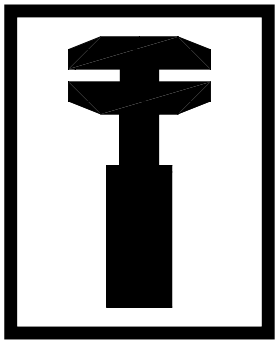


Order-No.: 5871 209 002 E

ZF – AXLE AP- 17

DIFFERENTIAL CARRIER
TYPE: LKST-2 AND LKZ - 7

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

Edition: 2001/01

REPAIR MANUAL

ZF - AXLE AP-17

DIFFERENTIAL CARRIER
TYPE: LKST-2 AND LKZ-7

INSTRUCTIONS CONCERNING THE REPAIR MANUAL

The described repair instructions are based on the design level of the ZF-Unit at the time of preparation of this document.
Technical development of the product as well as extensions concerning the design possibilities may require differing steps, which can be carried out by qualified specialists without greater difficulties with the help of the Perspective Illustrations in the corresponding Spare Parts Lists.

For servicing and maintenance work on the brake system the specifications of the respective brake manufacturer as well as of the vehicle manufacturer have to be observed.
Reference is also made to the attached original instructions of the component manufacturer,
ZF Part number 5871 209 102.

The present Manual is losing its legal obligation with the publication of a new successional Edition.
The ZF Passau GmbH is in this connection not responsible for the positive knowledge at the User of the Manual!

ATTENTION:

For the installation as well as for commissioning of the unit, the Instructions and Specifications of the Vehicle Manufacturer have to be observed!

ZF Passau GmbH

Donaustr. 25 - 71
D - 94034 Passau

Abt.: ASTDM / Section : ASTDM

2.Auflage / 2.Edition

PREFACE

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

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

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

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

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

1. Constantly trained personnel

2. Prescribed installations, e.g. Special Tools

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

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

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

Damages caused by inappropriate or inexpert work, carried out by personnel foreign to ZF, and after-expenditures eventually arising from it, are excluded from this contractual responsibility.
This applies also in case of a renouncement of Genuine ZF-Spare Parts.

ZF Passau GmbH

Service Department

GENERAL

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

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

Dismantling and mounting works must be carried out at a clean working place. Use the special tools developed for this purpose. Prior to the re-installation of the parts, clean the contact surfaces of housings and covers from the residues of old seals. Remove burrs, if any, or similar irregularities with an oil stone. Clean housings and locking covers with a suitable detergent, in particular corners and angles. Damaged parts or parts heavily worn down must be renewed. Here, the expert must assess, whether parts such as antifriction bearings, thrust washers etc. subjected to normal wear during operation, can be installed again.
Parts such as sealing rings, lock plates, split pins etc. must generally be renewed. Radial sealing rings with worn down or torn sealing lip must also be renewed. Particularly ensure that no chips or other foreign bodies remain in the housing. Lube oil bores and grooves must be checked for unhindered passage.
All bearings must be treated with operating oil prior to installing them:

REFE-RENCE: For heating up parts such as bearings, housings etc., only a heating furnace or an electric drier is permitted to be used!

CAUTION
When assembling the transmission, absolutely observe the indicated torque limits and adjustment data.
Screws and nuts must be tightened according to the enclosed standard table, unless otherwise specified.
In view of the risk of functional failures in the control unit, the use of liquid sealing agents is not permitted.
By no means, Molykote is permitted to be used.
Lined plates must not be washed. They must be cleaned with a leather cloth.

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

Structure of the Repair Manual

The structure of this Repair Manual reflects the sequence of the working steps for completely disassembling the dismantled transmission. Dismantling and installing as well as the disassembly and assembly of a main group are always summarized in one chapter.
Special tools required for performing the respective repair works are listed under „Special tools“.

Important information on industrial safety

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

The observation of all valid safety regulations and legal impositions is the pre-condition for avoiding damage to persons and to the product during maintenance and repair works.
Persons performing repair works must familiarize themselves with these regulations.

The proper repair of these ZF-products requires the employment of suitably trained and skilled staff.
The repairer is obliged to perform the training.

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

☞	Serves as **reference** to special working procedures, methods, information, the use of auxiliaries etc.

CAUTION	Is used, if a deviating and improper working procedure can **damage the product**.

DANGER	Is used, if lacking care can lead to **personal injury or danger to life**.

REFE-RENCE	Prior to starting the checks and repair works, thoroughly study the present instructions.

CAUTION:	Illustrations, drawings and parts do not always represent the original; the working procedure is shown. The illustrations, drawings, and parts are not drawn to scale; conclusions regarding size and weight must not be drawn (not even within one representation). The works must be performed according to the description.

REFE-RENCE:	After the repair works and the checks, the expert staff must convince itself that the product is properly functioning again.

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

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

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

Nota : Density lineaire en kg/m; Density superficielle en t/m2

Begriff **Unit** **Uniteo**	**Formelzeichen**	**neu** **New** **Nouveau**	**alt** **old** **Vieu**	**Umrechnung** **Conversion** **Conversion**	**Bemerkungen** **Note** **Nota**
Masse Mass Mass	m	kg (Kilogramm)	kg		
Kraft Force Force	F	N (Newton)	kp	1 kp = 9,81 N	
Arbeit Work Travail	A	J (Joule)	kpm	0,102 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 (Overpress) Pression (Sur-)	pü	bar	atü	1,02 atü = 1,02 kp/cm2 = 1 bar = 750 torr	
Drehzahl Speed Nombre de Tours	n	min -1			

VERGLEICHSTABELLE FÜR MASSEINHEITEN
CONVERSION TABLE
TABLEAU DE CONVERSION

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

TRAGBILDBEISPIELE ZUR GLEASONVERZAHNUNG

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

EXEMPLES POUR LA DENTURE GLEASON

Ideales Tragbild d.h. die Ritzeldistanz stimmt

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

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

Bild / Figure 1/3/5

Schubflanke (Konkav)

Coast side (concave)

Côté poussé (concave)

Bild / Figure 1

Bild / Figure 2/4/6

Zugflanke (Konvex)

Drive side (convex)

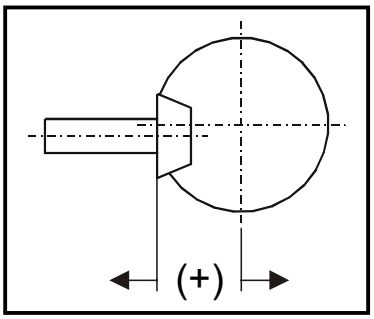
Côté entraîné (convexe)

Bild / Figure 2

Ritzeldistanz muß größer werden

Pinion distance must be increased

La distance du pignon doit être augmentée



Ritzeldistanz muß kleiner werden

Pinion distance must be decreased

La distance du pignon doit être diminuée

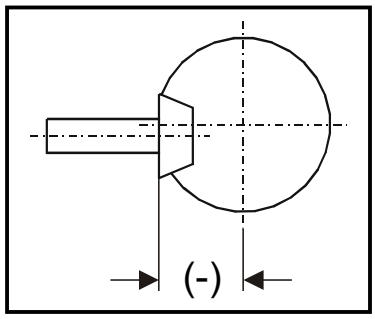


Bild / Figure 3

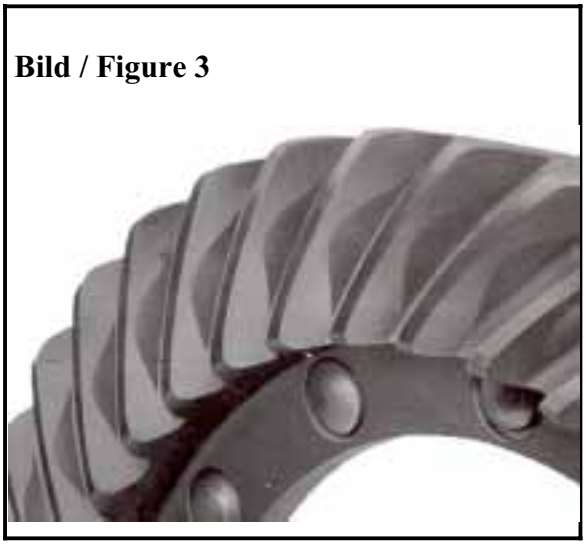
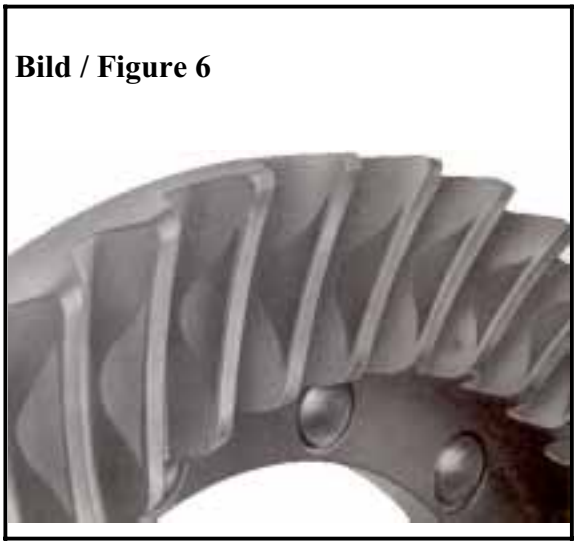


Bild / Figure 5

Bild / Figure 4

Bild / Figure 6



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

Friction value: μ tot.= 0,12 for screws and nuts without after-treatment, as well as phophatized nuts. Tightening by hand!
Torque limits, if not especially indicated, can be taken from the following list:

Metric ISO-Standard thread DIN 13, Page 13

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

Metric ISO-Fine thread DIN 13, Page 13

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