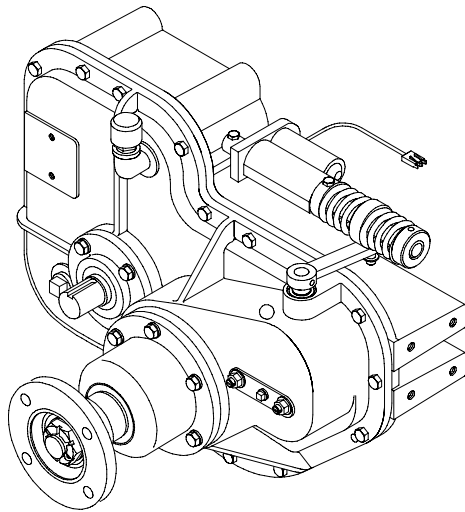


TG100 Power Take-Off

Models TG100, TG101 and TG102

Overhaul Instructions

Form No.	Issue Date	Rev. Date
T-349	04/12/96	08/17/07



WATEROUS

Fire Pumps – Since 1886



Table of Contents

Introduction	1
General Description	1
Removal of the PTO	1
Disassembly	1
Removal of the Electric Shift Actuator	2
Removal of the Parking Brake (if equipped), Coupling Shaft Housing and Bearing Cover	2
Removal of Companion Flanges, Coupling Shaft Housing (not equipped with parking brake) and Bearing Cover	3
Removal of Oil Seal Housing	3
Removal of Transmission Case and Cover	4
Removal of Gear Assemblies	4
Disassemble Gear and Bearings - Drive Shaft	5
Disassemble Gears and Bearings - Idler Shaft	5
Reassembly	6
Installing Bearings	6
Installing Oil Seals	6
Reassemble Gear and Bearings onto Drive Shaft	7
Reassemble Gears and Bearings onto Idler Shaft	7
Reinstall Shift Fork and Shift Collar	8
Reinstall Gear Assemblies	8
Reinstall Transmission Case to Cover	9
Adjusting the Shift Collar	9
Reinstall Oil Seal Housing	10
Reinstall Bearing Cover	10
Reinstall Coupling Shaft Housing	11
Reinstall Companion Flanges	12
Reinstall Brake Assembly (if equipped)	12
Reinstall Electric Shift Actuator Assembly	13
Lubrication and Final Check	13
After Installation into Chassis	13

Introduction

This instruction provides the necessary steps required to overhaul Model TG100, TG101 and TG102 Power Take-Off. These instructions are divided into the following: Disassembly of the PTO and Reassembly of the PTO. For

instructions on how to install the PTO, see T-348, *Installation Instructions for Waterous TG100 Series Power Take-Off*.

General Description

The Waterous TG100 Series Power Take-Off is designed to drive a Boss Air Compressor or GHH-Rand Air Compressor. The TG100 is a gear driven PTO (hardened, precision helical gears) with a 6:1 speed increasing ratio.

Standard on the PTO is an electric shift which enables the user to select "Road" mode or "PTO" mode.

Optional equipment on the PTO is a 9" parking brake and extended idler shaft. The parking brake will hold a truck under all operating conditions without affecting equipment operation. The parking brake can also serve as an emergency brake in case of truck brake failure. The extended idler shaft is available for driving auxiliary equipment. The 1-1/4 in. diameter, keyed shaft has a speed increasing ratio of 2.73.

Removal of the PTO

Before the overhaul can begin, the PTO must be removed from the vehicle. In addition, the air compressor must be removed from the PTO. To remove the

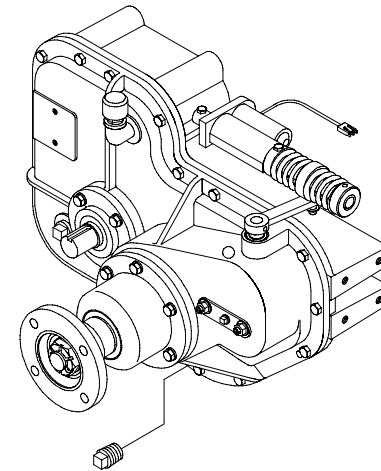
PTO from the vehicle, refer to the truck manufacturer's instructions. To remove the air compressor, refer to the Accessories section in T-348.

Disassembly

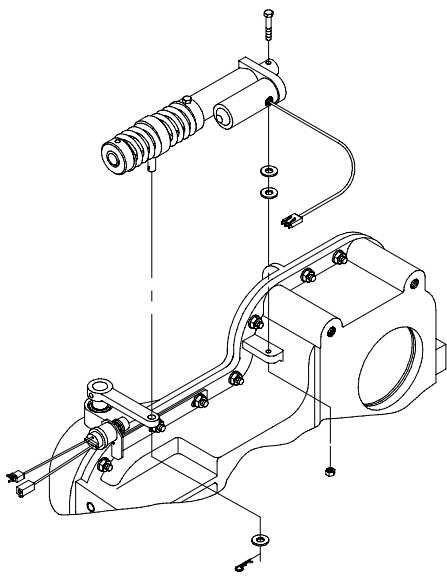
Before beginning the disassembly process, drain the oil from the TG100 by removing the drain plug.

The disassembly section contains instructions on the following items:

- Removal of electric shift actuator
- Removal of companion flanges, coupling shaft housing, bearing cover and parking brake (if equipped).
- Removal of oil seal housing
- Removal of transmission case from cover
- Removal of gear assemblies
- Removal of the shift fork from transmission cover



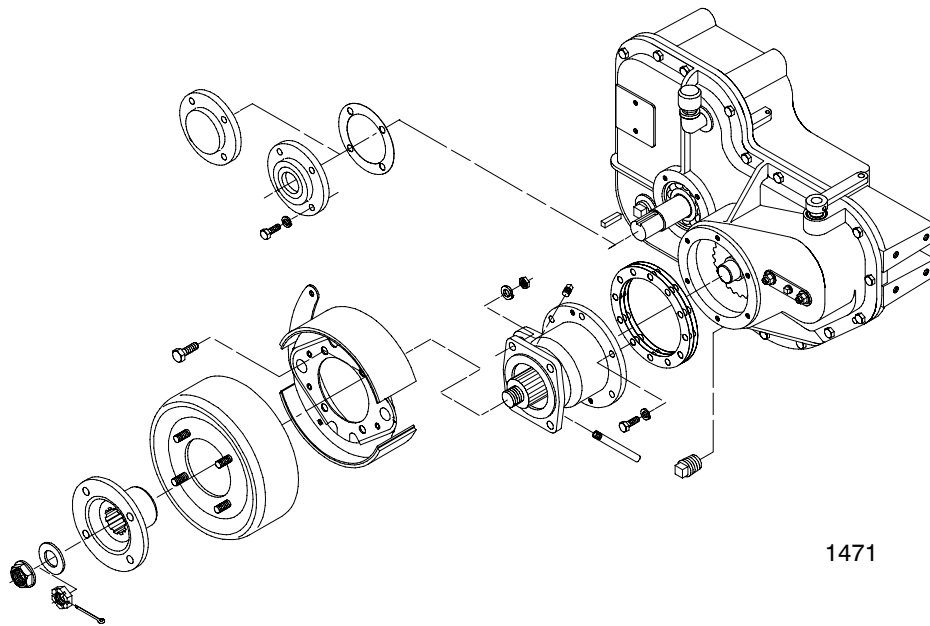
IL1467



1472

Removal of the Electric Shift Actuator

1. Remove the hex head screw that secures the actuator to the case.
2. Remove the cotter hair pin and washer from the shift lever.
3. Lift off the electric shift actuator from the case.



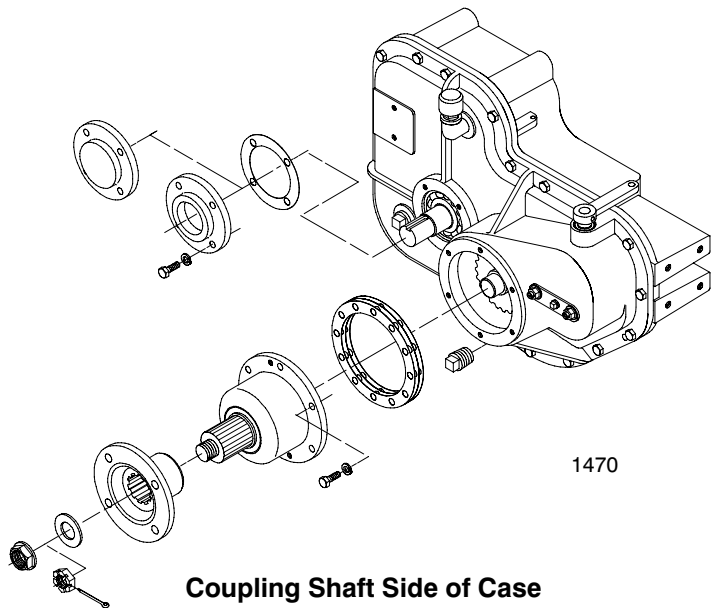
1471

Removal of the Parking Brake (if equipped), Coupling Shaft Housing and Bearing Cover

1. Remove the drain pipe.
2. Remove the cotter pin and shaft nut or self locking nut from shaft. Do not reuse self-locking nut. Apply lubricating oil to the threads before moving. Apply anti-seize to the threads before installing a new self-locking nut.
3. Slide the companion flange and brake drum off the shaft.
4. Disconnect linkage to brake operating arm.
5. Remove the four mounting screws from the parking brake assembly.
6. Remove the parking brake assembly.
7. Remove the six cap screws from the coupling shaft housing.
8. Remove coupling shaft housing.
9. Remove the four cap screws from the bearing cover.
10. Remove the bearing cover and gasket.

NOTE: The coupling shaft and bearings are removed from the transmission when the coupling shaft housing is removed.

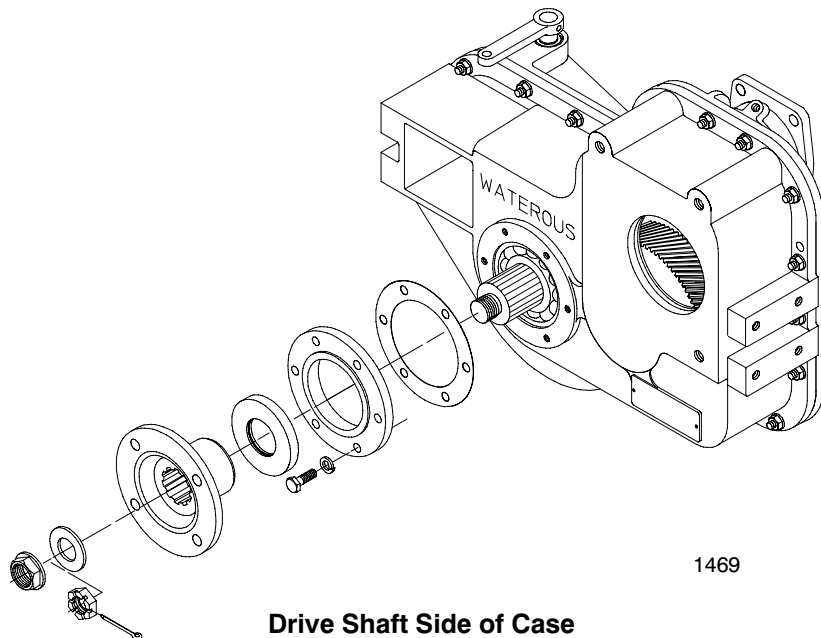
Removal of Companion Flanges, Coupling Shaft Housing (not equipped with parking brake) and bearing cover



1. Remove the cotter pin and shaft nut or self locking nut from shaft. Do not reuse self-locking nut. Apply lubricating oil to the threads before moving. Apply anti-seize to the threads before installing a new self-locking nut.
2. Slide the companion flange off the shaft.
3. Remove the six cap screws from the coupling shaft housing.
4. Remove coupling shaft housing. Note that jack screws are provided.
5. Remove the four cap screws from the bearing cover.
6. Remove the bearing cover and gasket.

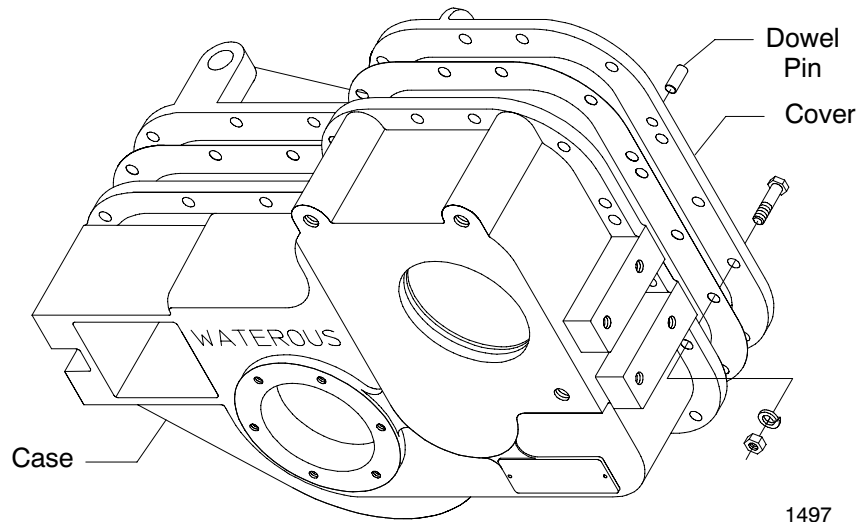
NOTE: The coupling shaft and bearings are removed from the transmission when the coupling shaft housing is removed.

Removal of Drive Shaft Oil Seal Housing



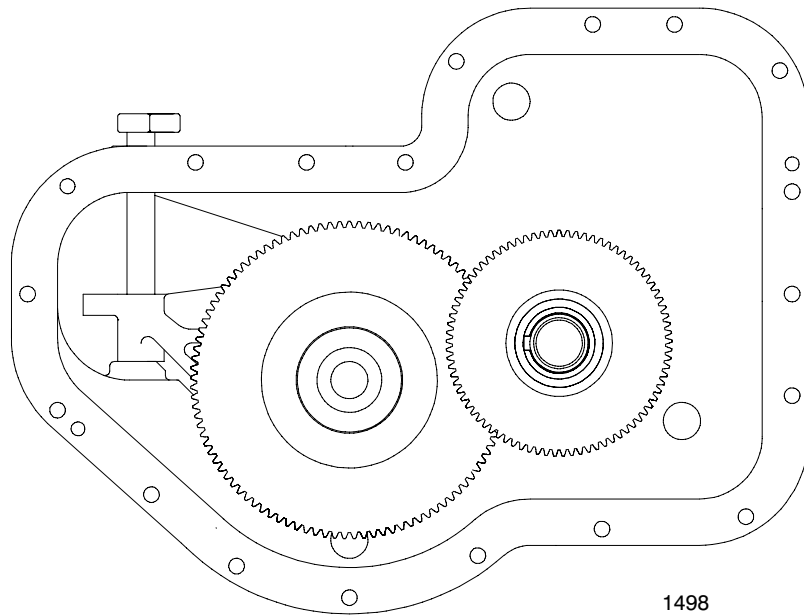
1. Remove the cotter pin and shaft nut or self locking nut from shaft. Do not reuse self-locking nut. Apply lubricating oil to the threads before moving. Apply anti-seize to the threads before installing a new self-locking nut.
2. Slide the companion flange off the shaft.
3. Remove the six cap screws from the oil seal housing.
4. Remove the housing and gasket from the transmission case.
5. Discard the gasket.

Removal of Transmission Case & Cover



1. Turn the TG100 assembly so it rests on its cover.
2. Remove the hex head bolts from the case and cover.
3. Remove the dowel pins (2).
4. Separate and lift the case from the cover. Note that two separator slots are provided.
5. Remove gasket and discard.

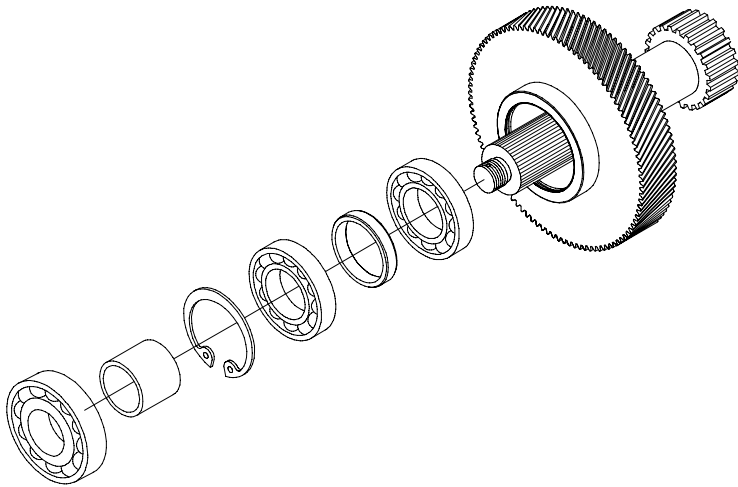
Removal of Gear Assemblies



1. Remove the idler shaft assembly.
2. Lift out the drive shaft assembly. Note that the shift collar will remain in the shift fork and can be removed at a later time.

Disassemble Gear & Bearings - Drive Shaft

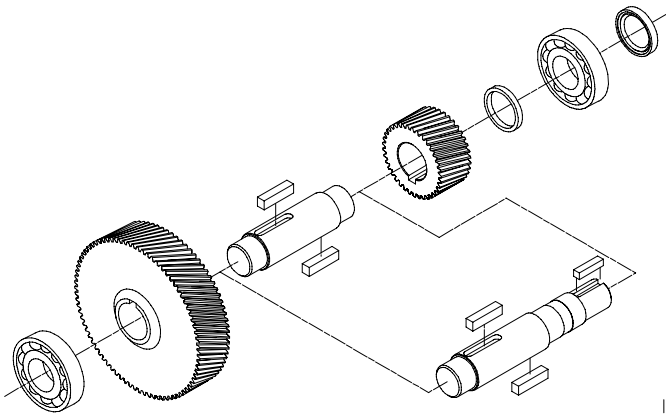
1. Press outer bearing off the shaft.
2. Slide drive shaft spacer off the shaft.
3. Stand drive shaft with threaded end down. Press gear assembly off the drive shaft.
4. Remove snap ring from inside drive gear.
5. Press out the outer shaft bearing, spacer and inner bearing from gear.
6. Press the drive shaft pilot bearing off the shaft (not shown).



From PL82120

Disassemble Gears & Bearings - Idler Shaft

1. Press the idler shaft bearings off the shaft.
2. Slide idler shaft spacer off the shaft.
3. Press the idler shaft gears off the shaft.
4. Remove keys from the keyways in the idler shaft.



IL2269

Reassembly

The reassembly section contains instructions on the following items:

- Reassembling gears & bearings onto shafts
- Installing shift fork and shift collar
- Installing gear assemblies into transmission cover
- Installing transmission cover to transmission cover
- Adjusting shift collar
- Installing oil seal housing
- Installing bearing cover
- Reassembling coupling shaft
- Reassembling coupling shaft assembly
- Installing coupling shaft housing to transmission cover
- Installing companion flanges
- Installing parking brake (if equipped)
- Installing electric shift actuator
- Refilling with lubricant
- After installation into chassis

Installing Bearings

Keep reusable bearings covered and new bearings wrapped until they are ready for installation. Note that before pressing a ball bearing on a shaft, coat the bearing bore with grease. Always apply force to the inner race of a ball bearing when pressing it on a shaft. Apply force to the outer race of the bearing if pressing the bearing into a bore.

Installing Oil Seals

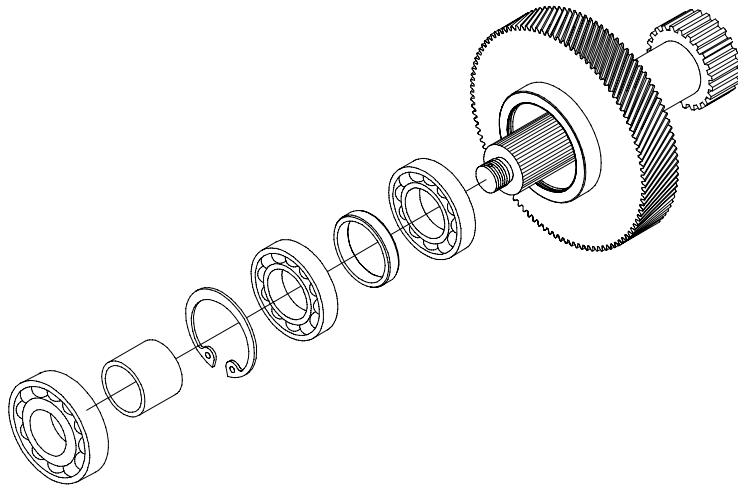
Before installing an oil seal in a housing, apply a thin coat of sealant to housing oil seal seat. (Waterous recommends Loctite Ultra Blue RTV Silicon Sealant to Permatex Super 300). Be sure that the seal, shaft and housing are clean. Always install a seal with the seal lip facing in. Apply force to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

NOTE: When reinstalling items with pipe thread fittings, use pipe sealant on all threads.

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.

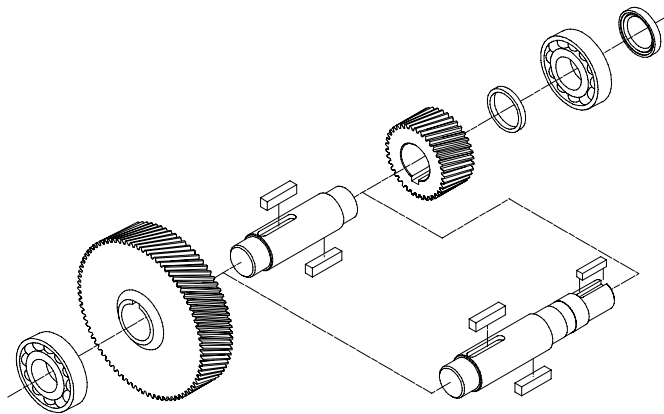
Reassemble Gear & Bearings onto Drive Shaft



1. Install drive shaft bearing in drive gear and push until bearing seats against the gear shoulder.
2. Place drive shaft spacer on inner race of bearing.
3. Install outer drive gear bearing in gear, trapping spacer between bearings.
4. Install snap ring in gear.
5. Stand drive shaft with threaded end up. Press gear assembly on drive shaft with snap ring end facing up.
6. Slide drive shaft spacer over shaft and seat it against the outer drive gear bearing.
7. Press final bearing onto shaft tight against the drive shaft spacer.
8. Position drive gear assembly so the threaded end is down and press the drive shaft pilot bearing onto the shaft (not shown).

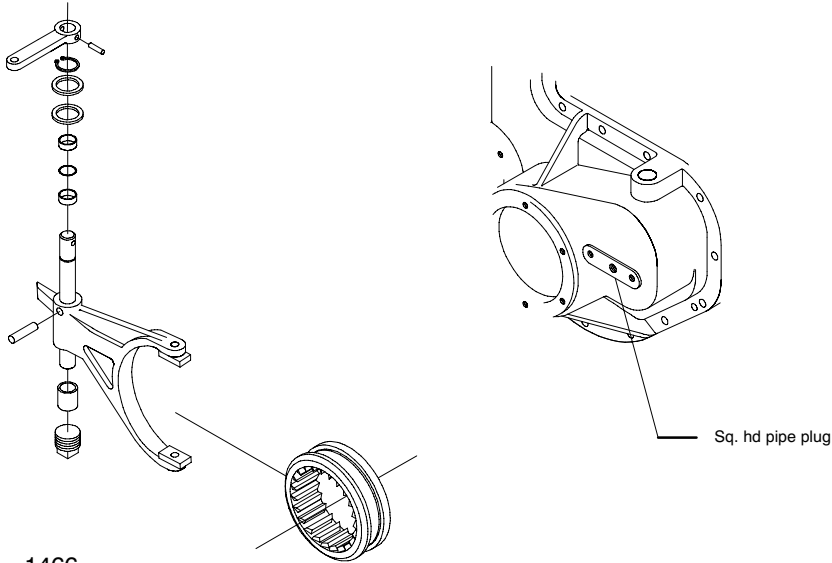
From PL82120

Reassemble Gears & Bearings onto Idler Shaft



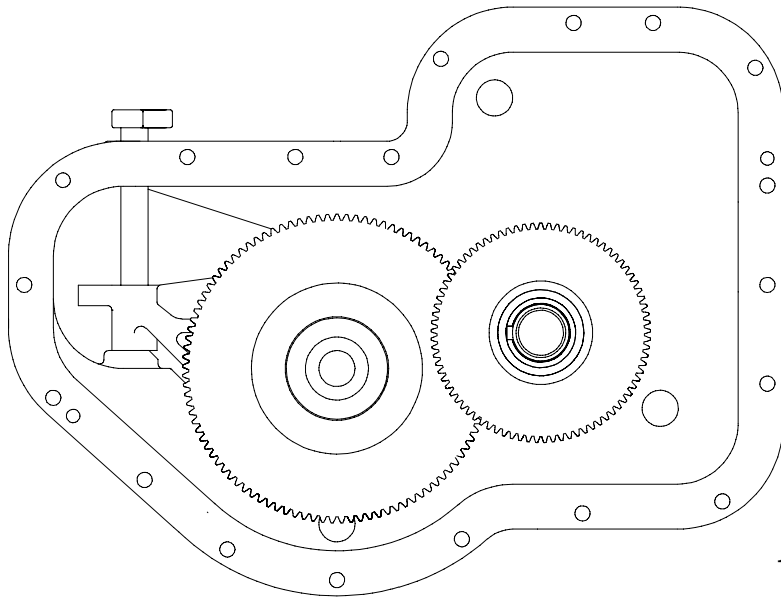
IL2269

1. Install the long keys into the keyways on the idler shaft and add high pressure grease.
2. Align one of the keys in the shaft with the keyway in the small idler gear and press the shaft into the idler gear.
3. Align the other key in the shaft with the keyway in the large idler gear and press the shaft into the idler gear.
4. Install the smaller key if required on the auxiliary shaft at this time and regrease.
5. Press the spacer on the shaft followed by the ball bearings on each end.



Reinstall Shift Fork and Shift Collar

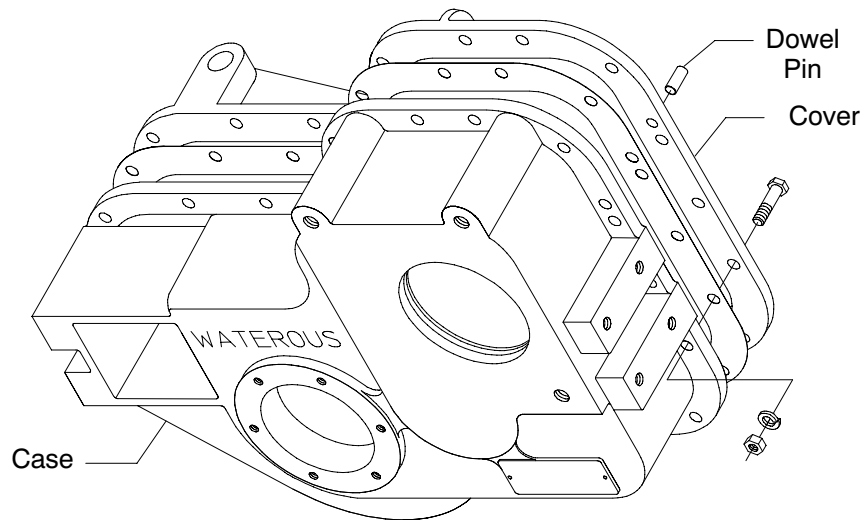
1. Replace sleeve bearings and o-rings into the case as needed.
2. Slide the shift shaft with shift arm into the sleeve bearings.
3. Slide the shift shaft through the shift fork and lower sleeve bearings.
4. Attach the shift fork to the shift shaft with a spirol pin.
5. Screw in the square head pipe plug into the transmission cover.
6. Place the shift collar into the shift fork.



Reinstall Gear Assemblies

1. Place the drive gear assembly into the shift collar in transmission cover.
2. Press the idler gear assembly into the transmission cover.

NOTE: Make sure the gear assemblies are seated properly in the transmission cover (drive gear assembly properly mated to the shift collar).

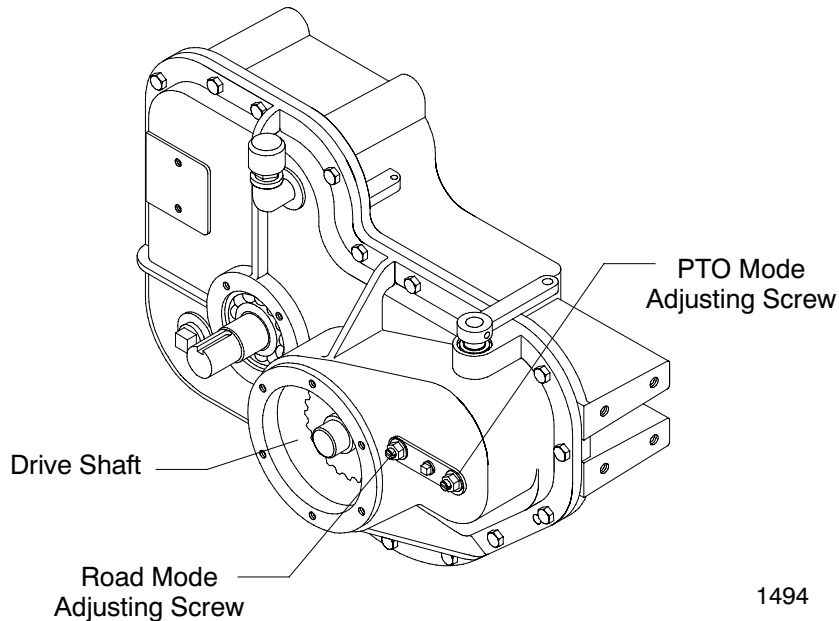


1497

Reinstall Transmission Case to Cover

1. Insert the dowel pins and several hex hd bolts into transmission case.
2. Place the gear case gasket on the transmission cover. (Place a small amount of grease on the cover to help the gasket remain in its proper position).
3. Align the transmission cover with the transmission case and press together.
4. Tap on the transmission case lightly to seat it against the cover.
5. Tap in the two dowel pins between the case and cover.
6. Secure the case to the cover by inserting and tightening the hex head bolts.
7. Install the shift switch bracket into position.

NOTE: Reinstall the bolts using a cross-tightening method with a torque of 35 foot-pounds.



1494

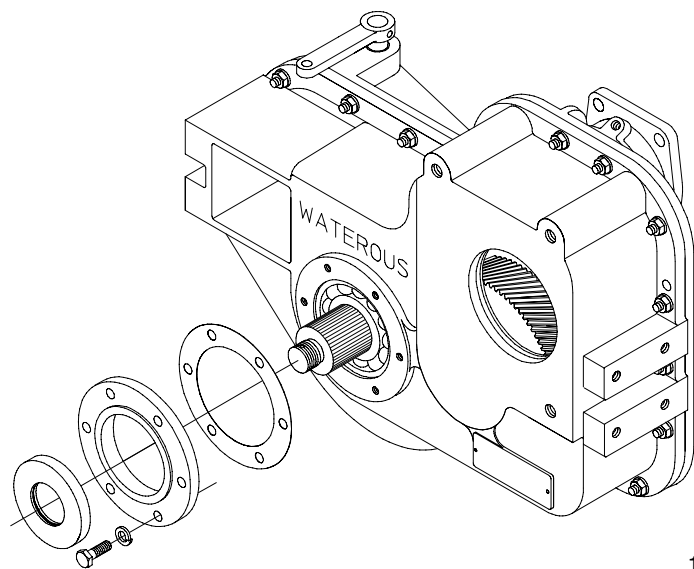
Adjusting the Shift Collar

The shift collar may need to be adjusted to the following configurations:

- PTO mode: 2 inches from the top of the drive shaft bore (transmission cover) to the shift collar.
- Road mode: 7/8 inch from the top of drive shaft bore (transmission cover) to the shift collar.

If the shift collar needs adjusting, perform the following:

1. Loosen the hex nut on the adjusting screw.
2. Turn adjusting screw until shift collar is in the proper position.
3. Tighten the hex nut.



1493

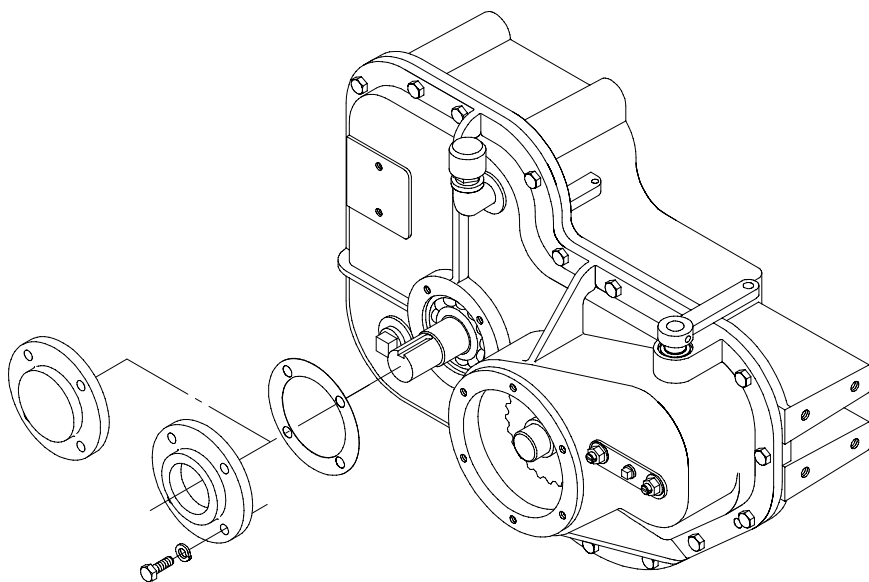
Reinstall Oil Seal Housing

1. 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 to Permatex Super 300). Be sure that the seal, shaft and seal housing are clean. Always install a seal with the seal lip facing in. Apply force to the outer edge of the seal and press in evenly.
2. Place a 0.010 in. shim between the oil seal housing and the transmission case.
3. Apply a light coat of RTV sealant on both sides of the shim.
4. Install oil seal housing to the transmission case with six cap screws.

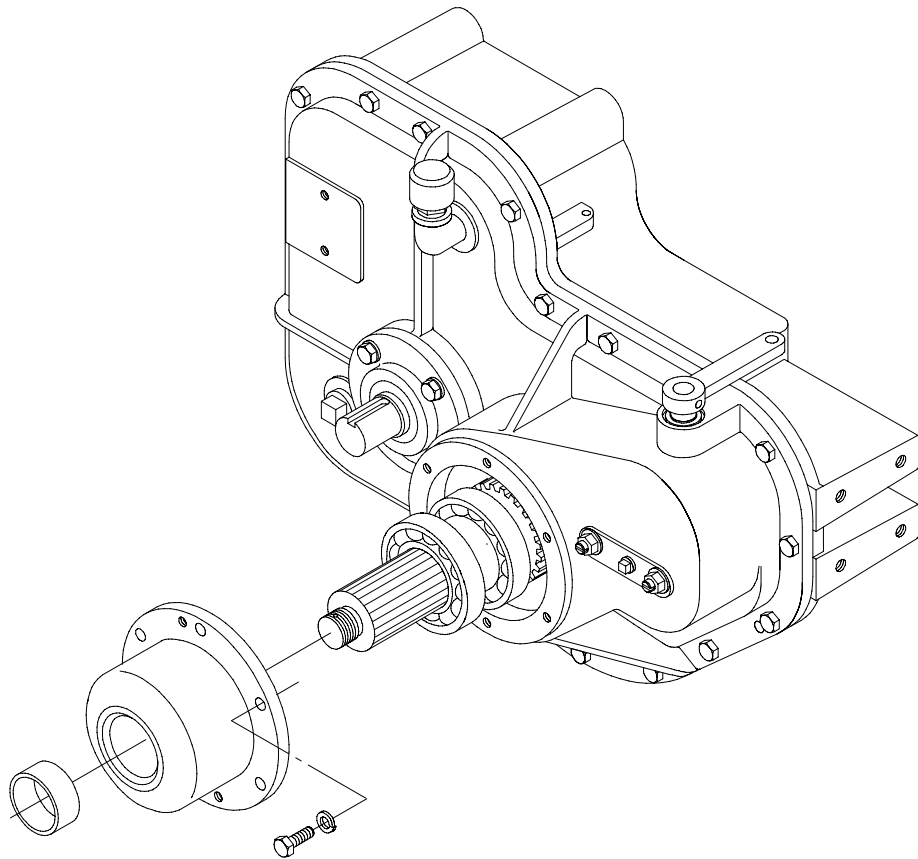
Reinstall Bearing Cover

1. Install the bearing cover and gasket to the transmission cover with four cap screws.

NOTE: If the TG100 is equipped with an external shaft, be careful not to damage the lip of the oil seal when sliding the seal over the shoulder on the idler shaft.



1494



1515

Reinstall Coupling Shaft Housing

1. 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 to Permatex Super 300). Be sure that the seal, shaft and coupling shaft housing are clean. Always install a seal with the seal lip facing in. Apply force to the outer edge of the seal and press in evenly.
2. Install the coupling shaft housing with no shims to the transmission cover (see note 1 below).
3. Tighten the cap screws on the coupling shaft housing evenly to force the drive line all the way forward. A gap will exist between the housing flange and transmission cover. Do not overtighten causing bending or breaking of the coupling shaft housing flange.
4. Measure the gap between the housing and the case and add 0.005 in. This will be the total thickness of shims needed to provide the recommended axial float of 0.005 inch.
5. Remove the coupling shaft housing from the cover.
6. Install the correct amount of shims on the coupling shaft housing.
7. Apply a light coat of RTV sealant between shims on both faces of the first and last shim.
8. Install the housing over the bearings on the coupling shaft and tighten the housing to the transmission cover.
9. Install the oil seal sleeve tight against bearing inner race.

NOTE 1: The drive line assembly was factory shimmed to limit the axial float of the drive line. If any of the drive line parts have been changed, it may be necessary to change the total thickness of shims between the coupling shaft housing and transmission cover.

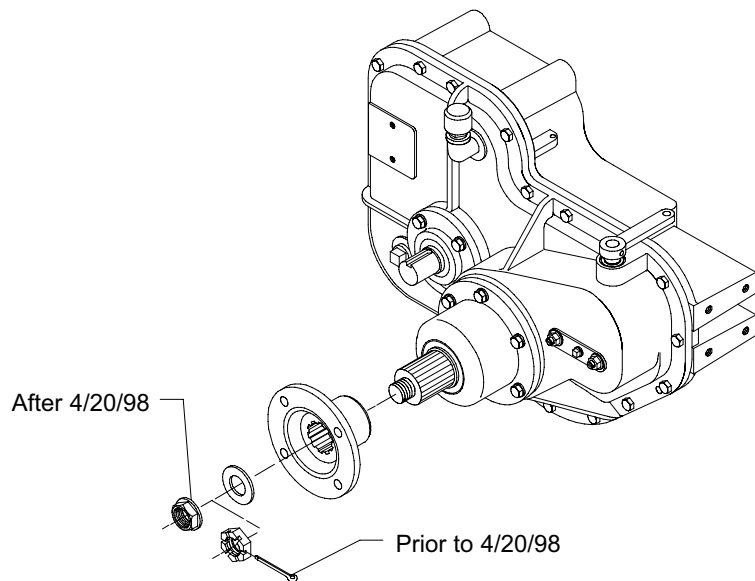
The shims are color coded for thickness as follows:

Blue005"
Aluminum007"
Brown010"

NOTE 2: Field conditions may make it difficult to determine the correct amount of shims. If in doubt, add one 0.005 in. shim. No harm will result from a small amount of additional axial float, but bearing life will be shortened if bearings are excessively preloaded.

Reinstall Companion Flanges

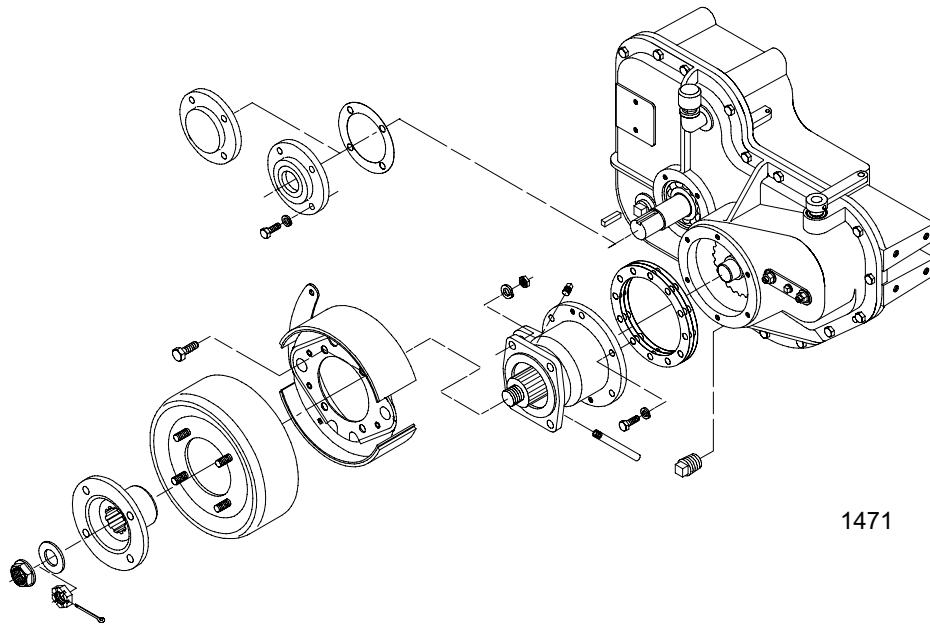
1. Slide companion flange on the coupling shaft.
2. Install washer and lock nut. Anti-seize should be applied to the threads before installing a self-locking nut. Do not reuse self-locking nuts. Torque to 275-325 lb-ft.
3. Align one slot in the lock nut with a hole in the end of the coupling shaft.
4. Install a cotter pin and spread open split end of the pin.
5. Repeat the same installation procedure at the drive shaft end.



1496

Reinstall Brake Assembly (if equipped)

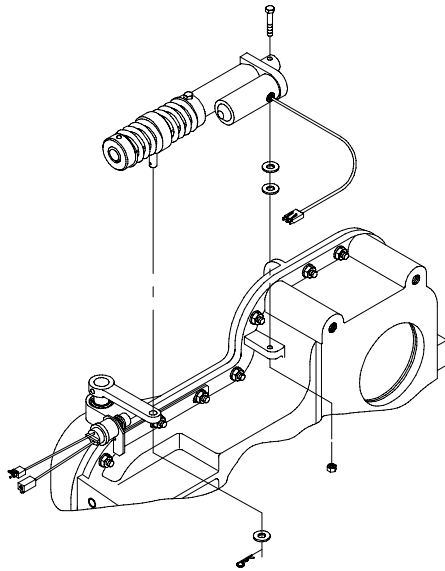
1. Install and fasten the brake assembly to coupling shaft housing.
2. Fasten the companion flange to the brake drum.
3. Install washer and lock nut. Anti-seize should be applied to the threads before installing a self-locking nut. Do not reuse self-locking nuts. Torque to 275-325 lb-ft.
4. Slide the brake drum and companion flange on the drive shaft.
5. Align one slot in the lock nut with a hole in the end of the drive shaft.
6. Install a cotter pin and spread open split end of the pin.
7. Install related linkage and adjust the brake.
8. Reinstall the drain tube in the hole in the bottom of the coupling shaft housing.



T-349

REV: 08/17/07

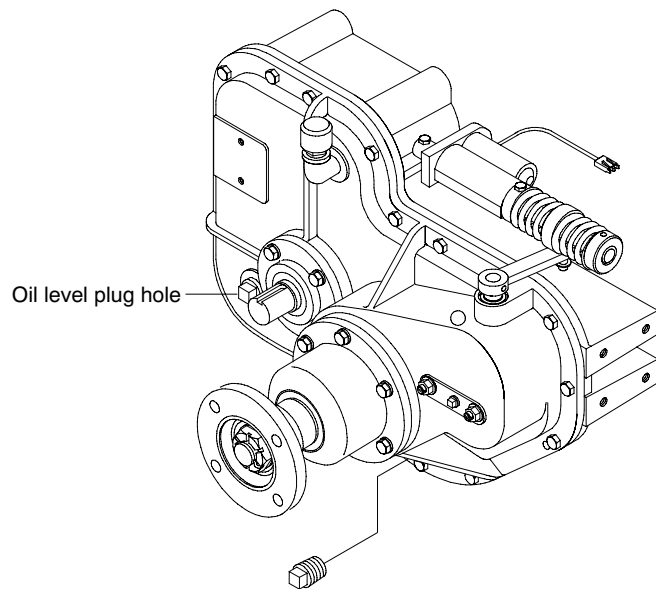
Page 12 of 13



1472

Reinstall Electric Shift Actuator Assembly

1. Slide the sliding block pin through the shift lever and the clevis pin through the mounting hole in the transmission case.
2. Secure the electric shift assembly by inserting cotter pins through the two pins.
3. Adjust the shift switch bracket so that the switch is depressed enough to energize the indicating light in the PTO mode.
4. Tighten the hex head screws on the switch bracket.



1467

Lubrication and Final Check

1. Fill the assembly to the oil level plug hole with SAE 80W-90 gear oil.
2. Recheck fasteners for tightness.

After Installation into Chassis

1. Recheck shift mechanism for proper operation.
2. Test shift indicator light system (if equipped).
3. Inspect for damaged wires and connections.
4. Repair as necessary.