REPAIR MANUAL

ZF – PORTAL AXLE

AV-132 / AV-132 T
Version: Wheel Head with Compact Bearing

5871.214.002 en

REPAIR MANUAL

ZF – DROP CENTER AXLE AV-132/AV-132 T

Version: wheel head with compact bearing

Information:

Due to the great variety of ZF units it is necessary to limit disassembly and reassembly manuals to a current ZF production unit.
This documentation has been developed for specialized staff trained by ZF for repair work to be done on ZF units.
Continuous technical upgrading of the ZF units and extensions concerning design options may require both deviating work steps and differing setting and testing data.

This disassembly and reassembly manual is based on the design level of a ZF production unit at the time of issue of the manual**.**

ZF Friedrichshafen AG reserves the right to replace this disassembly and reassembly manual by a successive edition at any time without advance notice. Upon request, ZF Friedrichshafen AG will advise which edition is the latest one.

Any maintenance work is to be done in accordance with ZF's Operating Instructions
(ZF order no. 5871 214 901) and **ZF List of Lubricants TE-ML 12**.

The ZF list of lubricants is being continuously updated and can be obtained or viewed as follows:
- at all ZF plants
- at all ZF Service Organizations
- Internet **www.zf.com**

For service and maintenance work on the brake system, always observe the specifications of the brake manufacturer as well as of the vehicle manufacturer.

ATTENTION:

Observe the vehicle manufacturer's instructions and specifications for the installation and commissioning of the unit!

ZF Friedrichshafen AG

ZF Services
Donaustr. 71
D - 94034 Passau

Section.: MAIP21

Design level: 2004/07
2nd edition: 2005/06
3rd edition: 2007/04
4th edition: 2007/09
5th edition: 2008/02
6th edition: 2008/09
7th edition: 2010/03
8th edition: 2011/04

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PREFACE

This documentation has been developed for specialized staff trained by ZF Passau for repair and maintenance work to be done on ZF units.

This manual describes a ZF series product with a design level valid at the date of edition

Due to the continuous technical upgrading of the product, however, the repair of the unit at your disposal may require both deviating work steps and differing setting and testing data.

We would therefore recommend you to entrust masters and servicemen with the work on your ZF product whose practical and theoretical training is constantly updated in our training school.

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

1. Permanently trained staff
2. Specified equipment, e.g. special tools
3. Stat-of-the-art genuine ZF spare parts

All work is done there with utmost care and reliability.

In addition, repair work carried out by ZF Service Stations is covered by the ZF warranty within the terms of the currently applicable contractual conditions.

Any damage resulting from work which is done in an improper and unprofessional manner by third parties and any consequential costs incurred are excluded from this contractual liability.
This shall also be applicable if other than genuine ZF spare parts are used.

ZF Passau GmbH

Service Department

GENERAL

The Service Manual covers all work required for disassembly and the relating reassembly.

When repairing the unit, ensure utmost cleanliness and excellent workmanship. Dismantle the unit only if any damaged parts must be replaced. After removing screws or nuts, loosen lids and housing parts which were installed with seals by slight blows with a plastic hammer. Use suitable pulling devices for removing parts being tightly installed on the shafts, such as bearings, bearing rings and similar.

Carry out disassembly and reassembly work on a clean working place. Use special tools which have been developed for this purpose. Prior to reinstallation of the parts, clean contact faces of housings and lids from residues of seals. Remove any burrs or similar irregularities with an oil stone. Clean housings and end covers, in particular corners and angles, with a suitable detergent. Damaged or heavily worn parts must be replaced, with an expert assessing whether parts subject to normal wear during operation, such as bearings, thrust washers etc. will be reinstalled.

Parts such as seal rings, locking plates, split pins etc. must generally be replaced. Radial seal rings with worn or broken sealing lip must also be renewed. In particular, ensure that no chips or other foreign bodies remain in the housing. Check the lube oil holes and grooves regarding unhindered passage.
Oil according to the relating List of Lubricants shall be applied to all bearings prior to their installation:

NOTE: Only a heating furnace or an electric drier is permitted for heating parts such as bearings, housings, etc!
Parts fitted in heated state must be readjusted after cooling down to ensure a perfect contact.

CAUTION:
When assembling the unit, exactly observe the tightening torques and setting data indicated in the manual. Tighten screws and nuts according to the enclosed standard table, unless otherwise specified.
The use of fluid seals or Molykote is not permitted for the control part in the transmissions due to a possible malfunction.

Never wash clutch plates having organic friction linings (e.g. paper linings) (adverse effect on lining adhesion).
Only dry-cleaning is permitted (leather cloth).

DANGER
When using detergents, observe the manufacturer's instructions regarding their handling.

Structure of the Repair Manual

The structure of this repair manual reflects the sequence of work steps for completely dismantling the removed unit.

Special tools required for carrying out the repair work are listed in the current text as well as in chapters "W" (List of Special Tools) and "WB" (Commercial Tools).

Important information on labor safety

As a basic principle, the workshop carrying out the repair or maintenance of ZF units shall be fully responsible for labor safety.
The observance of all valid safety regulations and legal requirements is a prerequisite for avoiding any damage to persons and products during maintenance and repair work.
Repair workshops must familiarize themselves with these regulations prior to starting any work.

A suitably trained and skilled staff is required for a proper repair of these ZF products.
The repair workshop shall be responsible for the training.

The following safety references are used in this manual:

☞ ***CAUTION***	This symbol serves as a **reference** to special working procedures, methods, information, use of auxiliaries etc... indicated in this repair manual.

⚠ ***DANGER***	This symbol identifies situations in which lacking care may lead to **personal injury or damage to the product**.

NOTE:	Thoroughly study this manual before starting any inspections or repair work.

NOTE:	Figures, drawings and parts in this manual do not always represent the original; they show the working procedure. Since the figures, drawings and parts are not shown to scale, do not draw any conclusions on size and weight (not even within one and the same illustration). Carry out work according to the legend.

NOTE:	After repair work and tests, the expert staff must verify that the product is perfectly functioning again.

TRAGBILDBEISPIELE ZUR GLEASONVERZAHNUNG

CONTACT PATTERN EXAMPLES OF 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

Portée idéale, 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)

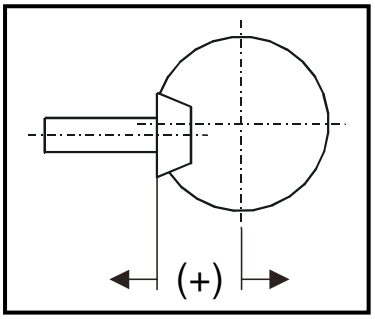
Côté entraîné (convexe)

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

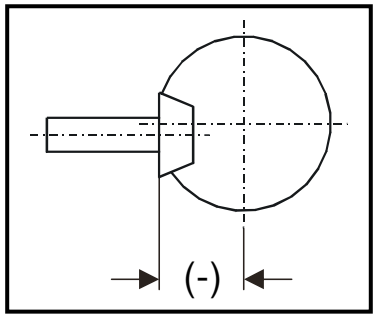


Bild / Figure 3

Bild / Figure 5

Bild / Figure 4

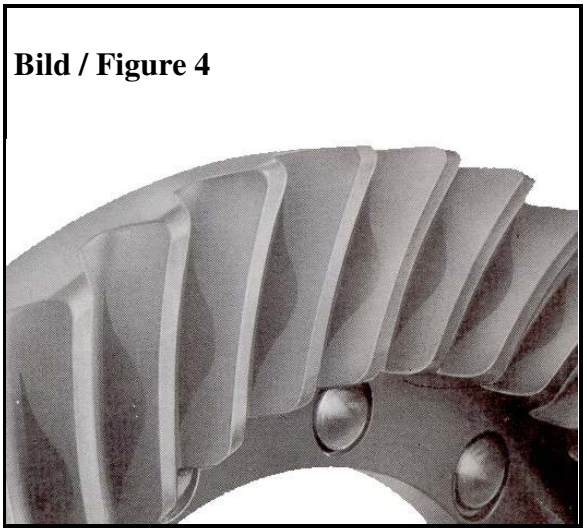
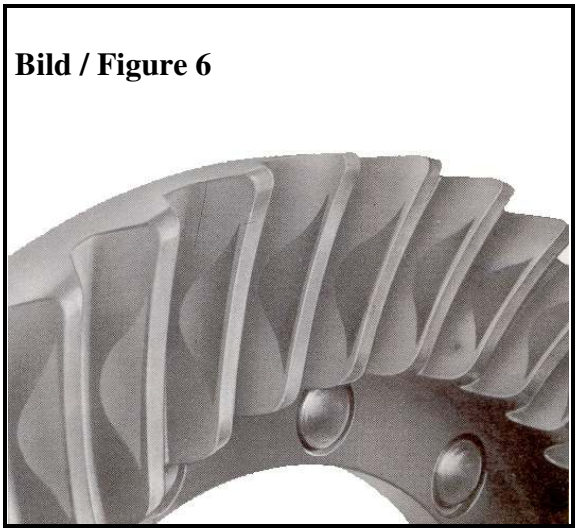


Bild / Figure 6



VERGLEICHSTABELLE FÜR MASSEINHEITEN
CONVERSION TABLE
TABLEAU DE CONVERSION

25.40 mm	=	1 in (inch)
1 kg (kilogram)	=	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)	=	14.5 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 gallons (Imp.)
4.456 liters	=	1 gallon (Imp.)
1 liter	=	0.220 gallons (US)
3.785 liter	=	1 gallon (US)
1609.344 m	=	1 mile (land mile)
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/m^2

Note : linear density in kg/m; areal density in t/m^2

Nota : Densité linéaire en kg/m; Densité superficielle en t/m^2

Begriff **Unit** **Unité**	**Formelzeichen** **Formula Sign** **Symbole**	**neu** **New** **Nouveau**	**alt** **old** **Vieux**	**Umrechnung** **Conversion** **Conversion**	**Bemerkungen** **Note** **Nota**
Masse Density Densité	m	kg (Kilogramm)	kg		
Kraft Force Force	F	N (Newton)	kp	1 kp = 9.81 N	
Arbeit Work Travail	A	J (Joule)	kpm	0.102 kpm = 1J = 1 Nm	
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 (Over-) Pression (Sur-)	pü	bar	atü	1.02 atü = 1.02 kp/cm^2 = 1 bar = 750 torr	
Drehzahl Speed Nombre de Tours	n	min $^{-1}$			

TIGHTENING TORQUES FOR SCREWS (in Nm) ACC. TO ZF-STANDARD 148

Friction coefficient: μ tot.= 0.12 for screws and nuts without subsequent treatment. as well as phosphated nuts. Tighten manually!

Unless otherwise specified, the tightening torques can be taken from the following chart:

Metric ISO-standard thread DIN 13. page 13

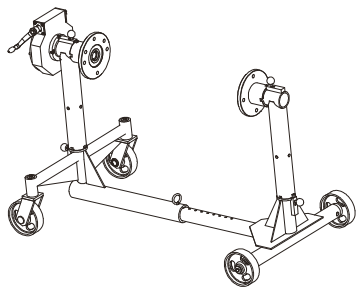
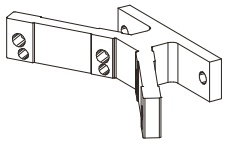
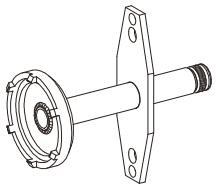
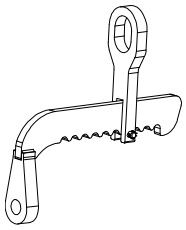
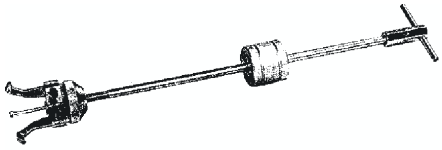
Size	8.8		10.9		12.9
M4	2.8		4.1		4.8
M5	5.5		8.1		9.5
M6	9.5		14		16.5
M7	15		23		28
M8	23		34		40
M10	46		68		79
M12	79		115		135
M14	125		185		215
M16	195		280		330
M18	280		390		460
M20	390		560		650
M22	530		750		880
M24	670		960		1100
M27	1000		1400		1650
M30	1350		1900		2250
M33	1850		2600		3000
M36	2350		3300		3900
M39	3000		4300		5100

Metric ISO- fine thread DIN 13. page 13

Size	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

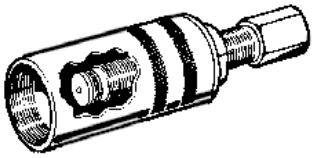
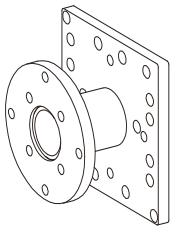
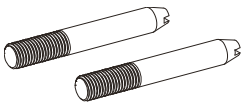
SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

AV-132/AV-132 T
4472 036 072/4472 036 577

Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
1		**Assembly truck assy** With tilting device **5870 350 000**	1	1/1 1/20
2		**Support** **5870 350 093**	1	1/1
3		**Slotted nut wrench** **5870 401 146**	1	1/6 2/93
4		**Lifting bracket** **5870 281 043**	1	1/7 2/92
5		**Striker** **5870 650 004**	1	1/16 1/29

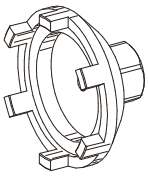
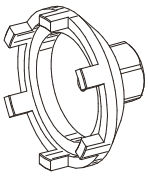
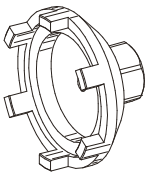
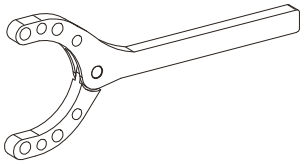
SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

AV-132/AV-132 T
4472 036 072/4472 036 577

Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
6		**Rapid grip** **5873 012 013**	1	1/18
7		**Basic tool** **5873 002 001**	1	1/18 1/26 1/35 4/1
8		**Clamping plate** **5870 350 119**	1	1/20
9		**Locating pins** M14 **5870 204 022**	1	1/20 2/56
10		**Rapid grip** **5873 002 052**	1	1/26 4/1

SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

AV-132/AV-132 T
4472 036 072/4472 036 577

Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
11		**Rapid grip** **5873 002 025**	1	1/26 4/1
12		**Slotted nut wrench** Ø 86 **5870 401 093**	1	1/30 2/12 2/43
13		**Slotted nut wrench** Ø 84 **5870 401 173**	1	1/30 2/12 2/43
14		**Slotted nut wrench** Ø 81 **5870 401 139**	1	1/30 2/12 2/43
15		**Clamping fork** **5870 240 002**	1	1/30 2/12 2/43

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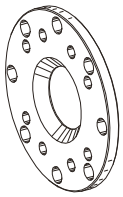
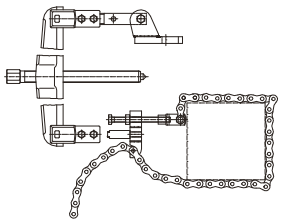
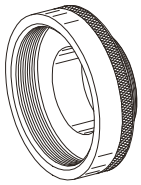
Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
16		**Centering disk** **5870 912 015**	1	1/30 2/12 2/43
17		**Forcing device** **5870 080 044**	1	1/33
18		**Grab sleeve** For bearing 0735 371 894 **5873 003 022**	1	1/35
19		**Reducing adapter** For grab sleeve 5873 003 022 **5873 003 011**	1	1/35
20		**Grab sleeve** for bearing 0750 117 860 **5873 002 051**	1	1/35

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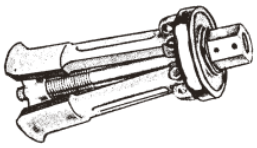
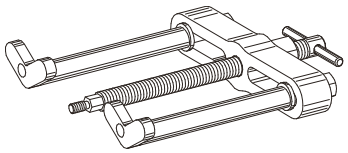
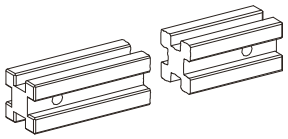
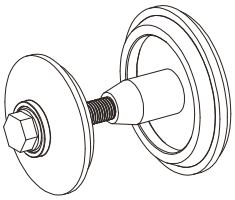
Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
21		**Internal extractor** **5870 300 019**	1	1/36
22		**Counter support** **5870 300 020**	1	1/36
23		**Straightedge** L = 580 mm **5870 200 022**	1	2/4 2/64 2/73
24		**Assembly fixture** **5870 345 080**	1	2/7
25		**Reducing adapter** 1/2 ″ - 1/4 ″ **5870 656 056**	1	2/13 2/40

SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

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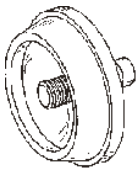
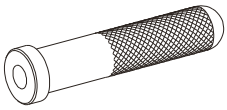
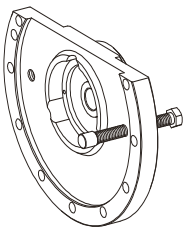
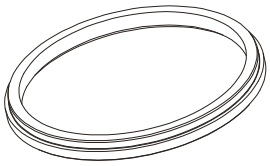
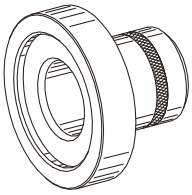
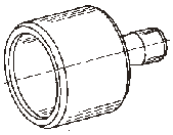
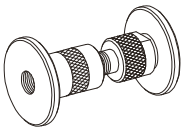
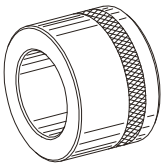
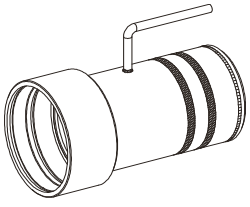
Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
26		**Driver tool** **5870 058 078**	1	2/25
27		**Handle** **5870 260 002**	1	2/25 2/42
28		**Test equipment** **5870 200 121**	1	2/28 2/30 2/31
29		**Adapter ring** (just for AV-132 T) **AA00 692 068**	1	2/28
30		**Driver tool** **5870 048 216**	1	2/41

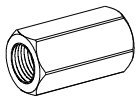
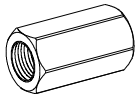
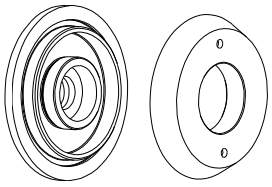
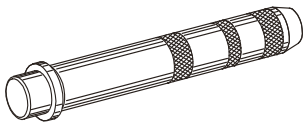
SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

AV-132/AV-132 T
4472 036 072/4472 036 577

Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
31		**Driver tool** **5870 056 008**	1	2/42
32		**Assembly fixture** **5870 345 103**	1	2/47
33		**Plug gauge** **5870 200 094**	1	2/52
34		**Measuring bar** **5870 200 127**	1	2/61 2/63
35		**Pressing fixture** **5870 506 162**	1	2/68

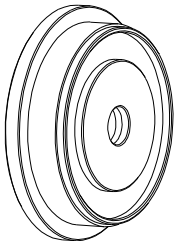
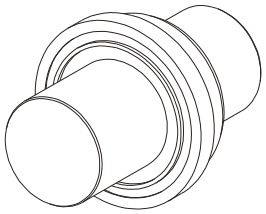
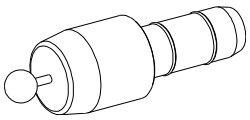
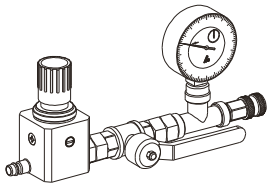
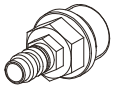
SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

AV-132/AV-132 T
4472 036 072/4472 036 577

Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
36		**Assembly fixture** **5870 610 010**	1	2/77
37		**Insert** M22x1.5 **5870 610 002**	1	2/77
38		**Insert** 7/8 – 11 BSF **5870 610 008**	1	2/77
39		**Driver tool** **5870 050 007**	1	2/80
40		**Handle** **5870 260 004**	1	2/80

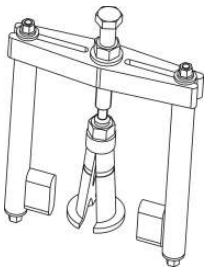
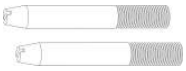
SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

AV-132/AV-132 T
4472 036 072/4472 036 577

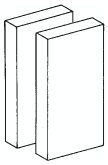
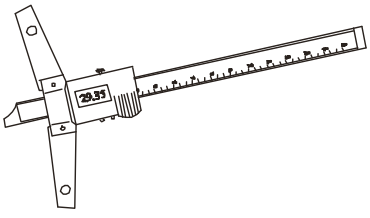
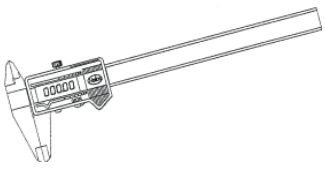
Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
41		**Driver tool** **5870 051 053**	1	2/87 2/88
42		**Driver tool** **AA00 607 922**	1	2/87 2/88
43		**Assembly aid** **5870 651 085**	1	2/91
44		**Air connection** **5870 286 079**	1	2/99
45		**Reducing adapter** M24x1.5 **5870 286 080**	1	2/99

SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

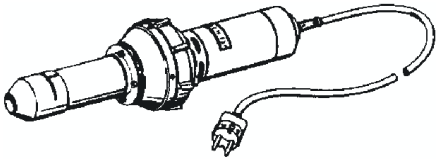
AV-132/AV-132 T
4472 036 072/4472 036 577

Cons. No.	Figure	Designation Order no.	Qty.	Chapter/Fig
46		**Pulling device** **5870 080 067**	1	4/4
47		**Locating pin** **AA00 622 210**	2	4/15
48		**Locating pins** M14x1.5 **5870 204 025**	1	4/16

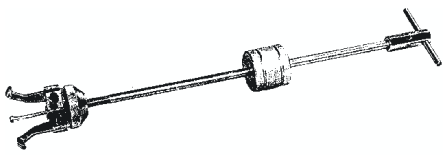
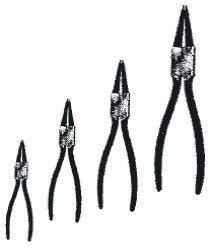
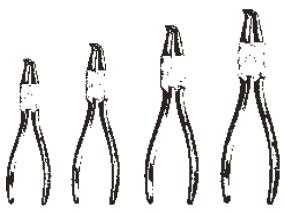
COMMERCIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

Cons. No.	Figure	Designation Order no.	Qty	Chapter/Fig.
1		**Magnetic stand** **5870 200 055**	1	Universal
2		**Dial indicator** **5870 200 057**	1	Universal
3		**Gauge blocks** **5870 200 066** 70 mm **5870 200 067** 100 mm	1	Universal
4		**Digital depth gauge** **5870 200 072** 200 mm **5870 200 114** 300 mm	1	Universal
5		**Digital caliper gauge** **5870 200 109** 150 mm	1	Universal

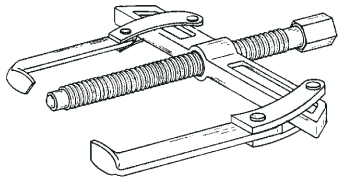
COMMERCIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

Cons. No.	Figure	Designation Order no.	Qty	Chapter/Fig.
6	 	**Torque wrench** **5870 203 030** 0.6 -6.0 Nm **5870 203 031** 1.0 – 12 Nm **5870 203 032** 3.0 – 23 Nm **5870 203 033** 5.0 – 45 Nm **5870 203 034** 10 – 90 Nm **5870 203 039** 80 – 400 Nm **5870 203 016** 140 – 750 Nm **5870 203 011** 750 - 2000 Nm	1	Universal
7		**Hot air blower** **5870 221 500** 230 V **5870 221 501** 115 V	1	Universal
8		**Plastic hammer** **5870 280 004** Ø 60 mm **Substitute nylon insert** **5870 280 006**	1	Universal
9		**Lifting strap** **5870 281 026**	1	Universal

COMMERCIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

Cons. No.	Figure	Designation Order no.	Qty	Chapter/Fig.
10		**Lifting chain** **5870 281 047**	1	Universal
11		**Pry bar** **5870 345 071**	1	Universal
12		**Striker** **5870 650 004**	1	Universal
13		**Set of internal pliers** I1-I2-I3-I4 **5870 900 013**	1	Universal
14		**Set of internal pliers** I11-I21-I31-I41 90° **5870 900 014**	1	Universal

COMMERCIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

Cons. No.	Figure	Designation Order no.	Qty	Chapter/Fig.
15		**Set of external pliers** A1-A2-A3-A4 **5870 900 015**	1	Universal
16		**Set of external pliers** A01-A02-A03-A04 90° **5870 900 016**	1	Universal
17		**Two-armed puller** **5870 970 001** Jaw width 80 mm Throat depth 100 mm **5870 970 002** Jaw width 120 mm Throat depth 125 mm **5870 970 003** Jaw width 170 mm Throat depth 125 mm **5870 970 004** Jaw width 200 mm Throat depth 175 mm **5870 970 006** Jaw width 350 mm Throat depth 250 mm **5870 970 007** Jaw width 520 mm Throat depth 300 - 500 mm **5870 970 026** Jaw width 250 mm Throat depth 200 mm **5870 970 028** Jaw width 380 mm Throat depth 200 mm	1	Universal

COMMERCIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

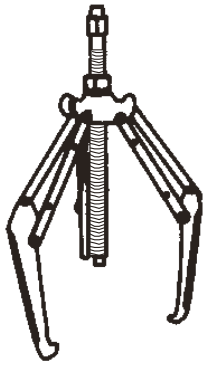
Cons. No.	Figure	Designation Order no.	Qty	Chapter/Fig.
18		**Three armed puller** **5870 971 001** Jaw width 85 mm Throat depth 65 mm **5870 971 002** Jaw width 130 mm Throat depth 105 mm **5870 971 003** Jaw width 230 mm Throat depth 150 mm **5870 971 004** Jaw width 295 mm Throat depth 235 mm **5870 971 005** Jaw width 390 mm Throat depth 270 mm **5870 971 006** Jaw width 640 mm Throat depth 300 mm	1	Universal

Figure 1

1. DISASSEMBLY

Fix axle on the assembly truck.

(S) Assembly truck	5870 350 000
(S) Support	5870 350 093

Drain oil.

Oil to be disposed of ecologically and in accordance with the legal provisions!

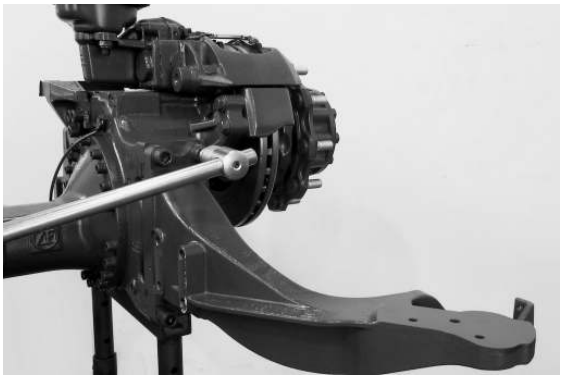


Figure 2

If necessary, separate spring carrier (4x) from the axle.

Mark the installation position of the different spring carriers!

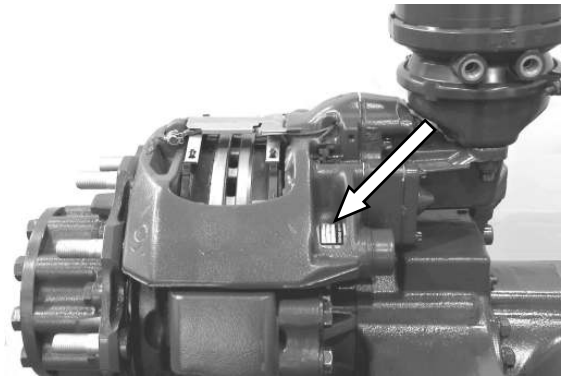


Figure 3

Separate brake from the axle (figure 3 and 4):

The brake manufacturer's instructions and specifications are mandatory for any operations done on the brake system!
The relating information is included in the repair, maintenance and service manuals of the component manufacturer!
The applicable instructions are to be requested from the brake manufacturer or can be viewed on the brake manufacturer's internet site!
Brake manufacturer and brake type are indicated on the identification plate of the brake caliper!
Figure 3 shows the position of the identification plate (arrow) using the KNORR-brake as an example!

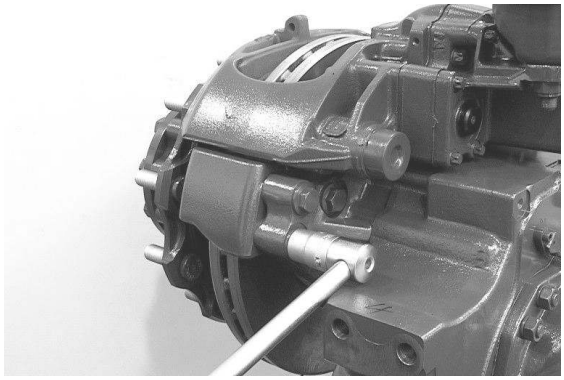


Figure 4

Loosen hexagon screws and separate brake caliper from the axle.

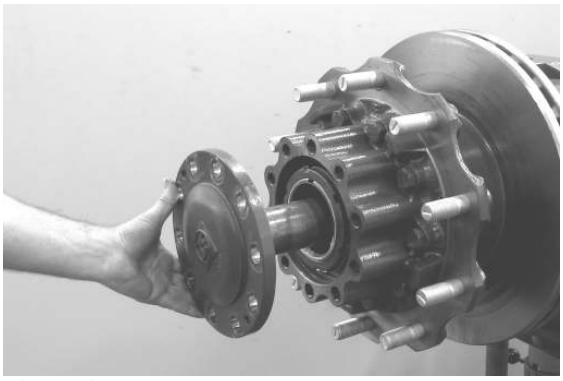


Figure 5

1.1 OUTPUT

Loosen hexagon screws and separate flange shaft from the axle.

Watch out for low quantities of residual oil!

Unlock and loosen outer slotted nut.
Remove retaining plate and loosen inner slotted nut.

(S) Slotted nut wrench 5870 401 146

Figure 6

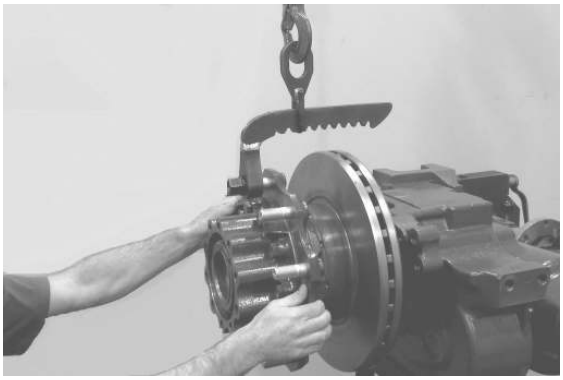


Figure 7

Separate hub/brake disk from the hub carrier.

(S) Lifting bracket 5870 281 043

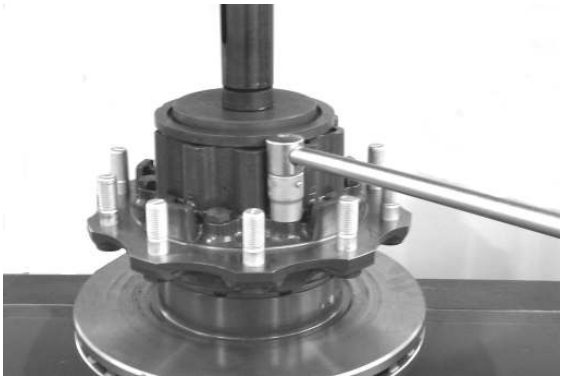


Figure 8

Fix hub/brake disk by means of press.
Loosen threaded connection and separate hub from the brake disk.

Locate press-fit mandrel at the hub mounting face.

Figure 9

Remove O-ring (arrow).

Figure 10

Use lever to remove shaft seal on the brake disk side out of hub hole.

Figure 11

Remove outer shaft seal from the hub hole.

Removal of compact bearing (figures 12 to 14)

☞ **Inspection of the compact bearing inside followed by a grease change is also required:**

- **within the maintenance interval, see List of Lubricants TE-ML 12.**
- **In case of grease leakage on the shaft seal at brake disk side, or when replacing the shaft seals.**
- **In case of overheated brake parts (e.g. burnt pressure piece – bellows)**

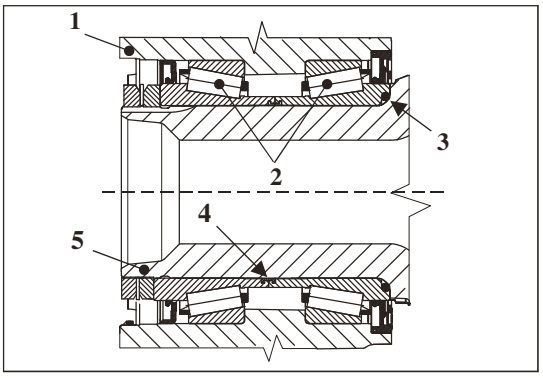


Figure 12

Legend to figure 12:

1 = Hub
2 = Compact bearing
3 = O-ring
4 = Retaining ring
} Complete component
5 = Hub carrier

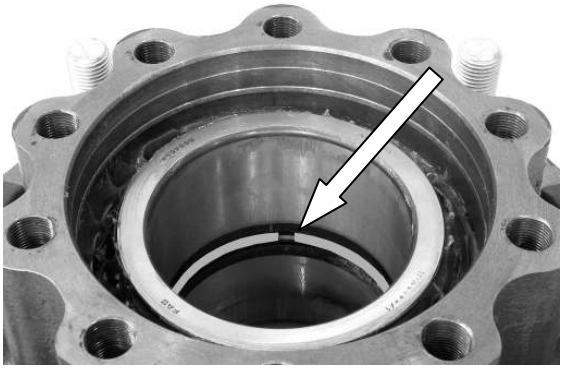


Figure 13

Unsnap retaining ring (arrow).

Figure 14

Remove both bearing inner rings.

If necessary, remove both bearing outer rings.

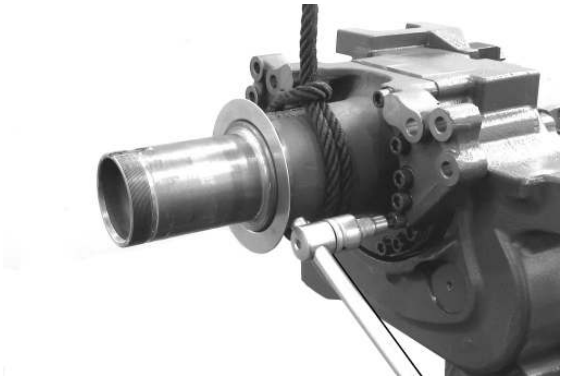


Figure 15

1.2 PORTAL DRIVE

Locate hub carrier by means of lifting device.
Loosen threaded connection and separate hub carrier from the portal housing.

Figure 16

Pull bearing outer ring out of the hole with a striker.

☞ **Pay attention that the releasing shim does not drop!**

(S) Striker 5870 650 004

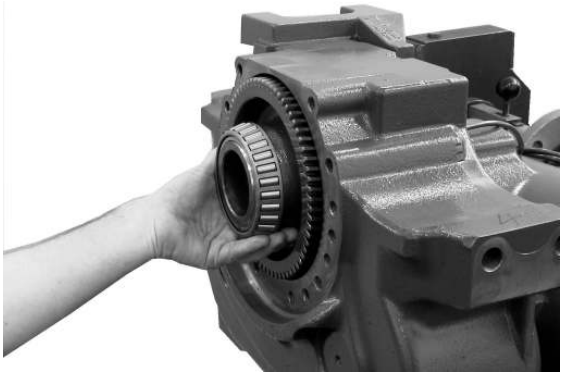


Figure 17

Remove output gear.

Figure 18

Remove both bearing inner rings from the output gear.

(S) Rapid grip 5873 012 013
(S) Basic tool 5873 002 001

Figure 19a

Use lifting device to fix portal housing.
Loosen threaded connection and separate portal drive from the axle housing.

Pay attention so that the differential and the stub shaft do not drop!
Watch out for low quantities of residual oil!

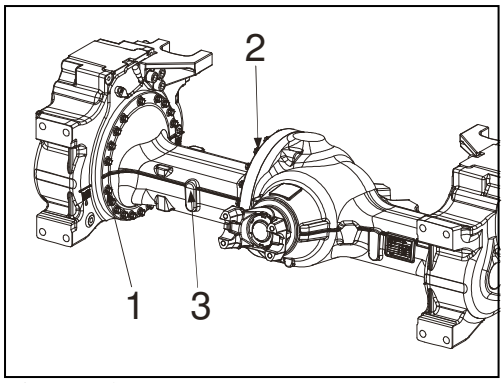


Figure 19b

Use lifting device to fix the portal housing of the AV-132 T (see previous figure). Loosen threaded connection (arrow 1) and separate portal drive from the axle housing.

Pay attention so that the stub shaft does not drop!

Then fix axle housing (arrow 3) by means of lifting device and loosen bolted connection (arrow 2). Remove axle housing.

Pay attention so that the differential does not drop!

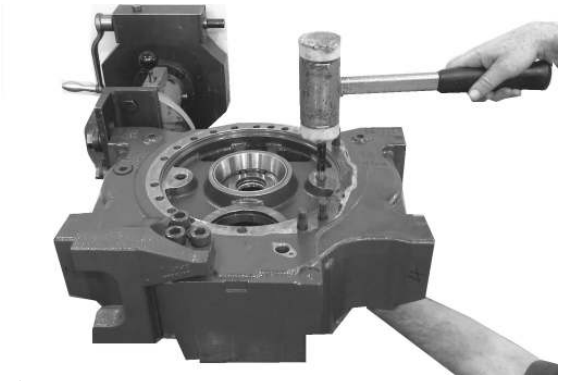


Figure 20

Fix portal drive to the assembly truck.

Mark installation position and allocation of the components during the subsequent removal of the two intermediate gears (figures 20 to 22)!

Loosen hexagon screw and install locating pin.
Drive out bearing bolt.
Remove second bearing bolt accordingly.

(S) Assembly truck	5870 350 000
(S) Clamping plate	5870 350 119
(S) Locating pins	5870 204 022

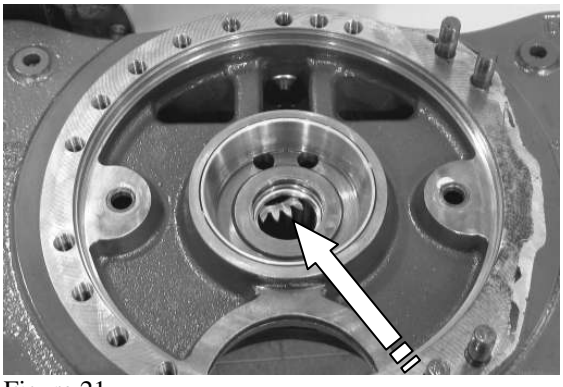


Figure 21

Shift drive gear diagonally (see arrow/figure 21) and remove releasing intermediate gear (figure 22)!

Remove second intermediate gear accordingly.

Now remove the complete drive gear.

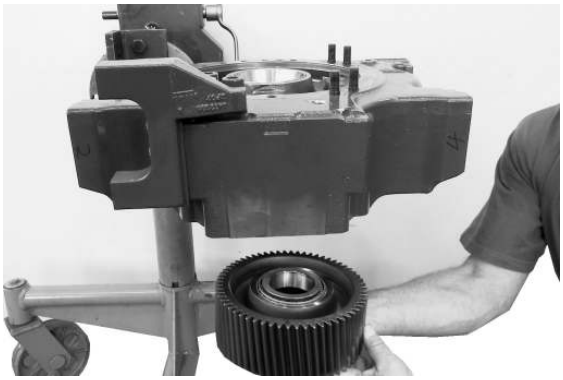


Figure 22

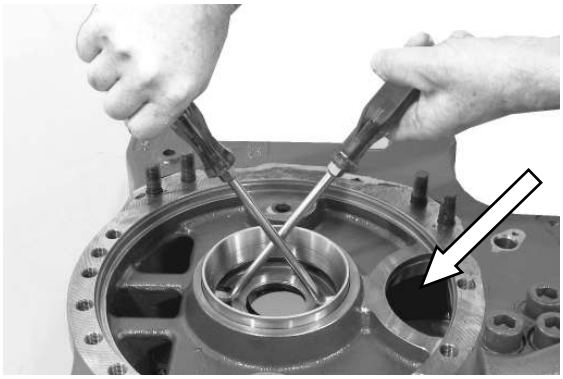


Figure 23

Use lever to pull bearing outer ring – differential bearing - out of the housing hole.

Pay attention that releasing adjusting shim does not drop!

If necessary, drive bearing outer ring - output gear bearing (arrow) - out of the housing hole.

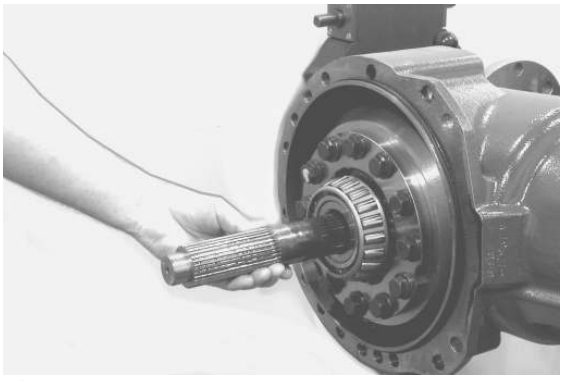


Figure 24

Pull stub shaft out of the differential.

Differential is not fixed!

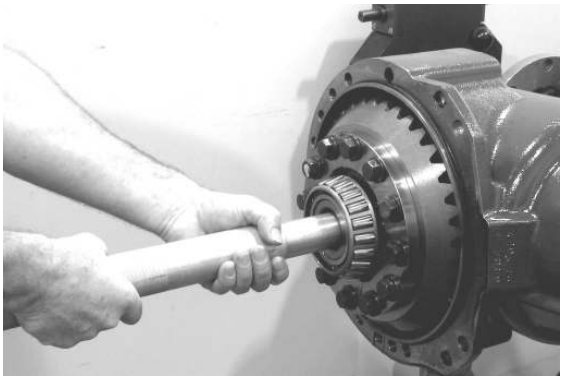


Figure 25

1.3 DIFFERENTIAL

☞ **The following illustrations provide a description of the differential disassembly: Version I, Type "C".**

Disassembly of the differential version II, type "D" see description on page 4/1 and following.

Lift differential out of the axle housing by means of an appropriate assembly mandrel.

Figure 26

Remove both bearing inner rings.

(S) Rapid grip	5873 002 052
(S) Rapid grip	5873 002 025
(S) Basic tool	5873 002 001

Loosen hexagon screws.
Separate both differential carrier halves and single components.
If necessary, loosen threaded connection and press crown wheel out of the differential carrier.

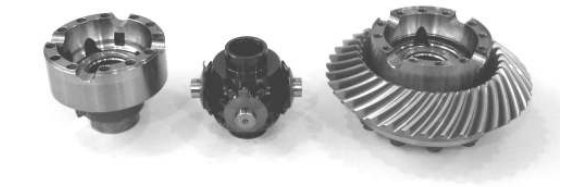


Figure 27

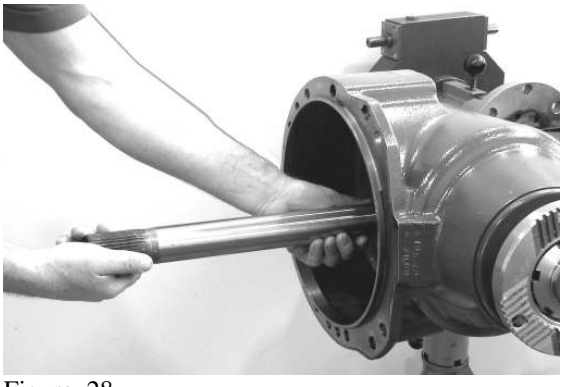


Figure 28

Pull stub shaft out of the axle.

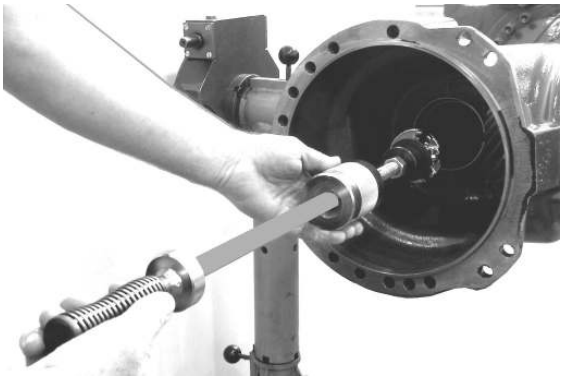


Figure 29

Drive bearing outer ring out of the housing hole by means of striker.

☞ **Pay attention that the releasing adjusting shim does not drop!**

(S) Striker 5870 650 004

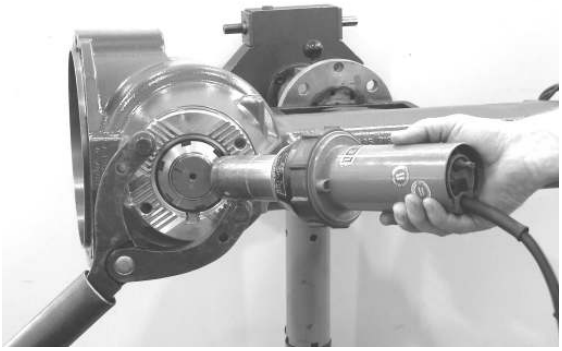


Figure 30

1.4 INPUT

Loosen slotted nut (figure 30 and 31).

☞ **Heat grooved nut before loosening it (secured with Loctite)!**

(S) Clamping fork		5870 240 002
(S) Slotted nut wrench	Ø 86	5870 401 093
(S) Slotted nut wrench	Ø 84	5870 401 173
(S) Slotted nut wrench	Ø 81	5870 401 139
(S) Centering disk		5870 912 015

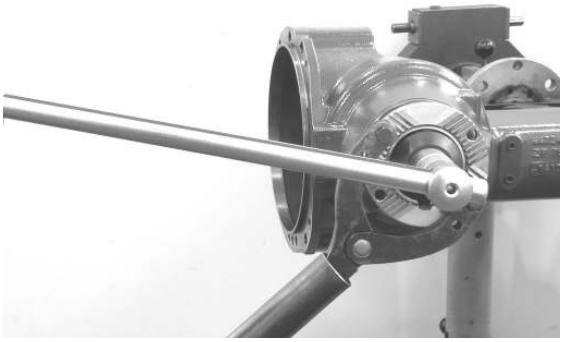


Figure 31

Pull off input flange and remove shaft seal.

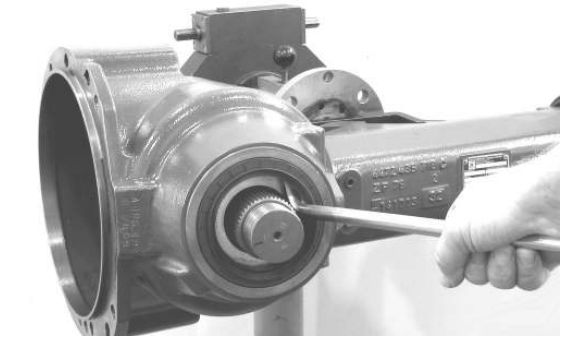


Figure 32

Press input pinion out of the bearing hole.

(S) Forcing device 5870 080 044

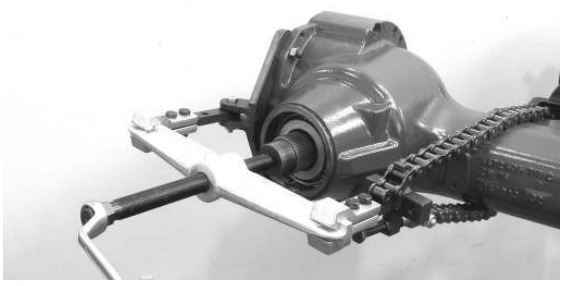


Figure 33

Figure 34

Remove adjusting ring.

Remove bearing inner ring from the input pinion.

Figure 35

☞ **Regarding special tools pay attention to the different versions of the pinion head bearing!**

Version I, bearing dimension 70 x 150 x 41 mm;
Required special tools**:**

(S) Grab sleeve	5873 003 022
(S) Reducing adapter	5873 003 011
(S) Basic tool	5873 002 001

Version II, bearing dimension 70 x 150 x 50 mm;
Required special tools:

(S) Grab sleeve	5873 002 051
(S) Basic tool	5873 002 000

Figure 36

Pull external bearing outer ring out of the hole.

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

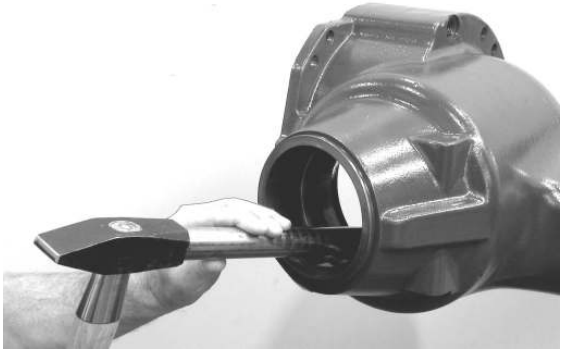


Figure 37

Drive internal bearing outer ring out of the hole.

☞ **Pay attention that the releasing adjusting shim!**

2. REASSEMBLY

2.1 INPUT - DIFFERENTIAL

General: **If either crown wheel or input pinion is damaged, both parts (bevel gear set) must be replaced!**

☞ **Make sure that mating numbers are identical!**

The following settings are described on the next pages.

- **A - Contact pattern of bevel gear set**
- **B - Backlash of bevel gear set**
- **C - Rolling torque of input pinion bearing**
- **D - Rolling torque of differential bearing**

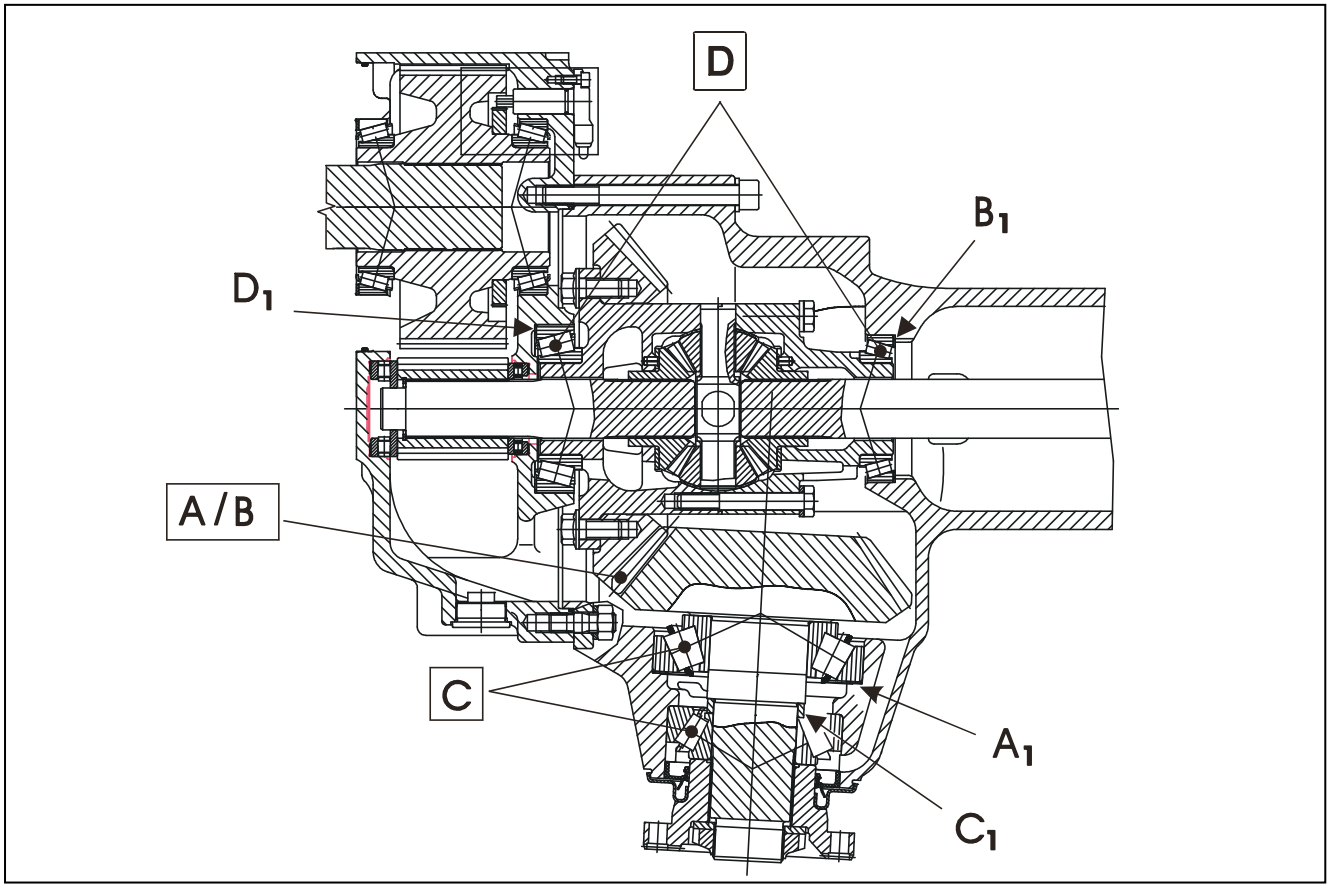


Figure 1

Legend:

A_1 - Contact pattern shim
B_1 - Shim - backlash
C_1 - Shim - input pinion bearing
D_1 - Shim - differential bearing

☞ **According to our experience, the required setting values are obtained when installing the shims removed during disassembly!**
A later check of the values, however, is absolutely necessary!

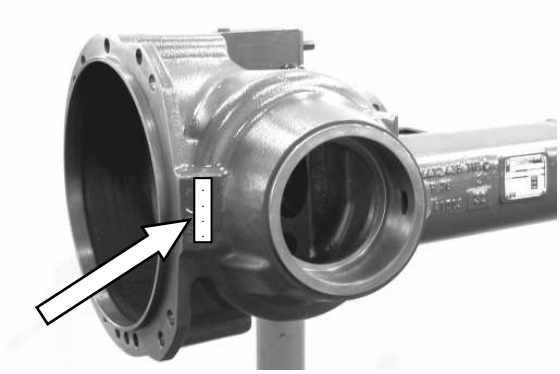


Figure 2

Setting of bevel gear set contact pattern (figure 1 … 6):

Read installation dimension A from the axle housing (arrow).

Dimension A e.g. …….. 195.42 mm

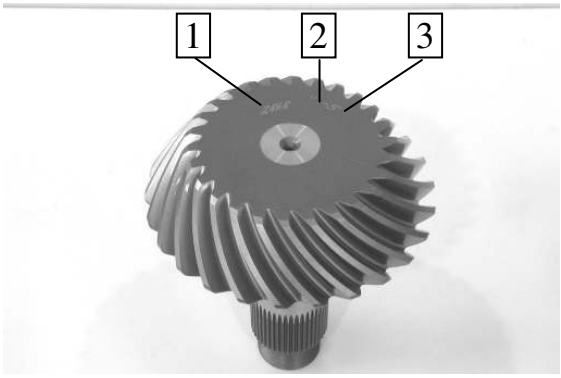


Figure 3a

Figures 3a and 3b show the input pinion.

The following technical data are stamped or marked by hand:

1 = mating number (marked by hand, on the pinion head)
2 = pinion basic dimension (stamped into the pinion head or shaft, see figure 3b)
3 = pinion distance deviation + or – (marked by hand, on the pinion head)

NOTE:
Distance deviation is indicated in $^{1}/_{100}$ mm.

Pinion dimension „X“ e.g.:

Dimension X 153 $_{-5}$ ($^{5}/_{100}$ = 0.05) = 152.95 mm

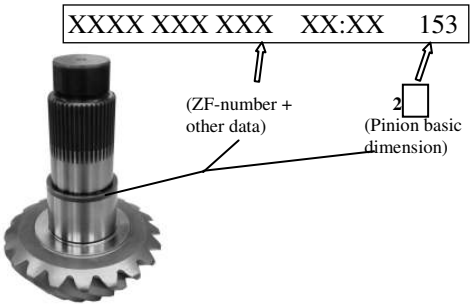


Figure 3b

If no pinion distance deviation is indicated, the pinion basic dimension corresponds with the pinion dimension „X“!

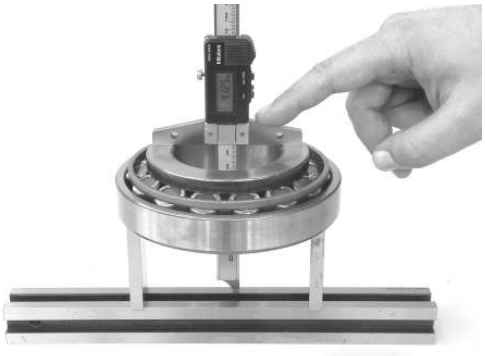


Figure 4

Determine bearing height.

Dimension Y e.g. …….. 41.25 mm

(S) Straightedge 5870 200 022

Calculation example A_1:

Dimension X (pinion dimension) e.g. …….		152.95 mm
Dimension Y (bearing height) e.g. …….	+	41.25 mm
Resulting in dimension Z	=	194.20 mm

Calculation example A_2:

Dimension A e.g. …….		195.42 mm
Dimension Z e.g. …….	-	194.20 mm
Difference = shim s	=	1.22 mm

☞ **The individual shims are available in 0.03 mm size intervals. Use the next available shim size e.g. s = 1.23!**

Supercool external bearing outer ring and insert it until contact is obtained.

Figure 5

Install shim (according to calculation example s = 1.23 mm). Supercool bearing outer ring and insert it into the bearing hole until contact is obtained using the fixture (figure 6 and 7).

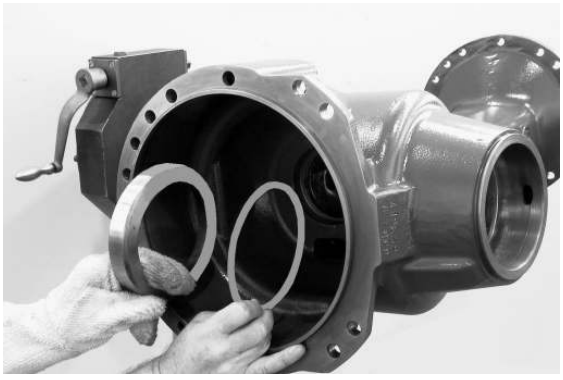


Figure 6

(S) Assembly fixture 5870 345 080

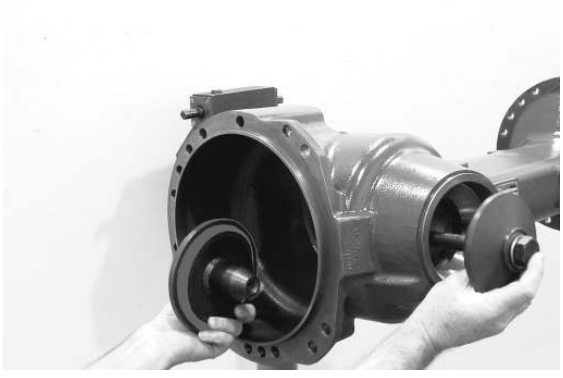


Figure 7

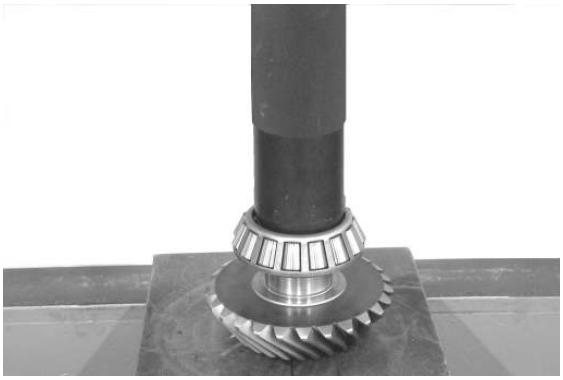
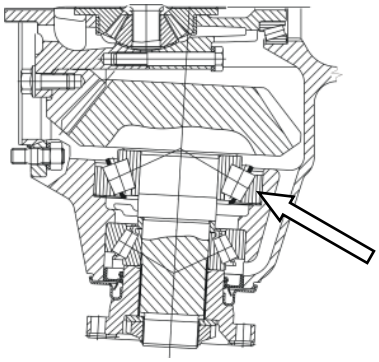


Figure 8

Force bearing inner ring to contact position.

Setting of rolling torque of the input pinion bearing (Sketch … figure 13):



☞ **Pay attention to different versions of pinion head bearing (arrow) regarding setting values!**

Version I: **Bearing dimension 70 x 150 x 41.27 mm.**
Required rolling torque 3.0 … 7.0 Nm

Version II: **Bearing dimension 70 x 150 x 50.0 mm.**
Required rolling torque 4.0 … 10.0 Nm

☞ **When installing new bearings, try to achieve the respective average value!**
In case of used bearings, try to achieve the lower value!

According to our experience, the necessary rolling torque is obtained when reusing the adjusting ring removed during disassembly!
A later check of the rolling torque, however, is absolutely necessary!

Figure 9

Install adjusting ring e.g. s = 10.32 mm, see figure 9!

Figure 10

Position the input pinion and mount the heated bearing inner ring until contact position is obtained.

☞ **Before mounting the input flange and tightening the slotted nut (figure 11 und 12), let bearing inner ring cool down to ambient temperature!**

Figure 11

Mount the input flange.

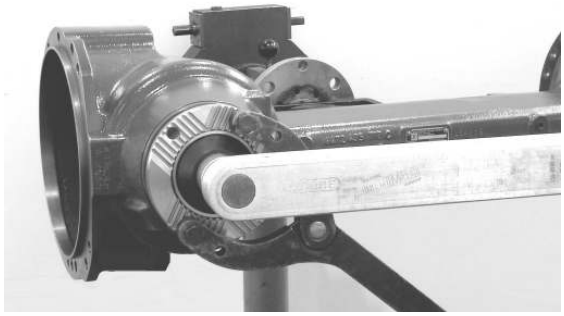


Figure 12

Mount washer and tighten slotted nut.

Tightening torque …… M_A = 1000 … 1700 Nm

☞ **Pre-tighten slotted nut with 1000 Nm and check rolling torque (figure 13)! If required, increase tightening torque step by step up to max. M_A = 1700 Nm until the required rolling torque is achieved!**
While tightening, rotate the input pinion in both directions several times.
If the required rolling torque cannot be obtained within the tolerance range of the tightening torque, use a suitable adjusting ring (figure 9) for correction as specified below:

<u>Insufficient rolling torque – fit thinner ring</u>
<u>Excessive rolling torque – fit thicker ring</u>

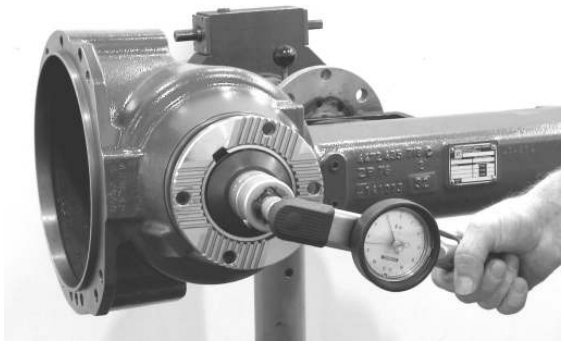


Figure 13

☞ **Note down the tightening torque of the slotted nut as well as the rolling torque of the pinion bearing after they have been set!**

Secure the slotted nut (Loctite-locking) and mount the shaft seal ring <u>after</u> contact pattern check (starting from figure 41)!

(S) Slotted nut wrench Ø 86 mm	5870 401 093
(S) Slotted nut wrench Ø 84 mm	5870 401 173
(S) Slotted nut wrench Ø 81 mm	5870 401 139
(S) Centering disk	5870 912 015
(S) Clamping fork	5870 240 002
(S) Reducing adapter ½“ – ¼““	5870 656 056

Figure 14

Differential (figure 14 … 23)

☞ **The following figures provide a description of the differential reassembly: Version I, type "C".**

Reassembly of the differential: Version II, type "D" see description on page 4/3 and following.

Heat up crown wheel and bring it into contact position with the mounting face of the differentials.

⚠ **Observe radial installation position!**
Use protective gloves!

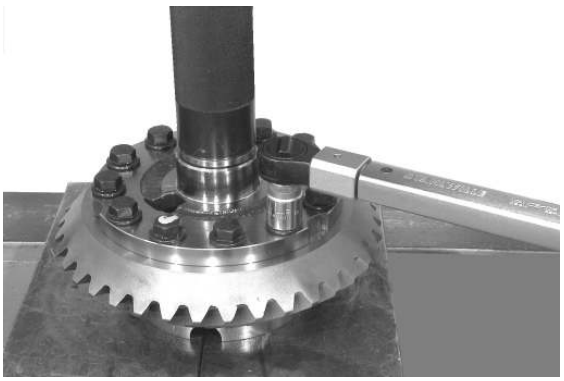


Figure 15

Fix differential carrier by means of press.
Bolt crown wheel and differential carrier.

☞ **Permitted temperature for crown wheel and differential carrier when bolting: max. + 30° C!!**

Use of new locking screws is imperative!

Tightening torque …….. M_A = 250 Nm

Figure 16

Insert thrust washer.

☞ **Pay attention to installation position – lubricating groove to show upwards (towards the axle bevel gear).**

Figure 17

Use grooved pins (2x) for radial fixation of thrust washer.

☞ **Observe installation depth of the grooved pins!**
The front face of the grooved pins must be slightly below the contact face/thrust washer (approx. 1.0 mm).

Pre-assemble second differential carrier half accordingly.

Figure 18

Install axle bevel gear.

☞ **Oil all internal components of the differential according to ZF –List of lubricants TE ML 12!**

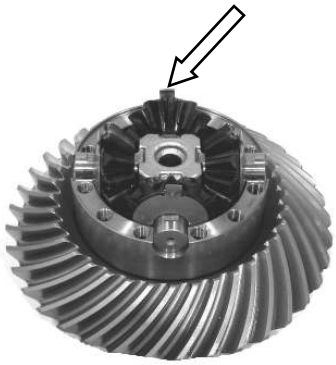


Figure 19

Mount complete differential spider.

☞ **Pay attention to radial installation position of the thrust washers – torsional stop in vertical position, see arrow!**

Figure 20

Position the second axle bevel gear.

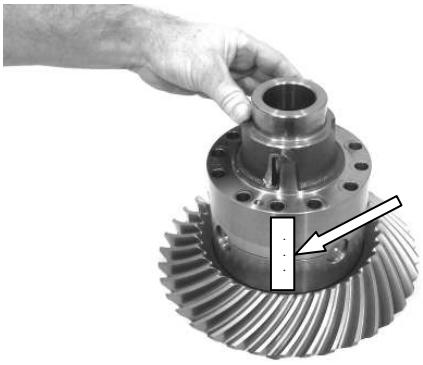


Figure 21

Mount pre-assembled differential carrier half II.

☞ Observe radial installation position, see ZF-Nr. …. … … (arrow) !

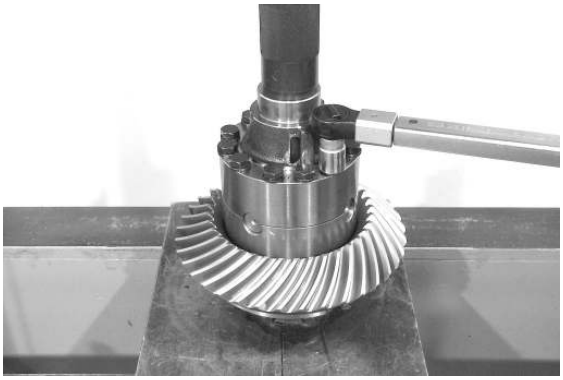


Figure 22

Fix differential carrier halves by means of hexagon screws and washers (s = 3.0 mm).

Tightening torque (M12x1.5/10.9) …… M_A = 120 Nm

Figure 23

Press both bearing outer rings until contact is obtained.

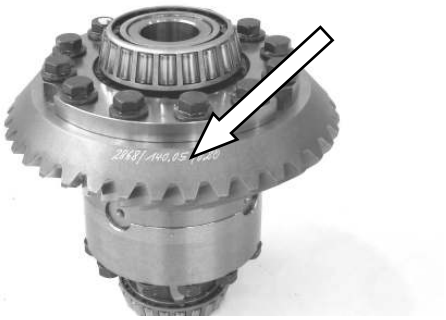


Figure 24

<u>Setting of backlash of bevel gear set</u>
and
<u>bearing rolling torque of differential 2.5 … 5.5 Nm</u>
<u>(Figure 24 … 40):</u>

☞ **For the required backlash, see crown wheel (arrow)!**

Figure 25

Insert adjusting shim and bearing outer ring into the bearing hole until contact is obtained.

(S) Driver tool	5870 058 078
(S) Handle	5870 260 002

☞ **According to our experience, the required setting values are obtained when installing the shims removed during disassembly.**
A later check of the values, however, is absolutely necessary!

Insert pre-assembled differential into the axle housing.
Then bring the axle housing into vertical position.

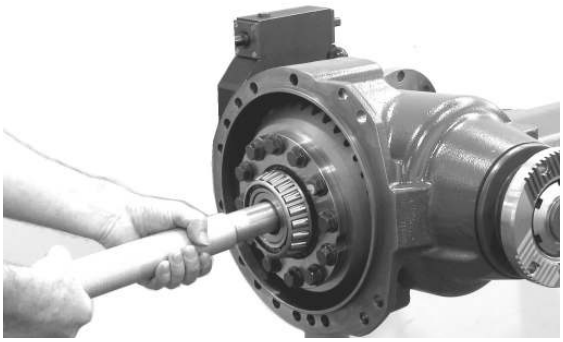


Figure 26

Install bearing outer ring.

Figure 27

Position test equipment and bring it evenly into contact position by means of hex. screws (4x).

(S) Test equipment	5870 200 121
(S) Adapter ring (just for AV-132T)	AA00 692 068

Figure 28

To ensure an exact centering of the single components, rotate bevel gear set in both directions several times.

Figure 29

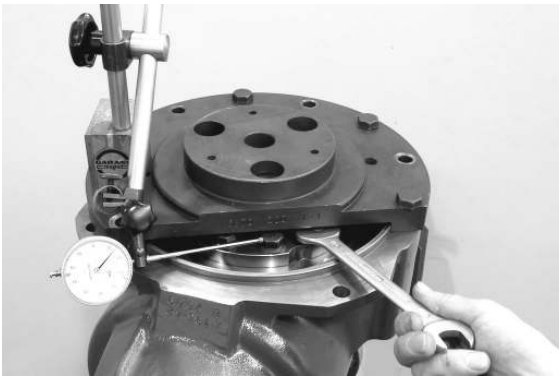


Figure 30

Check backlash!

Due to the installation conditions it is not possible to measure the backlash on the outer diameter of the crown wheel! Therefore measure the backlash on the crown wheel connection (screw head), see adjacent figure!

☞ **The required backlash is indicated on the crown wheel, see figure 24!**

Permitted tolerance deviation ± 0.04 mm

☞ **When measuring the backlash, ensure that the screw head side face is located as parallel as possible towards the center axle of the differential!**

Observe the following specifications for any necessary corrections of the backlash:

1. **Insufficient backlash ⇒ install thicker shim (figure 25).**

2. **Excessive backlash ⇒ install thinner shim (figure 25).**

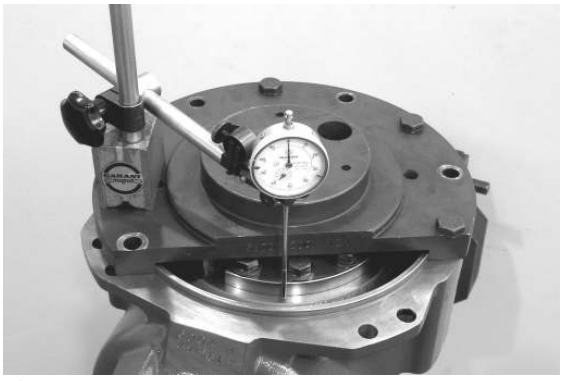


Figure 31

Position dial indicator to the crown wheel back and check max. axial run-out. 0.08 mm!

☞ **In case of deviations from the permitted axial run-out, check the exact contact between crown wheel and differential carrier and correct, if required!**

Figure 32

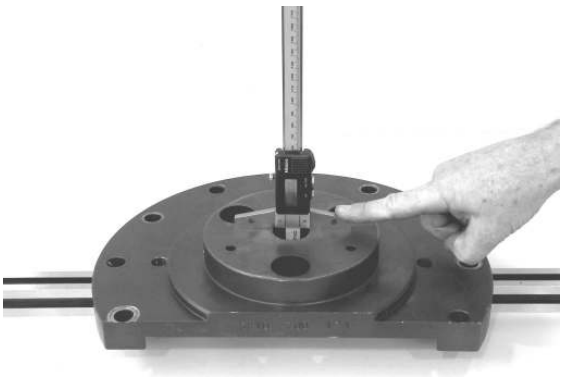


Figure 33

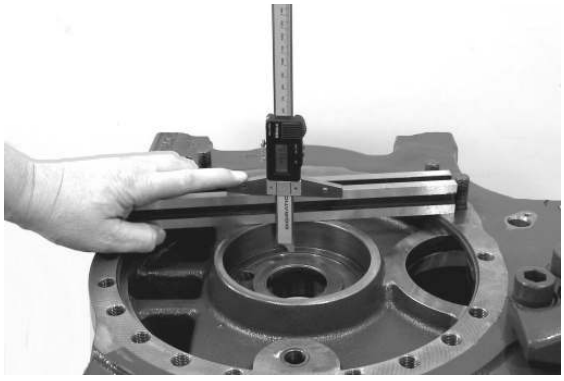


Figure 34

Setting of the rolling torque of the differential bearing 2.5 … 5.5 Nm (figure 32 … 35):

Determine dimension I, from the front face of bearing outer ring to the mounting face of the axle housing (figure 32 and 33).

☞ **Dimension I is based on the measuring operations of figure 32 and figure 33!**

Measuring operation I (figure 32):

Place digital caliper gauge in contact position with bearing outer ring and adjust to 0.00 mm.

Then separate test equipment from the axle housing.

Measuring operation II (figure 33):

Place caliper gauge to straightedge and read dimension I .

Dimension I e.g. …… 26.68 mm

(S) Straightedge 5870 200 022

Determine dimension II from mounting face of the portal housing to contact face/bearing outer ring (figure 34).

Measuring operation I:
Position digital caliper gauge between straightedge and mounting face and adjust to 0.00 mm.

Measuring operation II:
Then place caliper gauge to contact face/bearing outer ring and read dimension II.

Dimension II e.g. ……27.69 mm

Calculation example B:

Dimension II……	27.69 mm
Dimension I……	- 26.68 mm
Difference	= 1.01 mm

☞ **Difference ≙ installation dimension of the adjusting shim! The individual shims are available in 0.05 mm size intervals. The required rolling torque of the differential bearing = 2.5 … 5.5 Nm is obtained when using the next available shim size e.g. s = 1.00 mm!**

Figure 35

Insert the determined shim (e.g. s = 1.00 mm) and mount the bearing outer ring until contact is obtained.

☞ **In case of the AV-132 T, install shim and bearing outer ring on the axle housing.**

Figure 36

Check of contact pattern of bevel gear set (figure 36 … 40):

Cover some drive and coast flanks of the crown wheel with marking ink.

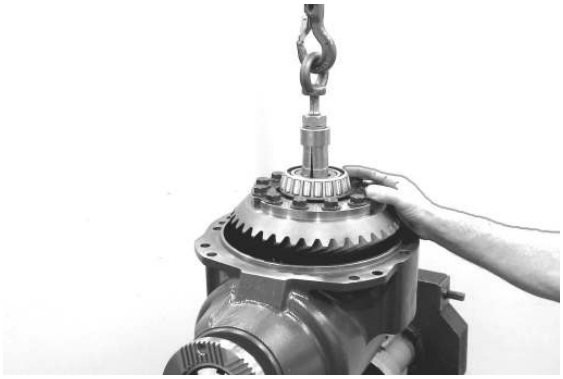


Figure 37

Insert differential into the axle housing.

Figure 38

Position the portal housing on the axle housing and fix it provisionally by hexagon nuts as well as cylindrical screws.

Tightening torque …….. M_A = 200 Nm

☞ **In case of the AV-132 T, alternatively install the axle housing (also refer to chapter 2/25 figure 74b).**

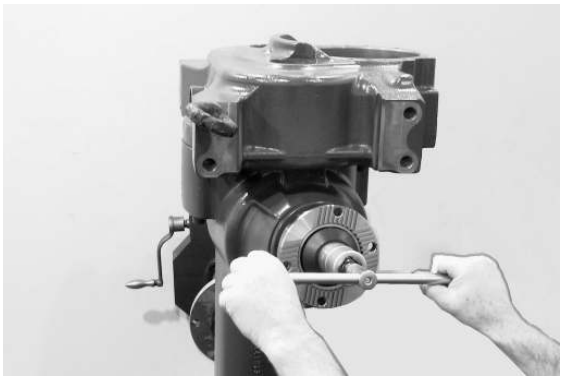


Figure 39

Roll the input pinion over the crown wheel in both directions several times.

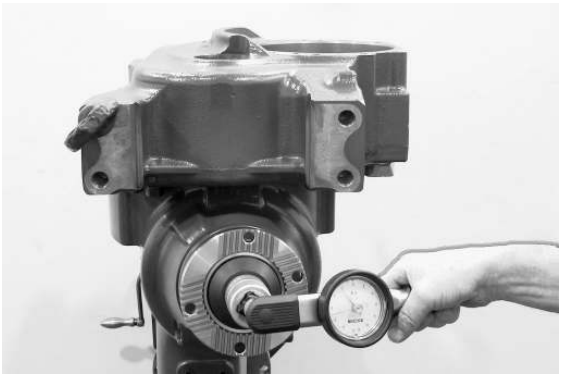


Figure 40

<u>Check of total rolling torque (pinion and differential bearing)!</u>

☞ **Total rolling torque must be approx. 2 – 3 Nm above the previously measured rolling torque of the pinion bearing (figure 13)!**
The attachment of a completely preassembled portal drive requires an increase by 3 – 4 Nm!

(S) Reducing adapter $^{1}/_{2}$ " - $^{1}/_{4}$ " 5870 656 056

Then disassemble differential and compare the contact pattern result with the contact pattern examples shown on page 0/4 and 0/5.

☞ **In case of any contact pattern deviation, a measuring error was made when determining the shim (figure 6), which must be corrected by all means!**

Figure 41

Bring axle housing into horizontal position.
Loosen slotted nut and remove input flange.

Install shaft seal with the seal lip showing to the oil chamber (figure 41).

☞ **Wet outer diameter with spirit!**
Use of the specified special tool (S) ensures the precise installation position!

(S) Driver tool	5870 048 216

Figure 42

Force the screen sheet over the collar of the input flange until contact is obtained.

(S) Driver tool	5870 056 008
(S) Handle	5870 260 002

Figure 43

☞ **Carefully clean and degrease the thread of the input pinion and the slotted nut.**
Then wet some threads of the slotted nut and of the pinion with Loctite locking compound (product no.: 262)!

Mount the input flange.
Finally fix the input flange by using a disk and a slotted nut.

☞ **The required tightening torque of the slotted nut was determined and noted down on page 2/5!**

If the pinion bearing was not dismantled, but only the shaft seal was replaced, tighten the slotted nut as follows:

- **lift the axle to allow the wheels to freely rotate.**
- **pre-tighten slotted nut to M_A = 500 Nm and rotate the input flange 10 to 15 times.**
- **finally tighten the slotted nut to M_A = 1700 Nm.**

(S) Slotted nut wrench Ø 86 mm	5870 401 093
(S) Slotted nut wrench Ø 84 mm	5870 401 173
(S) Slotted nut wrench Ø 81 mm	5870 401 139
(S) Centering disk	5870 912 015
(S) Clamping fork	5870 240 002

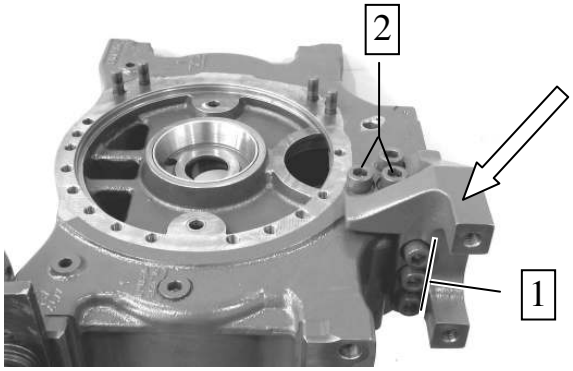


Figure 44

2.2 PORTAL DRIVE

Fix the longitudinal rod bracket (arrow) by means of cylindrical screws and washers on the portal housing as specified below:

Secure screws with Loctite 243!

1. Position the bracket on the housing.
   Provisionally hand-tighten the cylindrical screws (item 1) on rod connection side (3 … 5 Nm)!

2. Then install cylindrical screws (item 2) and tighten them with the required tightening torque M_A = 440 Nm

3. Finally tighten cylindrical screws (item 1) with the required tightening torque M_A = 440 Nm!

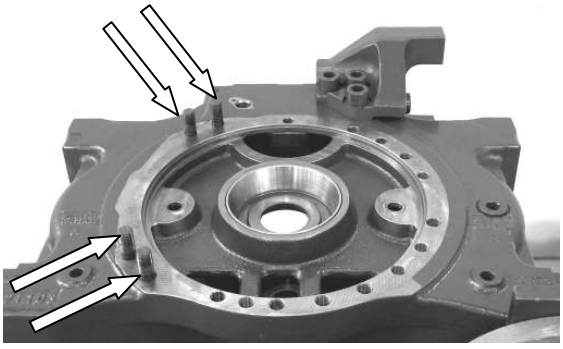


Figure 45

Mount stud bolts, see arrows!

Tightening torque …….. M_A = 33 Nm

Wet thread with Loctite 262!
Mount stud bolts only on the portal housing at differential side!

Mount drive gear (figure 46 … 50)

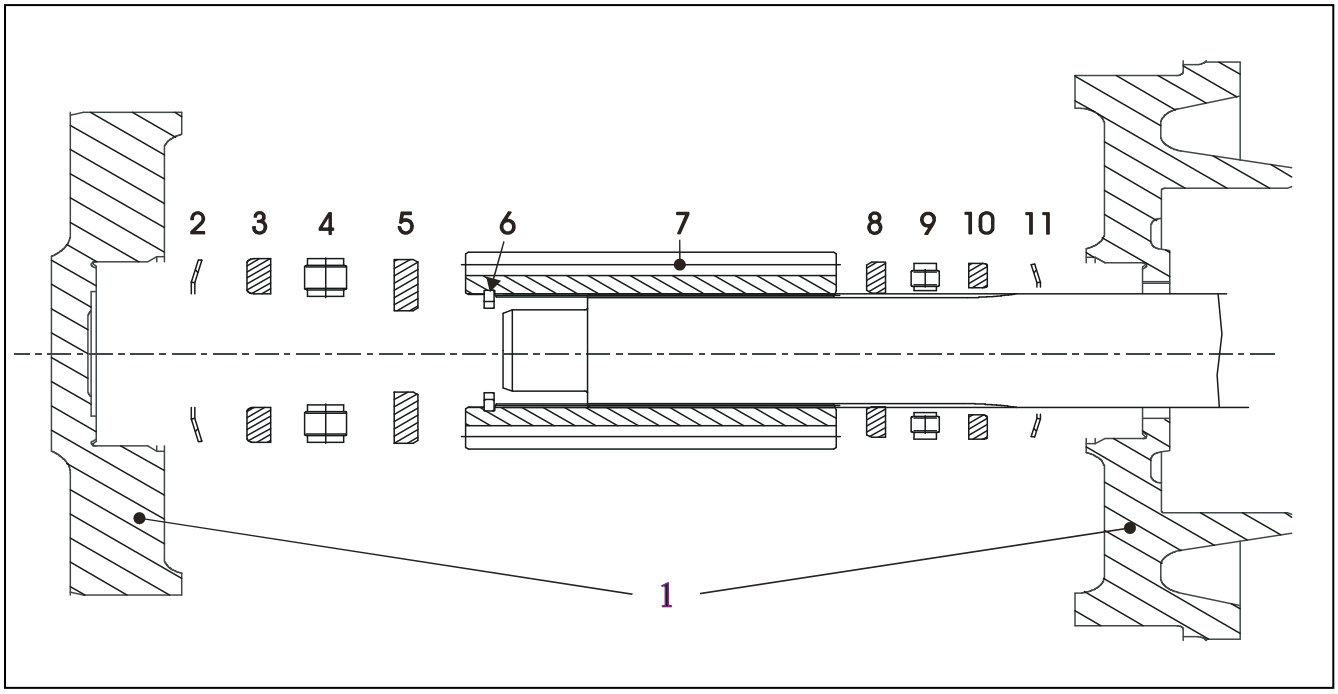


Figure 46

Legend to figure 46 :

1 = housing
2 = cup spring (67.5 x 50.5 x 0.7)
3 = Housing disk (68 x 42 x 5)
4 = axial bearing (68 x 40 x 9)
5 = Shaft disk (68 x 30 x 5)
6 = Retaining ring
7 = Drive gear
8 = Shaft disk (42 x 65 x 4)
9 = axial bearing (65 x 45 x 6)
10 = Housing disk (47 x 65 x 4)
11 = cup spring (63.8 x 50.5 x 0.7)

☞ **Observe installation position of cup springs (item 2 and item 11) see sketch!**

Install shaft disks (item 5 and item 8) with the larger chamfer or radius facing the drive gear!

Install housing disks (item 3 and item 10) with the larger chamfer or radius facing the housing!

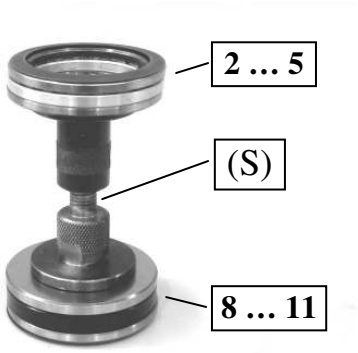


Figure 47

Position single components item 2 … 5 and item 8 … 11 in the portal housing by using the assembly fixture (figure 47) (arrow/figure 48).

(S) Assembly fixture 5870 345 103

☞ **Use the assembly fixture to preload the cup springs until it is possible to mount the drive gear (figure 50)!**
Observe installation position of the single components, see figure 46!

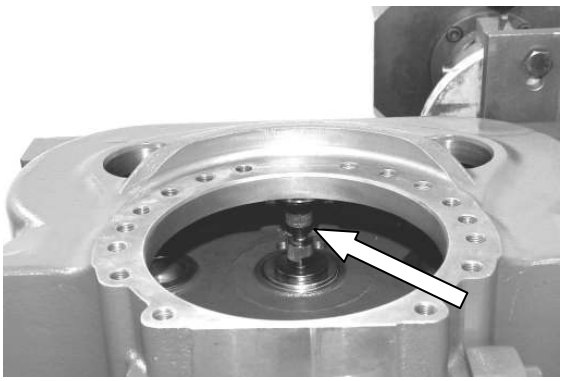


Figure 48

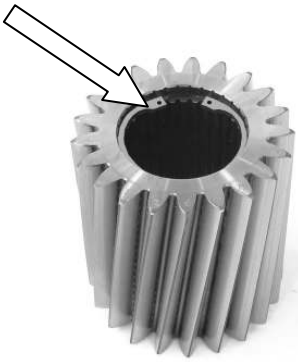


Figure 49

Engage retaining ring (arrow) into the groove of the drive gear.

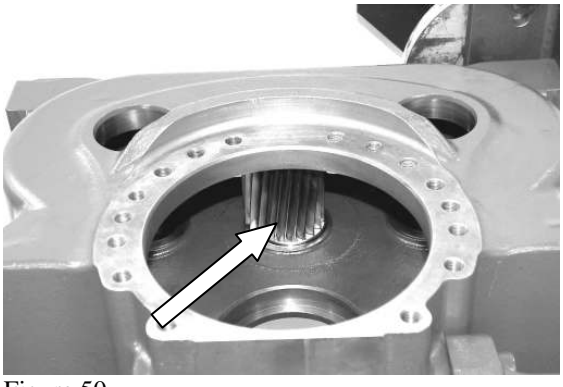


Figure 50

Position the drive gear in the housing (arrow) while removing the assembly fixture.

☞ **Observe installation position – retaining ring to show upwards, see also figure 46!**

Preassembly of intermediate gears and check of axial play 0.01 … 0.05 mm (figure 51 u. 52):

☞ **When reusing already used intermediate gears, observe allocation and installation position of single components! According to our experience, the required axial play of the intermediate gear bearing is obtained when installing the shims removed during disassembly. However, a later check is imperative!**

Install single components and insert adjusting shim.

Figure 51

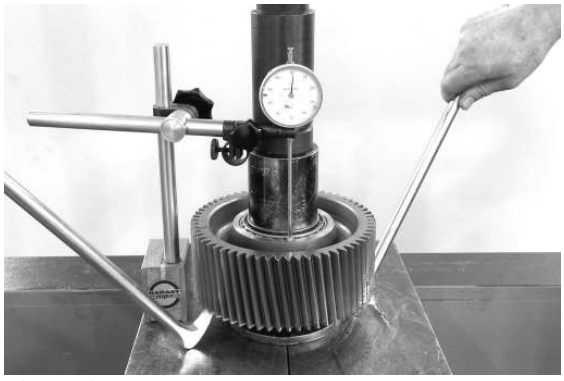


Figure 52

Insert plug gauge (S) and fix intermediate gear bearing by means of press. Contact pressure approx. 10 000 N (1 ton).

Check axial play!

☞ **In case of deviations from the necessary axial play, use suitable shim for correction (figure 51).**

(S) Plug gauge 5870 200 094

Then remove bearing bolt again.

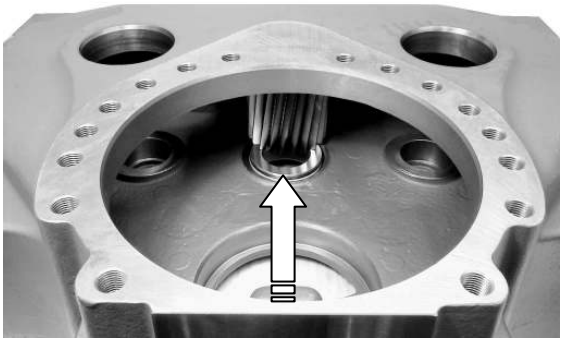


Figure 53

Installation of intermediate gears (figure 53 … 58):

In order to enable the assembly of both intermediate gears, preliminarily move drive gear in direction of arrow.

☞ **When putting back the drive gear, make sure that the installation position of the single components is maintained!**

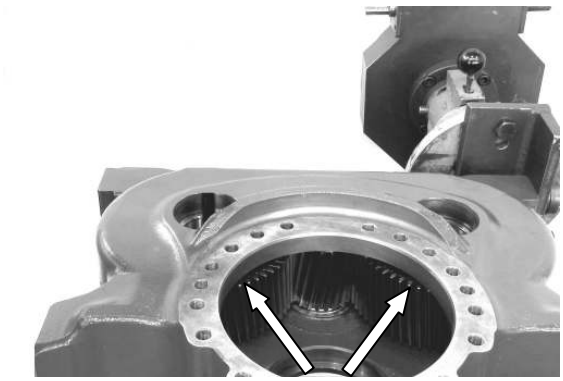


Figure 54

Position both intermediate gears (arrows) in the portal housing. Then align intermediate gears and drive gear centrally to the bearing holes.

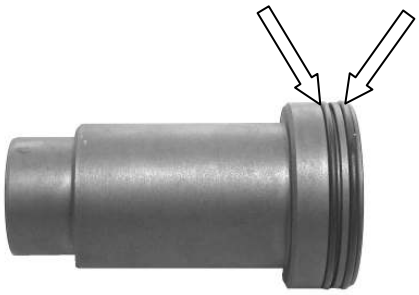


Figure 55

Insert O-rings (arrows) in both annular grooves of the bearing bolt and grease them.

Figure 56

Fix determined shim with grease (use assembly grease) and install adjusting screws.

(S) Adjusting screws 5870 204 022

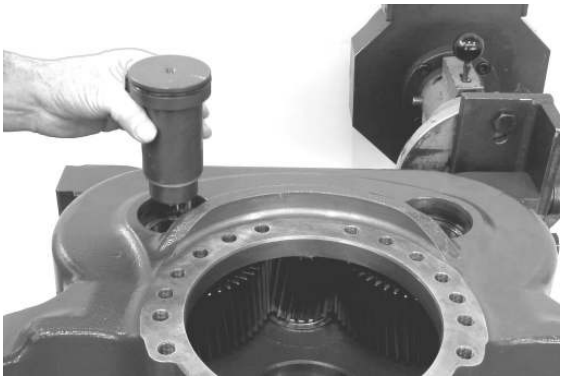


Figure 57

Locate both intermediate gears by means of bolts.

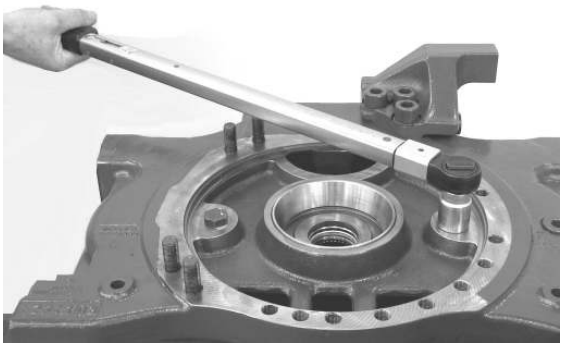


Figure 58

Rotate portal housing by 180°.

Fix both bearing bolts by means of hexagon screws.

Tightening torque (M14/10.9) …… M_A = 185 Nm

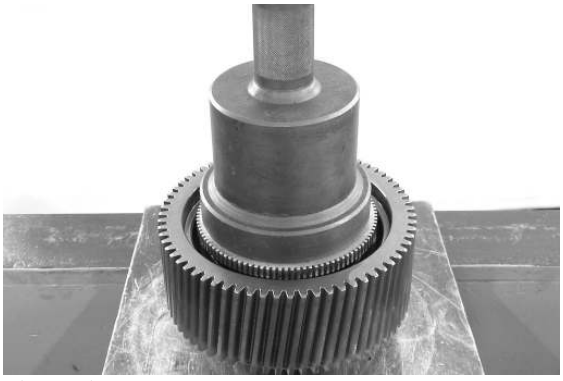


Figure 59

<u>Pre-assembly and installation of output gear (figure 59 … 71)</u>

Heat up impulse disk and force it to contact position.


Figure 60

Press both bearing inner rings until contact is obtained.

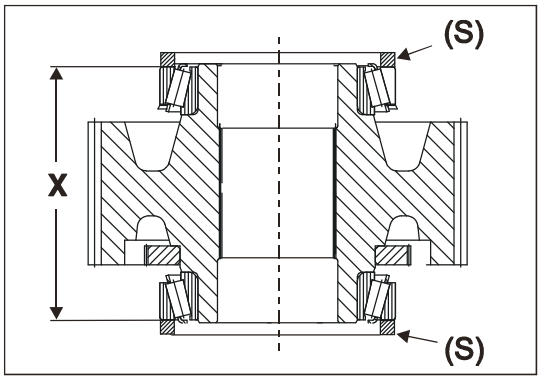


Figure 61

Setting of axial play – output bearing 0.00 … 0.03 mm (figure 61 … 65):

Determine the total height of the output gear bearing, figure 61 and 62!

(S) Measuring ring (2x)	0730 161 832
(S) Measuring bar	5870 200 127
(S) Straightedge	5870 200 022

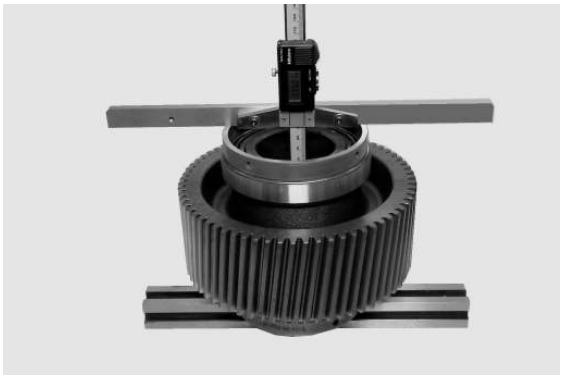


Figure 62

Dimension X e.g. ……. 135.12 mm

☞ **To ensure an exact centering of the single components, rotate bearing in both directions several times!**


Figure 63

Portal housing:

Determine dimension I, from mounting face to contact face of the bearing outer ring.

Dimension I e.g. …….. 136.48 mm

(S) Measuring bar 5870 200 127

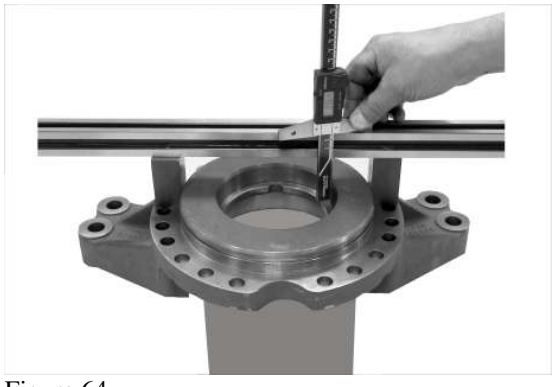


Figure 64

Hub carrier:

Measure dimension II, from the mounting face to the contact face of the bearing outer ring.

Dimension II e.g. ……... + 0.02 mm

☞ **Dimension II, can be + or – !**

(S) Straightedge 5870 200 022

Calculation example C:

Dimension I ……		136.48 mm
Dimension II ……..	+	0.02 mm
Resulting in dimension Y	=	136.50 mm

Dimension Y. ……		136.50 mm
Dimension X. ……..	-	135.12 mm
Difference	s =	1.38 mm

☞ **The individual shims are available in 0.03 mm size intervals. Use of the next thinner shim, e.g. 1.37 mm, results in an axial play of 0.01 mm!**

Figure 65

Insert the determined shim and mount bearing outer ring until contact is obtained.

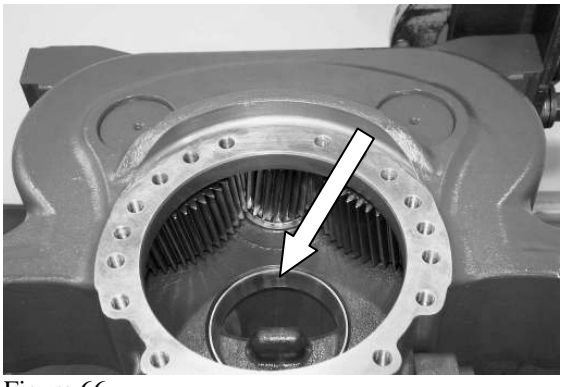


Figure 66

Insert bearing outer ring (arrow) into the bearing hole until contact is obtained.

Figure 67

Insert output gear.

☞ **Observe installation position – impulse disk to show downwards!**

Figure 68

Install screen sheet.

(S) Pressing fixture 5870 506 162

☞ **Wet the carrier seat with Loctite (type no. 574)!**
Pay attention to installation dimension 4^{+1} mm, see figure 69!
Use of the specified special tool ensures the exact installation dimension!

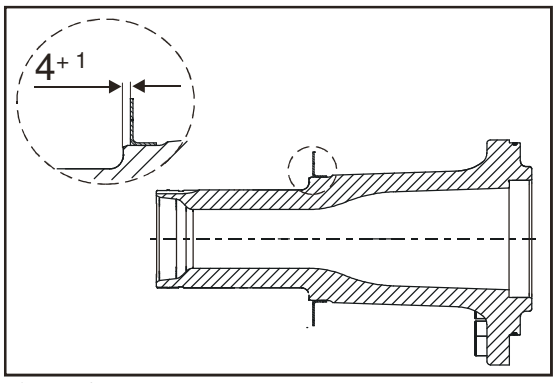


Figure 69

Figure 70

Install and grease O-ring (arrow).

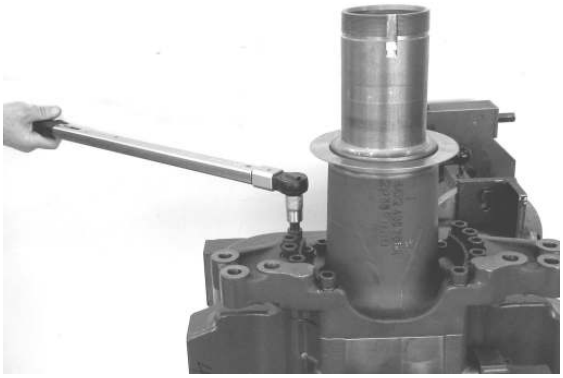


Figure 71

Fix hub carrier on portal housing.

☞ **Install washers s = 3.0 mm!**
No installation of washers is required for the version with Torx screws!
Secure with Loctite 243!

Tightening torque (cylindrical screws) M_A = 200 Nm
or (depending on version)
Tightening torque (Torx screws) M_A = 185 Nm

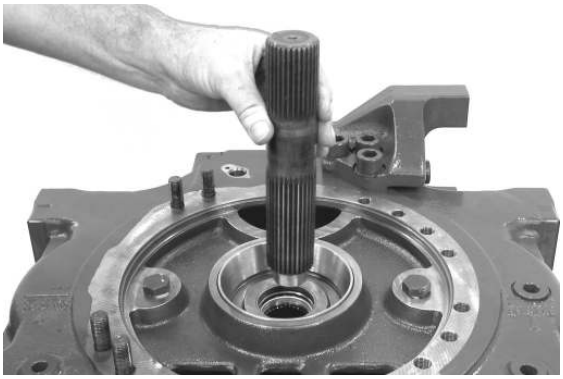


Figure 72

Insert stub shaft until contact is obtained (figure 72 and 73).

☞ **An installation dimension between 109 and 112 mm (see figure 73) ensures that all single components of the drive gear bearing are installed and centrically aligned!**

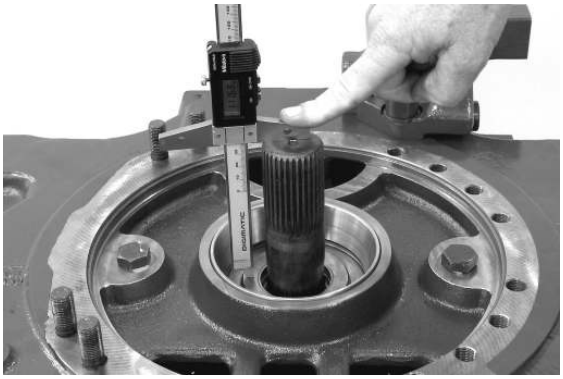


Figure 73

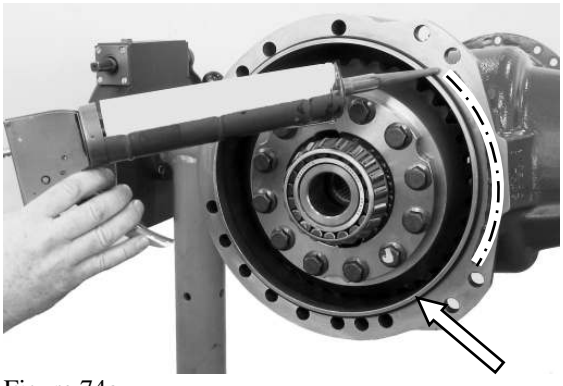


Figure 74a

Apply sealing compound, DREI-BOND SILIKON type 1207 on the area without holes of the mounting face.

Install and grease O-ring (arrow).

☞ **The sealing agent is not applicable for the AV-132 T.**

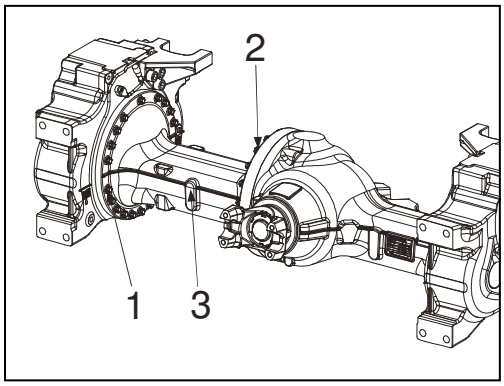


Figure 74b

Position axle housing half (arrow 3) and tighten Torx screws (arrow 2).

Mount stub shaft on portal drive. Grease O-ring and mount it on the axle housing half (arrow 3). Bring portal drive and stub shaft into contact position with axle housing half (arrow 3) and fix it by means of Torx screws (arrow 1).

Tightening torque (Torx screws) M_A = 185 Nm

☞ **This operation is not applicable for the AV-132.**

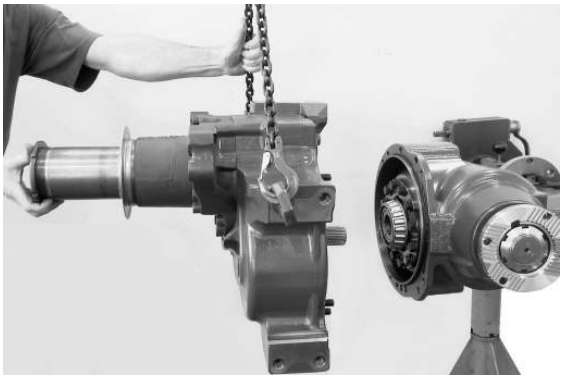


Figure 75

Use lifting device to bring portal housing into contact position with the axle housing and fix it.

☞ **Install washers s = 3.0 mm!**
No installation of washers is required for the version with Torx screws!

Tightening torque:

Hexag. nuts……	M_A = 200 Nm
Cyl-screws …..……..……	M_A = 200 Nm
or	
Torx screws ……..…	M_A = 185 Nm

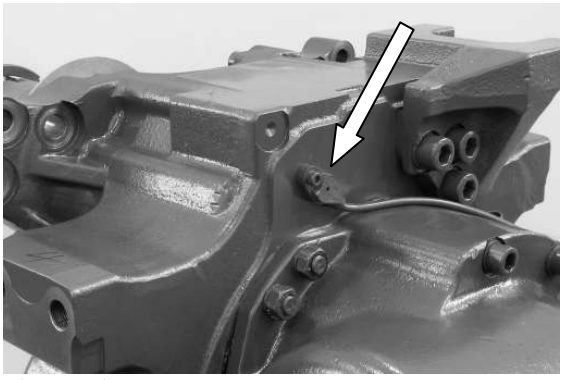


Figure 76

Mount speed sensor (arrow).

Tightening torque …… M_A = 9,5 Nm

☞ **Left and right speed sensors can vary depending on the version – observe vehicle manufacturer's specifications!**

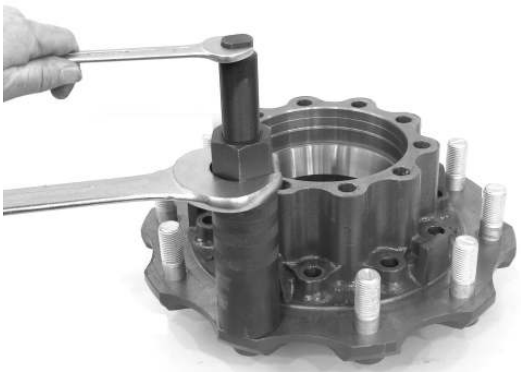


Figure 77

2.3 OUTPUT

Mount wheel bolt.

☞ **Observe radial installation position!**

(S) Wheel bolt puller – basic tool	5870 610 010
(S) Insert 7/8 – 11	5870 610 008
(S) Insert M22x1.5	5870 610 002

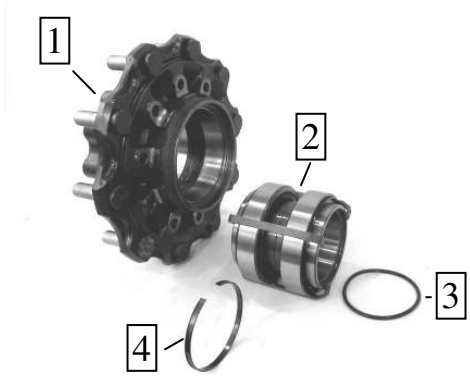


Figure 78

Mounting of compact bearing (figure 78 …86)

☞ **When replacing the compact bearing or when changing grease within the maintenance interval make sure that hub and compact bearing are cleaned thoroughly.**

Figures 78 and 79 show the single components of the compact bearing and the installation position.

Legend to figure 78 and 79:

1 = Hub
2 = Compact bearing
3 = O-ring
4 = Retaining ring
} Complete component
5 = Hub carrier

☞ **Item 3 and 4 are provided with the compact bearing as loose parts!**

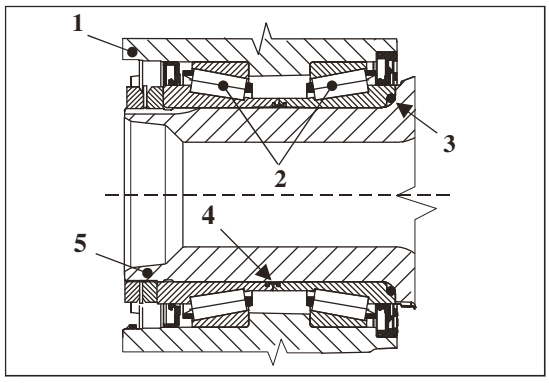


Figure 79

Figure 80

Press-in both bearing outer rings until contact is obtained.

(S) Driver tool	5870 050 007
(S) Handle	5870 260 004

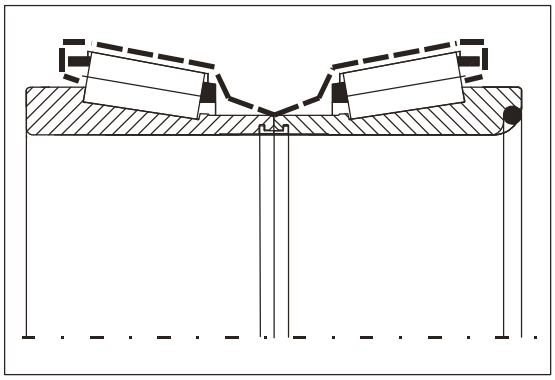


Figure 82

Apply grease on the marked area - - - of the compact bearing

Total grease quantity per output side: 130 gram (max. 150 g).

Richly grease the bearing rollers inside and outside as well as on front sides!

Do not use grease types other than those approved by ZF (e. g. Renolit LX-PEP 2, ZF-order no.: 0671 190 122).
The binding ZF List of Lubricants is TE-ML 12!
The latest update of the List of Lubricants is available at internet site www.zf.com**!**

Figure 82

Install the bearing inner ring at brake disk side.

To ensure the exact contact position of the bearing rollers in the bearing outer ring: Press bearing inner ring firmly and rotate several times (rolling in)!
The bearing inner ring at brake disk side is visible at the annular groove for the O-ring (arrow)!

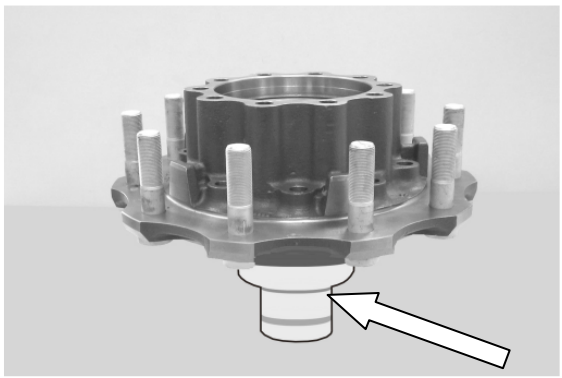


Figure 83

Turn hub.

Support the bearing inner ring at brake disk side by means of an appropriate mandrel (arrow) to maintain contact position of the bearing inner ring!

Figure 84

Install external bearing inner ring.

To ensure the exact contact position of the bearing rollers in the bearing outer ring: Press bearing inner ring firmly and rotate several times (rolling in)!
Clearance-free contact of both bearing inner rings must be ensured!

Figure 85

Fix both bearing inner rings by means of retaining ring.

☞ **Pay attention to the exact installation position of the retaining ring, see arrow / figure 86!**
A correct location results in a reference dimension of 140 $^{+/- 0.4}$ mm, see figure 86!
It is no more possible to lift the external bearing inner ring!

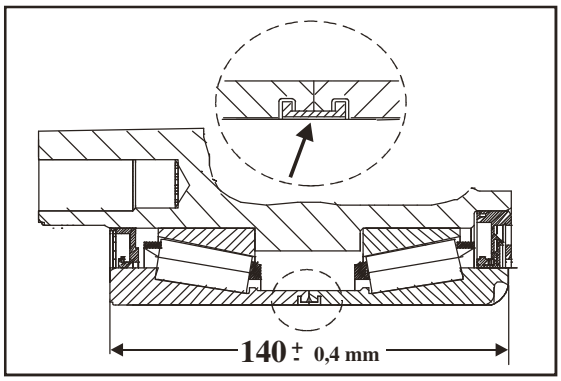


Figure 86

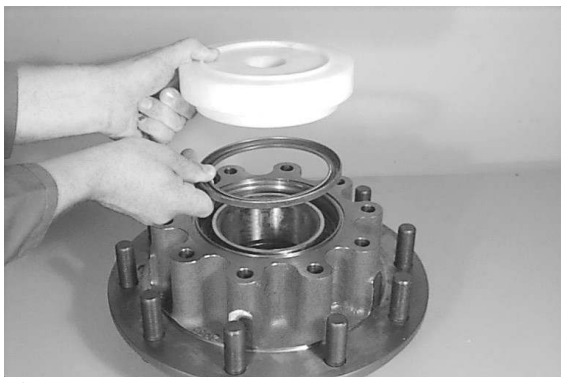


Figure 87

Carefully mount the outer shaft seal by means of the hand-operated press.

Shaft seal ZF-order no 0734 300 258:
(S) Driver tool AA00 607 922

Shaft seal ZF-order no 0734 319 643:
(S) Driver tool 5870 051 053

☞ **Use of the specified special tool (S) ensures the exact installation position!**
Pay attention to the installation position. Designation AUSSENSEITE/ OUTSIDE/OILSIDE“ to show upwards (outside)!

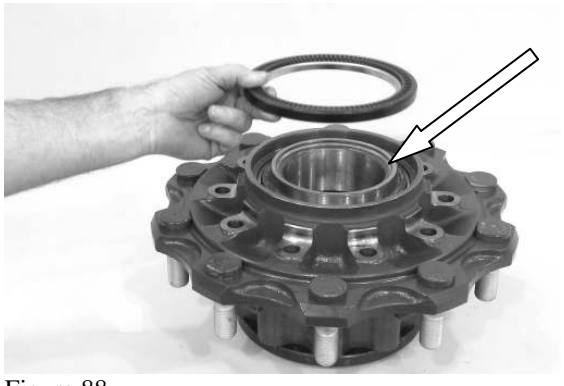


Figure 88

Carefully press-in the shaft seal at brake disk side by means of a hand-operated press. Then insert O-ring into the annular groove of the bearing inner ring.

Shaft seal ZF-order number 0734 300 257:
(S) Driver tool AA00 607 922

Shaft seal ZF-order number 0734 319 644:
(S) Driver tool 5870 051 053

☞ **Use of the specified special tool (S) ensures the exact installation position!**
Pay attention to the installation position – sensor ring to show upwards (outside) or designation „FETTSEITE / GREASE SIDE/INSIDE“ to show towards the bearing inner ring!

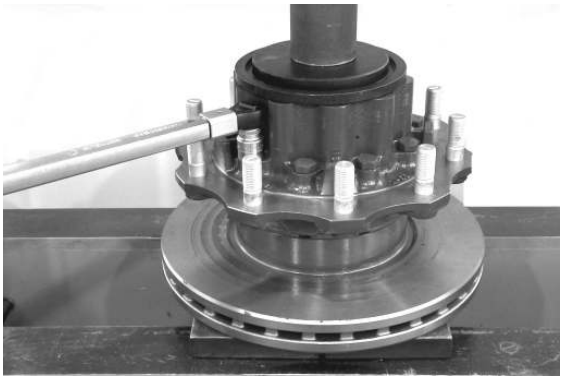


Figure 89

Bolt hub/brake disk.

Tightening torque:

Version with hex. screws M16x1.5/10.9 ….. M_A = 300 Nm

Version with Torx screws M14x1.5/10.9 …. M_A = 185 Nm

Figure 90

Apply lubricant „MOLYKOTE DX“ on bearing.

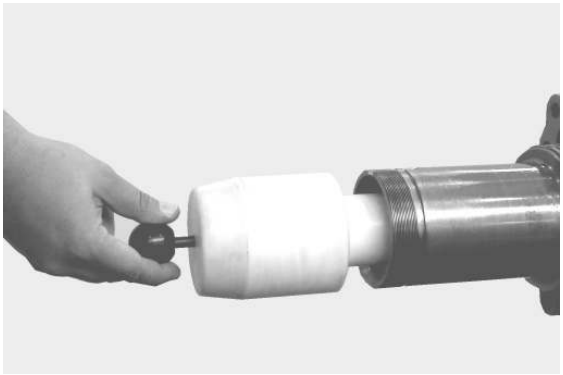


Figure 91

Mount inner installer in the hub carrier until contact is obtained.

(S) Inner installer 5870 651 085

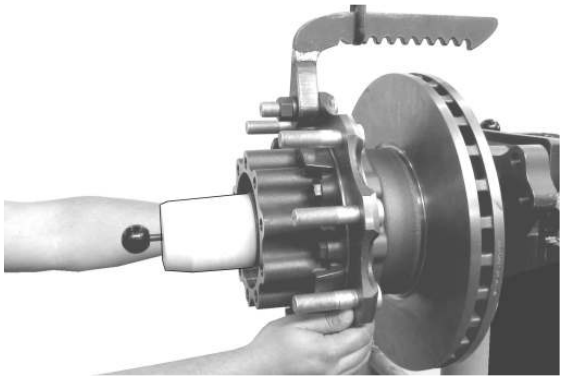


Figure 92

Carefully bring pre-assembled hub into contact position by using the lifting device.
Then remove inner installer.

(S) Lifting bracket 5870 281 043

Mount internal slotted nut.

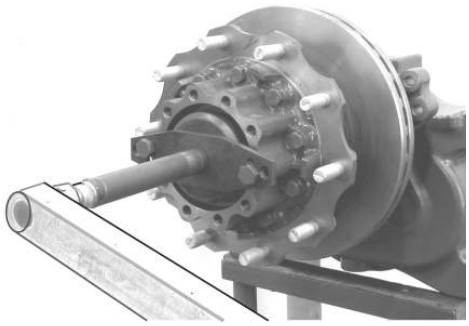


Figure 93

☞ **Pay attention to the installation position of the slotted nut – chamfer to show <u>outwards!</u>**
While tightening rotate the hub in both directions several times!

Tightening torque (inner slotted nut) ….. M_A = 850 Nm

(S) Slotted nut wrench 5870 401 146

⚠ **If during the tightening process of the slotted nut (figure 93) no increase of the bearing rolling torque is noticeable, or if an axial play of the wheel bearing is detected (figure 94), this may be caused by the unsnapping of the retaining ring (figure 85 u. 86).**
Correct asssembly fault, if required!

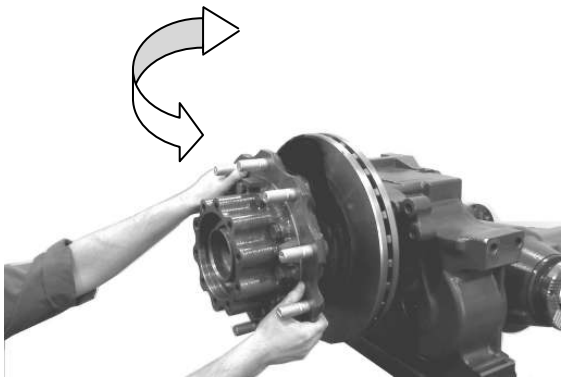


Figure 94

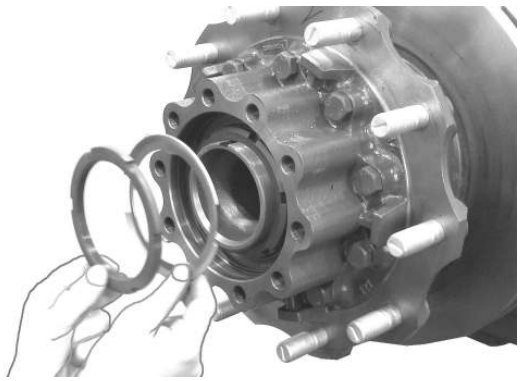


Figure 95

Install locking plate and mount outer slotted nut.

☞ **Pay attention to installation position of the locking plate – Securing clip to show inwards!**
Pay attention to installation position of the slotted nut– chamfer to show <u>inwards!</u>

Tightening torque (outer slotted nut) …….. M_A = 1200 Nm

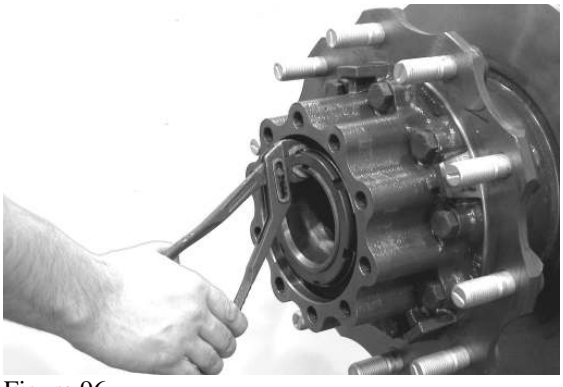


Figure 96

Secure slotted nut by deforming the locking plate into a groove of the outer slotted nut.

Figure 97

Insert the O-ring into the annular groove of the flange shaft (arrow) and grease it.

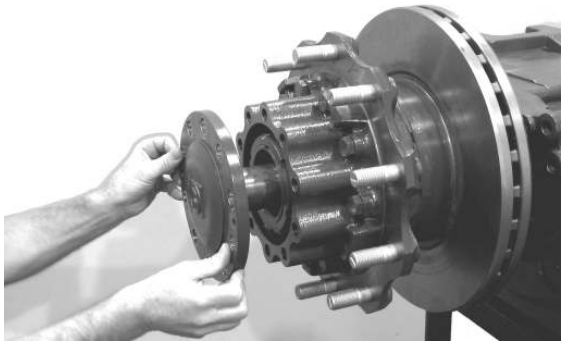


Figure 98

Mount flange shaft until contact is obtained and fix it with hexagon nuts.

Tightening torque (M18x1.5/10.9) …….. M_A = 440 Nm

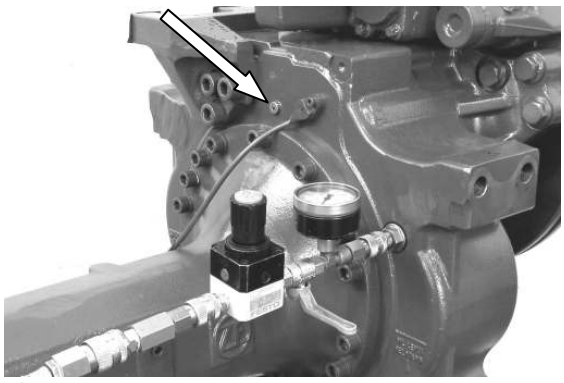


Figure 99

Check if the function of the sealing elements is correct!

Test medium: air
Test pressure : 0.5 bar
Testing time : 10 minutes

Preliminarily plug locating hole for breather valve (arrow)!
Close the shut-off valve during the 10-minute testing time!

(S) Air connection	5870 286 079
(S) Reducing adapter	5870 286 080

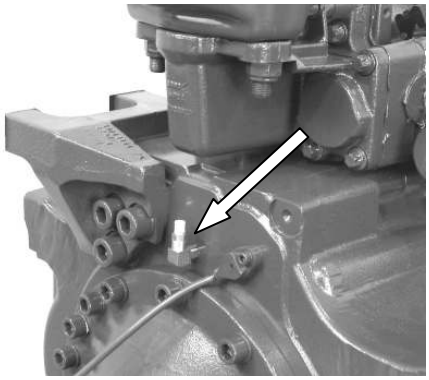


Figure 100

The following figures provide a description of the mounting of various peripheral parts and assemblies!
Different versions may require different work steps.
In this context also refer to the specifications given in the relevant spare parts list and by the vehicle manufacturer!

Mount breather valve, see arrow (Version : breather hose)!

Tightening torque …….. M_A = 6 Nm

Fitting of brake

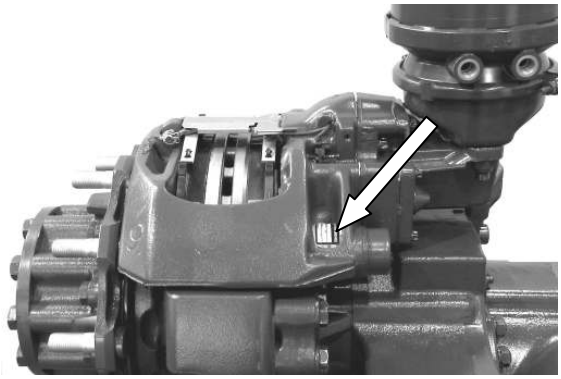


Figure 101

Tightening torque (M16x1.5 / 10.9) …….. M_A = 270 Nm
or (depending on the version)
Tightening torque (M18x1.5 /10.9) ……M_A = 440 Nm

The brake manufacturer's instructions and specifications are mandatory for any operations done on the brake system!

The relating information is included in the repair, maintenance and service manuals of the component manufacturer!

The applicable instructions are to be requested from the brake manufacturer or can be viewed on the brake manufacturer's internet site!

Brake manufacturer and brake type are indicated on the identification plate of the brake caliper.

Figure 101 shows the position of the identification plate (arrow), using the KNORR-brake as an example!
In this version pay attention to installation position of the tight-fit screw (arrow / figure 102)!.
Install the tight-fit screw on the left and right output side each <u>at the front in driving direction</u>!

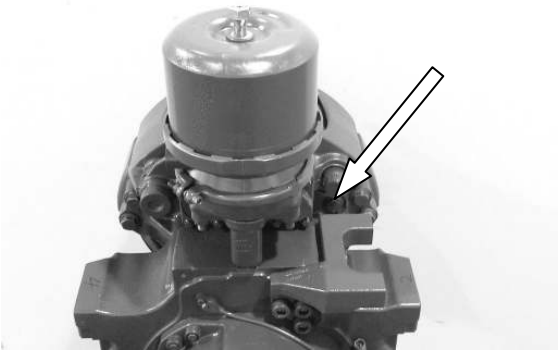


Figure 102

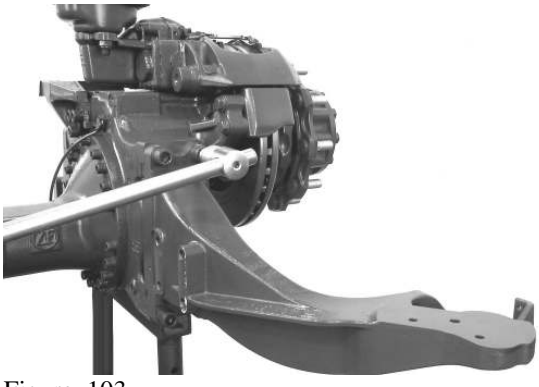


Figure 103

Fix the spring carriers (4x) with screws and washers to the axle housing.

Tightening torque (M20x1.5/10.9) …….. M_A = 620 Nm

Pay attention to the installation position – see the markings which have been applied during disassembly!

Before operating the unit, fill it with oil according to the specifications indicated in the lubrication and maintenance instructions (ZF-order no.: 5871 214 901)!

3. SUSPENSION

Version: track guidance system

Mount individual parts according to the following perspective representation and table.

Differences regarding execution are possible ! Observe the respective spare parts list !

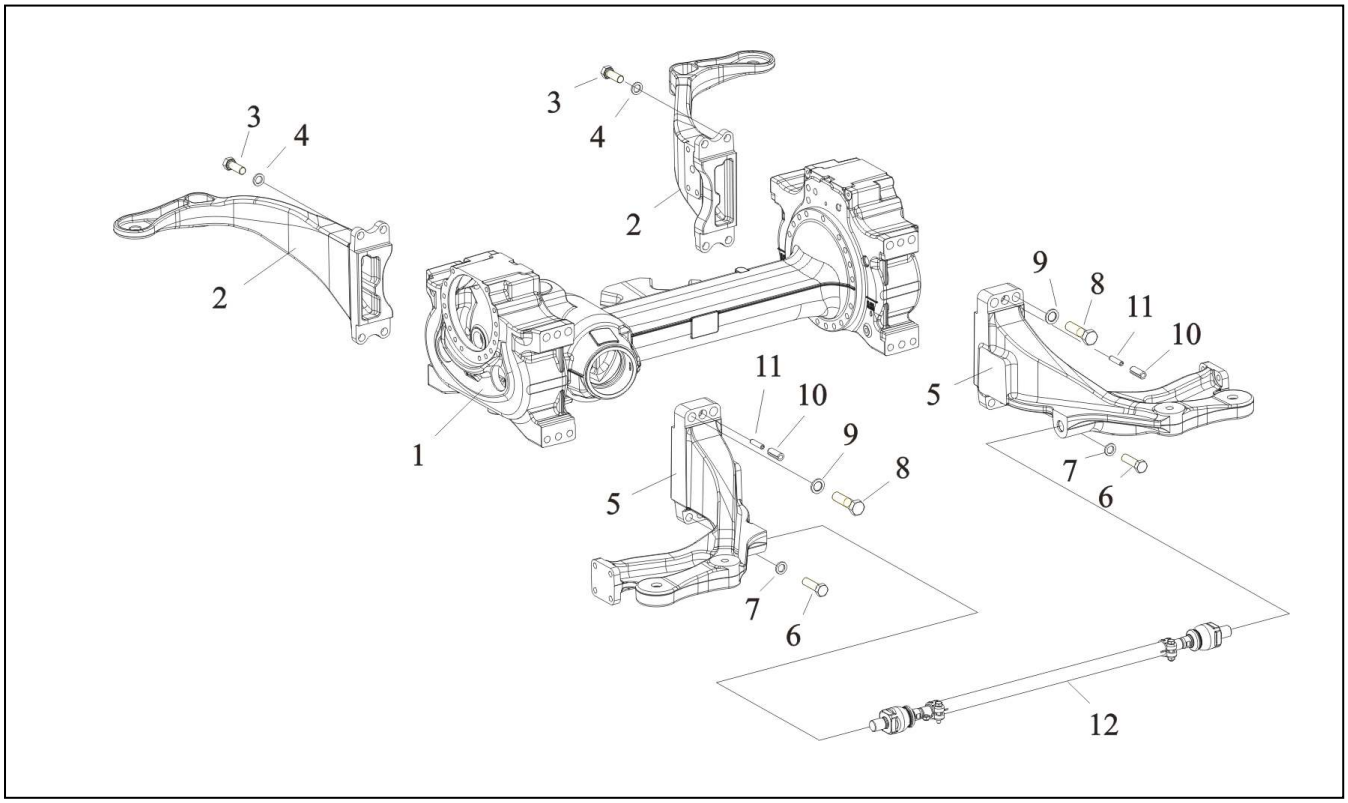


Figure 1

Legend to Figure 1:

1 = Torso axle
2 = spring carrier le. / ri.
3 = hexagon screw (M20x1,5x55/10.9) M_A = 620 Nm
4 = washer
5 = spring carrier le. / ri.
6 = hexagon screw (M20x1,5x70/10.9) M_A = 620 Nm
7 = washer
8 = hexagon screw (M24x1,5x90/10.9) …. M_A = 1100 Nm
9 = washer
10 = slot. pin
11 = slot. pin
12 = Complete stabilizer link consisting of:
Axial joint (2x) …… M_A = 600 Nm
Tube with clamps …… M_A = 50 Nm

Note on pos. 10 / 11:
Mount the slots of the slotted pins in a 180 ° offset position to each other!

Note on pos. 12:
Mount the stabilizer link clearance free!
Place the tube centrally – difference in length (le. - ri.) max. 4 mm!
Wet some threads of the axial joints (M30x1.5 / connection to the spring carrier) with Loctite locking compound (product no.: 243)!


Figure 1

4. Differential Version II / Type „D“

4.1 Disassembly

Pull off both bearing inner rings.

(S) Grab sleeve	5873 002 052
(S) Grab sleeve	5873 002 025
(S) Basic tool	5873 002 001

☞ **Due to difficult disassembly, the differential can also be obtained as a component!**

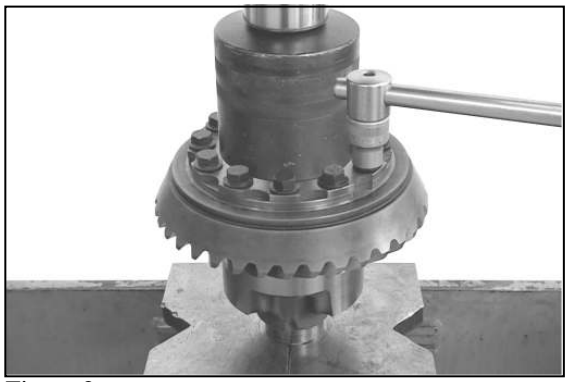


Figure 2

Fix differential by means of the press and loosen locking screws.


Figure 3

Press crown wheel out of differential carrier.

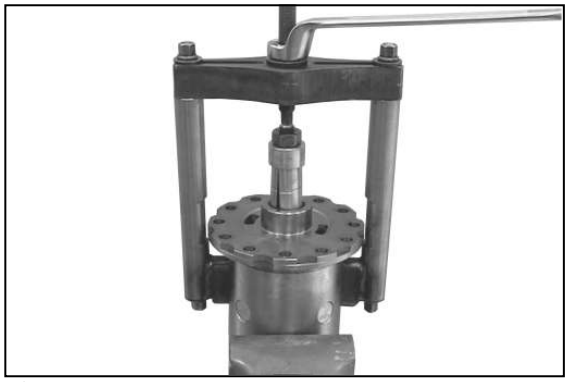


Figure 4

Pull differential cover out of differential carrier using pulling device (S).

(S) Pulling device	5870 080 067

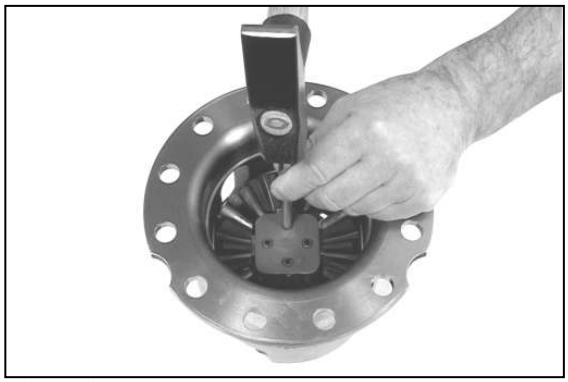


Figure 5

Take thrust washer and axle bevel gear out of the differential carrier.

Then force slotted pins out of cross joint as well as differential pin.

Figure 6

Force differential pin out of differential carrier or cross joint as far as possible.

Afterwards pull differential pin out of differential carrier (see following figure).

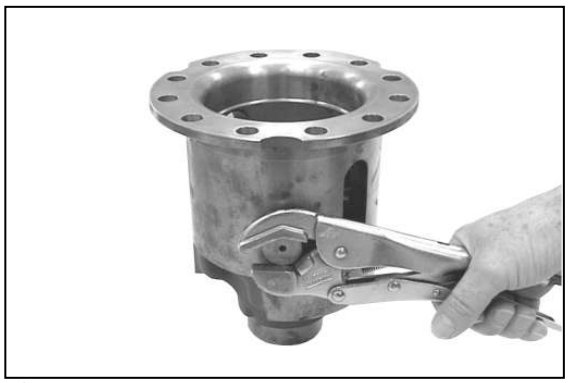


Figure 7

Figure 8

Force out opposite differential pin.

Then remove releasing single parts.

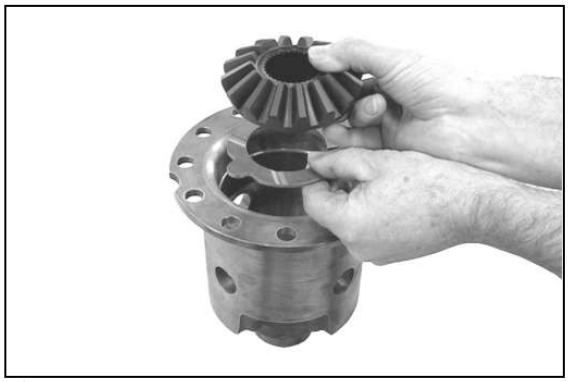


Figure 9

4.2 Reassembly

Insert thrust washer and axle bevel gear into the differential carrier.

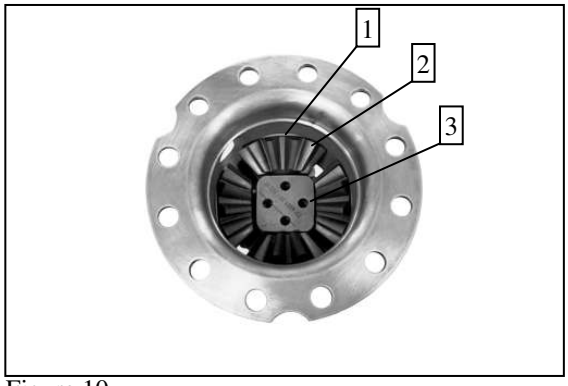


Figure 10

Insert differential bevel gears with thrust washers and cross joint into the differential carrier.

1 = Thrust washer
2 = Differential bevel gear
3 = Cross joint

☞ **Ensure radial installation position of thrust washers!**

Figure 11

Install differential pins (4x).

☞ **Ensure radial installation position, and that holes in the cross joint are aligned with holes in the planetary pin!**

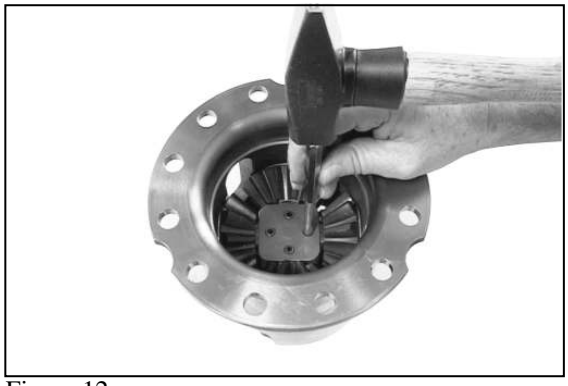


Figure 12

Force slotted pins (2 each hole) into the cross joint and into the planetary pins.

☞ **Mount slotted pins with the openings being in a 180° offset position to each other!**

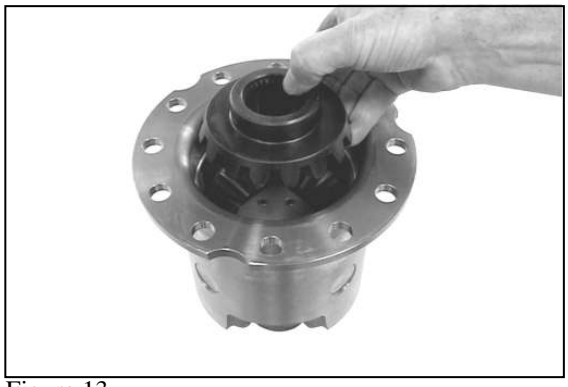


Figure 13

Insert axle bevel gear into the differential carrier.

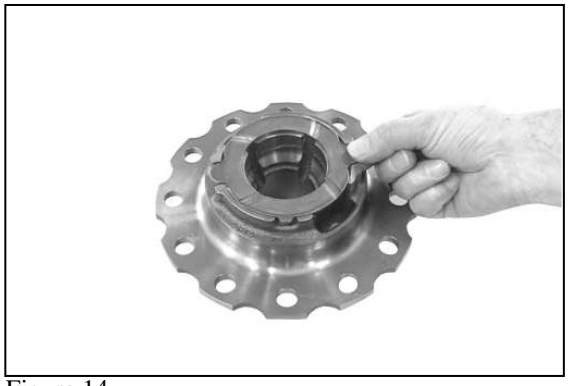


Figure 14

Fix thrust washer in differential cover using some grease.

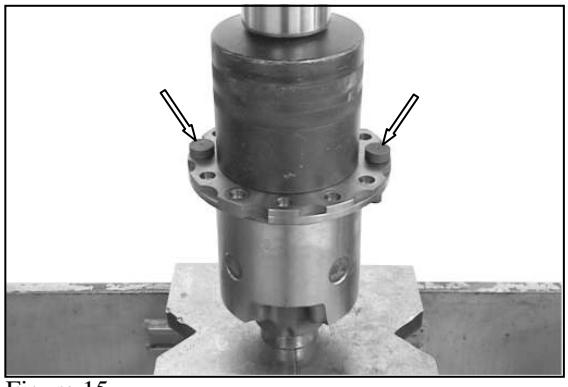


Figure 15

Radially align the differential cover by means of locating pins (2x, see arrows) and then press it into the differential carrier until contact is obtained.

(S) Locating pin AA00 622 210

Figure 16

Mount two locating pins (S), heat up crown wheel and bring into contact position with mounting face of the differential.

(S) Locating pins (M14x1.5) 5870 204 025

Wear protective gloves!

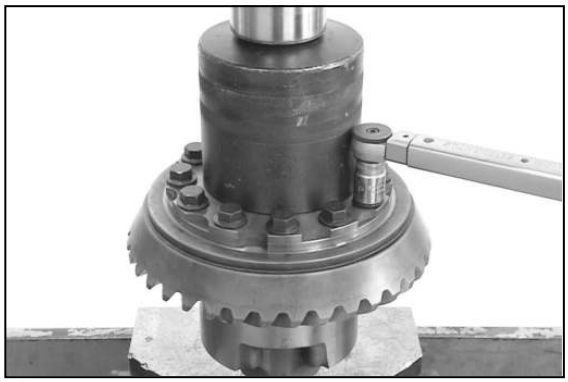


Figure 17

Fix differential carrier by means of a press.

Bolt crown wheel to differential carrier.

Tightening torque M_A = 250 Nm

Permissible crown wheel and differential carrier temperature when bolting, max. + 30° C!

Use of new locking screws is imperative!

Figure 18

Press both bearing outer rings until contact is obtained.