

# Repair Manual

6 S 1000 BD

6 S 1000 BO

6 S 1200 BD

6 S 1200 BO

1350 751 101



Subject to technical changes

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Printed in Germany

ZF Friedrichshafen AG, MC-C / 2005-06

Edition: 2005-06

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This repair manual 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 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 After-Sales Service training centers.

Service Points 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 Points is carried out conscientiously and with utmost care.

**Warranty:**  
**Repair work carried out at ZF Service Points 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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### Transmission description and function

The 6-speed transmission serie is available as a direct drive or an overdrive transmission with a separate fitted clutch bell housing. It is of conventional transmission gearing design. Helical gears are used for the lock-synchronized forward speeds and also for the constant-mesh reverse speed.

The 6-speed transmissions may be equipped with the following auxiliary equipment, depending on the vehicle configuration:

- ZF secondary retarder
- Engine-dependent power take-offs
- Vehicle-driven power take-off to drive a pump for an emergency or dual-circuit steering system
- Clutch-dependent power take-off for connection on output end
- Separate heat exchanger to cool transmission oil

## Safety Instructions

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 processes, techniques, data, 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.**

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## General Information

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

### CAUTION

Pictures, drawings, and components 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 After-Sales Services 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, discs, 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 discs, 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 oiled with operating oil.

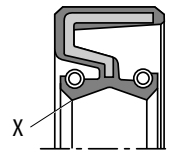
## Sealing

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 surfaces are sealed.

## 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 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 circumference of the rubber jacket as described above in section 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 the seal shaft with mounting or faceplate onto the relevant installation depth plan.

## Retaining Agents

Retaining agents\* may only be used in places as specified in 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 oils, refer to the transmission operating manual and TE-ML List of Lubricants (refer to identification plate) which are available from any ZF After-Sales Service Point and on the Internet under [www.zf.com](http://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

## Zf 6s1000 1200bo Bd Repair Manual

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