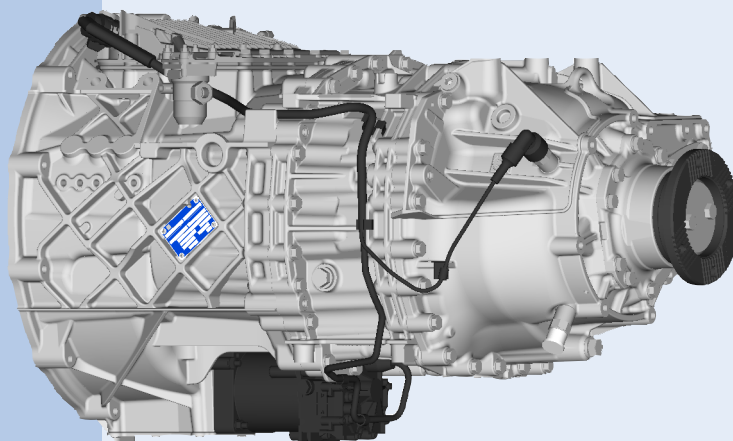




ZF-AS TRONIC

Repair Manual

Trucks and Buses



10-, 12- and 16-speed version
without ZF-Intarder

Repair Level 3

1327 751 102b

Subject to technical changes

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Overview of Amendments	5
Preface	6
Safety Instructions	7
General Information	7
Instructions for Repairs	8
Tightening Torques for Screws/Bolts and Nuts, Extract from ZFN 148	10
Screw Plugs DIN 908, 910, and 7604	11
Union Screws DIN 7643	11
Conversion from DIN to ISO Standards	12
Consumable Material	14
Setting Data	15
Special Tool	16
Diagnosis Tool	24
Preparatory Work	25
Clutch Actuator	27
Removing Clutch Actuator	27
Mounting Clutch Actuator	28
Output Flange	30
Removing Output Flange	30
Mounting Output Flange	30
Output Cover	31
Removing Output Cover	31
Mounting Output Cover	31
RC Housing	33
Dismounting the RC Housing	33
Play Setting of the Main Shaft – Planetary Carrier	35
Mounting the RC Housing	38
Dismantling the RC Housing	41
Assembling the RC Housing	41
Planetary Carrier	42
Disassembling Planet Carrier	42
Pre-Assembling the Sun Gear	44
Pre-Assembling the Planetary Gear Set	44
Completing the Planet Carrier	45
Place Transmission Without RC (planetary range) in Horizontal Position	47
Transmission Actuator	48
Removing Transmission Actuator	48
Mounting Transmission Actuator	49
Removing the Upper Section from the Lower Section	51
Mounting the Upper Section to the Lower Section	51
Replacing Pressure Relief Valve	52
Programming Transmission Actuator	53
Putting Transmission in Vertical Position	54

Clutch Release Mechanism	55
Removing Release Fork	55
Mounting the Release Fork	57
Connection Plate	60
Removing Connection Plate	60
Measure the Connection Plate	62
Assembling Connection Plate	64
Housing I	66
Removing Housing I	66
Dismantling Housing I	67
Assembling Housing I	67
Fitting Housing I	68
Shaft Pack	70
Removing Shaft Pack	70
Installing Shaft Pack	72
Input Shaft	74
Disassembling the Input Shaft	74
Disassembling the Synchronization	76
Assembling the Synchronization	77
Setting the Axial Play of the Bearing Disk in Constant Gear 2	79
Assembling the Input Shaft	80
Main Shaft	82
Dismantling Main Shaft	83
Assembling Main Shaft	84
Set the Axial Play Gear to Wheel Disk	87
Set the Axial Play MS Disk to Wheel Disk	88
Countershaft	90
Disassembling the Countershaft	90
Mounting the Countershaft	90
Selector Shaft	91
Dismantling the Selector Shaft	91
Assembling the Selector Shaft	91
Housing II	92
Dismantling Housing II	92
Assembling Housing II	93
Appendix	
Service Information No. 08_00	95
Service Information No. 02_04	99
Service Information No. 20_04	105
Service Information No. 02_05	109
Service Information No. 25_05	115

Index	Date of issue	Initiator	Remark
a	2004-02	LKS-T dept.	The scope of validity of the ZF-AS Tronic transmission Repair Manual was extended to 10-, 12-, and 16-speeds.
b	2007-05	LKS-T dept.	Complete revision of text, i.a. the following items were added: <ul style="list-style-type: none">- Solid sealings- Measuring disks in helical gears and on the main shaft.- Service Information No. 08_00, 02_04, 02_05, 20_04, 25_05.- New clutch release mechanism

This documentation is intended for skilled personnel trained by ZF Friedrichshafen AG to carry out maintenance and repair work on ZF products.

This manual deals with the standard ZF products in accordance with the state of development on the date of issue.

However, due to continuing technical development of the product, repair work might require work practices and test or adjustment data not contained in this manual.

We recommend that work done on your ZF product is carried out only by skilled mechanics who have had their practical and theoretical knowledge updated on a regular basis at our Customer Service / After Sales training center.

Service Centers equipped by ZF Friedrichshafen AG all over the world offer you:

1. Continually trained personnel,
2. Specified equipment, e.g. special tools,
3. Genuine ZF spares, according to our latest specifications.

All work performed at these Service Centers is carried out conscientiously and with utmost care.

Warranty:
Repair work carried out at ZF Service Centers is subject to the contractual conditions prevailing in the individual case.

Damage resulting from work performed by non-ZF personnel in an improper and unprofessional manner and any consequential costs are excluded from the contractual liability agreement. Exclusion of liability also applies if genuine ZF spares are not used.

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Safety Instructions

In principal, companies repairing ZF units are responsible for their own work safety.

To avoid injury to personnel and damage to products, all safety regulations and legal requirements which apply to repair and maintenance work must be adhered to.

Before starting work, mechanics must familiarize themselves with these regulations.

Personnel required to carry out repairs on ZF products must receive appropriate training in advance. It is the responsibility of each company to ensure that their repair staff is properly trained.

The following safety instructions appear in this manual:

NOTE

Refers to special working procedures, methods, information, use of auxiliary equipment, etc.

CAUTION

This is used when incorrect, unprofessional working practices could damage the product.



DANGER

This is used when lack of care could lead to personal injury or death.

General Information

Read this manual carefully before starting any tests or repair work.

CAUTION

Pictures, drawings, and components shown do not always represent the original object, but are used to illustrate working procedures.

Pictures, drawings, and components are not to scale. Conclusions about size and weight should not be drawn (even within a complete illustration).

Always follow the working steps as described in the text.

After completion of repair work and testing, skilled staff must check whether the product is functioning correctly.



THREATS TO THE ENVIRONMENT!

Lubricants, consumables, and cleaning agents must not be allowed to enter the soil, ground water, or sewage system.

- **Ask your local environment agency for safety information on the relevant products and adhere to their requirements.**
 - **Collect used oil in a suitably large container.**
 - **Dispose of used oil, dirty filters, lubricants, and cleaning agents in accordance with environmental protection guidelines.**
 - **When working with lubricants and cleaning agents always refer to the manufacturer's instructions.**
-

CAUTION

The transmission must NOT be suspended by the input shaft NOR by the output flange.

ZF Service Information must be observed. This information is available at all ZF Service Centers or via the ZF-ServiceLine.

In case of doubt always turn to the relevant department within ZF Customer Service / After Sales Service for advice.

All work on transmissions is to be performed by experts only and under clean conditions. Use specified tools to dismantle and assemble transmissions.

After removing the transmission from the vehicle, clean it thoroughly with a suitable cleaning agent before opening.

Pay particular attention to the projections and recesses of housings and covers when cleaning.

Parts joined with Loctite are easier to separate if warmed with a fan heater.

Cleaning Parts

Remove remains of old gaskets on all sealing surfaces. Carefully remove burrs or similar patches of roughness using an oilstone.

Lube bores and grooves must be free of anti-corrosion agents and foreign matter; check for perfect passage.

Carefully cover opened transmissions to prevent foreign matter from entering.

Reusing Parts

Parts such as roller bearings, disks, thrust washers etc., must be inspected by a competent person who should decide whether or not they can be re-used. Replace parts which are damaged or have suffered from excessive wear.

Gaskets, Locking Plates

Parts which cannot be removed without being damaged must always be replaced with new parts (e.g. gaskets and locking plates).

Shaft Seals

Always change shaft seals with rough, ripped, or hardened sealing lips. Seal contact surfaces must be totally clean and in perfect condition.

Reworking

Rework may be carried out on seal contact surfaces using plunge-cut grinding only, never use an emery cloth. Ensure that there are no traces of grinding or scroll.

If rework is needed on spacer disks, shims etc. because of clearance adjustment, ensure that the reworked areas contain no face runout and have the same surface quality.

Transmission Assembly

Find a clean work area to assemble the transmission. Gaskets are installed without sealing compound or grease. When measuring silicon-coated gaskets, do **not include the silicon layer**. During assembly, comply with all adjustment data and tightening torques in the Repair Manual.

Bearings

If bearings are mounted in heated condition, they are to be heated evenly (e.g. heating cabinet). Temperature should be at approx. 85 °C and must not exceed 120 °C. Each mounted bearing must be lubricated with operating oil.

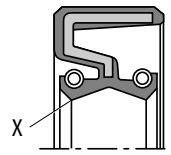
Sealing

If a specific sealing agent* is to be used for sealing, comply with the manufacturer's directions for use. Apply a thin layer of sealing agent to the surfaces and spread evenly. Do not allow sealing to enter oil ducts and bores. On oil-carrying ducts and bores, wipe off the sealing agent on the surfaces to be sealed near apertures to ensure that no sealing agent enters the oil feeds when the parts are pressed together.

Shaft Seals

- a) Apply a light coat of sealing agent* on circumference of shaft seals with "steel jacket".
- b) **Never apply sealing agent** to shaft seals with "rubber jacket", but apply a thin coat of Vaseline 8420 to the outer circumference or wet with a lubricant, e.g. a water-soluble, concentrated washing-up liquid (e.g. Pril, Coin, Palmolive).
- c) Shaft seals with steel and rubber jackets should be treated on the outer circumference of the rubber jacket as described for shaft seal b).

- d) Dual shaft seals have two sealing lips. The dust-proof sealing lip (X) must face outwards.



- e) Fill the gap between the sealing lips so it is 60 % filled with grease (e.g. produced by Aral, such as Aralub HL2 or by DEA, such as Spectron FO 20).
- f) If possible, heat shaft seal bores to between 40 and 50 °C (makes fitting easier). Press in shaft sealing ring with mounting or face plate until firmly home at relevant installation depth.

Retaining Agents

Retaining agents* may only be used where specified by the parts list.

Always comply with manufacturer's directions for use when using retaining agents (e.g. Loctite).

During assembly, comply with all adjustment data, checking data, and tightening torques.

Transmission Oil

After completing repairs, fill transmissions with transmission oil. For the procedure and approved oil grades, refer to the transmission Operating Instructions and TE-ML List of Lubricants (refer to identification plate) which can be obtained from all ZF Customer Service / After Sales Centers and on the Internet under www.zf.com.

After filling the transmission with oil, tighten the screw plugs at the oil filling point and the oil overflow using the specified torques.

* refer to expendable material

Tightening Torques for Bolts/Screws and Nuts
Extract from ZFN 148

This standard applies to screws/bolts acc. to DIN 912, DIN 931, DIN 933, DIN 960, DIN 961, as well as ISO 4762, ISO 4014, ISO 4017, ISO 8765, ISO 8676, and to nuts acc. to DIN 934 as well as ISO 4032, ISO 8673.

This Standard contains data on tightening torques for screws/bolts and nuts in strength categories 8.8, 10.9, and 12.9, and nuts in strength categories 8, 10, and 12.

Surface condition of bolts/screws and nuts: Thermally blackened and oiled or galvanized and oiled or galvanized, chromated, and oiled.

Tighten screws/bolts with a calibrated ratchet dial torque or ratchet wrench.

NOTE

Deviating tightening torques are listed separately in the Repair Manual.

Regular screw thread			
Size Screw/Bolt Nut	Tightening torque (Nm) for		
	8.8 8	10.9 10	12.9 12
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

Fine screw thread			
Size Screw/Bolt Nut	Tightening torque (Nm) for		
	8.8 8	10.9 10	12.9 12
M8x1	24	36	43
M9x1	36	53	62
M10x1	52	76	89
M10x1.25	49	72	84
M12x1.25	87	125	150
M12x1.5	83	120	145
M14x1.5	135	200	235
M16x1.5	205	300	360
M18x1.5	310	440	520
M18x2	290	420	490
M20x1.5	430	620	720
M22x1.5	580	820	960
M24x1.5	760	1100	1250
M24x2	730	1050	1200
M27x1.5	1100	1600	1850
M27x2	1050	1500	1800
M30x1.5	1550	2200	2550
M30x2	1500	2100	2500