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ZF - TRACTOR TRANSMISSION

ECCOM 1.5 (SDFG SERIES 20)

REPAIR LEVEL III



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

REPAIR MANUAL **for** **ZF – TRACTOR TRANSMISSION** **ECCOM 1.5**

IMPORTANT INFORMATION:

Due to the great variety of ZF units it is necessary to limit disassembly and reassembly manuals to a current ZF production unit. Continuous technical upgrading of the ZF units and extensions concerning design options may require differing steps, which can be carried out by qualified specialists without greater difficulties by means of the perspective views included in the corresponding spare parts lists.

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

ACHTUNG:

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

For information on operation, maintenance and for descriptions please refer to the corresponding ZF-Operation Manual.

ZF Passau GmbH

Donaustr. 25 - 71

D- 94034 Passau

Abt. : ASDM / Division : ASDM

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Subject to technical modifications!

Sous réserve de modifications techniques!

Konstruktionsstand / Design Level / Niveau Technique

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CONTENT	Chapter/page
Preface	0/1
General	0/2 ... 3
Conversion table	0/4
Denomination of standard dimensions	0/5
Tightening torques for screws	0/6
SPECIAL TOOLS	W/1 ... WB/15
List of tools (requested special tool)	W/1 ... 9
ILLUSTRATED TABLES	WB/1 ... 15
DISASSEMBLY	1/1 ... 4/23
<u>1. Disassembly of components</u>	1/1 ... 6
1.1 Disassembly of the clutch control block	1/1 ... 3
1.2 Disassembly of the system control block	1/4 ... 5
1.3 Disassembly of the pump	1/6
<u>2. Separation of the transmission halves</u>	2/1 ... 2
<u>3. Disassembly of the intermediate housing</u>	3/1 ... 17
3.1 Disassembly of the front wheel drive	3/1 ... 3
3.2 Disassembly of clutch (KV/KR) and double gear	3/4 ... 10
3.2.1 Disassembly of clutch KV	3/4 ... 7
3.2.2 Disassembly of clutch KR	3/7 ... 10
3.3 Disassembly of the output gear	3/11 ... 12
3.4 Disassembly of the input shaft (hydrostatic unit)	3/13 ... 14
3.5 Disassembly of the central shaft (clutch KV/KR)	3/15
3.6 Disassembly of the intermediate gear	3/16 ... 17
<u>4. Disassembly of the clutch housing</u>	4/1 ... 23
4.1 Disassembly of the multi-disk brake (BG)	4/1 ... 2
4.2 Disassembly of the drum selector gear (planetary transmission)	4/3 ... 18
4.2.1 Disassembly of ring gear P4/BG	4/3 ... 4
4.2.2 Disassembly of clutch K3/K4	4/4 ... 6
4.2.3 Disassembly of planetary drive P4	4/7 ... 8
4.2.4 Disassembly of the central shaft	4/8 ... 9
4.2.5 Disassembly of clutch K1/K2	4/10 ... 13
4.2.6 Disassembly of planetary drive P3	4/13 ... 15
4.2.7 Disassembly of planetary drive P2	4/15 ... 17
4.2.8 Disassembly of planetary drive P1	4/17 ... 18
4.3 Disassembly of the hydrostatic unit	4/19 ... 23

CONTENTS	Chapter / Page
REASSEMBLY	5/1 ... 8/12
<u>5. Reassembly of the clutch housing</u>	5/1 ... 44
5.1 Reassembly of the hydrostatic unit	5/3 ... 7
5.2 Reassembly of the drum selector gear (planetary transmission)	5/8 ... 40
5.2.1 Reassembly of planetary drive P1	5/8 ... 11
5.2.2 Reassembly of planetary drive P2	5/11 ... 13
5.2.3 Reassembly of planetary drive P3	5/14 ... 18
5.2.4 Reassembly of clutch K1/K2	5/18 ... 25
5.2.5 Reassembly of the central shaft	5/25 ... 27
5.2.6 Reassembly of planetary drive P4	5/27 ... 31
5.2.7 Reassembly of clutch K3/K4	5/31 ... 40
5.3 Reassembly of the multi-disk brake (BG)	5/41 ... 44
<u>6. Reassembly of the intermediate housing</u>	6/1 ... 34
6.1 Reassembly of the input shaft (hydrostatic unit)	6/3
6.2 Reassembly of the intermediate gear	6/4 ... 5
6.3 Reassembly of the central shaft (clutch KV/KR)	6/6 ... 7
6.4 Reassembly of the output gear	6/8 ... 11
6.5 Reassembly of the pump	6/12 ... 13
6.6 Reassembly of clutch KV/KR	6/14 ... 27
6.6.1 Reassembly of clutch KV	6/15 ... 22
6.6.2 Reassembly of clutch KR	6/22 ... 27
6.7 Reassembly of the front wheel drive	6/28 ... 33
<u>7. Joining of the preassembled transmission halves</u>	7/1 ... 7
7.1 Setting of the axial play drum selector gear/hollow shaft (KV/KR)	7/1 ... 2
7.2 Setting of the axial play of the KV/KR bearing	7/2 ... 3
7.3 Setting of the axial play of the double gear bearing	7/4 ... 5
7.4 Setting of the axial play of the front wheel drive	7/5 ... 6
<u>8. Reassembly of components</u>	8/1 ... 12
8.1 Reassembly of the system control block	8/1 ... 4
8.2 Reassembly of the clutch control block	8/5 ... 10
8.3 Reassembly of the speed and inductive sensor	8/11 ... 12

PREFACE

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

This documentation 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. State-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 shall be excluded from this contractual liability.

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 that the work is done in a professional manner. 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 hammer 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 replaced. 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 (oil bath) or an electric drier is permitted to be used for heating up 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 transmissions – due to a possible malfunction.

Never wash disks having organic friction linings (e.g. paper disks - adverse effect on lining adhesion).

Only dry cleaning is permitted (leather cloth).

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



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

Structure of the Service Manual

The structure of this repair manual reflects the sequence of the work steps for completely disassembling the dismantled 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” (illustrated tables).

Important information on industrial safety

As a basic principle, the workshop carrying out the repair or maintenance of ZF units shall be fully responsible for industrial 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.
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 DANGER	This symbol identifies situations in which lacking care may lead to personal injury or damage to the product .
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<u>NOTE:</u>	Thoroughly study this manual before starting any tests or repair work.
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<u>NOTE:</u>	<p>Figures, drawings and parts in this manual do not always represent the original; they show the working procedure.</p> <p>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.</p>
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<u>NOTE:</u>	After repair work and tests, the expert staff must verify that the product is perfectly functioning again.
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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)	=	14.5 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 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 (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/m²

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

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

Begriff Unit Unité	Formelzeichen Formel Sign Symbole	Neu New Nouveau	Alt Old Vieux	Umrechnung Conversion Conversion	Bemerkungen Note Nota
Masse Mass Masse	m	kg (Kilogramm)	kg		
Kraft Force Force	F	N (Newton)	kp	1 kp = 9.81 N	
Arbeit Work Travail	A	J (Joule)	kpm	0.102kpm = 1J = 1Nm	
Leistung Power Puissance	P	KW (Kilowatt)	PS (DIN)	1 PS = 0.7355 KW 1 KW = 1.36 PS	
Drehmoment Torque Couple	T	Nm (Newtonmeter)	kpm	1 kpm = 9.81 Nm	T (Nm) = F (N) · r (m)
Kraftmoment Moment (Force) Moment (Force)	M	Nm (Newtonmeter)	kpm	1 kpm = 9.81 Nm	M (Nm) = F (N) · r (m)
Druck (Über-) Pressure (Overpress) Pression (Sur-)	pü	bar	atü	1.02 atü = 1.02 kp/cm ² = 1 bar = 750 torr	
Drehzahl Speed Nombre de Tours	n	min ⁻¹			



REPAIR MANUAL

Off-Road Driveline
Technology and Axle
Systems Division



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

Friction coefficient: μ tot.= 0.12 for screws and nuts without rework, as well as phophated nuts. Tighten manually!

Take tightening torques from the chart below, unless otherwise specified:

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