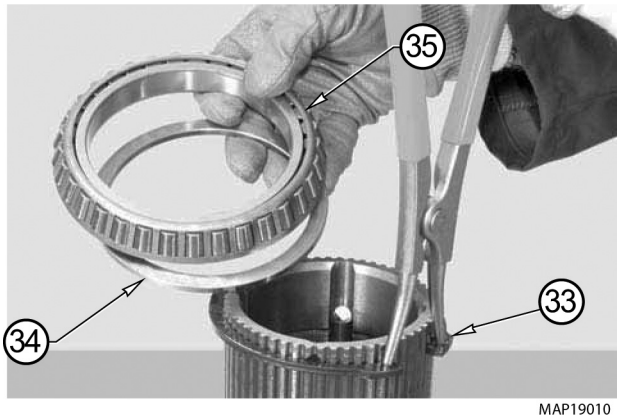
MAP18990

5. Remove the snap ring (**33**) out of its seat by moving it sideways.



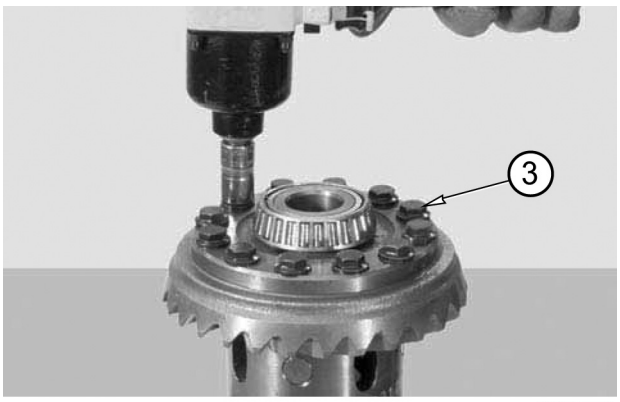
MAP19000

6. Using a puller, extract the bearing (**35**) and the washer (**34**).



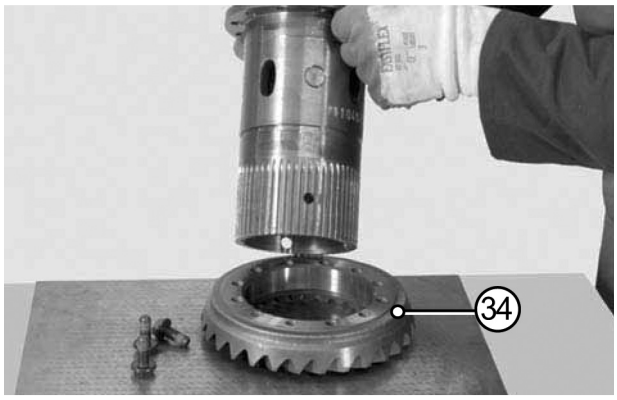
MAP19010

7. Remove completely bearing (**35**), washer (**34**) and snap ring (**33**).



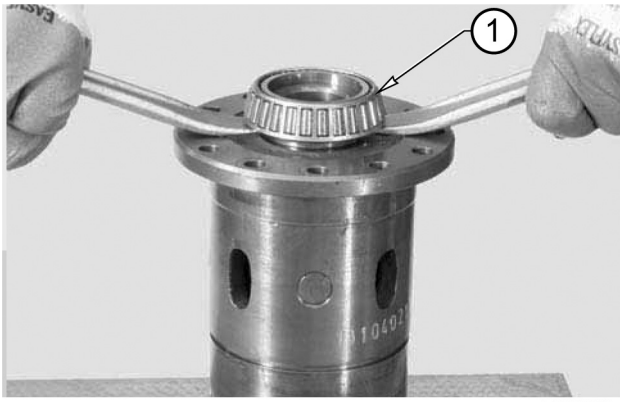
MAP19020

8. Remove the cap screws (**3**) of crown. Renew the screws (**3**) at each reassembly.



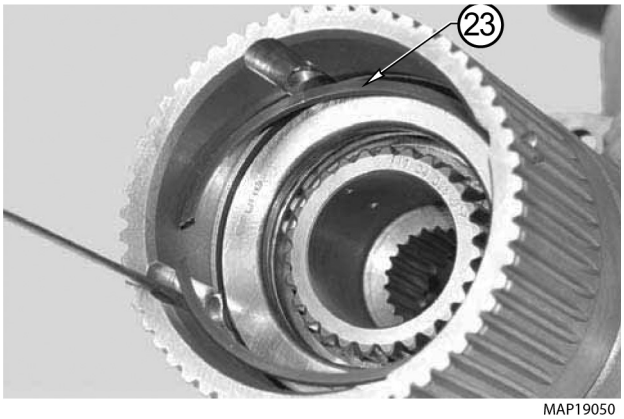
MAP19030

9. Extract the ring gear (**34**).



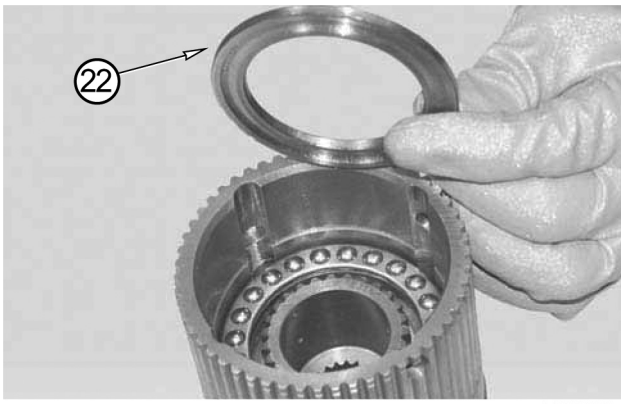
MAP19040

10. Remove the tapered roller bearing (**1**) of the ring gear side, using two levers.



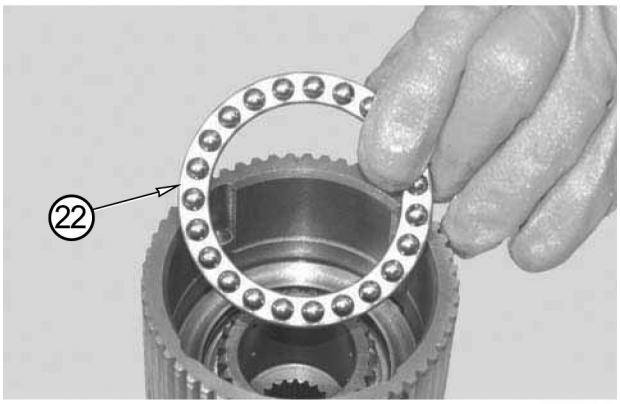
MAP19050

11. Remove the snap ring (23) that secures the thrust bearing.



MAP19060

12. Remove the thrust block (**22**).



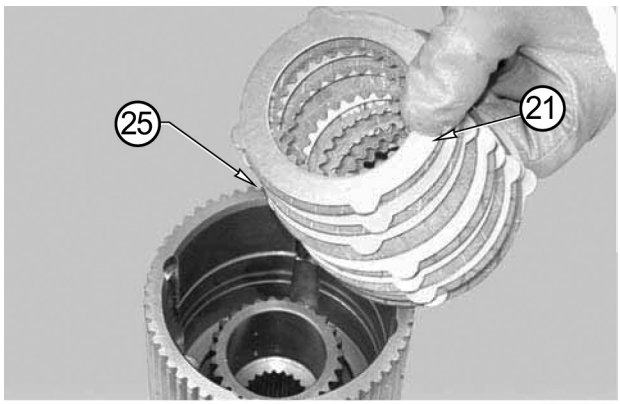
MAP19070

13. Remove the thrust bearing (**22**).

MAP19080

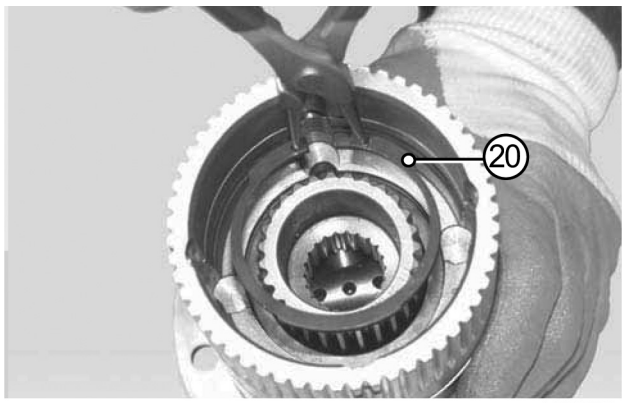
14. Remove the thrust block (**22**).

.



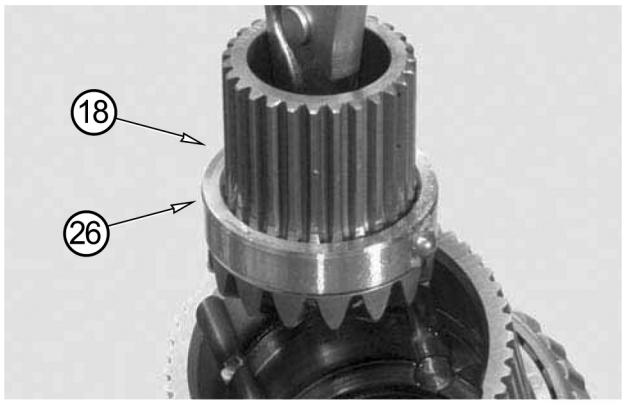
MAP19090

15. Remove the hydraulic block discs (**21**) and (**25**) one after the other.



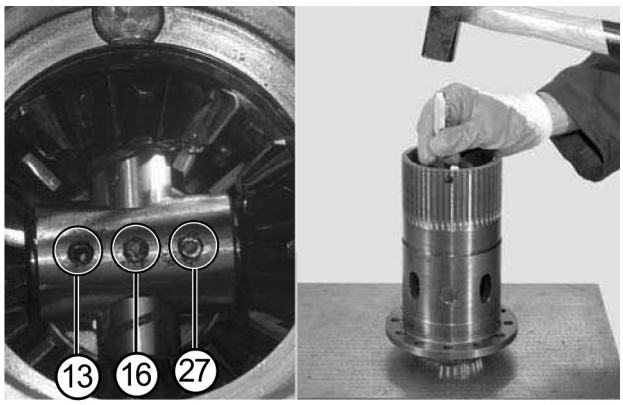
MAP19100

16. Remove the snap ring (**20**) that secures the planetary gear.



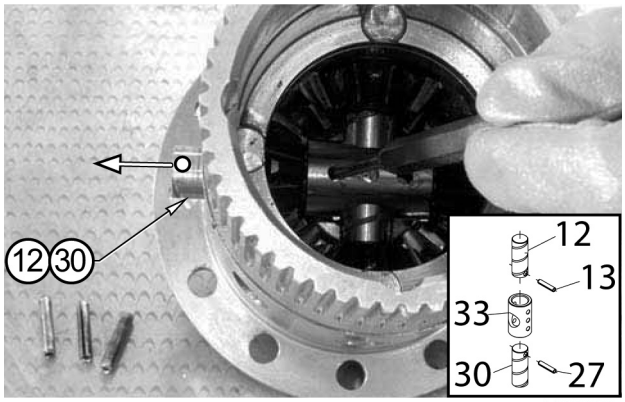
MAP19110

17. Remove the brake side planetary gear (**18**).



MAP19120

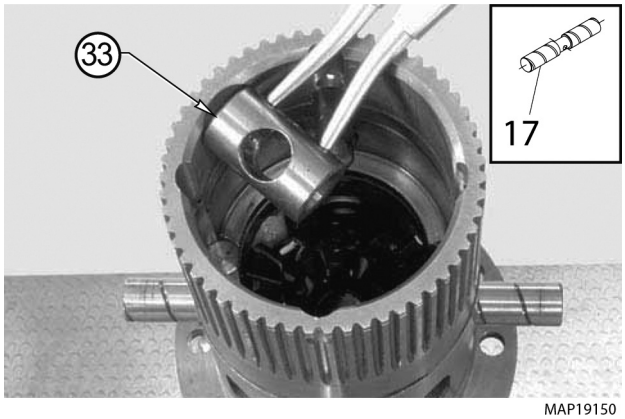
18. Remove the three spider blocking pins (**13**), (**16**) and (**27**) using a pin driver.



MAP19130

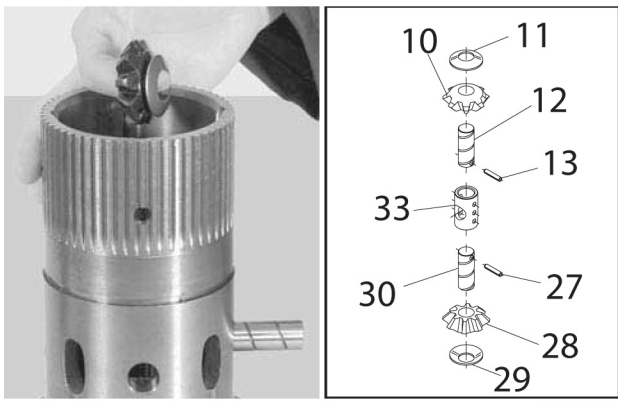
19. Move the two opposite mounted short bolts (**12**) and (**30**) to the outside of the box using the same pin driver.

.



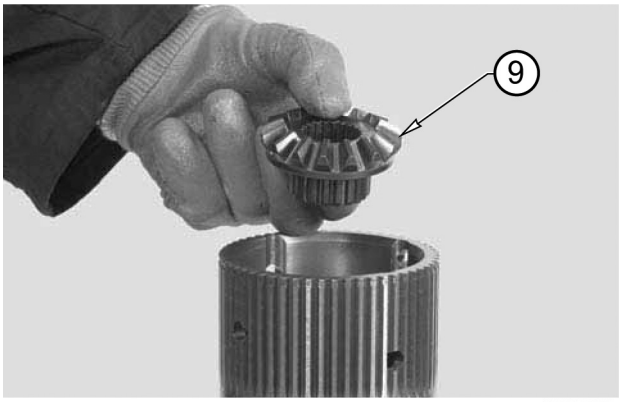
MAP19150

20. Drive out the long bolt (**17**) and pull out the spider (**33**) from the center.



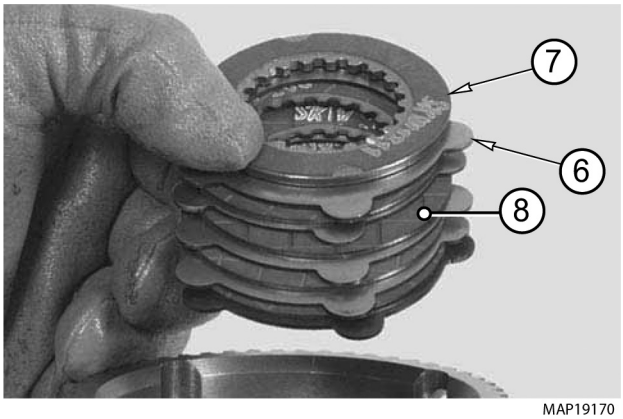
MAP19140

21. Remove long bolt (**17**), spherical washers (**11**) and (**29**).



MAP19160

22. Remove the planetary gear (**9**).

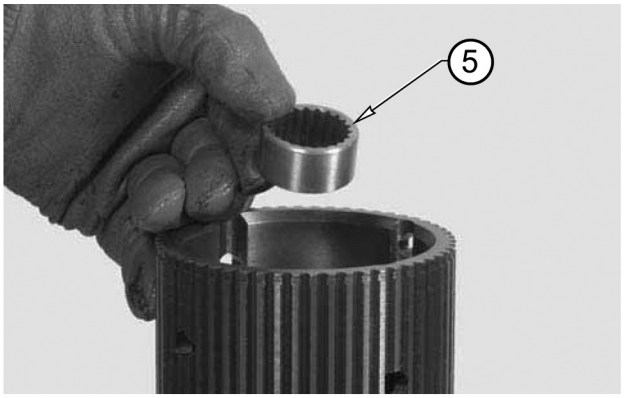


MAP19170

23. Remove the limited slip friction disks (**6**), (**7**) and (**8**).

CAUTION

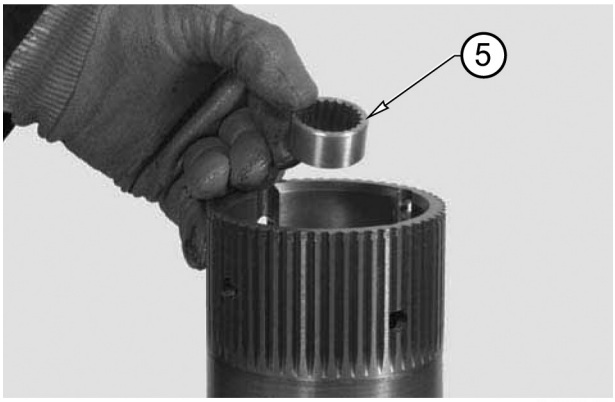
Do not change the position of the friction disks.



MAP19180

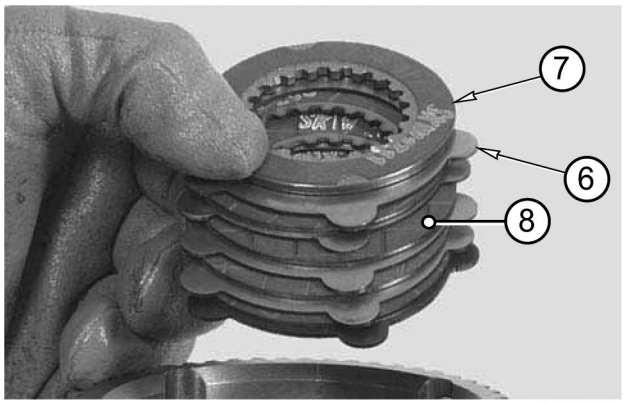
24. Remove the half shaft bushing (**5**).

25.3 PRELOADED LIMITED SLIP DIFFERENTIAL UNIT 45%(INTERMEDIATE VERSION) - ASSEMBLY



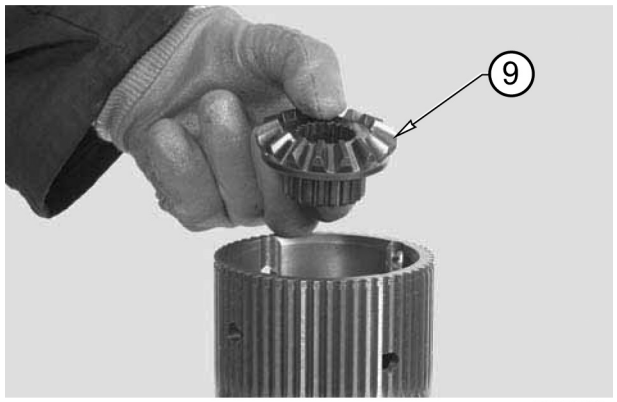
MAP19190

1. Install the half shaft bushing (**5**).



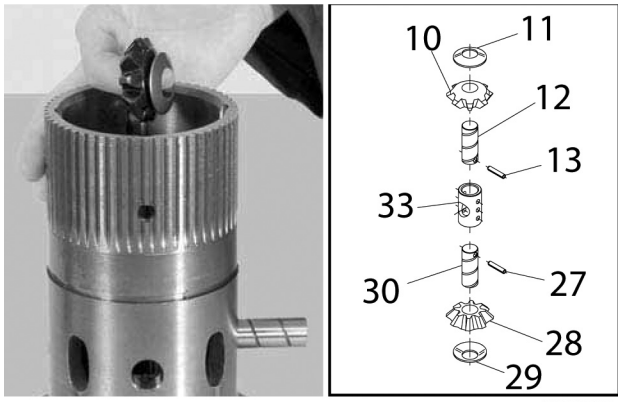
MAP19200

2. Insert in the body of the differential unit any required shims and the friction disks (**6**), (**7**) and (**8**).



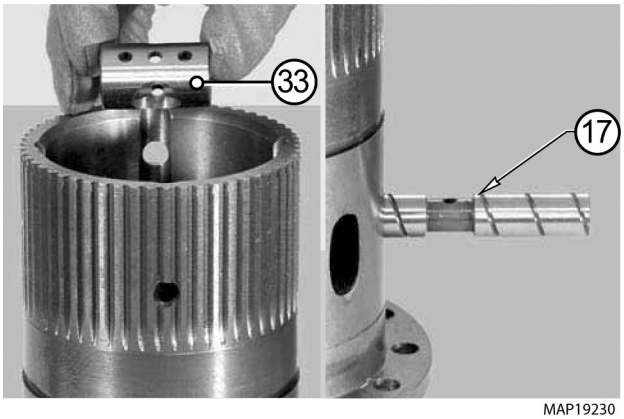
MAP19210

3. Install the planetary gear (**9**).



MAP19220

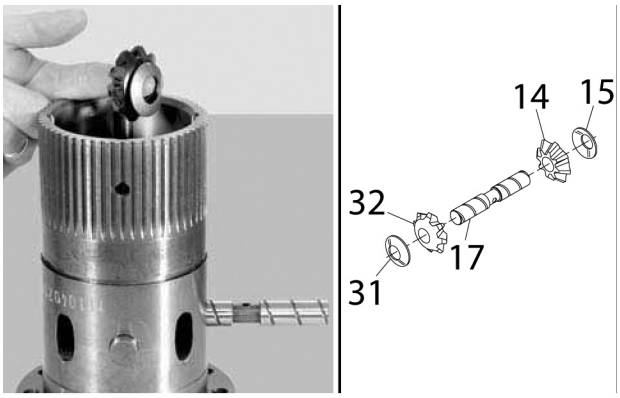
4. Install the planetary gears (**10**) and (**28**) and spherical washers (**11**) and (**29**) onto the shafts (**12**) and (**30**).



MAP19230

5. Insert spider (**33**) and partially insert the long bolt (**17**).

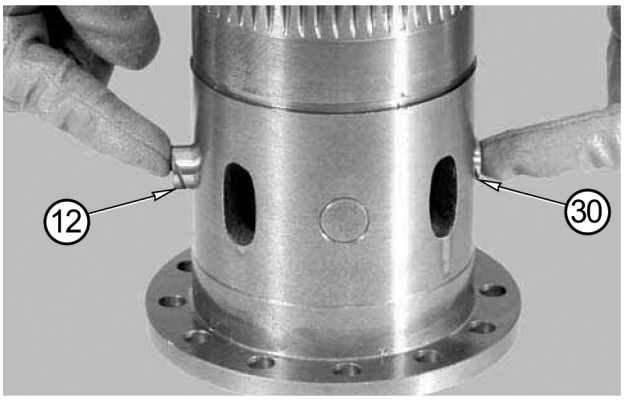
.



MAP19240

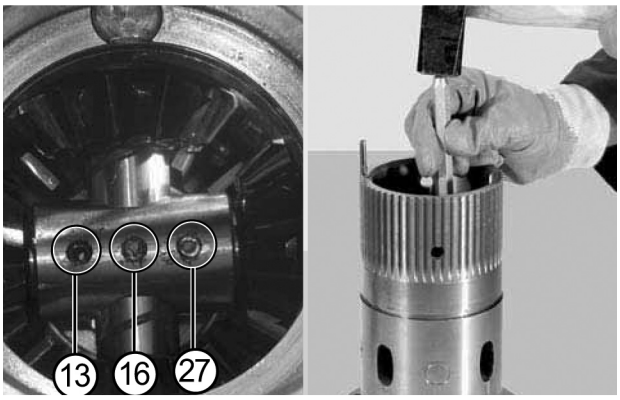
6. Satellite gears (**32**) and (**14**), spherical washers (**15**) and (**31**) and completely insert the long bolt (**17**).

.



MAP19250

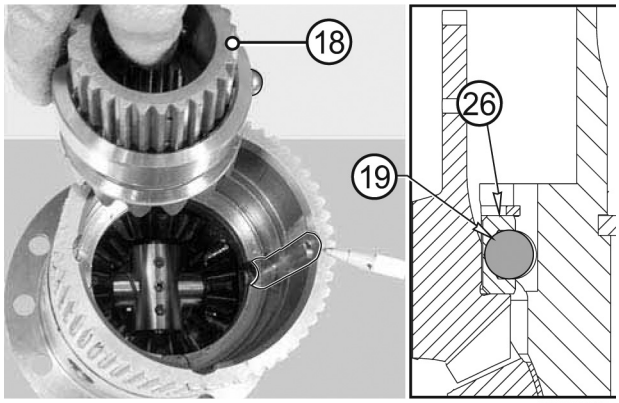
7. Insert completely the half bolts (**30**) and (**12**).



MAP19260

8. Center the pin holes and insert the **3** pins (**13**), (**16**) and (**27**).

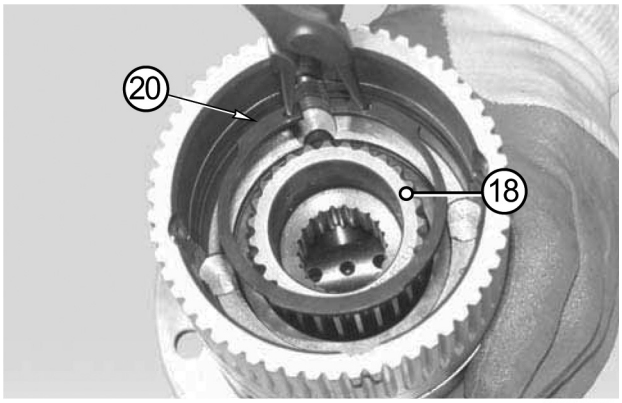
Note: *Check the free rotation of the satellite wheels on the bolts.*



MAP19270

9. Insert the planetary wheel (**18**) together with the centering sleeve (**26**).

Note: *The centering sleeve must have the fixing ball (**19**) assembled.*

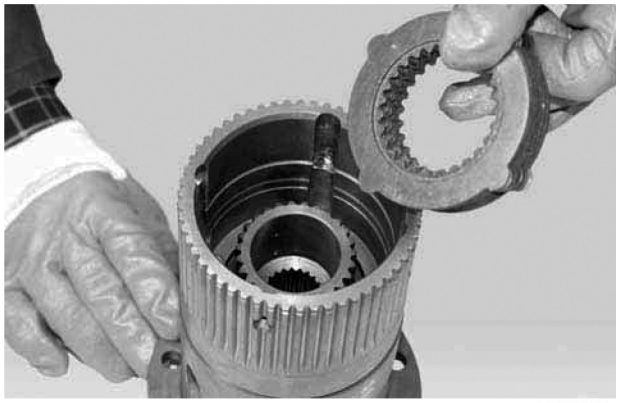


MAP19280

10. Insert snap ring (**20**) of the planetary wheel (**18**).

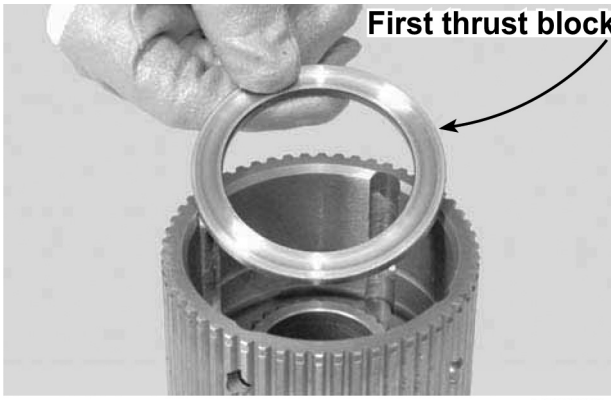
⚠ CAUTION

First and last disc have to be of steel material.



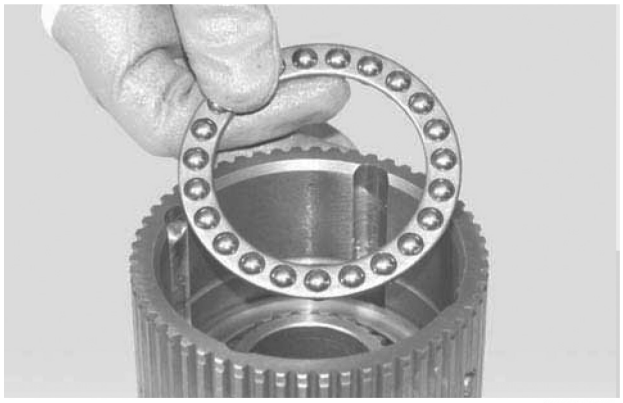
MAP19290

11. Insert and substitute, if necessary, the discs of the differential lock.



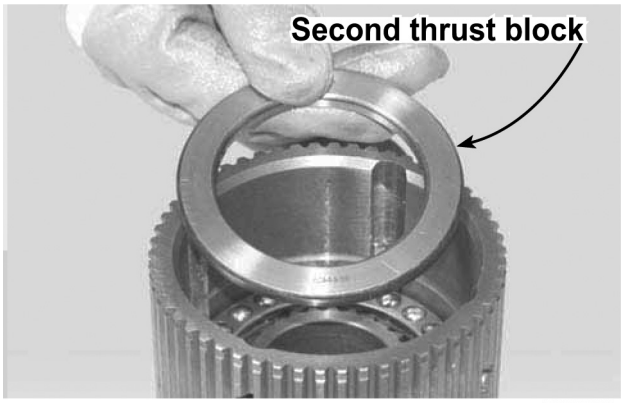
MAP19300

12. Install the thrust block with maximum internal diameter.



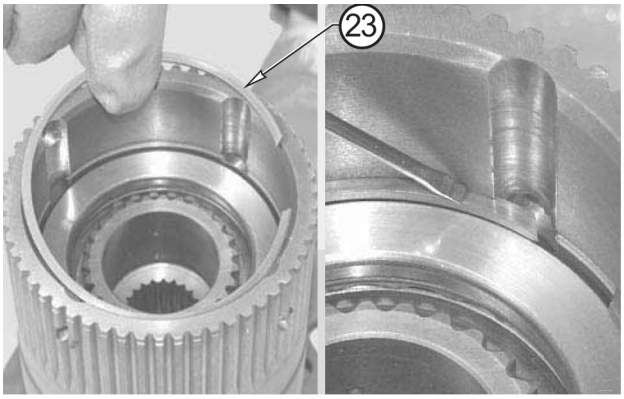
MAP19310

13. Position the bearing (**22**) in the differential unit.



MAP19320

14. Install the thrust block with minimum internal diameter.



MAP19330

15. Positioning the snap ring (**23**).

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

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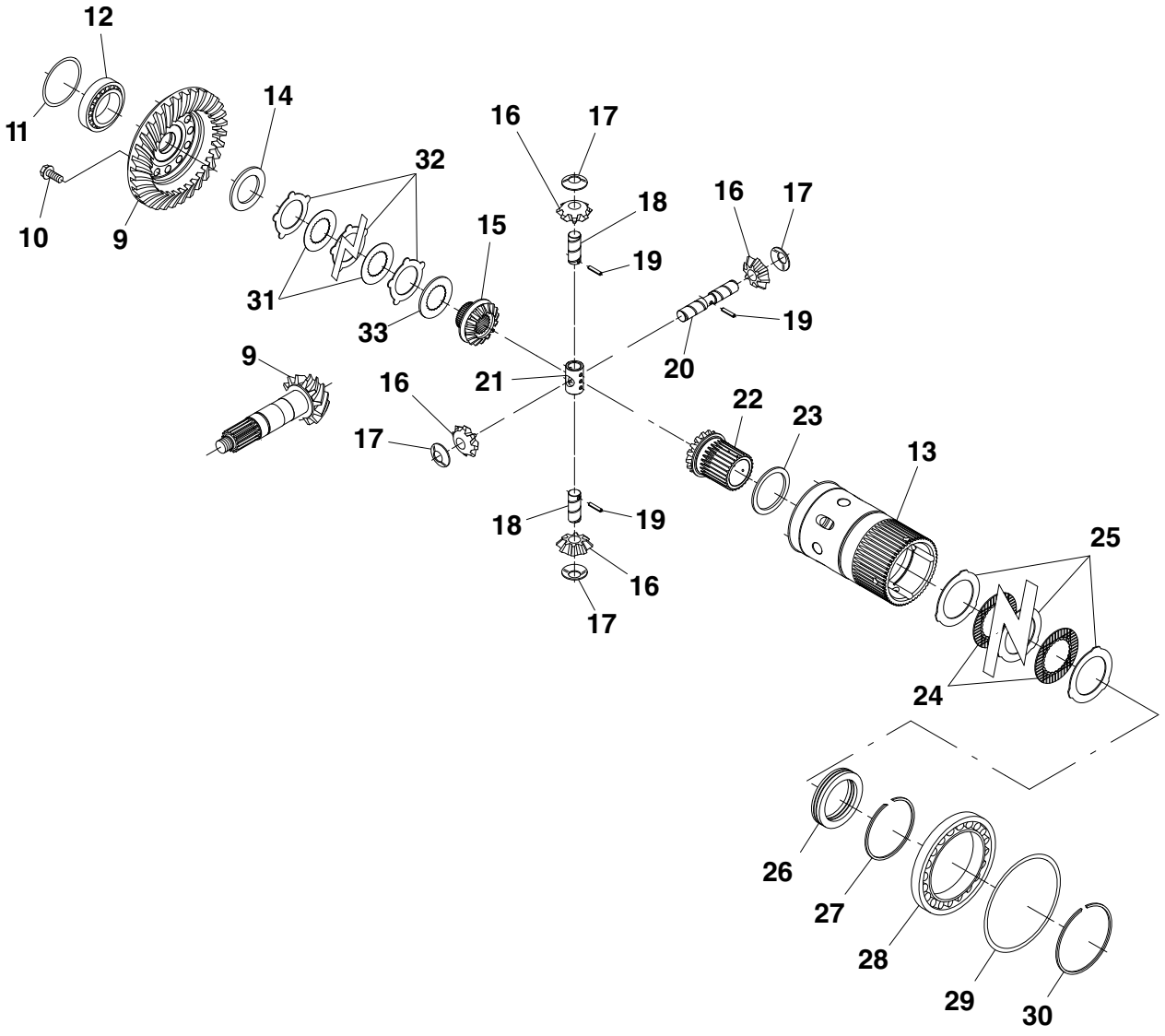
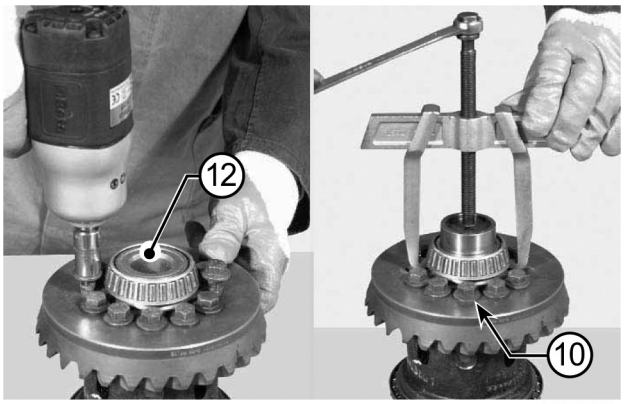
Section 26
Preloaded Limited Slip Differential Unit 45%(Last Version)

26.1 EXPLODED VIEW



MAP19340

26.2 PRELOADED LIMITED SLIP DIFFERENTIAL UNIT 45%(LAST VERSION) - DISASSEMBLY

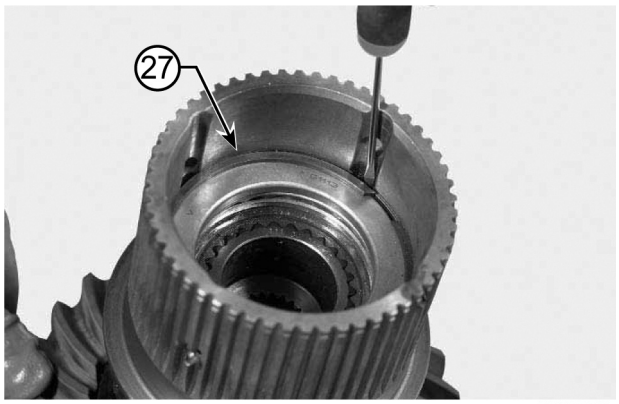


MAP19350

1. If the bearing (**12**) has to be replaced, remove two retaining screws (**10**) from the crown and, using an extractor, remove the crown bearing (**9**).

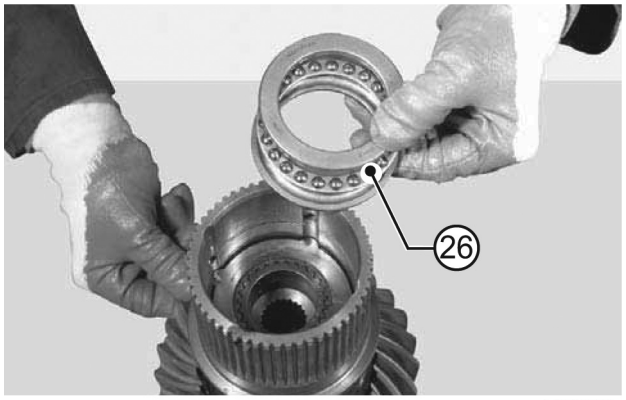
MAP19360

2. If the bearing needs replacing, extract the bearing (**28**) from the differential carrier.



MAP19370

3. Remove the snap ring (**27**).

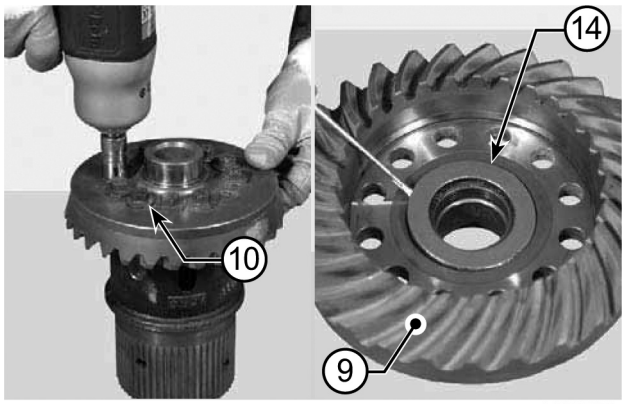


MAP19380

4. Remove the thrust block (**26**).
5. Remove the thrust bearing (**26**).
6. Remove the thrust block (**26**).

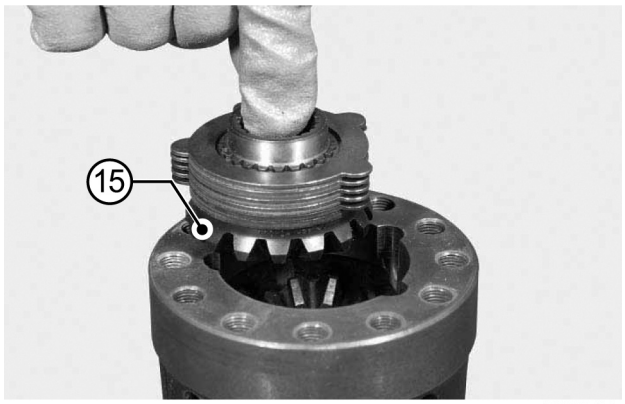
MAP19390

7. Remove the hydraulic block discs (**24** and **25**) one after the other.



MAP19400

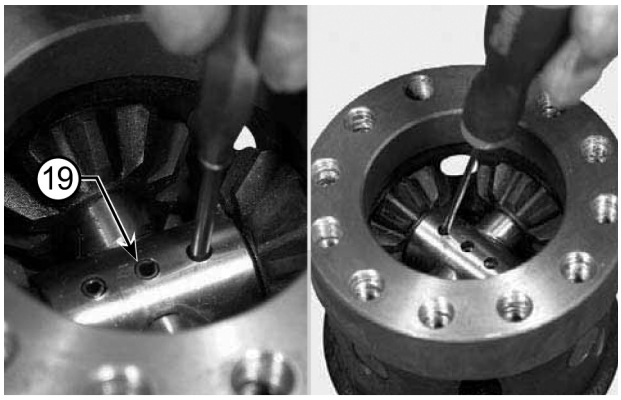
8. Remove cap screws (**10**) of the ring gear (**9**); Replace each time when removed.
9. Extract the ring gear (**9**).
10. Remove the shim washer (**14**).



MAP19410

11. Remove the planetary gear (**15**) and the whole friction assembly concerned.

.

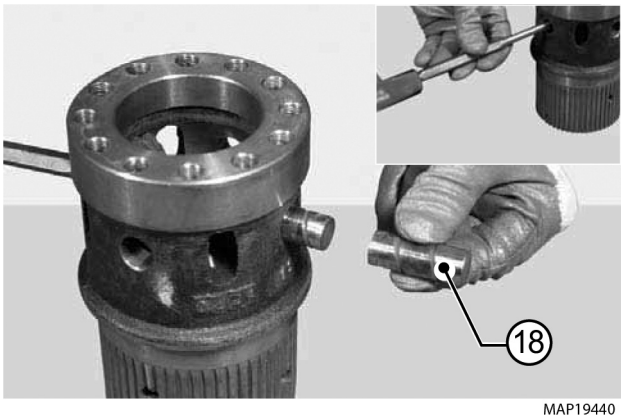


MAP19420

12. Remove the three spider blocking pins (**19**) by using a pin driver. Move the two opposite mounted short bolts (**18**) to the outside of the box using the same pin driver.

MAP19430

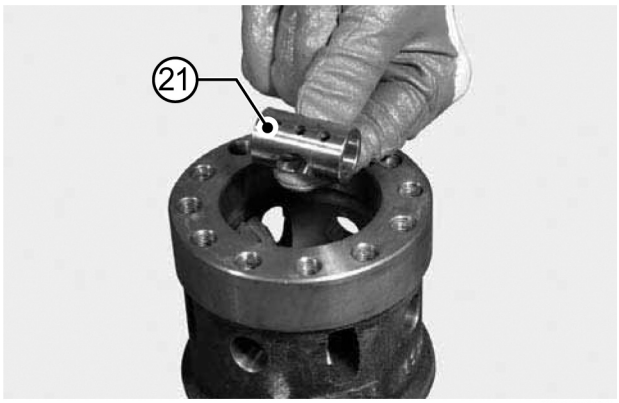
13. Remove the bolts with the help of a drift (**20**).



MAP19440

14. Remove the two half bolts (**18**), spherical washers (**17**) and satellite gears (**16**).

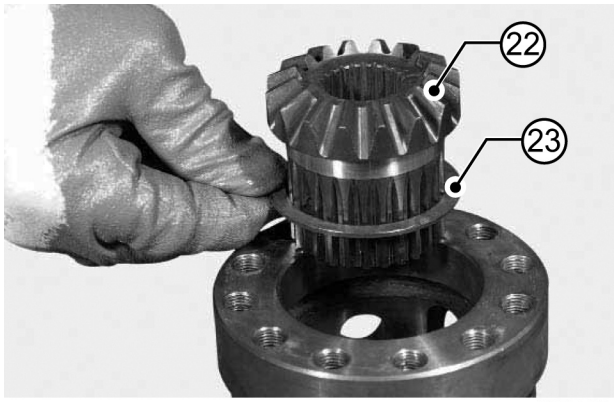
.



MAP19450

15. Remove the cross bolts (**21**)

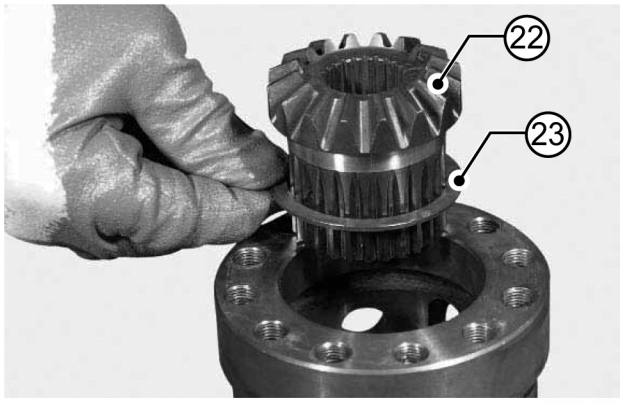
.



MAP19460

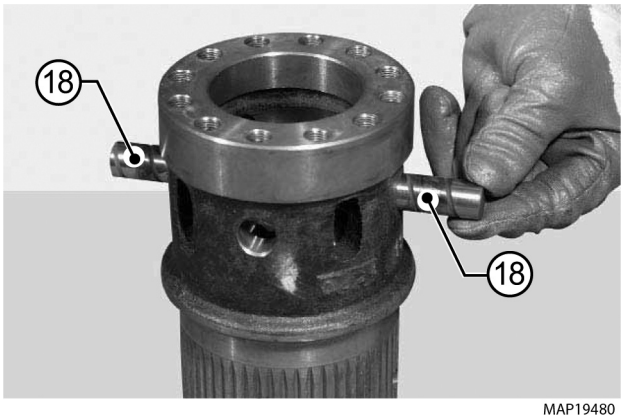
16. Remove the planetary gear (**22**) with washer (**23**).

26.3 PRELOADED LIMITED SLIP DIFFERENTIAL UNIT 45%(LAST VERSION) - ASSEMBLY



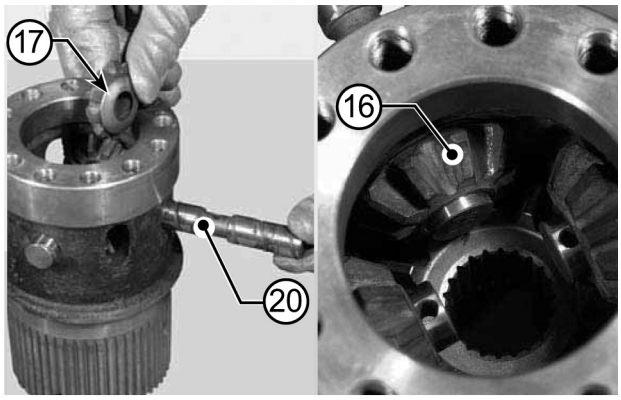
MAP19470

1. Lubricate and insert washer (**23**) and planetary gear (**22**).



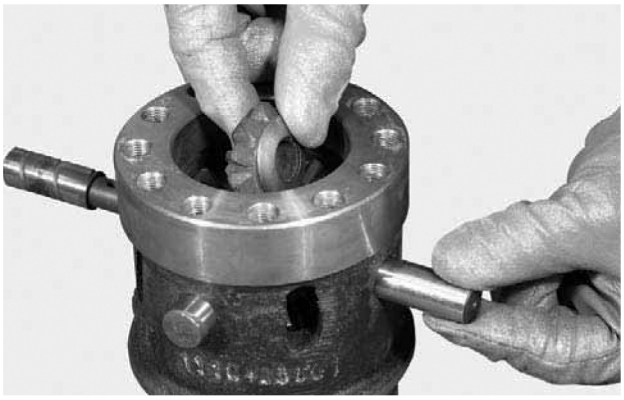
MAP19480

2. Insert the two half bolts (**18**), spherical washers (**17**) and satellite gears (**16**).



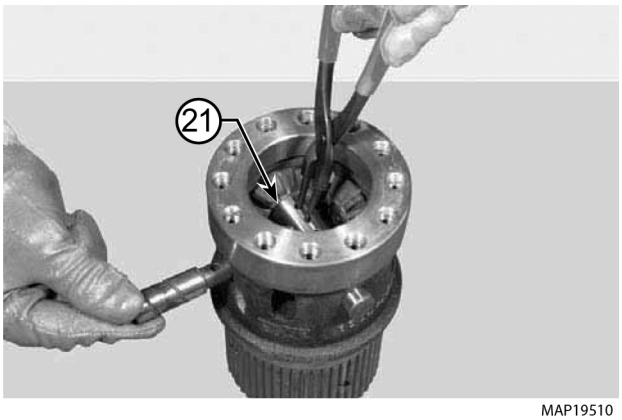
MAP19490

3. Partially insert the long bolt (**20**), satellite gears (**16**) and spherical washers (**17**).



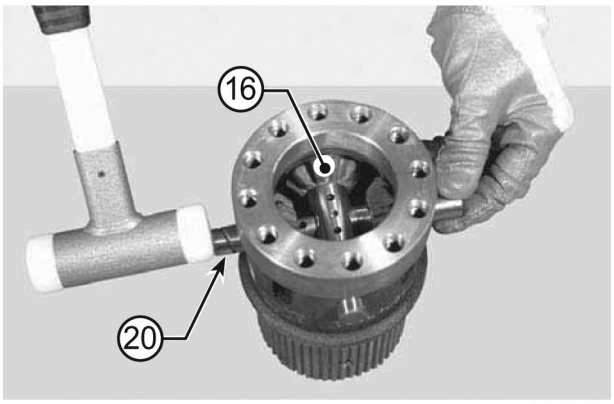
MAP19500

4. Place the planetary gear (**16**) and the spherical washer (**17**) in the box and fix with a fake pin of suitable diameter.



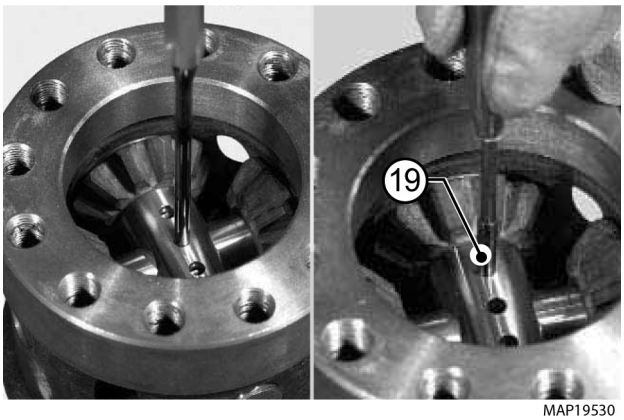
MAP19510

5. Insert the cross bolt (**21**) in the correct position.



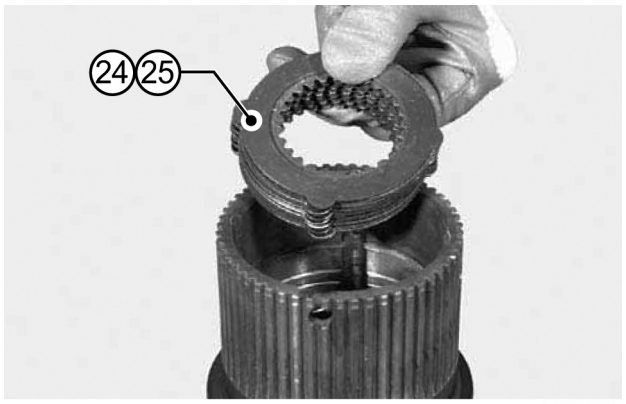
MAP19520

6. Satellite wheels (**16**), spherical washers (**17**) and completely insert the long bolt (**20**).



MAP19530

7. Bring the pin holes in line with the help of a pin driver. Insert pins (**19**) to end of stroke.

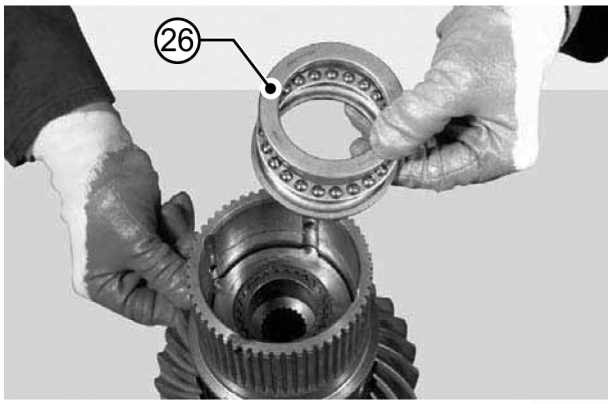


MAP19540

8. Insert and replace, if necessary, the discs of the differential lock (**24** and **25**).

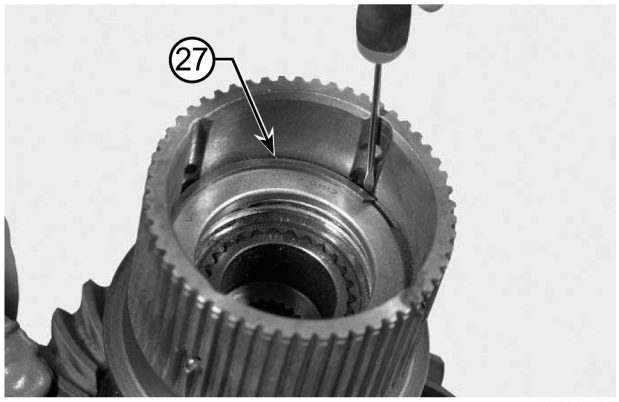
⚠ CAUTION

First and last disc have to be of steel (**25**).



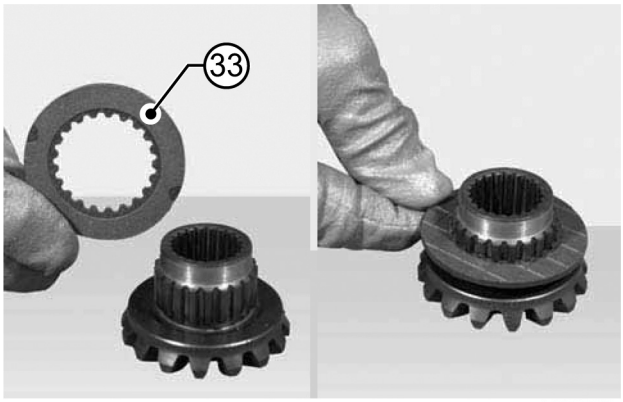
MAP19550

9. Install the thrust block with maximum internal diameter.
10. Position the bearing (**26**) in the differential unit.
11. Install the thrust block with minimum internal diameter.



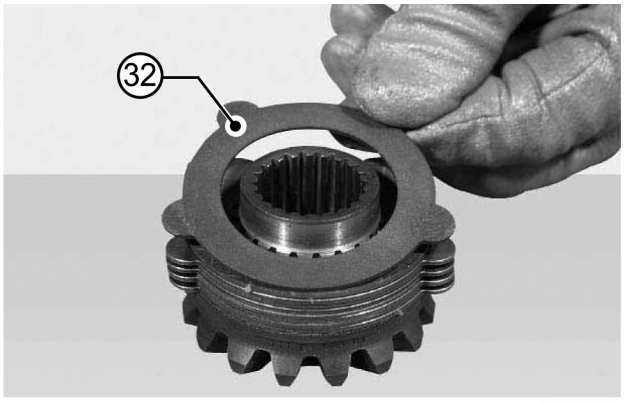
MAP19560

12. Insert the snap ring **(27)**.



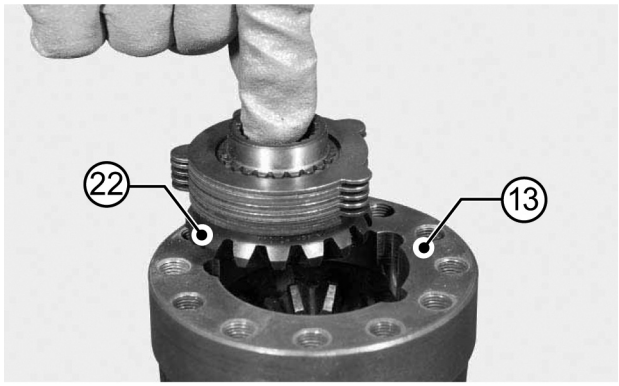
MAP19570

13. As to ring (**33**), the side without notches must face outwards.



MAP19580

14. 35% FRICTION UNIT COMPOSITION:
Friction discs with increased shim (**33**), steel discs (**32**) and friction discs (**31**) alternated, and end disc (**32**).



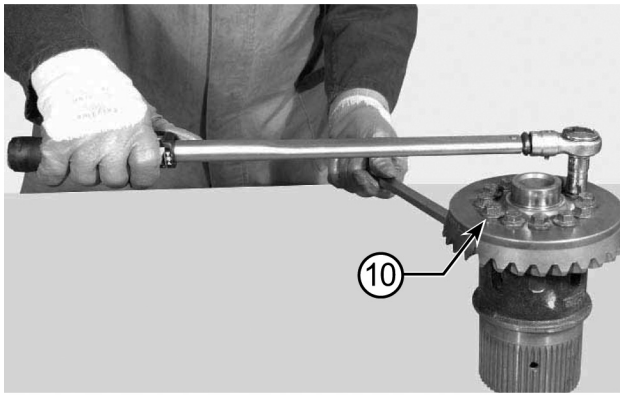
MAP19590

15. Place a friction unit and planetary gear (**22**) into the half-box (**13**).

MAP19600

16. Position the shim washer (**14**) on the crown (**9**). Install the ring gear (**9**).

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

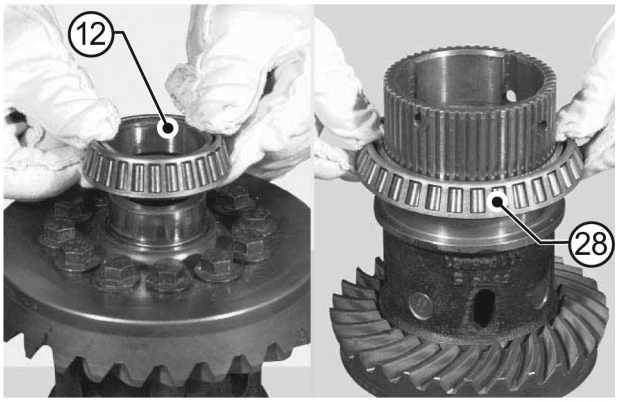


MAP19610

17. Mount the gear ring (**9**) and fasten it to the differential box with screws (**10**).

⚠ CAUTION

Use only new screws pre-treated with locking adhesive.

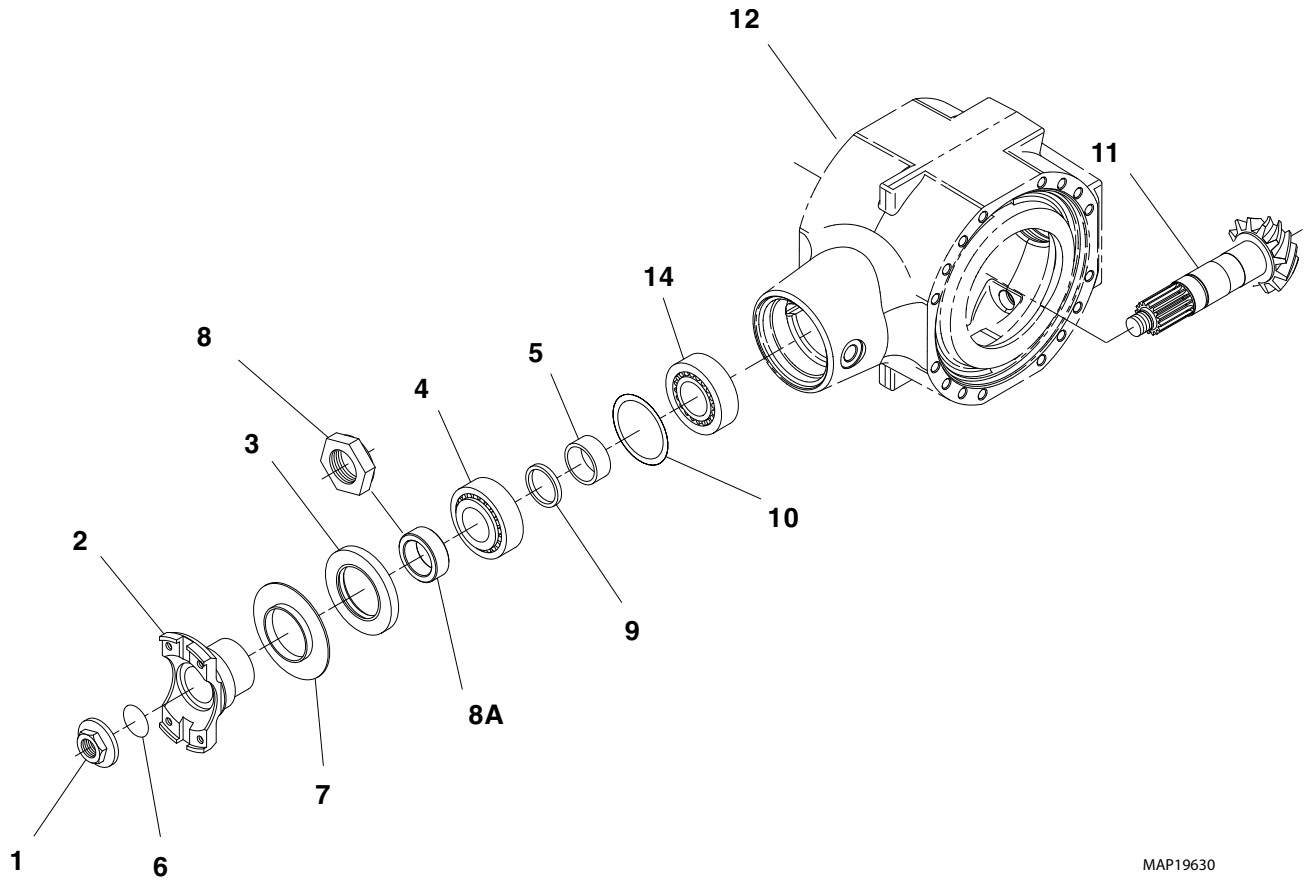


MAP19620

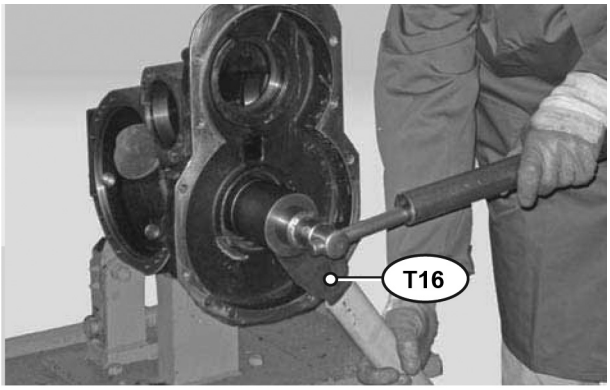
18. Heat the bearings (**12** and **28**) at 100° and insert them on differential.

Section 27
Bevel Pinion: Flanged to Reduction Gear 603

27.1 EXPLODED VIEW

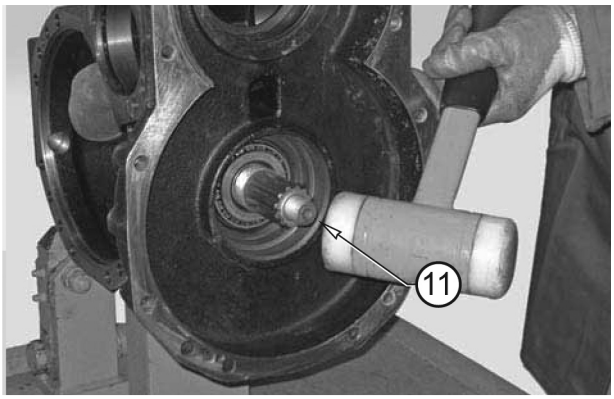


27.2 BEVEL PINION: FLANGED TO REDUCTION GEAR 603 - DISASSEMBLY



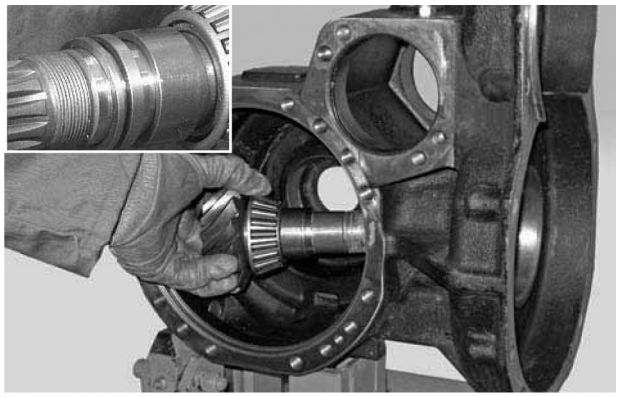
MAP19640

1. Position tool (**T16**), to avoid pinion rotation.
2. Loosen and remove the nut (**1**) and o-ring (**6**).



MAP19650

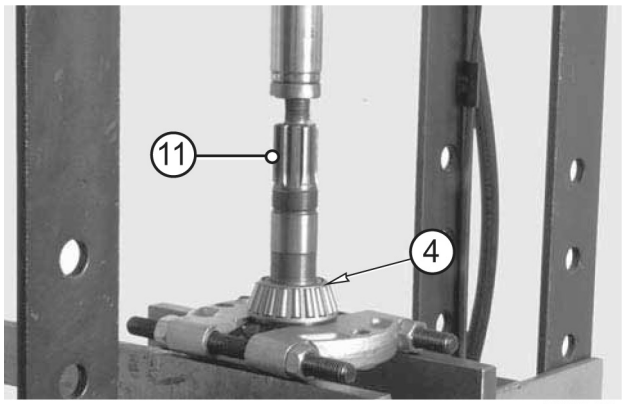
3. Remove the pinion (**11**), shims, and spacer.



MAP19660

4. Refer and keep to the positions marked during disassembly

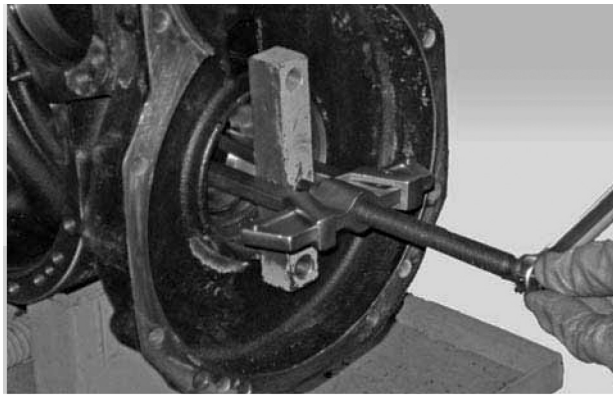
.



MAP19670

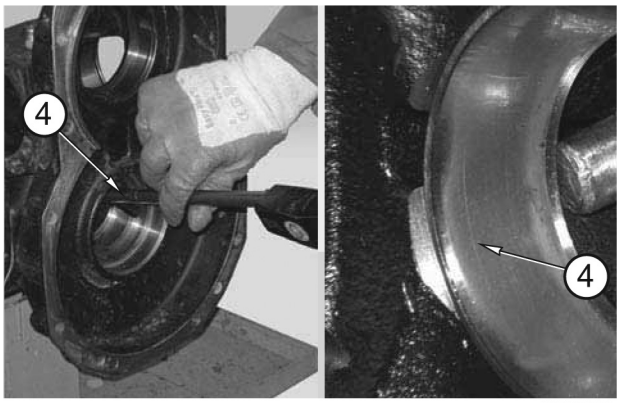
5. Using a puller and a press, remove the inner bearing (**4**) from the pinion (**11**).

.



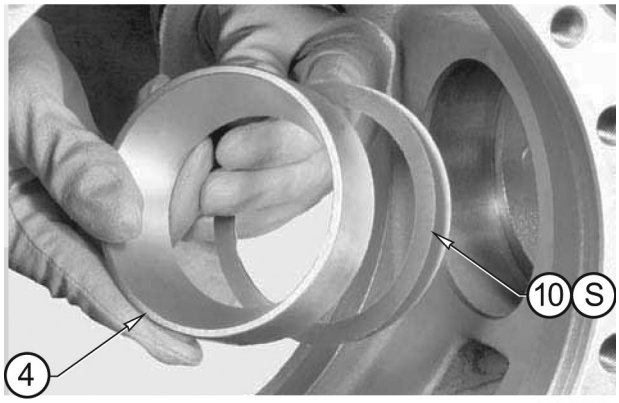
MAP19680

6. Remove the thrust block of the external bearing (**14**).



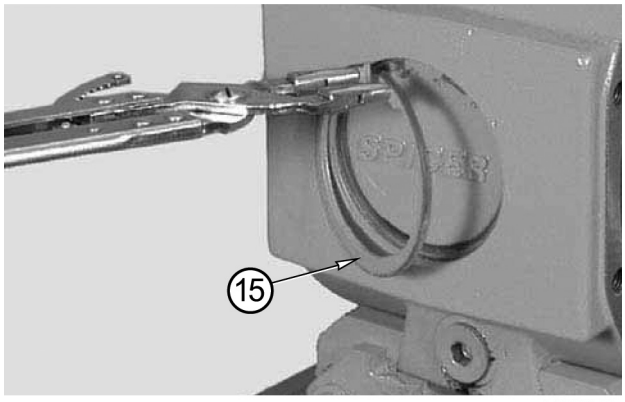
MAP19690

7. Insert a drift in the appropriate holes.



MAP19700

8. Remove the thrust block of the internal bearing (**4**) as well as the shims (**10**)(**S**).



MAP19710

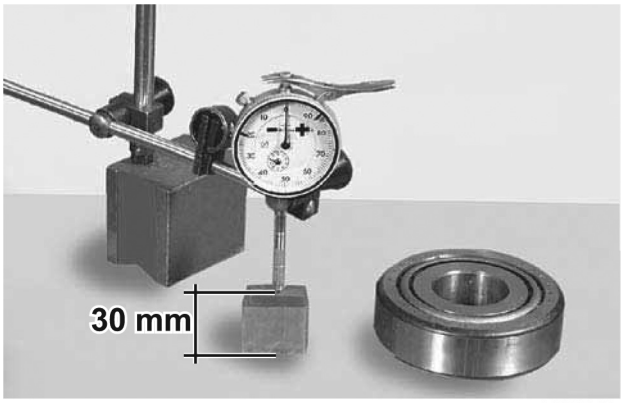
9. Remove the snap ring (**15**).

.

MAP19720

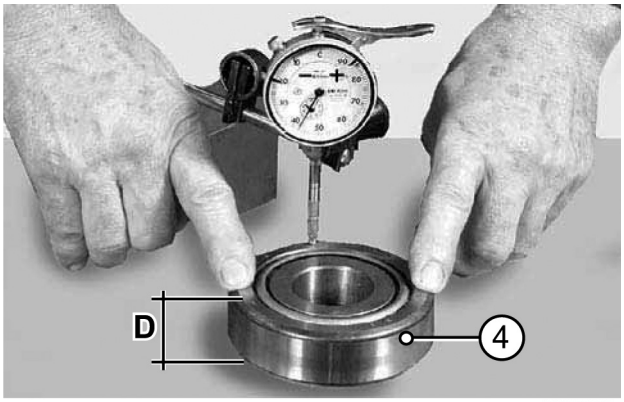
10. Remove the cap (**14**).

27.3 BEVEL PINION: FLANGED TO REDUCTION GEAR 603 - ASSEMBLY



MAP19730

1. **CALCULATING PINION CENTER DISTANCE:** Using a faceplate, reset a dial indicator "DG" on a calibrated block (whose known thickness is 30 mm.
2. Preload the depth gauge by about 3 mm.

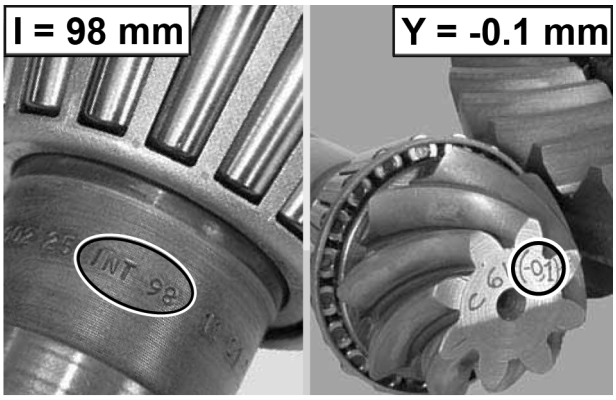


MAP19740

3. Bring inner bearing (4), complete with thrust block, under depth gauge "DG".
   EXAMPLE: 30 - 0.55 = 29.45 = "D".

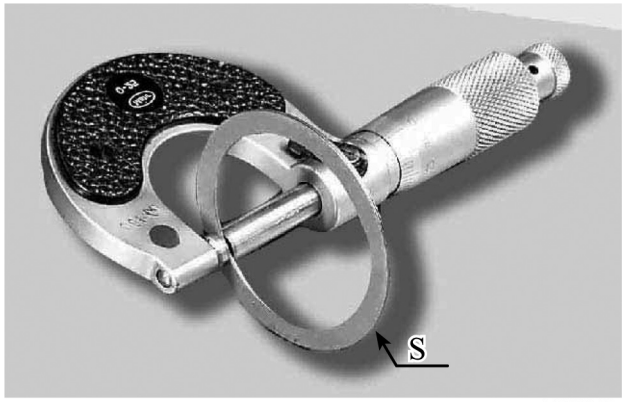
⚠ CAUTION

Press the thrust block centrally and carry out several measurements by rotating the thrust block.



MAP19750

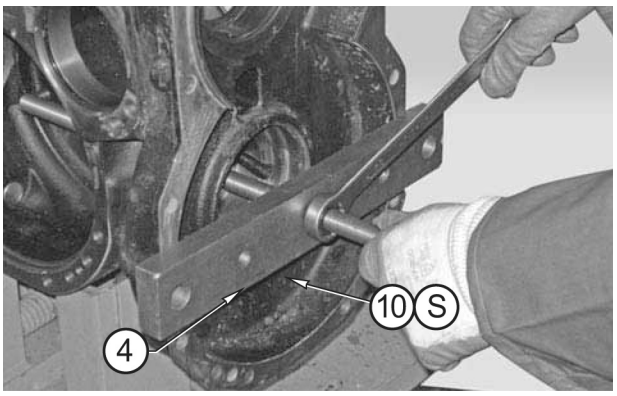
4. Check nominal dimension "I" as marked on the pinion. Add up to or subtract from "I" the variation indicated as "Y " to obtain the actual center distance "I".
   EXAMPLE: I=INT ± Y ==98-0.1=97.9mm.



MAP19760

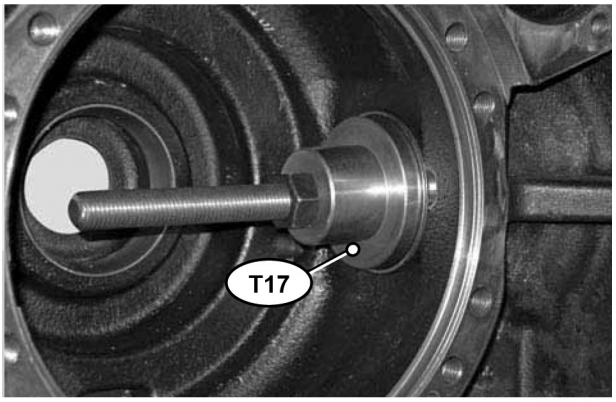
5. Calculate shims "S" for insertion under the thrust block of the inner bearing using the following formula:
   S = X - (I + D) where: X = fixed dimension
   I = actual pinion center distance
   D = Total bearing thickness;
   EXAMPLE: S = 128 - (97.9+29.45) = 0.65 mm.

.



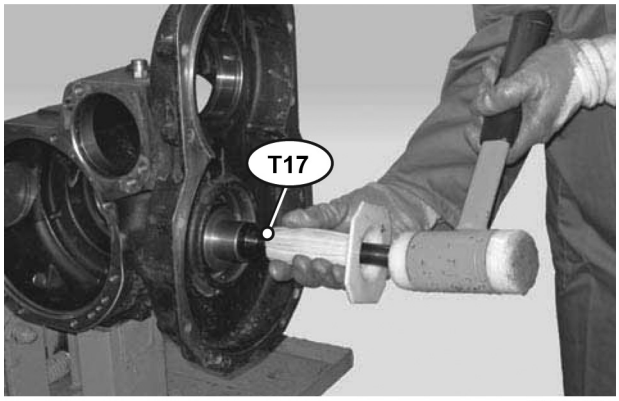
MAP19770

6. Using special tool (**T17**) insert the thrust block of the bearings (**4**) and shims (**10**).



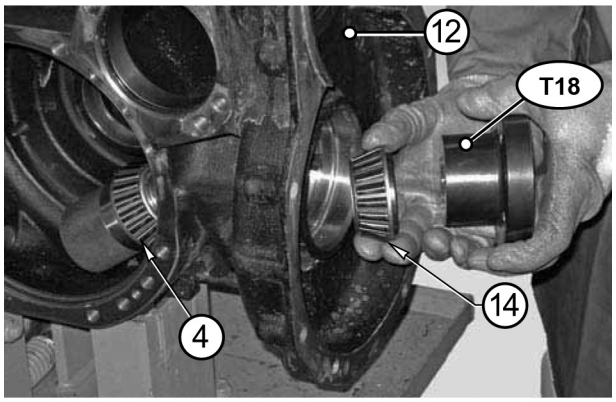
MAP19780

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



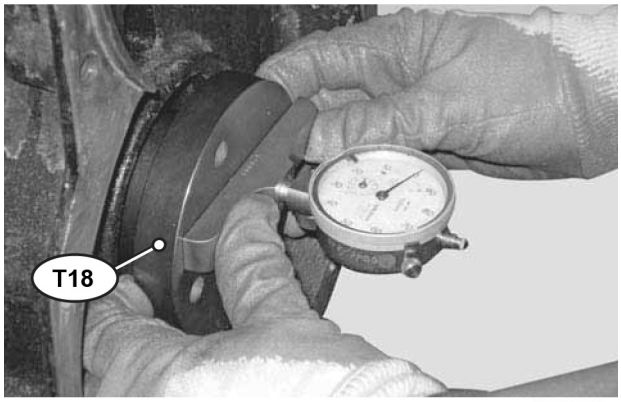
MAP19790

8. Using special tool (**T17**) insert the thrust block of the bearings (**4**)and shims (**10**).



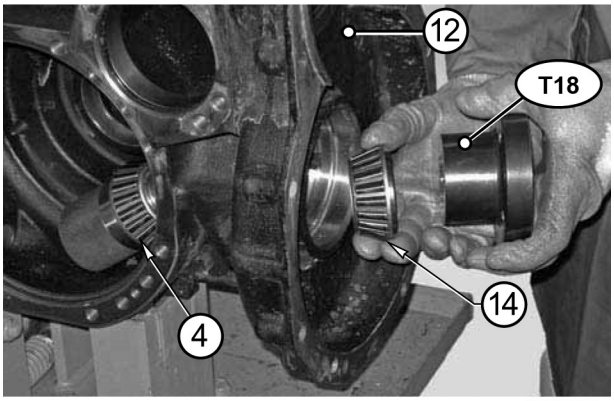
MAP19800

9. **CALCULATING PINION BEARINGS ROLLING TORQUE:** Introduce tool (**T18**) complete with bearings (**4**) and (**14**) into the main body (**12**); tighten by hand until a rolling torque is definitely obtained.



MAP19810

10. Introduce the tracer of a depth gauge “DDG” into either side hole of tool (**T18**) Reset the dial indicator with a preload of about 3 mm.

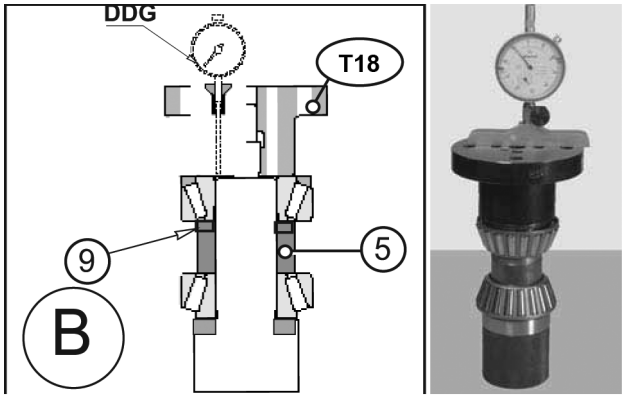


MAP19800

11. Remove the depth gauge and take out tool (**T18**) and bearing kits from the main body. Reinstall every part, also introducing a spacer between bearings (**4**) and (**14**), tighten the entire pack by hand.

MAP19830

12. Assemble on top of the tool (**T18**) and between the two bearings the shim (**5**) and the largest calibrated shim (**9**).



MAP19840

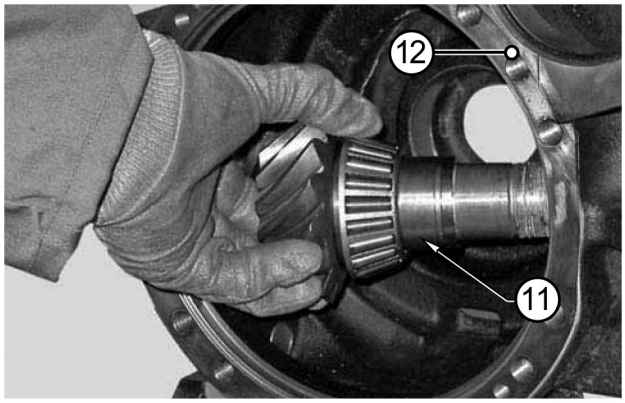
13. Measure the difference H using a dial gauge DDG
E.g. H = A -B = 2.93 mm.

MAP19850

14. Calculate the shim S2 to be inserted.
E.g. S2 = H + X = 3.01 mm
where X = fixed value to obtain = 0.07÷0.08 mm.

MAP19860

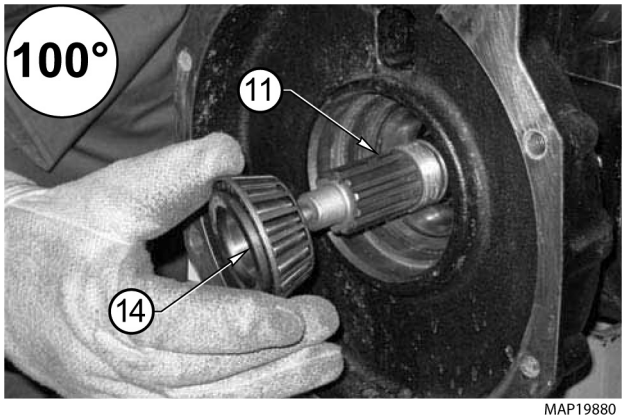
15. Heat the bearing to 100°C and assemble it to the pinion shaft.



MAP19870

16. Fit the pinion (**11**), shim "S1" (**10**) and spacer (**5**) and (**9**) in the main body (**12**).

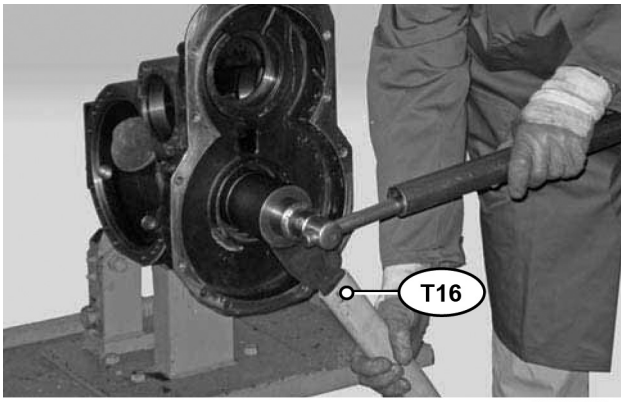
Note: *The thin shims must be placed in- between the thick ones.*



MAP19880

17. Heat the external bearing (**14**) to a temperature of about 100 C° and fit it on to the pinion (**11**) so as to complete the pack as shown in the figure.

Note: *Lightly lubricate bearing with SAE85W90 oil.*



MAP19890

18. Apply onto the pinion (**11**) the bar-hold and with the help of a torque wrench, check the torque of the pinion (**11**).
    Tightening torque: 500 Nm (369 ft.lb.)
    Rolling torque: 8 - 12 Nm (5.9-8.9 ft.lb.)

⚠ CAUTION

If torque exceeds the maximum value, then the size of shim "S1" (**4**) between the bearing (**9**) and the spacer (**3**) needs to be increased. If torque does not reach the set value, increase the torque setting of the ring nut (**10**) in different stages to obtain a maximum value of 700 Nm (516 ft.lb.) If torque does not reach the minimum value, then the size of shim "S1" (**4**) needs to be reduced.

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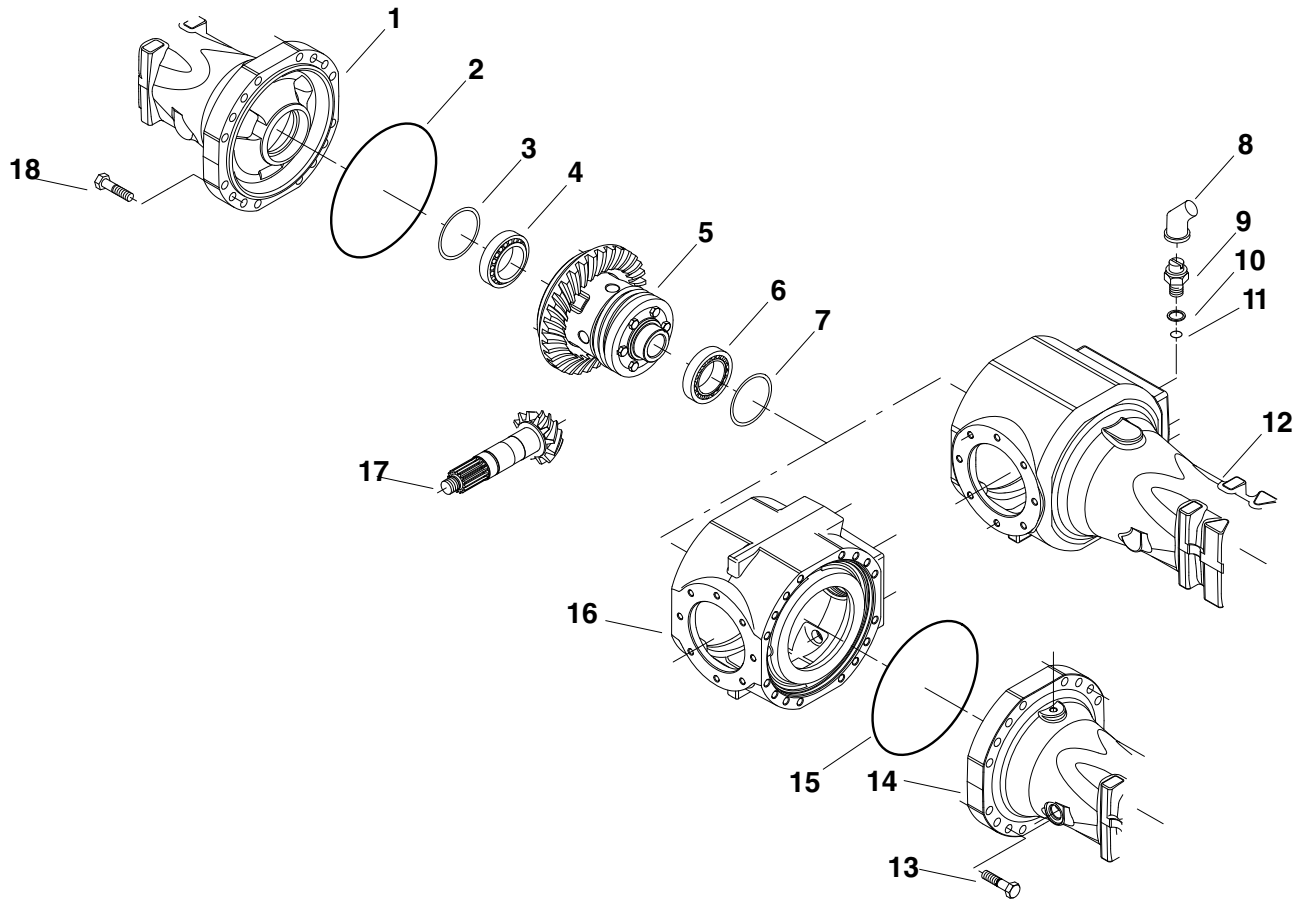
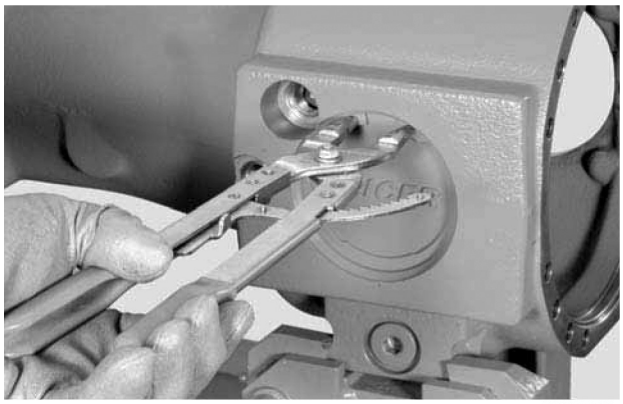
Section 28
Ring and Pinion Adjusting: Version Pinion Cover and Single Arm

28.1 EXPLODED VIEW



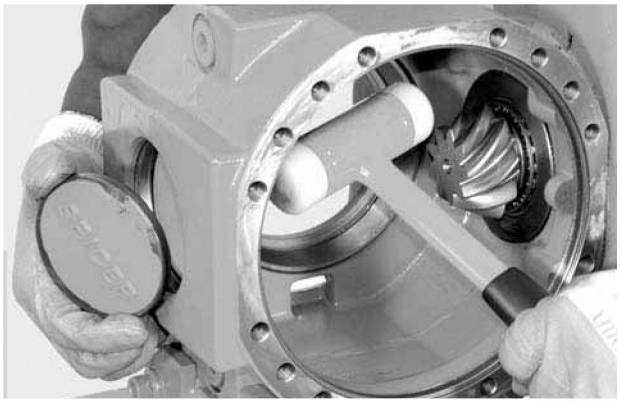
MAP19930

28.2 RING AND PINION ADJUSTING: VERSION PINION COVER AND SINGLE ARM - INSTALL AND ADJUST



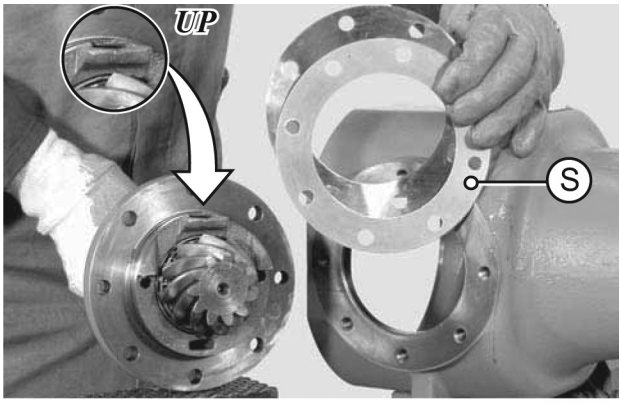
MAP19940

1. Remove the snap ring.



MAP19950

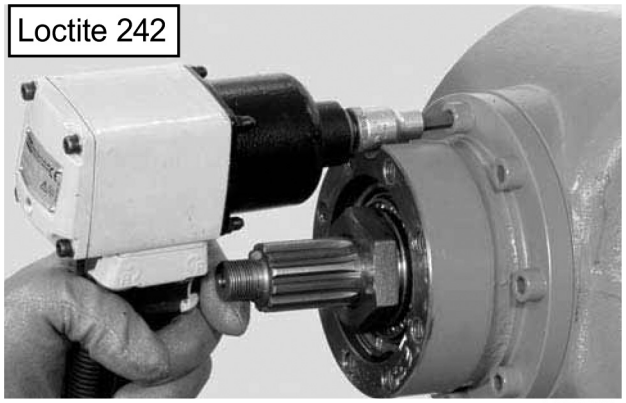
2. Remove cap.



MAP19960

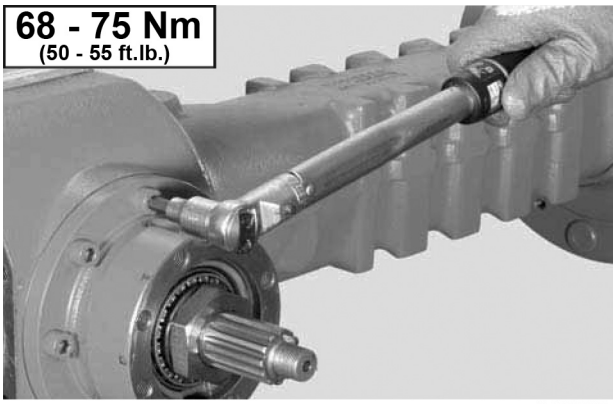
3. Insert shim washers (**S**) as calculated and insert the pinion.

Note: *Position pinion support respecting assembly direction.*



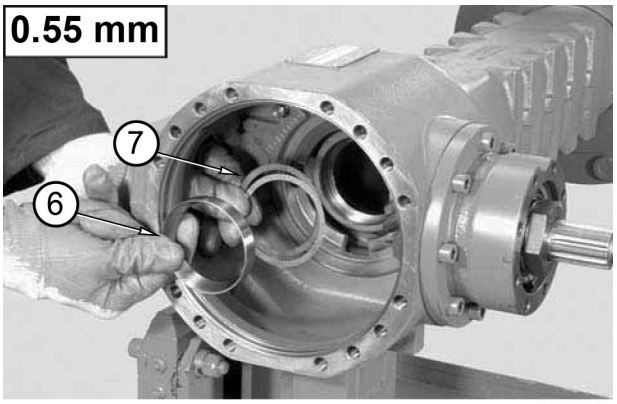
MAP19970

4. Insert the pinion cover screws.



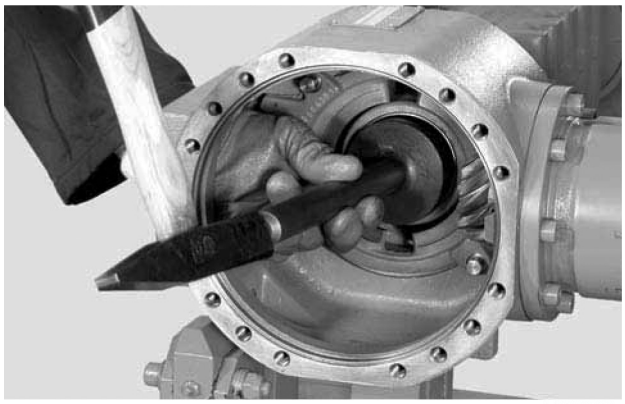
MAP19980

5. Tighten using the criss-cross method and a torque wrench setting of 68 - 75 Nm (50 - 55 ft.lb.).



MAP19990

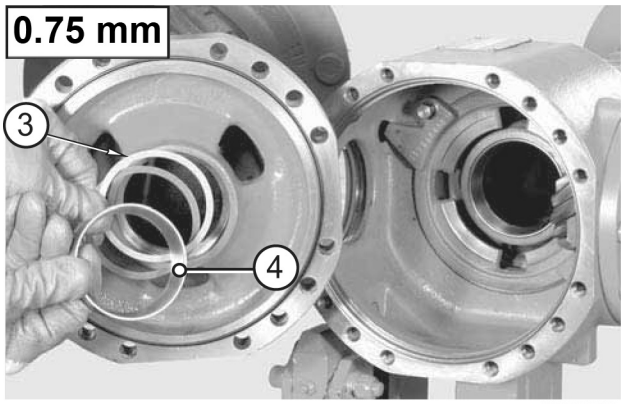
6. **SETTING OF THE RING GEAR AND PINION**
   Insert the thrust block of the bearing (**6**) opposite side of the crown wheel shims (**Sb**) and (**7**) of an initial thickness of about 0.55 mm.



MAP20000

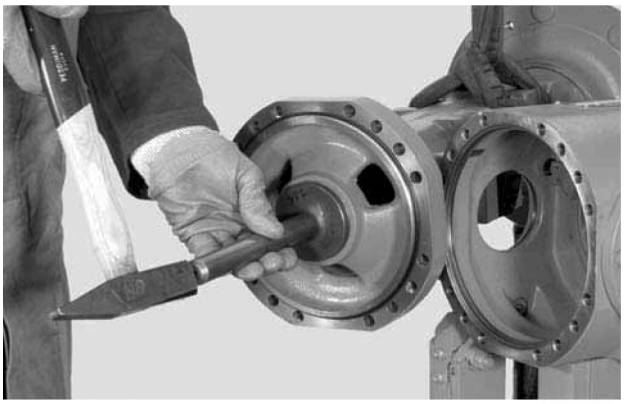
7. Insert the thrust block (**6**) and the shims (**Sb**) and (**7**) into the arm.

Note: *Verify at end of stroke.*



MAP20010

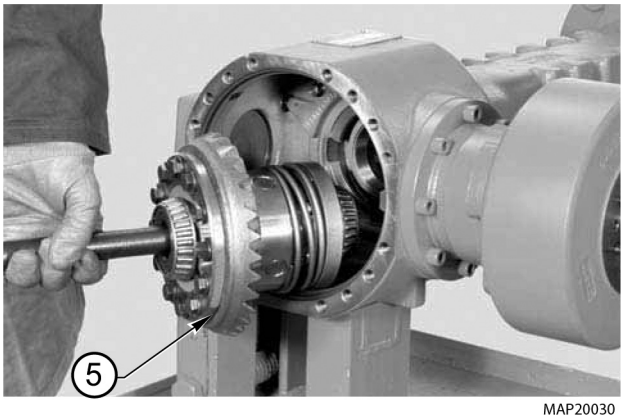
8. **SETTING OF THE RING GEAR AND PINION**
   Insert thrust block (**4**) of the bearing shims (**Sc**) and (**3**) to an initial thickness of about 0.75 mm.



MAP20020

9. Insert the thrust block and the shims into the arm.

Note: *Verify at end of stroke.*



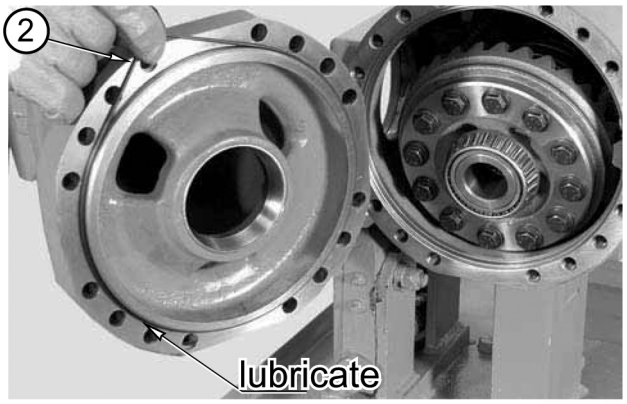
MAP20030

10. Insert complete differential (**5**).

CAUTION

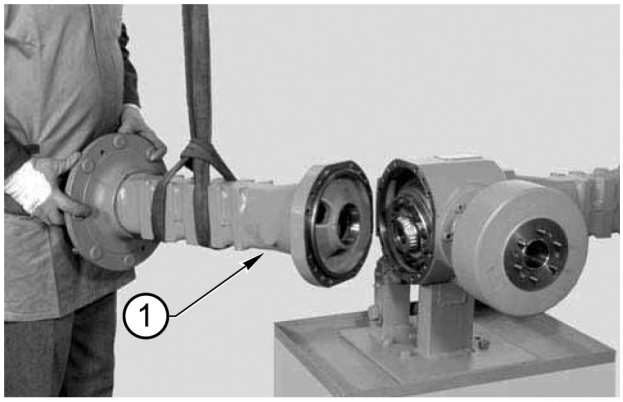
Do not damage the seat of the o-ring with the planetary gear.

.



MAP20040

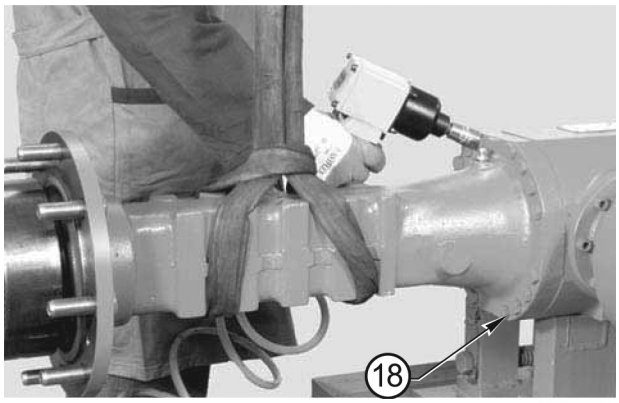
11. Inspect the o-ring (**2**) and grease.



MAP20050

12. Install the ring gear side arm (**1**) without the half axle.

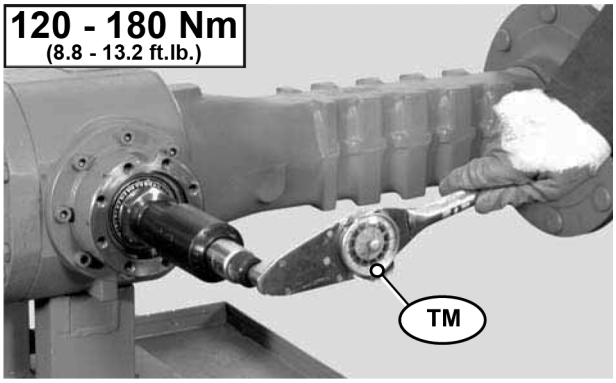
Note: *To check the torque of the differential, neither half-axles should be installed.*



MAP20060

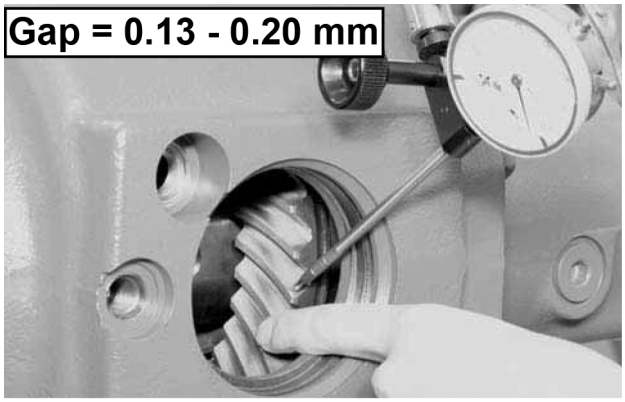
13. Temporarily insert all screws of the arm (**18**).

.



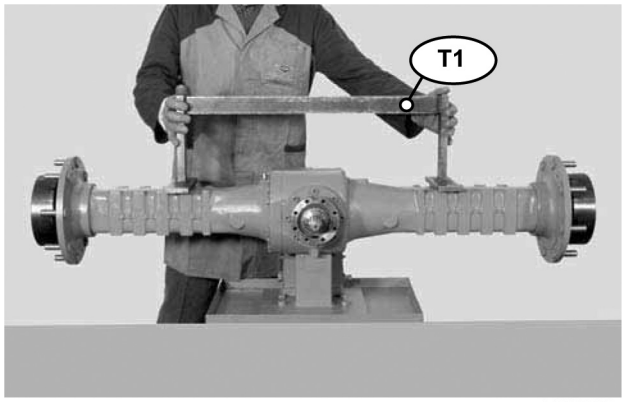
MAP20070

14. Apply torque meter (**TM**) to pinion nut and check that torque will increase by 40-60 Ncm (3-4 ft.lb.) as a result of differential bearing preload.
    Pinion + differential torque: 120-180 Ncm (8.8-13.2 ft.lb.)



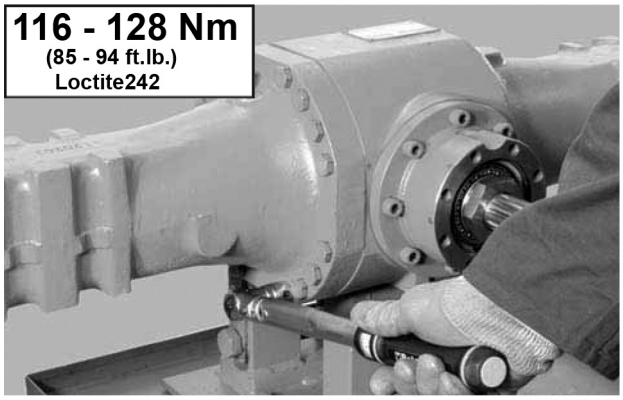
MAP20080

15. Introduce a depth gauge with rotary key through the rear cap hole. Position depth gauge on the center of one of the crown teeth, preset it to 1 mm and reset it to zero. Manually move the crown in both directions to check the existing clearance between pinion and crown.
    Gap= 0,13-0,20mm
    In order to increase the gap while keeping the load on the bearing unchanged, take off shims from the ring gear side and insert them on the opposite side. In order to decrease the gap, do the opposite.



MAP20090

16. Check that the arms are level; then lock the arms into their final position, using screws adequately coated with Loctite 242.



MAP20100

17. Torque wrench setting: 116 - 128 Nm (86-94 ft.lb.)

Note: *Tighten using the criss-cross method.*

MAP20110

18. Using a driver, fit the cap and secure with the snap ring.

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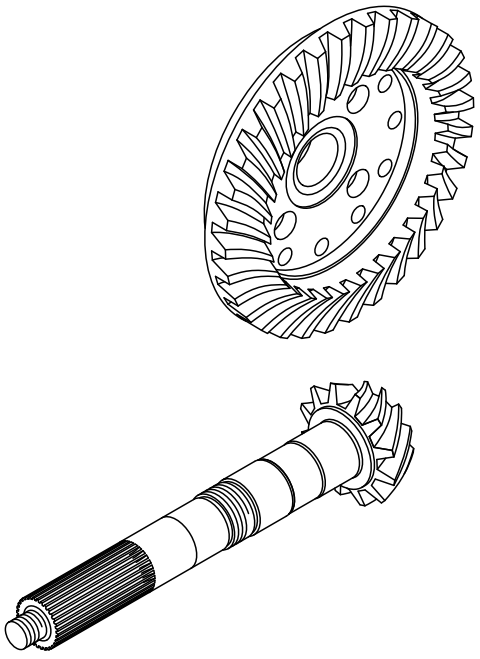
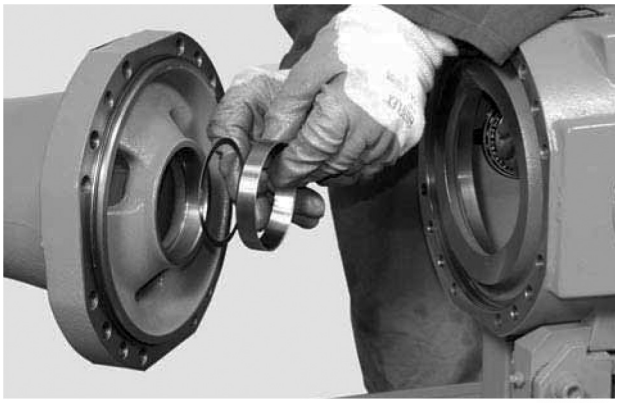
Section 29
Ring and Pinion Adjusting: Version Pinion Integral and Double Arm

29.1 EXPLODED VIEW



MAP20120

29.2 RING AND PINION ADJUSTING: VERSION PINION INTEGRAL AND DOUBLE ARM - INSTALL AND ADJUST



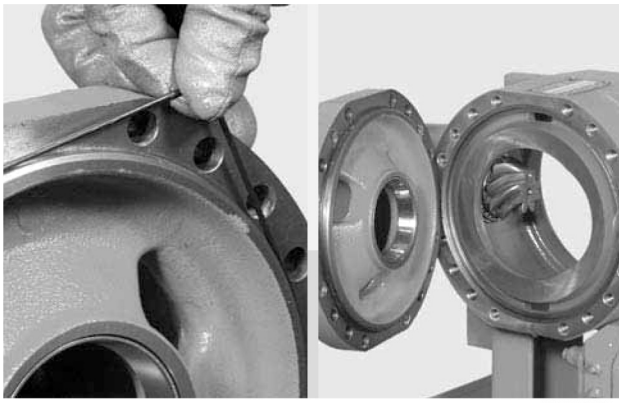
MAP20130

1. **SETTING OF THE RING GEAR AND PINION:** Insert the thrust block of the bearing (**6**) opposite side of the ring gear shims (**Sb**) and (**7**) of an initial thickness of about 0.55mm**.**

MAP20140

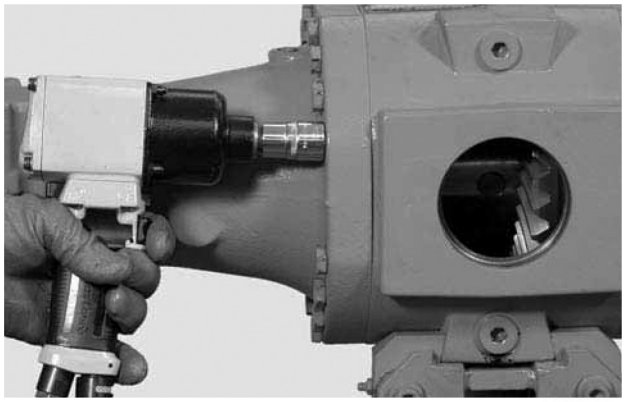
2. Insert the thrust block (**6**) and the shims (**Sb**) and (**7**) into the arm.

Note: *Verify at end of stroke.*



MAP20150

3. Check the o-ring (**2**) and grease.



MAP20160

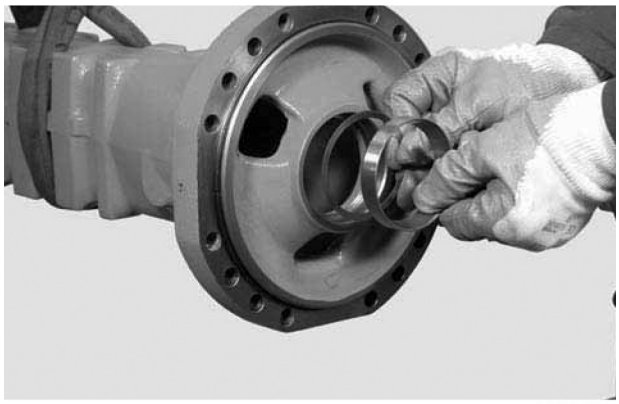
4. Temporarily insert all screws of the arm (**18**).

MAP20170

5. Insert complete differential (5).

CAUTION

Do not damage the seat of the o-ring with the planetary gear.



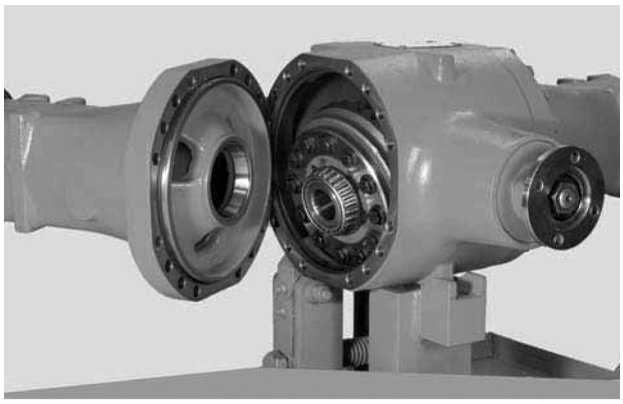
MAP20180

6. **SETTING OF THE RING GEAR AND PINION:** Insert thrust block (**4**) of the bearing shims (**Sc**) and (**3**) an initial thickness of about 0.75mm.

MAP20190

7. Insert the thrust block and the shims into the arm.

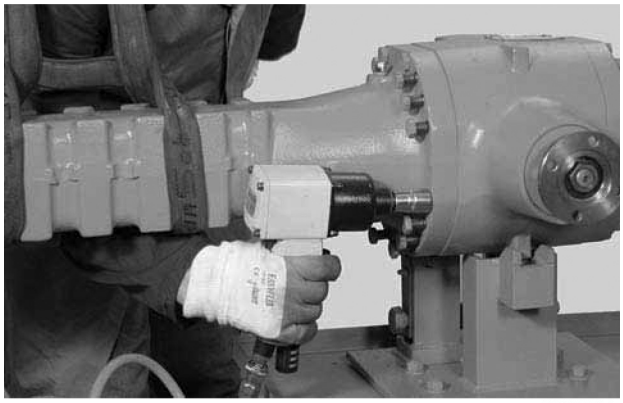
Note: *Verify at end of stroke.*



MAP20200

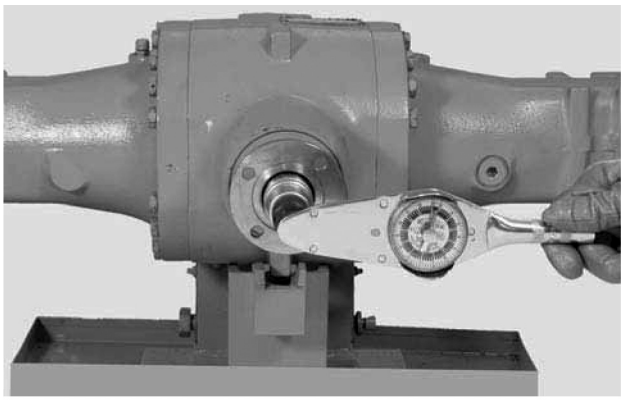
8. Install the ring gear side arm (**1**) without half-axle.

Note: *To check the torque of the differential, neither of both half-axles should be installed.*



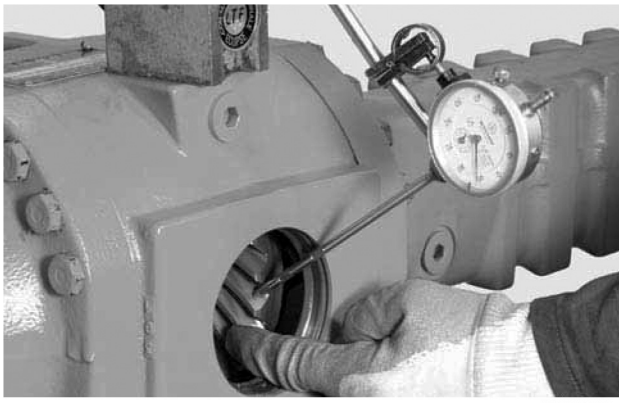
MAP20210

9. Temporarily insert all screws of the arm (**18**).



MAP20220

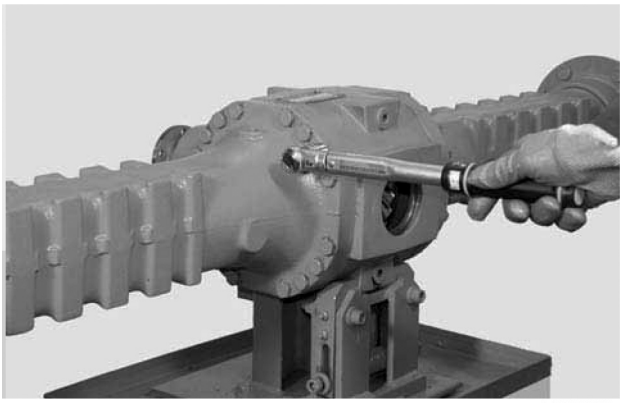
10. Apply torque meter (**TM**) to pinion nut and check that torque will increase by 40-60 Ncm (2.9 - 4.4 ft.lb.) as a result of differential bearing preload.
    Example: pinion torque: 80-120 Ncm (5.9 - 8.8 ft.lb.)
    Pinion +differential torque:120-180 Ncm (8.8 - 13.2 ft.lb.)



MAP20230

11. Introduce a depth gauge with rotary key through the rear cap hole. Position depth gauge on the center of one of the crown teeth, preset it to 1 mm and reset it to zero. Manually move the crown in both directions to check the existing clearance between pinion and crown.
    Gap = 0.13 - 0.20 mm
    In order to increase the gap while keeping the load on the bearing unchanged, take off shims from the ring gear side and insert them on the opposite side.
    In order to decrease the gap, do the opposite.

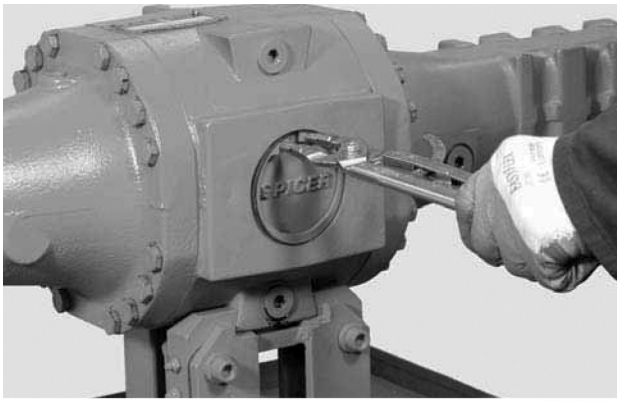
Note: *Verify at end of stroke.*



MAP20240

12. Torque wrench setting: 130 Nm (96 ft.lb.)

Note: *Tighten using the criss-cross method.*



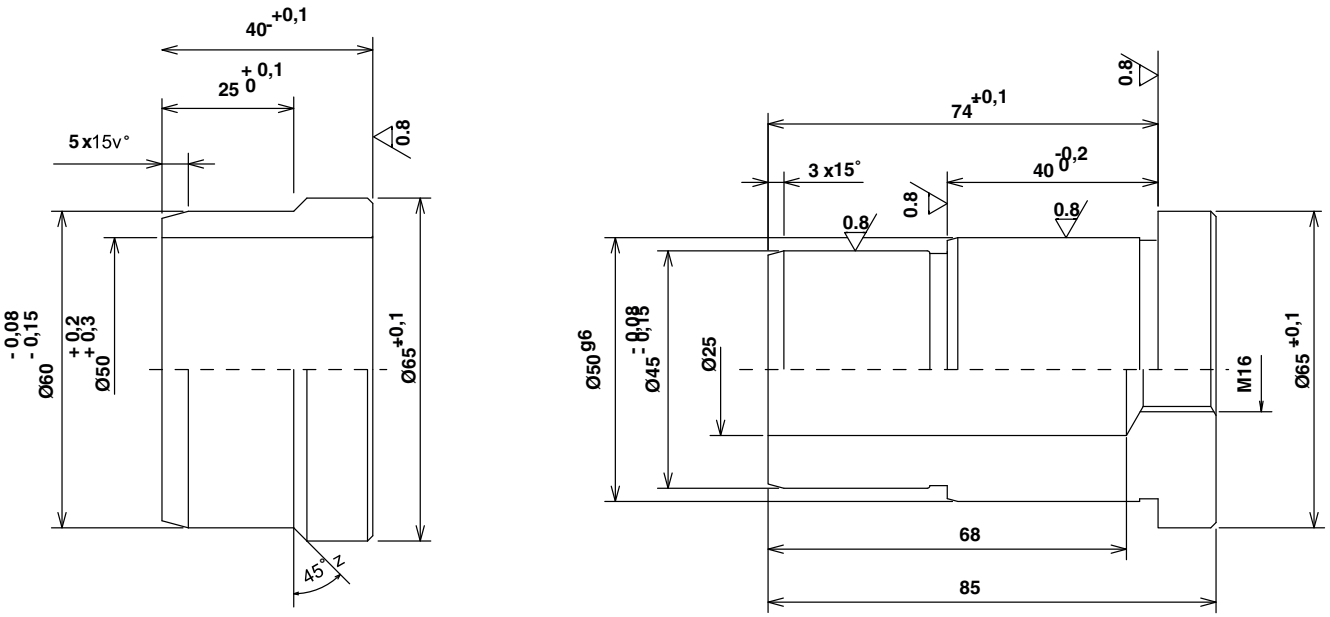
MAP20250

13. Using a driver, fit the cap and secure with the snap ring.

Section 30
Special Tools

30.1 T1

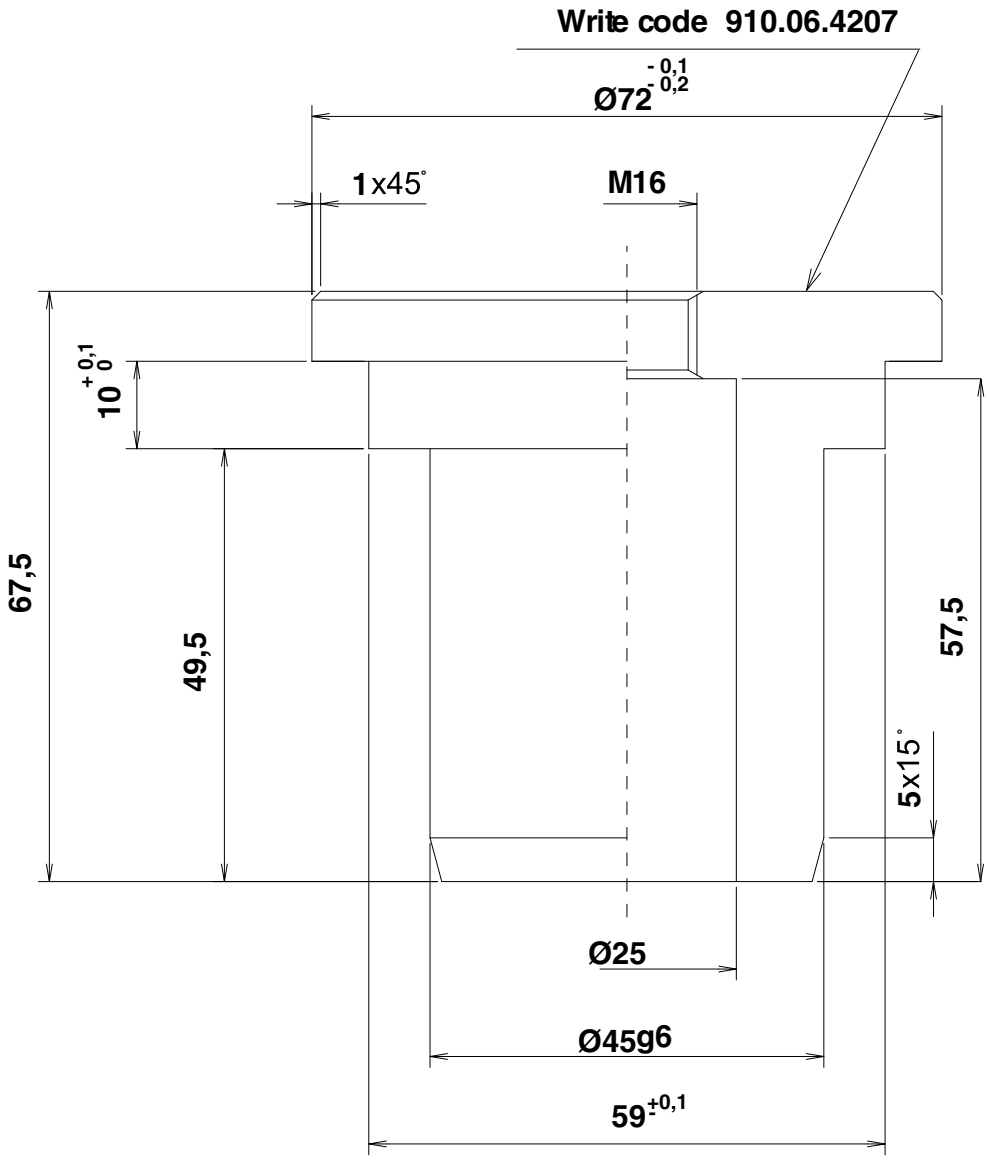
910.06.4209



MAP11900

30.2 T2

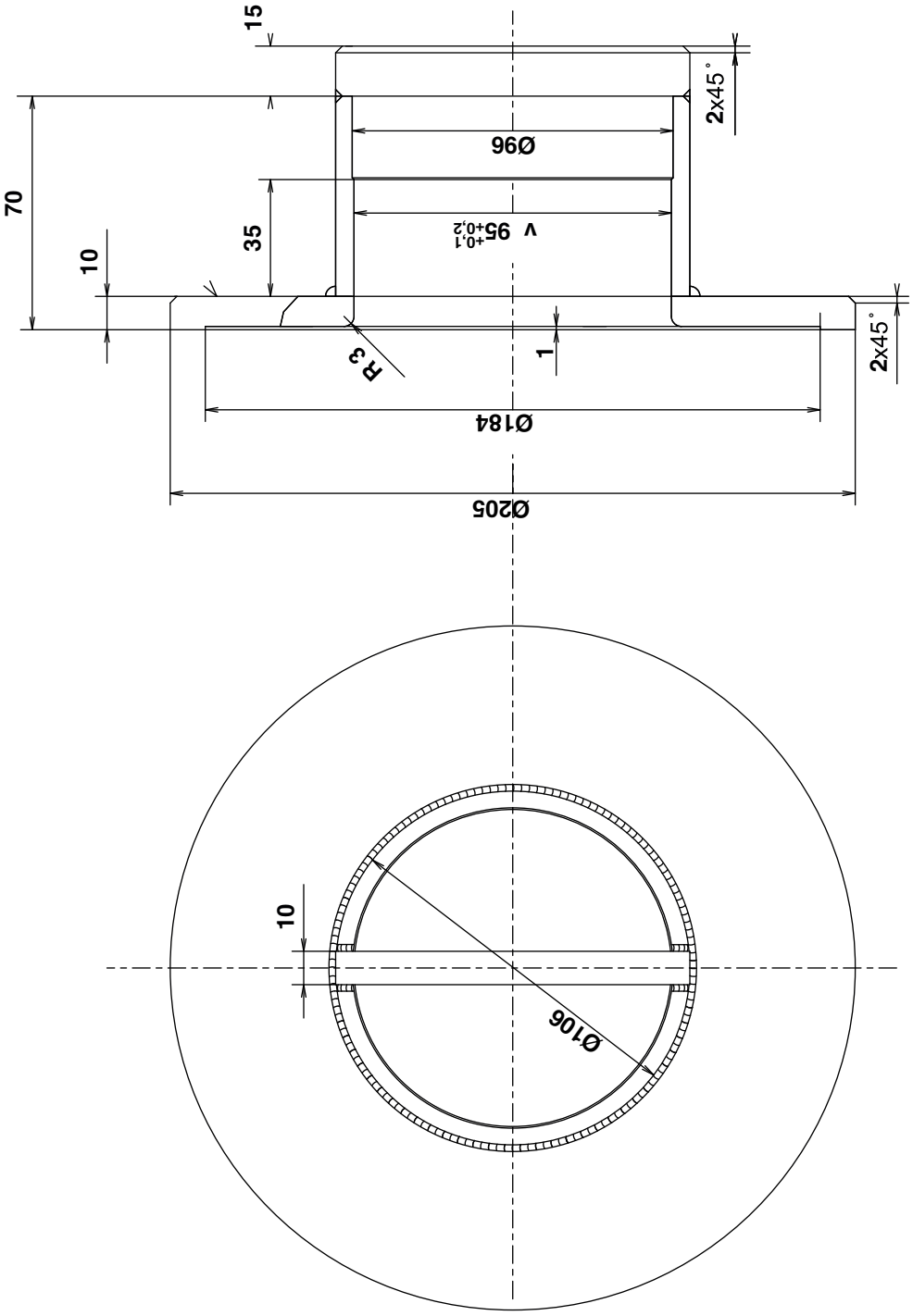
910.06.4207



MAP11910

30.3 T3

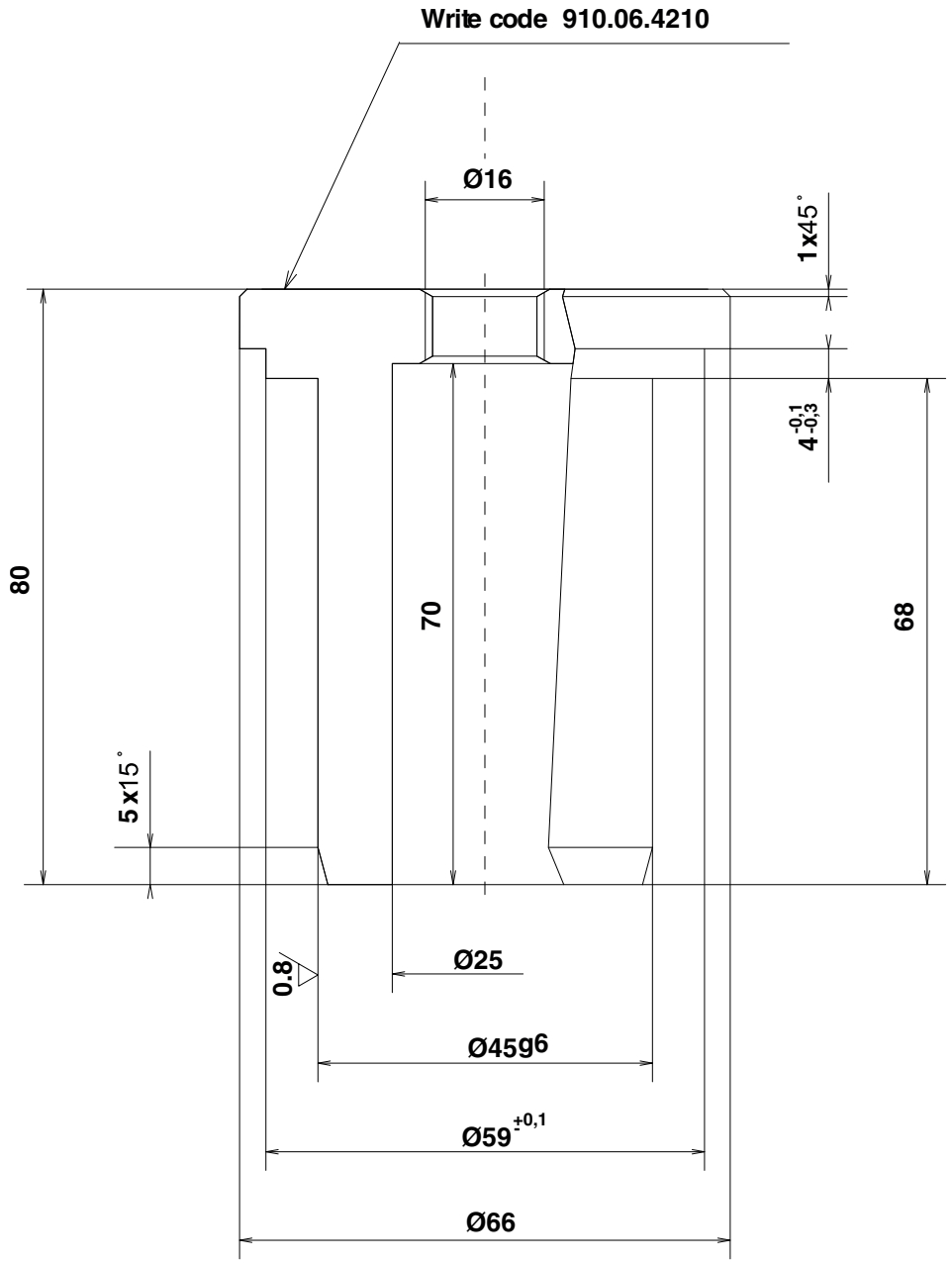
910.06.4203



MAP11920

30.4 T4

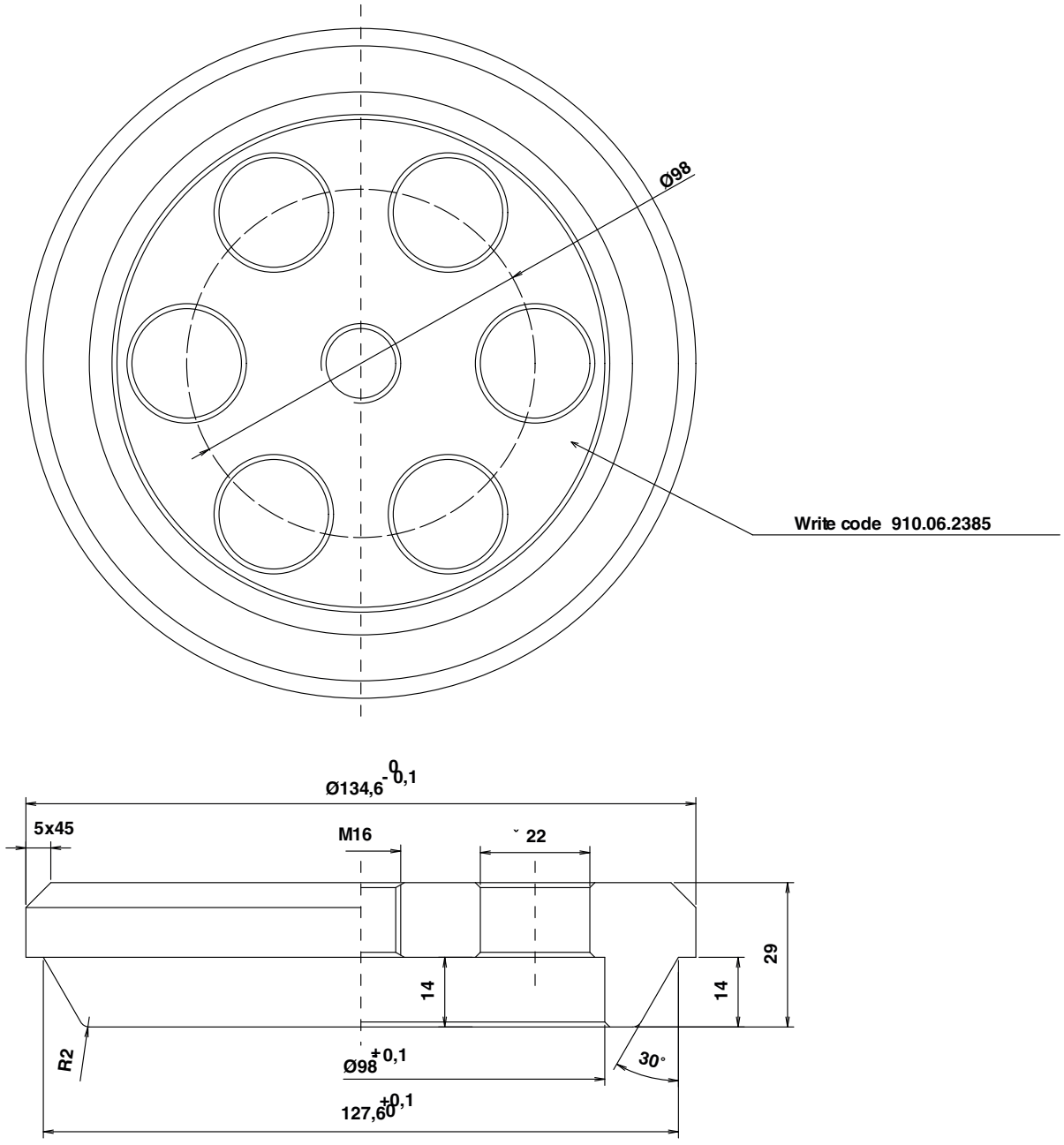
910.06.4210



MAP11930

30.5 T5

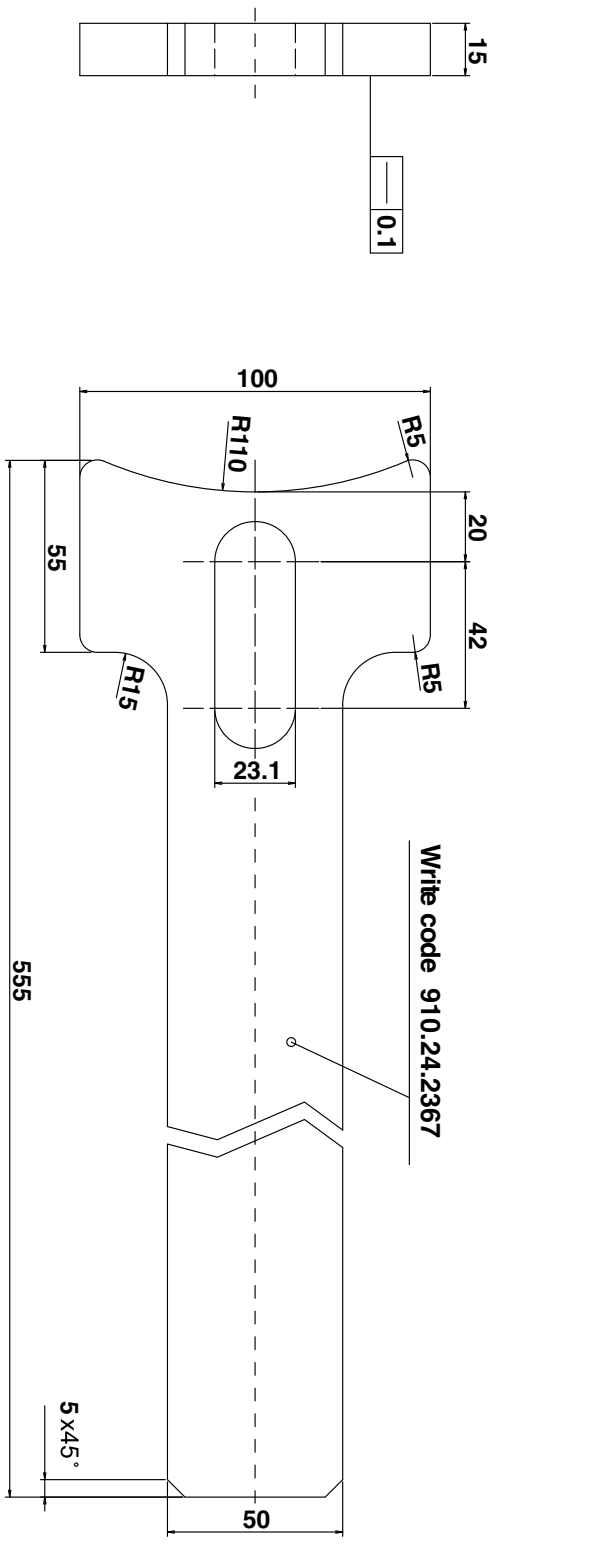
910.06.2385



MAP11940

30.6 T6

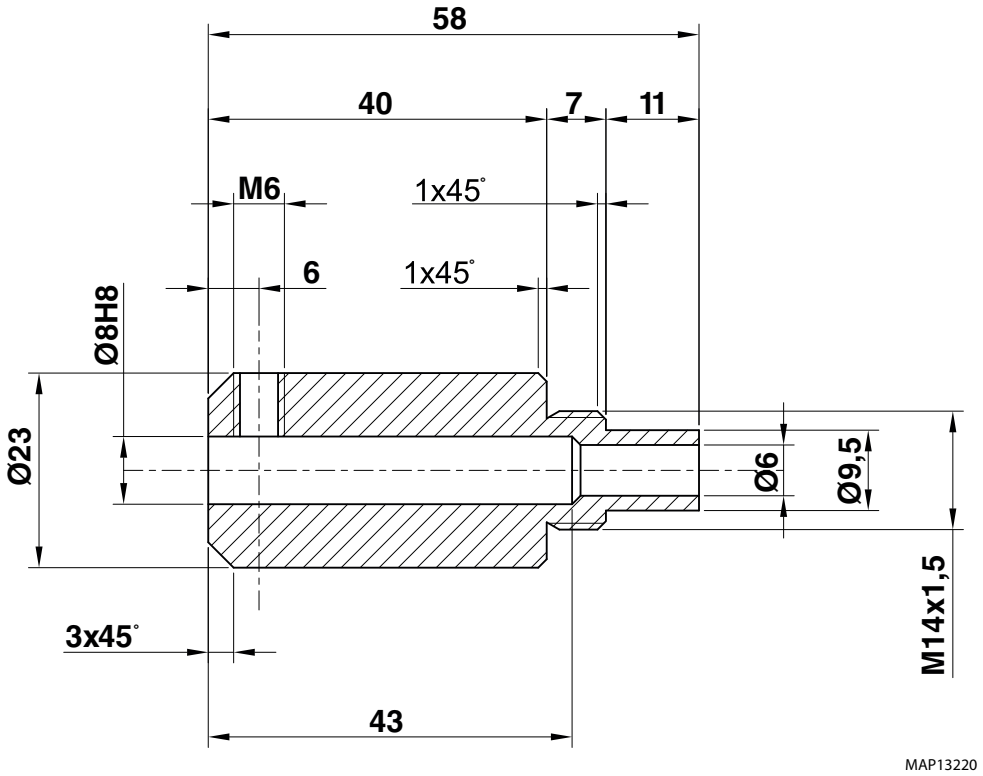
910.24.2367



MAP12360

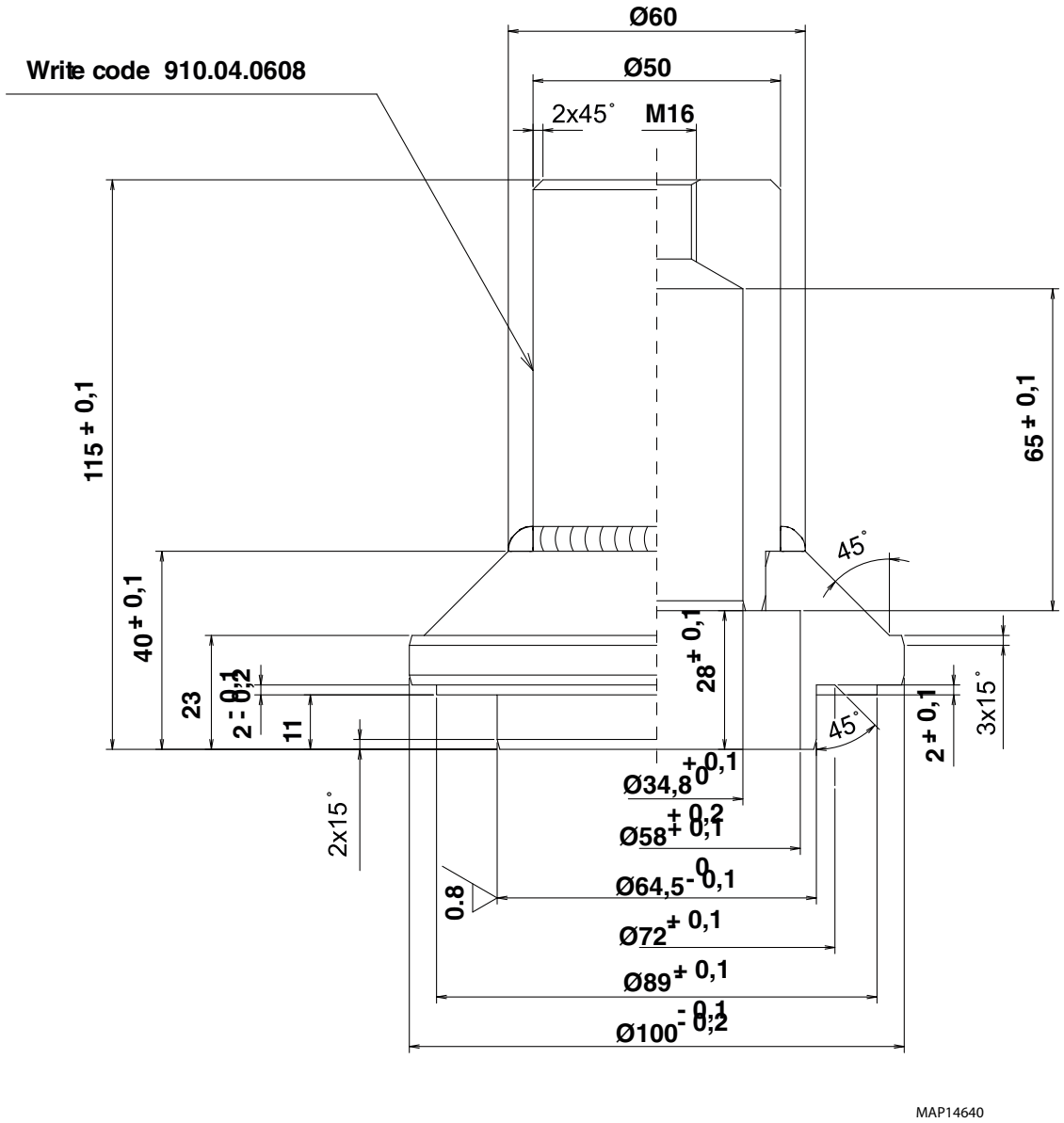
30.7 T7

660.18.1469



30.8 T8

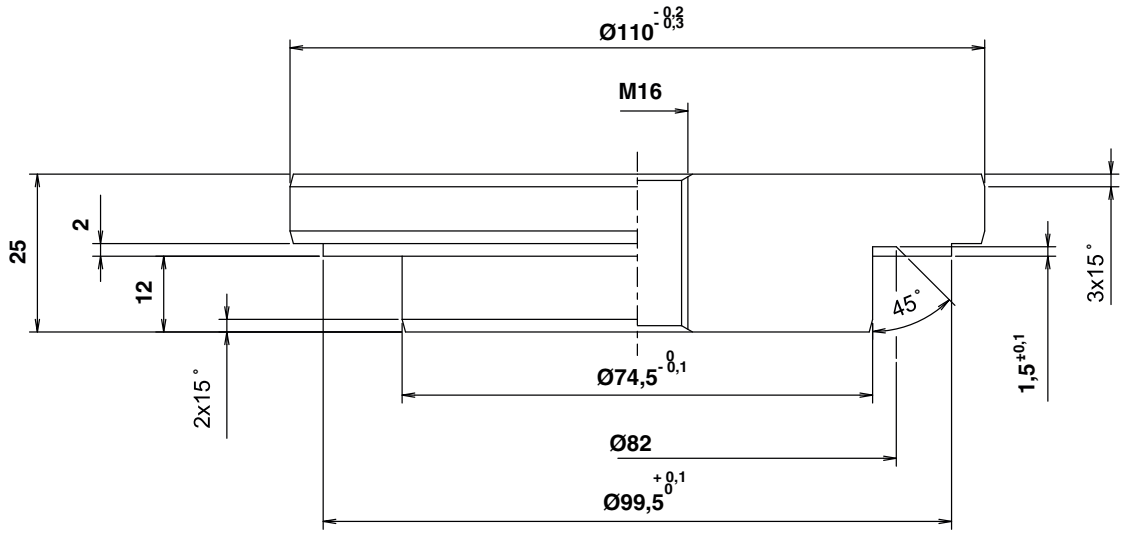
910.04.0608



MAP14640

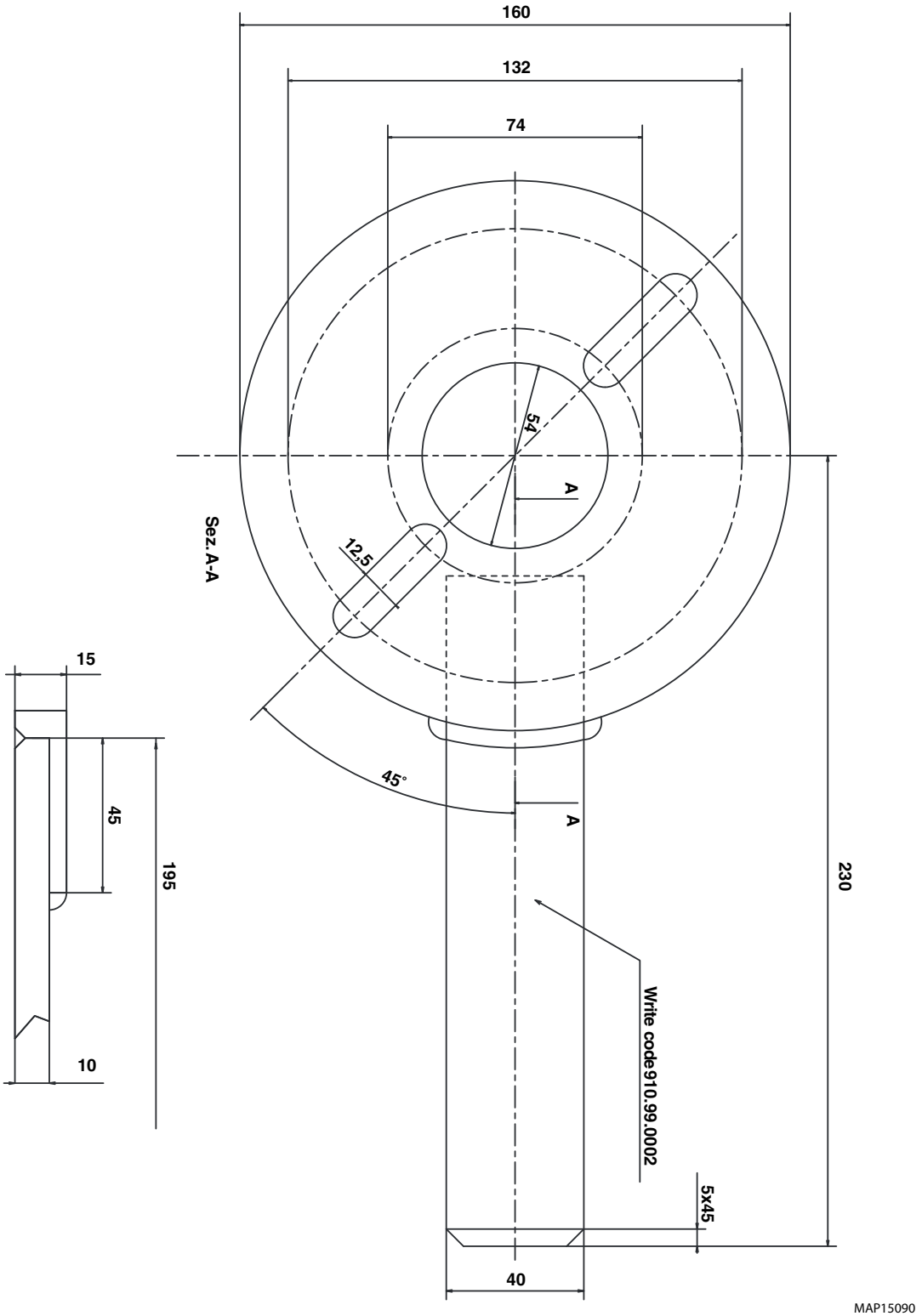
30.9 T9

910.04.0599



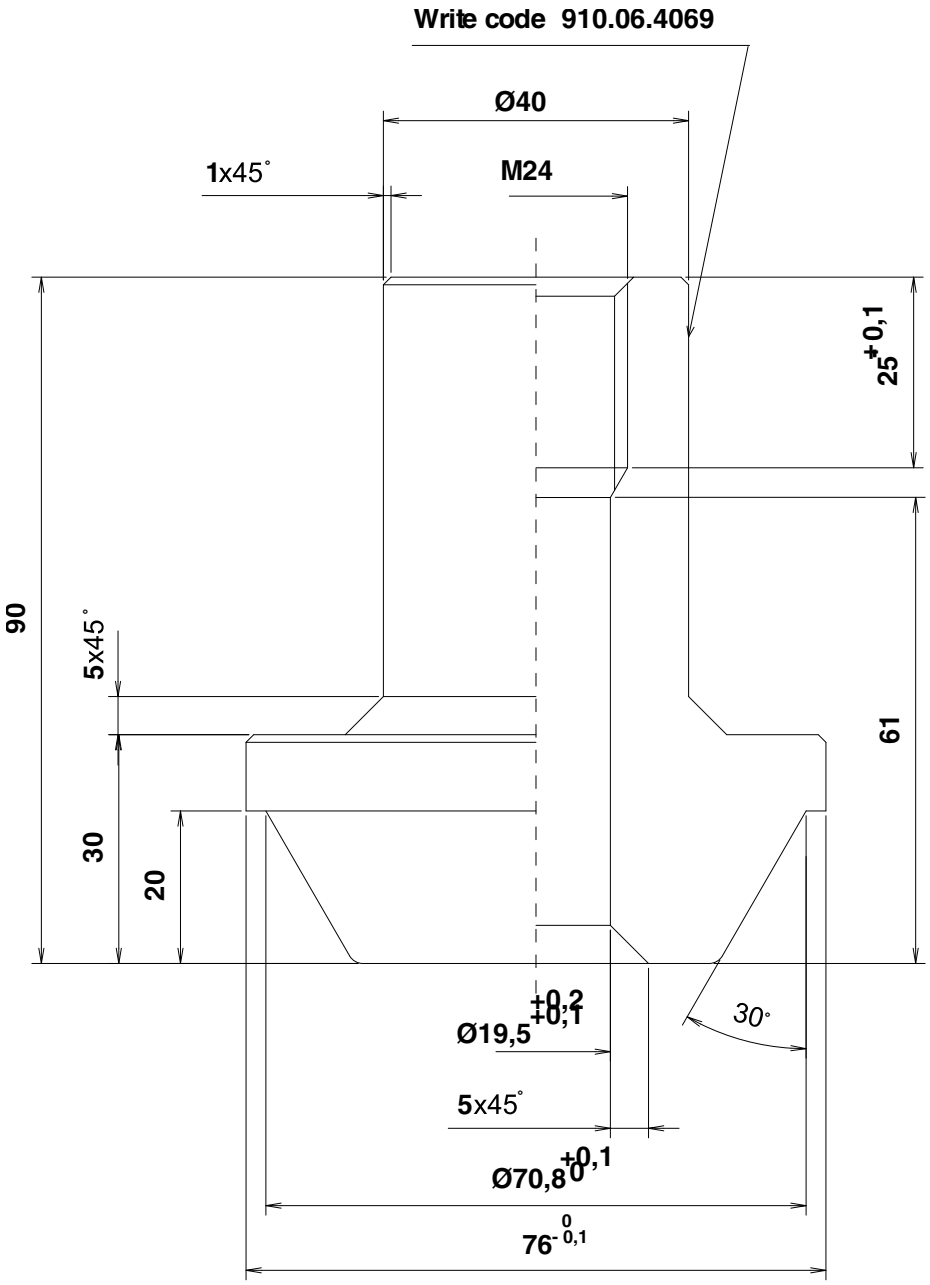
30.10 T10

910.99.0002



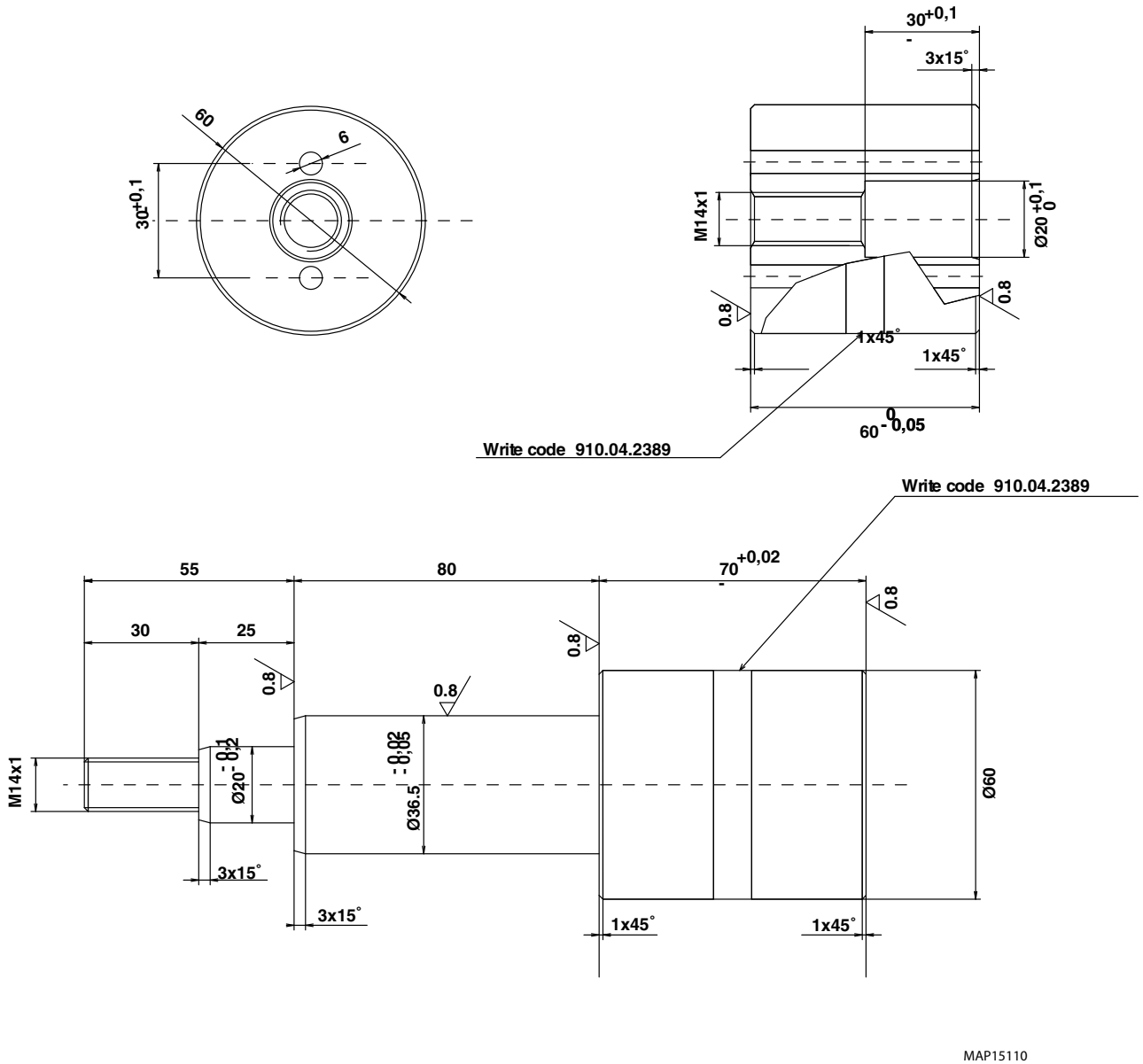
30.11 T11

910.06.4069



30.12 T12

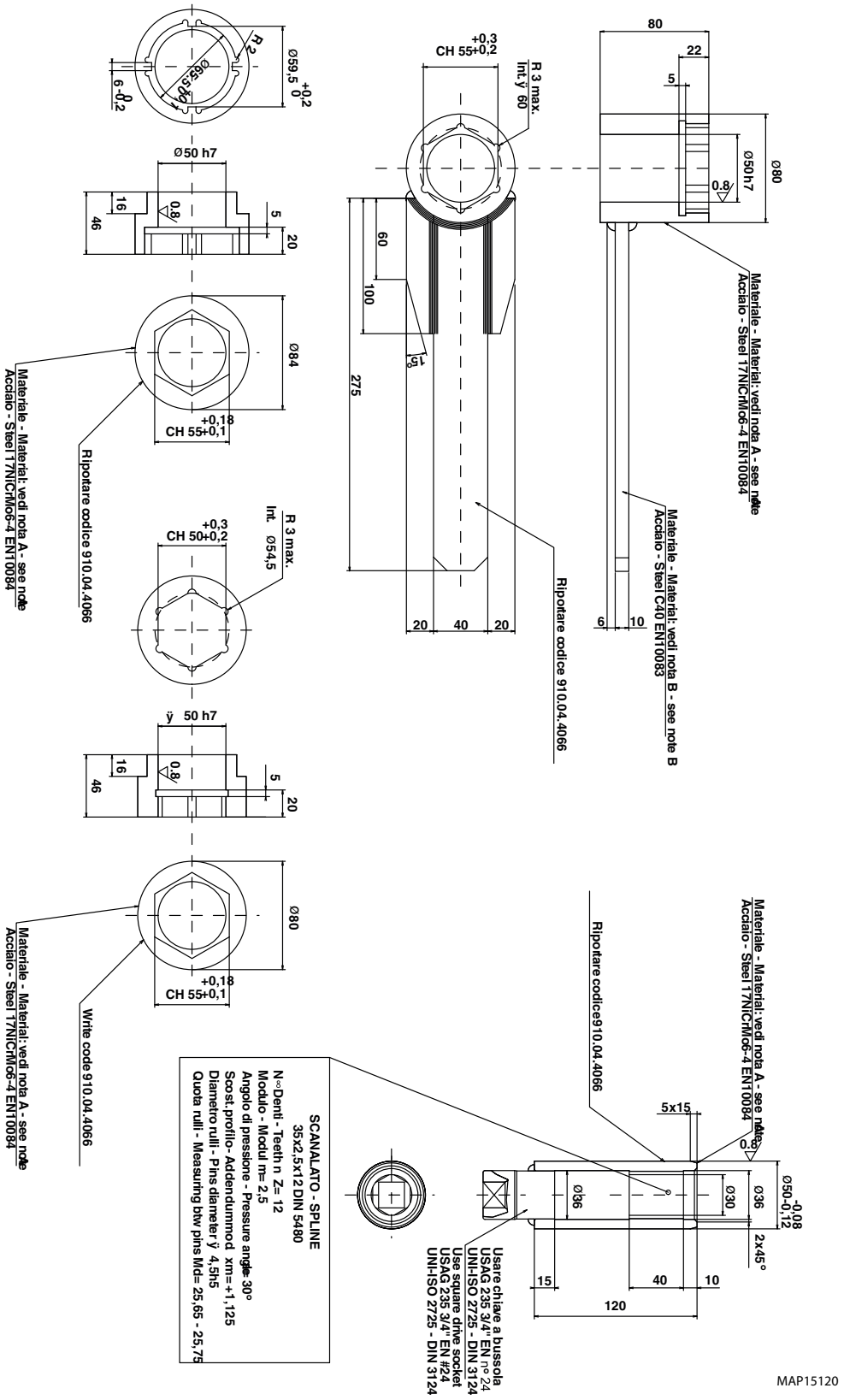
910.04.2389



MAP15110

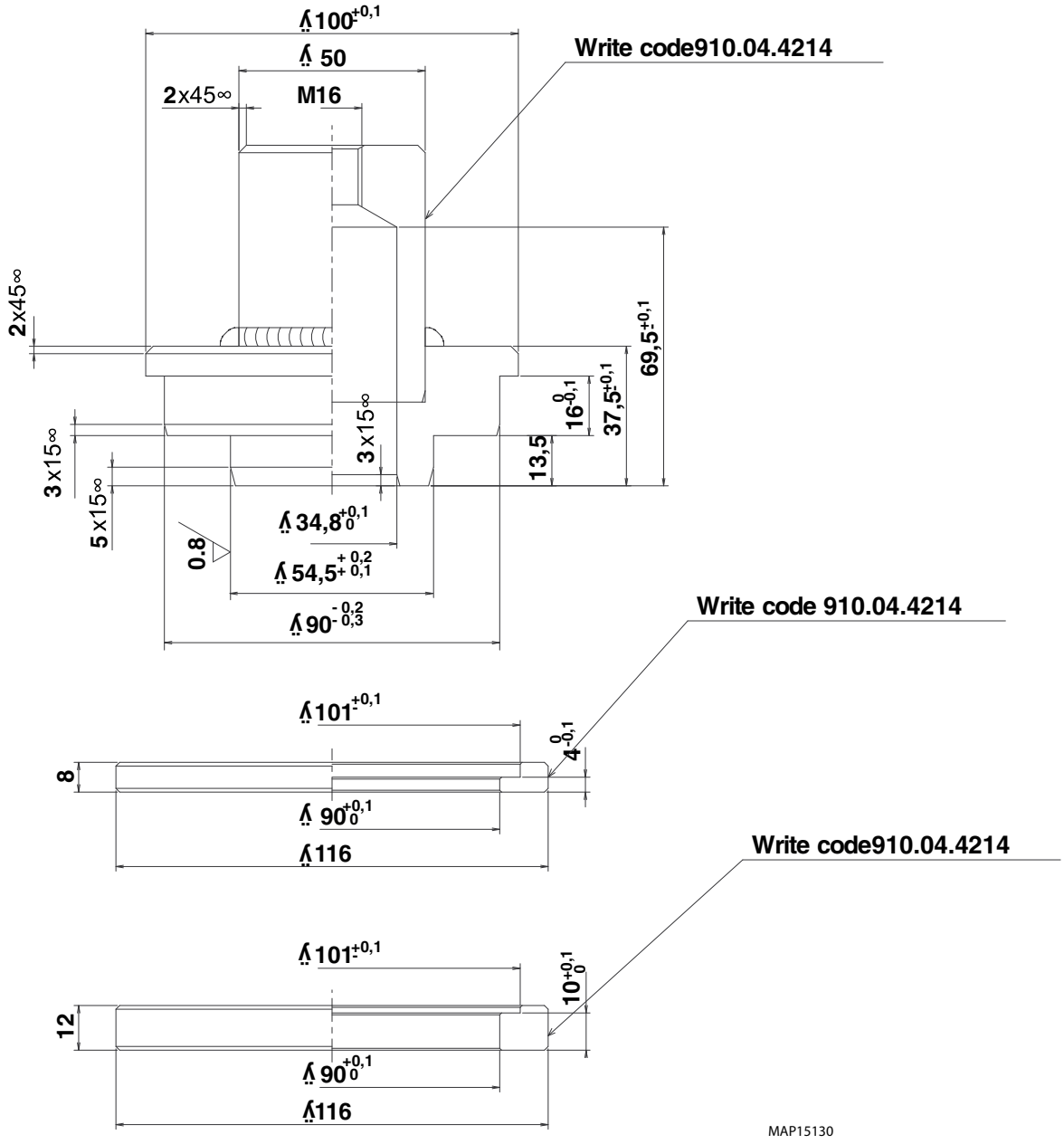
30.13 T13

910.04.4066



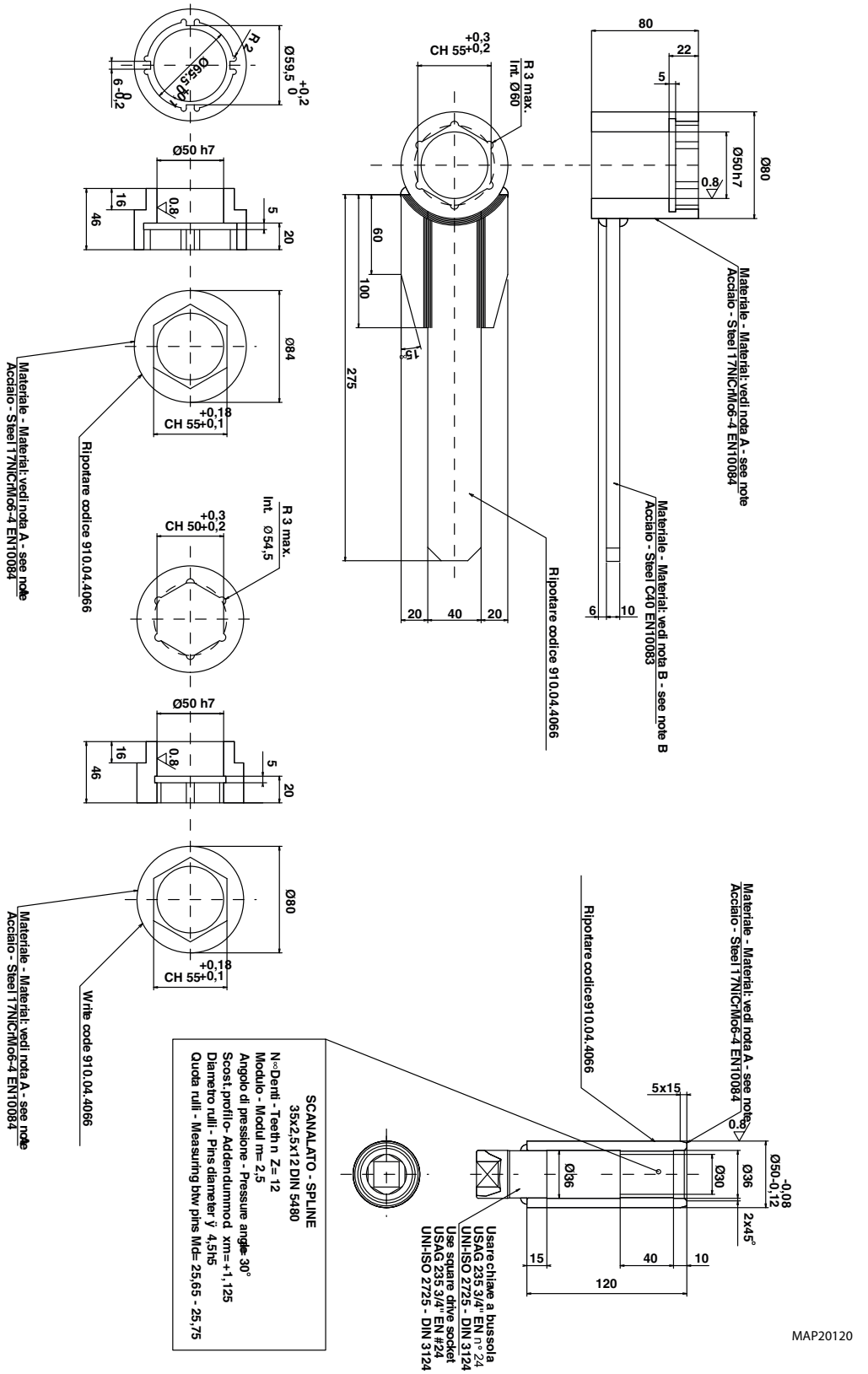
30.14 T14

910.04.4214



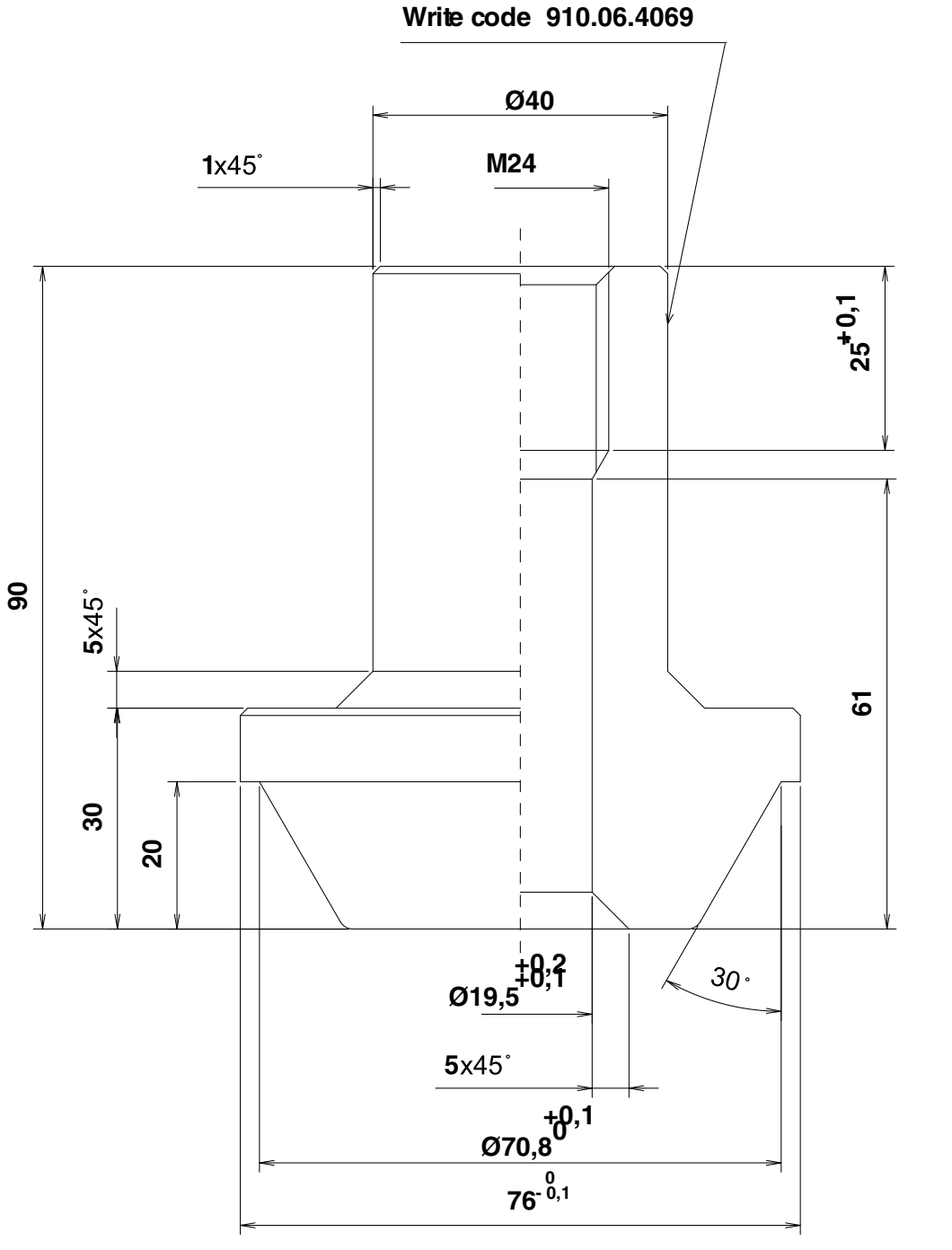
30.15 T16

910.04.4066



30.16 T17

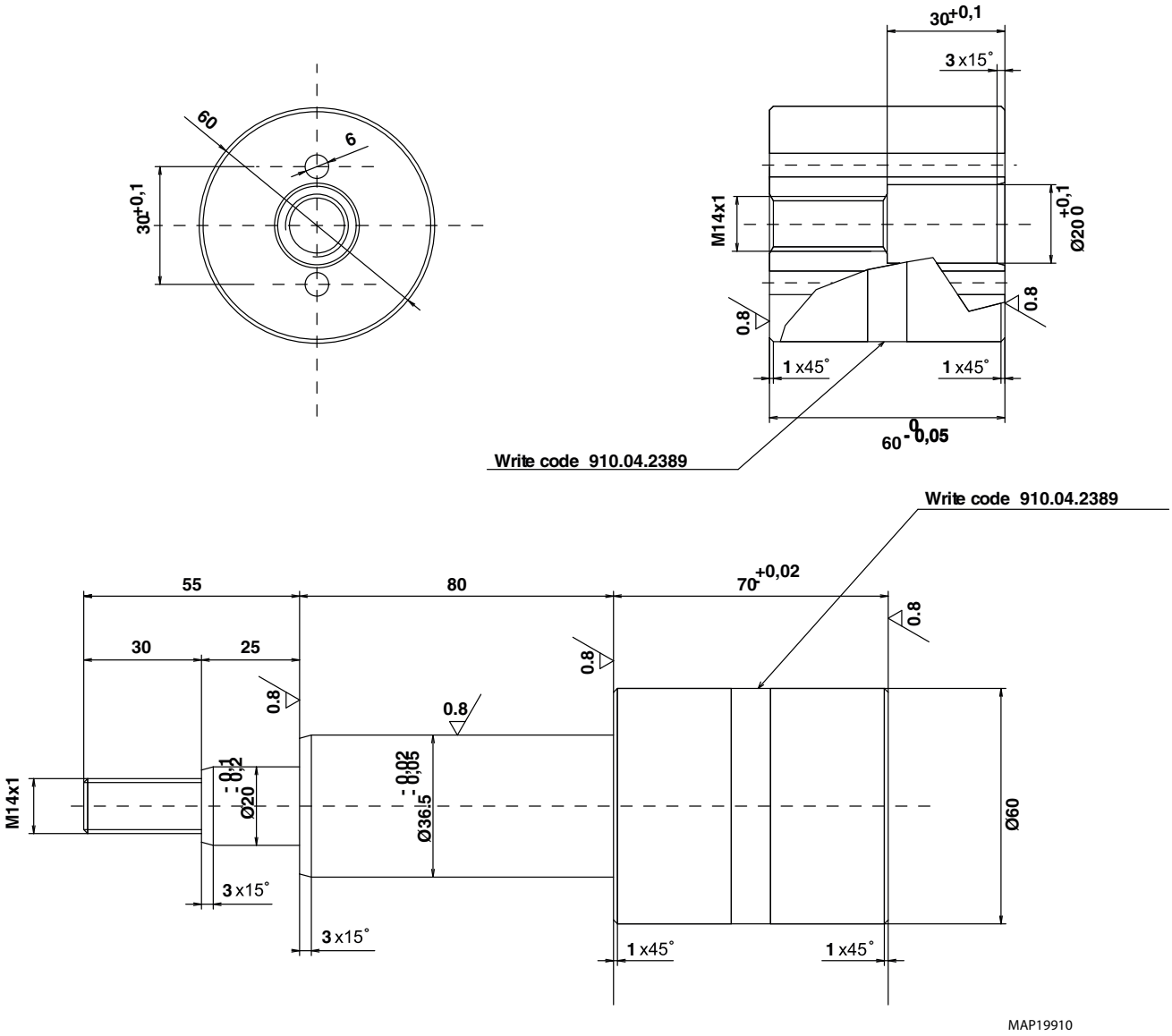
910.06.4069



MAP19900

30.17 T18

910.04.2389



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