



***Drive Axle
Supplemental Repair Manual***

***Models
944E, 8042,
10042, 10054,
1044C-54,
MMV & EIRV***

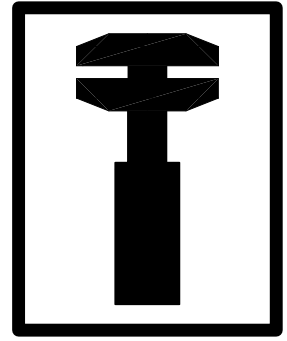
**JLG
8990430**

**Component Manufacturer
5871 560 002**

*Revised
November 4, 2014*



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Order No.: 5871 560 002

ZF - MULTISTEER

MS-T 3060



ZF Passau GmbH
Donaustr. 25 – 71
D- 94034 Passau

REPAIR MANUAL **for the ZF - Multisteer** **MS-T 3060**

IMPORTANT INSTRUCTIONS CONCERNING THE REPAIR MANUAL

The great variety of ZF units compels a restriction of the Disassembly and Assembly Manuals to a current ZF production unit. Technical development of the ZF units as well as extensions concerning the design possibilities may require differing steps, which can be carried out by qualified Specialists without greater difficulties with the help of the Perspective Illustrations in the corresponding Spare Parts Lists.

The described Disassembly and Assembly Manual is based on the design level of a ZF production unit at the time of preparation of the Repair Manual.

The ZF Passau GmbH reserve the right to replace the present Disassembly and Assembly Manual by a successional edition without advance notice. Upon request, the ZF Passau GmbH will advise what edition is the latest one.

For maintenance work always observe the lubrication and maintenance instructions (ZF- order no: 5871 560 902) as well as the ZF-list of lubricants TE-ML 05!

The list of lubricants is being continuously updated and can be obtained or viewed as follows:

- In all ZF-plants
 - In all ZF Service Centers
 - Internet <http://www.zf.com> - Service / Techn. Information / ZF List of lubricants.....
-

CAUTION:

Observance of the vehicle manufacturer's notes and instructions is imperative for installing and putting the unit into operation!

ZF Passau GmbH

Donaustr. 25 - 71

D - 94034 Passau

Abt.: ASDM / Section : ASDM

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Technische Änderungen vorbehalten! With the reserve of technical modifications!

Sous reserve de modification techniques!

Konstruktionsstand / Design level 2000/12

2.Auflage / 2.Edition 2002/12

3.Auflage / 3.Edition 2005/04

4.Auflage / 4.Edition 2006/07

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PREFACE

This documentation has been developed for the skilled Serviceman, trained by the Zahnradfabrik Passau for the Repair and Maintenance operations on ZF-Units.

Treated is a ZF-Serial product according to the design stage of the date of Edition.

However, due to further technical developments of the product, the repair of the unit at your disposal could require different steps as well as other adjustment and testing specifications.

Therefore, we recommend to commit your ZF-Product to Masters and to Servicemen, whose practical and theoretical training is constantly completed to the actual situation in our Training School.

The Service Stations, established by the Zahnradfabrik Friedrichshafen all over the world, offer you:

1. Constantly trained personnel

2. Prescribed installations, e.g. Special Tools

3. Genuine ZF-Spare Parts according to the latest phase of development

Here, all operations are carried out for you with utmost care and reliability.

Repair operations carried out by ZF-Service Stations, are covered additionally within the terms of the actual contractual conditions, by the ZF-Warranty.

Damages caused by inappropriate or inexpert work, carried out by personnel foreign to ZF, and after-expenditures eventually arising from it, are excluded from this contractual responsibility.

This applies also in case of a renouncement of Genuine ZF-Spare Parts.

ZF Passau GmbH

Service Department

GENERAL

The Service Manual covers all work required for dismantling and the pertaining installation.

When repairing the axle, ensure utmost cleanliness and that the work is carried out in an expert-like manner. The axle should only be disassembled for renewing damaged parts. Covers and housing parts installed with seals must be loosened by slight blows with a plastic mallet after screws and nuts have been removed. For removing parts being in tight contact with the shaft such as antifriction bearings, bearing races, and similar, use suitable pulling devices.

Dismantling and mounting work must be carried out at a clean working place. Use the special tools developed for this purpose. Prior to the re-installation of the parts, clean the contact surfaces of housings and covers from the residues of old seals. Remove burrs, if any, or similar irregularities with an oil stone. Clean housings and locking covers with a suitable detergent, in particular corners and angles. Damaged parts or parts heavily worn down must be renewed. Here, the expert must assess, whether parts such as antifriction bearings, thrust washers etc. subjected to normal wear during operation, can be installed again.

Parts such as sealing rings, lock plates, split pins etc. must generally be renewed. Radial sealing rings with worn down or torn sealing lip must also be renewed. Particularly ensure that no chips or other foreign bodies remain in the housing. Lube oil bores and grooves must be checked for unhindered passage. All bearings must be treated with operating oil prior to installing them:

REFERENCE: For heating up parts such as bearings, housings etc., only a heating furnace or an electric drier is permitted to be used!
Parts fitted in heated state have to be installed subsequently after cooling down to ensure a perfect contact!

CAUTION

When assembling the axle, absolutely observe the indicated torque limits and adjustment data. Screws and nuts must be tightened according to the enclosed standard table, unless otherwise specified.

When installing snap rings and retaining rings pay attention to an exact contact in the grooves!

Lined plates with organic friction linings (e.g. paper linings) must not be washed (negative effect on lining adhesion).

They are only allowed to be dry-cleaned (leather cloth).



DANGER

When using detergents, observe the instructions given by the manufacturer regarding handling of the respective detergent.

Structure of the Repair Manual

The structure of this Repair Manual reflects the sequence of the working steps for completely disassembling of the dismantled unit.

Special tools required for performing the respective repair work are listed in the text as well as in the Chapters “W” (List of Special Tools) and “WB” (Illustrated Tables).

Important information on industrial safety

Generally, the persons repairing ZF-sets are responsible on their own for the industrial safety.


The observation of all valid safety regulations and legal impositions is the pre-condition for avoiding damage to persons and to the product during maintenance and repair work.


Persons performing repair work must familiarize themselves with these regulations.

The proper repair of these ZF-products requires the employment of suitably trained and skilled staff.

The repairer is obliged to perform the training.

The following safety references are used in the present Repair Manual:

 CAUTION	This symbol is indicated in this repair manual as reference to special working procedures, methods, information, the use of auxiliaries etc.
--	---

 DANGER	This symbol refers to situations, if lacking care can lead to personal injury, danger to life and damages on the product.
---	--

<u>REFE- RENCE</u>	Prior to starting the checks and repair work, thoroughly study the present instructions.
-------------------------------	--

<u>REFE- RENCE</u>	Illustrations, drawings and parts do not always represent the original; the working procedure is shown. The illustrations, drawings, and parts are not drawn to scale; conclusions regarding size and weight must not be drawn (not even within one representation). The work must be performed according to the description.
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<u>REFE- RENCE:</u>	After the repair work and the checks, the expert staff must convince itself that the product is properly functioning again.
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TRAGBILDBEISPIELE ZUR GLEASONVERZÄHNUNG

EXAMPLES OF GEAR-TOOTH-CONTACT PATTERNS FOR THE GLEASON GEAR-TOOTH SYSTEM

EXEMPLES POUR LA DENTURE GLEASON

Ideales Tragbild d.h. die Ritzeldistanz stimmt

Ideal tooth-contact pattern i.e. pinion distance is correct

L'engrènement idéal, c'est-à-dire, la distance du pignon est correcte

Bild / Figure 1/3/5

Schubflanke (Konkav)

Coast side (concave)

Côté poussé (concave)

Bild / Figure 1



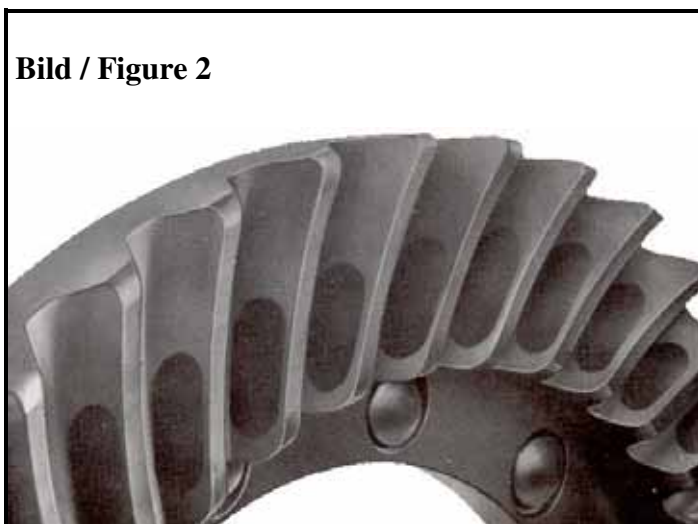
Bild / Figure 2/4/6

Zugflanke (Konvex)

Drive side (convex)

Côté entraîné (convexe)

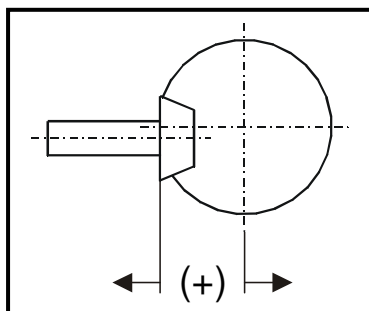
Bild / Figure 2



Ritzeldistanz muß größer werden

Pinion distance must be increased

La distance du pignon doit être augmentée



Ritzeldistanz muß kleiner werden

Pinion distance must be decreased

La distance du pignon doit être diminuée

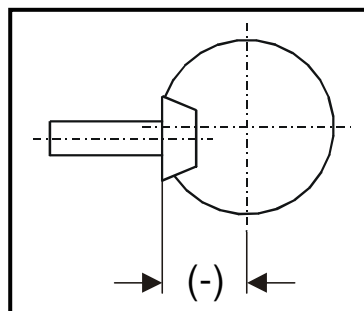


Bild / Figure 3

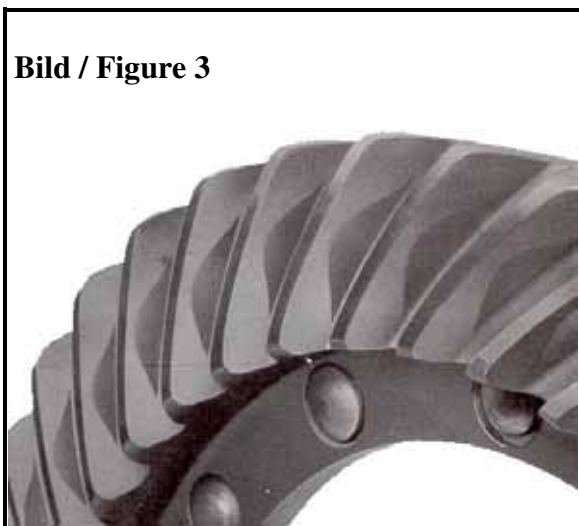


Bild / Figure 5



Bild / Figure 4



Bild / Figure 6



MAKE WEAR MEASUREMENT ON SERVICE BRAKE AND CHECK BREAK-AWAY TORQUE ON PARKING BRAKE

ATTENTION:

A wear measurement on the service brake and checking of the break-away torque on the parking brake respectively have to be made at least once a year, especially in case of a changed braking behaviour like e.g.:

- Braking noise
- Braking power reduced
- Deceleration changed
- Brake fluid level changed
- Braking pressure changed

1. Wear measurement – Service brake
(Figure 1 and 2):

A wear measurement has to be made on both multi-disc brakes.

Remove screw plug, open parking brake resp. pressurize it and determine Dim. X acc. to Fig. 1 and 2 by means of feeler gauge.

Dim. X corresponds to the clearance + wear of inner clutch discs.

ATTENTION: If dim X \geq 4,70 mm (for the type with 4 lined clutch discs per output side), or dim X \geq 5,65 mm (for the type with 5 lined clutch discs per output side), the lined clutch discs have to be replaced on both output sides!

Following to this provide level plug with a new O-ring and install it!

Tightening torque $M_A = 50 \text{ Nm}$

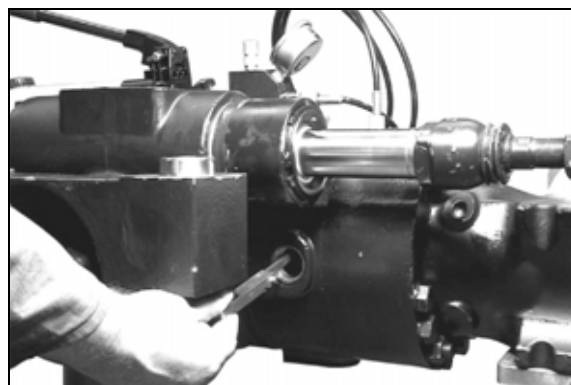


Fig. 1

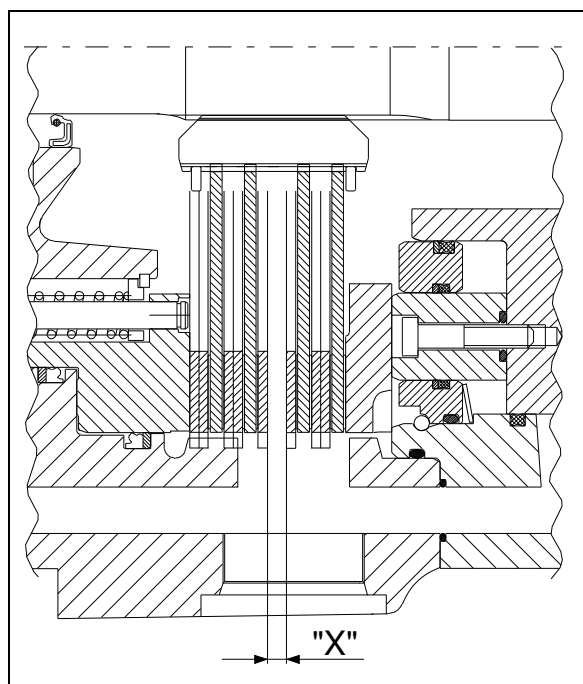


Fig. 2

2. Check break-away torque – Parking brake **≥ 1600 Nm (Figure 3):**

Adjust torque spanner to 1600 Nm and check break-away torque on the end yoke.

NOTE: Apply direction of force only clockwise!

ATTENTION: If break-away torque ≤ 1600 Nm (end yoke is slipping), internal checking of the parking brake is mandatory!

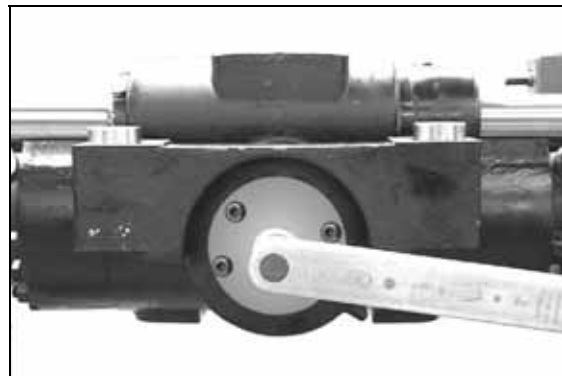


Fig. 3

VERGLEICHSTABELLE FÜR MASSEINHEITEN
CONVERSION TABLE
TABLEAU DE CONVERSION

25,40 mm	=	1 in (inch)
1 kg (Kilogramm)	=	2,205 lb (pounds)
9,81 Nm (1 kpm)	=	7,233 lbf x ft (pound force foot)
1,356 Nm (0,138 kpm)	=	1 lbf x ft (pound force foot)
1 kg / cm	=	5,560 lb / in (pound per inch)
1 bar (1,02 kp/cm ²)	=	14,233 psi (pound force per square inch lbf/in ²)
0,070 bar (0,071 kp/cm ²)	=	1 psi (lbf/in ²)
1 Liter	=	0,264 Gallon (Imp.)
4,456 Liter	=	1 Gallon (Imp.)
1 Liter	=	0,220 Gallon (US)
3,785 Liter	=	1 Gallon (US)
1609,344 m	=	1 Mile (Landmeile)
0° C (Celsius)	=	+ 32° F (Fahrenheit)
0° C (Celsius)	=	273,15 Kelvin

BEZEICHNUNG DER GESETZLICHEN EINHEITEN DENOMINATION OF STANDARD DIMENSIONS DENOMINATION DES DIMENSIONS STANDARDISEES

Hinweis : längenbezogene Maße in kg/m; flächenbezogene Maße in t/m²

Note : linear density in kg/m; areal density in t/m²

Nota : Densité linéaire en kg/m; Densité superficielle en t/m²

Begriff Unit Unité	Formelzeichen Formula Sign Symbols	Neu New Nouveau	Alt Old Vieu	Umrechnung Conversion Conversion	Bemerkungen Note Nota
Masse Mass Mass	M	kg (Kilogramm)	kg		
Kraft Force Force	F	N (Newton)	kp	1 kp = 9,81 N	
Arbeit Work Travail	A	J (Joule)	kpm	0,102kpm = 1J = 1Nm	
Leistung Power Puissance	P	KW (Kilowatt)	PS (DIN)	1 PS = 0,7355 KW 1 KW = 1,36 PS	
Drehmoment Torque Couple	T	Nm (Newtonmeter)	kpm	1 kpm = 9,81 Nm	T (Nm) = F (N) · r (m)
Kraftmoment Moment (Force) Moment (Force)	M	Nm (Newtonmeter)	kpm	1 kpm = 9,81 Nm	M (Nm) = F (N) · r (m)
Druck (Über-) Pressure (Overpress) Pression (Sur-)	pü	bar	atü	1,02 atü = 1,02 kp/cm ² = 1 bar = 750 torr	
Drehzahl Speed Nombre de Tours	n	min -1			

TORQUE LIMITS FOR SCREWS (IN Nm) ACCORDING TO ZF-STANDARDS 148

Friction value: μ total= 0,12 for screws and nuts without after-treatment, as well as phosphatized nuts. Tightening by hand!

Torque limits, if not especially indicated, can be taken from the following list:

Metric ISO-Standard thread DIN 13, Page 13

Dimension	8.8	10.9	12.9
M4	2,8	4,1	4,8
M5	5,5	8,1	9,5
M6	9,5	14	16,5
M7	15	23	28
M8	23	34	40
M10	46	68	79
M12	79	115	135
M14	125	185	215
M16	195	280	330
M18	280	390	460
M20	390	560	650
M22	530	750	880
M24	670	960	1100
M27	1000	1400	1650
M30	1350	1900	2250
M33	1850	2600	3000
M36	2350	3300	3900
M39	3000	4300	5100

Metric ISO-Fine thread DIN 13, Page 13

Dimension	8.8	10.9	12.9
M 8 x 1	24	36	43
M 9 x 1	36	53	62
M 10 x 1	52	76	89
M 10 x 1,25	49	72	84
M 12 x 1,25	87	125	150
M 12 x 1,5	83	120	145
M 14 x 1,5	135	200	235
M 16 x 1,5	205	300	360
M 18 x 1,5	310	440	520
M 18 x 2	290	420	490
M 20 x 1,5	430	620	720
M 22 x 1,5	580	820	960
M 24 x 1,5	760	1100	1250
M 24 x 2	730	1050	1200
M 27 x 1,5	1100	1600	1850
M 27 x 2	1050	1500	1800
M 30 x 1,5	1550	2200	2550
M 30 x 2	1500	2100	2500
M33 x 1,5	2050	2900	3400
M 33 x 2	2000	2800	3300
M 36 x 1,5	2700	3800	4450
M 36 x 3	2500	3500	4100
M 39 x 1,5	3450	4900	5700
M 39 x 3	3200	4600	5300

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Output

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
Fig. 1.11		<p><u>Two-armed puller #500 mm</u> Universal use. To press off the hub from the joint housing.</p>	5870 970 007
Fig. 1.14		<p><u>Gripping insert Super</u> To pull off the tapered roller bearing inner ring JP120049 = 0750 117 570 from the joint housing. Can be used in combination with: <u>Threaded ring #</u> M 150 x 3 <u>Two-armed puller #</u></p>	5873 004 026
Fig. 1.17		<p><u>Two-armed puller #160 mm</u> Universal use. To press off the tie rod end from the joint housing.</p>	5870 970 003
Fig. 1.20		<p><u>Gripping insert Super #</u> To pull off the tapered roller bearing inner ring HM804846 = 0750 117 469 from the bearing pin. <u>Back-off insert #</u></p>	5873 001 030
Fig. 1.21 Fig. 1.25		<p><u>Parting tool</u> Universal use. To press off the shaft seal 0734 309 379 from the bearing pin, the bush with screen sheet from the universal shaft.</p>	5870 300 024
Fig. 1.22		<p><u>Eye bolt assortment</u> Combined with: <u>Lifting chain</u> 3-strand</p>	5870 204 002
Fig. 1.24		<p><u>Extracting tool</u> Universal use. To press the double universal shaft out of the joint housing.</p>	5870 281 047
			5870 000 017

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Output

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
Fig. 1.28		<p><u>Internal extractor</u> Universal use. To pull the tapered roller bearing outer ring HM804810 = 0750 117 469 from the axle housing. Combined with:</p>	<p>5870 300 019</p>
		<p><u>Counter support</u></p>	<p>5870 300 020</p>
		<p><u>Magnetic block</u> 1 Set = 3 pcs.</p>	<p>5870 450 003</p>
Fig. 1.29		<p><u>Internal extractor</u> \varnothing 45 – 58 mm Universal use. \varnothing 36 – 46 mm To remove the bush and the shaft seal from the axle casing. Combined with:</p>	<p>5870 300 007 5870 300 005</p>
		<p><u>Counter support</u></p>	<p>5870 300 003</p>
	Fig. 9.1	<p><u>Driver #</u> To install the bush 0501 315 509 into the axle casing. Combined with:</p>	<p>5870 048 156</p>
	Fig. 9.2	<p><u>Driver #</u> To install the shaft seal 0734 309 278 into the axle casing.</p>	<p>5870 048 157</p>
	Fig. 9.3	<p><u>Driver #</u> To install the bearing outer ring HM 804 810 into the axle casing. Combined with:</p>	<p>5870 058 022</p>
		<p><u>Handle</u></p>	<p>5870 260 002</p>
	Fig. 9.7	<p><u>Driver #</u> To install the shaft seal 0750 110 162 into the joint housing. Can only be used in combination with:</p>	<p>5870 048 172</p>
		<p><u>Driver #</u></p>	<p>5870 048 156</p>
	Fig. 9.10	<p><u>Pressure piece #</u> To press the screen sheet 4475 307 028 and the bush 4475 306 112 onto the double universal shaft.</p>	<p>5870 506 097</p>

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Output

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
	Fig. 9.13	<p><u>Internal extractor #</u> Combined with: <u>Counter support #</u> To mount the double joint shaft into the joint housing.</p>	<p>5870 300 005</p> <p>5870 300 003</p>
	Fig. 9.16	<p><u>Driver #</u> To press the shaft seal 0734 309 379 onto the bearing pin 4475 310 011 .</p>	5870 048 243
	Fig. 9.23	<p><u>Spanner #</u> Combined with: <u>Torque spanner #</u> 5 – 45 Nm To check the rolling moment in the swivel bearing.</p>	<p>5870 656 004</p> <p>5870 203 033</p>
	Fig. 9.24	<p><u>Wheel bolt puller Basic set</u> Combined with: <u>Insert</u> ¾ - 16 UNF To mount the wheel bolts into the hub bores.</p>	<p>5870 610 010</p> <p>5870 610 005</p>
	Fig. 9.26	<p><u>Driver</u> To install the shaft seal 0750 110 162 into the hub bore. Combined with: : <u>Handle</u></p>	<p>5870 051 055</p> <p>5870 260 004</p>

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Output

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
Fig. 1.11		<p><u>Two-armed puller #500 mm</u> Universal use. To press off the hub from the joint housing.</p>	5870 970 007
Fig. 1.14		<p><u>Gripping insert Super</u> To pull off the tapered roller bearing inner ring JP120049 = 0750 117 570 from the joint housing. Can be used in combination with: <u>Threaded ring #</u> M 150 x 3 <u>Two-armed puller #</u></p>	5873 004 026 5870 285 026 5870 970 007
Fig. 1.17		<p><u>Two-armed puller #160 mm</u> Universal use. To press off the tie rod end from the joint housing.</p>	5870 970 003
Fig. 1.20		<p><u>Gripping insert Super #</u> To pull off the tapered roller bearing inner ring HM804846 = 0750 117 469 from the bearing pin. <u>Back-off insert #</u></p>	5873 001 030 5870 026 100
Fig. 1.21 Fig. 1.25		<p><u>Parting tool</u> Universal use. To press off the shaft seal 0734 309 379 from the bearing pin, the bush with screen sheet from the universal shaft.</p>	5870 300 024
Fig. 1.22		<p><u>Eye bolt assortment</u> Combined with: <u>Lifting chain</u> 3-strand Universal use. For various lifting work.</p>	5870 204 002 5870 281 047
Fig. 1.24		<p><u>Extracting tool</u> Universal use. To press the double universal shaft out of the joint housing.</p>	5870 000 017

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Output

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
Fig. 1.28		<p><u>Internal extractor</u> Universal use. To pull the tapered roller bearing outer ring HM804810 = 0750 117 469 from the axle housing. Combined with: <u>Counter support</u> <u>Magnetic block</u> 1 Set = 3 pcs.</p>	<p>5870 300 019</p> <p>5870 300 020</p> <p>5870 450 003</p>
Fig. 1.29		<p><u>Internal extractor</u> \varnothing 70 – 100 mm Universal use. To remove the bush and the shaft seal from the axle casing. Combined with: <u>Counter support</u></p>	<p>5870 300 008</p> <p>5870 300 003</p>
	Fig. 9.1	<p><u>Driver #</u> To install the bush 0501 315 509 into the axle casing. Combined with:</p>	<p>5870 048 156</p>
	Fig. 9.2	<p><u>Driver #</u> To install the shaft seal 0734 309 278 into the axle casing.</p>	<p>5870 048 157</p>
	Fig. 9.3	<p><u>Driver #</u> To install the bearing outer ring HM 804 810 into the axle casing. Combined with: <u>Handle</u></p>	<p>5870 058 022</p> <p>5870 260 002</p>
	Fig. 9.7	<p><u>Driver #</u> To install the shaft seal 0750 110 162 into the joint housing. Can only be used in combination with: <u>Driver #</u></p>	<p>5870 048 172</p> <p>5870 048 156</p>
	Fig. 9.10	<p><u>Pressure piece #</u> To press the screen sheet 4475 307 028 and the bush 4475 306 112 onto the double universal shaft.</p>	<p>5870 506 097</p>

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Output

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
	Fig. 9.13	<p><u>Internal extractor #</u> Combined with: <u>Counter support #</u> To mount the double joint shaft into the joint housing.</p>	<p>5870 300 005</p> <p>5870 300 020</p>
	Fig. 9.16	<p><u>Driver #</u> To press the shaft seal 0734 309 379 onto the bearing pin 4475 310 011 .</p>	5870 048 243
	Fig. 9.23	<p><u>Spanner #</u> Combined with: <u>Torque spanner #</u> 5 – 45 Nm To check the rolling moment in the swivel bearing.</p>	<p>5870 656 004</p> <p>5870 203 033</p>
	Fig. 9.24	<p><u>Wheel bolt puller Basic set</u> Combined with: <u>Insert</u> ¾ - 16 UNF To mount the wheel bolts into the hub bores.</p>	<p>5870 610 010</p> <p>5870 610 005</p>
	Fig. 9.26	<p><u>Driver</u> To install the shaft seal 0750 110 162 into the hub bore. Combined with: : <u>Handle</u></p>	<p>5870 051 055</p> <p>5870 260 004</p>

LIST OF SPECIAL TOOLS FOR DISSAMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Steering Gear

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOL (S)	PART NO.
Fig. 2.1		<p><u>Assembly truck assy with tilting device</u></p> <p><u>Holding fixture</u> 1 Set = 2 pcs.</p> <p><u>Clamping bolts</u> 1 Set = 2 pcs.</p> <p>Universal use. To install the complete axle MS-T 3060 onto the assembly truck.</p>	<p>5870 350 000</p> <p>5870 350 089</p> <p>5870 204 059</p>
Fig. 2.3		<p><u>Hot-air blower</u> 230 V 50 Hz</p> <p><u>Hot-air blower</u> 215 V 60 Hz</p> <p>Universal use. To heat the connections joined with Loctite.</p>	<p>5870 221 500</p> <p>5870 221 501</p>
Fig. 2.5	Fig. 10.5	<p><u>Slotted nut wrench</u></p> <p>To loosen and tighten the slotted nut 0501 318 198 on the steering cylinder.</p>	<p>5870 401 147</p>
Fig. 2.7	Fig. 10.12	<p><u>Set of external pliers</u> A1-A2-A3-A4</p> <p>Universal use. To unsnap and snap-in externally clamped retaining rings.</p>	<p>5870 900 015</p>
Fig. 2.8		<p><u>Plastic hammer</u> ø 30 mm</p> <p>Universal use. To separate and join sensitive parts.</p>	<p>5870 280 003</p>
	Fig. 10.3 Fig. 10.4	<p><u>Installer #</u></p> <p>Combined with:</p> <p><u>Installer #</u></p> <p>To mount the slip rings onto the piston rod.</p>	<p>5870 651 045</p> <p>5870 651 046</p>
	Fig. 10.19 Fig. 10.20	<p><u>Measuring fixture</u></p> <p>Combined with:</p> <p><u>Straightedges</u> 1 Set = 2 pcs.</p> <p>For basic setting of the axle geometry as well as to adjust the steering angle</p>	<p>5870 200 033</p> <p>5870 200 029</p>

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Parking Brake and Multi-Disc Brake

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
Fig. 3.1		<p><u>Assembly truck assy with tilting device</u></p> <p><u>Holding fixture</u> 1 Set = 2 pcs.</p> <p><u>Clamping bolts</u> 1 Set = 2 pcs.</p> <p>Universal use. To install the complete axle MS-T 3060 on the assembly truck.</p>	<p>5870 350 000</p> <p>5870 350 089</p> <p>5870 204 059</p>
Fig. 3.1	Fig. 8.42	<p><u>Lifting strap</u></p> <p>Universal use. To remove and install housing components and assemblies.</p>	<p>5870 281 026</p>
Fig. 3.3	Fig. 8.37	<p><u>Two-armed puller</u></p> <p><u>Assembly ring</u></p> <p>Universal use. To preload the cup spring 0732 000 246 To snap-in and unsnap the snap ring.</p>	<p>5870 900 006</p> <p>5870 345 033</p>
Fig. 3.6 Fig. 3.22		<p><u>Crowbar set</u> 2 pcs. required</p> <p>Universal use. To press the piston out of the axle casing and the bearing outer ring from the brake housing.</p>	<p>5870 345 071</p>
Fig. 3.7		<p><u>Three-armed puller</u></p> <p>Universal use. To separate the sealing washer from the piston.</p>	<p>5870 971 003</p>
Fig. 3.11		<p><u>Striker</u></p> <p>Universal use. To remove the oil guide from the axle casing.</p>	<p>5870 650 004</p>
Fig. 3.14 Fig. 3.16	Fig. 8.20 Fig. 8.22	<p><u>Set of external pliers</u> A1-A2-A3-A4</p> <p>Universal use. To unsnap and to snap-in externally clamped retaining rings.</p>	<p>5870 900 015</p>

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY
ZF – MULTISTEER MS – T 3060 / Limited-Slip Differential DZ-500

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
Fig. 4.1		<p><u>Assembly truck assy with tilting device</u></p> <p><u>Holding fixture</u> 1 Set = 2 pcs.</p> <p><u>Clamping bolts</u> 1 Set = 2 pcs.</p> <p>Universal use. To install the complete axle MS-T 3060 on the assembly truck.</p>	<p>5870 350 000</p> <p>5870 350 089</p> <p>5870 204 059</p>
Fig. 4.2		<p><u>Gripping insert #</u></p> <p>To pull off the bearing inner ring 0750 117 569 as well as 0750 117 024 from the differential cage. Combined with:</p> <p><u>Pressure piece #</u></p> <p><u>Back-off insert</u></p>	<p>5873 001 020</p> <p>5870 100 024</p> <p>5870 026 100</p>
	Fig. 6.8	<p><u>Magnetic stand #</u></p> <p>Combined with:</p> <p><u>Dial indicator #</u></p> <p>Universal use. For various measuring purposes.</p>	<p>5870 200 055</p> <p>5870 200 057</p>

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Input and Brackets

4475 038 007

DISASSEMBLY	REASSEMBL.	DESIGNATION/APPLICATION OF THE SPECIAL TOOLS (S)	PART NO.
Fig. 5.1		<p><u>Assembly truck assy with tilting device</u></p> <p><u>Holding fixture</u> 1 Set = 2 pcs.</p> <p><u>Clamping bolts</u> 1 Set = 2 pcs.</p> <p>Universal use. To install the complete axle MS-T 3060 onto the assembly truck.</p>	<p>5870 350 000</p> <p>5870 350 089</p> <p>5870 204 059</p>
Fig. 5.1	Fig. 7.11 Fig. 7.13 Fig. 7.21	<p><u>Fixture #</u></p> <p>Universal use. To lock the input flange when the pinion bolt connection is loosened and tightened.</p>	5870 240 025
Fig. 5.3		<p><u>Parting tool</u></p> <p>Universal use. To separate the bearing sheet from the yoke.</p>	5870 300 024
Fig. 5.8		<p><u>Two-armed puller</u></p> <p><u>Tension arm with threaded connection</u></p> <p>To press out the bevel pinion from the housing.</p>	<p>5870 970 006</p> <p>5870 970 025</p>
Fig. 5.10		<p><u>Gripping insert</u></p> <p>To remove the tapered roller bearing inner ring 0750 117 354 from the bevel pinion. Combined with:</p> <p><u>Basic device</u></p>	<p>5873 001 037</p> <p>5873 001 000</p>
Fig. 5.11		<p><u>Crowbar set</u> 2 pcs. required</p> <p>Universal use. To separate housing and bearing parts, to remove shaft seals etc.</p>	5870 345 071
Fig. 5.12		<p><u>Internal extractor</u></p> <p>Universal use. To remove the bearing outer ring from the axle drive housing. Combined with:</p> <p><u>Counter support</u></p>	<p>5870 300 019</p> <p>5870 300 020</p>

LIST OF SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

ZF – MULTISTEER MS – T 3060 / Input and Brackets

4475 038 007

DEMONTAGE	MONTAGE	BEZEICHNUNG/VERWENDUNG SPEZIALWERKZEUGE (S)	SACH-NR.
	Fig. 7.3 Fig. 7.25 Fig. 7.26	<u>Digital depth gauge #</u> Combined with: <u>Gauge blocks #</u> <u>Straightedge #</u> Universal use. For various measuring purposes.	5870 200 072 5870 200 022 5870 200 066
	Fig. 7.5	<u>Assembly fixture #</u> Combined with: <u>Pressure ring #</u> To install the bearing outer ring JW 5010 = 0750 117 355 into the axle drive housing.	5870 345 049 5870 345 056
	Fig. 7.6	<u>Driver</u> To install the bearing outer ring 31308 = 0750 117 088 into the axle drive housing. Combined with: <u>Handle</u>	5870 058 083 5870 260 002
	Fig. 7.12	<u>Torque measuring device</u> 0,6 – 6 Nm Universal use. To determine the rolling moment in the pinion bearing.	5870 203 030
	Fig. 7.14	<u>Driver #</u> To install the combination ring 0734 119 659 into the axle drive housing.	5870 048 247
	Fig. 7.32 Fig. 7.33	<u>Magnetic stand #</u> Combined with: <u>Dial indicator #</u> <u>Straightedge #</u> Universal use. For various measuring purposes.	5870 200 055 5870 200 057 5870 200 092
# Particularly important special tools for partial repair (wear part repair) !			

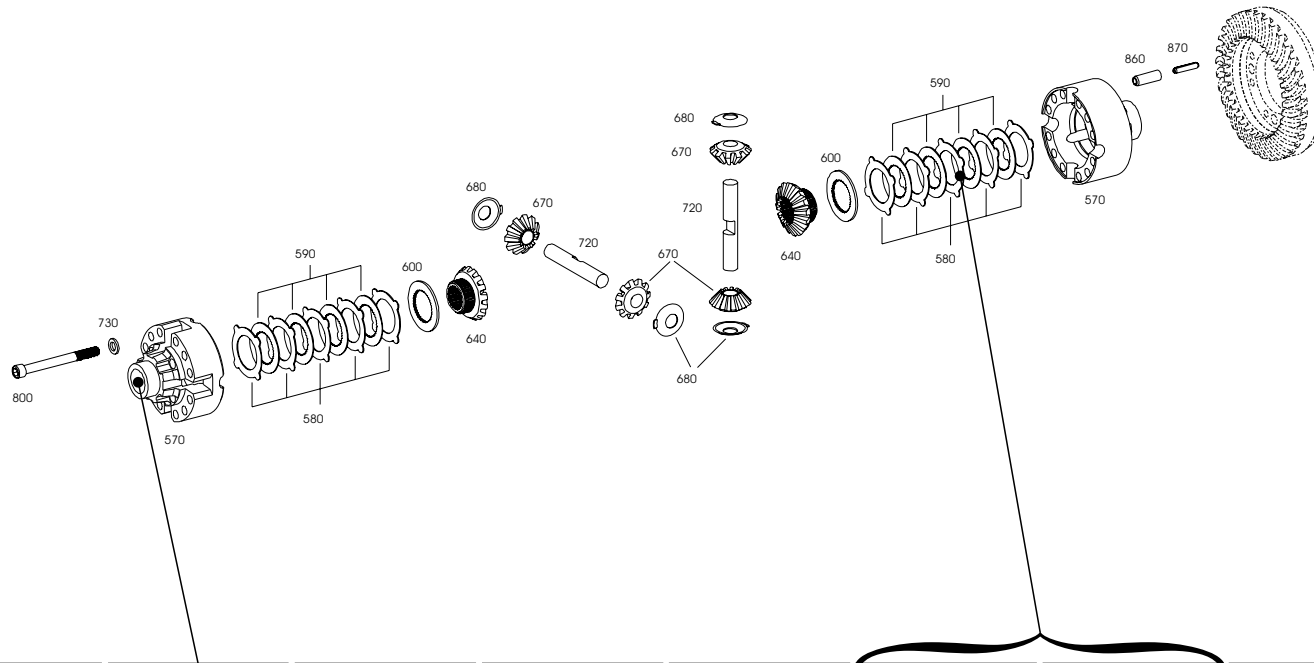


MS-T 3060
 LAM. SPERRDIFF.
 LIMIT. SLIP DIFF
 DIFF. AUT. BLOQ. D
 4475 038 007/008



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5870 200 092

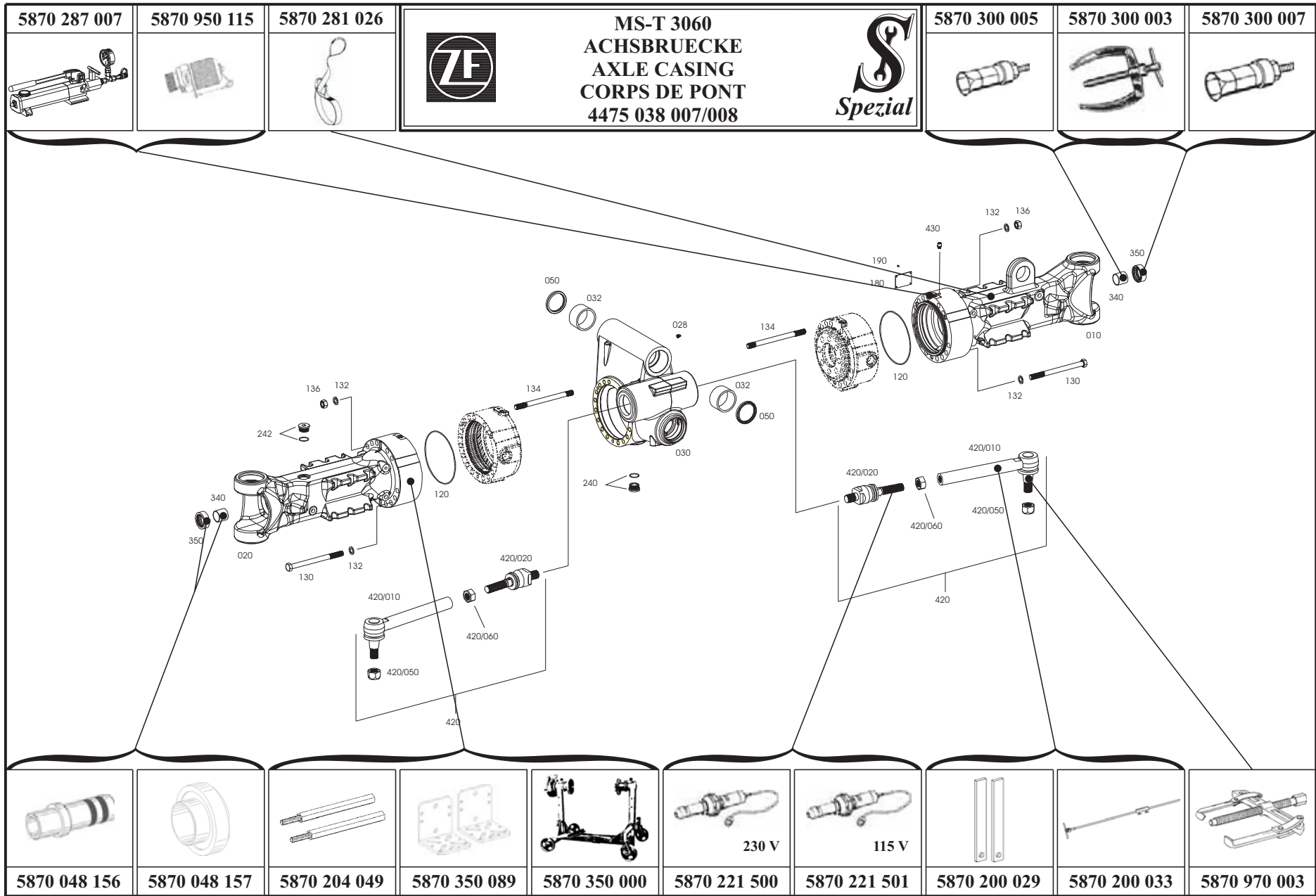


5870 200 055



5870 200 057

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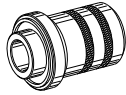


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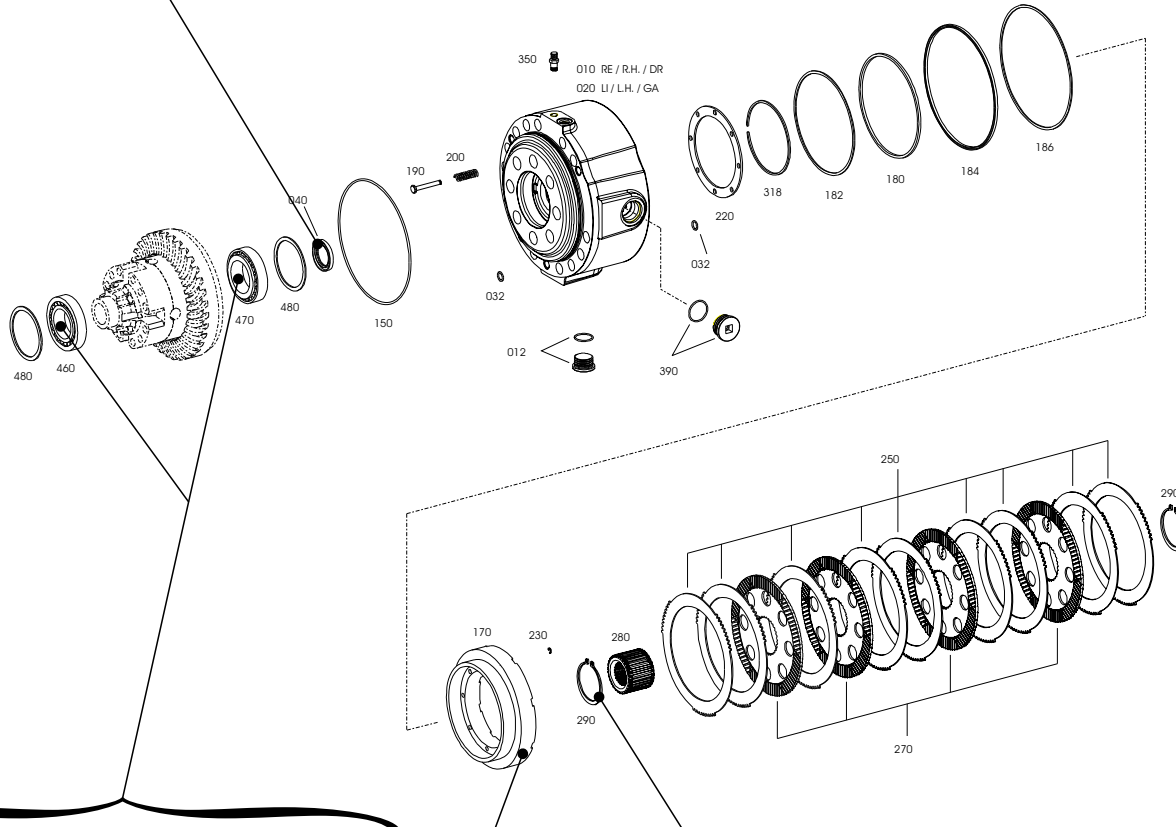
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Division



5870 048 242



MS-T 3060
LAMELLENBREMSE
M-DISC BRAKE
FREIN MULTIDISQUE
4475 038 007/008



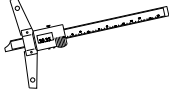
5873 001 020



5870 100 024



5870 026 100



5870 200 072



5870 900 015

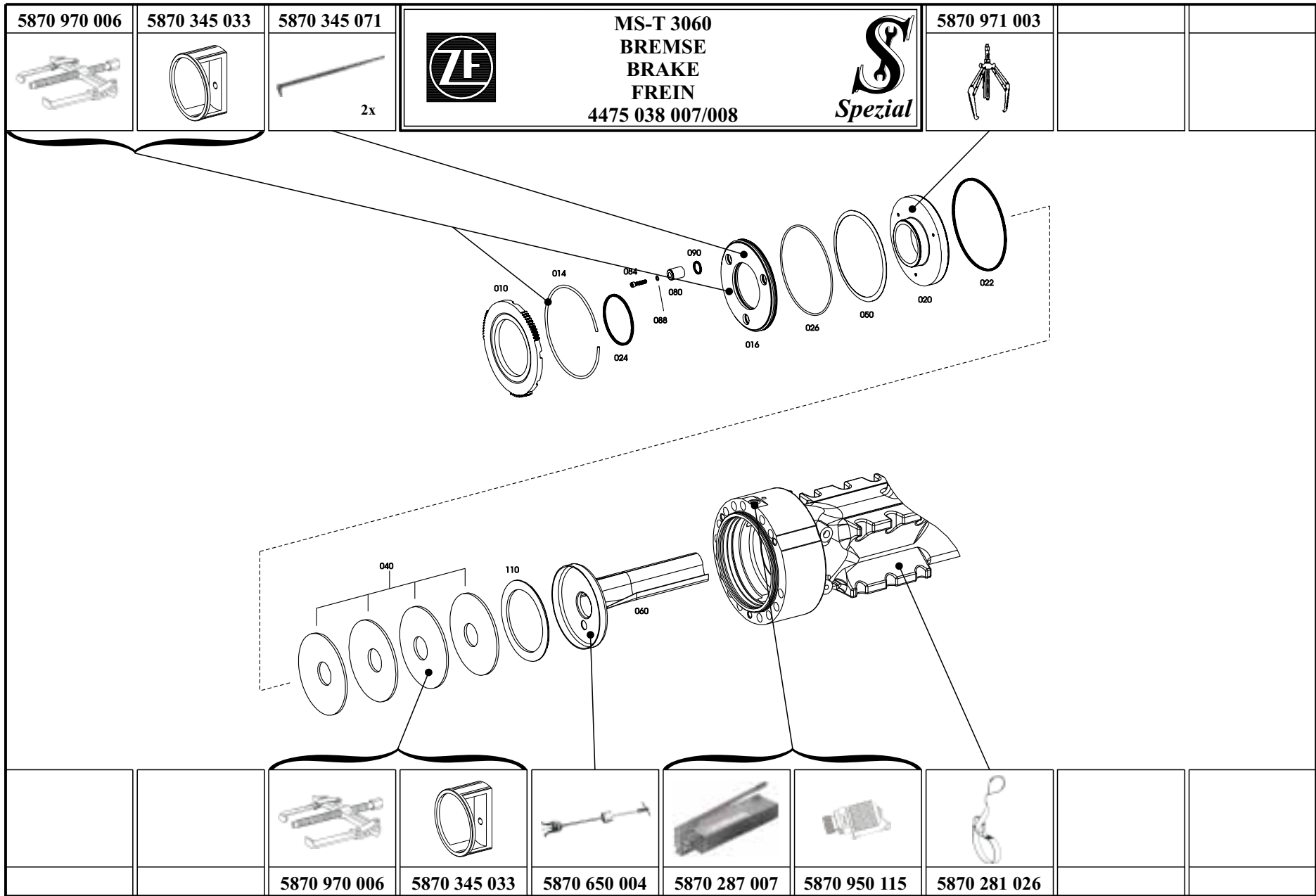
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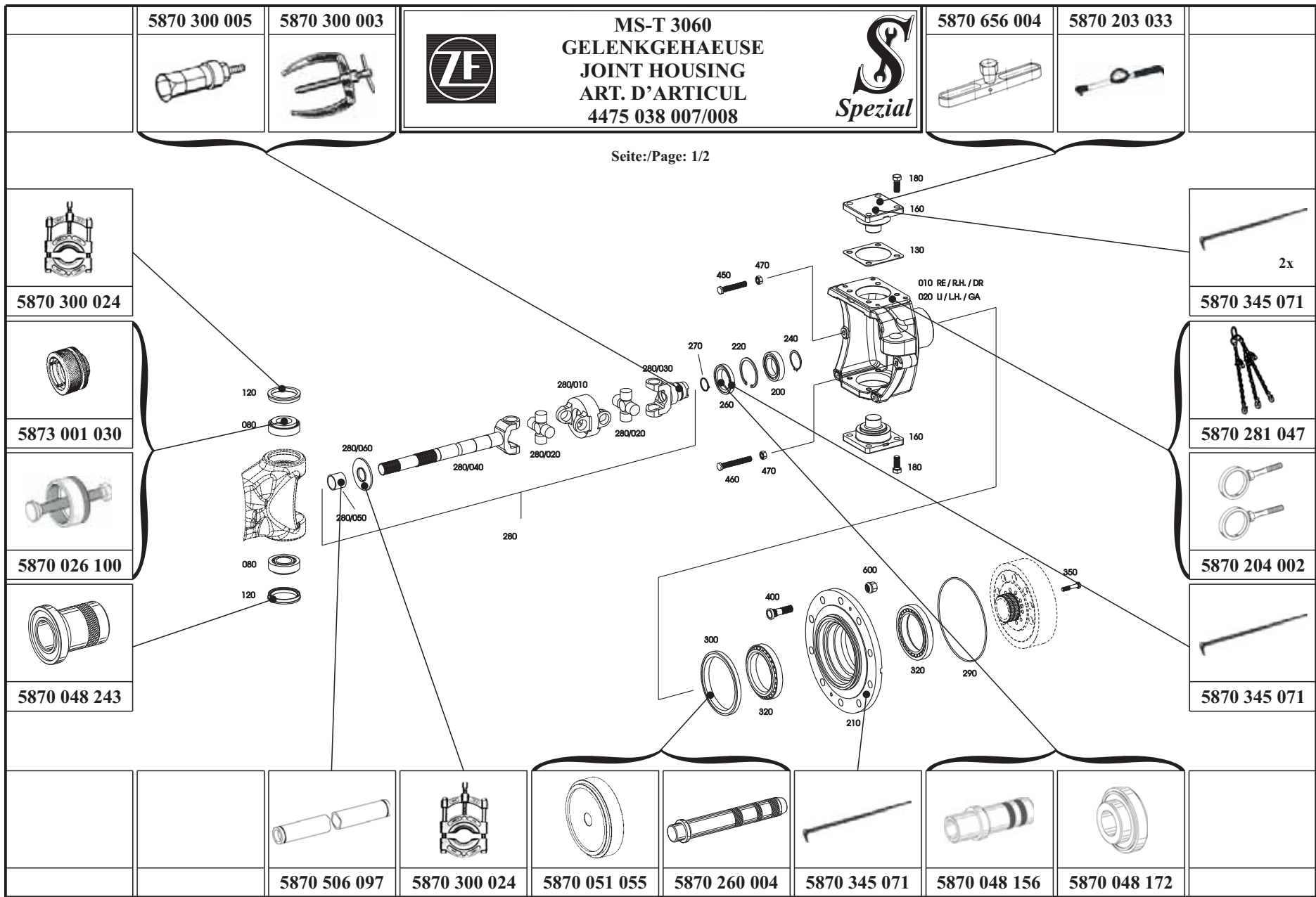


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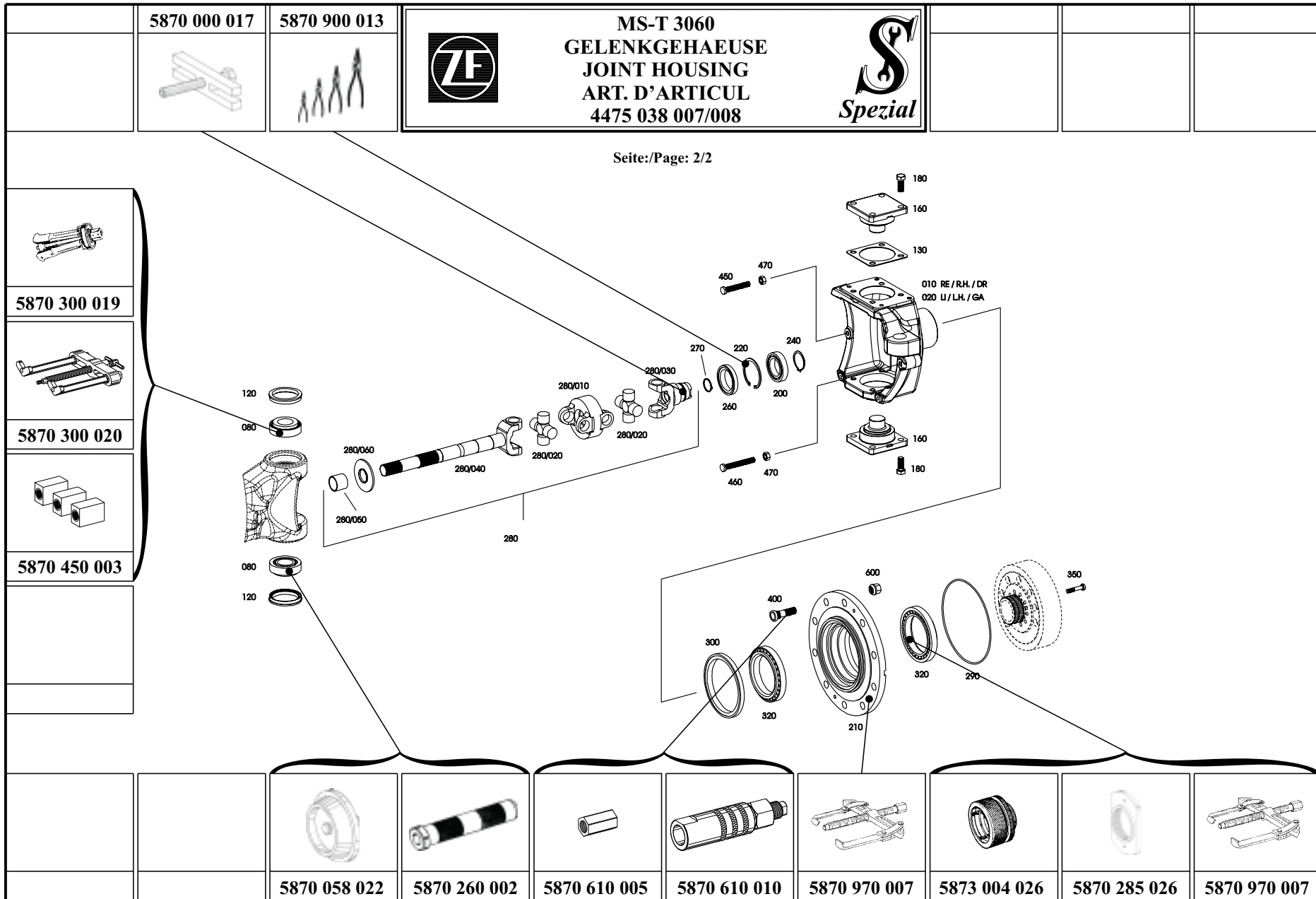
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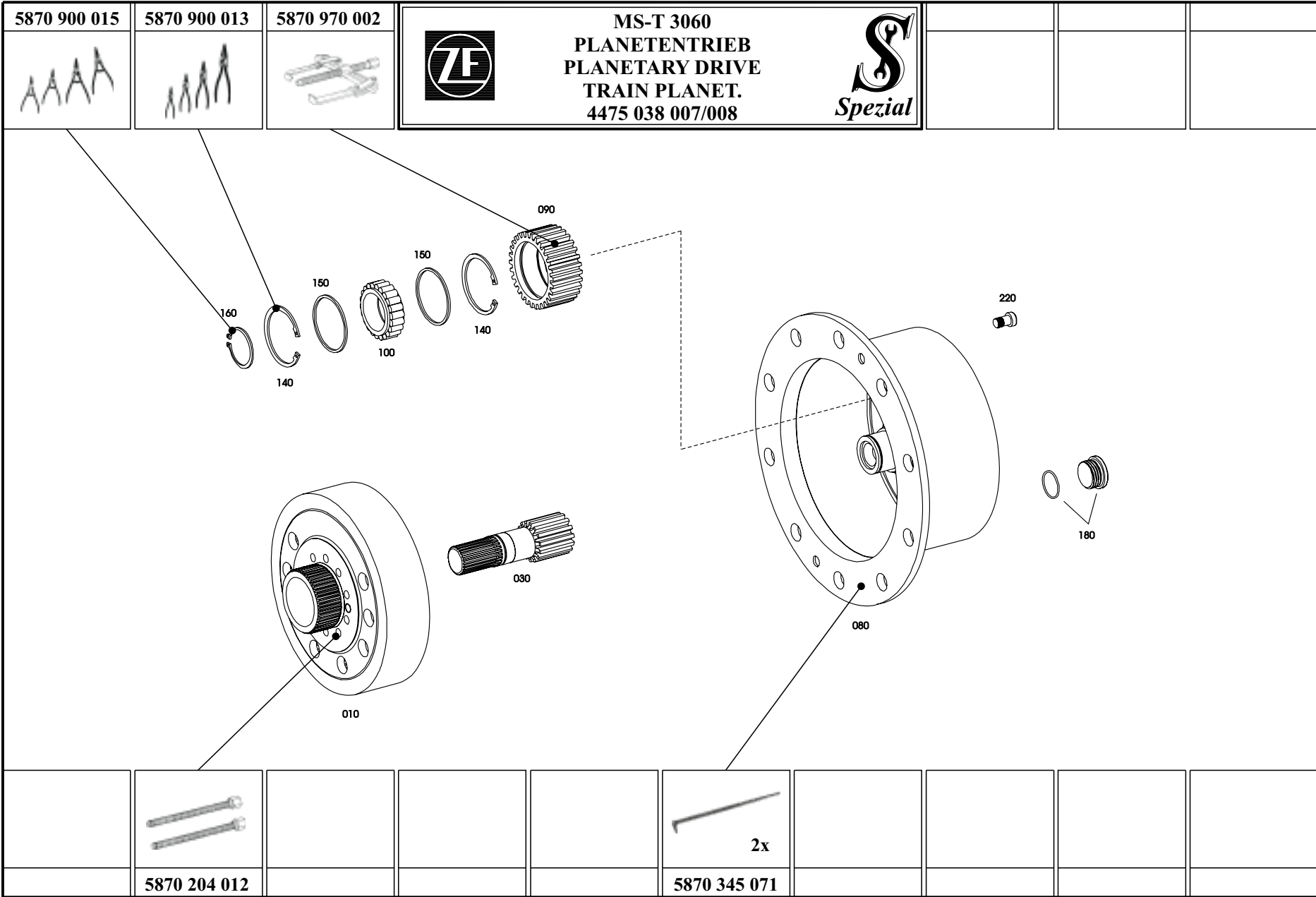


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WB-8

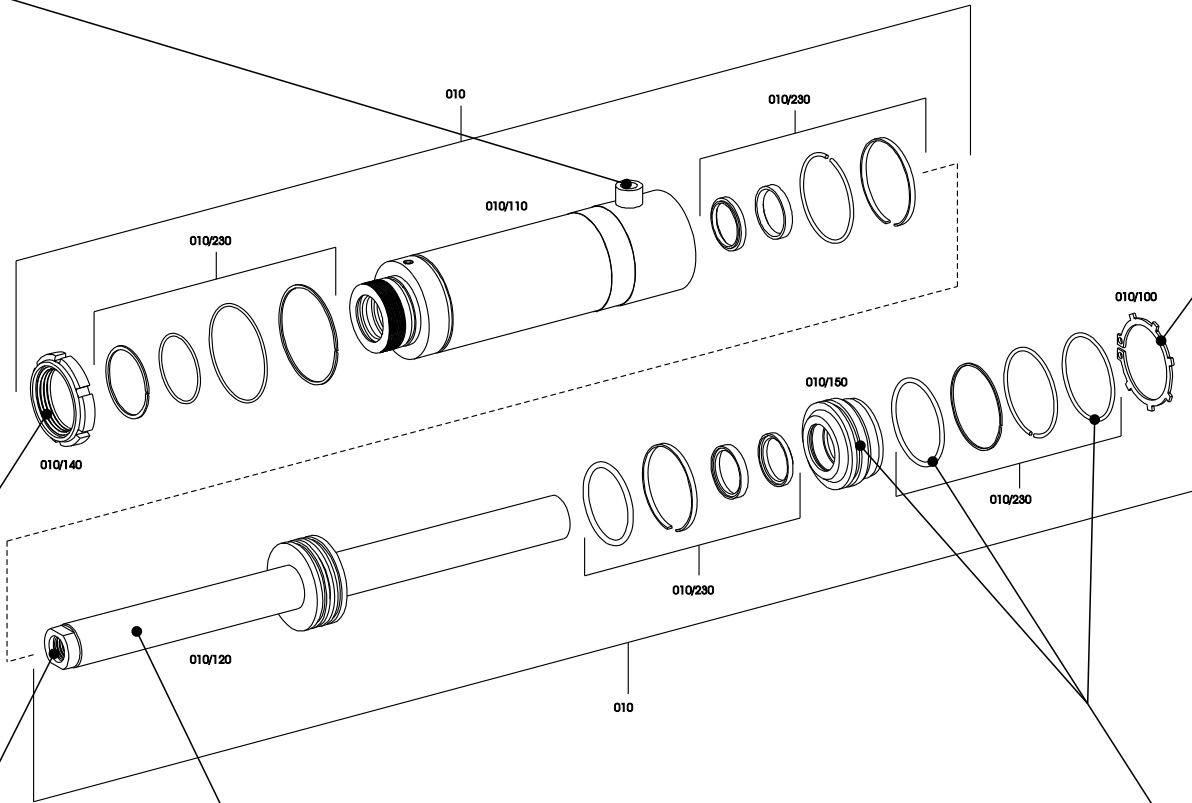








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Off-Road Transmissions
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5870 287 007 	5870 950 100 	5870 950 150 	 <p style="text-align: center;"> MS-T 3060 LENKUNG STEERING GEAR DIRECTION 4475 038 007/008 </p> 			5870 900 015 
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 5870 401 147	 5870 280 003	 5870 200 029	 5870 200 033				 5870 651 045	 5870 651 046	
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WB-9



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ZF - Multisteer Steering Axle MS-T 3060

DISASSEMBLY

1. Disassembly of the Output

Fasten axle on the assembly truck.

(S) Assembly truck	5870 350 000
(S) Holding fixtures	5870 350 089
(S) Clamping bolts	5870 204 059

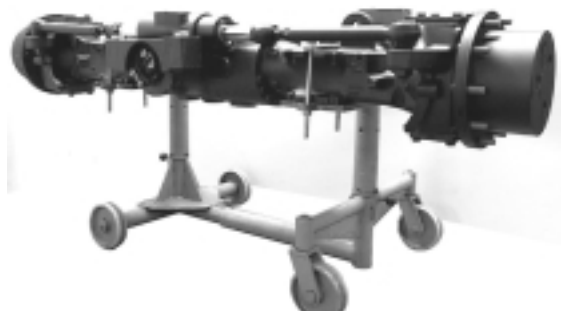


Figure 1

Loosen screw plugs and drain oil from the axle.

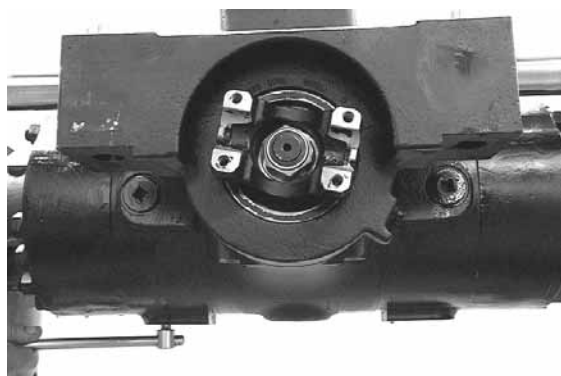


Figure 2

Pressurize parking brake by means of HP-Pump (S) and bring drain hole into lowest position.

Then loosen screw plug and drain oil from the planet carrier.

(S) HP-Pump	5870 287 007
(S) Measuring hub (9/16" – 18 UNF)	5870 950 115



Figure 3

Loosen cap screws and pull off planet carrier from the hub.

(S) Crowbar set	5870 345 071
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Figure 4

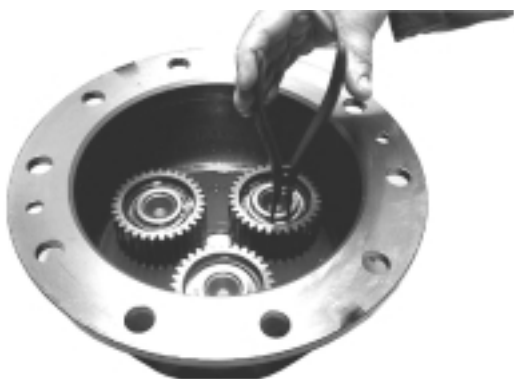


Figure 5

Squeeze out the retaining ring.

(S) Set of external pliers 5870 900 015



Figure 6

Pull off the planet gear.

(S) Two-armed puller 5870 970 002



Figure 7

Squeeze out both retaining rings and remove the released single components.

(S) Set of internal pliers 5870 900 013

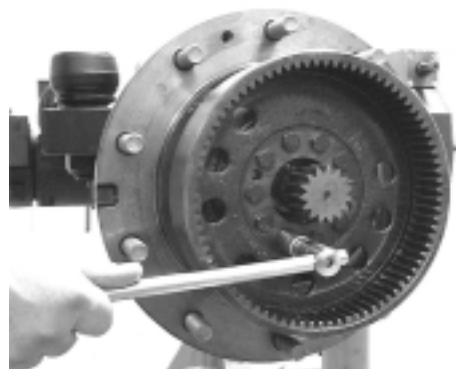


Figure 8

Loosen hexagon screws.

 **Hexagon screws are installed with Loctite (Type No. 243)!**

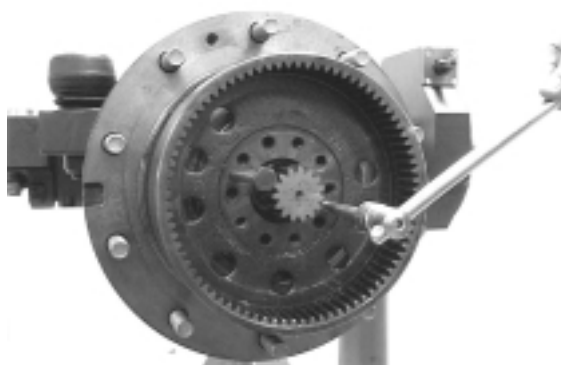


Figure 9

By means of back-off screws (S) pull out the ring gear evenly from the joint housing.

(S) Back-off screws 5870 204 012



Figure 10

Expand the retaining ring and pull out the sun gear shaft from the double universal shaft.

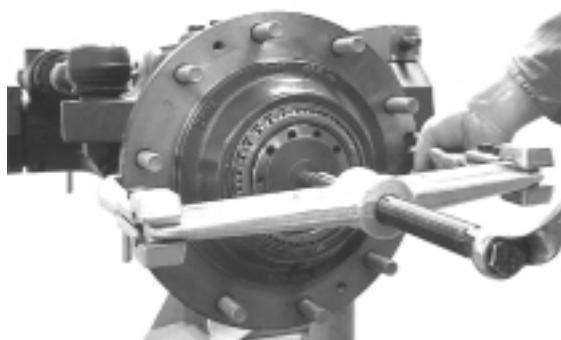


Figure 11

By means of two-armed puller (S) remove the hub from the joint housing.

(S) Two-armed puller 5870 970 007



Pay attention to released bearing inner ring!



Figure 12

Press off shaft seal from the hub.

(S) Crowbar set 5870 345 071

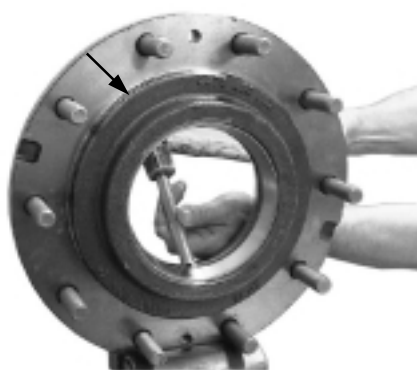


Figure 13

Press off both bearing outer rings from the hub and remove the O-ring (see arrow).

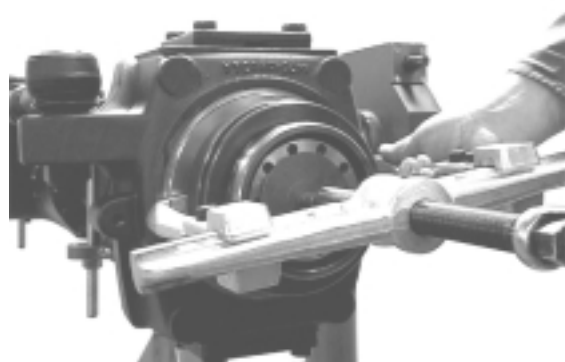


Figure 14

Pull off the bearing inner ring from the joint housing.

(S) Gripping insert	5873 004 026
(S) Two-armed puller	5870 970 007
(S) Threaded ring	5870 285 026



Figure 15

Loosen stop screw.

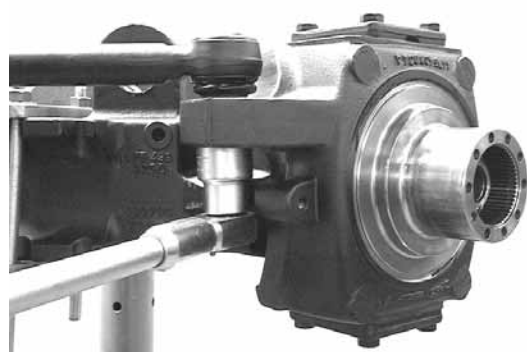


Figure 16

Loosen hexagon nut.



Figure 17

By means of two-armed puller (S) press off the tie rod from the joint housing.

(S) Two-armed puller 5870 970 003

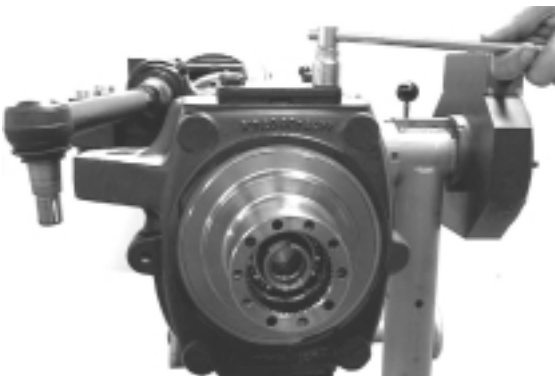


Figure 18

Loosen hexagon screws on both bearing pins.



Figure 19

Press off both bearing pins from the joint housing.

(S) Crowbar set 5870 345 071

 **Pay attention to released shim on the upper bearing pin!**



Figure 20

Pull off the bearing inner ring from the bearing pin.

(S) Gripping insert 5873 001 030

(S) Back-off insert 5870 026 100

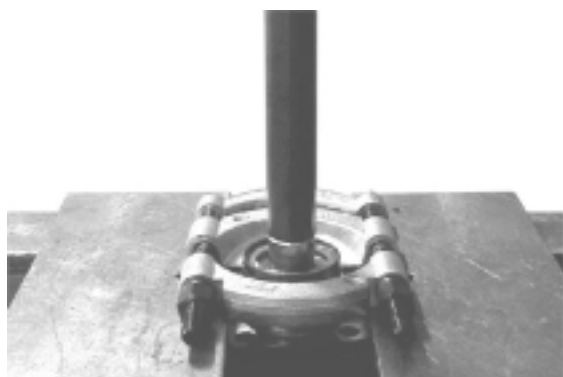


Figure 21

By means of parting tool (S) press off the shaft seal from the bearing pin.

(S) Parting tool 5870 300 024

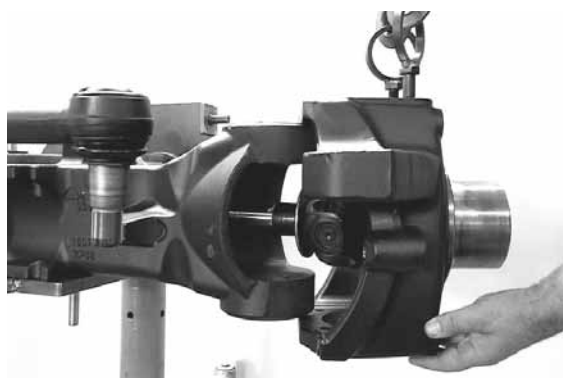


Figure 22

By means of lifting tackle separate the joint housing together with the double universal joint shaft from the axle casing.

(S) Eye bolt assortment 5870 204 002
(S) Lifting chain 5870 281 047



Figure 23

Squeeze out the retaining ring.

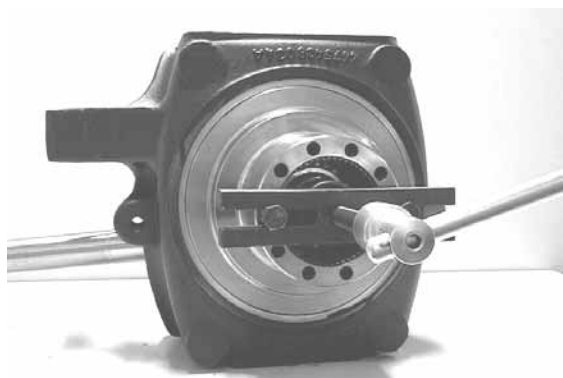


Figure 24

Press off the double joint shaft from the joint housing.

(S) Extracting tool 5870 000 017

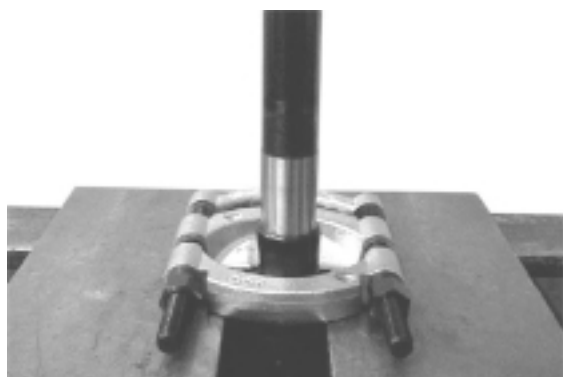


Figure 25

By means of parting tool (S) press off bush and screen sheet from the double universal shaft.

(S) Parting tool 5870 300 024

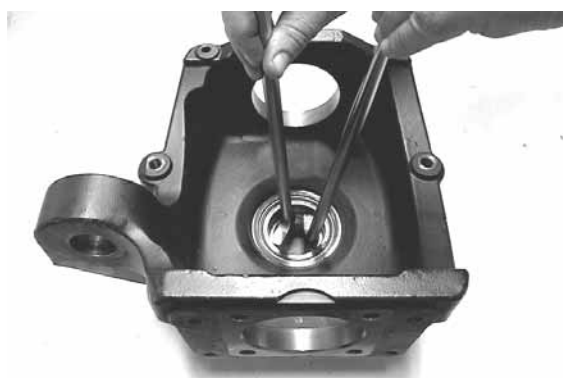


Figure 26

Press off shaft seal from the housing bore.

(S) Crowbar set 5870 345 071

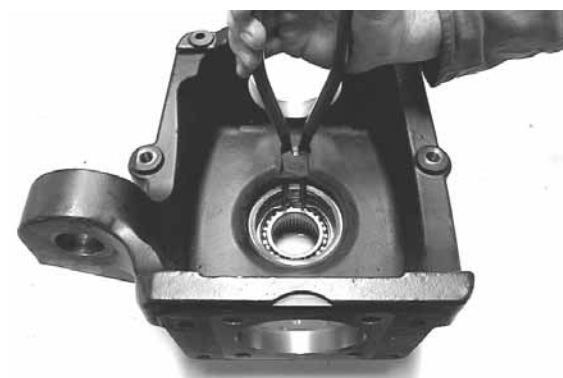


Figure 27

Squeeze out the retaining ring and remove the released ball bearing from the joint housing.

(S) Set of internal pliers 5870 900 013



Figure 28

Pull out both bearing outer rings from the swivel bearing bores.

(S) Internal extractor 5870 300 019

(S) Counter support 5870 300 020

(S) Magnetic block 5870 450 003

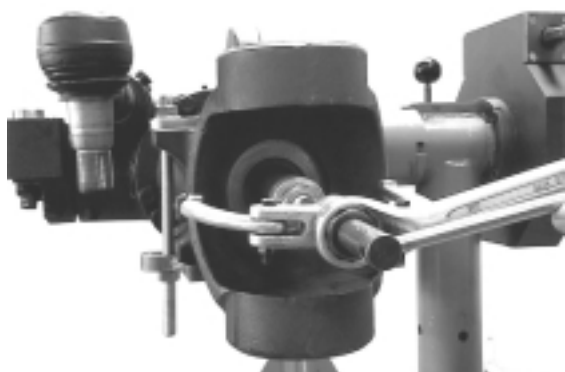


Figure 29

Remove shaft seal and bush from the axle casing.

(S) Internal extractor	5870 300 008
(S) Counter support	5870 300 003

2. Disassembly of the Steering Gear

Loosen hexagon nut (see arrow).

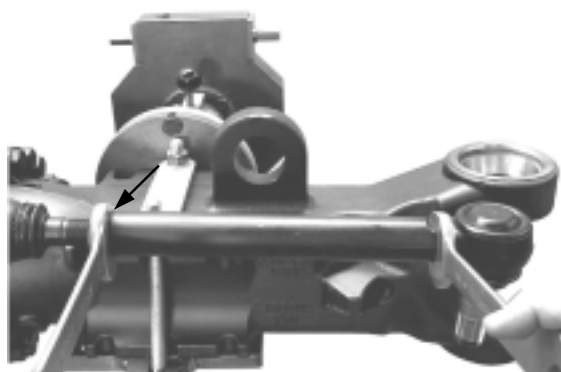



Figure 1

 **Step (Figure 1 ... 4) is to be done on both tie rods!**

Separate ball joint from axial joint.

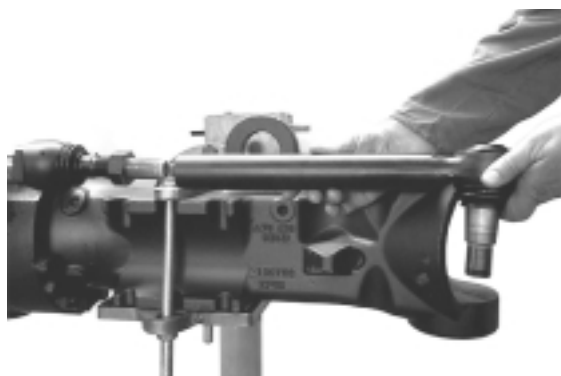



Figure 2

Heat piston rod and axial joint respectively by means of hot-air blower (S).

(S) Hot-air blower 230 V	5870 221 500
(S) Hot-air blower 115 V	5870 221 501



Figure 3

 **Axial joint is installed with Loctite (Type No.: 243)!**

Separate axial joint from the piston rod.



Figure 4

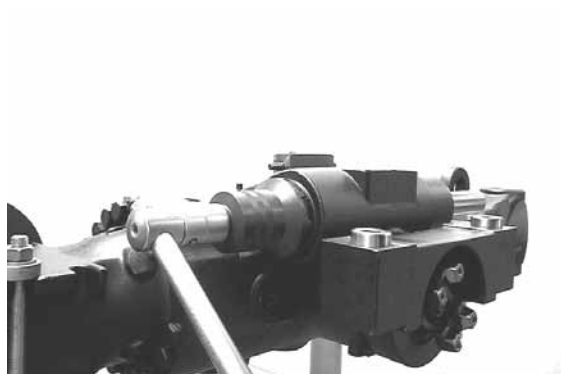


Figure 5

Loosen slotted nut.

(S) Slotted nut wrench

5870 401 147

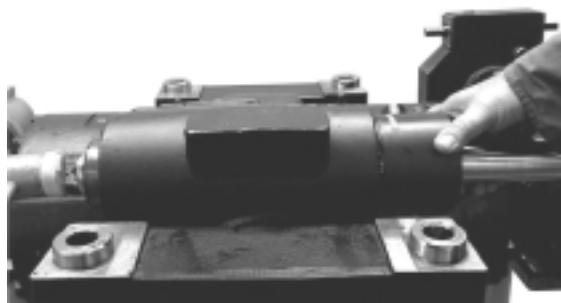


Figure 6

Drive out steering cylinder assy from the axle drive housing.



Figure 7

Squeeze out the retaining ring and remove the O-ring behind it.

(S) Set of external pliers

5870 900 015



Figure 8

Push or install guide piece into the cylinder tube until the retaining ring (see below sketch) can be squeezed out.

(S) Plastic hammer

5870 280 003

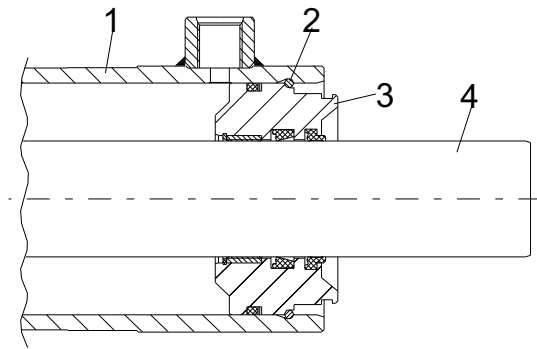


Figure 9

To sketch:

- 1 = Cylinder tube
- 2 = Retaining ring
- 3 = Guide piece
- 4 = Piston rod

Squeeze out retaining ring.



Figure 10

Press piston rod with guide piece out of the cylinder tube.



Figure 11

Separate guide piece from the piston rod.

Following remove all sealing elements from the piston rod, guide piece and cylinder tube.



Figure 12

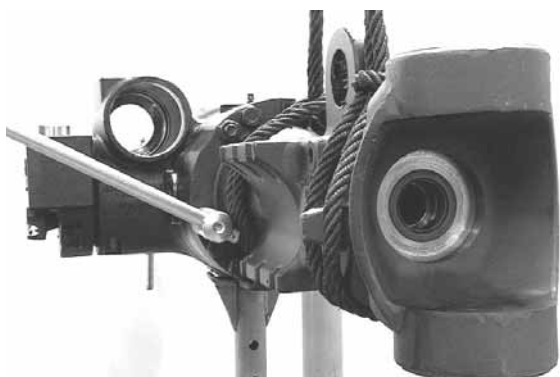


Figure 1

3. Disassembly of Parking Brake and Multi-Disc Brake

Lock axle casing by means of lifting tackle and loosen bolted connection.

(S) Lifting strap 5870 281 026

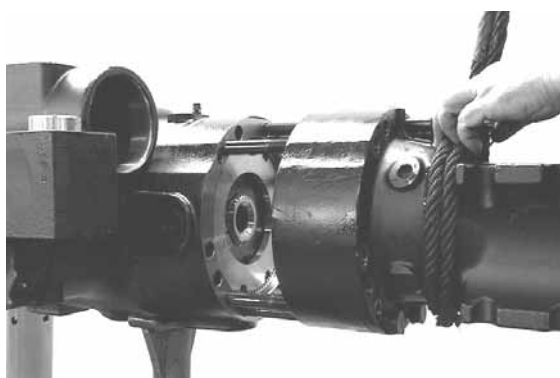


Figure 2

Separate axle casing from the brake housing.

☞ Pay attention to possibly released O-rings!

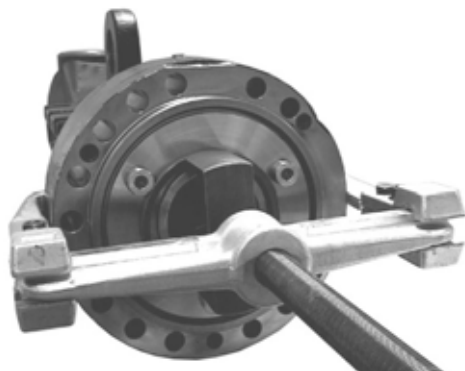


Figure 3

3.1 Disassembly of the Parking Brake

By means of two-armed puller (S) preload sealing washer and cup spring respectively to such an extent that the snap ring (see sketch) can be squeezed out.

(S) Two-armed puller 5870 970 006

(S) Assembly ring 5870 345 033

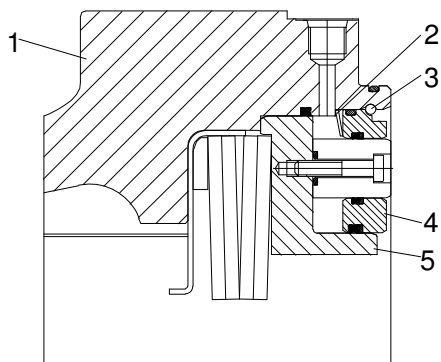


Figure 4

To the sketch:

- 1 = Axle housing
- 2 = Cup spring
- 3 = Snap ring
- 4 = Sealing washer
- 5 = Piston

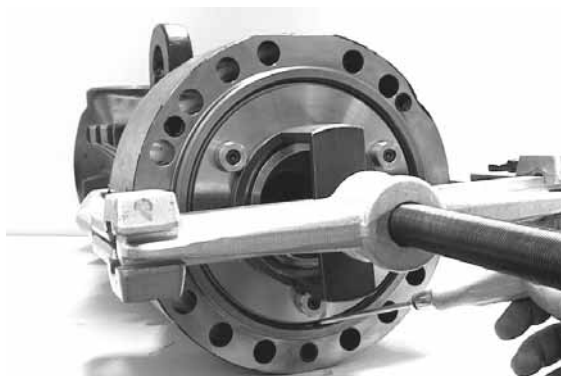


Figure 5

Squeeze out the snap ring.

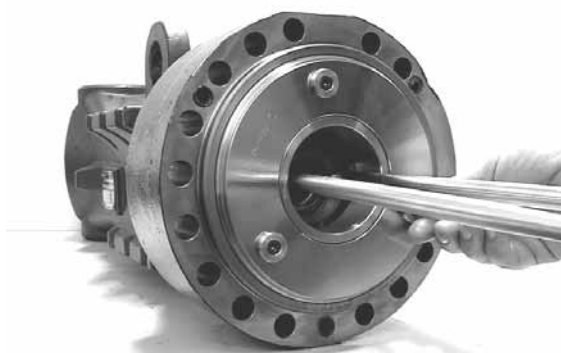


Figure 6

Press off the piston with sealing washer from the axle casing.

(S) Crowbar set 5870 345 071



Figure 7

Separate sealing washer by means of three-armed puller (S) from the piston and remove released cup spring.


Then remove all sealing elements from the sealing washer.

(S) Three-armed puller 5870 971 003



Figure 8

Loosen cap screws and remove released pressure pins.

 **Pay attention to released O-rings!**

Remove cup springs and spacing washer from the axle casing.



Figure 9

Remove O-ring (see arrow 1) and U-ring (see arrow 2) from the annular grooves of the axle casing.

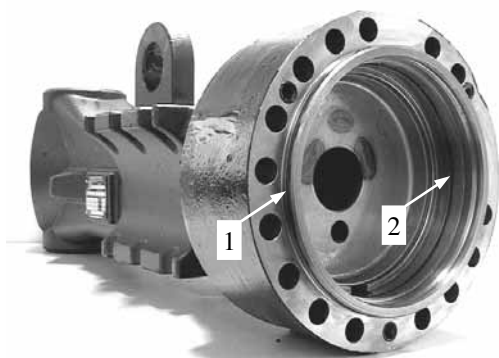


Figure 10

By means of striker (S) remove the oil guide from the axle housing.

(S) Striker

5870 650 004

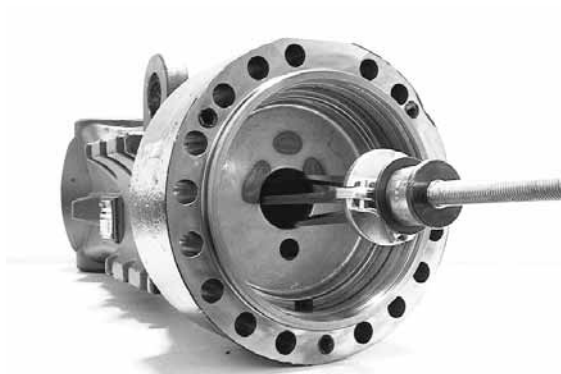


Figure 11

Remove end shim from the brake housing.

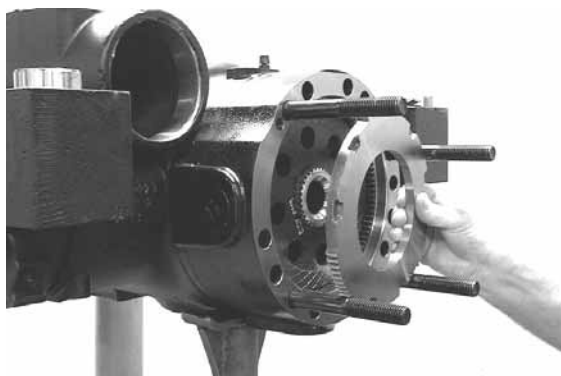


Figure 12

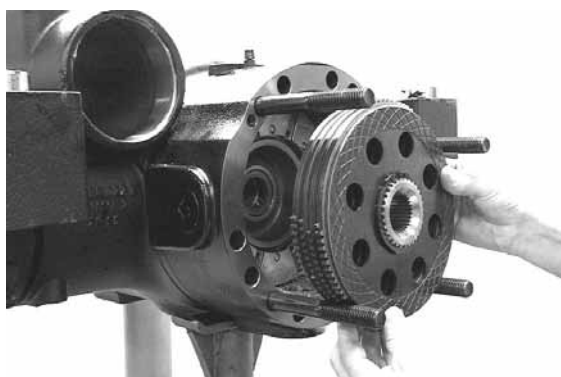


Figure 13

3.2 Disassembly of the Multi-Disc Brake

Remove disc pack assembly with disc carrier from brake housing.



Figure 14

Squeeze out both retaining rings and pull out disc carrier from the disc pack.

(S) Set of external pliers 5870 900 015

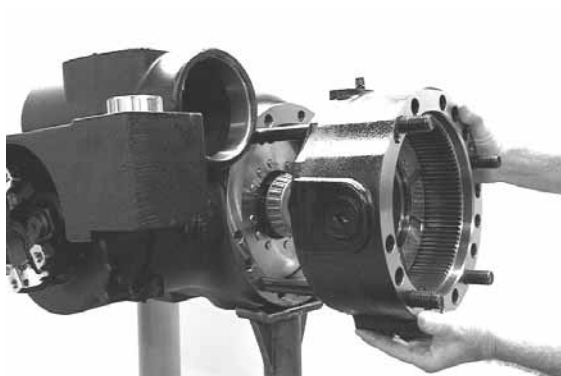


Figure 15

Separate brake housing from axle drive housing.

 Pay attention to possibly released O-rings!



Figure 16

Preload support shim and compression springs respectively by means of hexagon screws (2x, see arrows) and squeeze out the snap ring.

(S) Set of external pliers 5870 900 015



Figure 17

Press piston out of the brake housing by means of compressed air.



Figure 18

Support piston on the pins (also see below sketch).

Following preload compression springs by means of press and squeeze out all crescent rings.

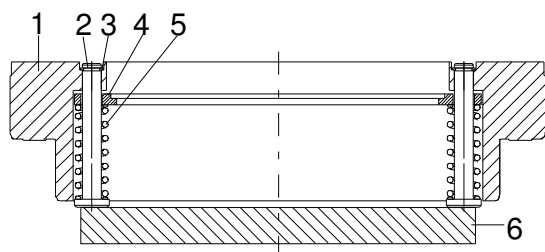


Figure 19

To the sketch:

- 1 = Piston
- 2 = Pins
- 3 = Crescent ring
- 4 = Support shim
- 5 = Compression spring
- 6 = Support



Figure 20

Remove pins, compression springs and support shim from the piston.

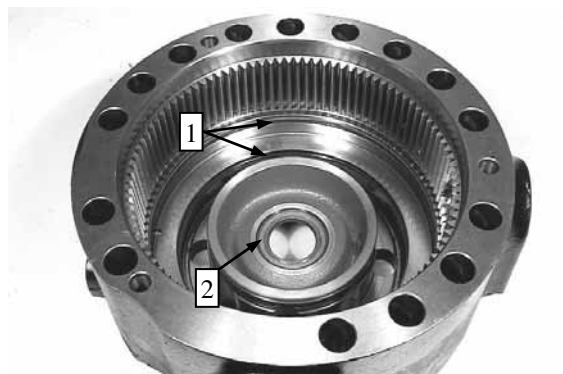


Figure 21

Remove U-rings and support rings (see arrow 1) from the annular grooves of the brake housing.

Following press shaft seal (see arrow 2) out of the bore.



Figure 22

Press out bearing outer ring from the bearing bore and remove the shim behind it.

(S) Crowbar set

5870 345 071



Figure 1

4. Disassembly of the Limited-Slip Differential DZ-500

Lift differential assy out of the axle drive housing.



Figure 2

Pull off both roller bearings from the differential cage.

(S) Gripping insert	5873 001 020
(S) Pressure piece	5870 100 024
(S) Back-off insert	5870 026 100



Figure 3

Fasten differential by means of press and loosen cap screws.



Figure 4

Take off differential cage and remove released single parts.

Press off crown wheel from the differential cage.



Figure 5

5. Disassembly of the Input and Brackets

Loosen hexagon nut and remove the washer behind it.

(S) Fixture 5870 240 025



Figure 1

Pull-off yoke from the input pinion.



Figure 2

Press off bearing sheet from the yoke by means of parting tool (S).

(S) Parting tool 5870 300 024



Figure 3

Pull off both brackets from the axle drive housing.



Figure 4

Remove V-ring and O-ring (see arrow).

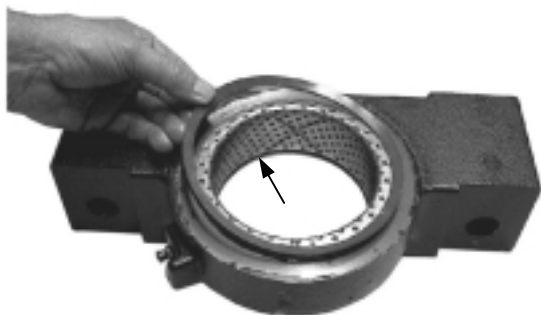


Figure 5

If required, remove flange bush (see arrow) and centering bushes (see below figure).

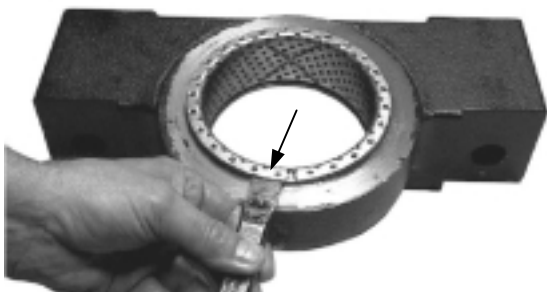


Figure 6



Figure 7

Press input pinion out of the axle drive housing.

- (S) Two-armed puller 5870 970 006
- (S) Tension arm with thread 5870 970 025

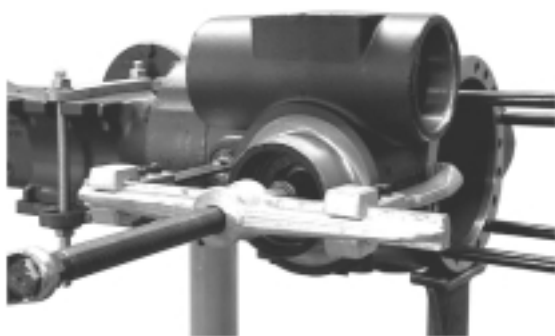


Figure 8



Figure 9

Remove spacer ring.



Figure 10

Pull off roller bearing from the input pinion.

(S) Gripping insert	5873 001 037
(S) Basic device	5873 001 000

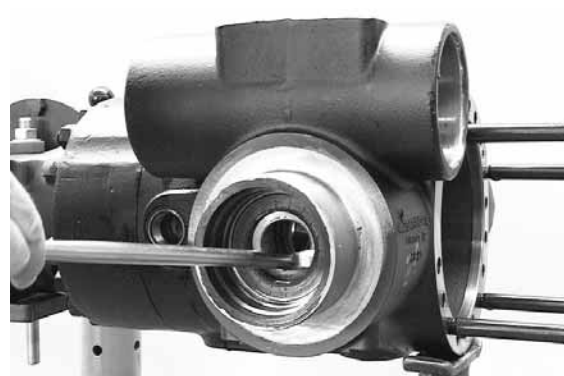


Figure 11

Press off shaft seal from the axle drive housing and remove released roller bearing.

(S) Crowbar set	5870 345 071
-----------------	--------------

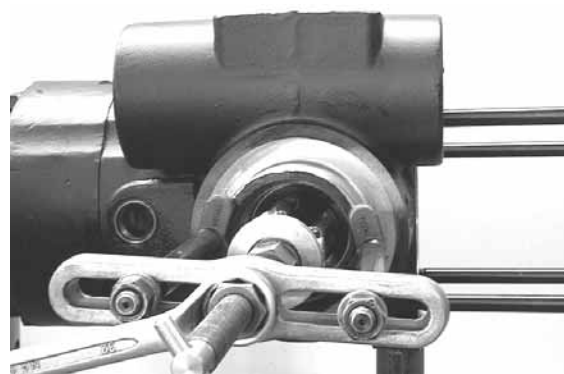


Figure 12

Pull out bearing outer ring from the external bore.

(S) Internal extractor	5870 300 019
(S) Counter support	5870 300 020

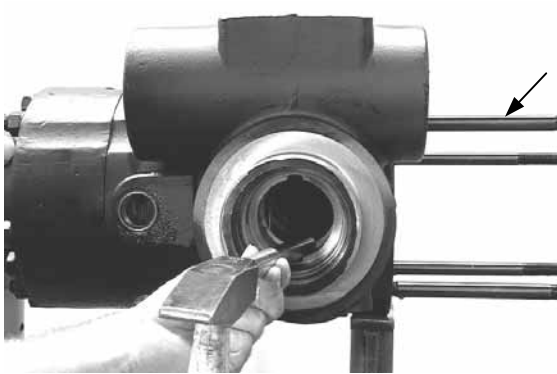


Figure 13

Drive out bearing outer ring from the inner bearing bore.



Pay attention to released shim!

If required, remove studs (see arrow) from the axle drive housing.




Figure 1

REASSEMBLY

6. Reassembly of the Limited-Slip Differential DZ-500

Install slotted pins (2 pcs. / bore) into the blind holes (4x) of the differential cage half I.

 **Install openings of the slotted pins always in circumferential direction and 180° offset to each other!**

Press crown wheel upon the slotted pins until contact.

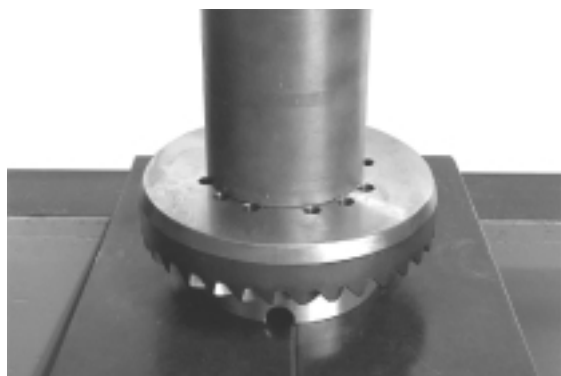



Figure 2

Adjust end play of both axle bevel gears = 0,20 mm (Figure 3 ... 8)

 **In order to obtain a perfect measuring result the single components have to be installed without lubricant first!**

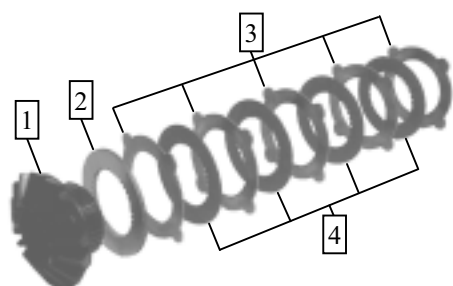


Figure 3

Preassemble axle bevel gear as shown in opposite figure.

- 1 = Axle bevel gear
- 2 = Thrust washer
- 3 = Outer clutch discs
- 4 = Inner clutch discs



Install thrust washer with coated surface showing to the outer clutch disc.



Figure 4

Place preassembled axle bevel gear into differential cage half II.



Figure 5

Install the complete compensating set.

☞ **Pay attention to radial location of the thrust washers!
Pins show vertically upwards (see arrow)!**



Figure 6

Put on differential cage half II.

☞ **Pay attention to radial location, see marking (ZF No.)!**



Figure 7

Fasten differential cage halves preliminarily with two cap screws.

Tightening torque (M12/12.9) $M_A = 145 \text{ Nm}$



Figure 8

Check axial play of the axle bevel gear.

(S) Magnetic stand 5870 200 055
(S) Dial indicator 5870 200 057

☞ If the required **axial play = 0,20 mm** is not obtained, this is to be corrected with suitable outer clutch discs (s = 1,2 mm, s = 1,3 mm or s = 1,4 mm)!



Figure 9

Upon the adjustment separate the differential cage halves again and remove the released single parts.

Then oil and reassemble all single parts according to the corresponding lubrication and maintenance instructions (5871 560 902).

⚠ **Thickness and arrangement of layers of the disc pack must not be changed any more!**



Figure 10

Place the preassembled axle bevel gear into the differential cage half I.



Figure 11

Install the complete compensating set.

☞ **Pay attention to radial location of the thrust washers! Pins show vertically upwards (see arrow)!**



Figure 12

Place the second axle bevel gear with the same arrangement of layers and thickness into differential cage half II.



Figure 13

Put on differential cage half II.

☞ Pay attention to radial location, see marking (ZF No.)!

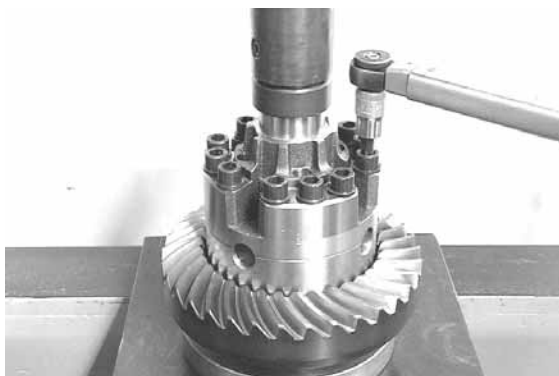


Figure 14

Fix differential by means of press and fasten differential cage halves by means of washers and cap screws.

Tightening torque (M12/12.9) $M_A = 145 \text{ Nm}$



Figure 15

Press on both roller bearings until contact.

7. Reassembly of the Input

**☞ If crown wheel or input pinion are damaged, both parts have to be replaced together!
For new installation of a complete bevel gear set pay attention to the same pair number of input pinion and crown wheel!**

7.1 Determine Shim Thickness for a Perfect Tooth Contact Pattern

**☞ Make the following measuring steps at maximum accuracy!
Inexact measurements result in a faulty tooth contact pattern and a repeated dis- and reassembly of the input pinion is required!**

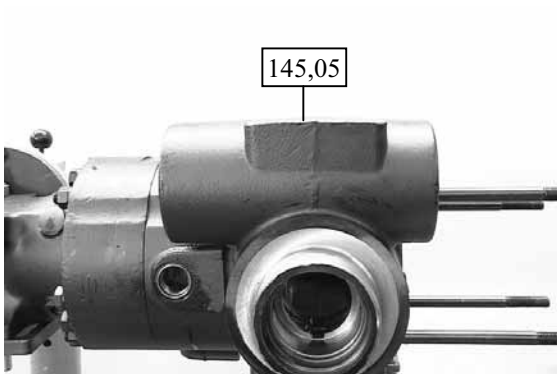


Figure 1

Read Dimension I from the axle drive housing.

Dim. I e.g. 145,05 mm

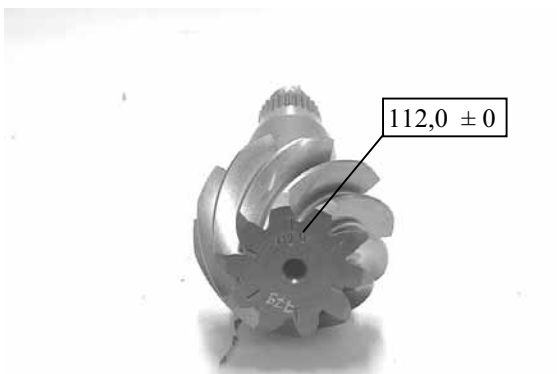


Figure 2

Read Dimension II (dimension for pinion).

Dim. II e.g. 112,00 mm



Figure 3

Determine Dimension III (bearing width).

Dim. III e.g. 32,10 mm

(S) Gauge blocks	5870 200 066
(S) Digital depth gauge	5870 200 072

EXAMPLE „A“:

Dim. II	112,00 mm
Dim. III	<u>+ 32,10 mm</u>
Results in Dim. X	= 144,10 mm

EXAMPLE „B“:

Dim. I	145,05 mm
Dim. X	<u>- 144,10 mm</u>
Difference = Shim	s = 0,95 mm



Figure 4

7.2 Install the Input Pinion

Place determined shim e.g. $s = 0,95$ mm into the bearing bore.



Figure 5

Undercool bearing outer ring (see arrow) and locate it until contact by means of assembly fixture (S).

(S) Assembly fixture	5870 345 049
(S) Pressure ring	5870 345 056



Figure 6

Undercool bearing outer ring and insert it into the bearing bore until contact.

(S) Driver	5870 058 083
(S) Handle	5870 260 002



Figure 7

Heat roller bearing and install it until contact.

☞ **After cooling-down install the bearing subsequently!**



Figure 8

Adjust rolling moment of input pinion bearing
1,0 ... 2,0 Nm (without shaft seal) (Figure 8 ... 12)

Assemble spacer ring (e.g. $s = 11,69$ mm).

☞ **As per experience the required rolling moment is obtained by use of the spacer ring (e.g. $s = 11,69$ mm) being available at disassembly! However, a later checking of the rolling moment is imperative!**



Figure 9

Place the preassembled input pinion into the axle drive housing and assemble the heated roller bearing until contact.

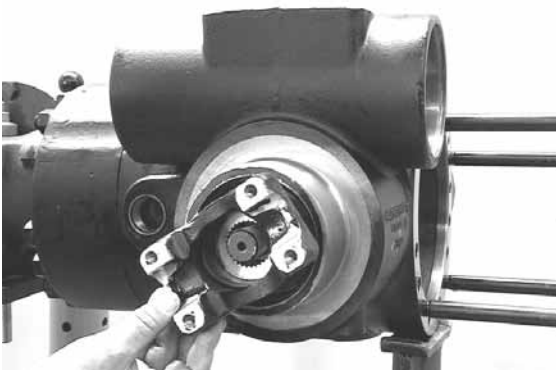


Figure 10

Assemble yoke.

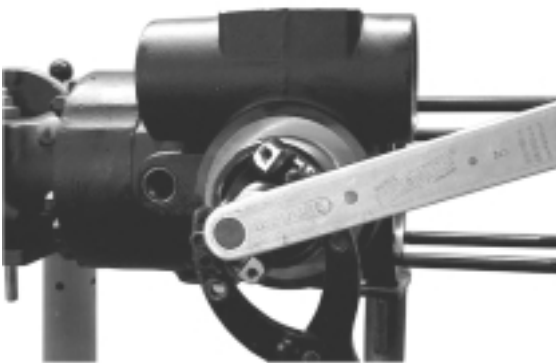



Figure 11

Fasten yoke by means of washer and hexagon nut.

Tightening torque $M_A = 600 \text{ Nm}$

(S) Fixture 5870 240 025

 **First of all use the previous hexagon nut (self-locking) which was removed at disassembly!**


 **When tightening rotate input pinion in both directions several times!**




Figure 12


Check rolling moment (1,0 ... 2,0 Nm without shaft seal).

(S) Torque measuring device 5870 203 042

(S) Reducer 5870 656 056

(S) Reducer 5870 656 057

 **For new bearings it should be tried to achieve the max. value of the rolling moment!**

 **If the required rolling moment is not obtained, correct it with an adequate spacer ring (Figure 8/ Page 7.3), acc. to the following instructions!**

Rolling moment too low - install a thinner spacer ring

Rolling moment too high- install a thicker spacer ring!

Upon adjusting detach the hexagon nut again and pull off the yoke from the input pinion.

(S) Fixture 5870 240 025

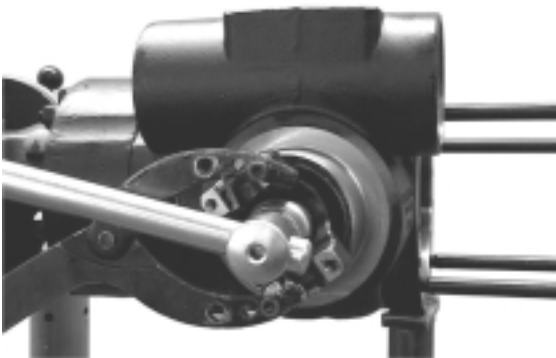


Figure 13

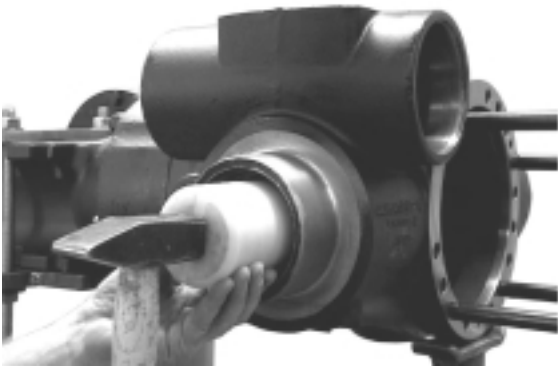


Figure 14

Install shaft seal with the sealing lip showing to the oil chamber.

(S) Driver

5870 048 247



The exact installation position of the shaft seal will be obtained by using the specified driver (S)!



Prior to installation wet the outer diameter of the shaft seal with spirit and fill the space between sealing and dust lip with grease!

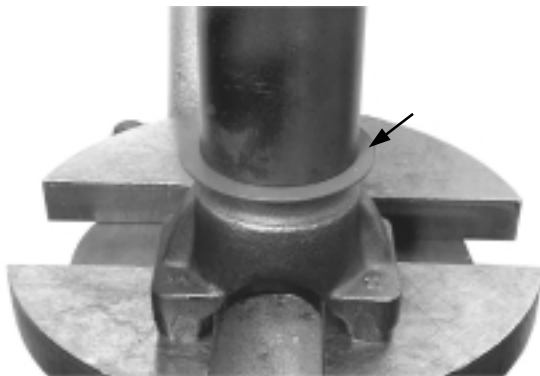


Figure 15

Press bearing sheet (see arrow) onto the yoke until contact.

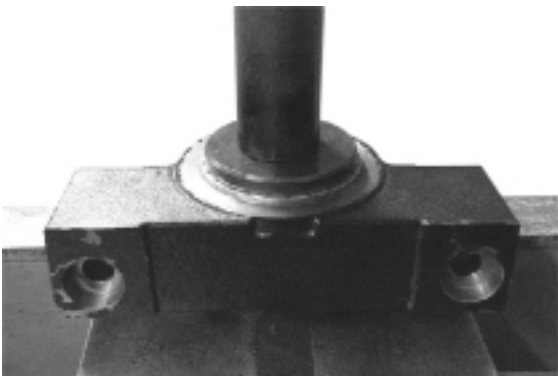


Figure 16

7.3 Reassembly of the Brackets

Press flange bush into the bearing until contact.



Pay attention to the location, gap of the flange bush must show to the bottom (6 o'clock)!

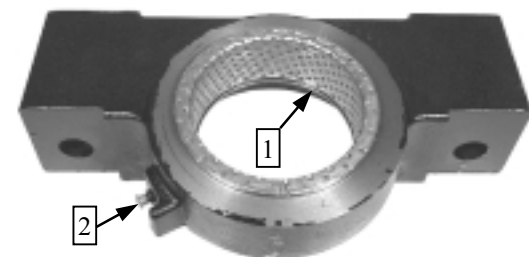


Figure 17

Grease O-ring (see arrow 1) and insert it into the gap of flange bush and bearing bracket.

Then install the breather (see arrow 2).

Grease V-Ring and install it.



Figure 18

Grease flange bush and assemble bracket until contact on the axle drive housing.

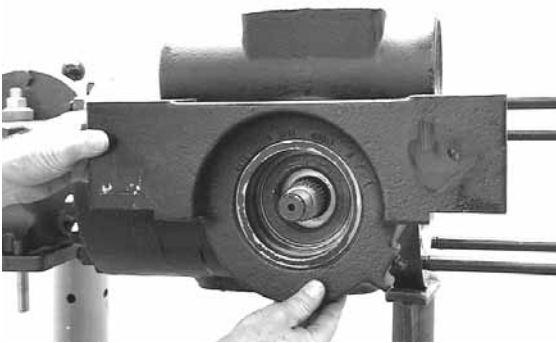


Figure 19

Install both centering bushes into the bracket until contact.

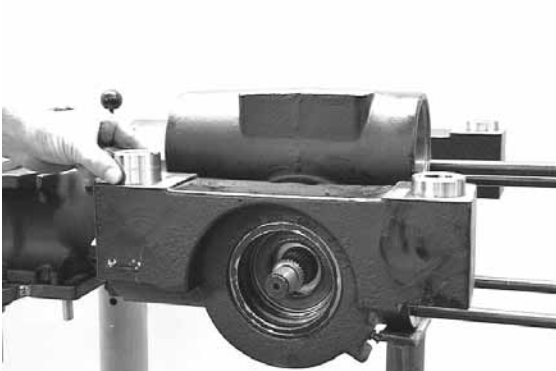


Figure 20

Assemble yoke and finally fasten it by means of washer and **„new“** hexagon nut (self-locking).

Tightening torque $M_A = 600 \text{ Nm}$

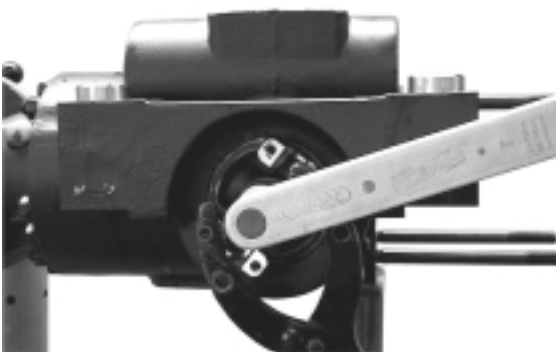


Figure 21

7.4 Adjust Backlash of Crown Wheel Set and Bearing Preload of Differential (Figure 22 ... 33)

Backlash = 0,20 ... 0,28 mm (if no separate value is etched into the crown wheel)

Bearing preload = 0,10 ... 0,15 mm (corresponds to a bearing rolling moment of 3 ... 4 Nm)


 **Rotate axle by 90°!**



Figure 22

Place shim(s) e.g. $s = 1,90$ mm (empirical value) into the bearing bore and install bearing outer ring until contact.



Figure 23

Cover some tooth flanks of the crown wheel with marking ink and place the preassembled differential into the axle drive housing.



Figure 24

Put on the bearing outer ring.

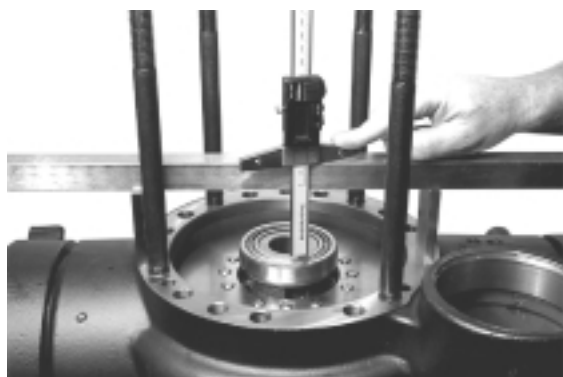



Figure 25

Align differential centrally and determine Dim. I, from the mounting face of the axle drive housing to the face of the bearing outer ring.

Dim. I e.g. 2,10 mm

(S) Digital depth gauge	5870 200 072
(S) Straightedge	5870 200 022
(S) Gauge blocks	5870 200 066

 **Take several measuring points and determine the mean value!**

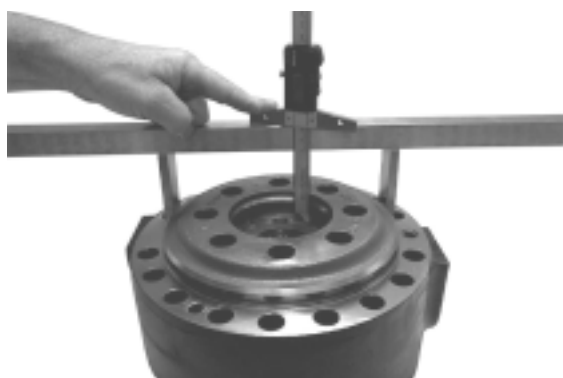


Figure 26

Determine Dim. II, from the mounting face of the brake housing to the locating face of the bearing outer ring.

Dim. II e.g. 2,55 mm

EXAMPLE „C“:

Dim. II	2,55 mm
Dim. I	- <u>2,10 mm</u>
Difference	= 0,45 mm
required bearing preload e.g.	+ <u>0,10 mm</u>
results in shim	<u>s = 0,55 mm</u>

Place determined shim e.g. s = 0,55 mm into the bearing bore.



Figure 27

Put bearing outer ring into bearing bore until contact on the shim.



Figure 28

Assemble brake housing.



 **Preliminarily install the brake housing without O-rings!**



Figure 29

Check the gap between axle drive and brake housing by means of feeler gauge.

(S) Feeler gauge 5870 200 113

 **When shim (acc. to example C, $s = 0,55 \text{ mm}$) was determined correctly, a gap dimension of approx. $0,10 \text{ mm}$ will result!**


 **Take several measuring points and determine the mean value!**



Figure 30

Tighten brake housing by means of hexagon screws and washers until contact.

Tightening torque (M18/10.9) $M_A = 390 \text{ Nm}$



Figure 31

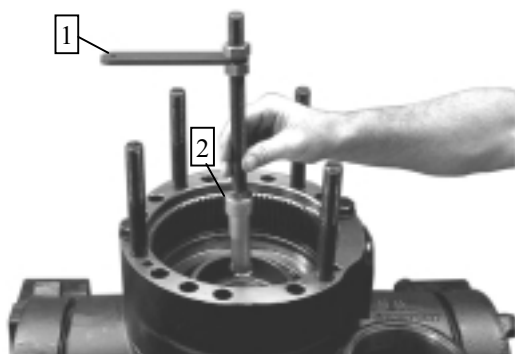


Figure 32

Fasten straightedge (1) and expanding mandrel (2) into bore hole of the differential cage.

(S) Straightedge 5870 200 092





Figure 33

Read backlash on marking of the straightedge.

(S) Magnetic stand 5870 200 055

(S) Dial indicator 5870 200 057

 **Marking on the straightedge corresponds with the external gear diameter of the crown wheel!**

 **If the required backlash is not obtained (see value etched into crown wheel e.g. 0,22 mm), correct it with suitable shims**

1. **Backlash too low – install a thicker shim (Figure 22).
A thinner shim has to be chosen for determination of the bearing preload (Figure 27) accordingly.**
2. **Backlash too high – install a thinner shim (Figure 22).
A thicker shim has to be chosen for determination of the bearing preload (Figure 27) accordingly.**

Check contact pattern:

By rotating the end yoke have crown wheel get in mesh with the input pinion several times in both directions.

Then separate the brake housing from the axle drive housing and remove the differential again.

Compare the resulting contact pattern with contact pattern examples on Page 0.6 and 0.7.


 **In case of a contact pattern deviation a measuring error was made at determination of the shim (Figure 4/Page 7.2) which is necessary to be corrected!**



Figure 34

Following place the differential into the axle drive housing.



Figure 1



Figure 2


8. Reassembly of Multi-Disc Brake and Parking Brake

8.1 Reassembly of Multi-Disc Brake

Place shaft seal into the brake housing.

(S) Driver 5870 048 242

 Pay attention to installation position, see Figure 3!

 The exact installation position of the shaft seal will be obtained by using the specified driver (S)!

Oil support and U-rings (see arrows) and place the same into both annular grooves of the brake housing.

 Pay attention to the installation position, see below sketch!

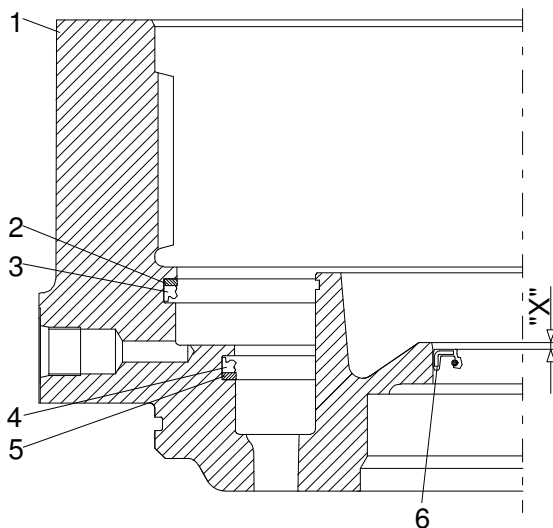


Figure 3

To the sketch:

- 1 = Brake housing
- 2 = Support ring
- 3 = U-ring
- 4 = U-ring
- 5 = Support ring
- 6 = Shaft seal
- X = Installation dimension 2,0 - 0,5 mm



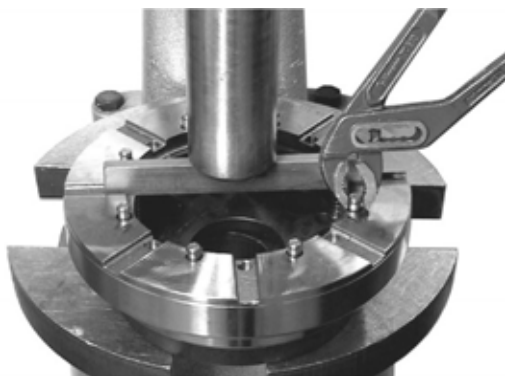
Place support shim with the shoulder showing downwards into the piston.

Figure 4



Install pins and compression springs.

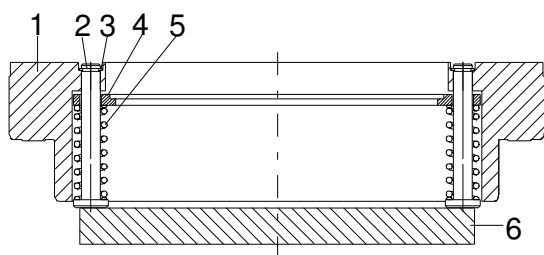
Figure 5



Support piston on the pins (also see below sketch).

Then preload compression springs by means of press and install all crescent rings.

Figure 6




To the sketch:

- 1 = Piston
- 2 = Pins
- 3 = Crescent ring
- 4 = Support shim
- 5 = Compression spring
- 6 = Support

Figure 7



Insert preassembled piston into the brake housing and install it cautiously by means of hand press until contact.

 **Pay attention to radial location!**

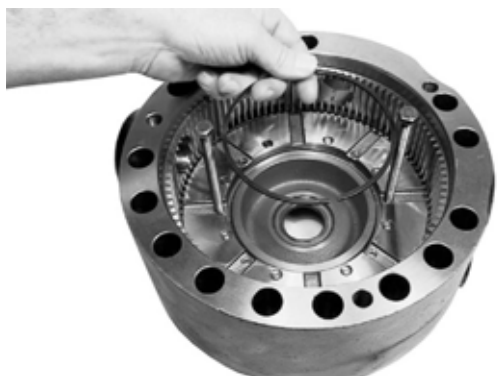
 **Install piston very cautiously to avoid shearing off and turning over of the support rings and U-rings!**

Figure 8



Preload support shim and compression springs by means of hexagon screws (2x) until the snap ring (see below sketch) can be snapped in.

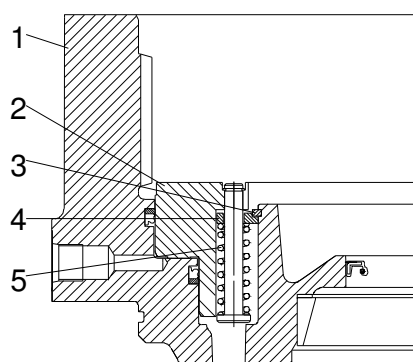
Figure 9



Squeeze snap ring into the annular groove of the brake housing (also see below sketch).

Then remove both hexagon screws again.

Figure 10



To the sketch:

- 1 = Brake housing
- 2 = Piston
- 3 = Snap ring
- 4 = Support shim
- 5 = Compression spring

Figure 11



Figure 16

Measure Dim. II from the face of the end shim to the mounting face of the axle casing.

Dim. II e.g. 24,05 mm

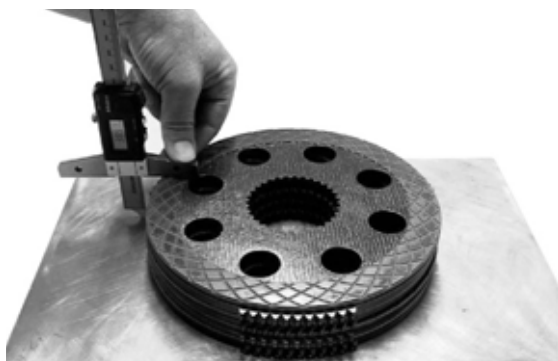


Figure 17

Measure Dim. III (thickness of the disc pack).

Dim. III e.g. 39,80 mm

**☞ Depending on the version varying disc assemblies are possible!
Binding is the respective spare parts list!**

EXAMPLE „A“:


Dim. I	65,00 mm
Dim. II	- 24,05 mm
Dim. III	- <u>39,80 mm</u>
Difference = Clearance	= <u>1,15 mm</u>

☞ If the required clearance deviates this is to be corrected with the respective outer clutch discs (s = 2,0 mm, s = 2,5 mm or s = 3,0 mm)!

Install disc pack (Figure 18 ... 24)

Opposite sketch shows the disk assembly and installation position of the single parts.

- 1 = Brake housing
- 2 = Outer clutch discs
- 3 = Inner clutch discs
- 4 = Retaining rings
- 5 = Disc carrier

 Depending on the version varying disc assemblies are possible!

Binding is the respective spare parts list!

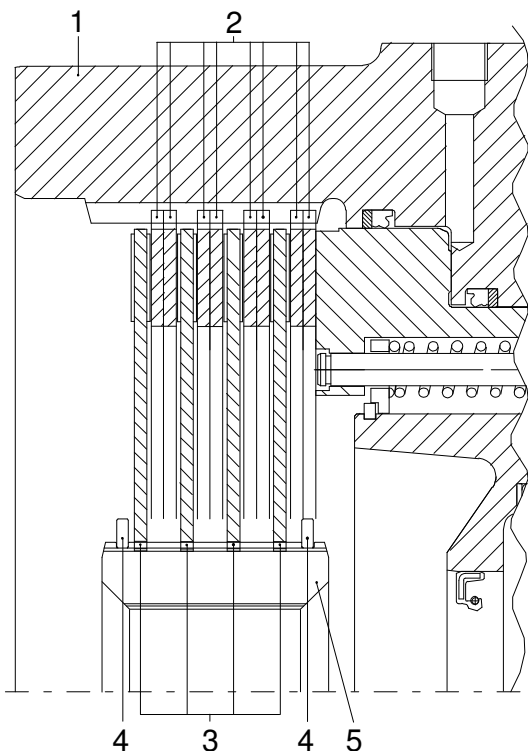


Figure 18

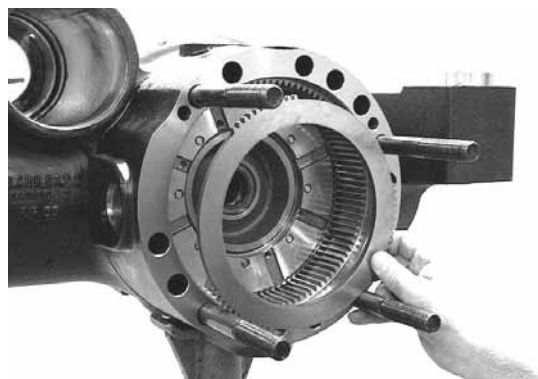




Figure 19

Install piston-sided outer clutch discs into the brake housing.

 Oil discs according to the lubrication and maintenance instructions (5871 560 902).

 When installing outer clutch discs of a different thickness, the thinner outer clutch discs must always be installed on the piston- and/or end shim-side!
Pay attention to radial location (see Figure)!

Snap retaining ring into the annular groove of the disc carrier.

(S) Set of external pliers 5870 900 015

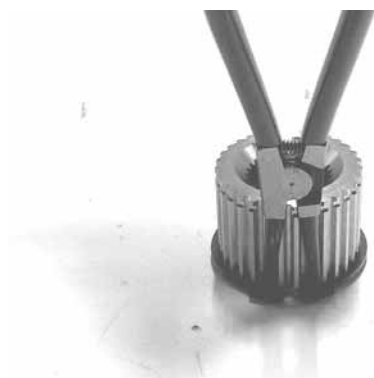


Figure 20

Assemble inner- and outer clutch discs on the disc carrier as shown in sketch 18.

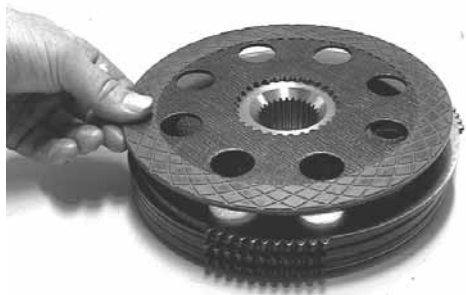


Figure 21

☞ Pay attention to radial location of the inner clutch discs. Cooling oil bores must be flush-mounted!

Fasten disc pack by means of retaining ring.

(S) Set of external pliers 5870 900 015



Figure 22

Insert preassembled disc pack into the brake housing.

☞ Pay attention to radial location of the outer clutch discs (see Figure)!

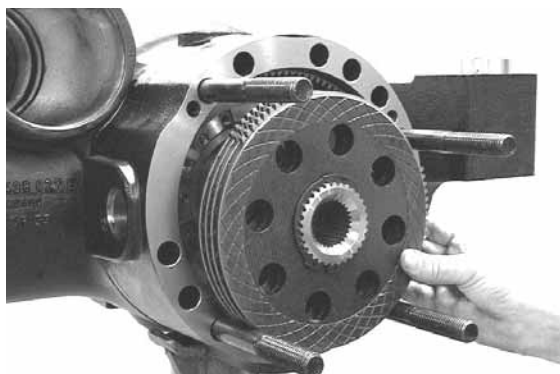


Figure 23

Assemble end shim into the brake housing.

☞ Pay attention to location (see Figure)!

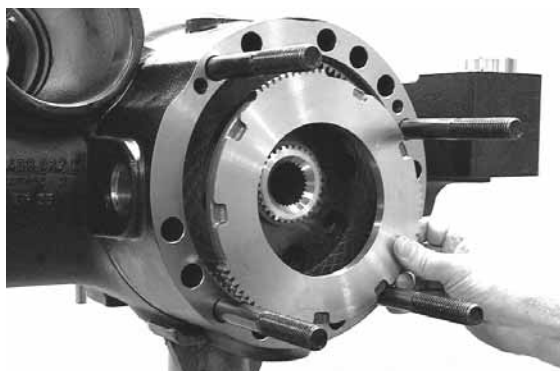


Figure 24

8.2 Reassembly of the Parking Brake

Install oil guide into axle casing until contact.



Figure 25



Pay attention to location, when installed the bore hole (see arrow) must show to the bottom (6 o'clock)!

Place U-ring (see arrow) into the annular groove of the axle casing.



Figure 26

Place spacing washer into the axle casing with chamfered side showing downwards (to the axle casing).



Figure 27

Place cup springs (4x) into the axle casing and align these centrally.



Pay attention to location, see below sketch!



Figure 28

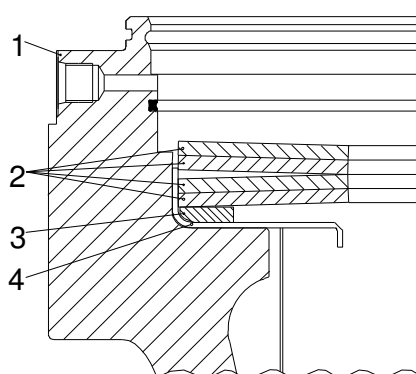


Figure 29

To the sketch:

- 1 = Axle casing
- 2 = Cup springs
- 3 = Spacing washer
- 4 = Oil guide



Figure 30

Fix O-ring with grease into the recess of the pressure pin.



Figure 31


Fasten pressure pin by means of cap screws to the piston.

 **Do not tighten cap screws!**



Figure 32

Install preassembled piston into axle casing until contact.

 **Install piston very cautiously to avoid shearing off and turning over of the U-ring!**

Place cup spring into the axle casing.



Figure 33

U-rings, back rings and O-ring have to be placed into the annular grooves of the sealing washer (see arrows) and greased.

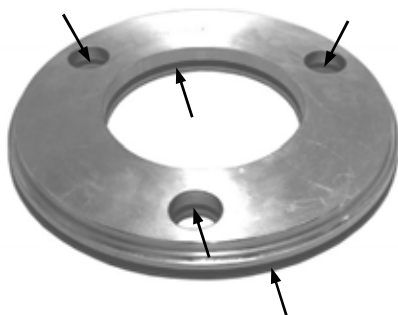
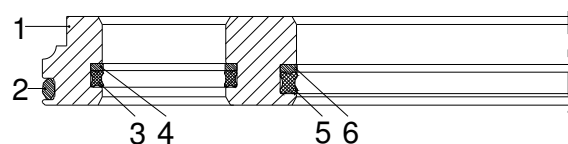


Figure 34

 Pay attention to installation position, see below sketch!

To the sketch:



- 1 = Sealing washer
- 2 = O-Ring
- 3 = U-Ring
- 4 = Back Ring
- 5 = U-Ring
- 6 = Back Ring

Figure 35

Install preassembled sealing washer into the axle casing resp. upon the pressure pins.



Figure 36



Figure 37

Preload sealing washer and cup spring respectively by means of two-armed puller (S) to such an extent that the snap ring (see below sketch) can be snapped in.

- | | |
|----------------------|--------------|
| (S) Two-armed puller | 5870 970 006 |
| (S) Assembly ring | 5870 345 033 |

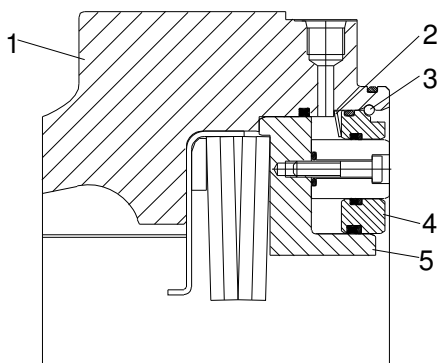


Figure 38

To the sketch:

- 1 = Axle casing
- 2 = Cup spring
- 3 = Snap ring
- 4 = Sealing washer
- 5 = Piston



Figure 39

Fix sealing washer by means of snap ring.



Figure 40

Finally fasten pressure pins.

Tightening torque (M6/8.8) $M_A = 9,50 \text{ Nm}$

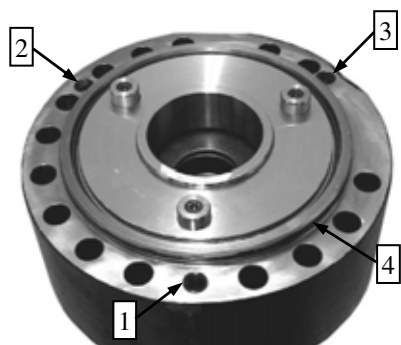


Figure 41

Fix O-rings (see arrow 1, 2 and 3) with grease into the recesses of the axle casing.

Then place the O-ring (see arrow 4) into the annular groove and grease it.



Figure 42

Install axle casing by means of lifting tackle (S) to the brake housing until contact.

(S) Lifting strap

5870 281 026



Figure 43

Fasten axle casing by means of hexagon screws and hexagon nuts.

Tightening torque (M18/10.9) $M_A = 390 \text{ Nm}$

8.3 Leakage Test of the Parking Brake



Figure 44

Test media:

Motor oils SAE-10W corresponding,
MIL-L 2104 C, MIL-L 46152,
API-CC, CD, SC, SD, SE,
ATF-Oils Type A, Suffic A Dexron
of II D.

 **Prior to start the test, ventilate the brake hydraulics and then actuate it several times (min. 10 times)!**

Pressure test:

Build up a test pressure of $p = 35$ bar and close shut-off valve of the HP-pump.
During a 4 minute testing time, a pressure drop is not allowed.

(S) HP-pump	5870 287 007
(S) Measuring hub (9/16" – 18UNF)	5870 950 115

8.4 Leakage Test of the Multi-Disc Brake



Figure 45

Test media:

Motor oils SAE-10W corresponding with,
MIL-L 2104 C, MIL-L 46152,
API-CC, CD, SC, SD, SE,
ATF-Oils Type A, Suffic A Dexron
of II D.

 **Prior to start the test, ventilate the brake hydraulics and then actuate it several times (min. 10 times)!**

High-pressure test:

Build up a test pressure of $p = 25$ bar and close shut-off valve of the HP-pump.
During a 5 minute testing time a pressure drop of max. 2%
($p = 0,5$ bar) is allowed.

Low-pressure test:

Build up test pressure $p = 5$ bar and close shut-off valve of the HP-pump.
During a 5 minute testing time no pressure drop is allowed.

(S) HP-pump	5870 287 007
(S) Measuring hub (9/16" – 18UNF)	5870 950 115

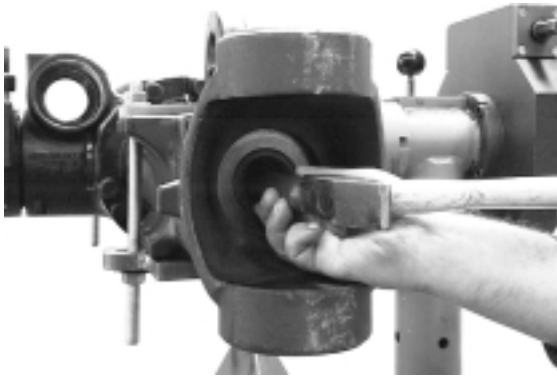



Figure 1

9. Reassembly of the Output

9.1 Preassembly of the Axle Casing

The bush is to be flush-mounted into the axle casing.

(S) Driver 5870 048 156

 **Pay attention to radial location, when installed the latching of the bush must show upwards (12 o'clock)!**

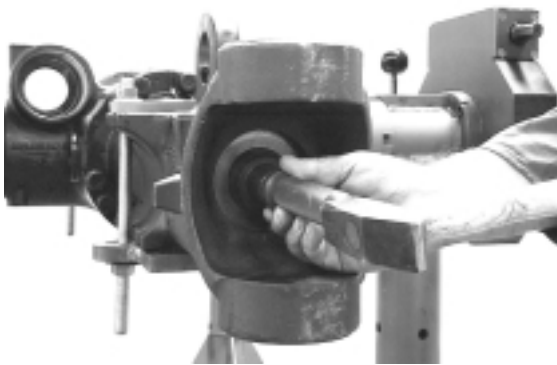



Figure 2

Flush-mount the shaft seal into axle casing with the sealing lip showing to the oil sump.

(S) Driver 5870 048 156
(S) Driver 5870 048 157

 **Wet outer diameter of the shaft seal with sealing compound (Loctite Type No.: 574) and fill the space between the sealing lips with grease!**

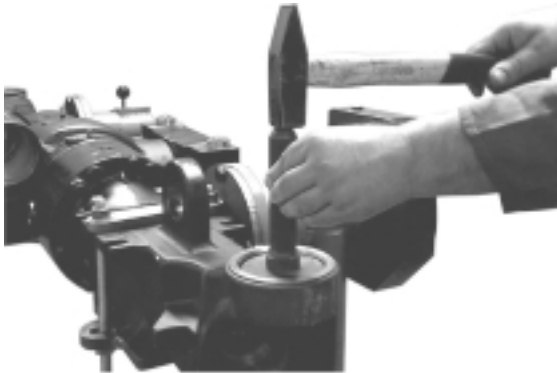


Figure 3

Install both bearing outer rings into the swivel bearing bores until contact.

(S) Driver 5870 058 022
(S) Handle 5870 260 002

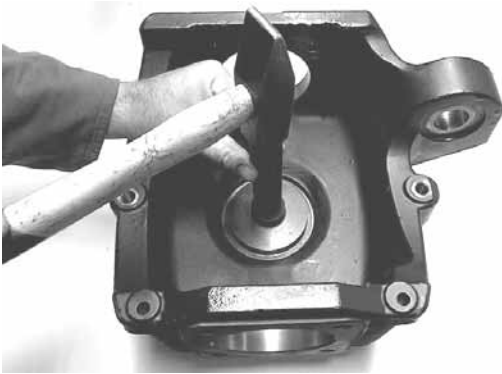


Figure 4

9.2 Installation of the Joint Housing

Install ball bearing into the joint housing until contact



Figure 5


Fasten ball bearing by means of retaining ring.


(S) Set of internal pliers 5870 900 013

Pull screen sheet (see arrow) out of the shaft seal.



Figure 6

 The shaft seal consists of two parts!

 It is necessary to remove the screen sheet to ensure the exact installation position of the shaft seal!

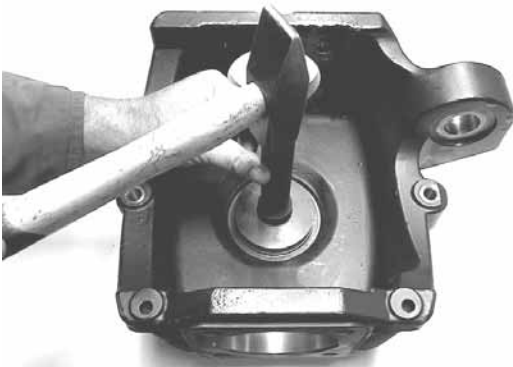



Figure 7

Install shaft seal into the joint housing.

(S) Driver 5870 048 172
(S) Driver 5870 048 156

 Exact installation position of the shaft seal will be obtained by use of the specified driver (S)!


 Wet outer diameter of the shaft seal with Loctite (Type No.: 574)!



Figure 8

Install screen sheet into the shaft seal again.

 Pay attention to the installation position, see below sketch!

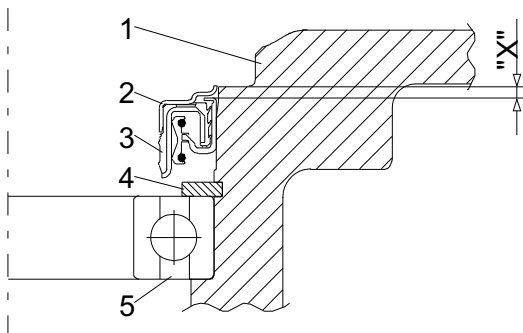


Figure 9

To the sketch:

- 1 = Joint housing
- 2 = Screen sheet
- 3 = Shaft seal
- 4 = Retaining ring
- 5 = Ball bearing
- X = Installation dimension $2,5^{+0,2}$ mm

9.2.1 Installation of the Double Universal Shaft

By means of pressure piece (S) install screen sheet and heated bush to the double universal shaft until contact.

(S) Pressure piece 5870 506 097

 Pay attention to the installation position of screen sheet and bush, see below sketch!



Figure 10

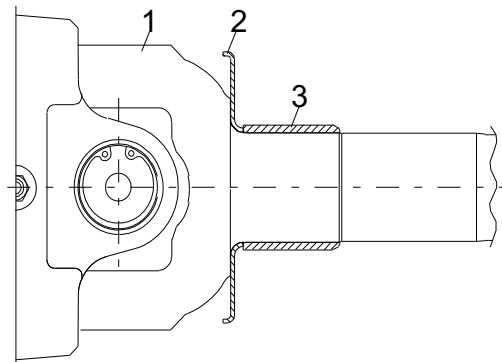


Figure 11

To the sketch:

- 1 = Double universal shaft
- 2 = Screen sheet
- 3 = Bush

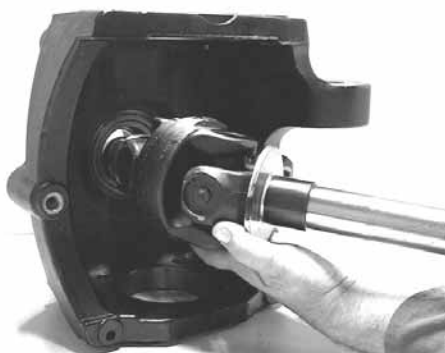


Figure 12

Install the preassembled double universal shaft into the joint housing.


 **Just before assembly wet the sealing lips of the shaft seal with spirit!**



Figure 13

Pull double universal shaft into the joint housing until contact.

(S) Internal extractor	5870 300 005
(S) Counter support	5870 300 020


 **Place the internal extractor (S) into groove of the double universal shaft!**



Figure 14

Fasten double universal shaft by means of retaining ring.



Figure 15

Insert retaining ring into the groove of the double universal shaft.



Figure 16

9.2.2 Installation and Adjustment of Swivel Bearing

Press shaft seals upon collar of the bearing pins.

(S) Driver 5870 048 243



Wet inner diameter of the shaft seals with sealant (Loctite, Type No.: 574)!



Exact installation position of the shaft seals is obtained by use of the specified drivers (S), see below sketches!

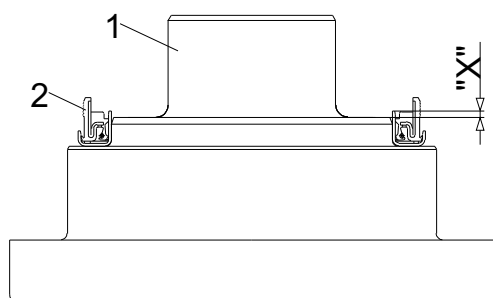


Figure 17

To the sketch:

1 = Bearing pin

2 = Shaft seal

X = Installation dimension $1,8^{+0,1}$ mm

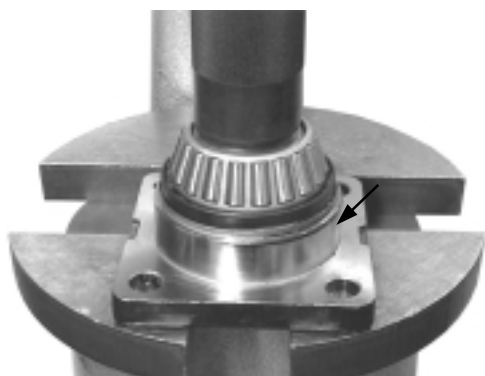


Figure 18

Press roller bearing onto bearing pins until contact.

Then wet collar of the bearing pins (see arrow) with anti-corrosive (Weicon Anti-Seize).

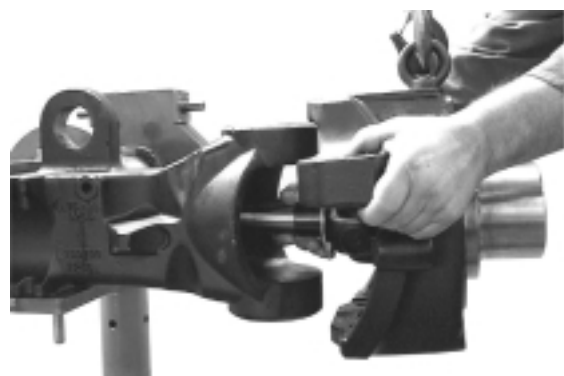


Figure 19

Position joint housing on the axle casing.



Install double universal shaft into the axle casing until the teeth of the joint fork are located in the differential (axle bevel gear)!



Figure 20

Fasten joint housing by means of preassembled bearing pins (Figure 20 ...21).

- ☞ **Install roller bearing with long-term lubricant (e.g. grease Glissando 283 EP 2 LF)!**
- Just before assembly wet shaft seal with spirit!**



Figure 21

Put shim e.g. $s = 0,80$ mm (empirical value) on the upper bearing pin.

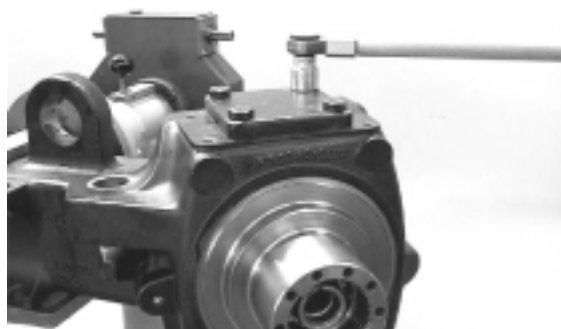


Figure 22

Fasten both bearing pins by means of hexagon screws.

Tightening torque (M16/10.9) $M_A = 280$ Nm

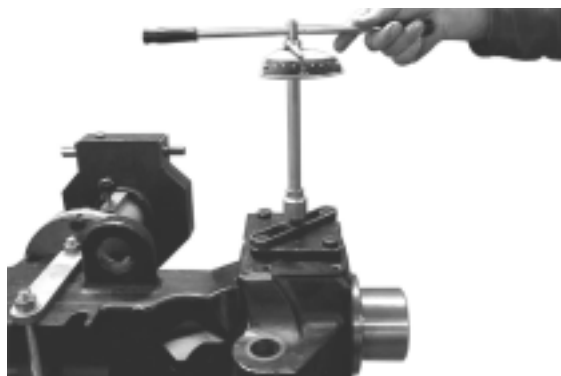


Figure 23

Check rolling moment of the swivel bearing 23 ... 30 Nm.

- (S) Spanner 5870 656 004
- (S) Torque spanner 5870 203 033

- ☞ **For new bearings the upper value of the rolling moment should be achieved!**

⚠ **If the specified rolling moment deviates, this is to be corrected with a corresponding shim (Figure 21)!**



Figure 24

9.3 Installation of the Hub

Install wheel bolt into the hub until contact.

- | | |
|-----------------------------------|--------------|
| (S) Wheel bolt puller – basic set | 5870 610 010 |
| (S) Insert (3/4 "-16UNF) | 5870 610 005 |



Figure 25


Press in both bearing outer rings until contact.



Figure 26

Press shaft seal into the hub so that marking „OUT SIDE“ shows to the outside (upwards).

- | | |
|------------|--------------|
| (S) Driver | 5870 051 055 |
| (S) Handle | 5870 260 002 |

 **Exact installation position of the shaft seal is obtained by use of the specified driver (S), see below sketch!**



Wet outer diameter of the shaft seal with sealant (Loctite, Type No.: 574)!

To the sketch:

- 1 = Shaft seal
- 2 = Hub
- 3 = Bearing outer rings
- X = Installation dimension 1,5^{+0,1} mm

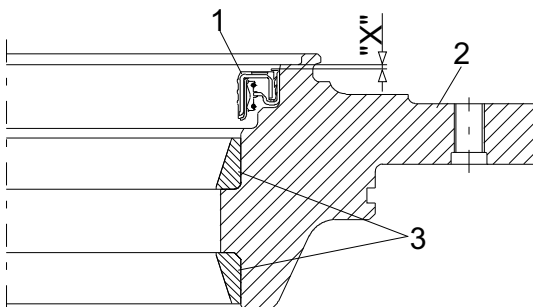


Figure 27



Figure 28

Heat roller bearing and install it until contact with the joint housing.

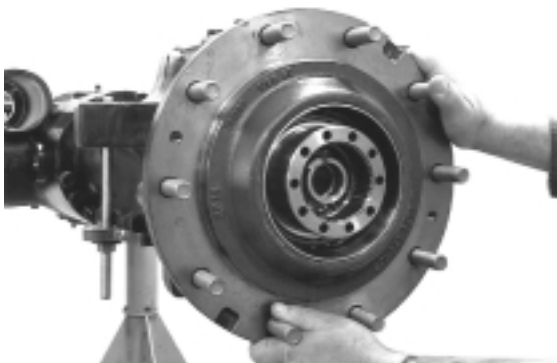


Figure 29

Install preassembled hub.



Just before installation wet sealing lips of the shaft seal with spirit!

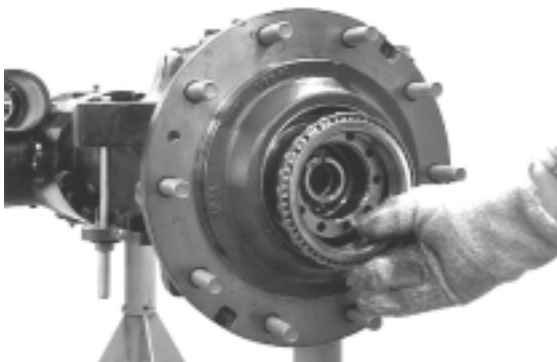


Figure 30

Heat the roller bearing and install it until contact.

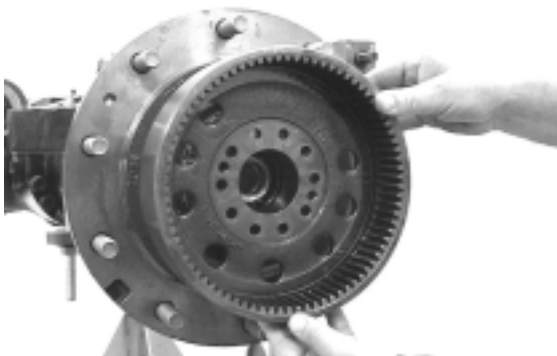


Figure 31

Assemble the ring gear.

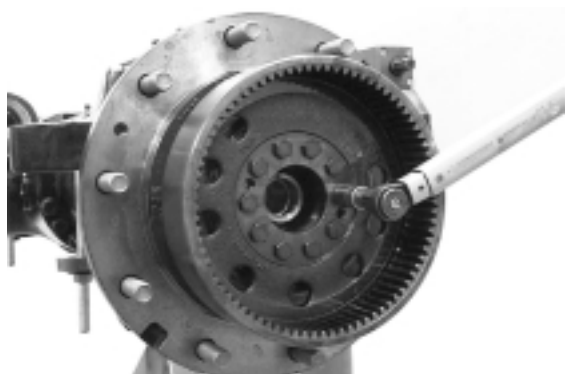


Figure 32

Fasten ring gear by means of hexagon screws.

Tightening torque (M10/12.9) $M_A = 68 \text{ Nm}$



**Wet threads of the hexagon screws with Loctite
(Type No.: 243)!**

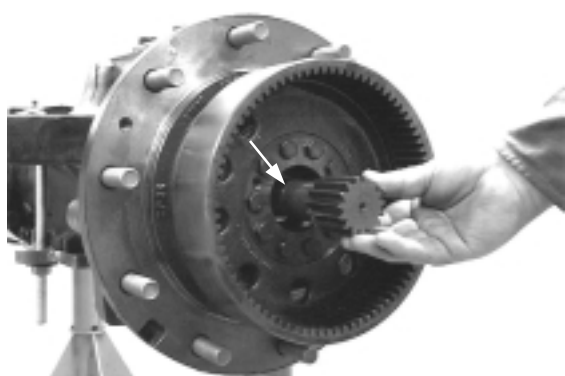


Figure 33

Insert sun gear shaft into the double universal shaft until the retaining ring (Figure 15) snaps into the annular groove (see arrow).

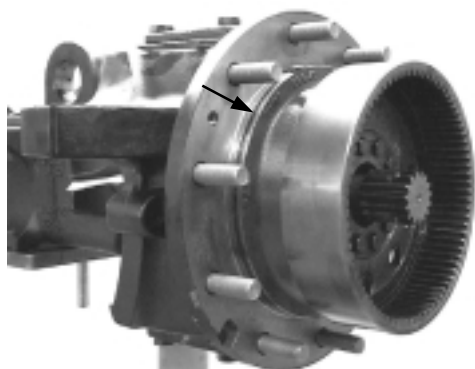


Figure 34

Locate O-ring (see arrow) in the annular groove and grease it.

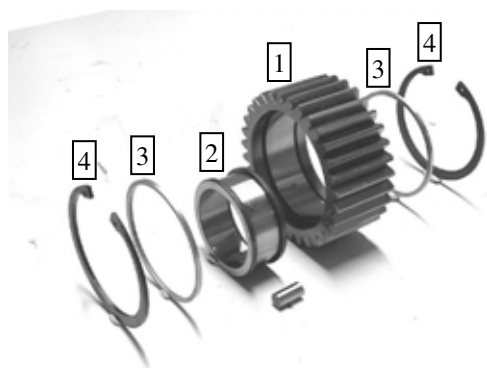


Figure 35

9.4 Installation of the Planet Carrier

Preassemble the planet gear as shown in opposite figure.

- 1 = Planet gear
- 2 = Roller bearing
- 3 = Washer
- 4 = Retaining ring



Figure 36

Heat the roller bearing and install the preassembled planet gear until contact.



Install bearing inner ring with the big radius showing to the planet carrier (to the bottom)!

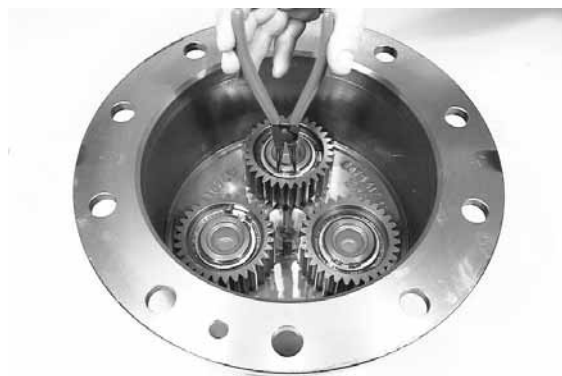


Figure 37

Fasten planet gear by means of retaining ring.

(S) Set of external pliers 5870 900 015

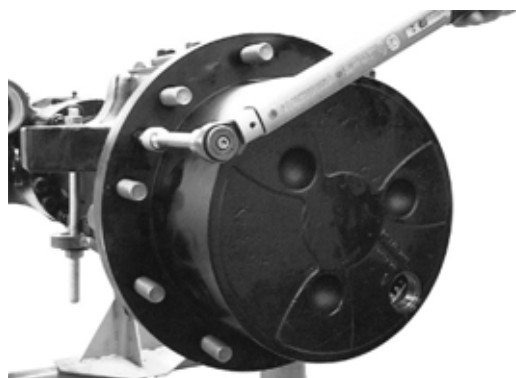


Figure 38

Assemble planet carrier and fasten it by means of cap screws.

Tightening torque (M12/8.8) $M_A = 55 \text{ Nm}$



Prior to putting the axle into operation, fill in the oil acc. to the lubrication and maintenance instructions (5871 560 902)!

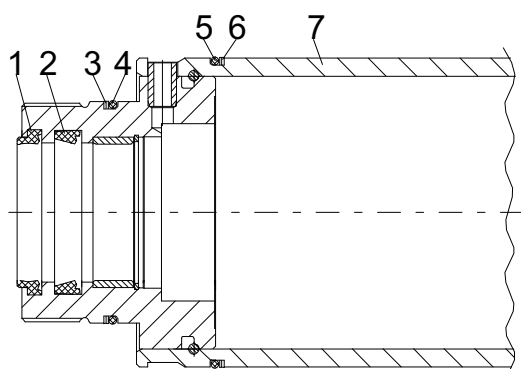


Figure 1

10. Reassembly of the Steering Gear

10.1 Preassembly of the Steering Gear

Preassemble cylinder tube as shown in the opposite sketch.

- 1 = Rod wiper
- 2 = U-ring
- 3 = Support ring
- 4 = O-ring
- 5 = O-ring
- 6 = Support ring
- 7 = Cylinder tube

Place both guide rings (see arrows) into the annular grooves of the piston rod.

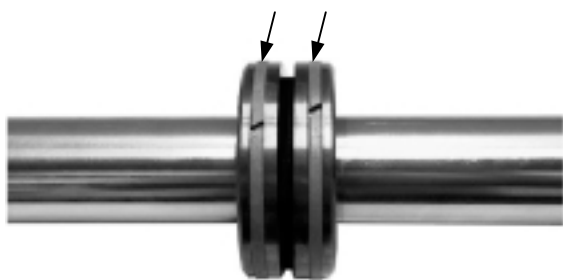


Figure 2

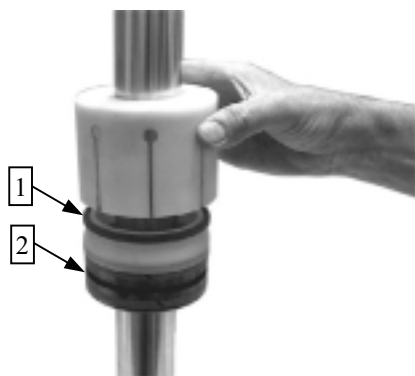



Figure 3

Insert slip ring (Part 1, see arrow 1) by means of installer (S) into the annular groove of the piston rod (see arrow 2).

- (S) Installer 5870 651 045
- (S) Installer 5870 651 046

 **Slip ring consists of two parts, pay attention to the installation position (see sketch 5/Page 10.2)!**

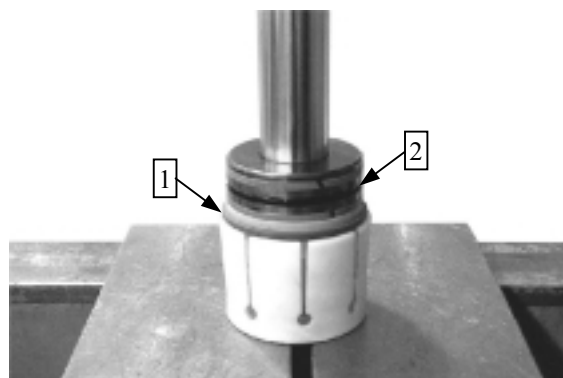


Figure 4

Press slip ring (Part 2, see arrow 1) by means of installer (S) into the annular groove of the piston rod (see arrow 2).

- (S) Installer 5870 651 045
- (S) Installer 5870 651 046

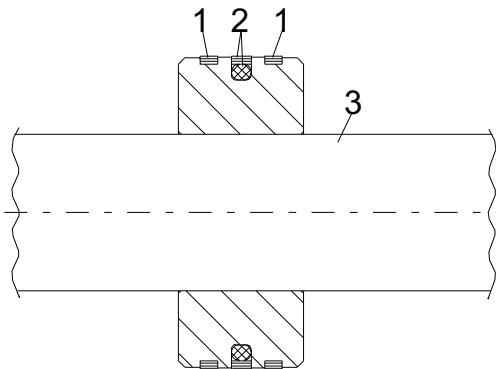


Figure 5


To the sketch:

- 1 = Guide ring
- 2 = Slip ring
- 3 = Piston rod

Push preassembled piston rod into the cylinder tube until contact.



Figure 6

 **Prior to installation of the piston rod oil all sealing elements slightly!**

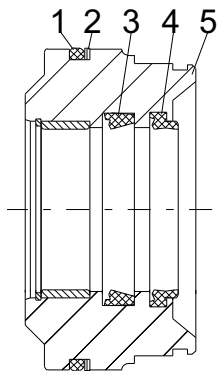


Figure 7


Preassemble guide piece as shown in the opposite sketch.

- 1 = O-ring
- 2 = Support ring
- 3 = U-ring
- 4 = Rod wiper
- 5 = Guide piece

Push the preassembled guide piece into the cylinder tube, so that the snap ring can be installed (see below figure).



Figure 8

 **Prior to installation of the guide piece oil all sealing elements slightly!**

Squeeze snap ring into the groove of the cylinder tube.



Figure 9

 Installation position, also see sketch 11!

Install guide piece by means of piston rod on the snap ring until contact.



Figure 10

Fill gap (X) of guide piece and cylinder tube with grease.

Then place the O-ring (1) into the gap of cylinder tube and guide piece.

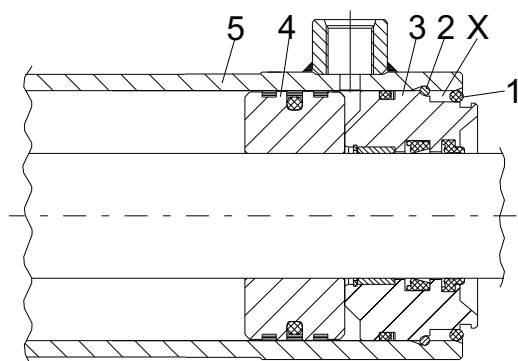


Figure 11

To the sketch:

- 1 = O-ring
- 2 = Snap ring
- 3 = Guide piece
- 4 = Piston rod
- 5 = Cylinder tube
- X = Gap Grease filling

Fasten guide piece by means of retaining ring.

(S) Set of external pliers 5870 900 015



Figure 12



Figure 13

10.2 Installation of the Steering

Wet cylinder tube with sealant (Loctite Type No.: 574).



Figure 14

Install the complete steering cylinder into the axle drive housing.



Pay attention to radial location, see figure!

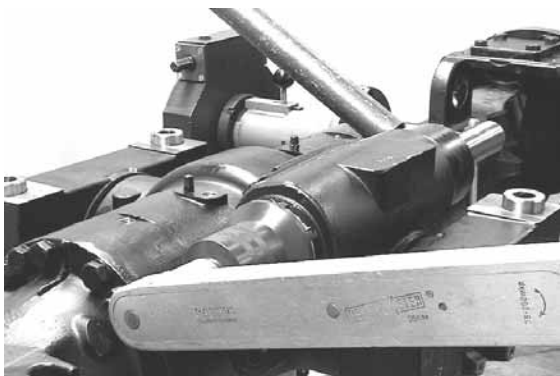


Figure 15

Fasten steering cylinder by means of „new“ slotted nut (self-locking).

Tightening torque $M_A = 1250 \text{ Nm}$

(S) Slotted nut wrench 5870 401 147



Figure 16

Fasten axial joint to piston rod.

Tightening torque $M_A = 450 \text{ Nm}$



Steps (Figure 16 ... 18) are to be made on both tie rods!

Wet thread of the axial joint with Loctite (Type No.: 243)!



Install ball joint to the axial joint.

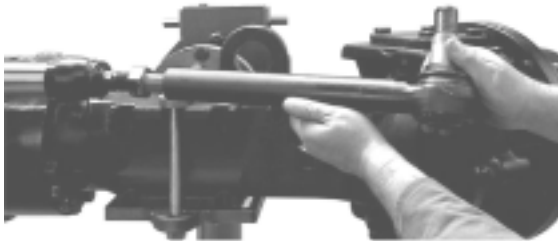


Figure 17

Hang the tie rod into the joint housing and fasten it by means of „new“ hexagon nut (self-locking).

Tightening torque $M_A = 530 \text{ Nm}$



Figure 18

10.3 Track Setting and Checking

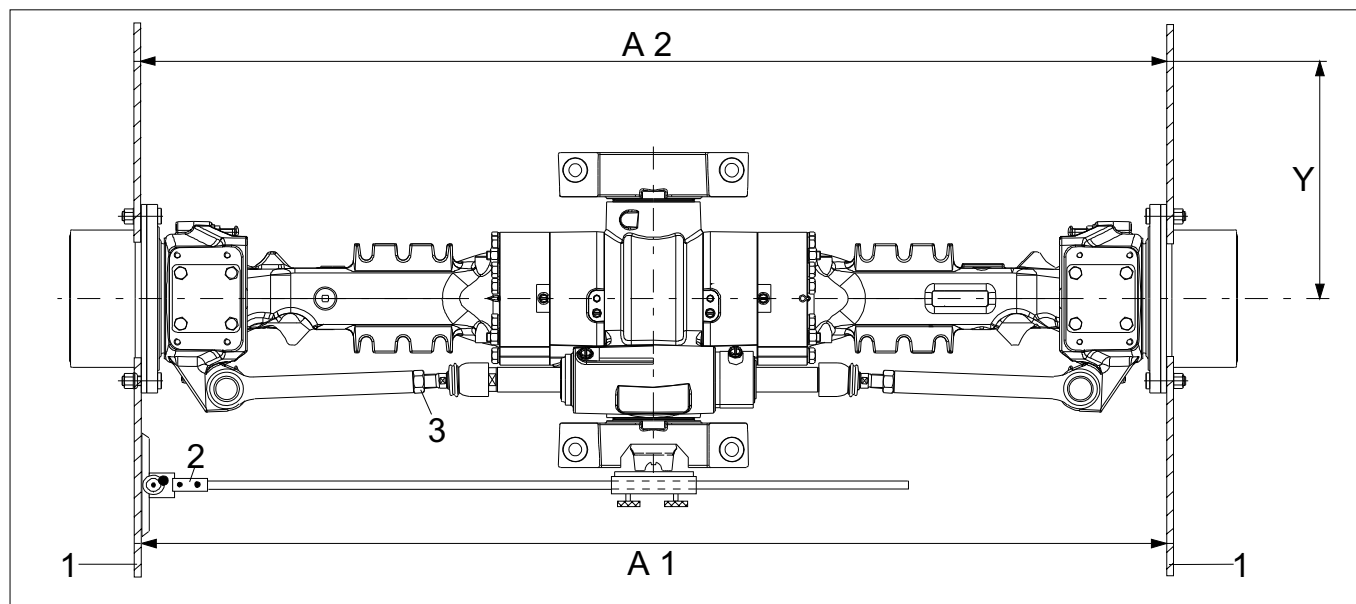


Figure 19

Basic track setting

Piston rod must be in central position.

Adjust Dimension X = 146,0 mm (measured from face/steering cylinder to face/axial joint).

ATTENTION:

During track setting the piston rod position is not allowed to be changed any more!

Mount straightedges (1) axle-centrally and horizontally.

Fasten measuring fixture (2) to the end yoke.

Loosen hexagon nut (3) and adjust length of the tie rod (axial joint) until „0°“ (corresponds with a track setting of „Zero“ mm) is indicated on the measuring fixture (2).

NOTE:

If a toe-in and toe-out setting respectively is required this is indicated in the vehicle manufacturer data!

ATTENTION:

Make the setting on both output sides!

To the sketch:

- | | |
|--------------------------------|--------------|
| 1 = (S) Straightedges | 5870 200 029 |
| 2 = (S) Measuring fixture | 5870 200 033 |
| 3 = Hexagon nut | |
| X = Setting dimension 146,0 mm | |

Check track setting (0°):

Determine Dimension A1.

Rotate both outputs by 180° – Dimension A2 must be equal to Dimension A1.

Dimension „Y“ = Distance from wheel center to rim flange.

Then fasten both tie rods (axial joint) by means of hexagon nut (3).

Tightening torque $M_A = 440 \text{ nm}$

10.4 Steering Angle Setting

ATTENTION:

If a track setting is to be made, the steering angle setting must be made only upon the track setting!

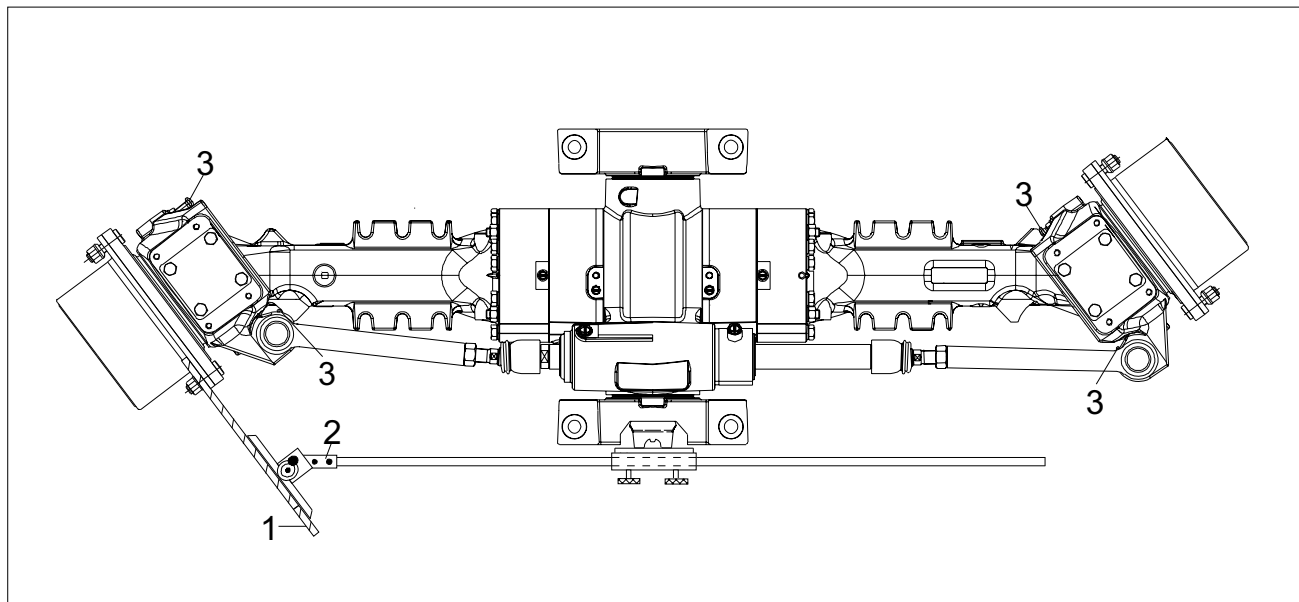


Figure 20

Mount straightedge (1) axle-centrally and horizontally.

Fasten measuring fixture (2) to the end yoke.

Rotate the output until the steering angle (e.g. 50°) is indicated on the measuring fixture (2).

Then position stop screws (3) on the axle casing until contact is obtained and lock them with hexagon nut.

Tightening torque (M14X1,5) $M_A = 150 \text{ Nm}$

NOTE:

Value of the steering angle setting is indicated in the vehicle manufacturer data!

ATTENTION:

Make setting on both output sides!

To the sketch:

1 = (S) Straightedge	5870 200 029
2 = (S) Measuring fixture	5870 200 033
3 = Stop screws	

10.5 Leakage test of the steering gear

Make leakage test of the steering in both steering directions by means of HP-pump.

Increase test pressure $p = 175 \text{ bar}$ (bleed pressure chamber).

Then close connection to HP-pump by means of shut-off valve.

During a 20 sec. testing time a pressure drop of max. 5 bar is allowed.

Test media: Motor oils SAE 10W
 MIL-L 2104 C / MIL-L 46152

(S) HP-pump	5870 287 007
(S) Measuring hub	5870 950 100
(S) Reducer	5870 950 150



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