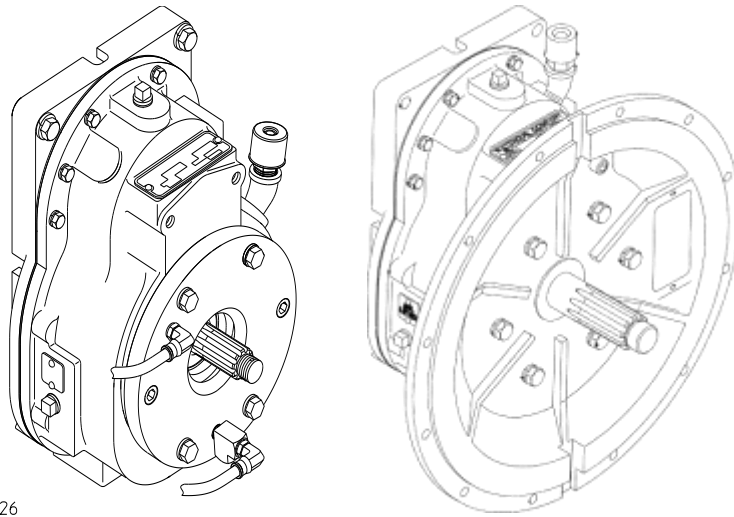


K & T Transmissions Overhaul Instructions

(Including Transmissions for E Series Motor Pumps)

Table of Contents



IL1526

Introduction	1
Disassembly	1
Medium Duty - K and T	1
Heavy Duty - K and T	2
Extra Heavy Duty - K Only	2
Inspection	3
Reassembly	3
Installing Ball Bearings.....	3
Installing Oil Seals.....	4
Installing Gaskets	4
Final Assembly	4



Read through the overhaul instructions carefully before repairing your Waterous K or T Transmission.

NOTE: Instructions subject to change without notice

Introduction

This instruction contains information for overhauling the K and T series gear drive transmissions. The text below uses reference numbers when discussing specific parts. These numbers refer to the parts called out in the service parts list for the transmission. For E301-A and E302-A motor pump models, refer to instructions for T series transmission.

Disassembly

NOTE: On units equipped with a separable impeller shaft, the transmission may be removed from the pump at any time during the disassembly procedure by removing the hex head screws (T21 & T22), lock washers (T27) and nuts (T23). Some pump bodies have jacking screw holes on mounting flange to aid in separation.

1. Disconnect propeller shaft from drive shaft (T11).
2. Remove oil cooler lines, if used.
3. Disconnect tachometer cable, if used.
4. Unscrew tachometer sleeve (T44) and remove tachometer driven gear (T43), if used.
5. Drain lubricant from gear case subassembly (T13) by removing magnetic drain plug (T18).
6. **T Transmissions Only** - If desired, remove bellhousing adapter (T62) from gear case subassembly.
7. **K Transmissions Only** - If desired, remove adapter (T88) or (T89), if used.
8. Remove hex hd screws (T19) and lock washers (T25) attaching gear case to bearing housing.
9. Remove dowel pins (T14).
10. Install two hex hd screws in jacking screw holes in gear case and bearing housing, and turn in evenly to separate gear case subassembly.
NOTE: Jacking screw hole in gear case is on right hand edge, slightly below impeller shaft (viewed from drive shaft end). In bearing housing, tapped hole is on opposite side, about in line with the driveshaft.
11. Remove oil seal (T24) from gear case.
12. Pull gear case straight back from bearing housing. Assembled drive shaft may come part way out, but will probably stay meshed with driven gear.

Medium Duty - K and T

1. Remove cotter pin (T80), castle nut (T77) or Nylok nut (T77) and washer (T79) from impeller/driven shaft. Remove pulley, key and seal sleeve on models with extended driven shafts. Remove outer bearing (T33 or T34) from hub of driven gear.

NOTE: Models with extended driven shafts have spherical roller bearings on the driven shaft. Care must be taken to apply axial force only during removal to avoid damage.

CAUTION

Care must be taken when uninstalling the spherical roller bearings to avoid damage. If the outer ring is tilted too much, the rollers can dislocate.

2. Remove driven gear (T3) with a suitable puller. Remove key (T76) and spacer (T75).
3. Remove bolts and cap screws attaching bearing housing to pump and separate pump from transmission.
4. Remove hex hd screws (T92), (T87 on T transmissions) and lock washers (T25) attaching bearing cover (T10) to bearing housing. Pull bearing housing from impeller shaft.
5. Press off inner bearing (T33 or T34) and remove bearing cover (T10). Discard oil seal (T50) and gasket (T4).
6. Remove bearing cover (T9) and discard gasket (T6). On models with a tachometer, remove tachometer housing (T40) and discard gasket (T6). Do not remove bushing (T45) from gear housing unless it is damaged.
7. **Tachometer Drive Only** - Drive pin (T73) into drive shaft and pull off tachometer drive gear (T36) and pilot ring (T74). Remove pin from drive shaft.
8. Remove assembled drive shaft from bearing housing.

9. Remove retaining ring (T28) from inner end of drive shaft and remove inner bearing (T33).
10. With a suitable press, remove drive gear (T15) from drive shaft and lift out Woodruff key (T1) or square key (T94).
11. Remove retaining ring (T28) from outer end of drive shaft and remove outer bearing (T33).

NOTE: Effective 7/8/05, models with extended driven shafts have a bearing lock nut (T77), (T108) or (T109) and a bearing lock washer (T79), (T109) or (T110) to retain the outer bearing.

NOTE: The drive shaft with a spline does not have two retaining rings (T28). Remove bearing (T33) following removal of drive gear.

Heavy Duty - K and T

1. Straighten bent tab of bearing lock washer (T47) and unscrew lock nut (T41) from impeller/driven shaft. Remove lock washer, outer bearing (T53) and outer spacer (T37 or T38).
2. Remove assembled drive shaft from bearing housing.
3. With a suitable puller, remove driven gear (T3) and key, and then pull off inner spacer (T37 or T38).
4. Remove bolts and cap screws attaching bearing housing to pump and separate pump from transmission.

NOTE: On units not equipped with separable impeller shaft, the pump must be disassembled to remove it. Refer to the pump overhaul instructions.

5. Remove oil seal housing (T10) and discard oil seal (T50) and gasket (T4). Press other bearing (T53 or T93) from shaft.

6. Remove tachometer gear housing (T40) and discard O-ring (T49). Do not remove bushing (T45) from gear housing unless it is damaged.
7. **Tachometer Drive Only** - Remove retaining ring (T51) from drive shaft (T11) and pull off tachometer drive gear. Remove Woodruff key (T35) from slot.
8. Remove retaining ring (T28) from drive shaft (T11) and remove bearing (T54).
9. **K Cases Only** - Remove oil seal sleeve (T39) and bearing (T52) from drive shaft (T11). On models with a female splined input shaft there is no oil seal sleeve, and bearing (T52) will be removed after the drive gear is removed in step 10.
10. With a suitable press, remove drive gear (T15) from drive shaft (T11) and lift out square key (T29). (Remove outer bearing (T52) if not done previously.)

Extra Heavy Duty - K only

1. Straighten bent tab of bearing lock washer (T47) and unscrew lock nut (T41) from impeller/driven shaft. Remove lock washer, outer bearing (T53) and outer spacer (T37).
2. Remove assembled drive shaft from bearing housing. Take care not to damage oil cooler tubing, if used.
3. With a suitable puller, remove driven gear (T3) and key, and then pull off inner spacer (T37 or T38).
4. Remove bolts and cap screws attaching bearing housing to pump, and separate pump from transmission.

NOTE: On units not equipped with separable impeller shaft, the pump must be disassembled to remove it. Refer to the pump overhaul instructions.

5. Remove oil seal housing (T10) and discard oil seal (T50) and gasket (T4). Press bearing (T83) from shaft.

6. Remove tachometer gear housing (T40) or bearing retainer (T86) and discard O-ring (T49). Do not remove bushing (T45) from gear housing unless it is damaged.
7. **Tachometer Drive Only** - Remove retaining ring (T51) from drive shaft (T11) and pull off tachometer drive gear. Remove Woodruff key (T35) from slot. Remove retaining ring (T28) from drive shaft (T11) and remove bearing (T54). Remove drive shaft spacer (T82).
8. Remove oil seal sleeve (T39) and bearing (T54) from outer end of drive shaft (T11). On models with a female splined drive shaft there is no oil seal sleeve, and bearing (T54) will be removed after the drive gear is removed in step 10.
9. With a suitable press, remove drive gear (T15) from drive shaft (T11) and lift out square key (T29). Remove spacer (T82) and outer bearing (T54), if not done previously.

Inspection

Examine all components for signs of excessive wear or other defects and replace if necessary. Replace all bearings, seals, gaskets and any worn parts.

Reassembly

Reassembly is essentially the opposite of removal and disassembly. Be sure to observe the following points.

Installing Ball Bearings

Keep bearings covered until they are to be installed. Before pressing a bearing on a shaft, coat its bore with grease. Always apply force to the inner race of a ball bearing when pressing it on a shaft, never to the outer race. Press on evenly with a piece of pipe or tube which will just clear the shaft. Be sure the shaft is clean before installing the bearing.

Models with Extended Driven Shafts (see Figure 1):

1. **Models with extended driven shaft have spherical roller bearings on the driven shaft.**

CAUTION

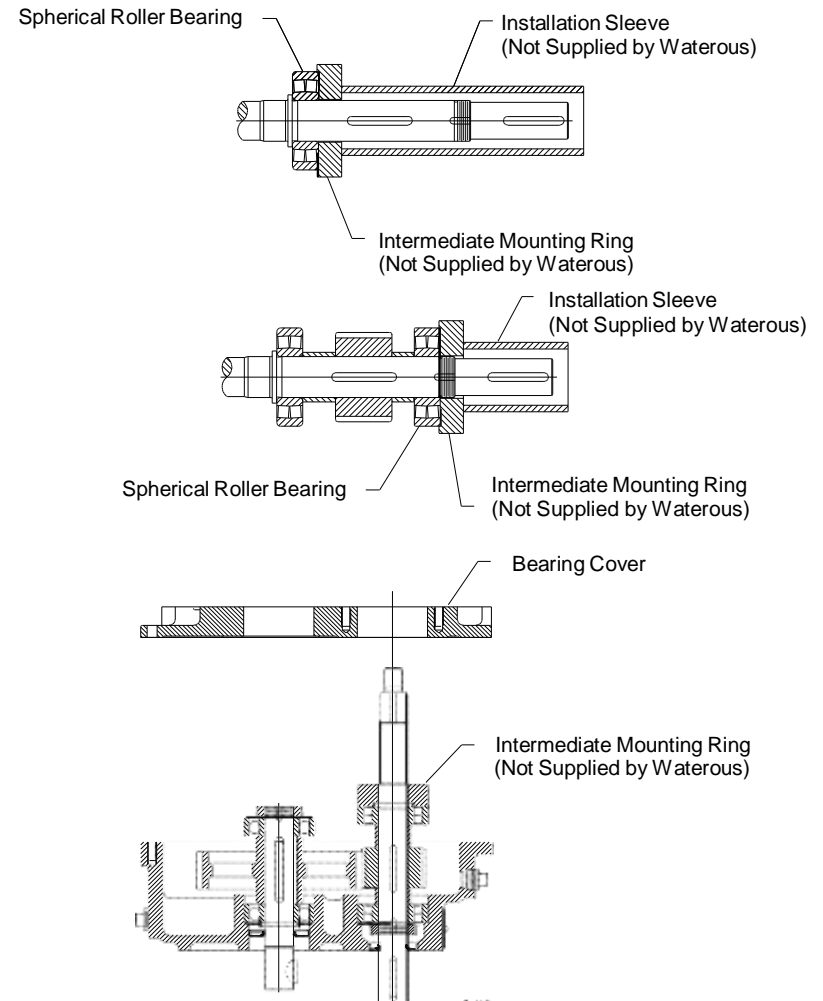
Care must be taken when installing the spherical roller bearings to avoid damage. If the outer ring is tilted too much, the rollers can dislocate. The use of an intermediate mounting ring prevents the outer ring from tilting and swiveling. See Figure 1.

Tighten bearing locknut 1/4 turn from finger tight and bend one of the locking tangs on the washer into one of the slots in the locknut.

Models without Extended Driven Shafts:

2. **Apply Loctite[®] 242 to shaft and bearing locknut threads. Tighten nut until against bearing. Torque to 100 ft-lbs. (136 N.m).**

Figure 1. Spherical Roller Bearings



End Yoke and Companion Flange Nuts

Do not reuse self-locking nuts. Apply lubrication oil to the threads before removing. Apply anti-seize to the threads before installing a new self-locking nut.

Installing Oil Seals

Before installing an oil seal in a housing, apply a thin coat of sealant to housing oil seal seat. (Waterous recommends Loctite Ultra Blue RTV Silicon Sealant or Permatex Super 300). Be sure that seal, shaft and housing are clean. Always install a seal with the seal lip facing in. Apply force to the outer edge of a seal and press in evenly.

Installing Gaskets

If a gasket is awkward to hold in place while assembling a component, coat one of the mating flanges with heavy grease, and press the gasket into position against the flange. The grease will hold the gasket in place during reassembly.

Final Assembly

1. Connect tachometer cable to sleeve, if used.
2. Connect propeller shaft to drive shaft. Secure with cotter pin, if used.

With all pumps except CP-5:

3. Fill gear case through the filler plug or breather at top of gear case with SAE 80W-90 gear oil. Check oil level through the square head pipe plug port on side of gear case marked OIL LEVEL.

With CP-5 pump:

Gear lube spec: 75W-90 full synthetic.

Capacity:

Inverted mounting: 1.2 quarts

Horizontal mounting: 1.5 quarts

Vertical mounting: 1.6 quarts

(Capacity measurements are approximate and include the transmission, oil cooler, and oil pump. Hoses and fittings are not included. Adjust accordingly to application)

Oil fill procedure:

1. With oil level plug installed, fill transmission with 1.5 quarts of gear lube.
2. Run electric oil pump for 1 minute.
3. Stop oil pump.
4. Remove oil level plug.
5. Drain excess oil or add oil until a small stream of oil runs out oil level hole.
6. Install oil level plug.
7. Repeat steps 2-6 until no additional oil is required.