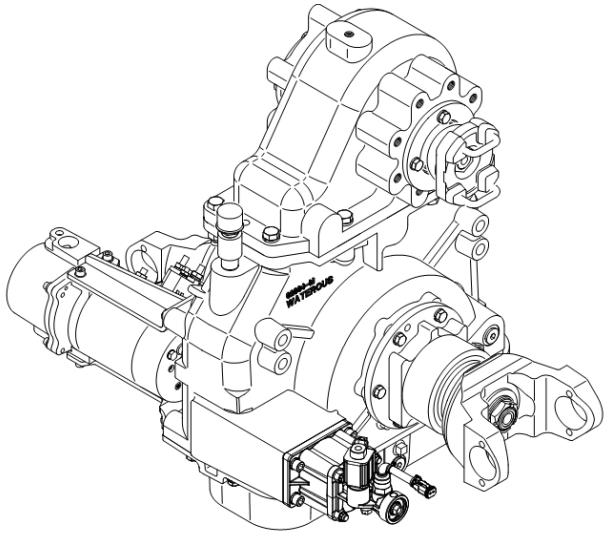
TC20 Chain Driven Power Take-Off
Overhaul Instructions



IL3370

Read through the safety information and overhaul instructions carefully before repairing your Waterous TC20 Power Take-Off.

NOTE: Instructions subject to change without notice

Table of Contents

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www.waterousco.com

Table Of Contents

Disassembly

For Reassembly of the PTO, See the Index on the next page.

Reassembly

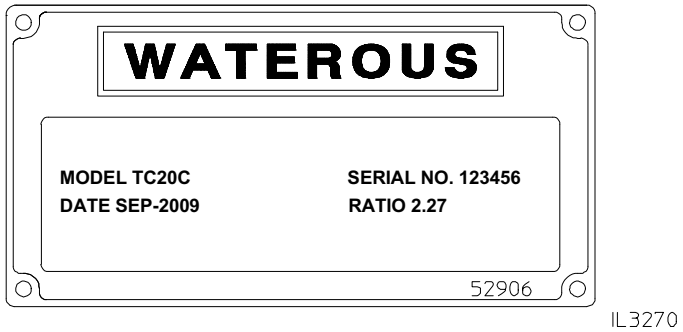
Introduction

This instruction provides the necessary steps involved to overhaul the TC20 Series PTO's. Note that the instructions are divided into Disassembly and Reassembly instructions.

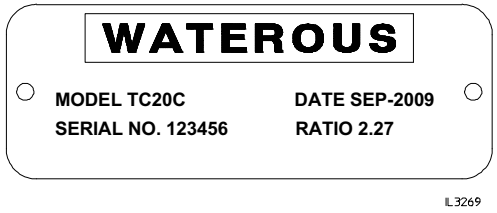
Ordering Repair Parts

Refer to TC20 Series PTO Service Parts List furnished with your PTO for identification of individual components. When ordering repair parts, furnish the reference number of the component (from Service Parts List) along with the PTO Model serial number. Gasket and O-ring repair kit (Part No. K-1117) is available from Waterous that includes all the gaskets and O-rings required for a complete overhaul. Note that this kit does not include shims installed between the cap and case which must be ordered separately (see Pages 31-32, 59 and 61).

Refer to the serial plate diagrams below for Model and Serial Number locations:



Serial Plate Located on Operator's Panel



Serial Plate Located on PTO

⚠ WARNING

Rotating Parts Hazard or Unexpected Truck Movement. May result in serious personal injury or death.

Stop the engine, set parking brake and chock the wheels before attempting to remove or repair the PTO.

⚠ WARNING

PTO Temperature Hazard. May result in serious burns.

The PTO may be warm from operation. Make sure that the PTO has cooled sufficiently prior to removal or repair.

Tools and Equipment

The following tools and equipment may be needed to overhaul your PTO:

1. Usual automotive mechanic's hand tools.
2. An arbor press for assembling or disassembling components.
3. A suitable hoist and slings.
4. Torque capability up to 325 lb-ft.

While no special tools and equipment are required, a few special items are illustrated or described on Pages 6 through 8 so the mechanic can make them or they are available from the apparatus manufacturer or the Waterous Company. These special items are not absolutely necessary, but they will make the mechanic's work much easier.

Cleaning

Satisfactory operation depends to a great extent upon the cleanliness of its internal parts. Sand, dirt or other abrasive material will wear gears and related parts. Before disassembling a PTO for repairs, be sure to clean its exterior. Make sure the working space, benches and tools are clean. Use only clean, lint-free cloths to wipe off components. Before reassembling, be sure to clean all components thoroughly.

Bearings, Gaskets, Seals and O-rings

Parts of this nature are frequently damaged during removal or disassembly. In addition, they sometimes deteriorate or lose their effectiveness because of age or misuse. Replacing these parts whenever overhauling a PTO is a good policy.

Installing Ball Bearings

Most Waterous PTOs are designed so that ball bearings fit tightly on their shafts and have relatively loose fits in the bearing housings. When mounting these bearings on shafts, always apply force to the inner races. When bearings have tight fit in the housings, and a heavy force is necessary to install them, be sure to apply force only to the outer bearing races. For either type of fit, applying force to the wrong bearing race may damage the balls and race.

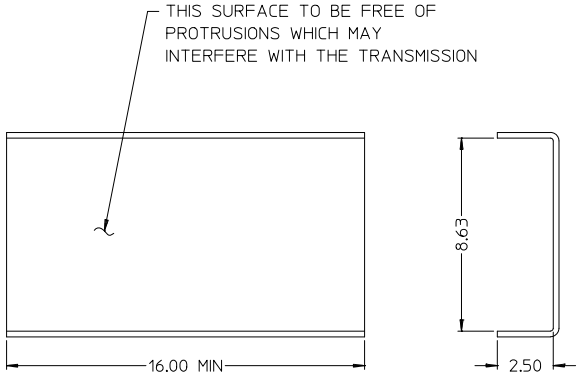
End Yoke and Companion Flange Nuts

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.

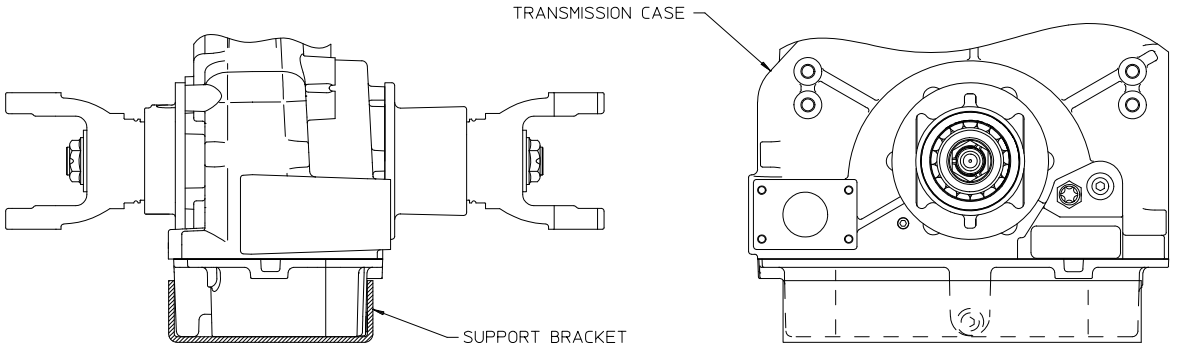
Case Support Bracket

Reference Page 18.

Bracket is not available from Waterous and must be fabricated.



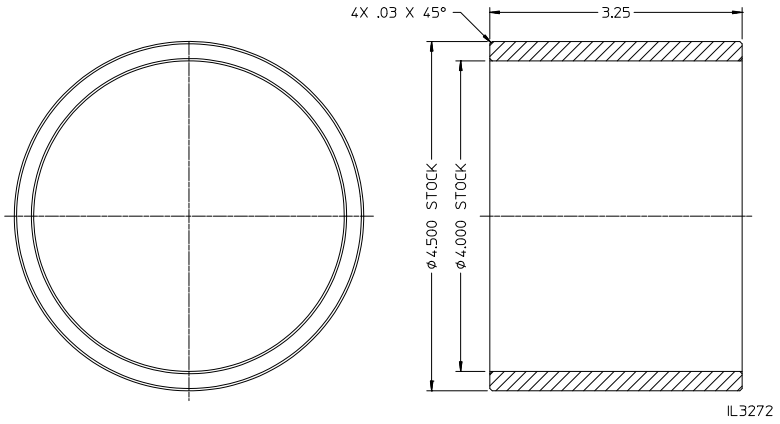
SUPPORT BRACKET LAYOUT



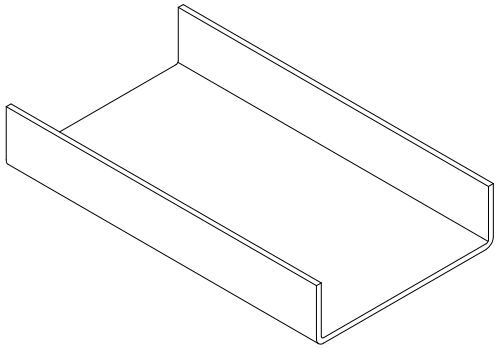
IL3508

Drive (Input) Shaft Removal Sleeve

Waterous Part No. 63431



Material: 4 in. Schedule 40 PVC Pipe



NOTE: Provisions must be made to secure bracket to jack. Fasteners used must not interfere with case mounting. The bracket may be larger if necessary

Material: 1/4 in. and 1/2 in. Mild Steel Plate

Special Tools Continued

Drive (Input) Shaft Installation Sleeve Assembly

Waterous Part No. 63432

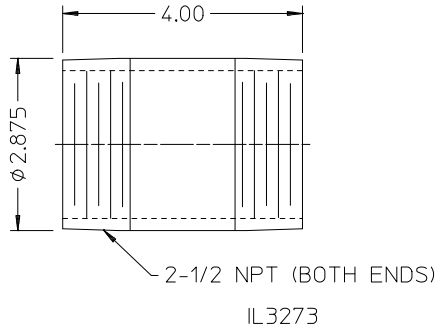
Reference pages 48-52 and 54-56.

This sleeve is used when installing the Driveline in the PTO case.

This sleeve is available from Waterous or may be fabricated per the diagrams below.

Pipe Nipple

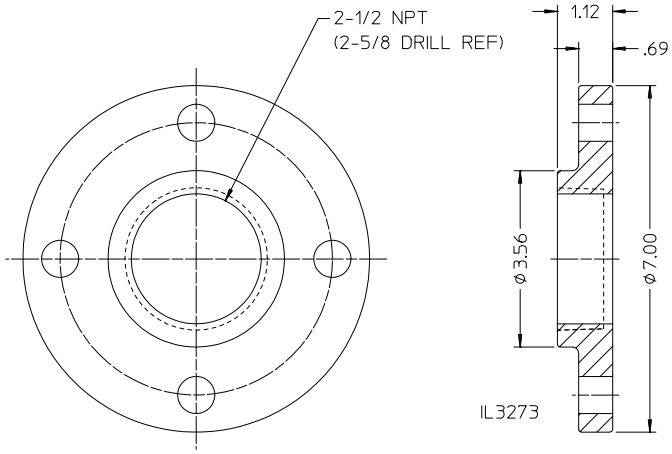
(Reference Waterous Part No. W 6040-64)



Material: 2-1/2 NPT x 4.00 in. Long Pipe Nipple

Pipe Flange

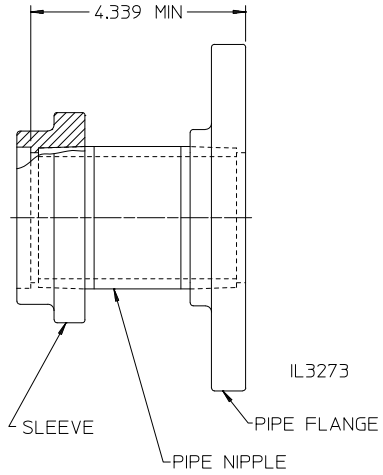
(Reference Waterous Part No. V 3743)



Material: 2-1/2 in. ANSI Class 125 Pipe Flange (2-1/2 NPT x 7.00 in. O.D.

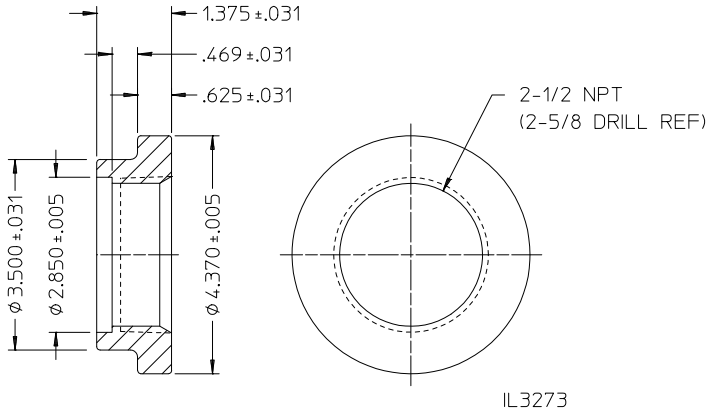
Assembly

(Reference Waterous Part No. 63432)



Sleeve

(Reference Waterous Part No. 63599)



Material: 4.50 in. Diameter Mild Steel Bar Stock

Special Tools Continued

Silicone Sealant Application Tools

Waterous Part No. V 3722

Reference page 58.

This tool is a 1/16 in. (2mm) notched trowel used to apply silicone sealant to the case and cap flanges.

Waterous Part No. 63596

Reference page 58.

This tool is to be used to ensure a 1-1/8 in. (29mm) area around the lubrication return holes in the case and cap are free of silicone.

This tool is available from Waterous or may be fabricated per the diagram below.

TC20 PTO Tool Kit

Waterous Part No. K1151

Includes the following tools:

Drive (Input) Shaft Removal Sleeve

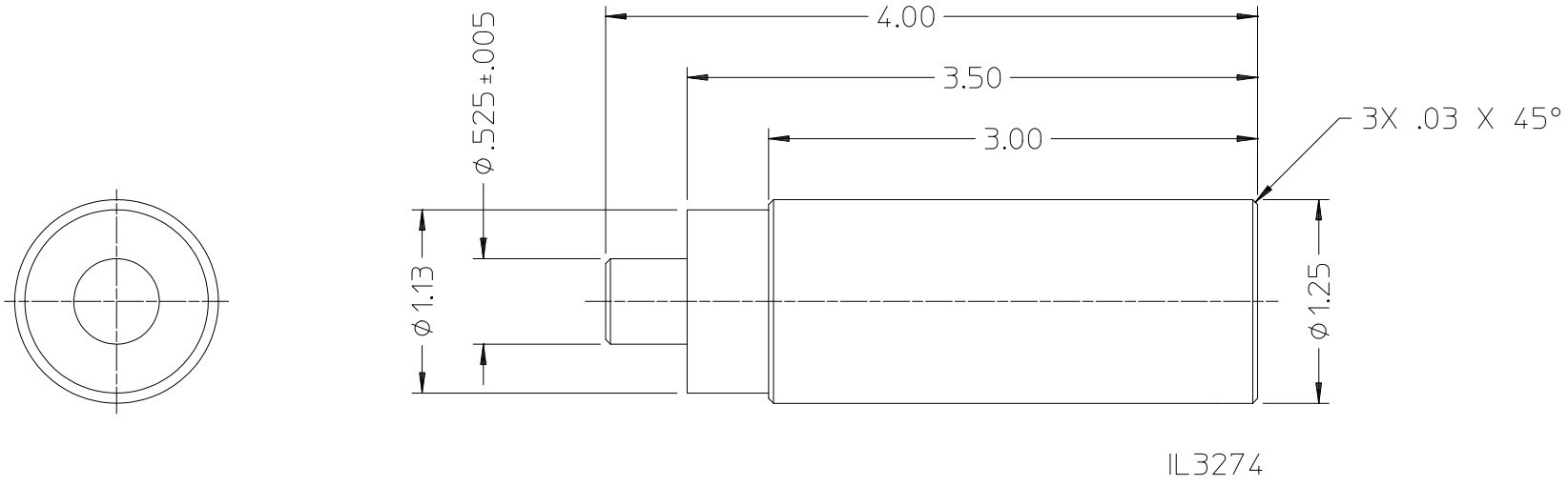
Waterous Part No. 63431

Drive (Input) Shaft Installation Sleeve Assembly

Waterous Part No. 63432

Silicone Sealant Application Tools

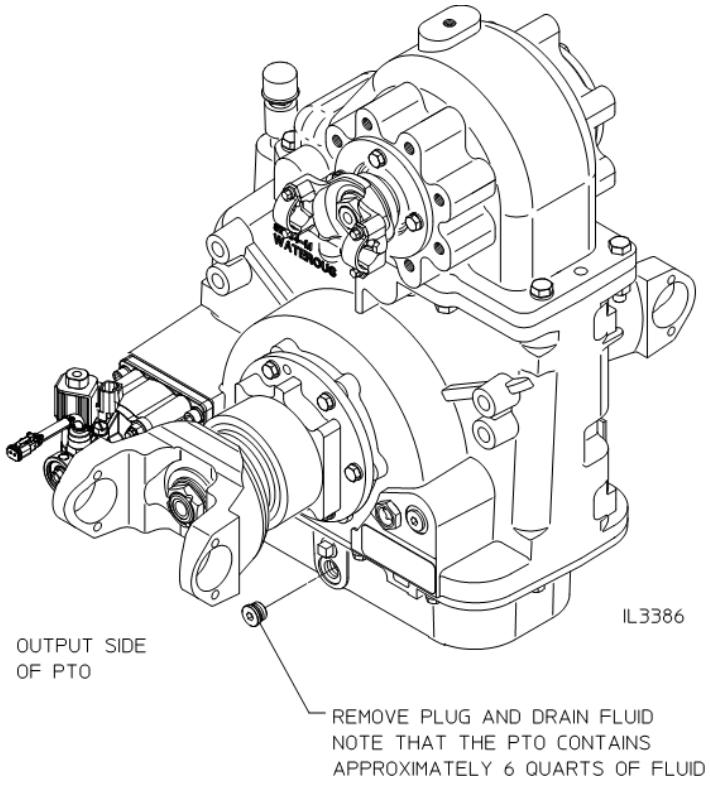
Waterous Part No.'s V 3722 and 63596



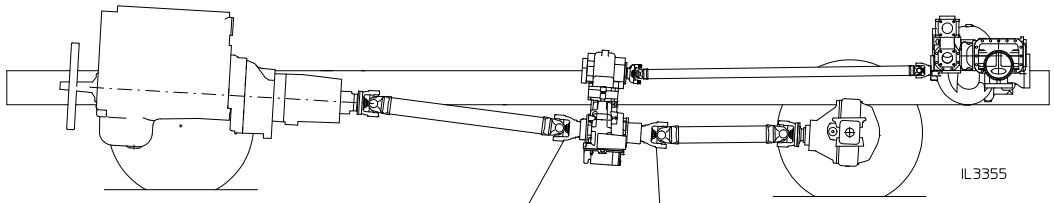
UNLESS OTHERWISE NOTED, DIMENSIONAL TOLERANCE IS ±.031.

Material: 1.250 Diameter Mild Steel Bar Stock

Drain Fluid from PTO



Disconnect Propeller Shaft (Driveline)



Driveline
Input

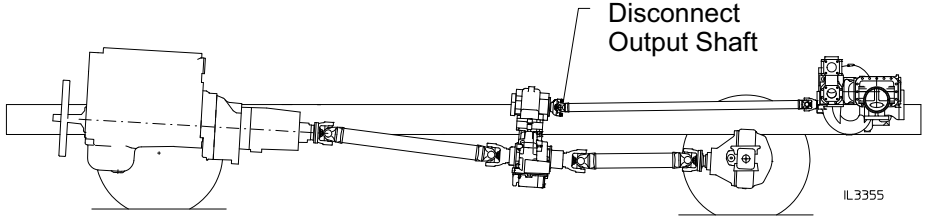
Driveline
Output
(Not required if PTO is configured with an input shaft only.)

Disconnect propeller shaft (driveline) at the PTO input and output shafts and the PTO output shaft.

NOTE: Driveline is furnished and installed by the truck builder, therefore configuration may vary from what is shown in the diagram.

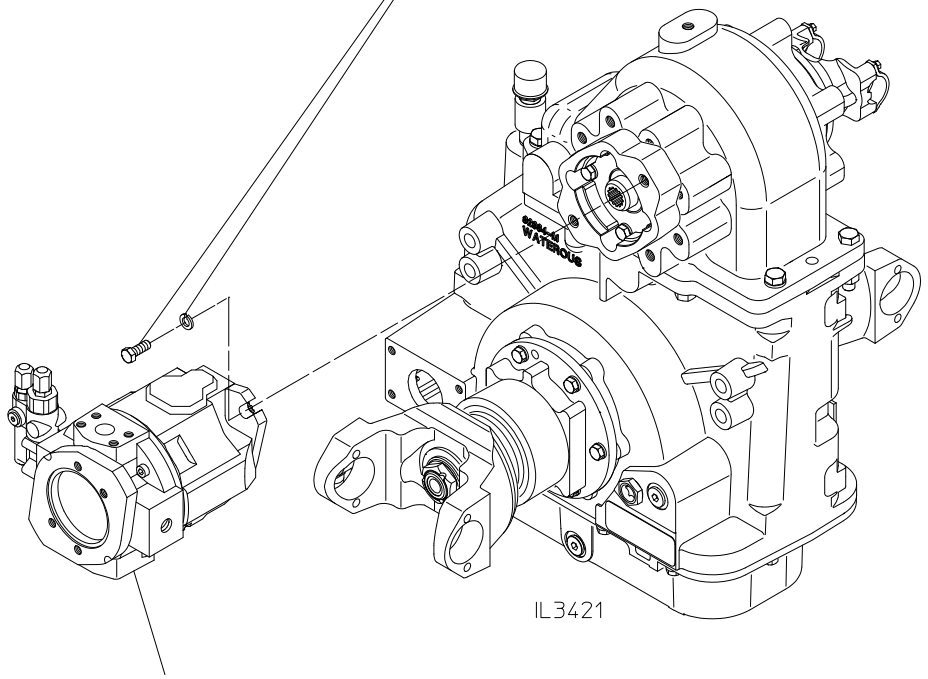
Disassembly - Disconnect Output Shaft

End Yoke Output



Hydraulic Pump or Rear or Front Output

Disconnect hydraulic pump from PTO. Remove two (2) 1/2-13 screws and lockwashers. Slide hydraulic pump away from PTO to disengage splines on shafts.

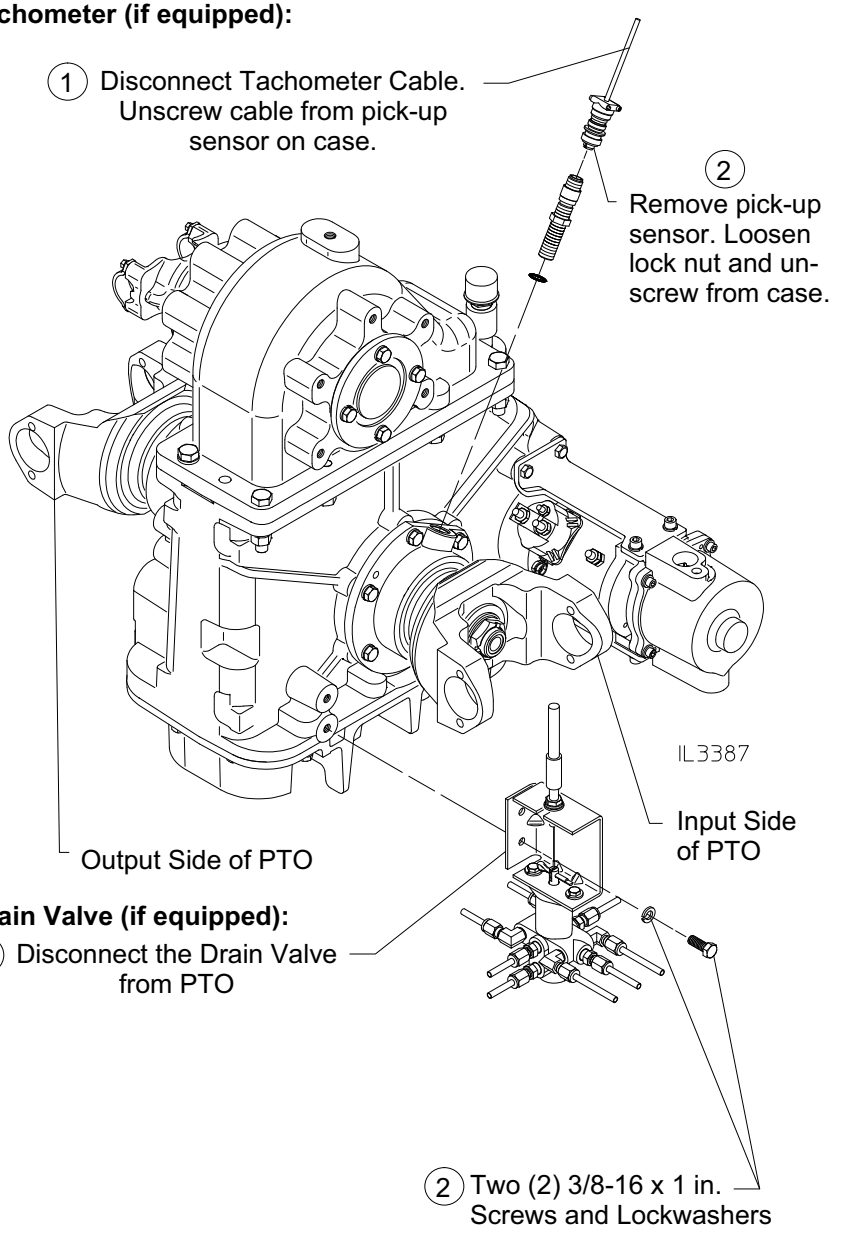


NOTE: Hydraulic Pump is furnished and installed by the truck builder, therefore configurations may vary from what is shown in the diagram.

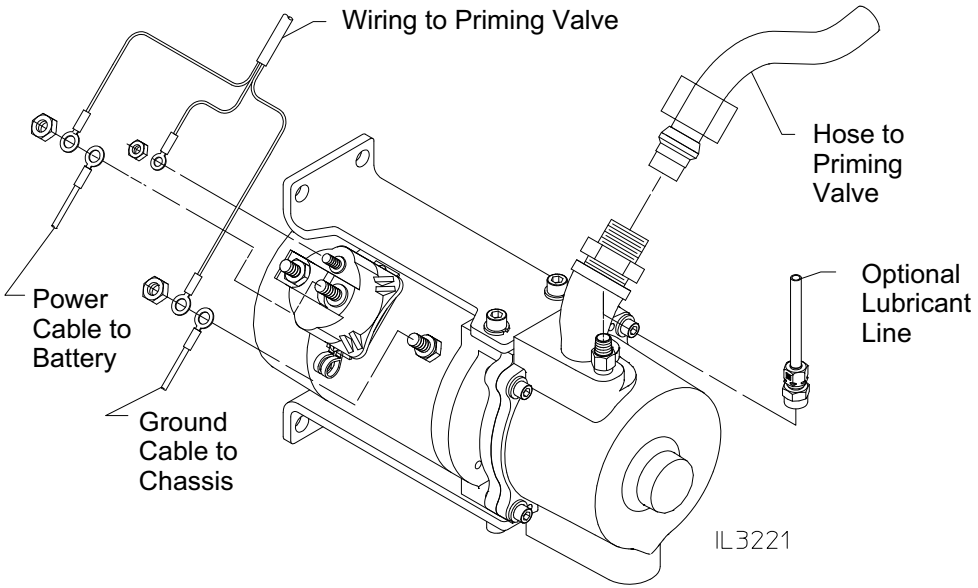
Disassembly - Disconnect Optional Accessories

Tachometer and Drain Valve

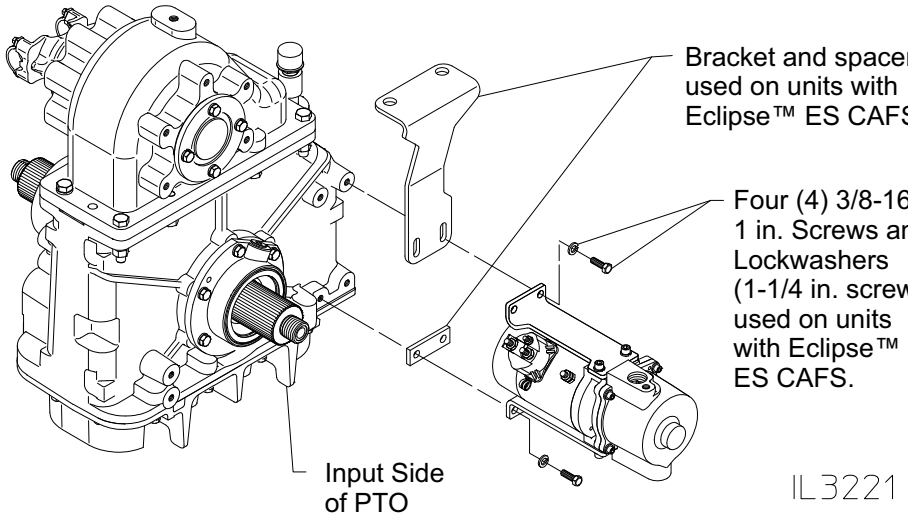
Tachometer (if equipped):



Priming Pump (if equipped) - Disconnect Wiring and Hoses

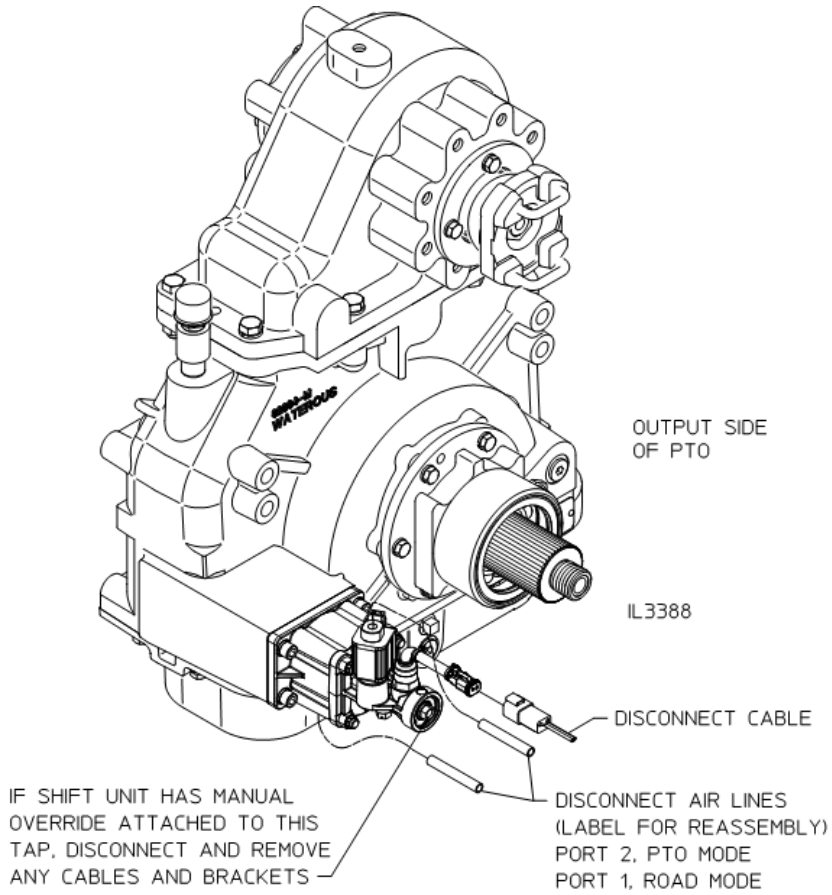


Priming Pump - Remove Priming Pump from Transmission

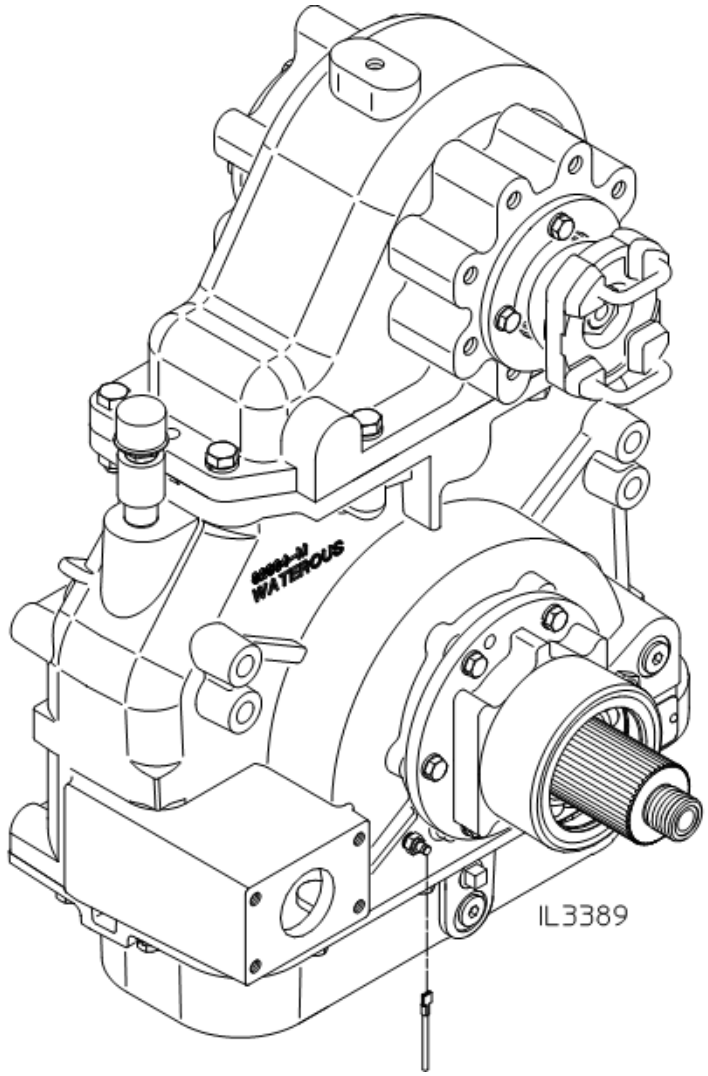


Disassembly - Disconnect Optional Accessories

Shift Unit



Oil Temperature Sensor



Disassembly - Disconnect Optional Accessories

Eclipse™ ES CAFS on Rear Output

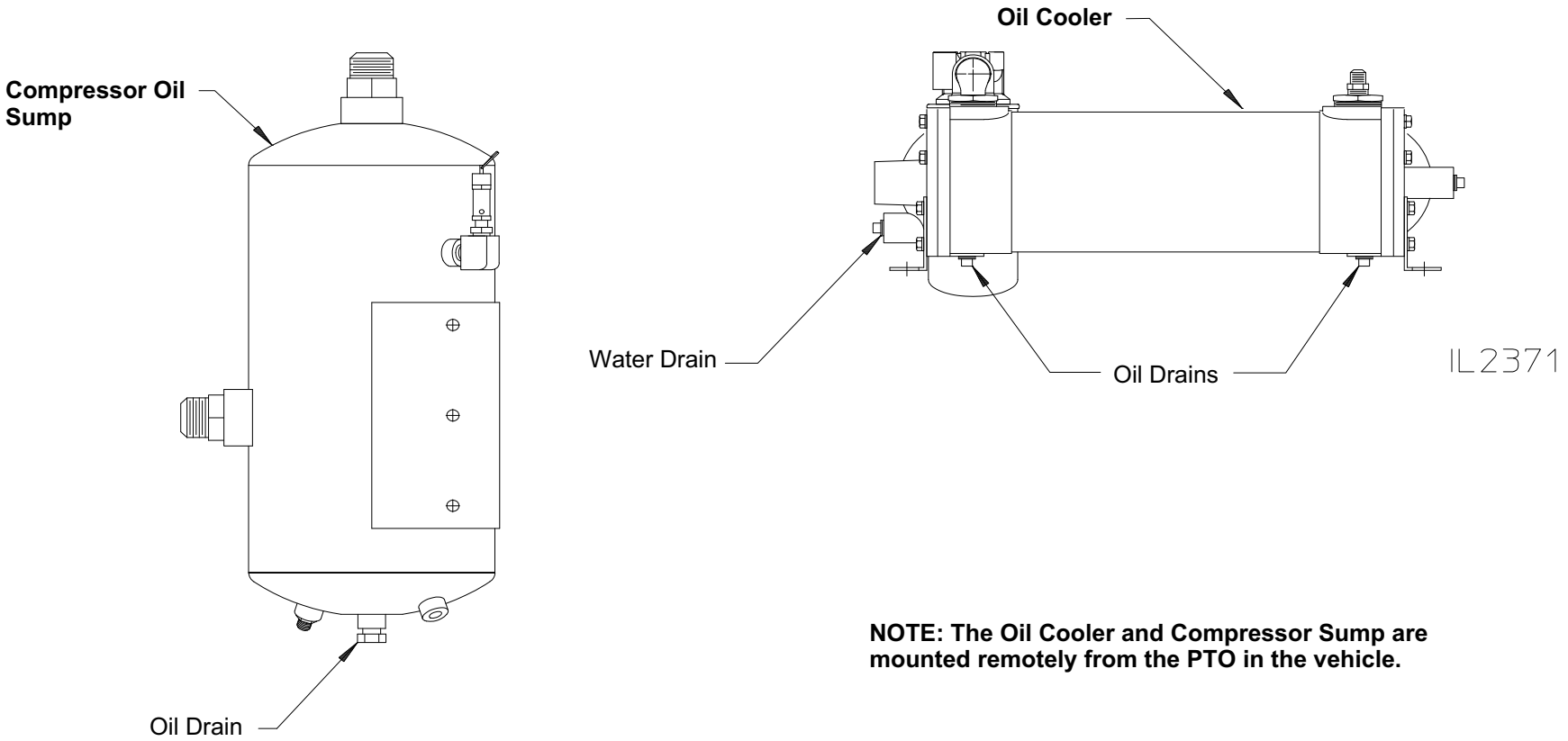
Draining Compressor and Oil Cooler

⚠ WARNING

Electrical Hazard. Possible electrical shock.

Disconnect electrical power to Eclipse™ ES unit (wire connected to Terminal No. 1 on Electrical Relay Panel (see Page 15) to prevent possible electrical shock.

1. Drain compressor oil and oil cooler water. System holds approximately 2 to 3 gallons of oil (continued on next page).



NOTE: The Oil Cooler and Compressor Sump are mounted remotely from the PTO in the vehicle.

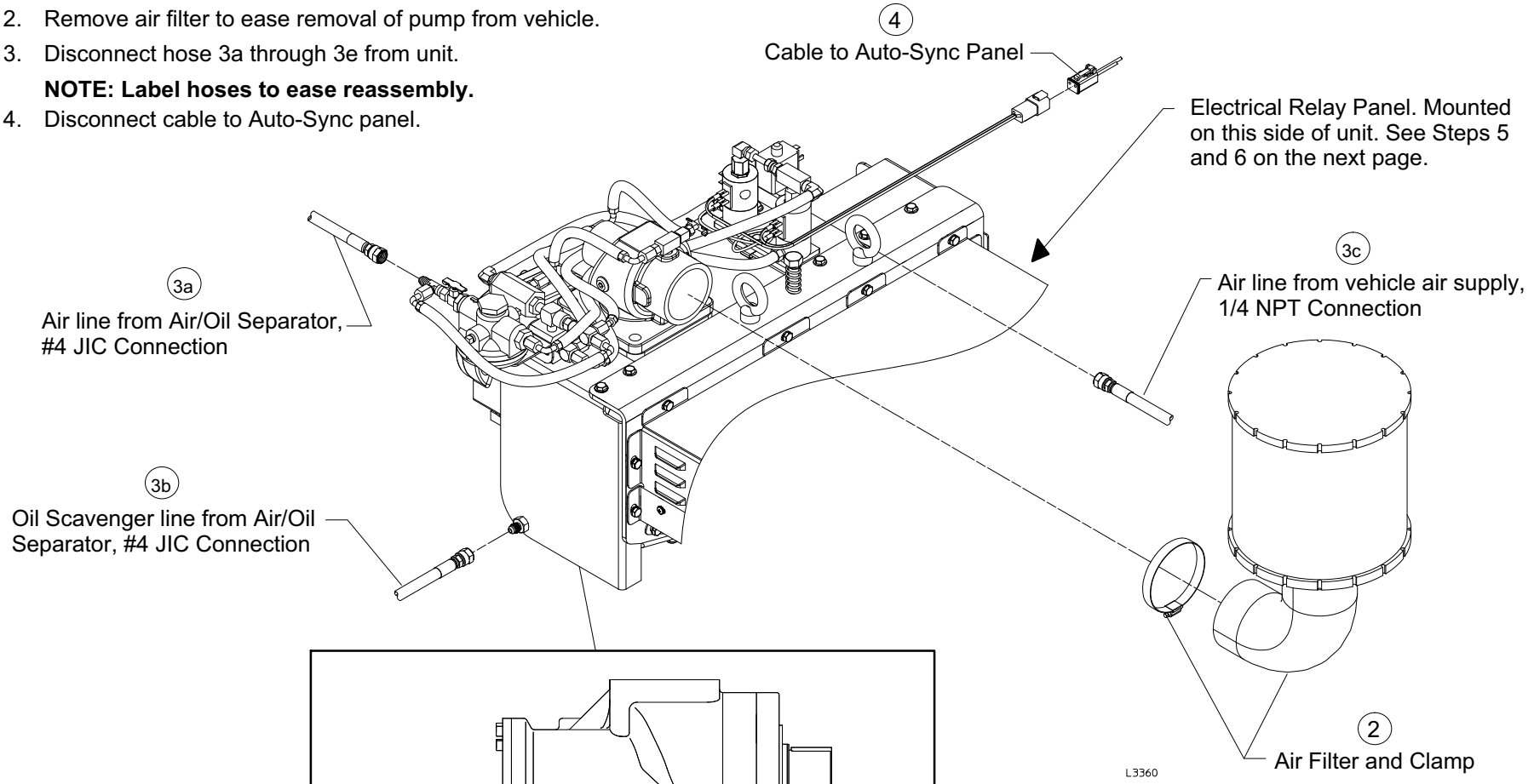
Disassembly - Disconnect Optional Accessories

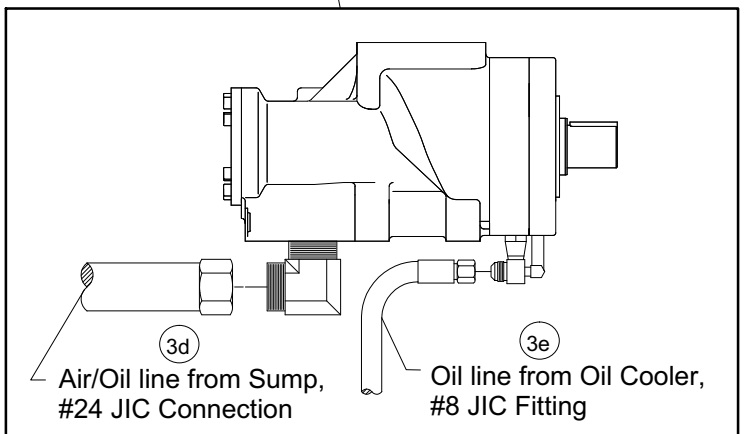
Eclipse™ ES CAFS on Rear Output (Continued)

Removal of Air Filter, Hoses and Cables

2. Remove air filter to ease removal of pump from vehicle.
3. Disconnect hose 3a through 3e from unit.

   NOTE: Label hoses to ease reassembly.
4. Disconnect cable to Auto-Sync panel.





View of Compressor Behind Panel

Disassembly - Disconnect Optional Accessories

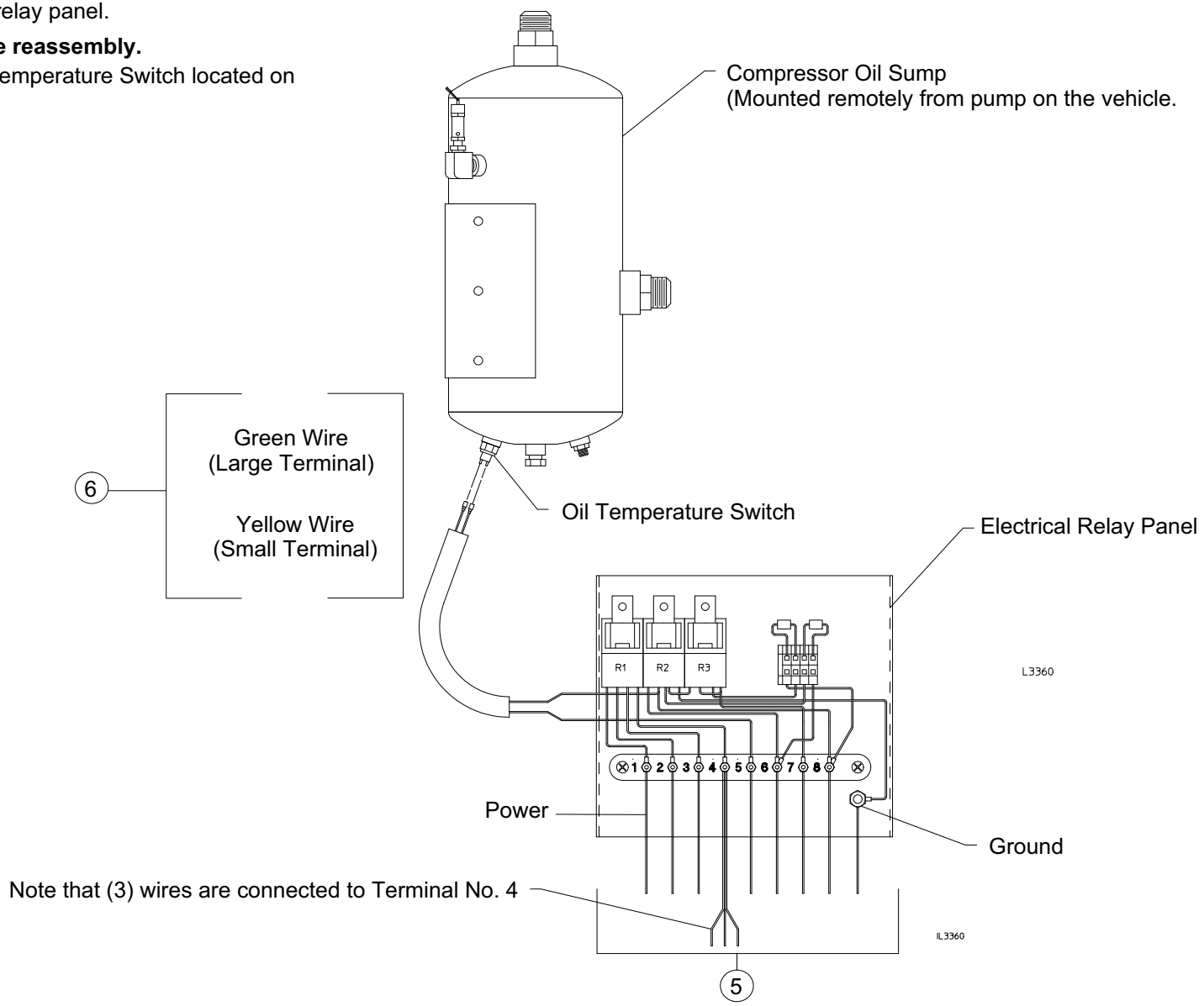
Eclipse™ ES CAFS on Rear Output (Continued)

Disconnect Wiring

5. Disconnect wiring from Terminals 1 through 8 along with ground wire from electrical relay panel.

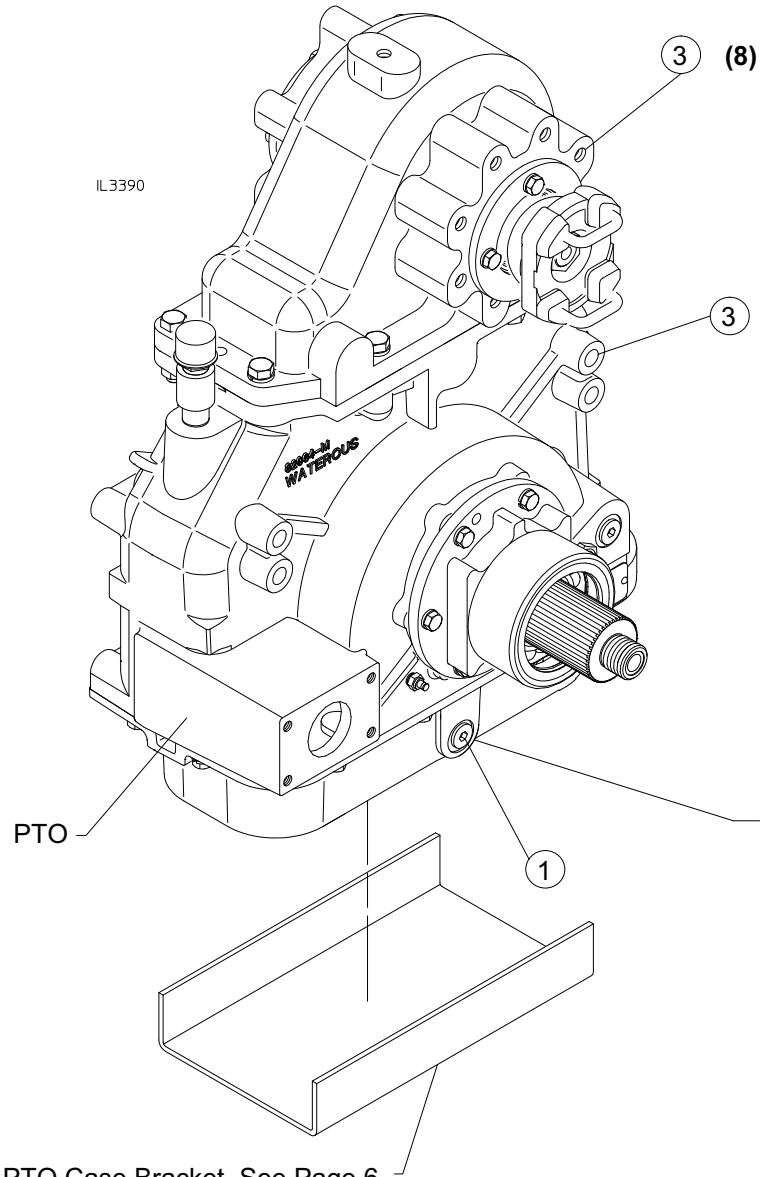
   NOTE: Label wires to ease reassembly.

6. Disconnect wires from Oil Temperature Switch located on the compressor oil sump.



Disassembly - Remove PTO from Vehicle

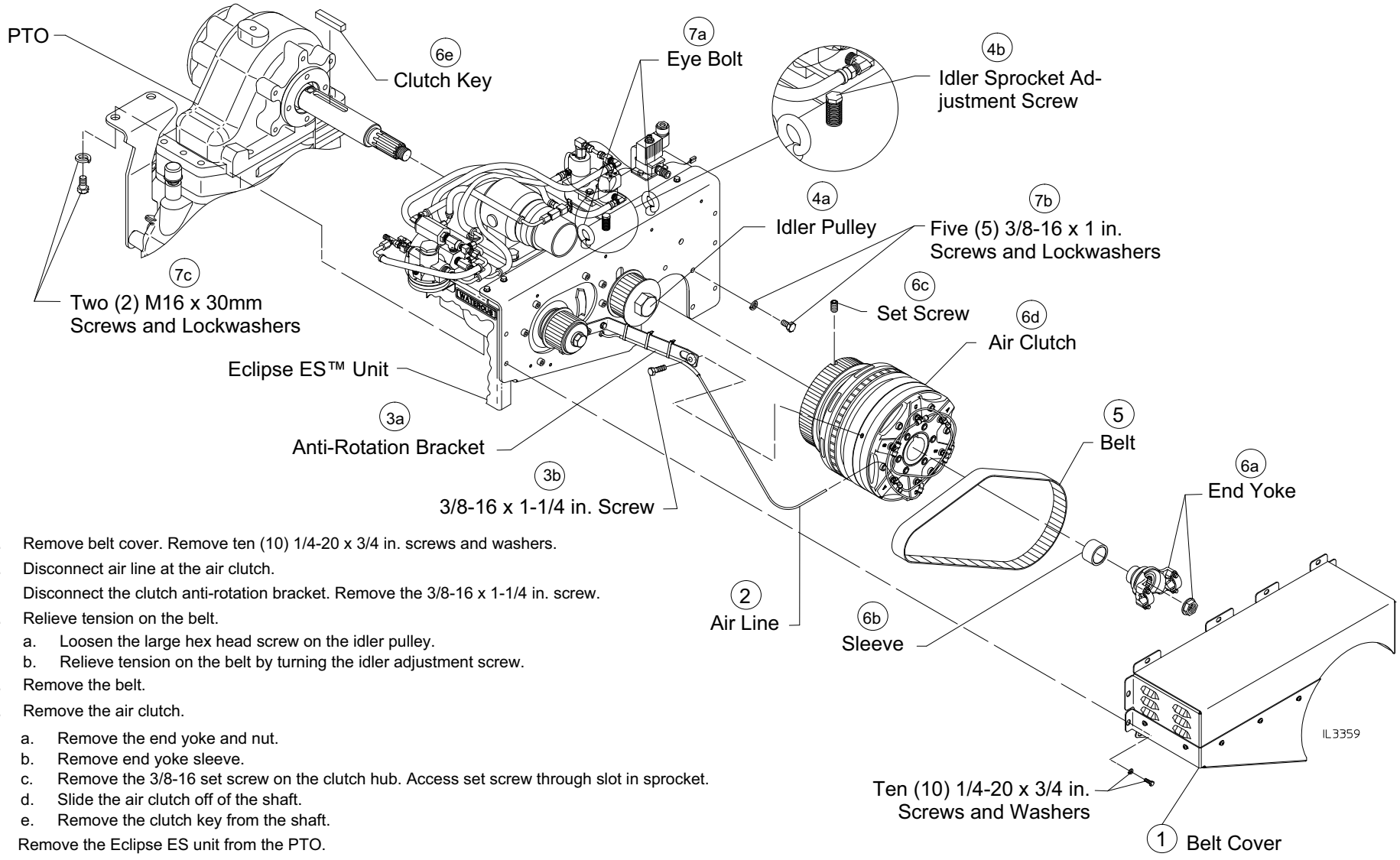
Removing PTO from Vehicle



1. Remove drain plug from case.
2. Place a PTO jack with PTO case support bracket attached (see Page 6 for construction details) under the PTO.
3. Free PTO from all mounting brackets securing it to the chassis. Brackets will normally be attached at the locations shown.
4. Lower PTO from vehicle.
5. Remove bracket and re-install drain plug once PTO is clear of the vehicle

Disassembly - Remove Eclipse™ Unit from PTO

Remove Eclipse™ ES CAFS Unit from PTO

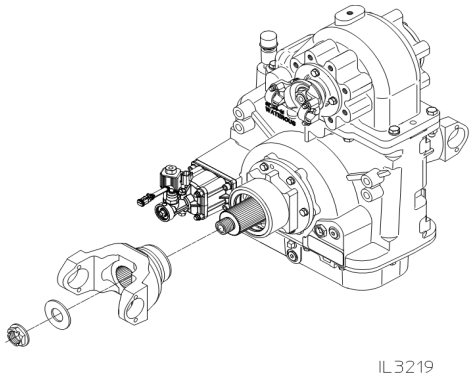


1. Remove belt cover. Remove ten (10) 1/4-20 x 3/4 in. screws and washers.
2. Disconnect air line at the air clutch.
3. Disconnect the clutch anti-rotation bracket. Remove the 3/8-16 x 1-1/4 in. screw.
4. Relieve tension on the belt.
   a. Loosen the large hex head screw on the idler pulley.
   b. Relieve tension on the belt by turning the idler adjustment screw.
5. Remove the belt.
6. Remove the air clutch.
   a. Remove the end yoke and nut.
   b. Remove end yoke sleeve.
   c. Remove the 3/8-16 set screw on the clutch hub. Access set screw through slot in sprocket.
   d. Slide the air clutch off of the shaft.
   e. Remove the clutch key from the shaft.
7. Remove the Eclipse ES unit from the PTO.
   a. Attach a hoist to the Eclipse ES unit. Two (2) eyebolts are provided on the top of the unit for this purpose. Also install a strap under the compressor for a 3-point connection.
   b. Remove the five (5) 3/8-16 x 1 in. screws and washers from the ES unit side of the PTO.
   c. Remove the two (2) M16 x 30mm screw and washer from the opposite side of the PTO.
   d. Remove the Eclipse ES unit.

Disassembly - Removal of Driveline from Case

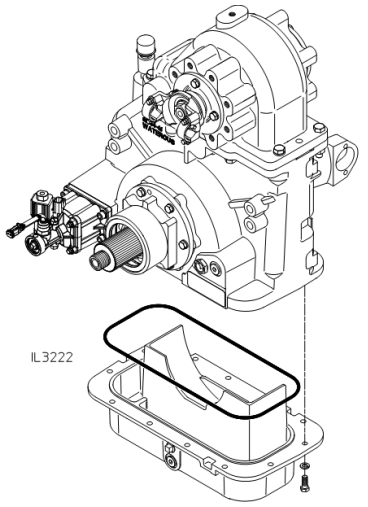
End Yokes or Companion Flanges

1. Remove end yoke or companion flange from input and output shafts. Note that the oil seal will remain in the housing.
2. Discard lock nuts as they are not to be re-used. Note that new lock nuts are included in gasket kit Waterous Part No. K1117.



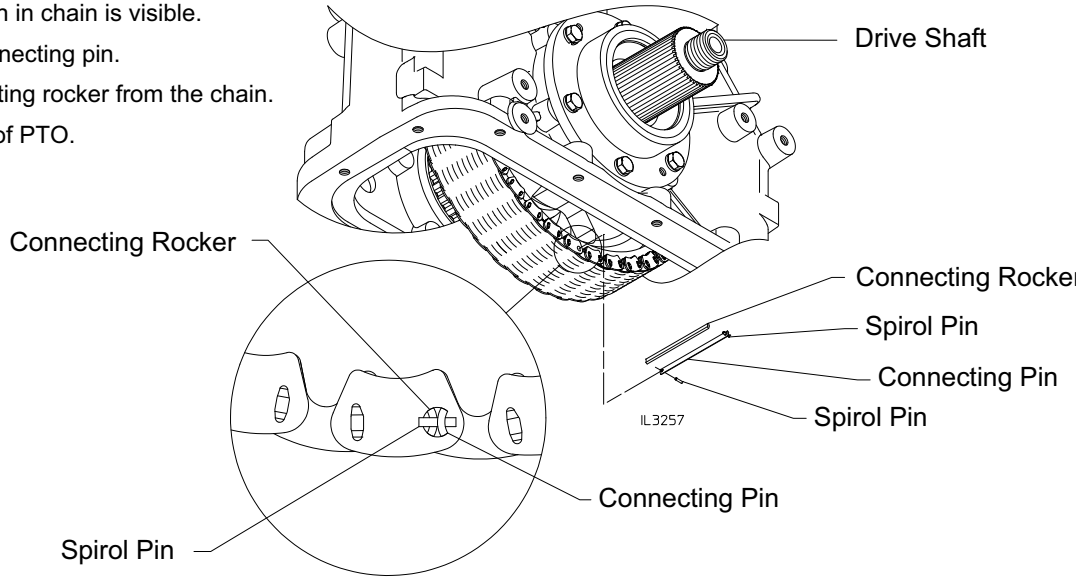
Oil Pan

1. Remove twelve (12) 3/8-16 x 1 in. screws from oil pan.
2. Remove oil pan and gasket.
3. If a new O-ring is required, note that a new O-ring is included in gasket kit Waterous Part No. K1117.



Chain

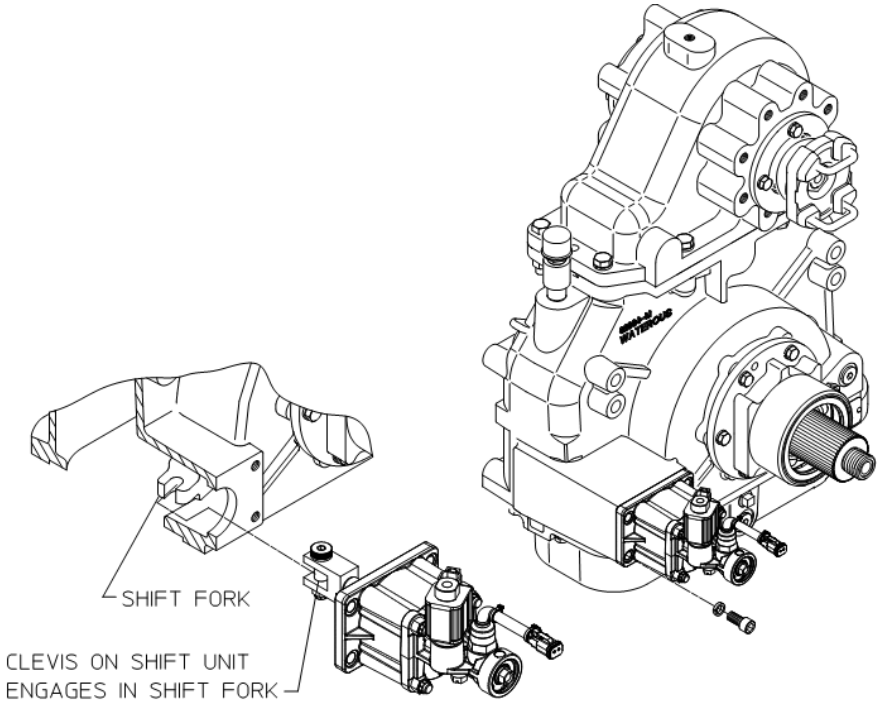
1. Rotate drive shaft until connecting pin in chain is visible.
2. Drive out one spirol pin in end of connecting pin.
3. Drive the connecting pin and connecting rocker from the chain.
4. Separate ends of chain and pull out of PTO.



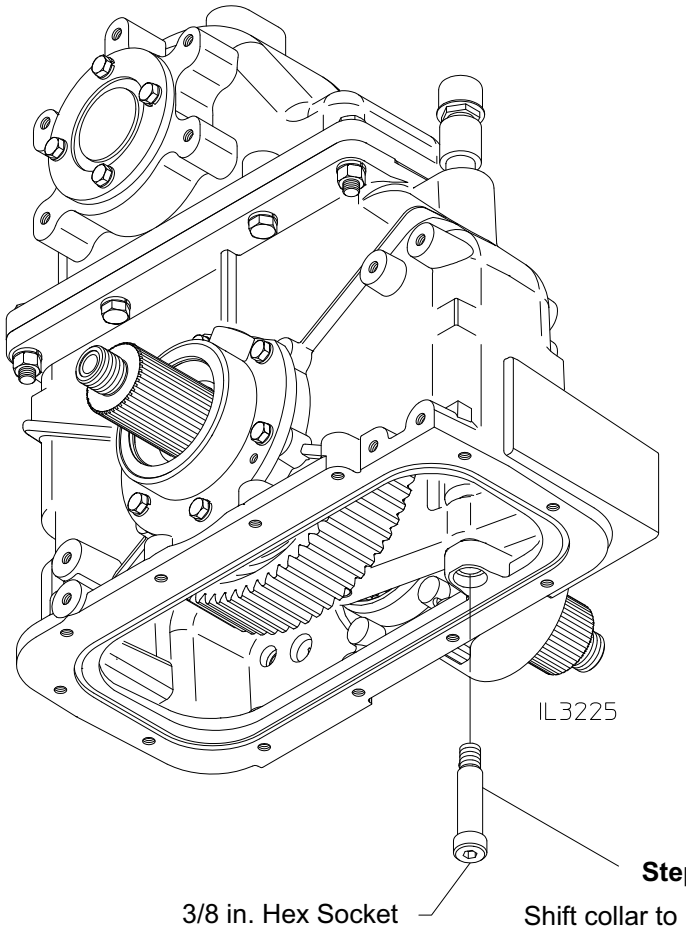
Disassembly - Removal of Driveline from Case (Continued)

Shift Unit

1. Place shift unit in ROAD Mode by pushing override rod in.
2. Remove the four (4) 3/8-16 x 1 in. mounting screws and washers.
3. Pull shift unit straight back as far as possible.
4. Rotate shift unit towards case to disengage clevis from shift fork.



Shift Fork - Step 1

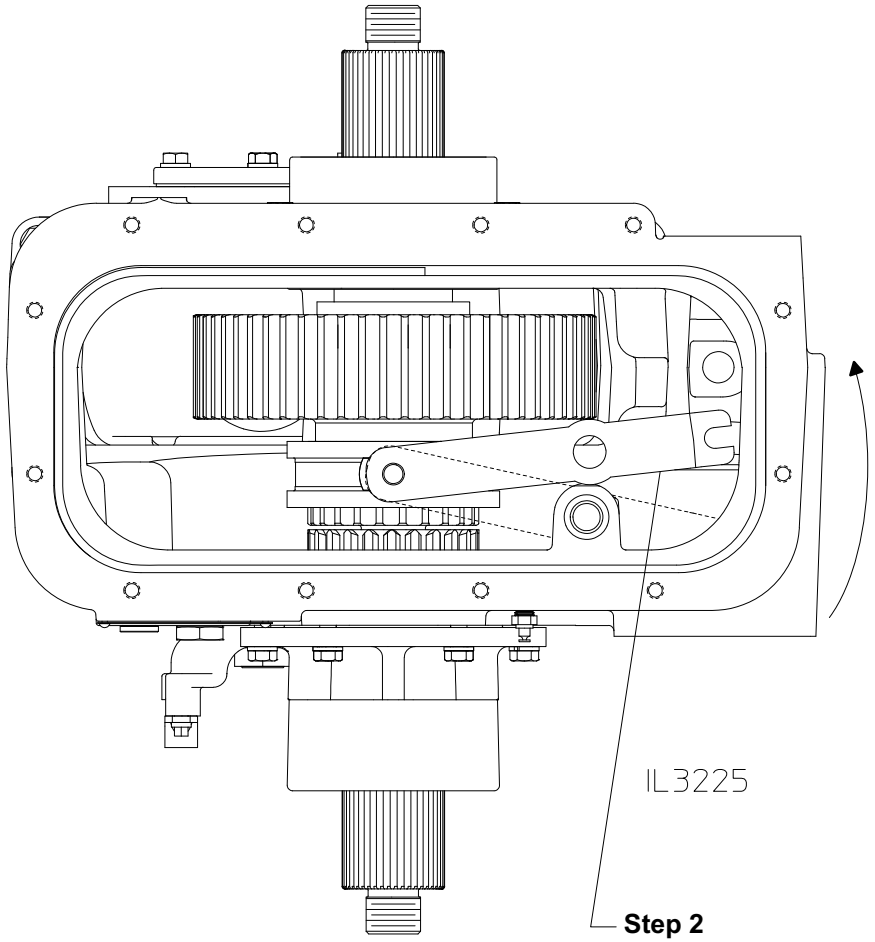


Step 1

Shift collar to PUMP (PTO) position. Remove 3/4 in. shoulder screw and discard. Screw is self-locking and is not to be re-used. Note that a new should screw is included in gasket kit Waterous Part No. K1117.

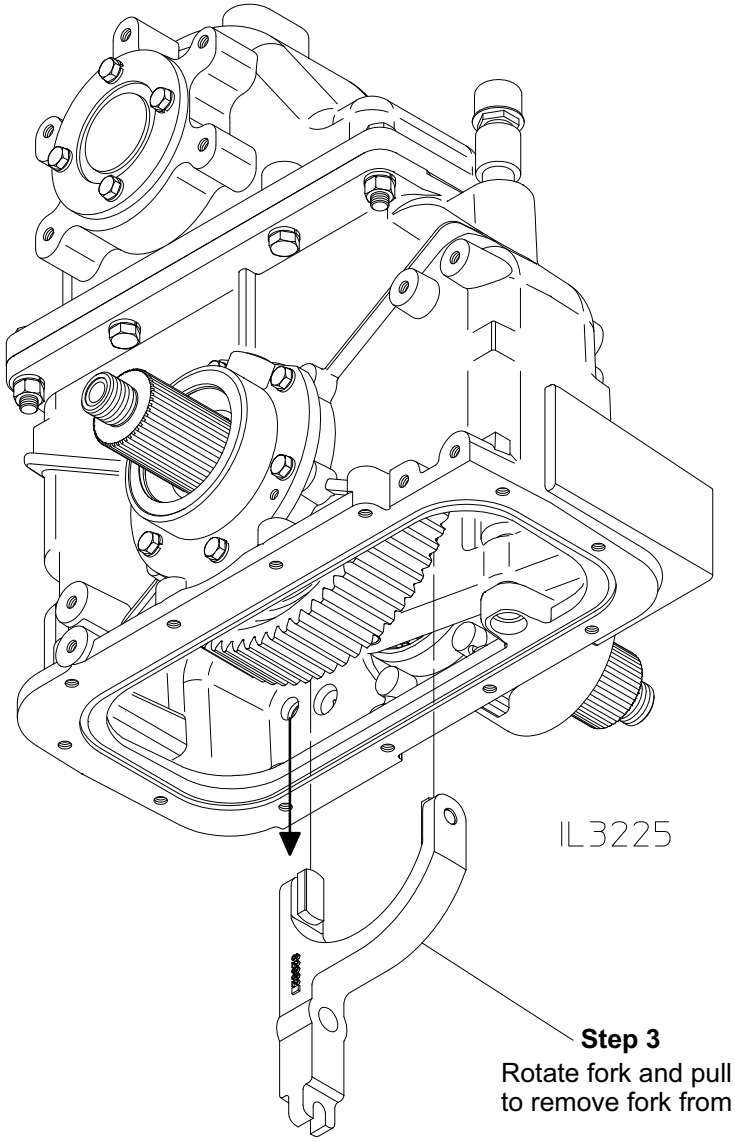
Disassembly - Removal of Driveline from Case (Continued)

Shift Fork - Step 2



Step 2
Push slotted end of shift fork towards sprocket to clear mounting bracket.

Shift Fork - Step 3



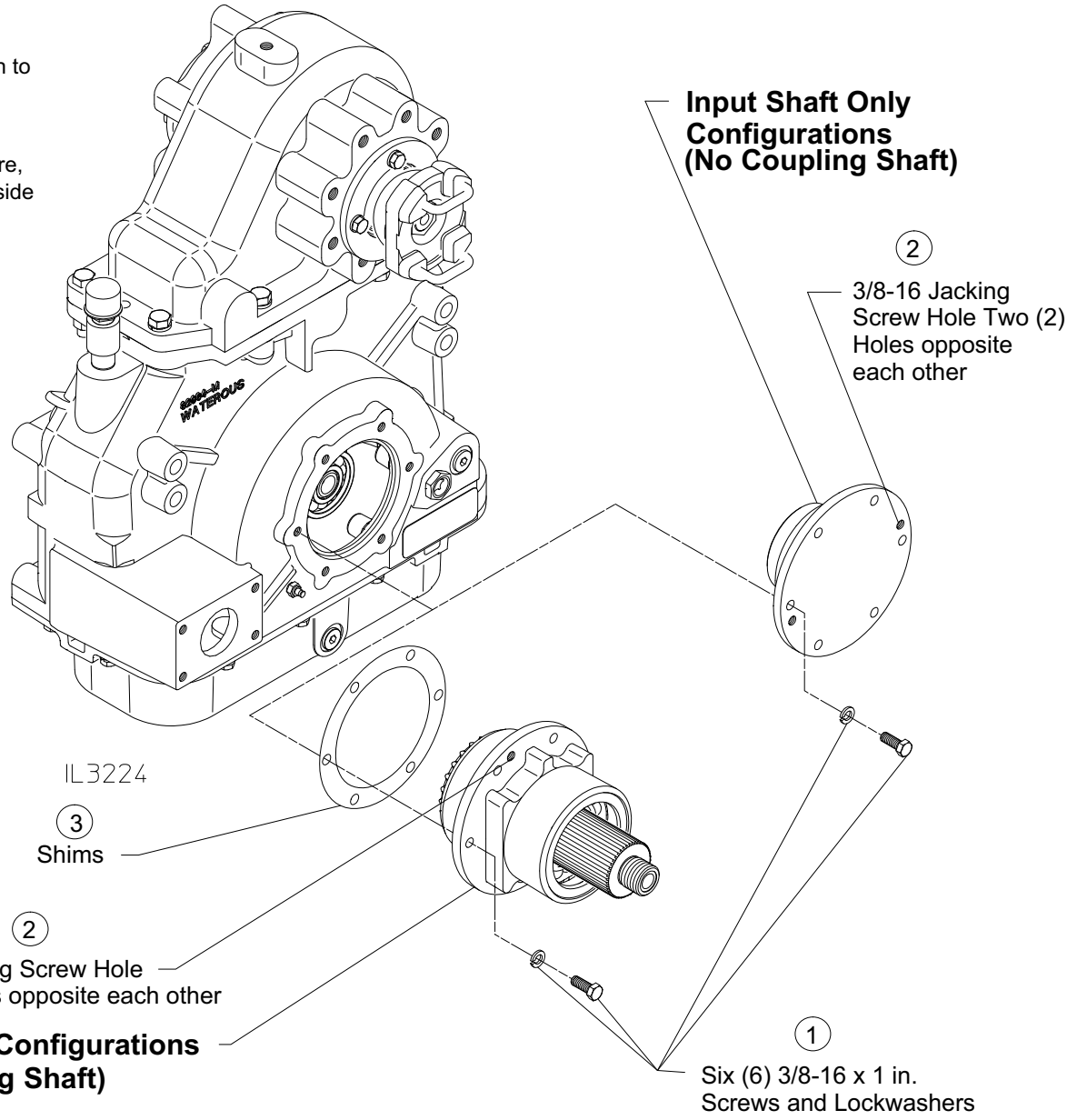
Step 3
Rotate fork and pull down to remove fork from case.

Disassembly - Removal of Driveline from Case (Continued)

Removal of Coupling (Output) Shaft

To remove coupling shaft from output side of case:

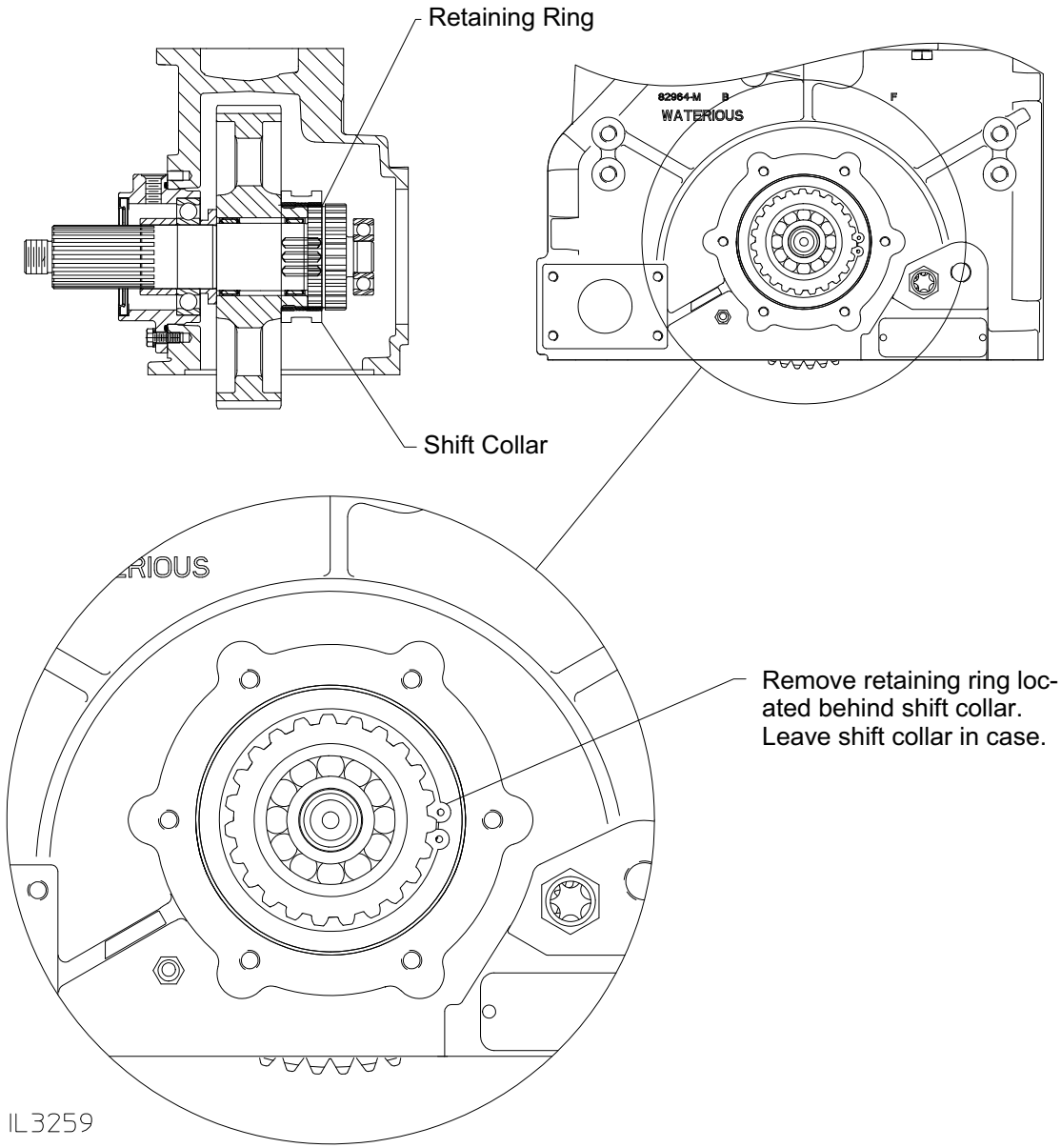
1. Remove six (6) 3/8-16 x 1 in. screws and lockwashers.
2. Install 3/8-16 x 1 in. screws in jacking screw holes and tighten to disengage coupling shaft housing from case.
   - **Input and Output Shaft Configurations:**
     Until coupling shaft housing shoulder / lip clears case bore, grasp coupling shaft and pull while rocking shaft side to side and up and down.
   - **Input Shaft Only Configurations:**
     Only the housing will be removed.
3. PTO's built after March 12, 2013:
   Remove shims.



Disassembly - Removal of Driveline from Case (Continued)

Removal of Drive (Input) Shaft

Shift Collar Retaining Ring (Input Shaft Only Configurations)



Disassembly - Removal of Driveline from Case (Continued)

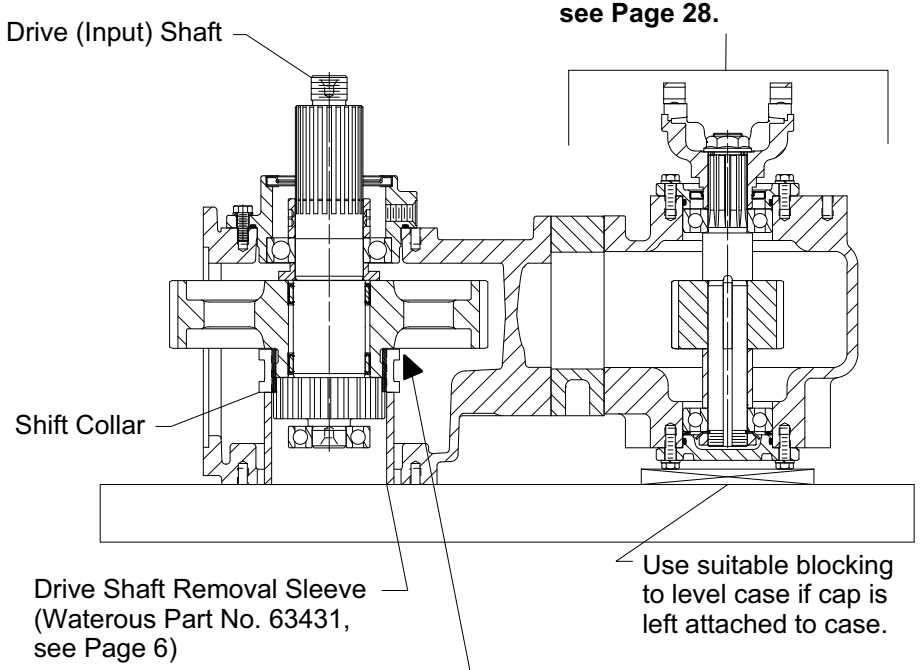
Removal of Drive (Input) Shaft

Pressing Out Drive Shaft

Step 1

Place case on a suitable press as shown with drive shaft removal sleeve (Waterous Part No. 63431, see Page 6) installed under the shift collar. Use suitable blocking to level the case.

If desired, the cap may be removed from the case, see Page 28.

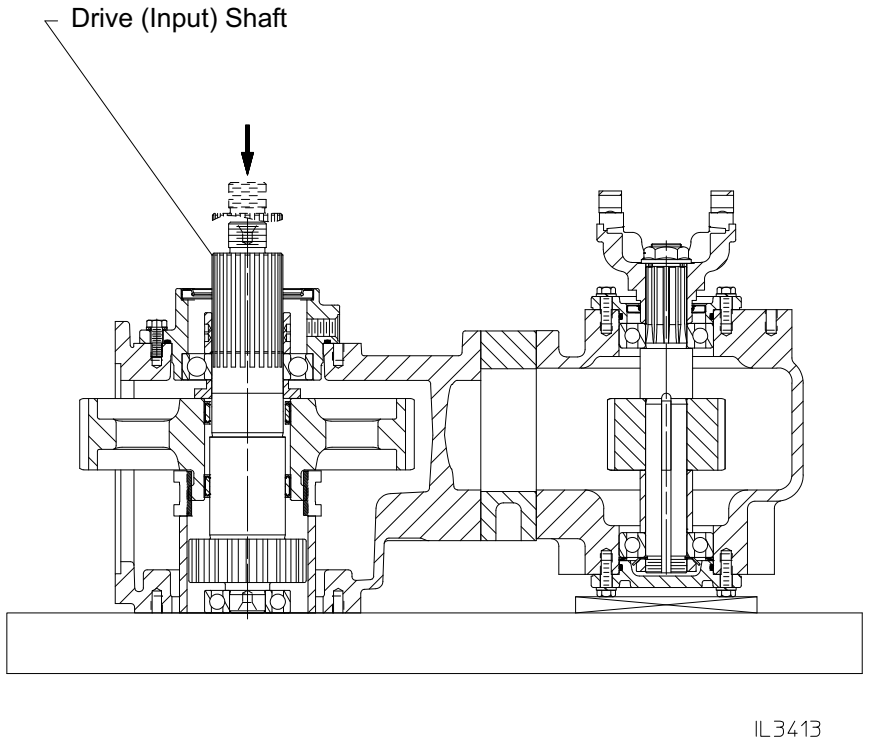


CAUTION

If shaft has a retaining ring behind the shift collar, it must be removed before shaft is pressed out of the case. See Page 22.

Step 2

Apply force to the drive (input) shaft in the direction shown to disengage shaft from case.



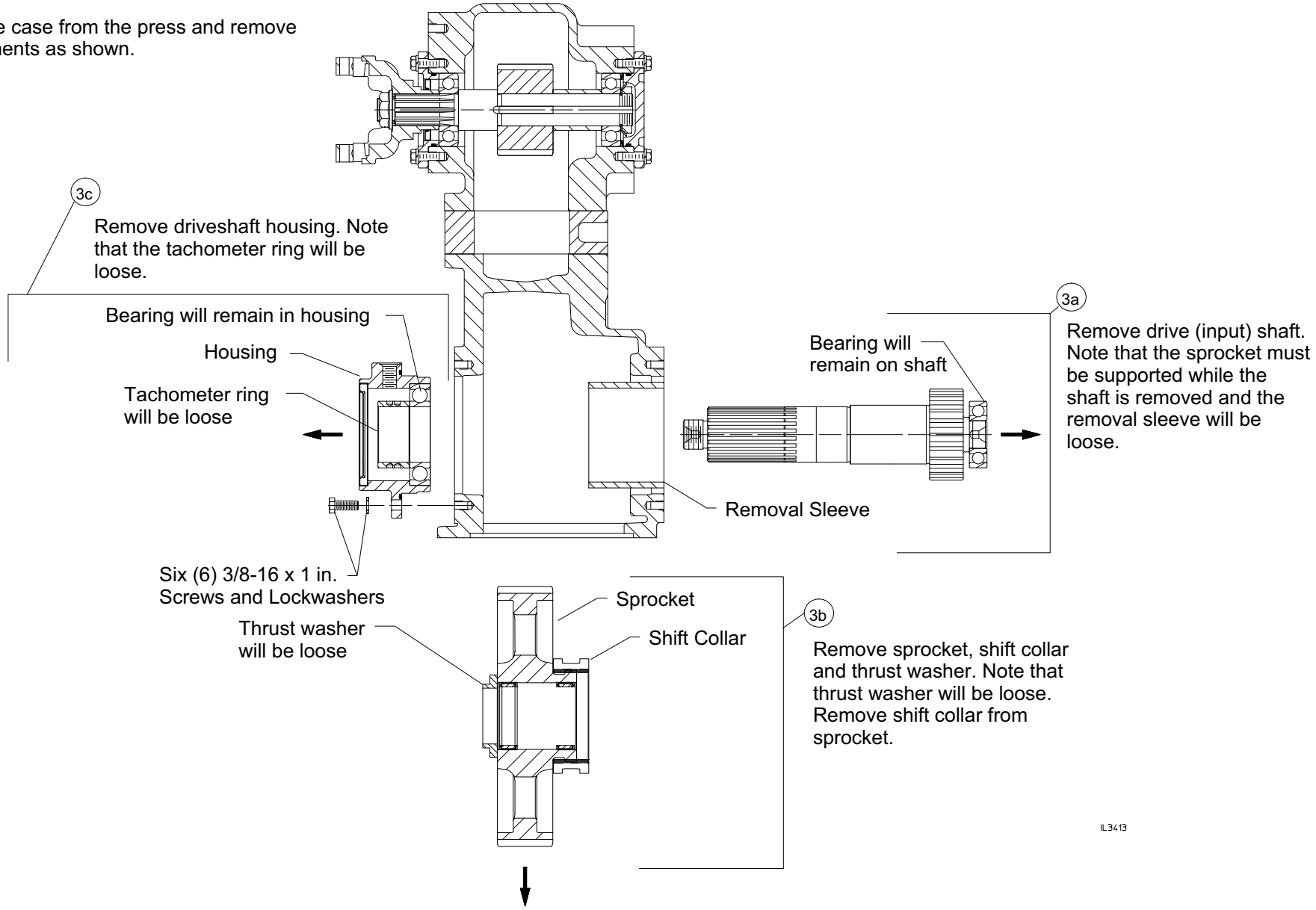
Disassembly - Removal of Driveline from Case (Continued)

Removal of Drive (Input) Shaft

Removing Drive Shaft, Sprocket and Housing

Step 3

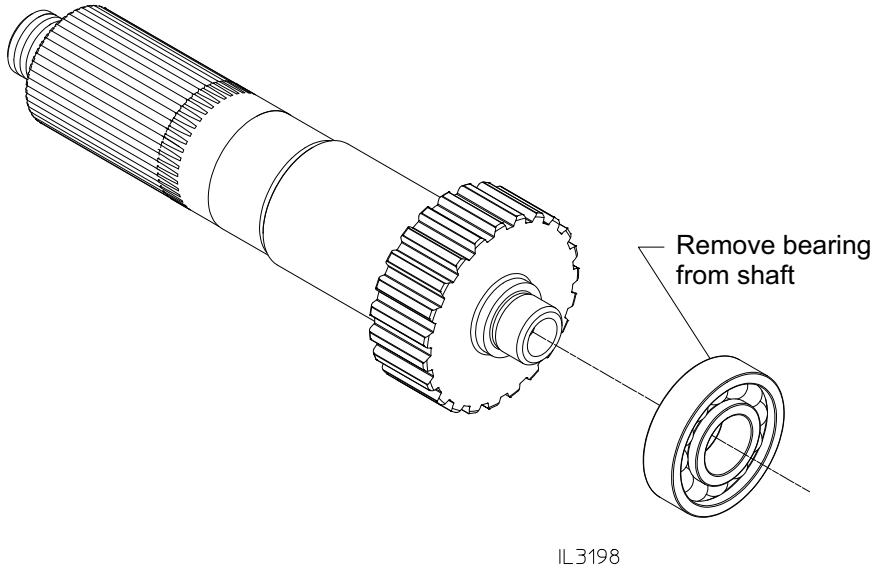
Remove case from the press and remove components as shown.



Disassembly - Driveline Components

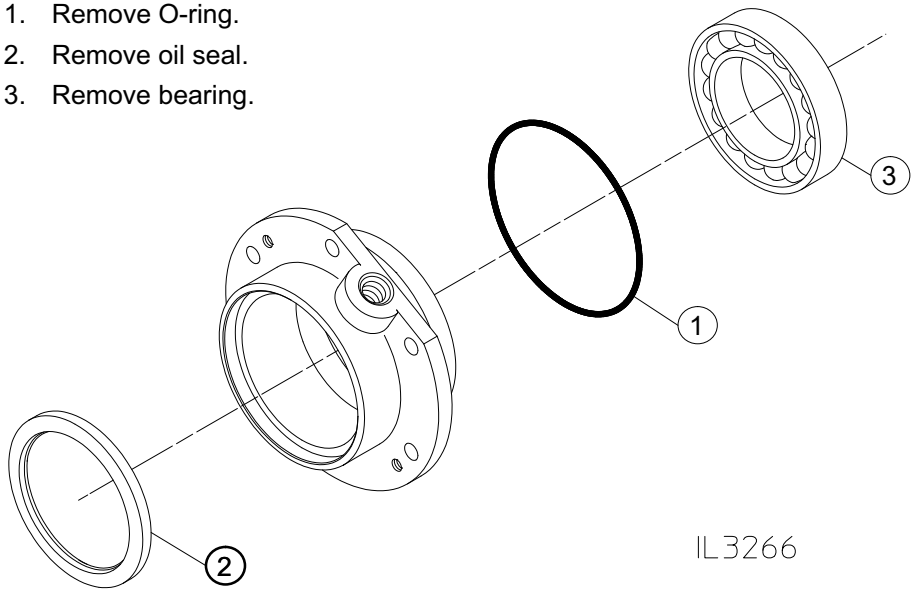
Drive (Input) Shaft

Shaft



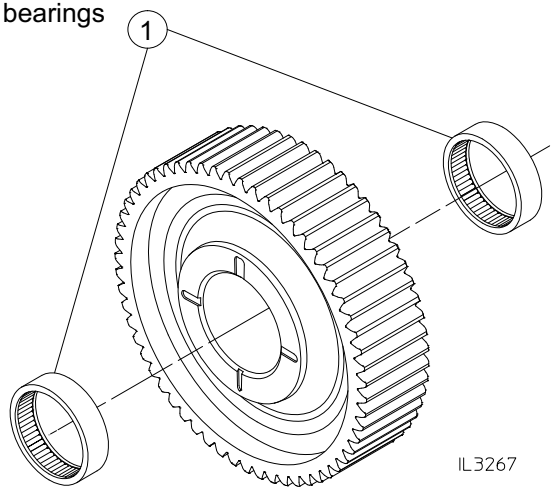
Housing

1. Remove O-ring.
2. Remove oil seal.
3. Remove bearing.



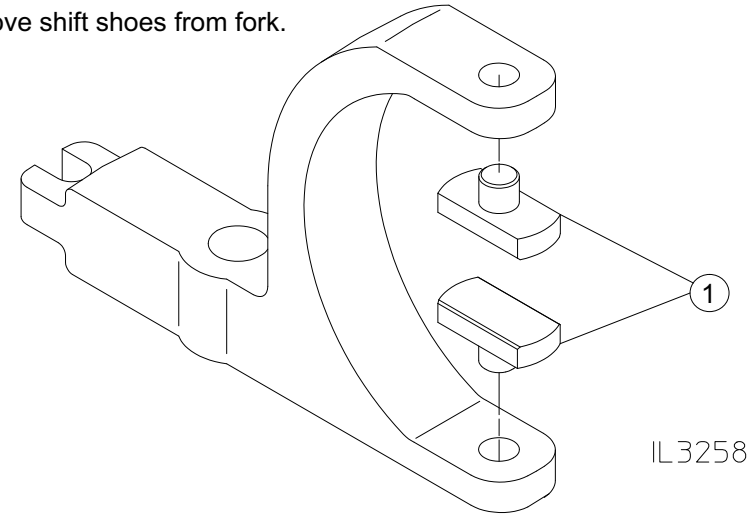
Sprocket

1. Remove both needle bearings from sprocket bore.



Shift Fork Shoes

1. Remove shift shoes from fork.

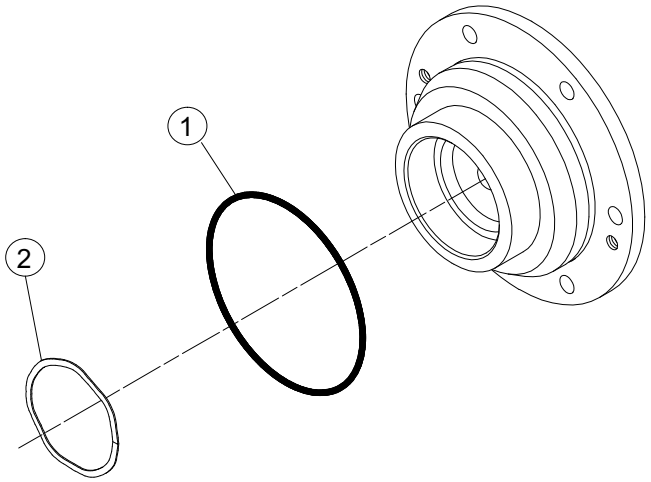


Disassembly - Driveline Components (Continued)

Coupling (Output) Shaft

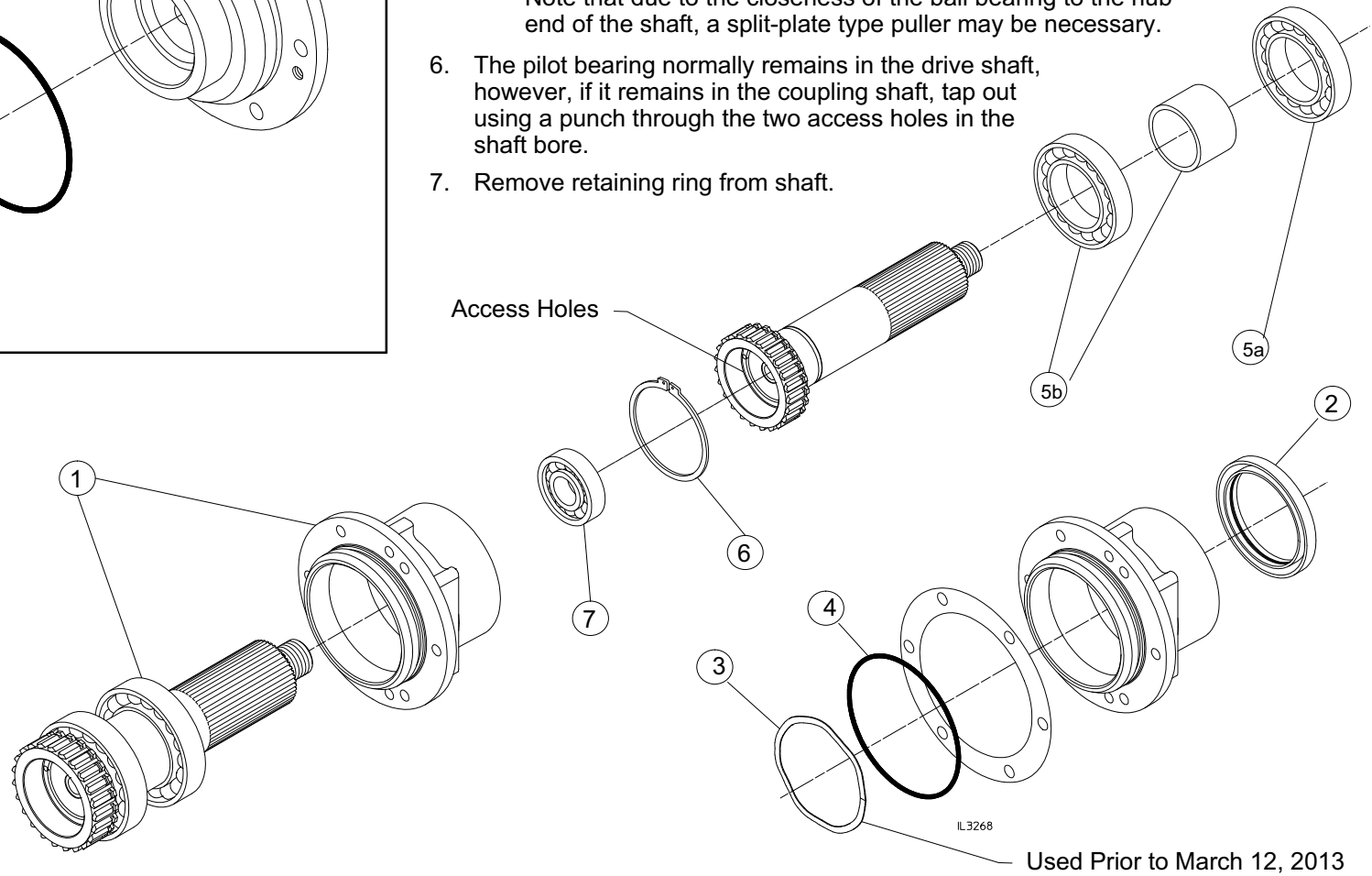
Input Shaft Only Configurations (No Coupling Shaft, Housing Only)

1. Remove O-ring from housing.
2. Remove wave spring from housing.



Input and Output Shaft Configurations

1. Press shaft out of housing.
2. Remove oil seal from housing.
3. Remove wave spring from housing. (PTO's built prior to March 12, 2013 only)
4. Remove O-ring from housing.
5. Remove outer bearing and spacer from shaft.
   a. Pull outer ball bearing from the shaft.
   b. Remove the spacer and pull inner ball bearing from the shaft. Note that due to the closeness of the ball bearing to the hub end of the shaft, a split-plate type puller may be necessary.
6. The pilot bearing normally remains in the drive shaft, however, if it remains in the coupling shaft, tap out using a punch through the two access holes in the shaft bore.
7. Remove retaining ring from shaft.

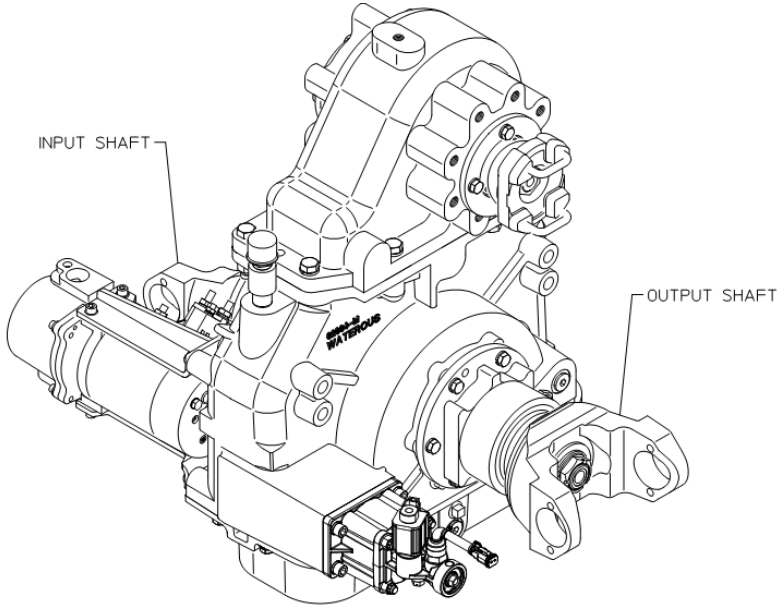


Disassembly - Removal of Output Shaft

Removal of Output Shaft

Various Output Connections are available on TC20 Series PTO's.
The disassembly and reassembly of each varies slightly, use the diagram below to determine the output connection on your PTO.

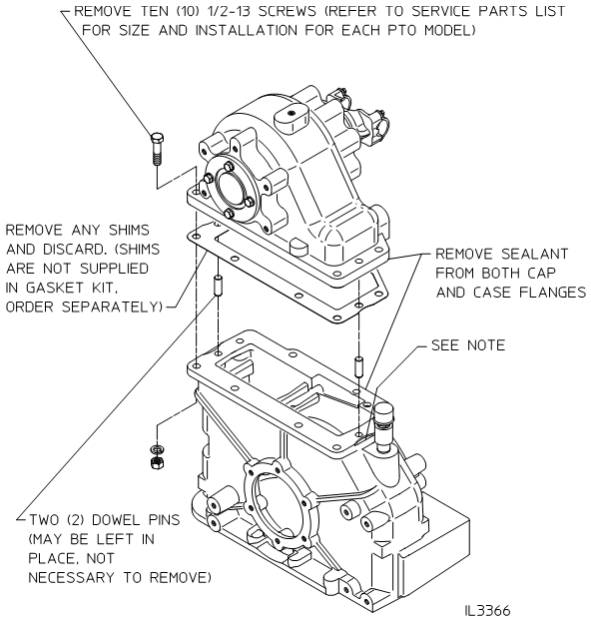
Type	Connection on Front (Input Shaft Side)	Connection on Rear (Output Shaft Side)	See Page	
			Disassembly	Reassembly
Single Output	End Yoke	--	29	37
	Hydraulic Pump	--	31	39
	--	End Yoke (Shown)	30	38
	--	Hydraulic Pump	32	40
	--	Eclipse™ ES CAFS	33	41
Dual Output	End Yoke	Hydraulic Pump	34	42
	Hydraulic Pump	End Yoke	35	43



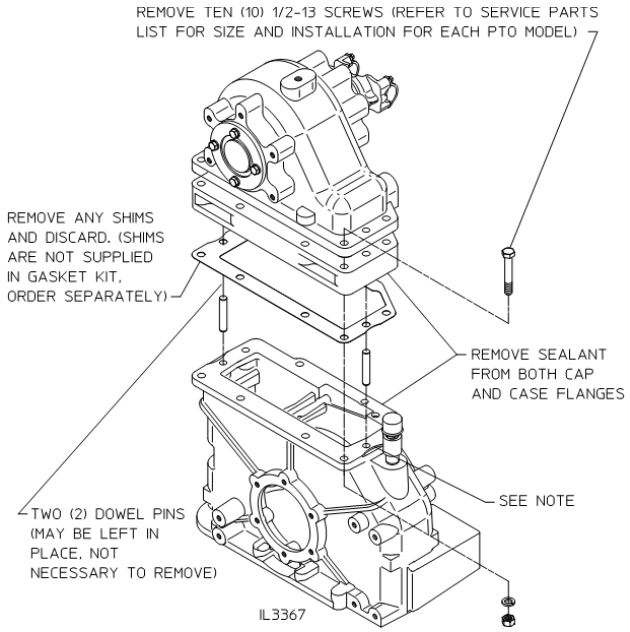
Disassembly - Removal of Output Shaft

Remove Cap from Case

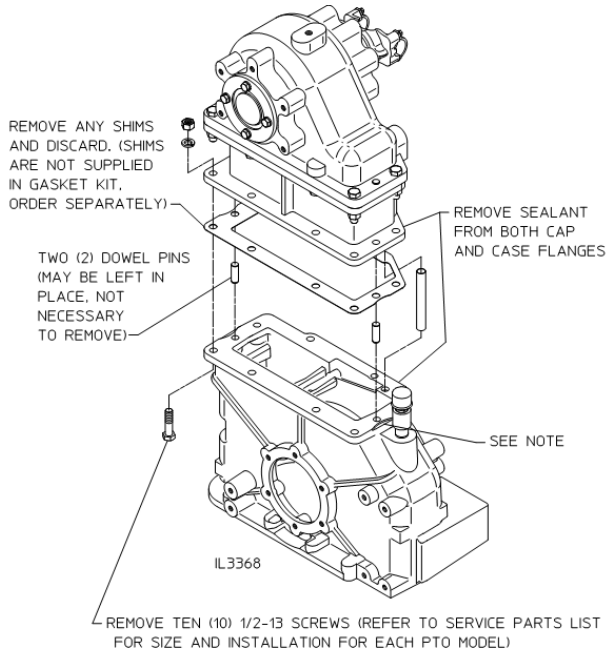
TC20B Models



TC20C Models



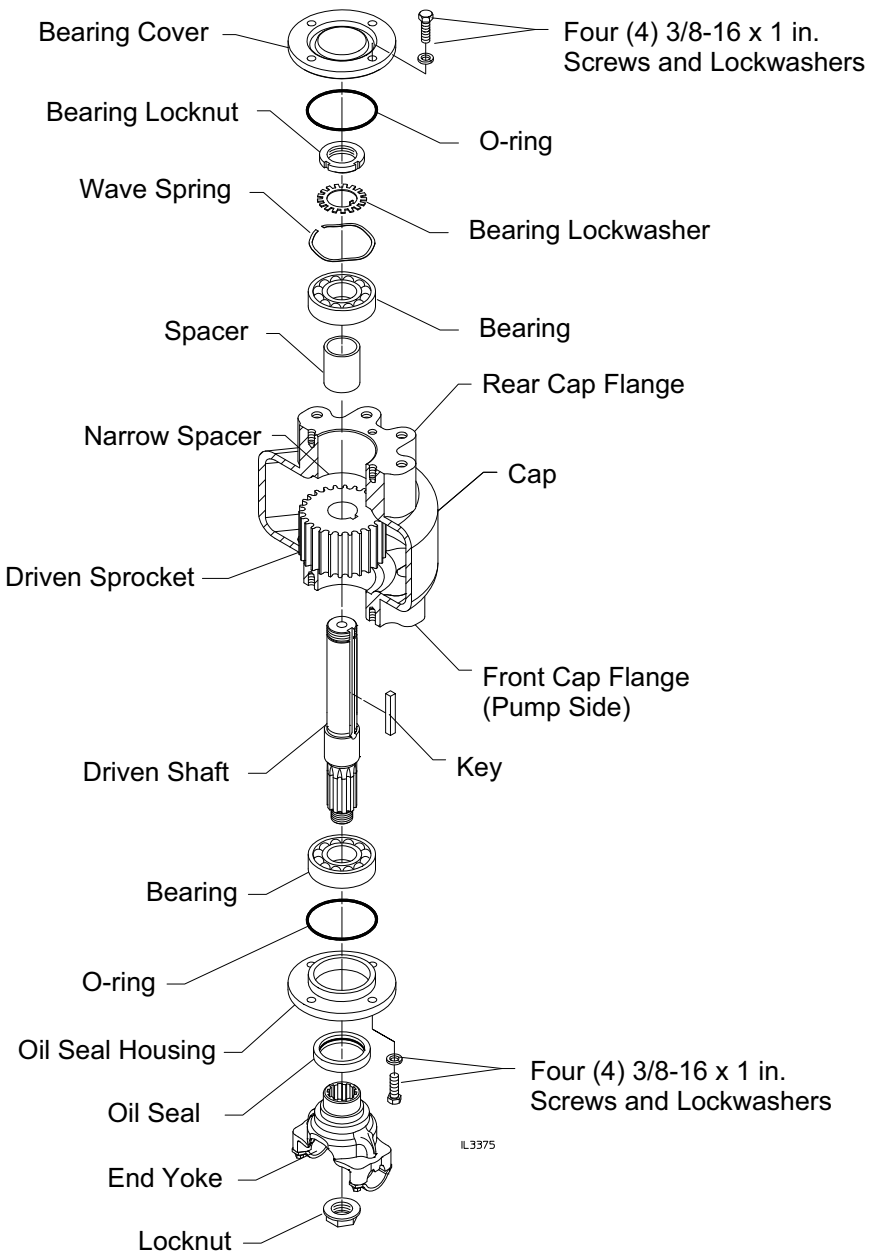
TC20D, TC20E and TC20F Models

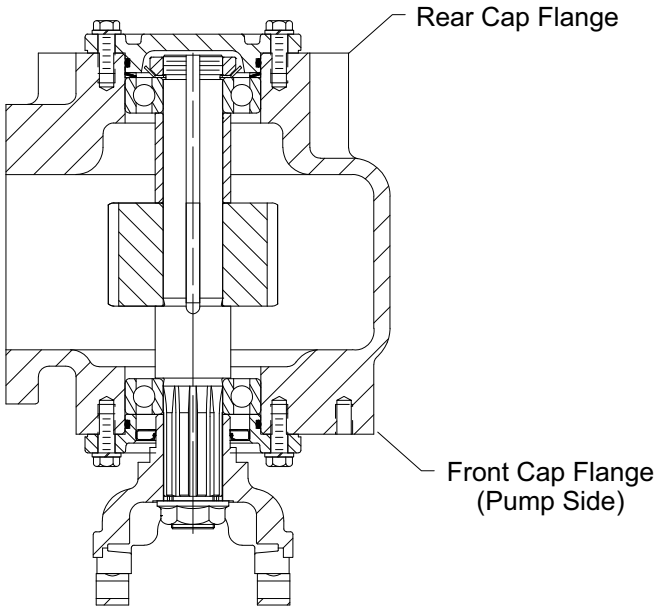


Note: The two (2) slots in the case flange may be used to help separate the cap from the case.

Disassembly - Disassemble Cap

End Yoke on Front of PTO

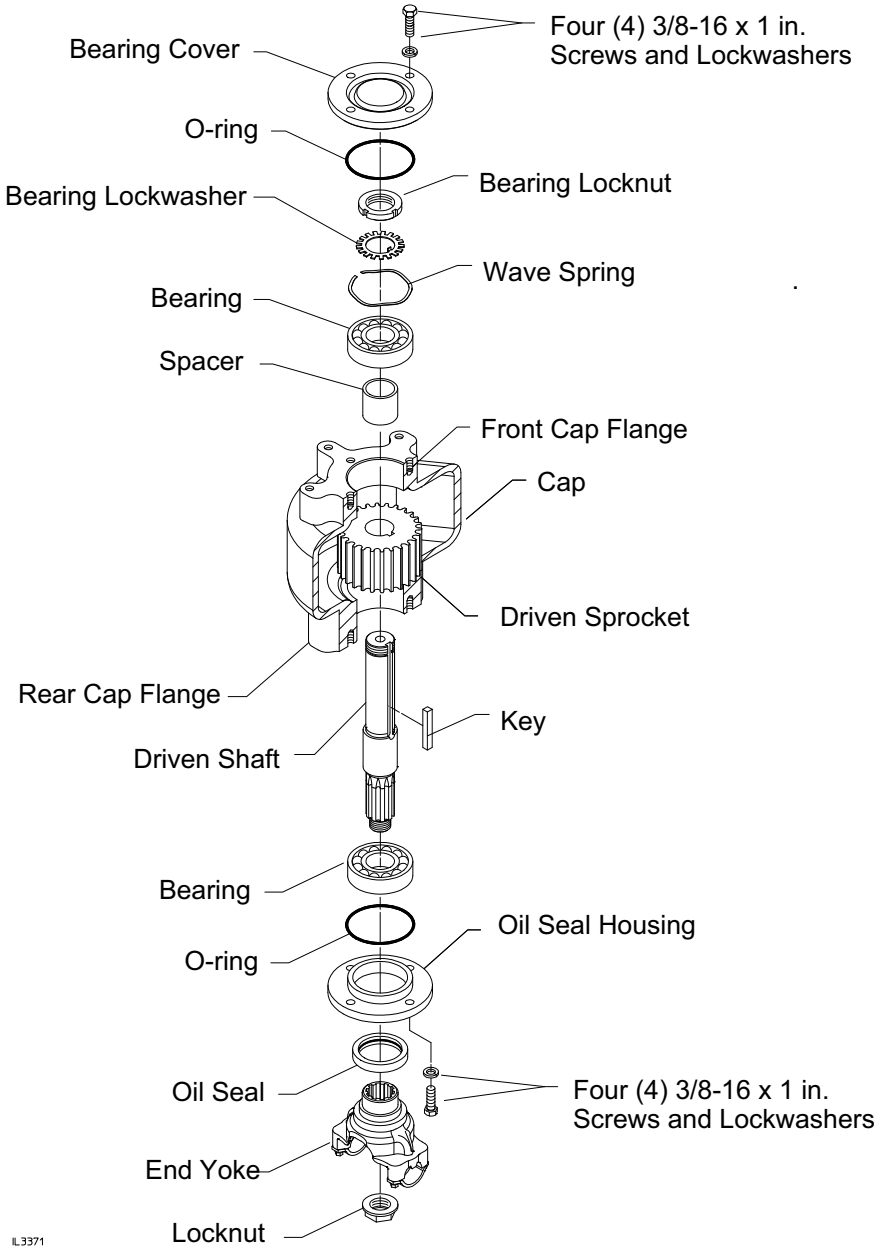


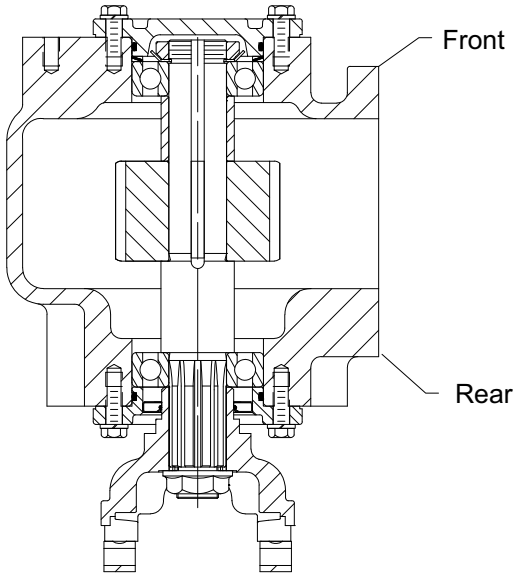


1. Remove the end yoke and locknut. Discard locknut.
2. Remove the screws that fasten the bearing cover and oil seal housing to the cap. Remove cover and housing. Discard the oil seal.
3. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the locknut, lockwasher and wave spring.
4. Under a press, support the assembly on the front face side of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacer and sprocket.
5. Remove the ball bearing, spacer and sprocket from cap.
6. Remove front ball bearing from shaft.

Disassembly - Disassemble Cap (Continued)

End Yoke on Rear of PTO

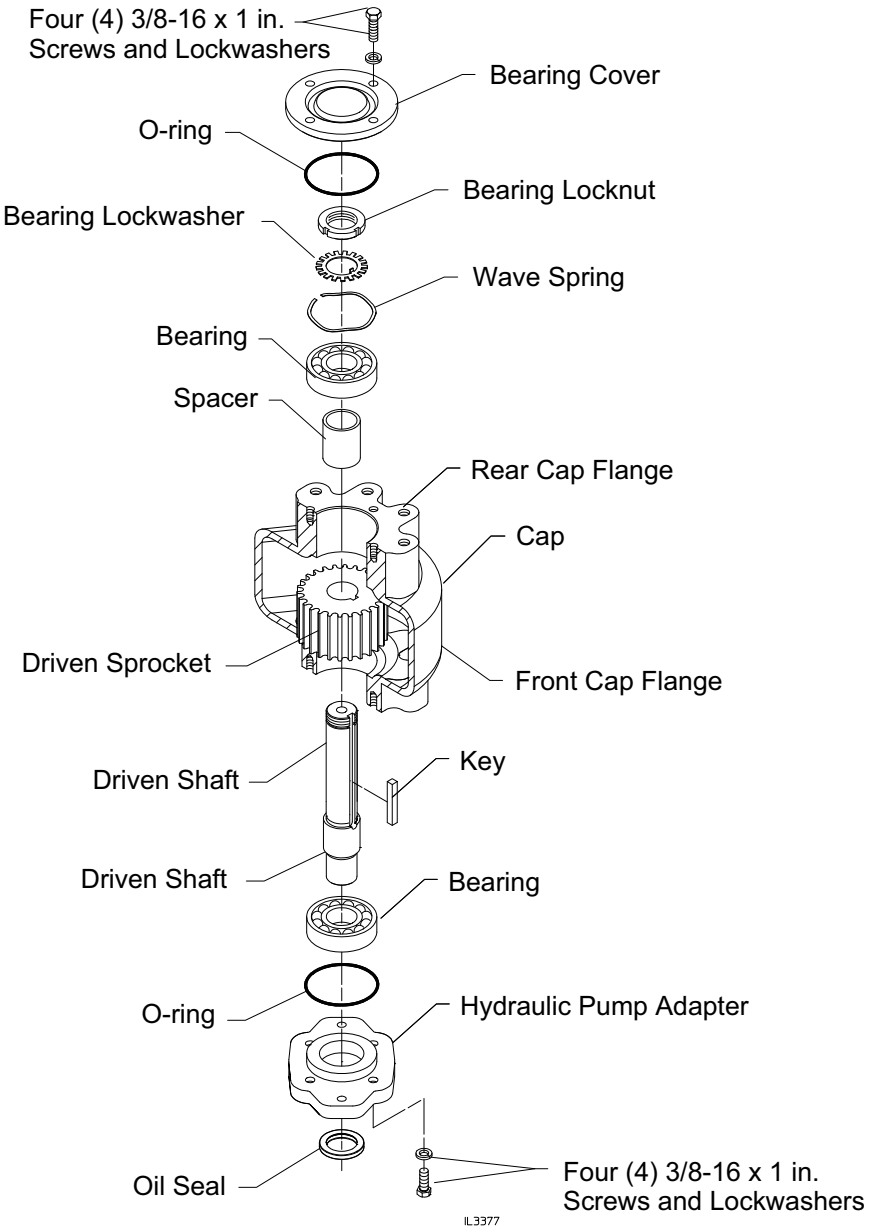


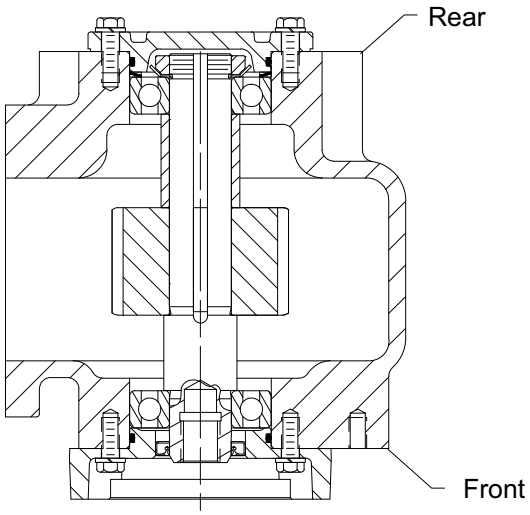


1. Remove the end yoke and locknut. Discard locknut.
2. Remove the screws that fasten the bearing cover and oil seal housing to the cap. Remove cover and housing. Discard the oil seal.
3. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the locknut, lockwasher and wave spring.
4. Under a press, support the assembly on the rear face side of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacer and sprocket.
5. Remove the ball bearing, spacer and sprocket from cap.
6. Remove rear ball bearing from shaft.

Disassembly - Disassemble Cap (Continued)

Hydraulic Pump on Front of PTO

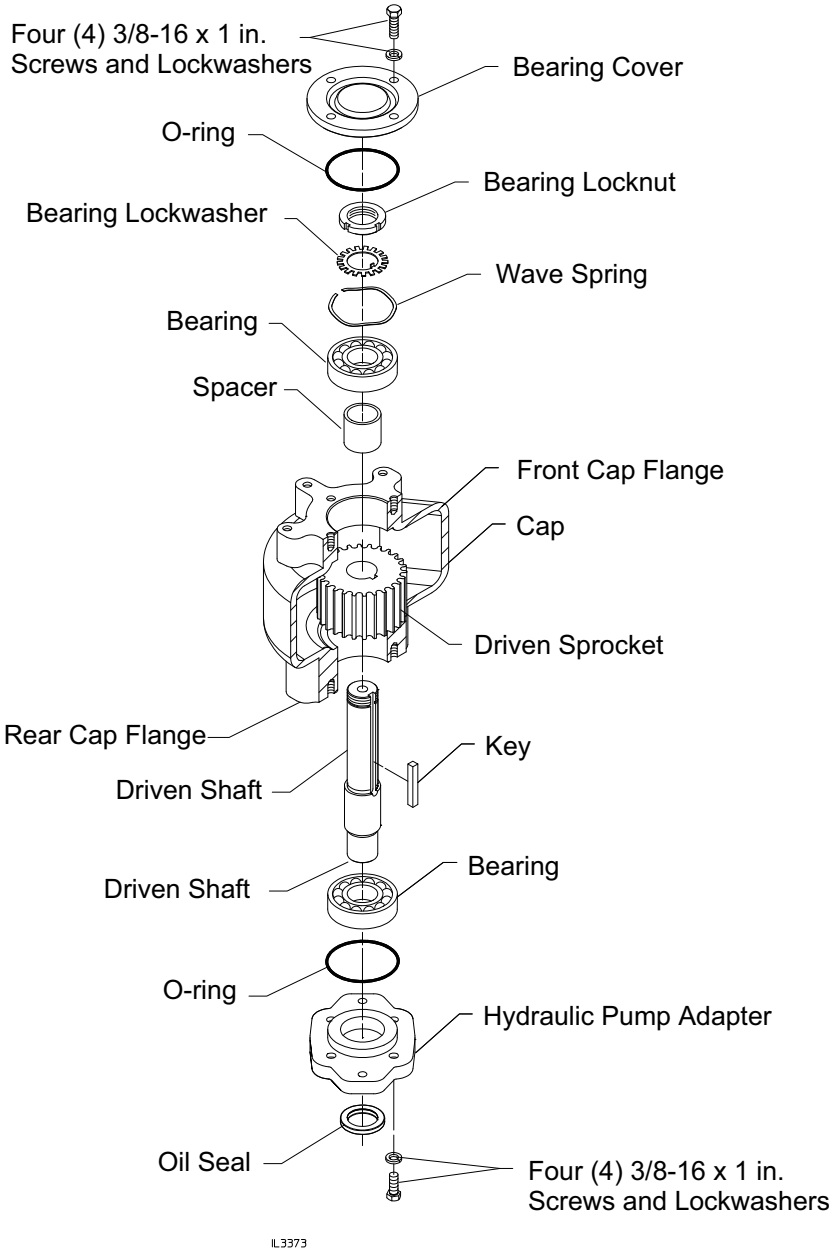


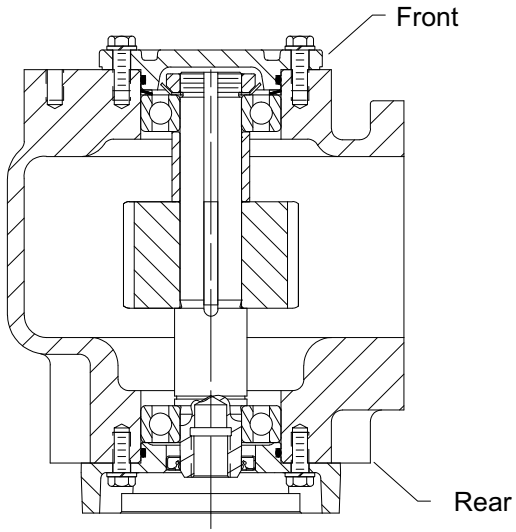


1. Remove the screws that fasten the hydraulic pump adapter and bearing cover to the cap. Remove adapter and cover. Discard the oil seal.
2. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the locknut, lockwasher and wave spring.
3. Under a press, support the assembly on the front face side of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacer and sprocket.
4. Remove the ball bearing, spacer and sprocket from cap.
5. Remove front ball bearing from shaft.

Disassembly - Disassemble Cap (Continued)

Hydraulic Pump on Rear of PTO

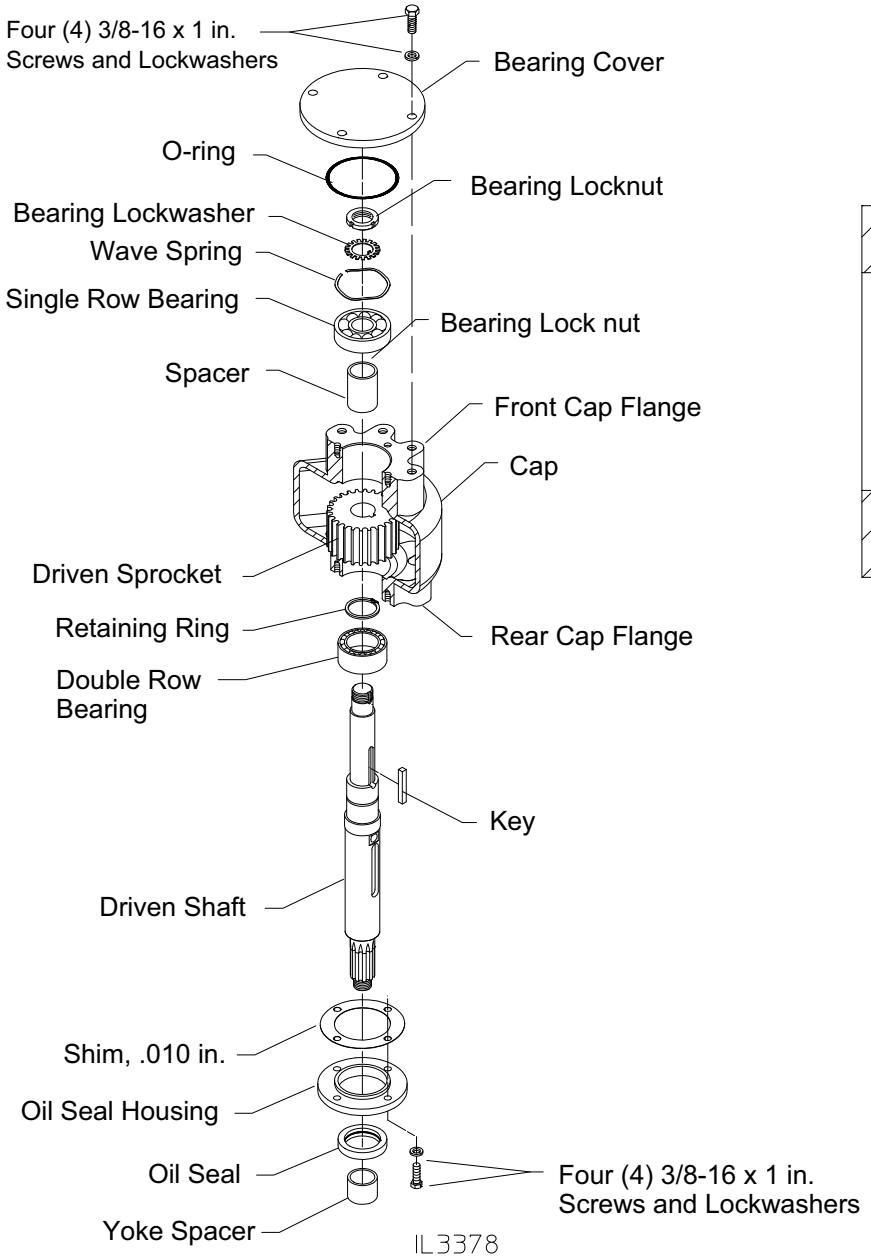


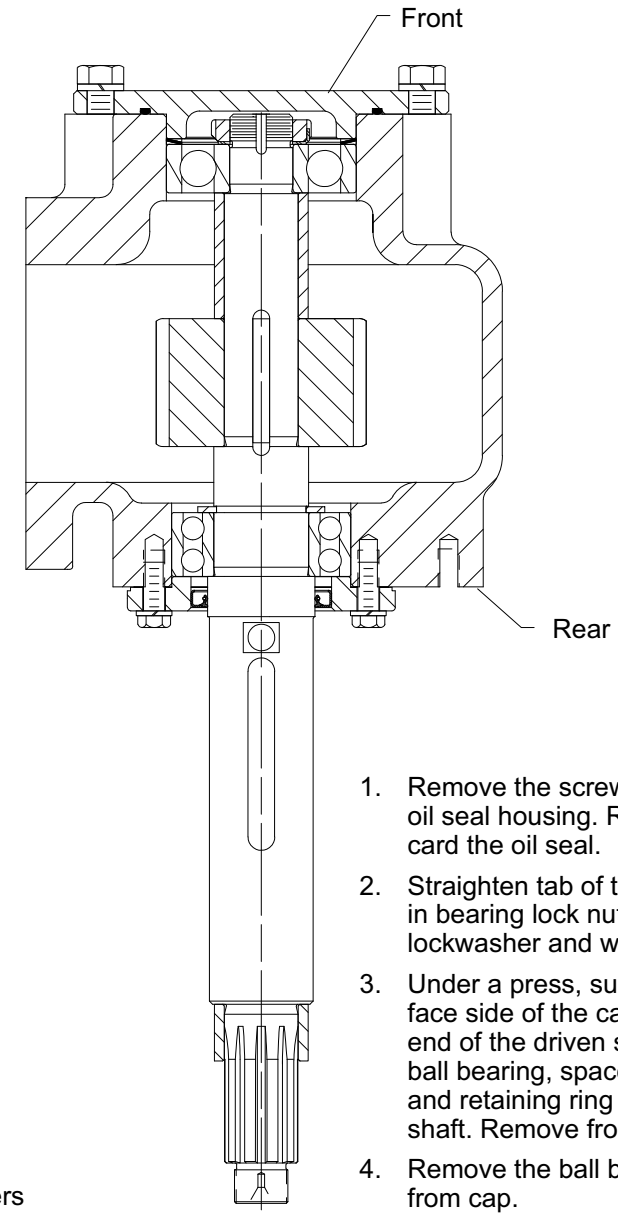


1. Remove the screws that fasten the hydraulic pump adapter and bearing cover to the cap. Remove adapter and cover. Discard the oil seal.
2. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the locknut, lockwasher and wave spring.
3. Under a press, support the assembly on the rear face of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacer and sprocket. Rear bearing and retaining ring will come out with the driven shaft. Remove from shaft.
4. Remove the ball bearing, spacer and sprocket from cap.

Disassembly - Disassemble Cap (Continued)

Eclipse ES™ CAFS on Rear of PTO

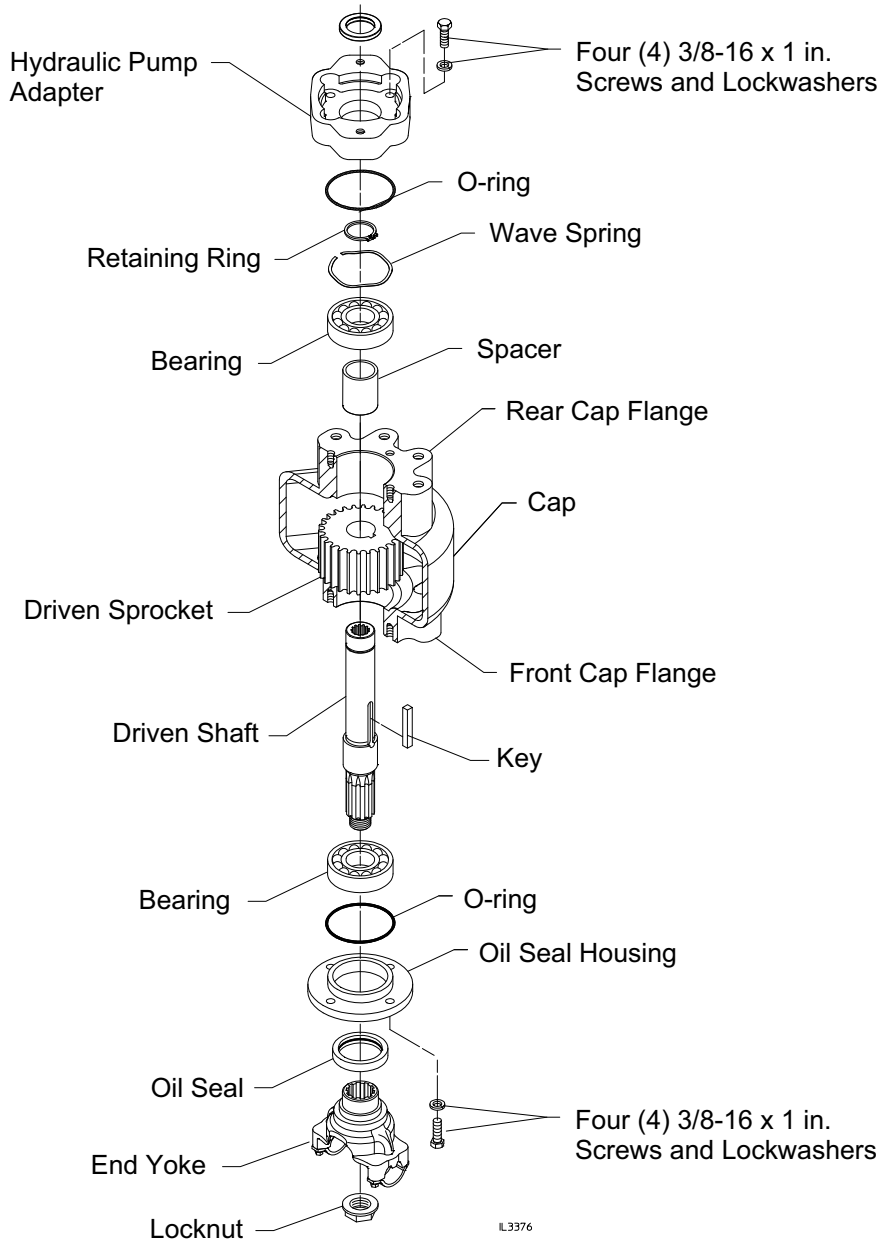


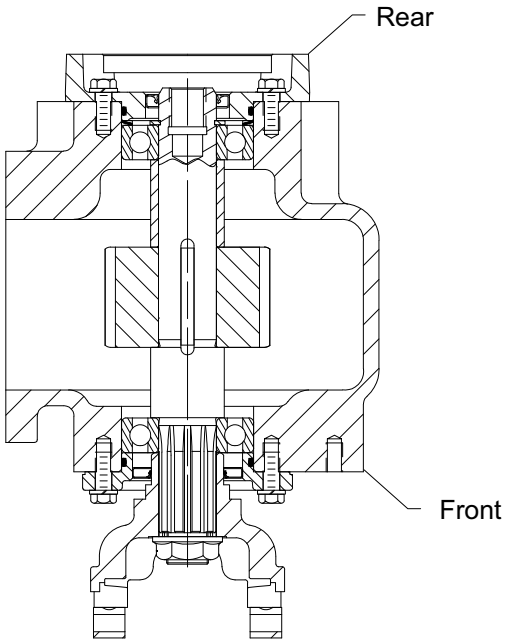


1. Remove the screws from the bearing cover and oil seal housing. Remove cover and housing. Discard the oil seal.
2. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the locknut, lockwasher and wave spring.
3. Under a press, support the assembly on the rear face side of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacer and sprocket. Rear bearing and retaining ring will come out with the driven shaft. Remove from shaft.
4. Remove the ball bearing, spacer and sprocket from cap.

Disassembly - Disassemble Cap (Continued)

End Yoke on Front and Hydraulic Pump on Rear

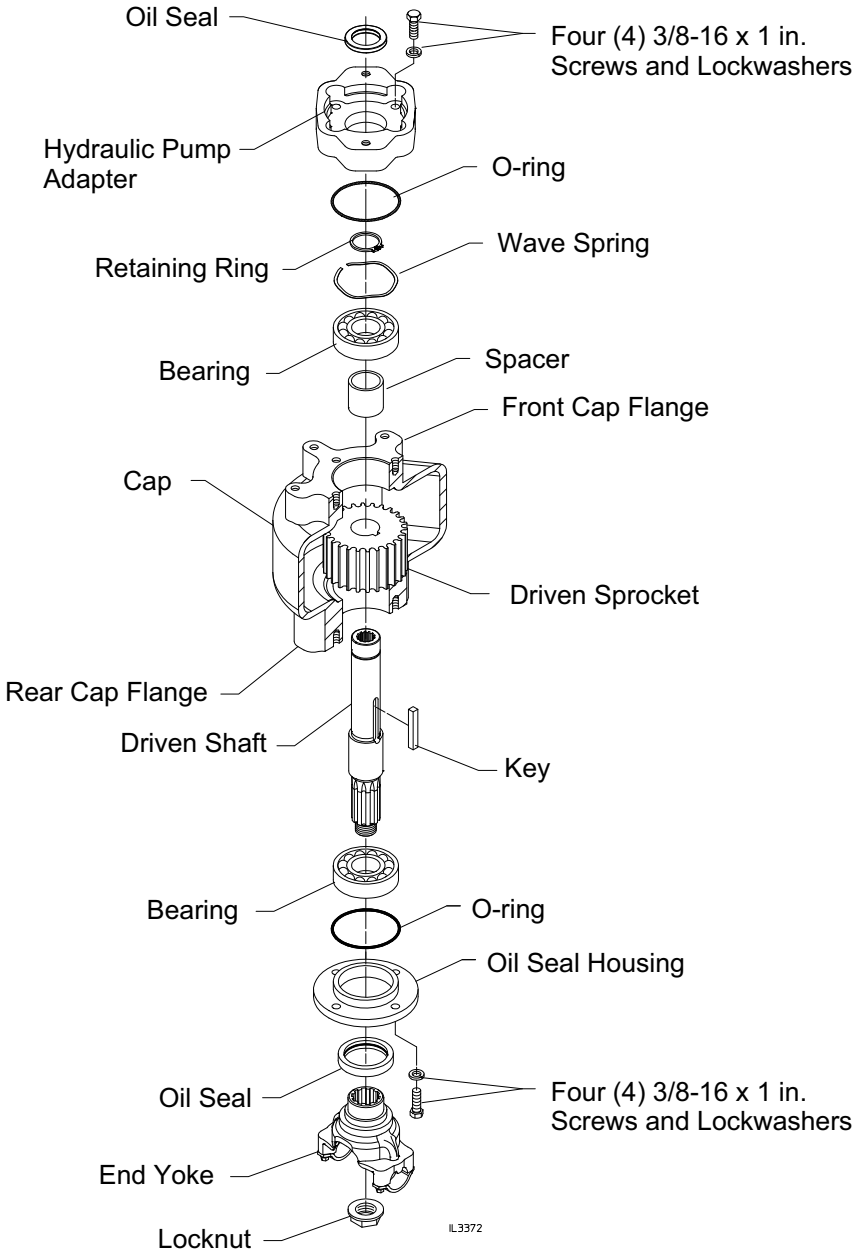


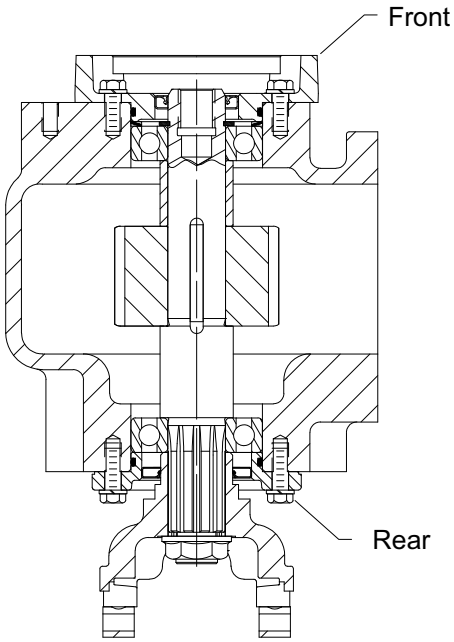


1. Remove the end yoke and locknut. Discard locknut.
2. Remove the screws that fasten the hydraulic adapter and oil seal housing to the cap. Remove adapter and housing. Discard oil seals.
3. Remove retaining ring from shaft.
4. Under a press, support the assembly on the front face side of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacer and sprocket.
5. Remove the ball bearing, spacer and sprocket from cap.
6. Remove the front ball bearing from the shaft.

Disassembly - Disassemble Cap (Continued)

Hydraulic Pump on Front and End Yoke on Rear





1. Remove the end yoke and locknut. Discard locknut.
2. Remove the screws that fasten the hydraulic adapter and oil seal housing to the cap. Remove adapter and housing. Discard oil seals.
3. Remove retaining ring from shaft.
4. Under a press, support the assembly on the rear face side of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacer and sprocket.
5. Remove the ball bearing, spacer and sprocket from cap.
6. Remove the rear ball bearing from the shaft.

Inspection and Repair

Before reassembly, check for the following:

Shift Components:

- Damage to the shift fork and shift shoes.
- Damage to the clevis end on the shift unit.
- Damage to the engaging teeth on the drive sprocket, coupling shaft and shift collar.

Note that minor burrs found on the teeth of the shift collar, drive sprocket or coupling shaft may be filed clean. If excessive damage is found on any component it should be replaced.

Sprockets:

- Worn sprocket teeth.

Chain:

- Worn flanks on inner links.
- Outside guide links not retained by riveted over pins.
- Wear on inner faces of outside guide links.

Shafts:

- Damaged splines.

Bearings:

- Ensure that all bearings turn freely.

NOTES:

1. Before reassembly, make sure all reusable parts have been cleaned and kept free of dirt during reassembly.
2. All O-rings, gaskets, bearings, oil seals, etc. required for overhaul of the PTO are available in gasket kit Waterous Part No. K-1117.

Ball Bearings and Oil Seals, O-rings

Installing Ball Bearings

Keep new ball bearings wrapped until they are to be installed. When pressing the ball bearing on a shaft or into a bore, coat appropriate surfaces with grease.

Shaft - grease shaft and ball bearing bore.

Bore - grease bore and outside of diameter of ball bearing.

Always apply force to the inner race of a ball bearing when pressing it on a shaft and to the outer race if pressing into a bore. Press evenly with a piece of pipe or tube which just clears the shaft.

Installing Oil Seals

Before installing a new oil seal in its housing, apply a thin coat of silicone sealant to housing oil seal seat. Be sure that the seal, shaft and housing are clean. Always install a seal with the seal lip facing in. Lubricate seal lip with light oil before installing shaft. Apply force to the outer edge of the seal and press in evenly.

Installing O-Rings

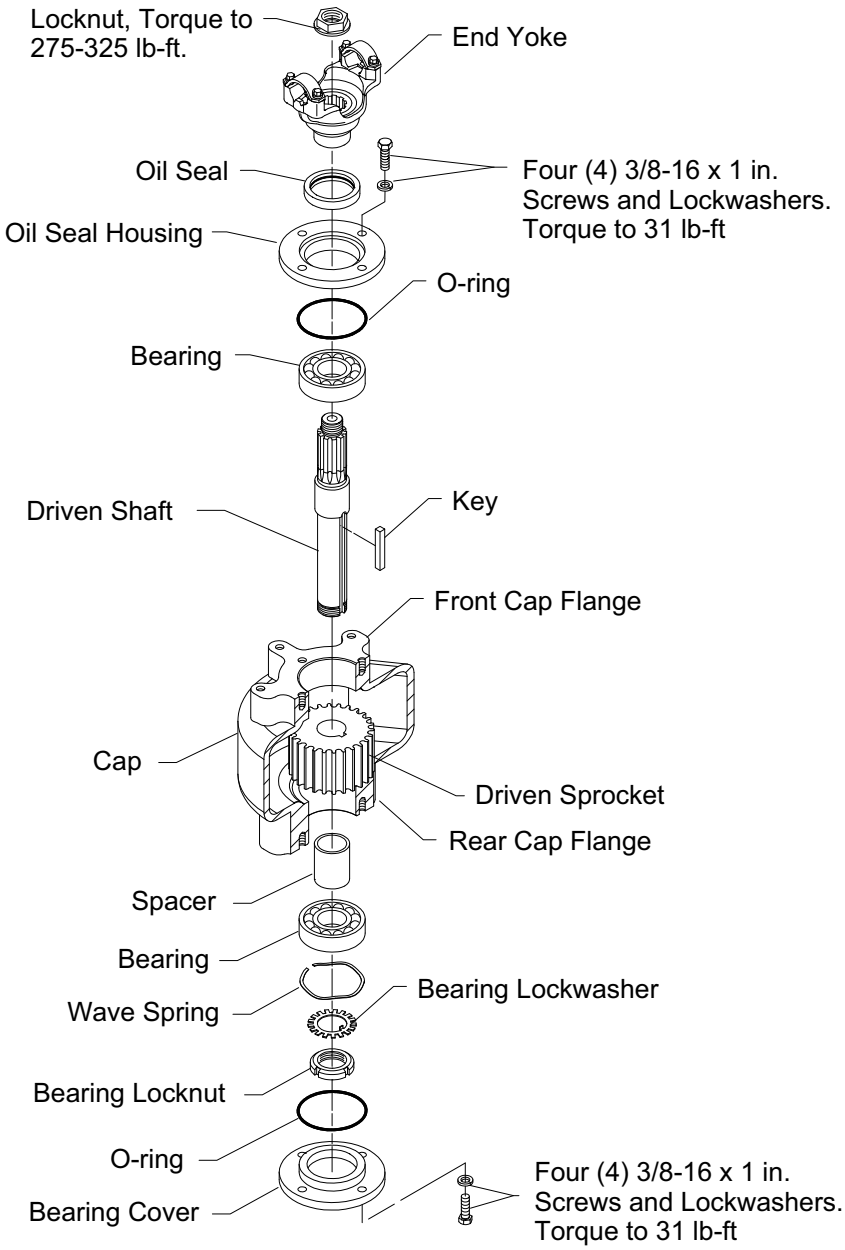
Grease new O-rings prior to installation. This will aid in the installation as well as prevent damage to the O-ring.

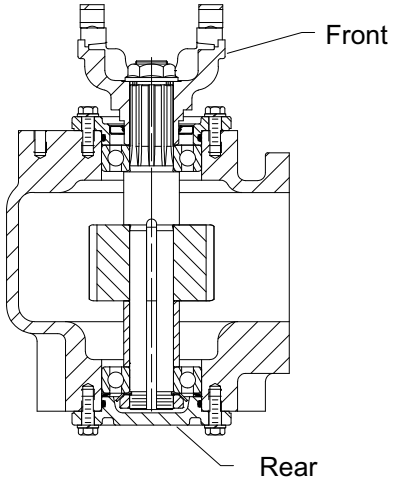
NOTES:

1. **Wherever silicone or sealant is referenced, use Loctite Ultra Blue RTV Silicone Sealant or equivalent, unless otherwise specified.**
2. Torque hardware to the values specified in the individual reassembly details.

Reassembly - Assembly Cap

End Yoke on Front of PTO

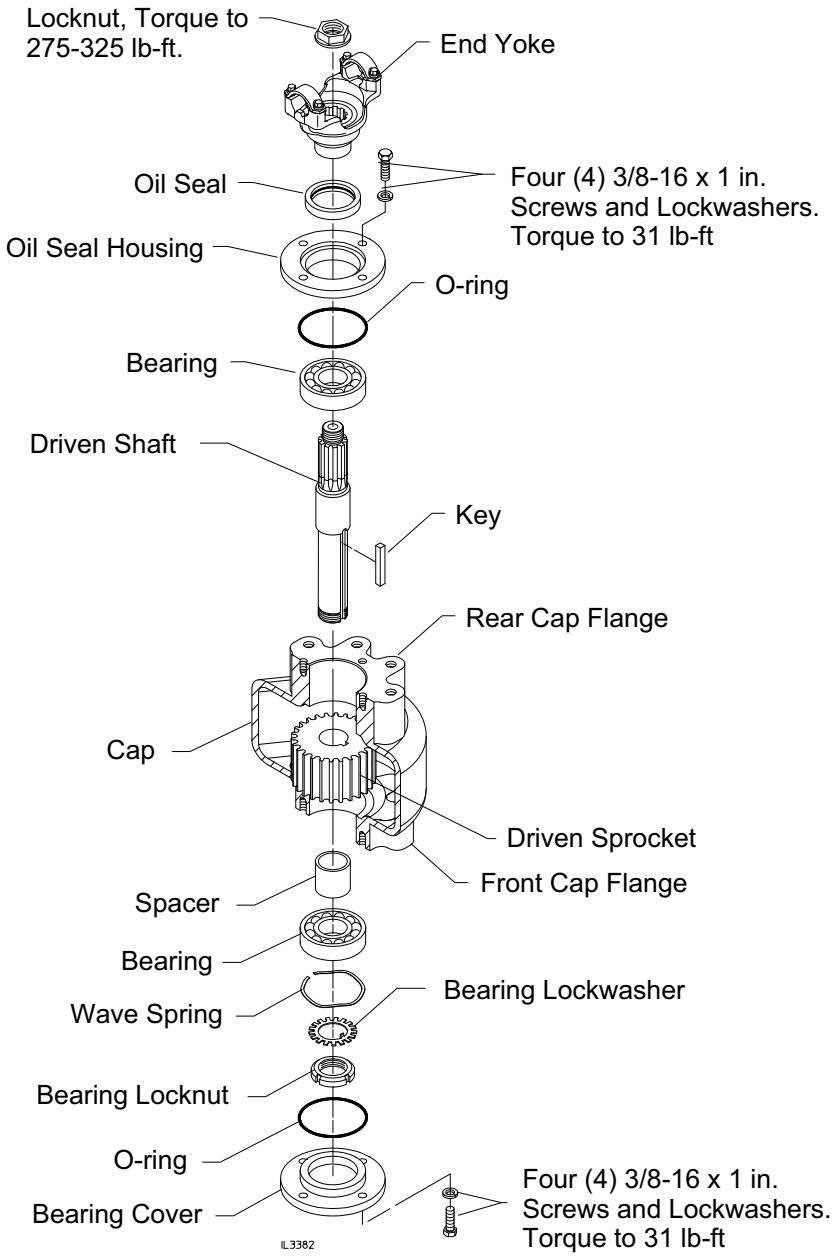


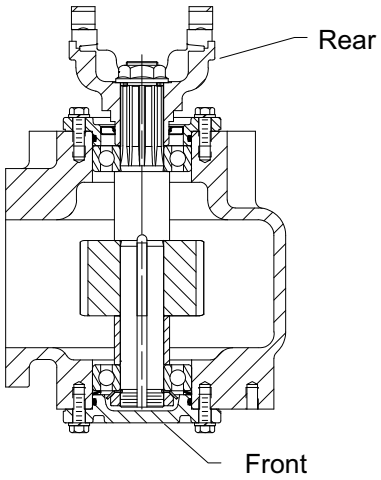


1. Use high pressure grease to coat the driven shaft's sprocket and bearing journals.
2. Press the ball bearing to the shoulder of the driven shaft.
3. Tap the key into place.
4. Place high pressure grease in the rear bore of the cap.
5. Tap the ball bearing into place.
6. Set the bearing cover on rear face of cap and secure with the hex head screws. Hand tighten only at this stage of reassembly.
7. With the cap resting on the rear face, position the spacer and driven sprocket inside the cap.
8. Take the driven shaft, bearing and key assembled previously and from the front face of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install O-ring and oil seal in the oil seal housing.
11. Install oil seal housing.
12. Remove the bearing cover and install the O-ring, bearing lock washer and locknut. Make sure the tang of the washer aligns with the keyway in the shaft.
13. Tighten nut 1/4 turn from finger tight and bend one of the locking tangs on the washer into one of the slots in the locknut.
14. Tap locknut end of driven shaft towards oil seal housing to seat assembly.
15. Install wave spring and bearing cover.
16. Install end yoke. Torque locknut to 275-325 lb-ft .

Reassembly - Assembly Cap

End Yoke on Rear of PTO

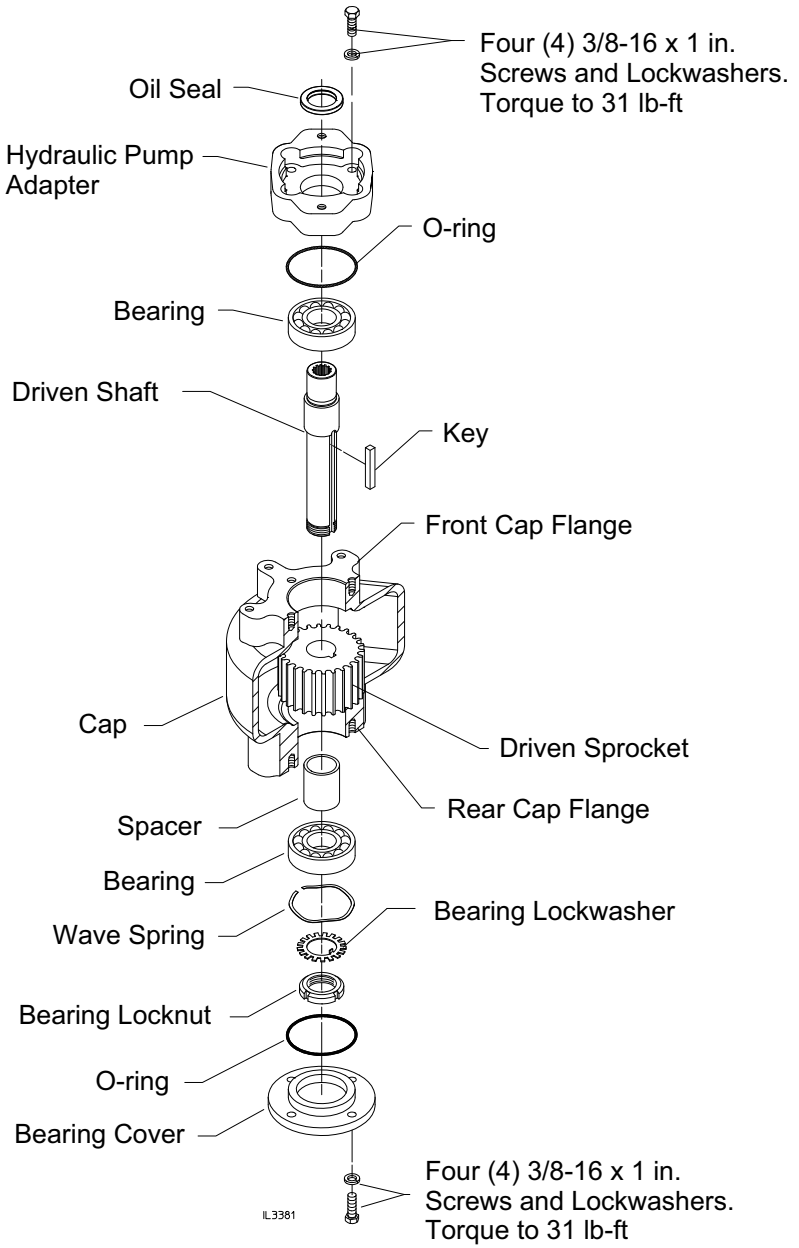


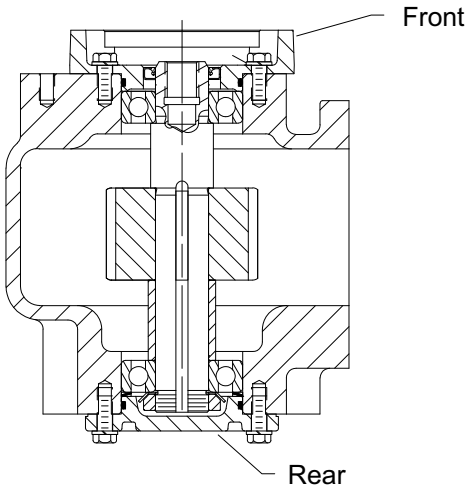


1. Use high pressure grease to coat the driven shaft's sprocket and bearing journals.
2. Press the bearing to the shoulder of the driven shaft.
3. Tap the key into place.
4. Place high pressure grease in the front bore of the cap.
5. Tap the ball bearing into place.
6. Set the bearing cover in cap and secure with the hex head screws. Hand tighten only at this stage of reassembly.
7. With the cap resting on the front face, position the spacer and driven sprocket inside the cap.
8. Take the driven shaft, bearing and key assembled previously and from the rear face of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install O-ring and oil seal in the oil seal housing.
11. Install oil seal housing.
12. Remove the bearing cover and install the O-ring, bearing lock washer and locknut. Make sure the tang of the washer aligns with the keyway in the shaft.
13. Tighten nut 1/4 turn from finger tight and bend one of the locking tangs on the washer into one of the slots in the locknut.
14. Tap locknut end of driven shaft towards oil seal housing to seat assembly.
15. Install wave spring and bearing cover.
16. Install end yoke. Torque locknut to 275-325 lb-ft .

Reassembly - Assembly Cap

Hydraulic Pump on Front of PTO

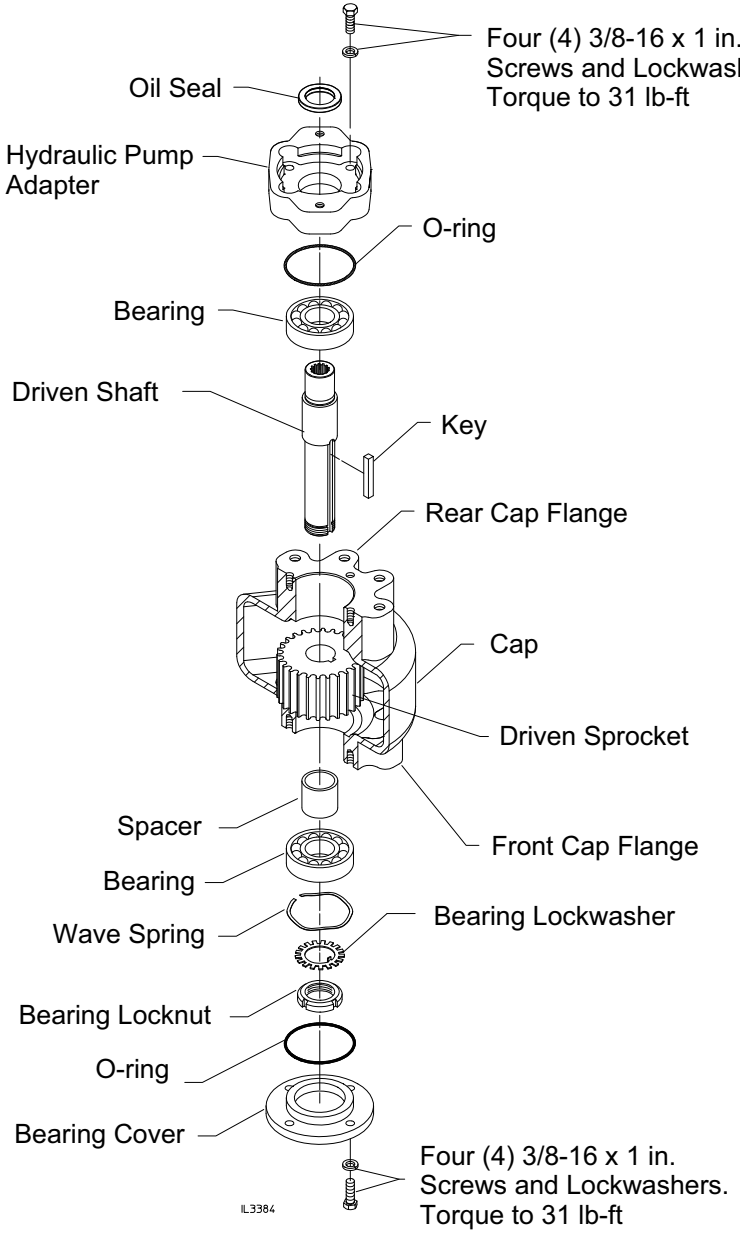


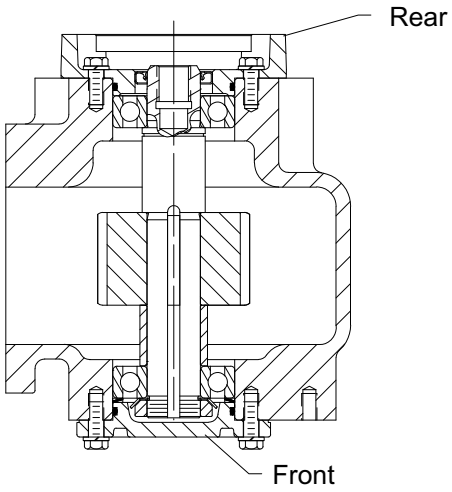


1. Use high pressure grease to coat the driven shaft's sprocket and bearing journals.
2. Press the bearing to the shoulder on the internal spline end of driven shaft.
3. Tap the key into place.
4. Place high pressure grease in the rear bore of the cap.
5. Tap the bearing into place.
6. Set the bearing cover in cap and secure with the hex head screws. Hand tighten only at this stage of reassembly.
7. With the cap resting on the rear face, position the spacer and driven sprocket inside the cap.
8. Take the driven shaft, bearing and key assembled previously and from the front side of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install O-ring and oil seal in the hydraulic pump adapter.
11. Install oil hydraulic pump adapter.
12. Remove the bearing cover and install the O-ring, bearing lock washer and locknut. Make sure the tang of the washer aligns with the keyway in the shaft.
13. Tighten nut 1/4 turn from finger tight and bend one of the locking tangs on the washer into one of the slots in the locknut.
14. Tap locknut end of driven shaft towards oil seal housing to seat assembly.
15. Install wave spring and bearing cover.

Reassembly - Assembly Cap

Hydraulic Pump on Rear of PTO

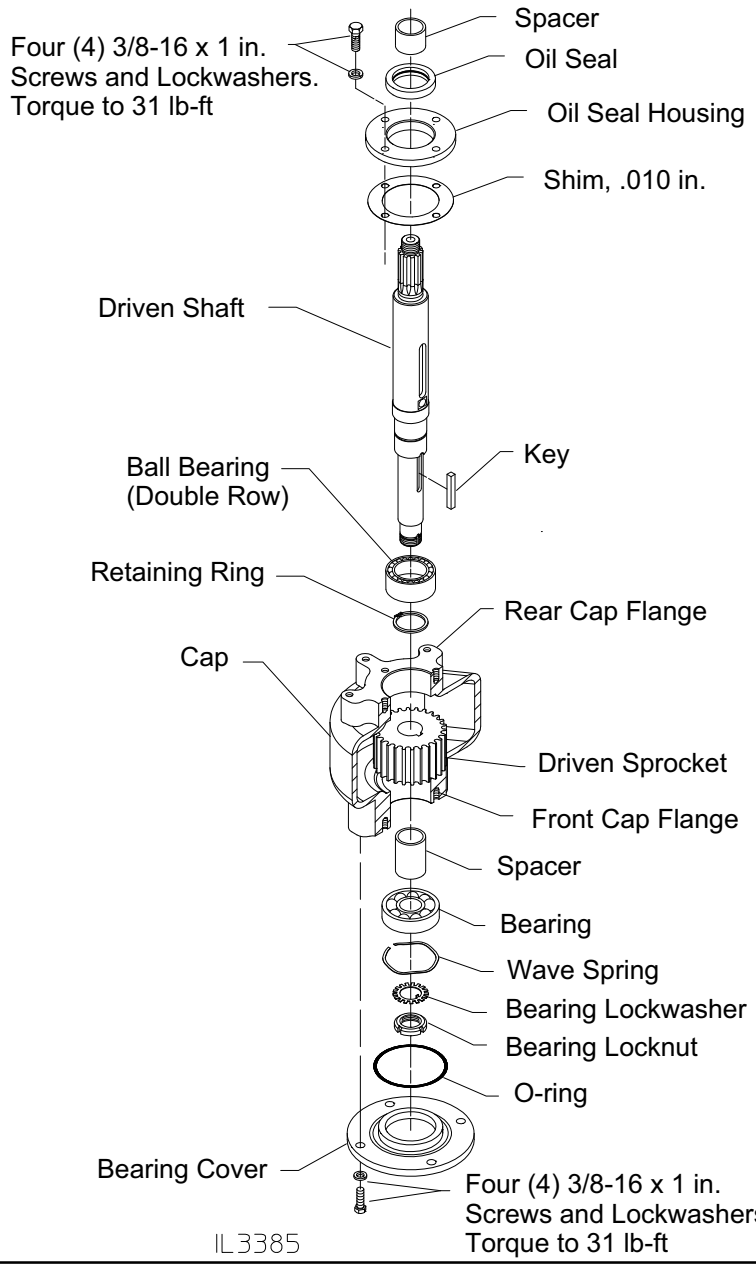


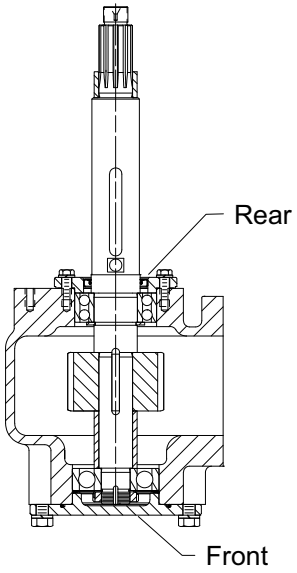


1. Use high pressure grease to coat the driven shaft's sprocket and bearing journals.
2. Press the bearing to the shoulder on the internal spline end of driven shaft.
3. Tap the key into place.
4. Place high pressure grease in the front bore of the cap.
5. Tap the bearing into place.
6. Set the bearing cover in cap and secure with the hex head screws. Hand tighten only at this stage of reassembly.
7. With the cap resting on the front face, position the spacer and driven sprocket inside the cap.
8. Take the driven shaft, bearing and key assembled previously and from the rear face of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install O-ring and oil seal in the hydraulic pump adapter.
11. Install oil hydraulic pump adapter.
12. Remove the bearing cover and install the O-ring, bearing lock washer and locknut. Make sure the tang of the washer aligns with the keyway in the shaft.
13. Tighten nut 1/4 turn from finger tight and bend one of the locking tangs on the washer into one of the slots in the locknut.
14. Tap locknut end of driven shaft towards pump adapter to seat assembly.
15. Install wave spring and bearing cover.

Reassembly - Assembly Cap

Eclipse ES™ CAFS on Rear of PTO

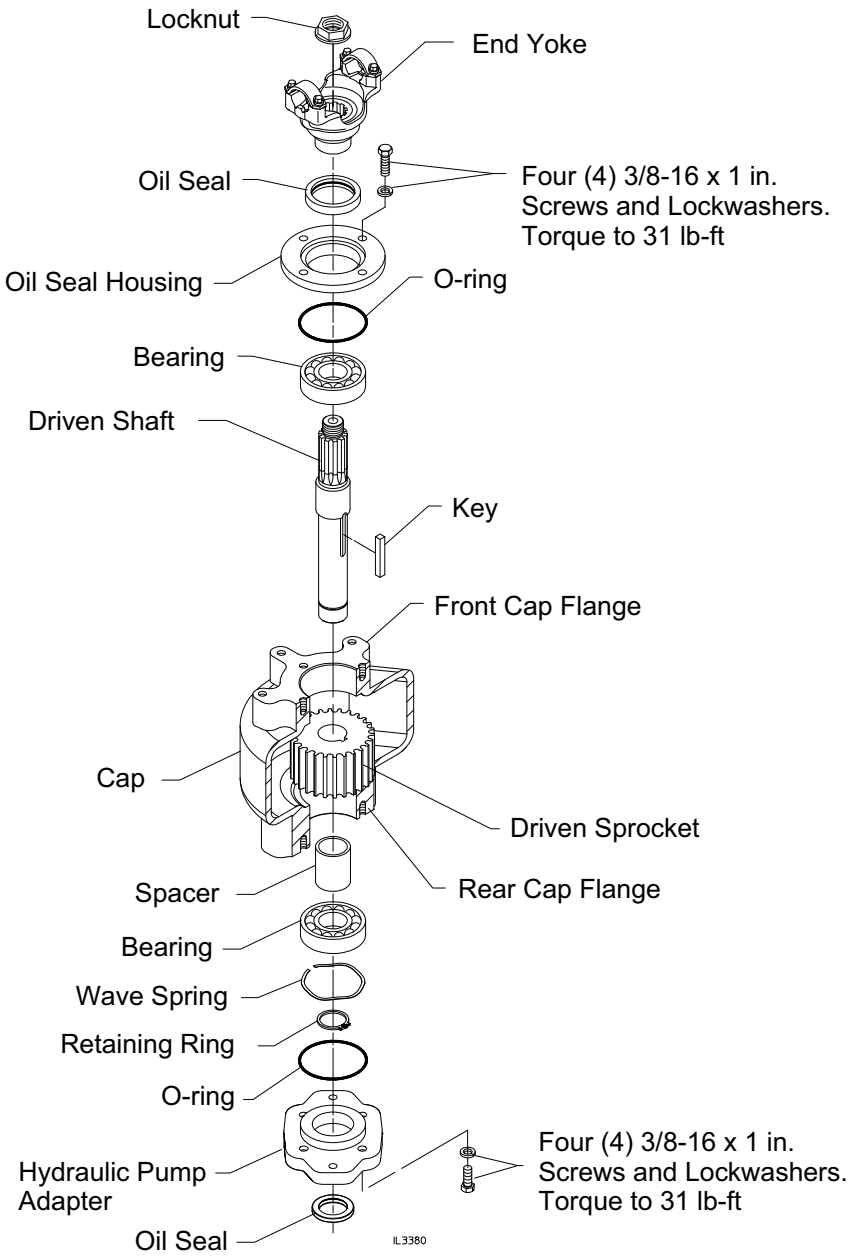


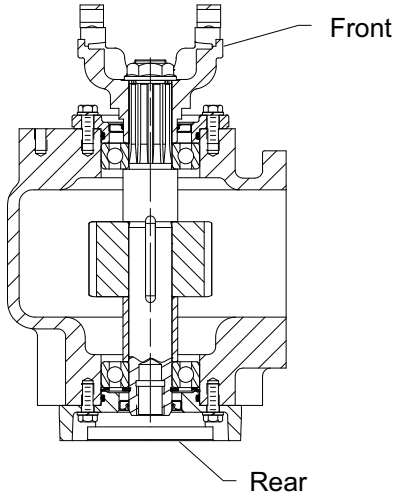


1. Use high pressure grease to coat the driven shaft's sprocket and bearing journals.
2. Press the bearing onto the shaft and secure in place with retaining ring.
3. Tap the key into place.
4. Place high pressure grease in the front bore of the cap.
5. Tap the bearing into place.
6. Set the bearing cover in cap and secure with the hex head screws. Hand tighten only at this stage of reassembly.
7. With the cap resting on the front face, position the spacer and driven sprocket inside the cap.
8. Take the driven shaft, bearing and key assembled previously and from the rear face of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install O-ring and oil seal in the oil seal housing.
11. Install the shim and oil seal housing.
12. Remove the bearing cover and install the O-ring, bearing lock washer and locknut. Make sure the tang of the washer aligns with the keyway in the shaft.
13. Tighten nut 1/4 turn from finger tight and bend one of the locking tangs on the washer into one of the slots in the locknut.
14. Tap locknut end of driven shaft towards oil seal housing to seat assembly.
15. Install wave spring and bearing cover.

Reassembly - Assembly Cap

End Yoke on Front and Hydraulic Pump on Rear

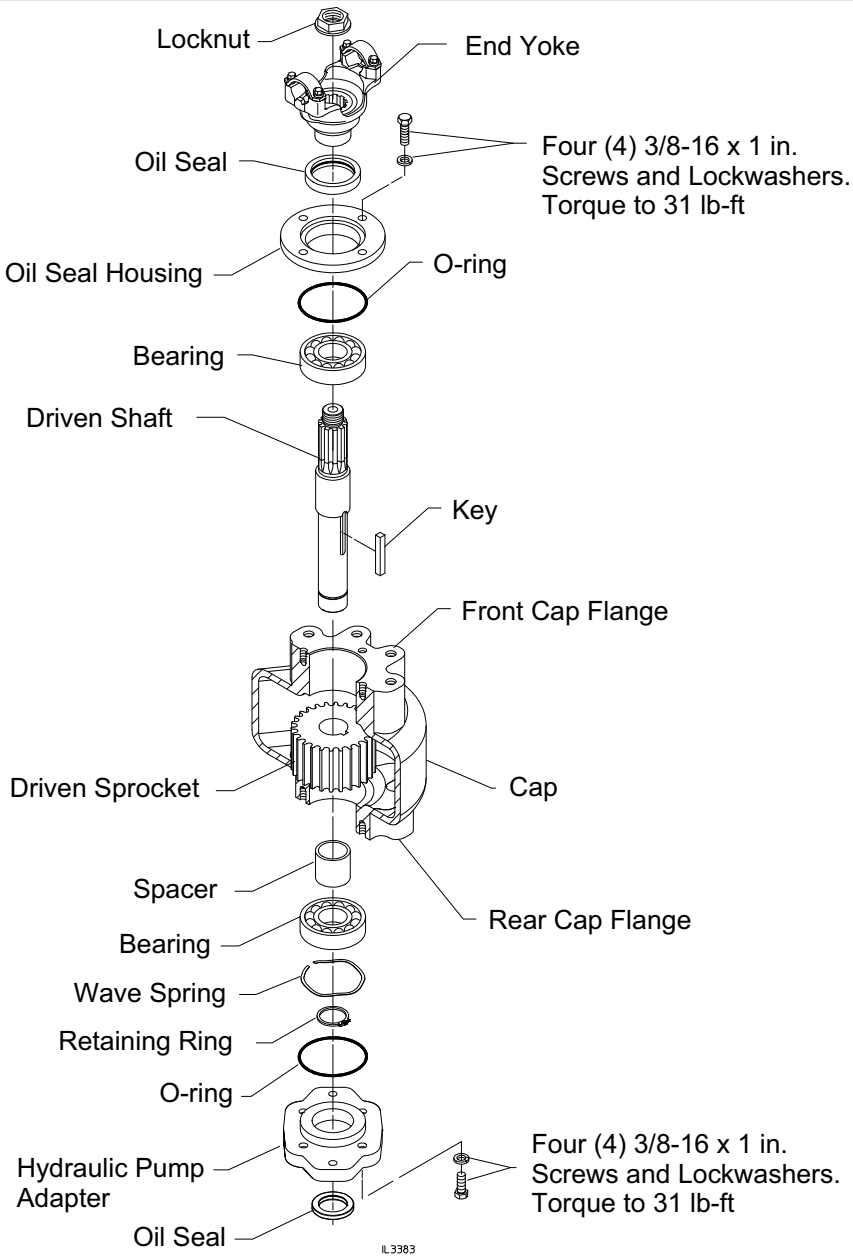


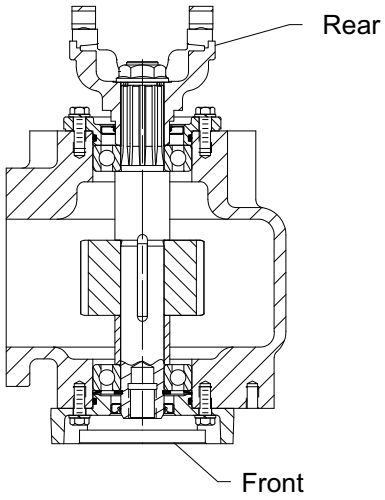


1. Use high pressure grease to coat the driven shaft's sprocket and bearing journals.
2. Press the bearing to the shoulder on the external spline end of driven shaft.
3. Tap the key into place.
4. Place high pressure grease in the rear bore of the cap.
5. Tap the bearing into place.
6. Set the hydraulic pump adapter on cap and secure with the hex head screws. Hand tighten only at this stage of reassembly.
7. With the cap resting on the rear face, position the spacer and driven sprocket inside the cap.
8. Take the driven shaft, bearing and key assembled previously and from the front side of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install O-ring and oil seal in the oil seal housing.
11. Install the oil seal housing.
12. Remove the hydraulic pump adapter and install retaining ring on shaft.
13. Tap internal splined end of driven shaft towards front face to seat assembly.
14. Install O-ring and oil seal in hydraulic pump adapter.
15. Install wave spring and hydraulic pump adapter.
16. Install end yoke. Torque locknut to 275-325 lb-ft.

Reassembly - Assembly Cap

Hydraulic Pump on Front and End Yoke on Rear

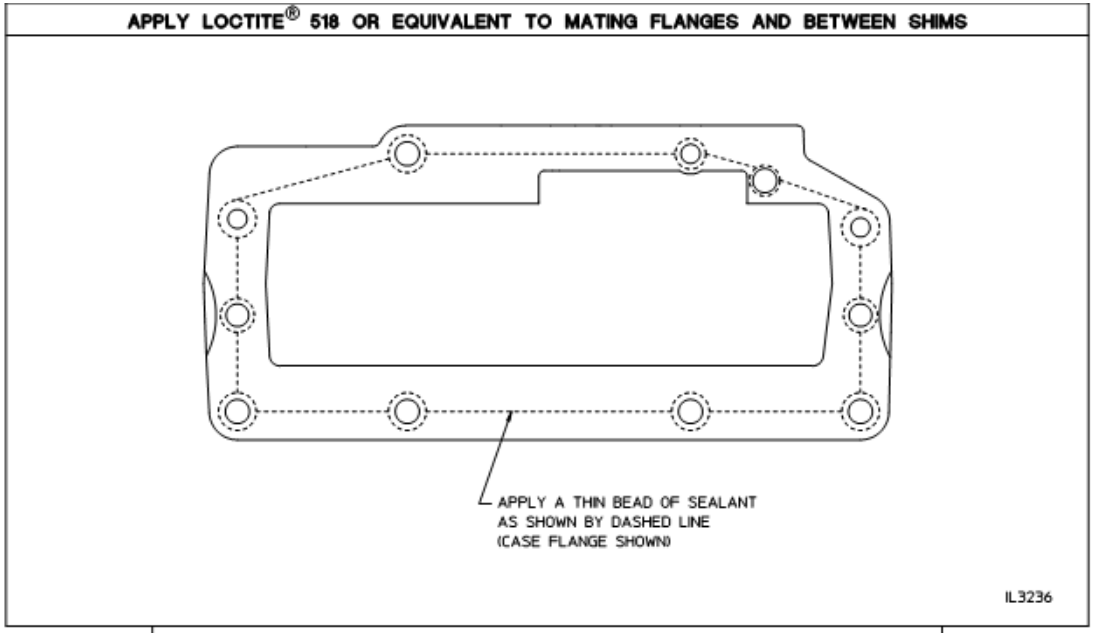


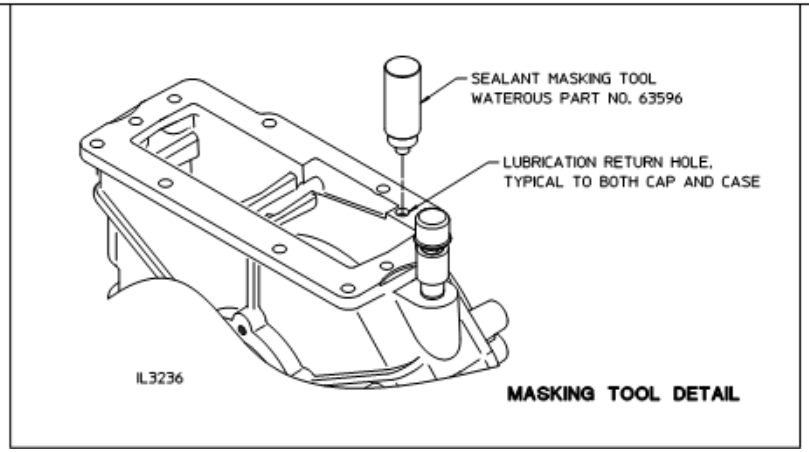


1. Use high pressure grease to coat the driven shaft's sprocket and bearing journals.
2. Press the bearing to the shoulder on the external spline end of driven shaft.
3. Tap the key into place.
4. Place high pressure grease in the front bore of the cap.
5. Tap the bearing into place.
6. Set the hydraulic pump adapter on front face of the cap and secure with the hex head screws. Hand tighten only at this stage of reassembly.
7. With the cap resting on the front face, position the spacer and driven sprocket inside the cap.
8. Take the driven shaft, bearing and key assembled previously and from the rear face of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install O-ring and oil seal in the oil seal housing.
11. Install the oil seal housing.
12. Remove the hydraulic pump adapter and install retaining ring on shaft.
13. Tap internal splined end of driven shaft towards front face to seat assembly.
14. Install O-ring and oil seal in hydraulic pump adapter.
15. Install wave spring and hydraulic pump adapter.
16. Install end yoke. Torque locknut to 275-325 lb-ft.

Reassembly - Attach Cap to Case

Apply Sealant





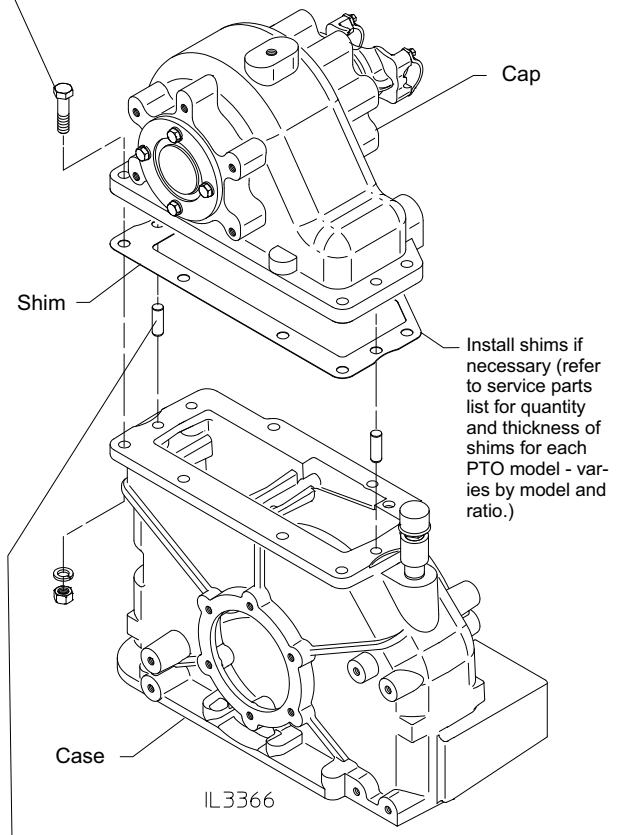
Reassembly - Attach Cap to Case (Continued)

TC20B Models

Install ten (10) 1/2-13 screws (refer to service parts list for size and installation for each PTO model - varies by model and ratio).

Torque as follows:

- Screws in Tapped Holes: 75 lb-ft.
- Bolt and Nut: 85 lb-ft.



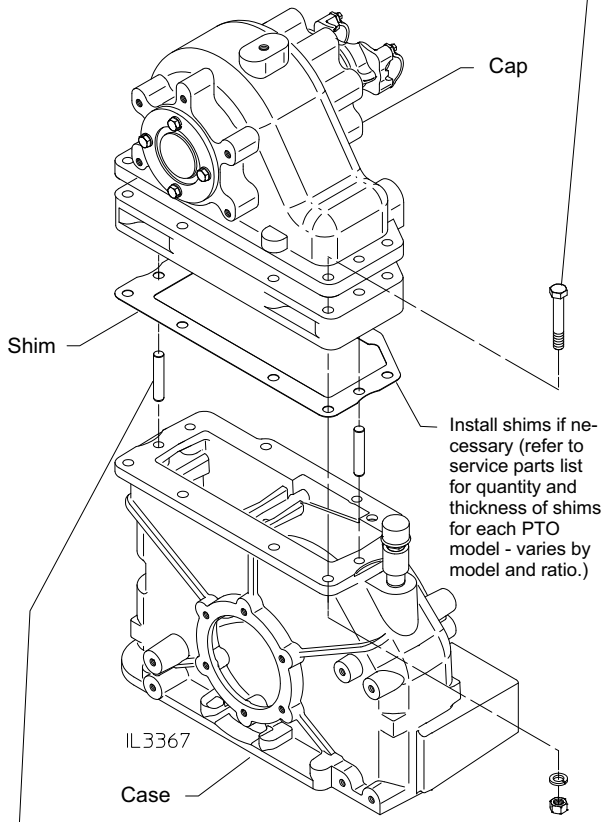
Install two (2) dowel pins if they were removed during disassembly.

TC20C Models

Install ten (10) 1/2-13 screws (refer to service parts list for size and installation for each PTO model - varies by model and ratio).

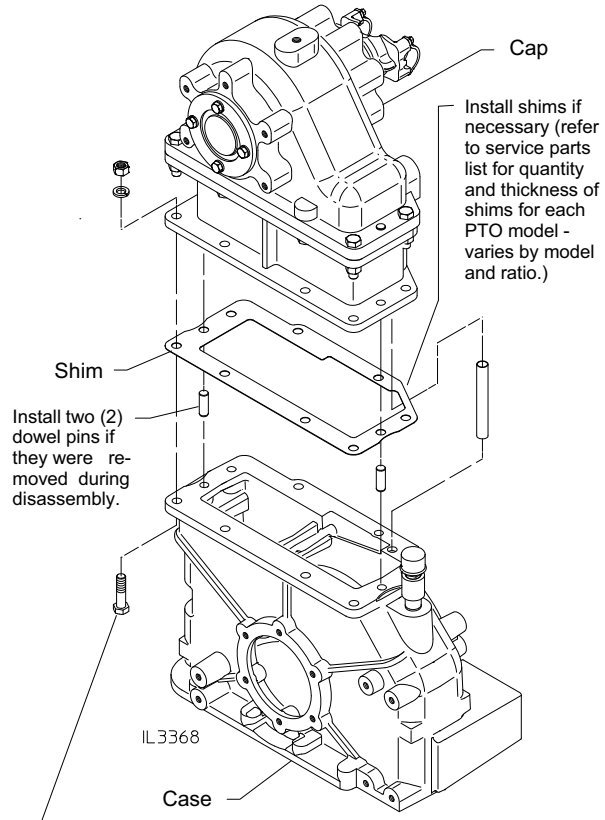
Torque as follows:

- Screws in Tapped Holes: 75 lb-ft.
- Bolt and Nut: 85 lb-ft.



Install two (2) dowel pins if they were removed during disassembly.

TC20D, TC20E and TC20F Models



Install ten (10) 1/2-13 screws (refer to service parts list for size and installation for each PTO model - varies by model and ratio).

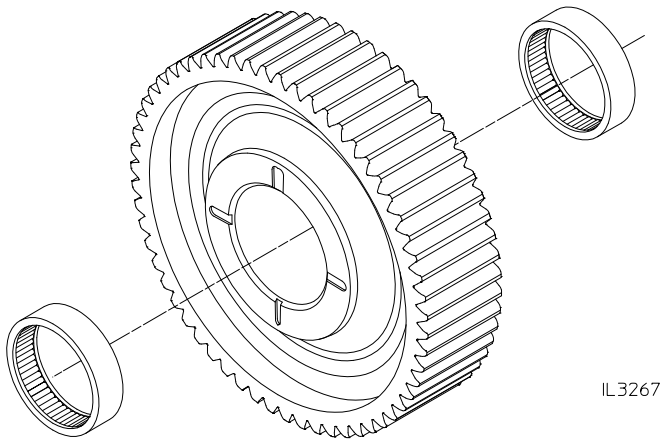
Torque as follows:

- Screws in Tapped Holes: 75 lb-ft.
- Bolt and Nut: 85 lb-ft.

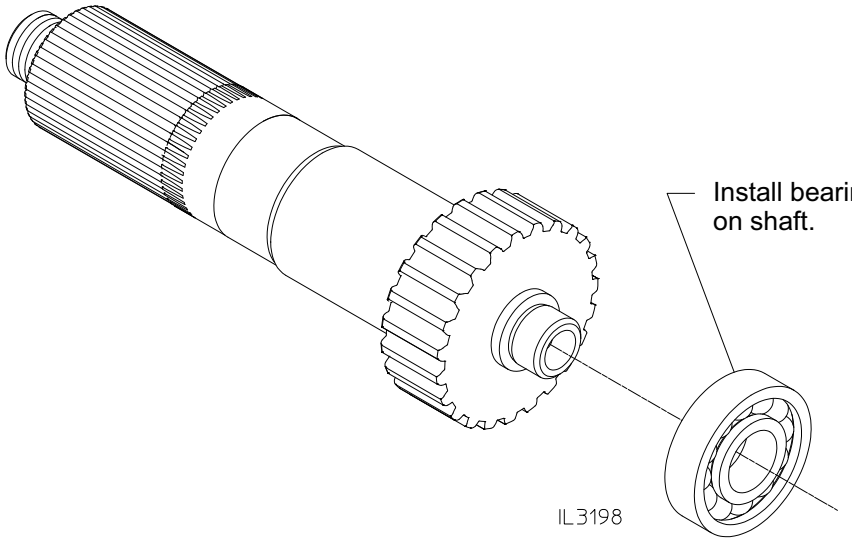
Reassembly - Assemble Driveline Components

Drive Sprocket

1. Install one needle bearing in each end of the drive sprocket.
2. Install needle bearing (larger radius edge first) just below bottom of chamfer on sprocket bore.

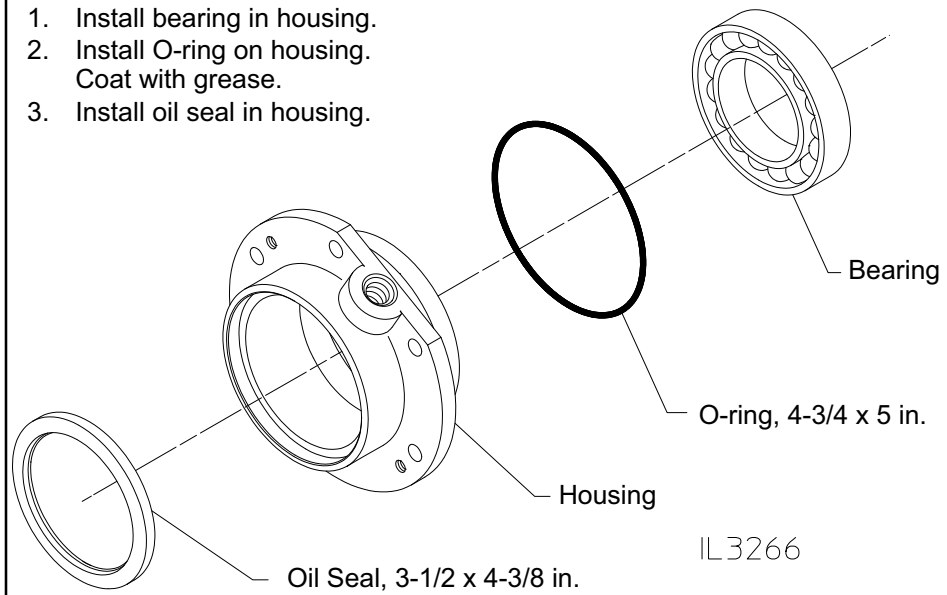


Drive Shaft

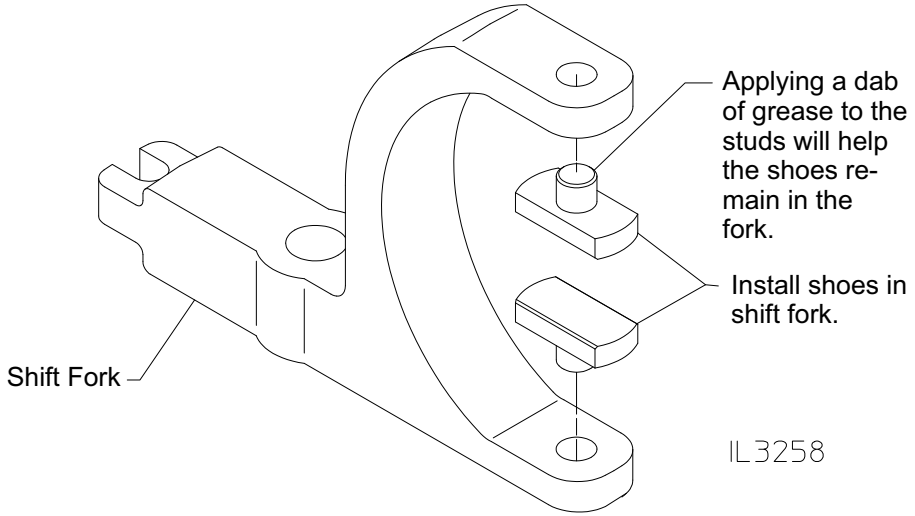


Drive Shaft Housing

1. Install bearing in housing.
2. Install O-ring on housing. Coat with grease.
3. Install oil seal in housing.



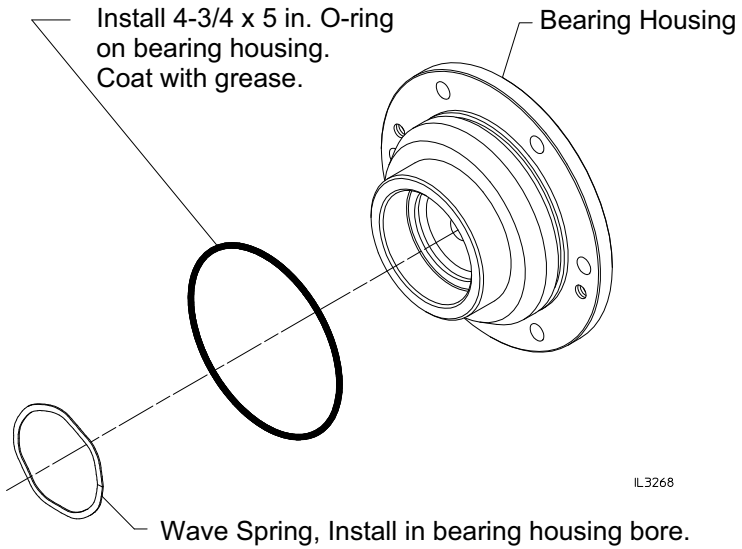
Shift Fork Shoes



Reassembly - Assemble Driveline Components (Continued)

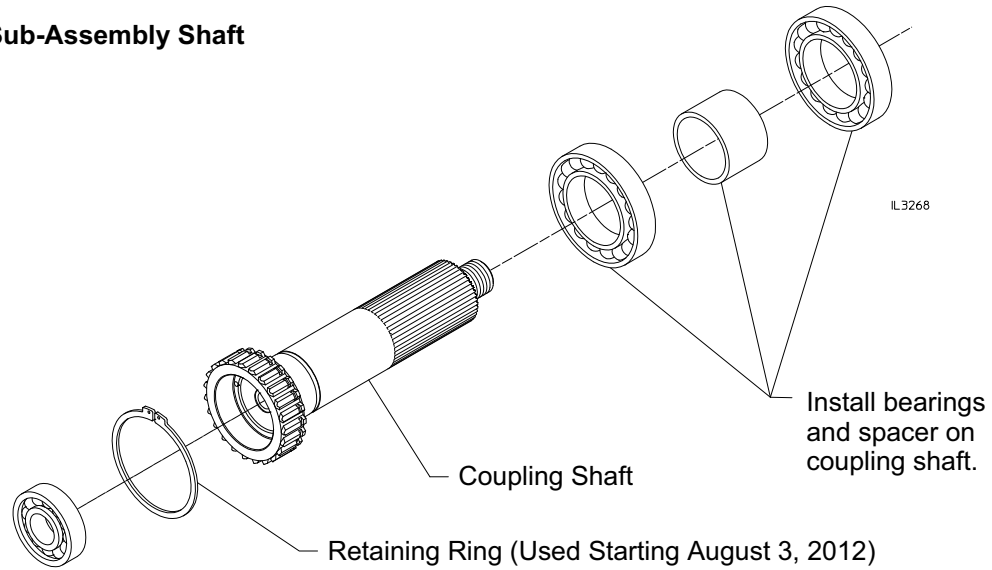
Coupling Shaft

Input Shaft Only Configurations (No Coupling Shaft, Housing Only)



Input and Output Shaft Configurations - Step 1

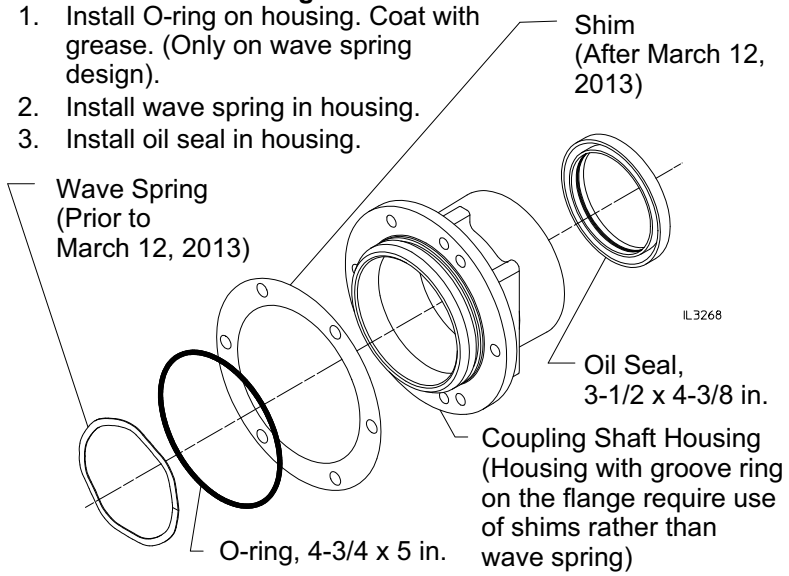
Sub-Assembly Shaft



Input and Output Shaft Configuations - Step 2

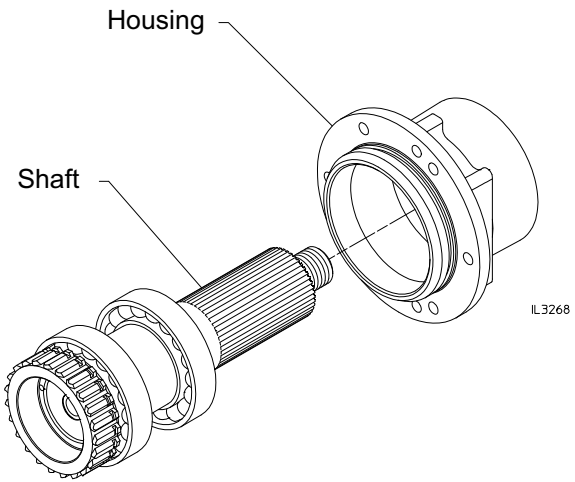
Sub-Assemble Housing

1. Install O-ring on housing. Coat with grease. (Only on wave spring design).
2. Install wave spring in housing.
3. Install oil seal in housing.



Input and Output Shaft Configurations - Step 3

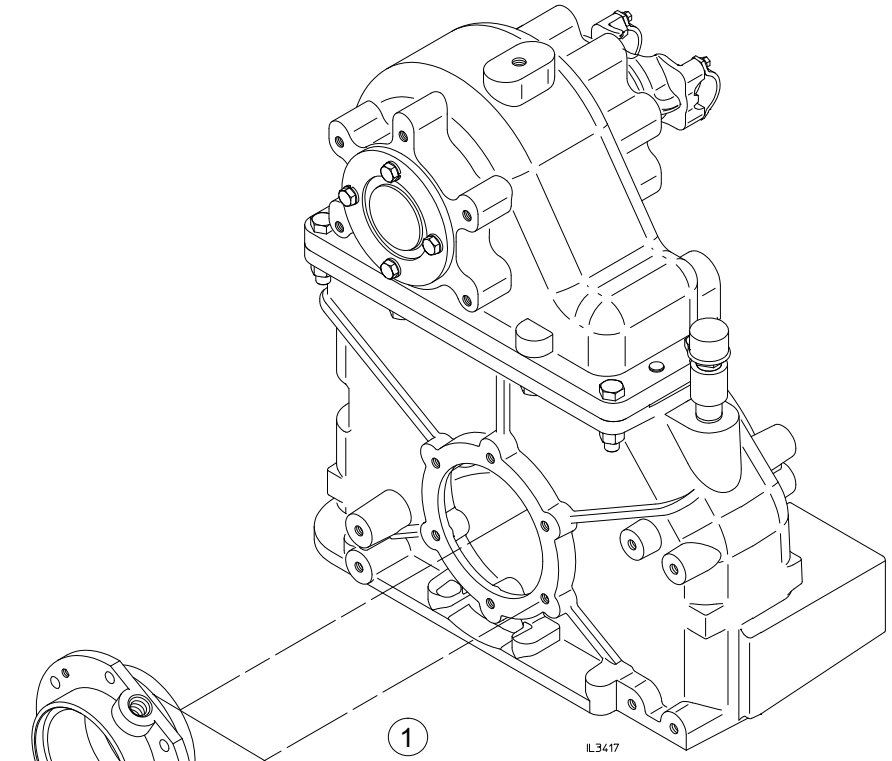
Install Shaft Sub-Assembly in Housing Sub-Assembly.



Reassembly - Installation of Driveline in Case

Drive (Input) Shaft

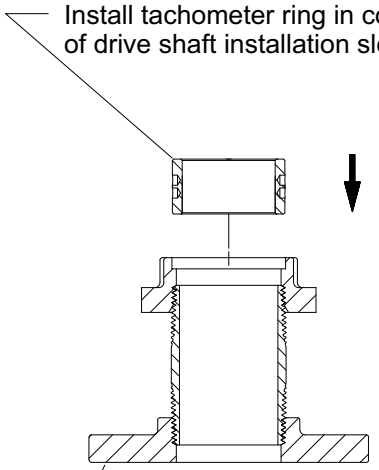
Install Drive Shaft Housing on Case



1 Grease O-ring

2 Install drive shaft housing assembly on case with six (6) 3/8-16 x 1 in. screws and lockwashers. Torque to 31 lb-ft.

Install Tachometer Ring in Installation Tool



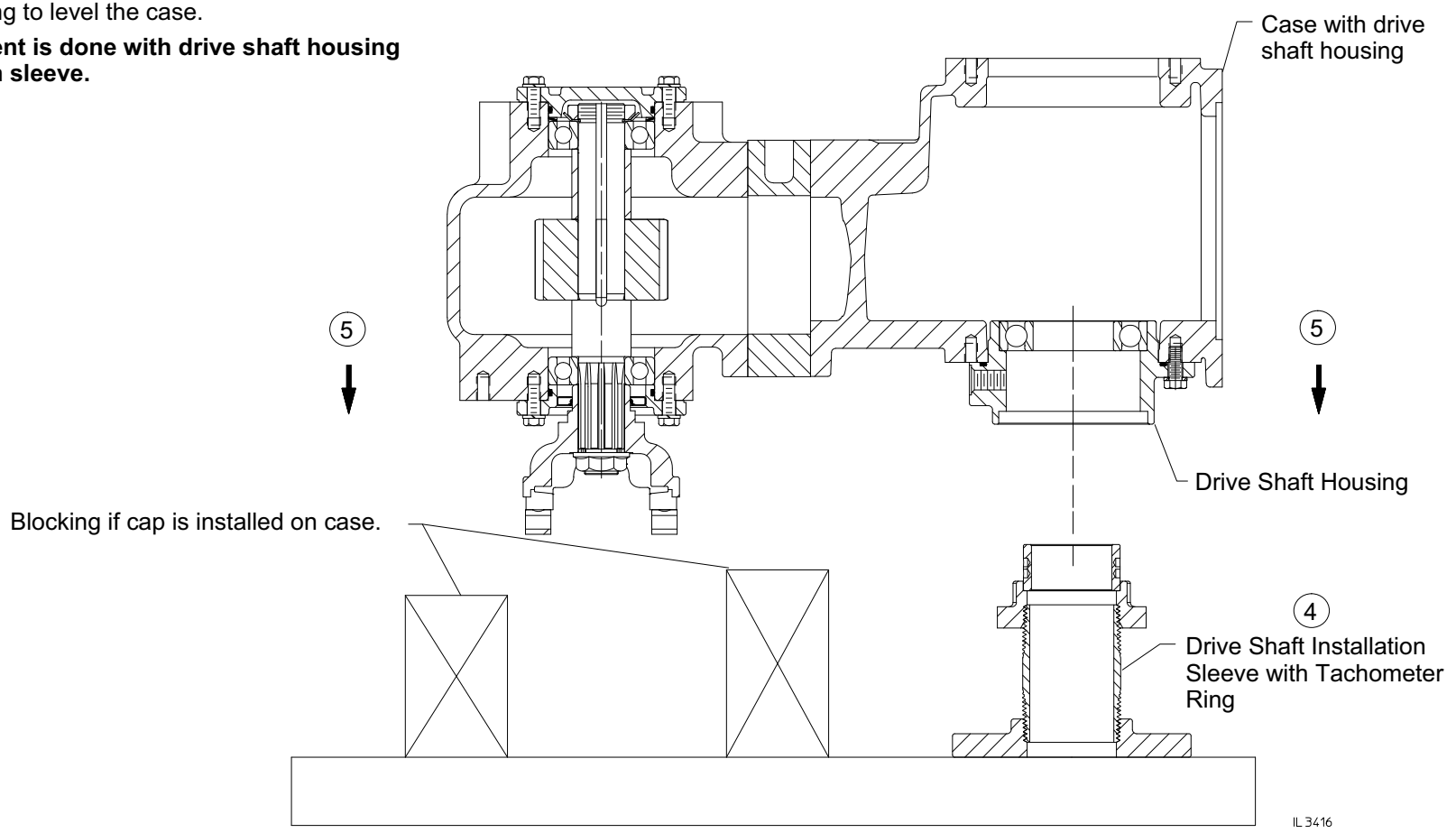
Install tachometer ring in counterbore of drive shaft installation sleeve.

Drive Shaft Installation Sleeve, Waterous Part No. 63432, See Page 7.

Install Case on Installation Tool

4. Place drive shaft installation sleeve on an arbor press.
5. Place case on drive shaft installation sleeve. Use appropriate blocking to level the case.

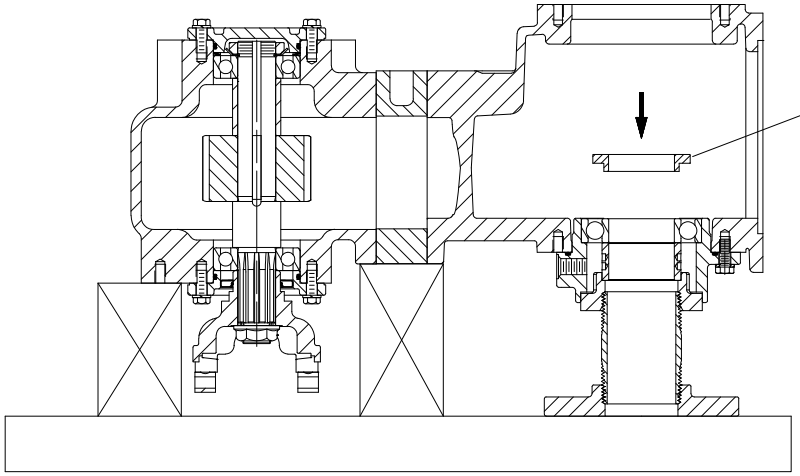
   NOTE: Alignment is done with drive shaft housing and installation sleeve.



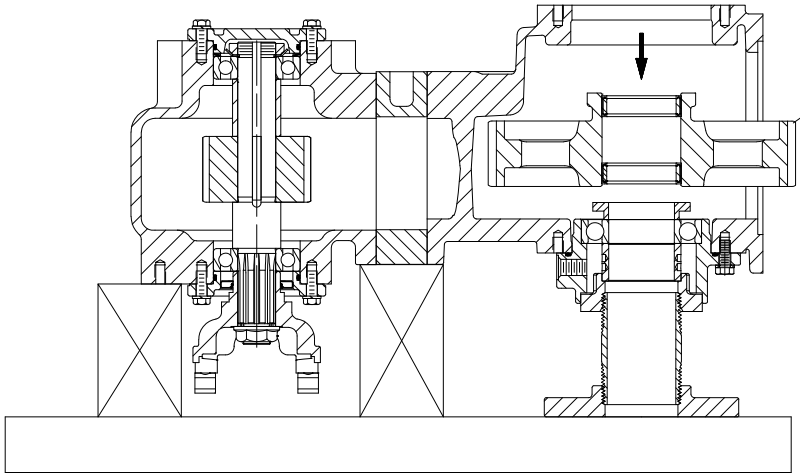
Reassembly - Installation of Driveline in Case (Continued)

Drive (Input) Shaft

Install Drive Sprocket



(6) Install thrust washer in case centering bore with bearing.

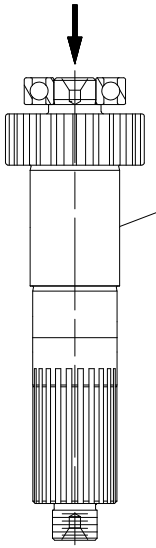


(7) Install drive sprocket in case centering bore with thrust washer.

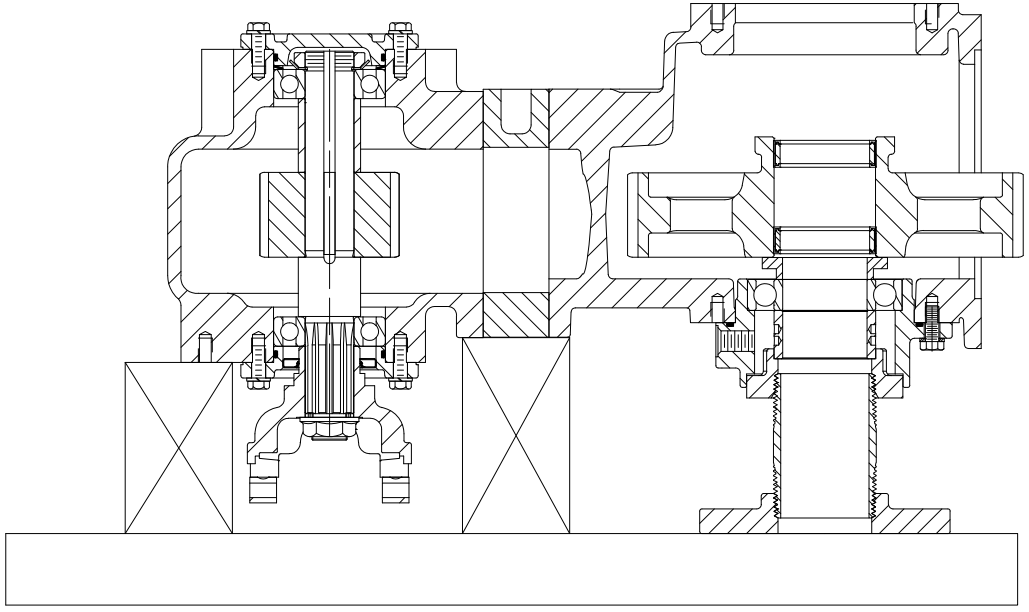
Reassembly - Installation of Driveline in Case (Continued)

Drive (Input) Shaft

Install Drive Shaft in Case



(8) Press drive shaft assembly into case and through sprocket and drive shaft housing.

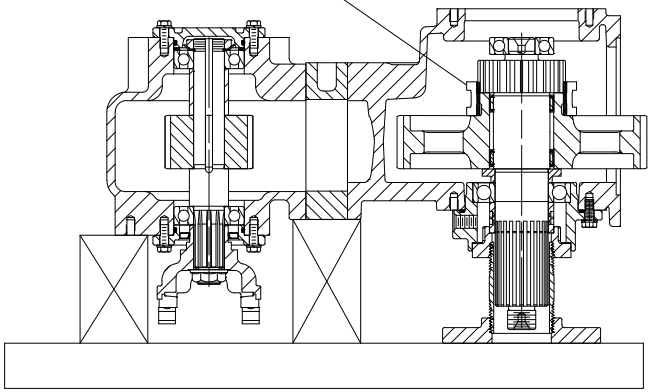


Reassembly - Installation of Driveline in Case (Continued)

Shift Collar

Input and Output Shaft Configuration

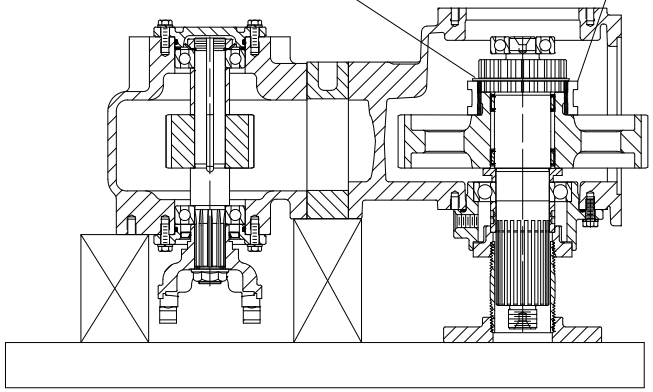
(9) Install shift collar on drive shaft, slide over spline teeth on both drive shaft and sprocket.



Input Shaft Only Configuration

(9a) Install shift collar on drive shaft, slide over spline teeth on both drive shaft and sprocket.

(9b) Install retaining ring in groove on drive shaft spline behind shift collar.



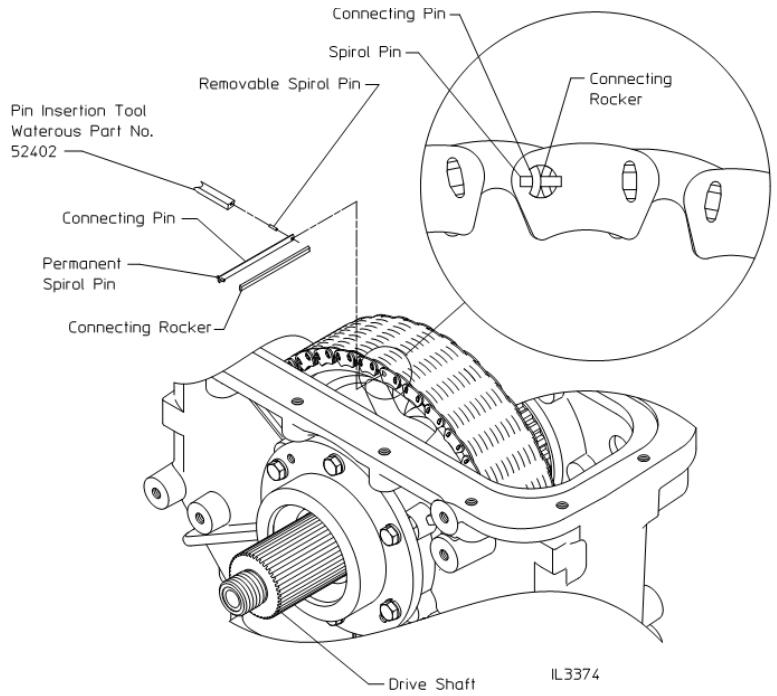
Reassembly - Installation of Driveline in Case (Continued)

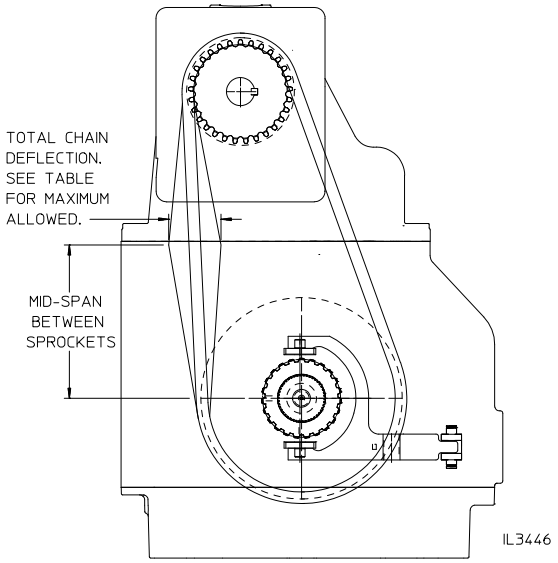
Chain

1. Wrap the chain around the drive and driven sprockets making sure everything meshes and then lace the joining ends together using the connecting pin set.

   NOTE: Move collar to PUMP position. Retain drive shaft / sprocket to prevent rotation. Pull chain ends together.
2. Insert the connecting pin rocker partway through the holes in the joining end links being careful of orientation. The connecting rocker must be on the side of the guide link opposite the joining end with the connecting rockers wide curved surface towards the center of the hole.
3. Insert the connecting pin assembly along side the connecting rocker. The two wide curved surfaces of the connecting pin and connecting rocker must face each other.
4. After the connecting pin assembly and connecting rocker have been pushed all the way through the joining end of the connecting pin assembly, insert the spirol pin into the open hole at the end of the connecting pin assembly. Make sure the spirol pin overlaps the connecting rocker.
5. Check chain for proper tension. Check deflection half-way between the drive sprocket and driven sprocket (see chart below for maximum deflection). Replace chain if deflection is greater than those displayed in the chart below.

PTO Model	Max. Deflection (In.)
TC20B	1.75
TC20C	1.75
TC20D	1.75
TC20E	2.0
TC20F	2.0



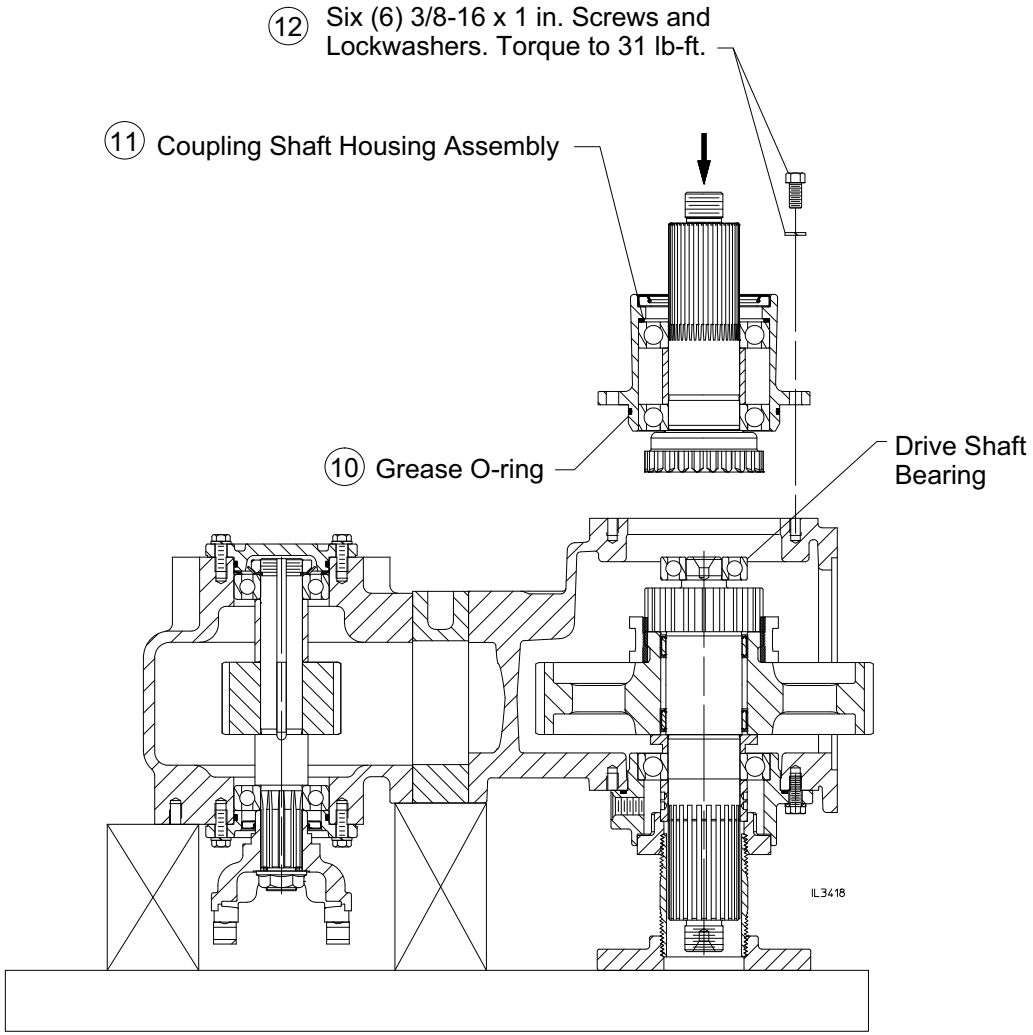


Reassembly - Installation of Driveline in Case (Continued)

Coupling (Output) Shaft

Input and Output Shaft Configuration (Wave Spring Design Prior to March 12, 2013)

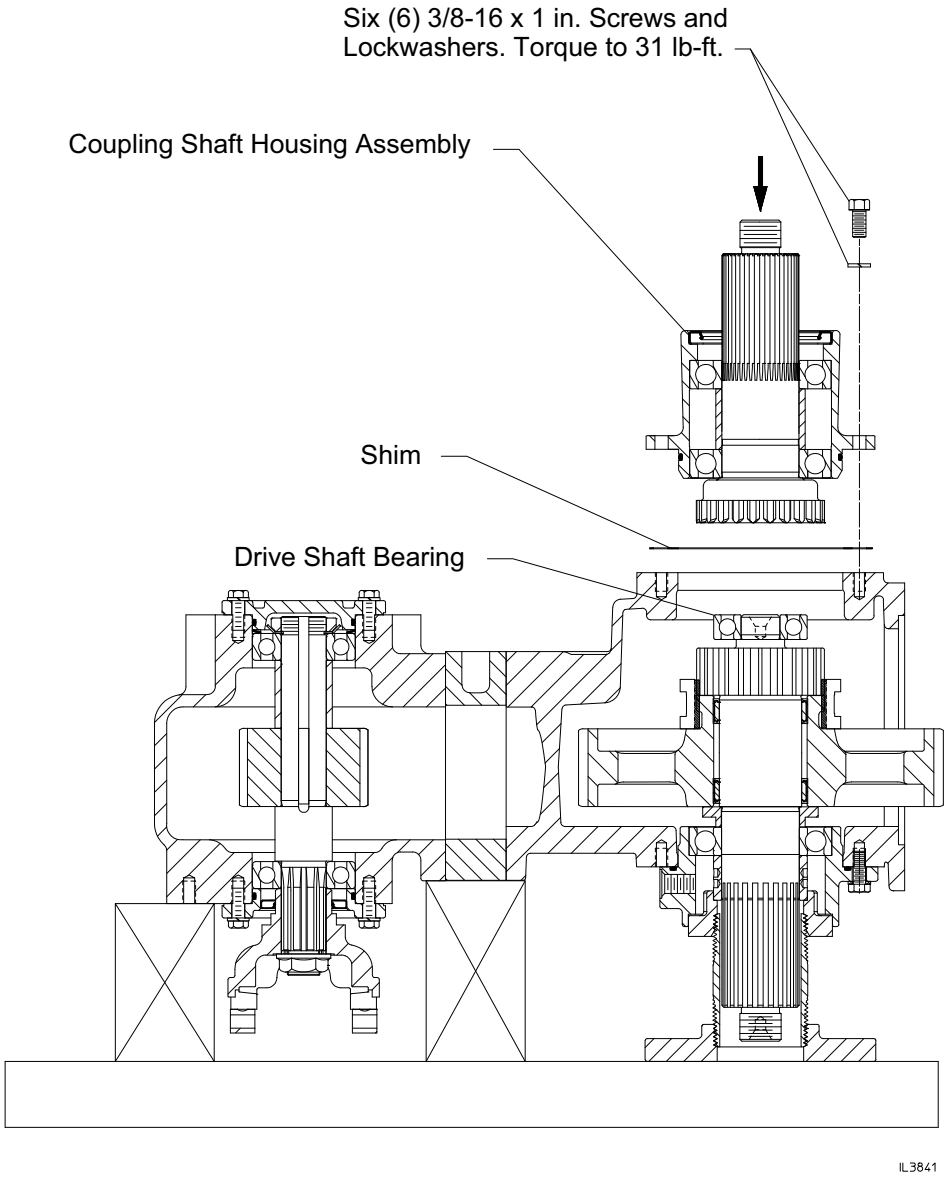
10. Grease O-ring on coupling shaft housing.
11. Press coupling shaft housing assembly on drive shaft bearing.
12. Install six (6) 3/8-16 x 1 in. screws and lockwashers. Torque to 31 lb-ft.



Reassembly - Installation of Driveline in Case (Continued)

Coupling (Output) Shaft

Input and Output Shaft Configuration (Shimming Design After March 12, 2013)



The driveline assembly was factory shimmed to limit the axial float of the driveline. If any of the driveline parts have been changed, it may be necessary to change the total thickness of shims between the coupling shaft housing and the transmission case. Shims are color coded for thickness as follows:

.005” Blue

.007” Natural Aluminum

.010” Brown

The correct amount of shims can be determined as follows:

1. Install coupling shaft and housing assembly with no O-ring or shims between the housing and case. Lightly tighten the cap screws evenly and tap the end of the coupling shaft with a soft mallet to force the driveline all the way forward. Do not overtighten causing bending or breakage of the coupling shaft housing.
2. Measure the gaps between the housing and case in several places to assure a uniform gap and add .005 in. This will be the total thickness of shims needed to provide the recommended axial float of .005 to .010 inch.
3. Remove the coupling shaft housing from the case after measuring the gap.

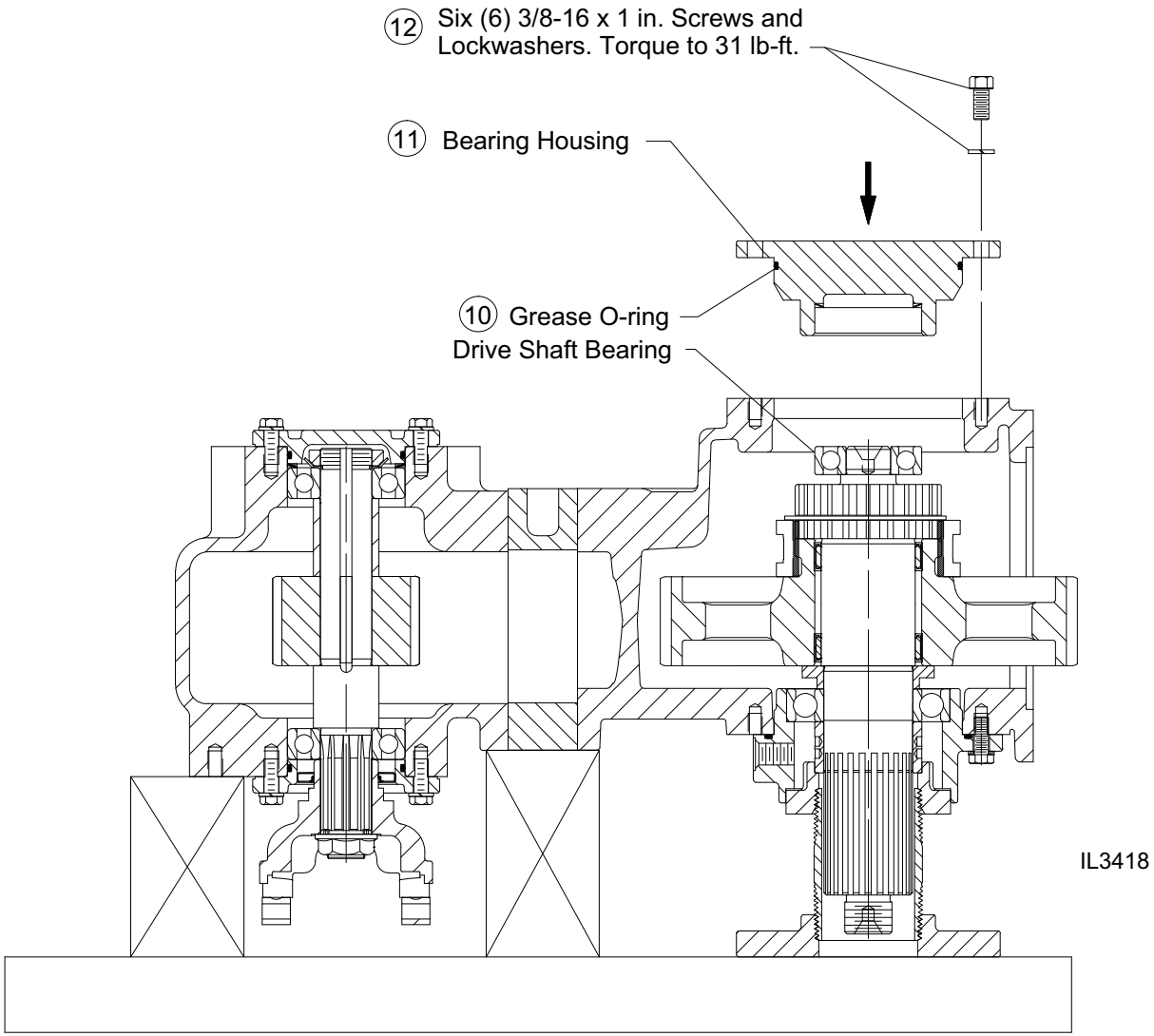
   Note: Field conditions may make it difficult to determine the correct amount of shims. If in doubt, add another .005 in. shim. No harm will result from a small amount of addition axial float but bearing life will be shortened if bearings are excessively preloaded.
4. Install the correct amount of shims on the coupling shaft housing or if all original parts are being used, reinstall original shims on coupling shaft.
5. Install O-ring on housing and coat O-ring with grease.
6. Install the housing over the bearings on the coupling shaft.
7. Mount housing to the case with fasteners.

Reassembly - Installation of Driveline in Case (Continued)

Coupling (Output) Shaft

Input Only Shaft Configuration

10. Grease O-ring on bearing housing.
11. Press bearing housing on drive shaft bearing.
12. Install six (6) 3/8-16 x 1 in. screws and lockwashers. Torque to 31 lb-ft.

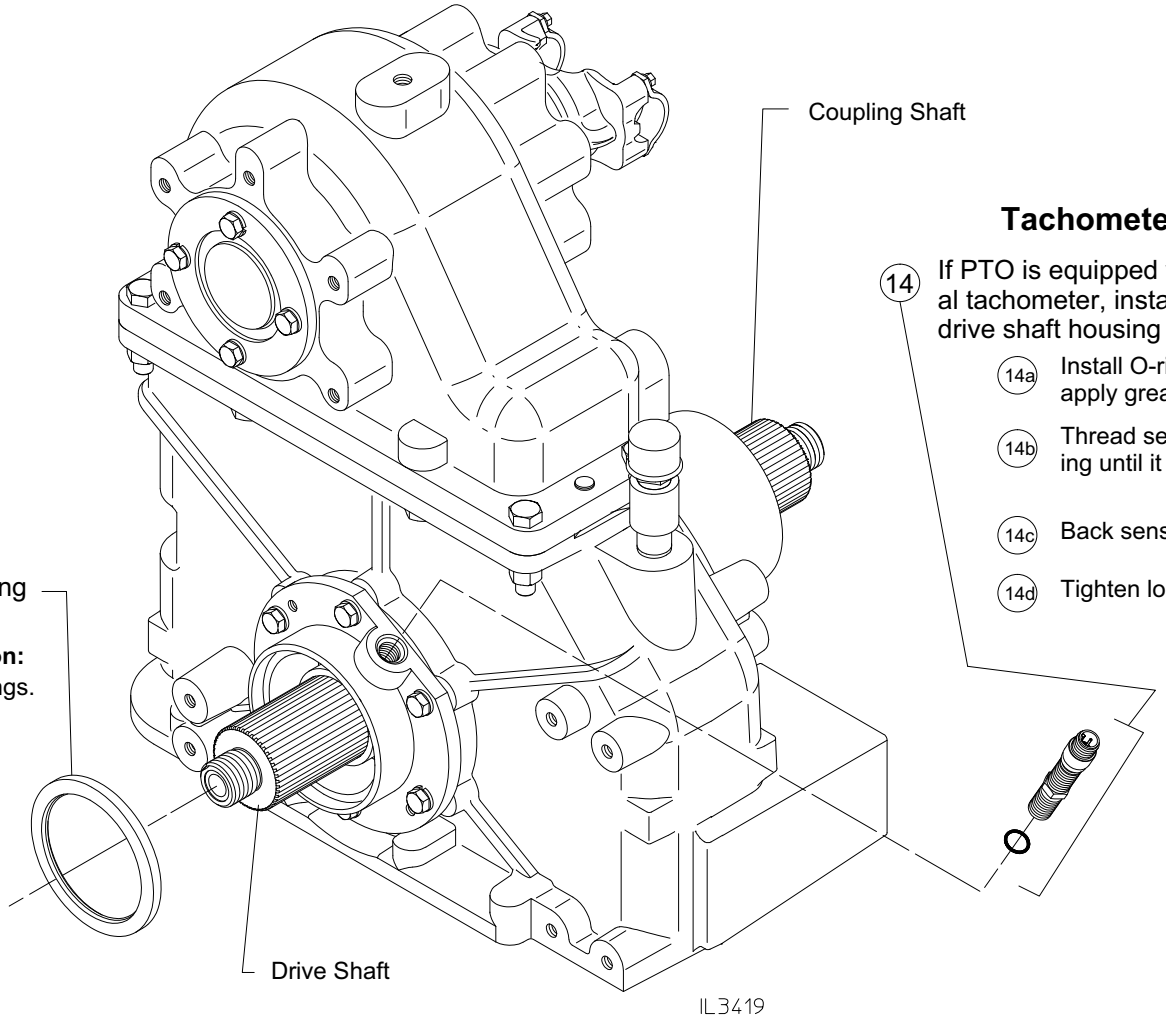


Oil Seals and Tachometer Sensor

Oil Seals:

13 Install oil seal (3-1/2 x 4-3/8 in.) in housing as follows:

- 13a **Input and Output Shaft Configuration:** In both drive and coupling shaft housings.
- 13b **Input Shaft Only Configuration:** In drive shaft housing only.



Tachometer Sensor:

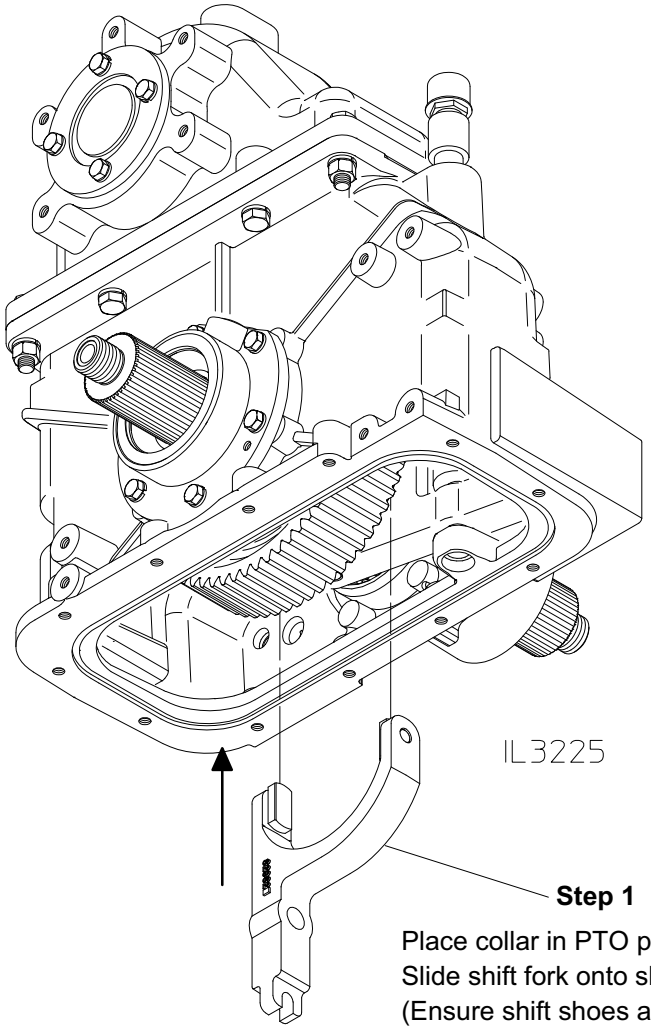
14 If PTO is equipped with an optional tachometer, install sensor in drive shaft housing as follows:

- 14a Install O-ring in housing, apply grease.
- 14b Thread sensor into housing until it bottoms out.
- 14c Back sensor out 1/2 turn.
- 14d Tighten lock nut.

Reassembly - Installation of Driveline in Case (Continued)

Shift Fork

Step 1



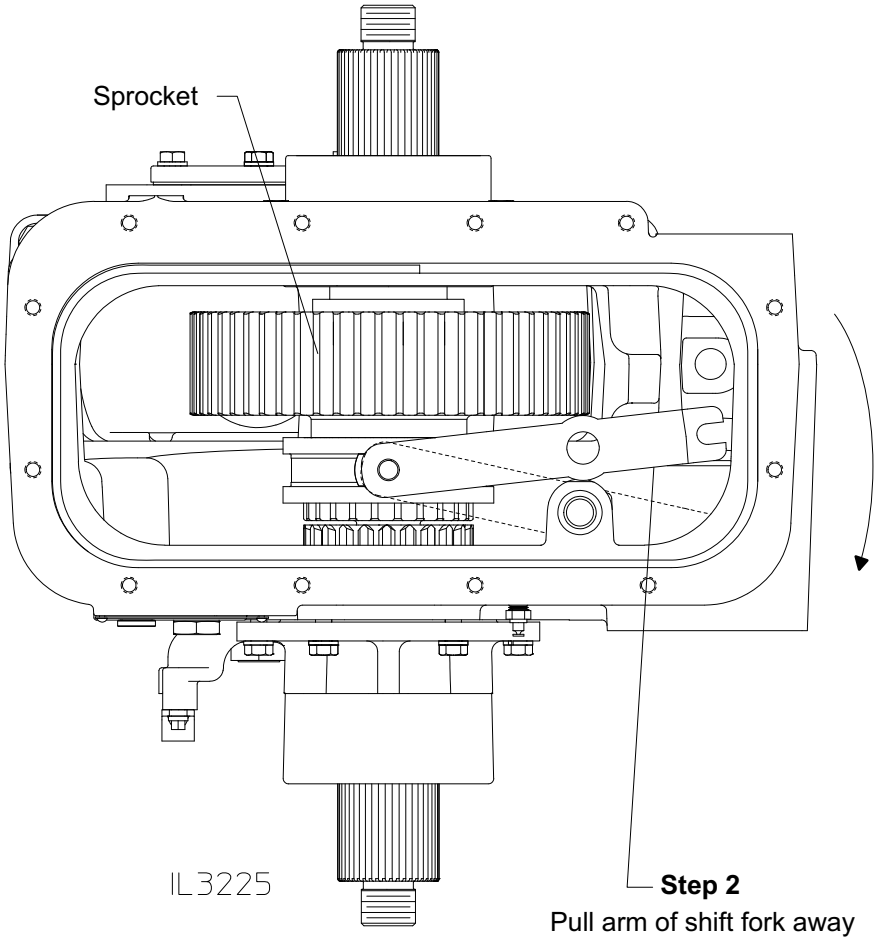
Step 1

Place collar in PTO position.

Slide shift fork onto shift collar in case.

(Ensure shift shoes are installed, see Page 46.)

Step 2



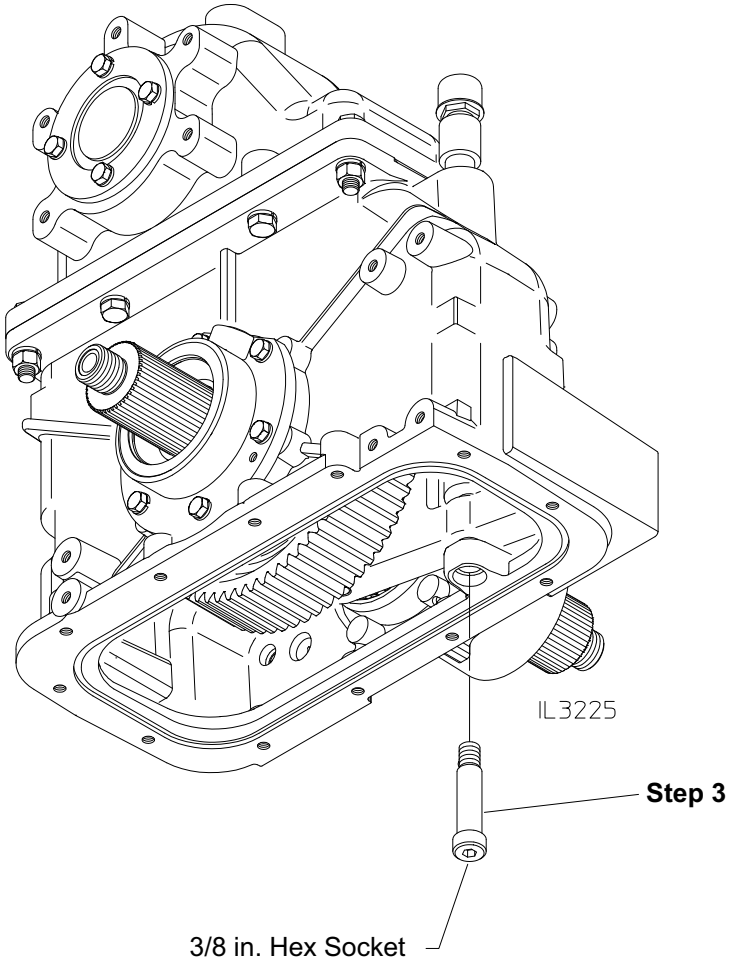
Step 2

Pull arm of shift fork away from sprocket aligning hole in fork with hole in case ears.

Reassembly - Installation of Driveline in Case (Continued)

Shift Fork / Shift Unit

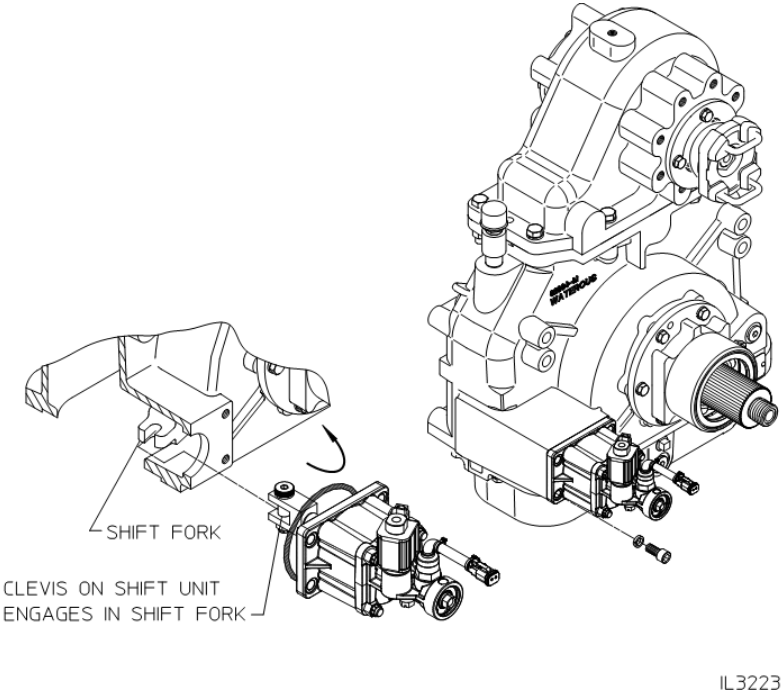
Step 3



Install 3/4 in. shoulder screw through hole in case ears and hole in shift fork. Torque to 75 lb-ft. Note that the shoulder screw is self-locking. Do not re-use original screw, a new screw must be installed.

Shift Unit

1. Install a new 1-13/16 x 2 in. O-ring on shift unit. Coat O-ring with grease.
2. Place shift unit in ROAD Mode by pushing override rod in.
3. Place shift fork in PTO Mode by pushing fork arm towards end of case where the shift unit mounts.
4. Rotate shift unit towards case and engage clevis in shift fork slot.
5. Push shift unit straight back in until flange contacts case.
6. Install four (4) 3/8-16 x 1 in. screws and lockwashers. Torque to 31 lb-ft.

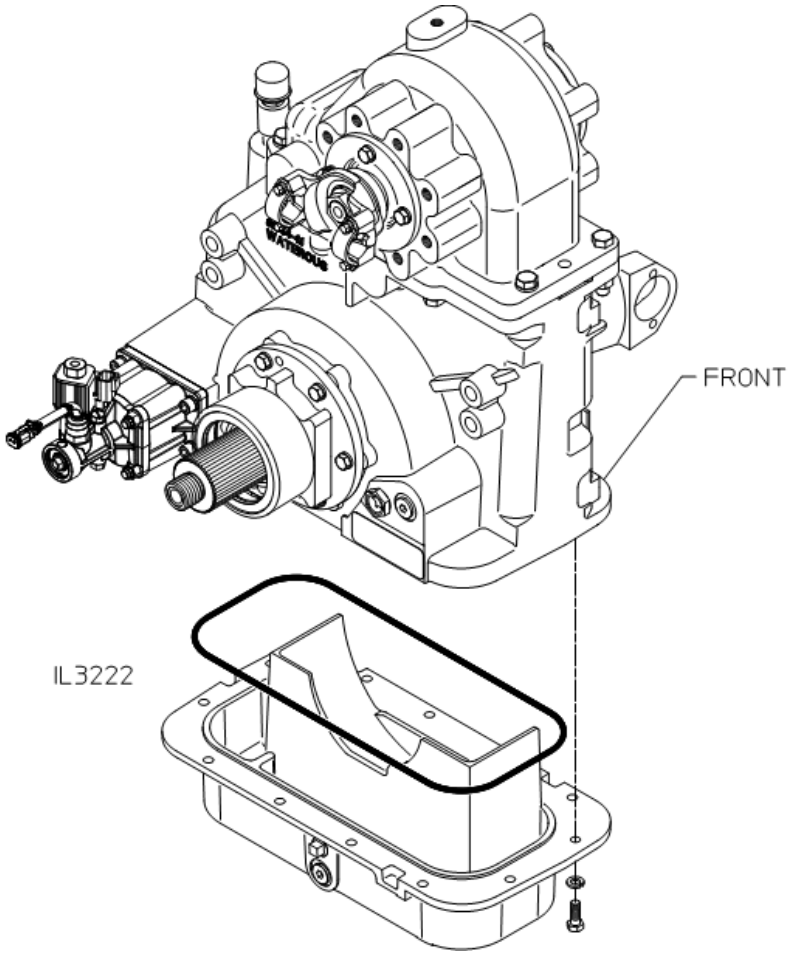


Reassembly - Installation of Driveline in Case (Continued)

Oil Pan

1. Install gasket on oil pan.
2. Attach oil pan to case with twelve (12) 3/8-16 x 1 in. screws and lockwashers. Torque to 31 lb-ft

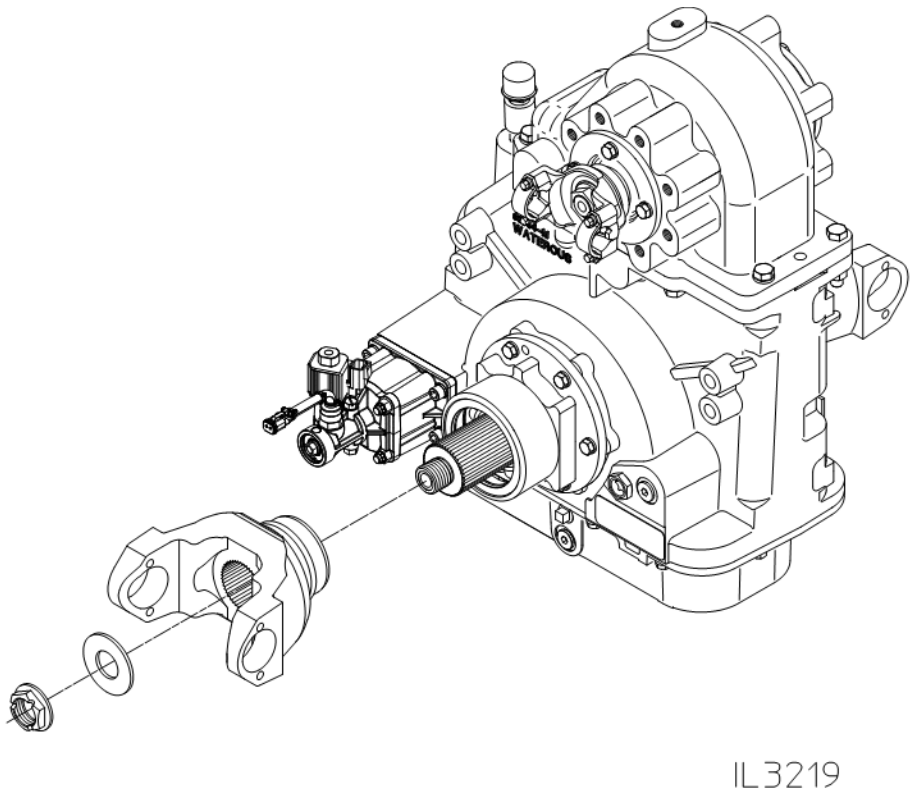
   Note: Before tightening fasteners, push the oil pan towards front of PTO to properly position oil pan against inner wall of the PTO case.



End Yokes or Companion Flanges

1. Lubricate oil seal in housing.
2. Install end yoke or companion flange on shaft.
3. Install lock nuts.

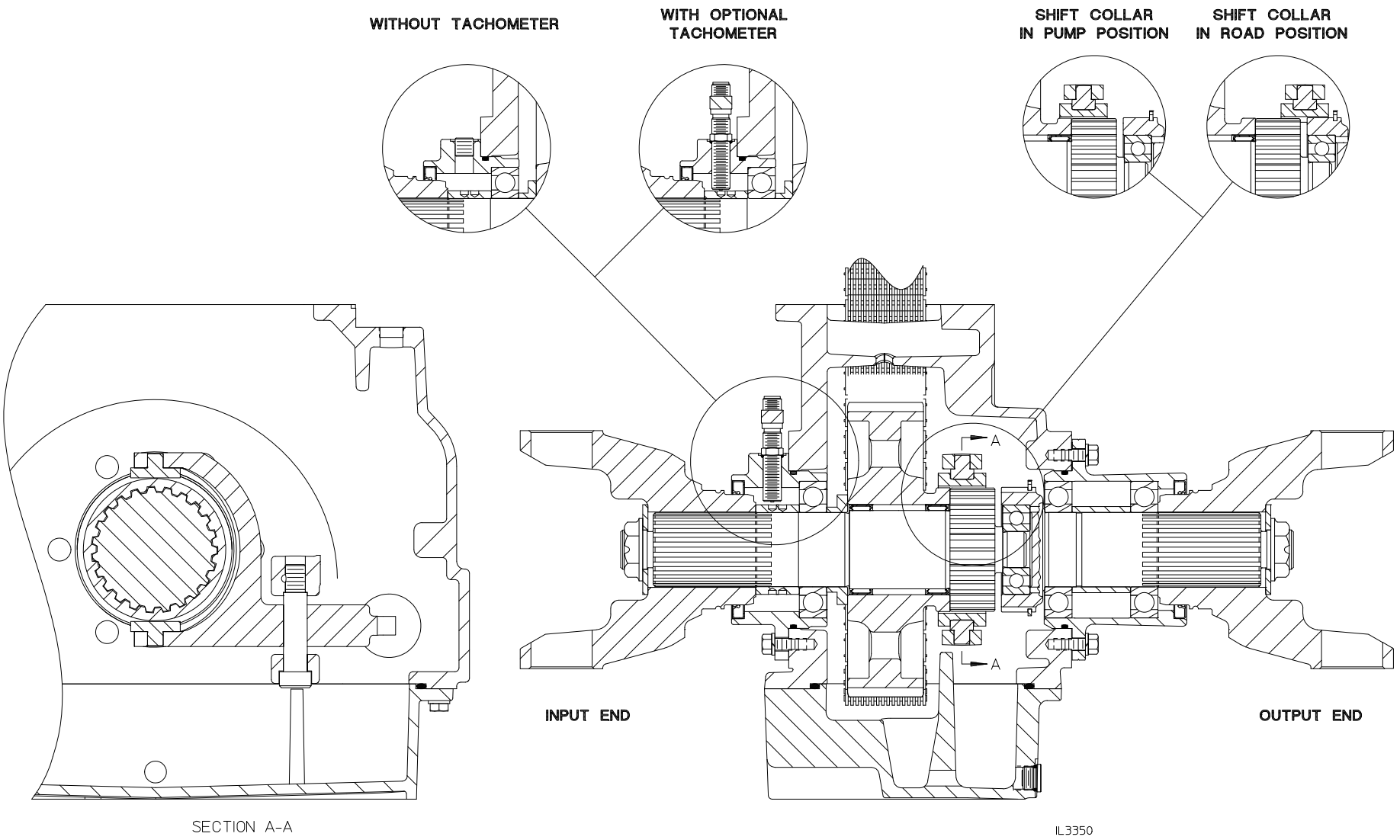
   a. Install washer.
   b. Install a new 1-1/4-18 self-locking nut. Torque to 475-525 lb-ft



Reassembly - Installation of Driveline in Case (Continued)

Cross-Section Diagram of Driveline

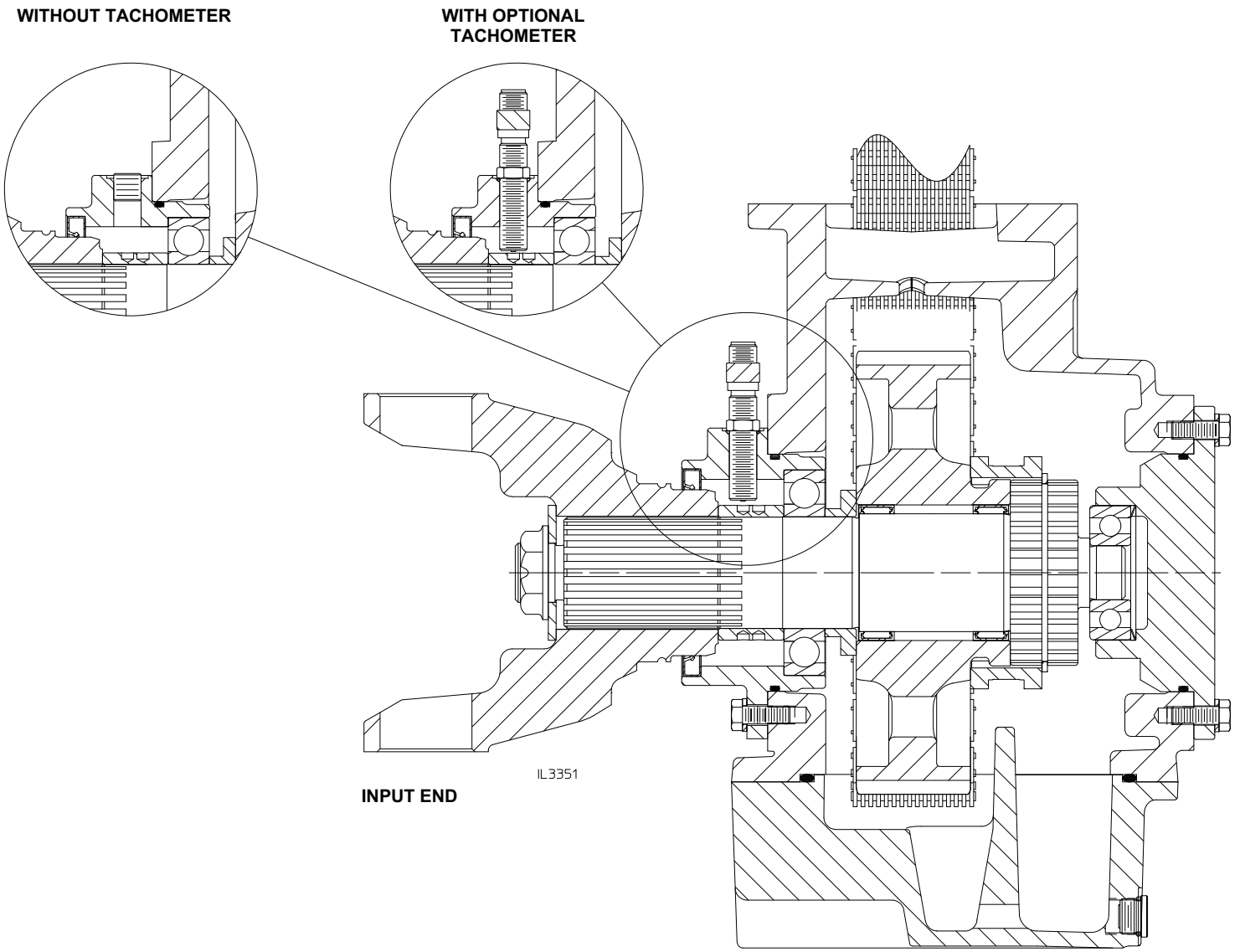
Input and Output Shaft Configurations



Reassembly - Installation of Driveline in Case (Continued)

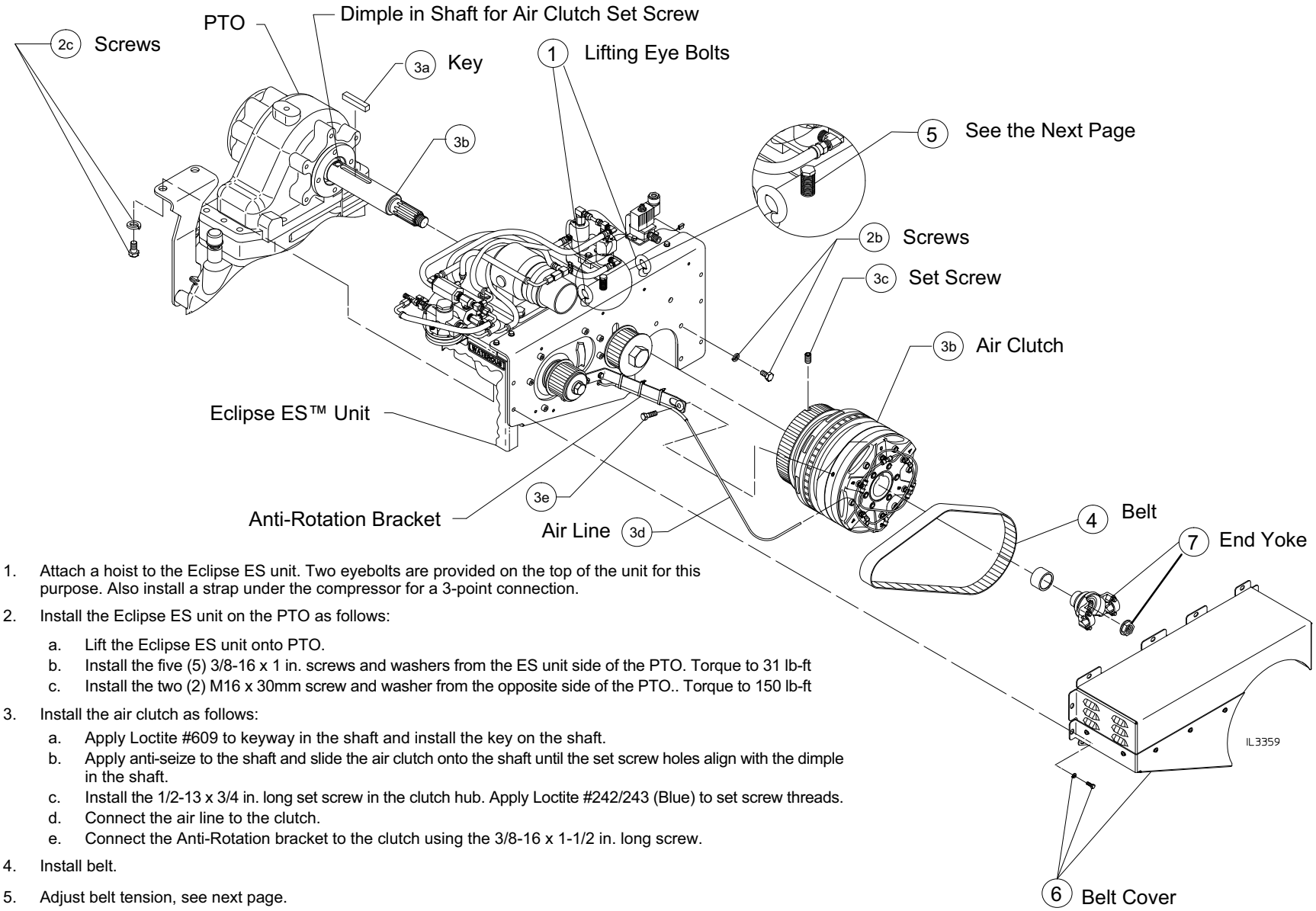
Cross-Section Diagram of Driveline

Input Shaft Only Configuration



Reassembly - Installation of Eclipse™ ES Unit

Eclipse™ ES Unit on PTO



1. Attach a hoist to the Eclipse ES unit. Two eyebolts are provided on the top of the unit for this purpose. Also install a strap under the compressor for a 3-point connection.
2. Install the Eclipse ES unit on the PTO as follows:
   a. Lift the Eclipse ES unit onto PTO.
   b. Install the five (5) 3/8-16 x 1 in. screws and washers from the ES unit side of the PTO. Torque to 31 lb-ft
   c. Install the two (2) M16 x 30mm screw and washer from the opposite side of the PTO.. Torque to 150 lb-ft
3. Install the air clutch as follows:
   a. Apply Loctite #609 to keyway in the shaft and install the key on the shaft.
   b. Apply anti-seize to the shaft and slide the air clutch onto the shaft until the set screw holes align with the dimple in the shaft.
   c. Install the 1/2-13 x 3/4 in. long set screw in the clutch hub. Apply Loctite #242/243 (Blue) to set screw threads.
   d. Connect the air line to the clutch.
   e. Connect the Anti-Rotation bracket to the clutch using the 3/8-16 x 1-1/2 in. long screw.
4. Install belt.
5. Adjust belt tension, see next page.
6. Install belt cover with eleven (11) 1/4-20 x 3/4 in. screws and washers. Torque to 8 lb-ft
7. Install the end yoke on the shaft. Torque self-locking nut to 275-325 lb-ft.

Reassembly - Installation of Eclipse™ ES Unit (Continued)

Adjusting Belt Tension

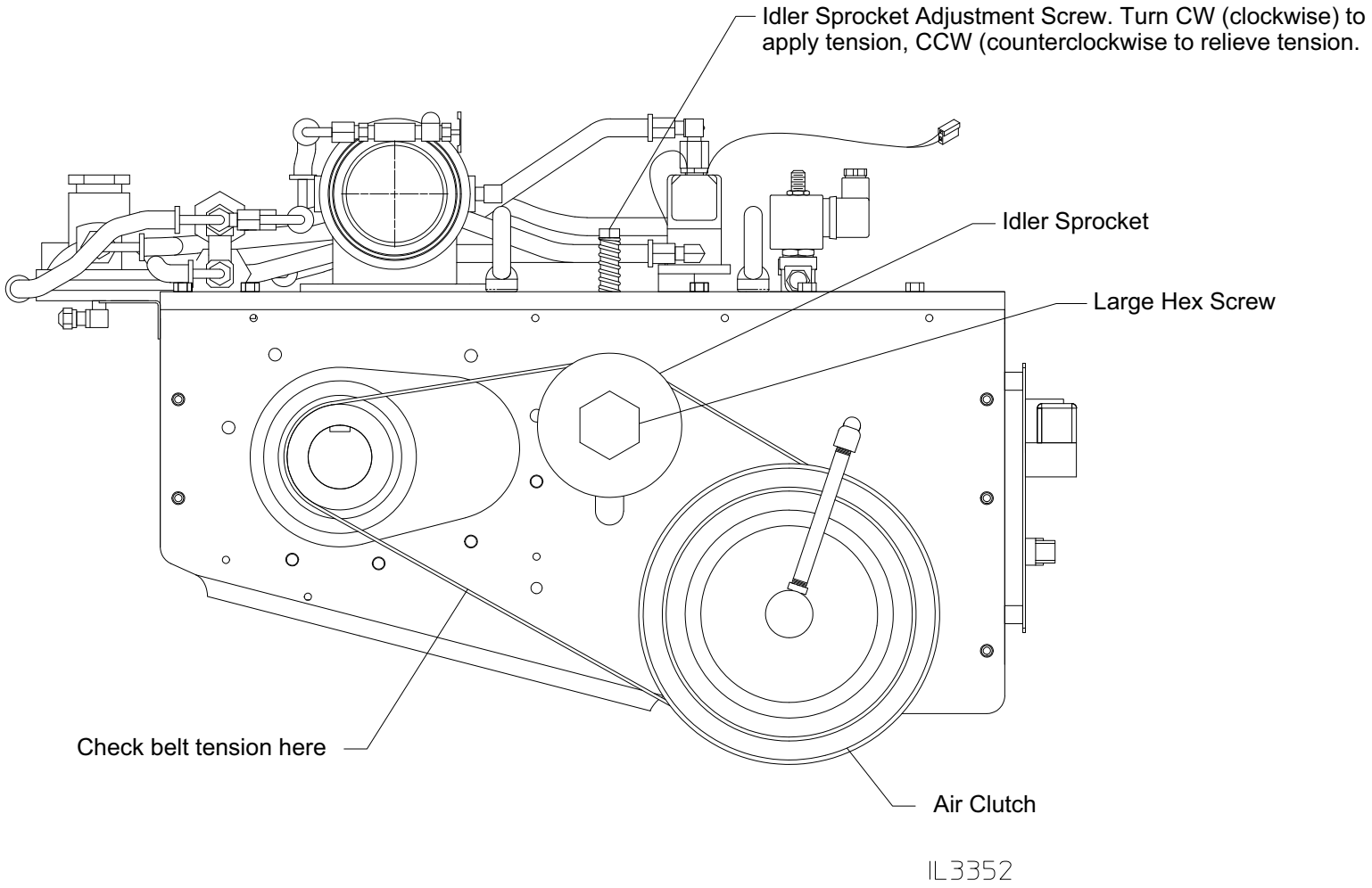
Adjust belt tension as follows:

a. Loosen the idler sprocket by turning the large hex screw counterclockwise.

b. Turn the idler sprocket adjustment screw clockwise to apply tension to the belt. Check the belt tension by applying a 10 pound load to the belt midway between the drive and driven sprocket. The belt should deflect between .250 and .313 inches.

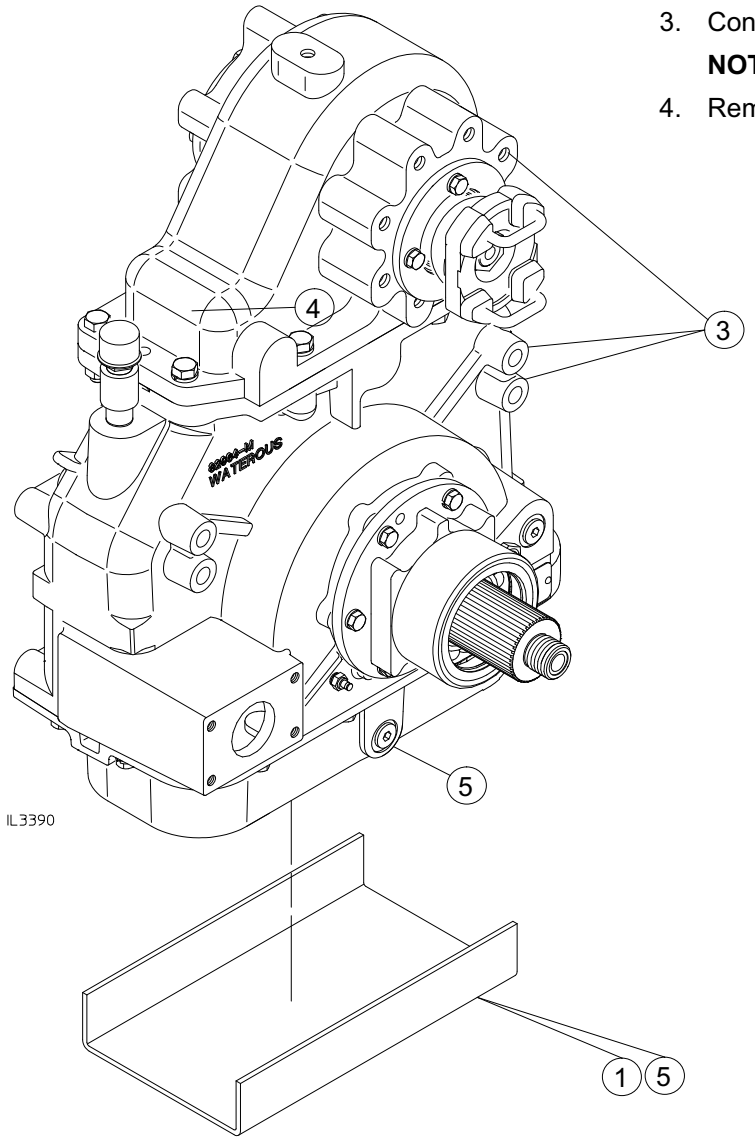
c. Once the proper belt tension is achieved, tighten the idler sprocket by turning the large hex screw clockwise.

d. Apply Loctite #242 to idler sprocket bolt threads before final tightening.



Reassembly - Installation of PTO in Vehicle

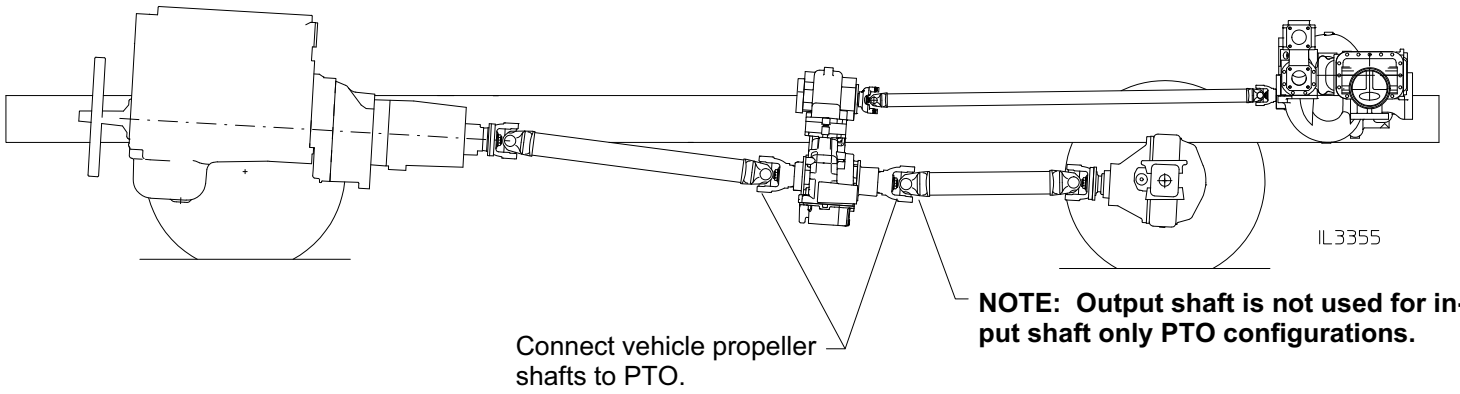
Installation of PTO in Vehicle



1. Secure PTO to support bracket on PTO jack.
2. Raise PTO up into vehicle.
3. Connect PTO to original mounting brackets in vehicle.

   NOTE: Ensure pump and PTO are within 1/8” before installing hardware.
4. Remove bracket and re-install drain plug in case.

Connection of Propeller Shaft (Driveline)

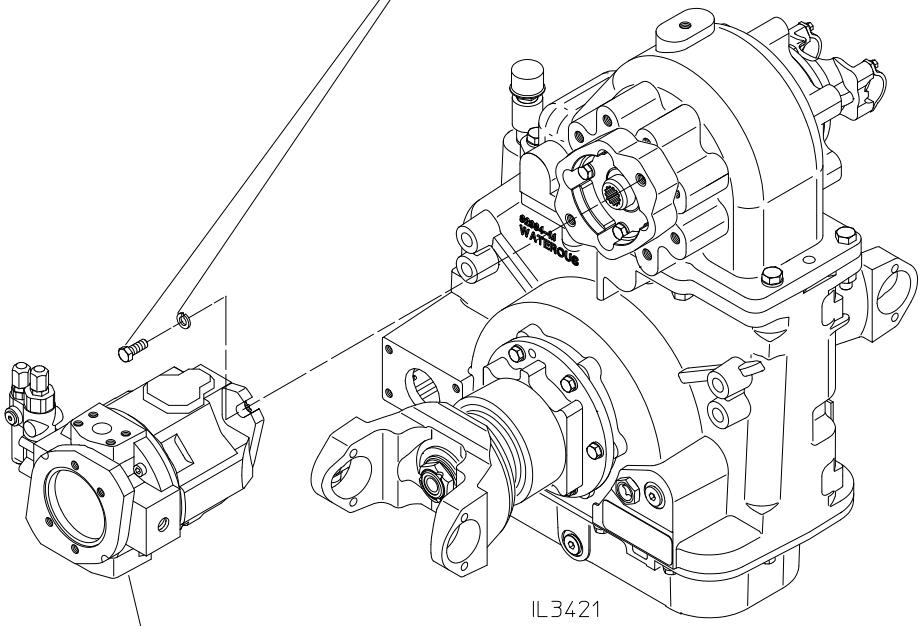


Reassembly - Installation of PTO in Vehicle (Continued)

Connection of Optional Accessories

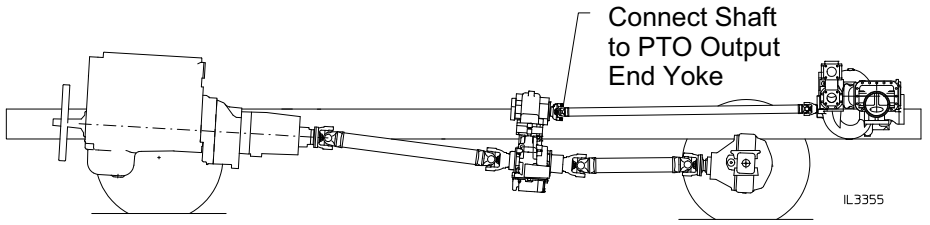
Hydraulic Pump on Rear or Front Output

Install hydraulic pump on PTO using two (2) 1/2-13 screws and lockwashers. Torque to 75 lb-ft



NOTE: Hydraulic Pump is furnished and installed by the truck builder, therefore configurations may vary from what is shown in the diagram.

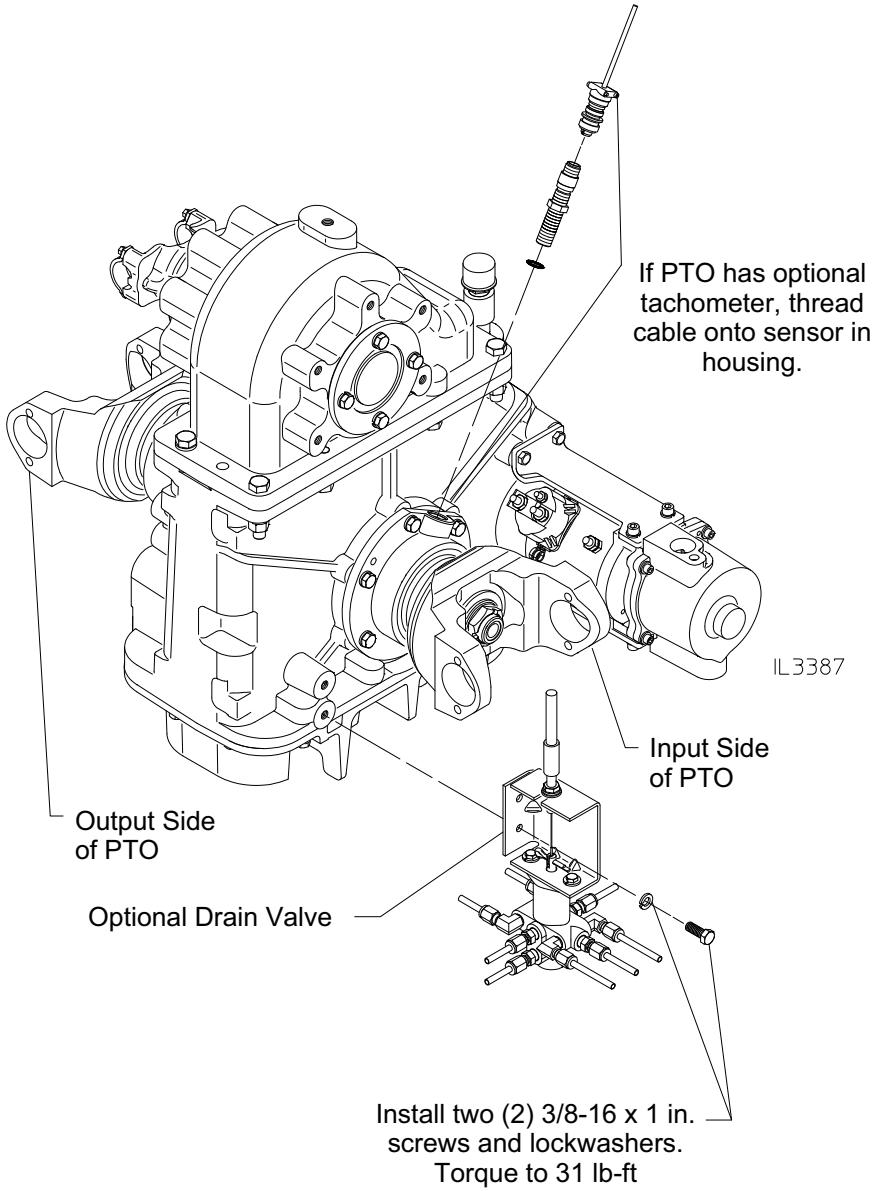
End Yoke on Front or Rear Output



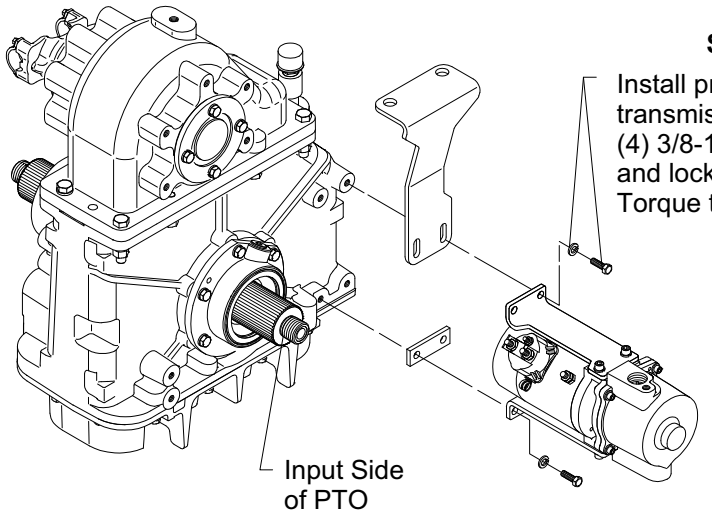
Reassembly - Installation of PTO in Vehicle (Continued)

Connection of Optional Accessories

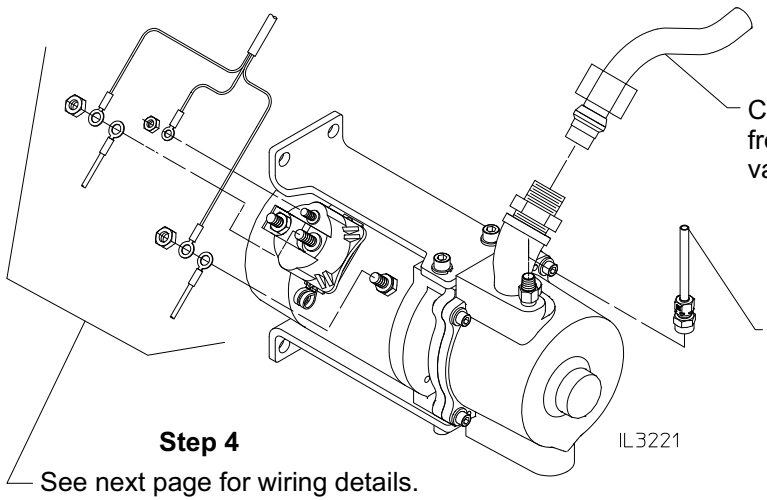
Tachometer Cable and Drain Valve



Priming Pump - Mounting on Transmission



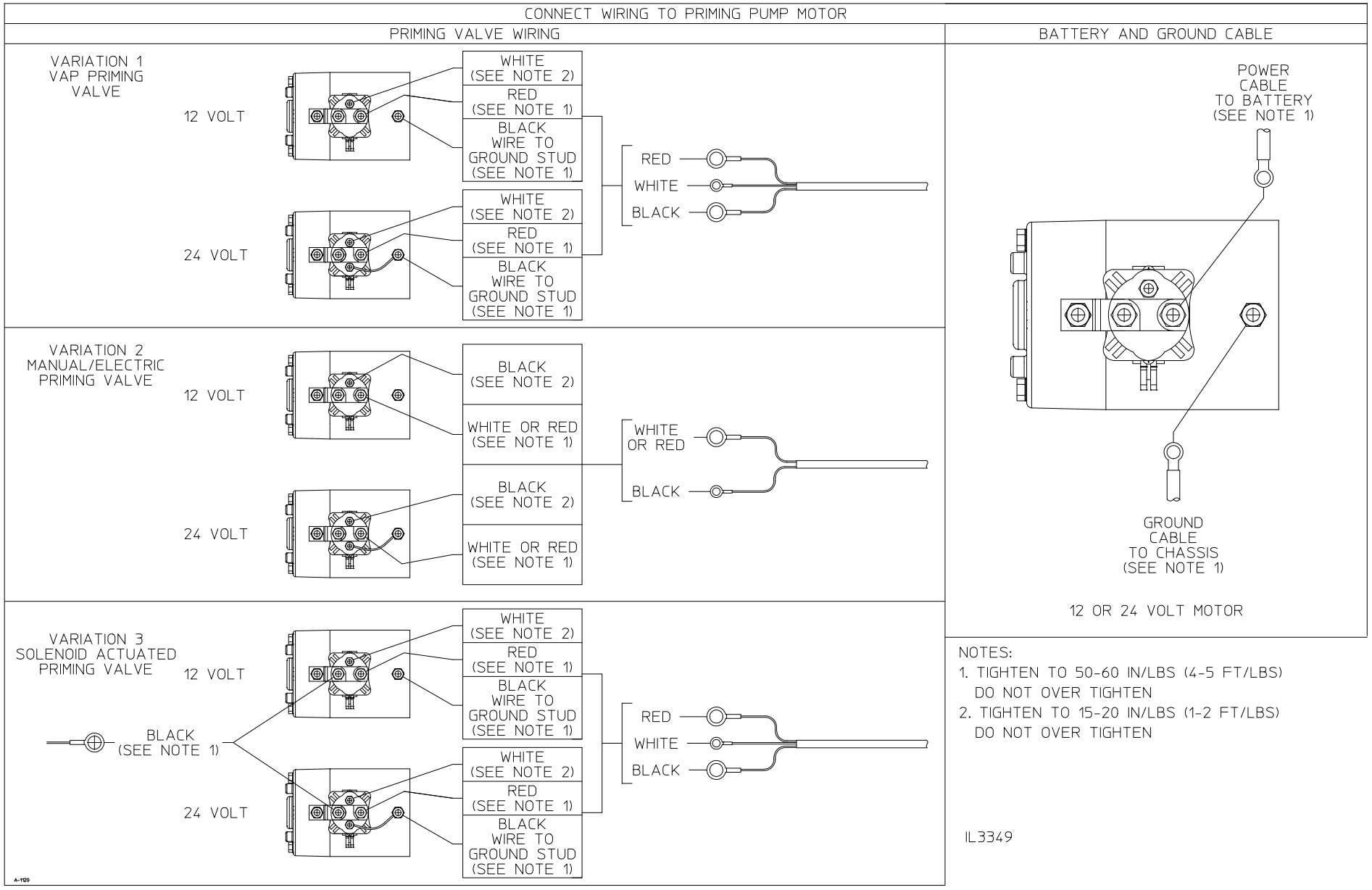
Priming Pump - Hose Connections



Reassembly - Installation of PTO in Vehicle (Continued)

Connection of Optional Accessories

Priming Pump - Wiring Connections



NOTES:

1. TIGHTEN TO 50-60 IN/LBS (4-5 FT/LBS)
   DO NOT OVER TIGHTEN
2. TIGHTEN TO 15-20 IN/LBS (1-2 FT/LBS)
   DO NOT OVER TIGHTEN

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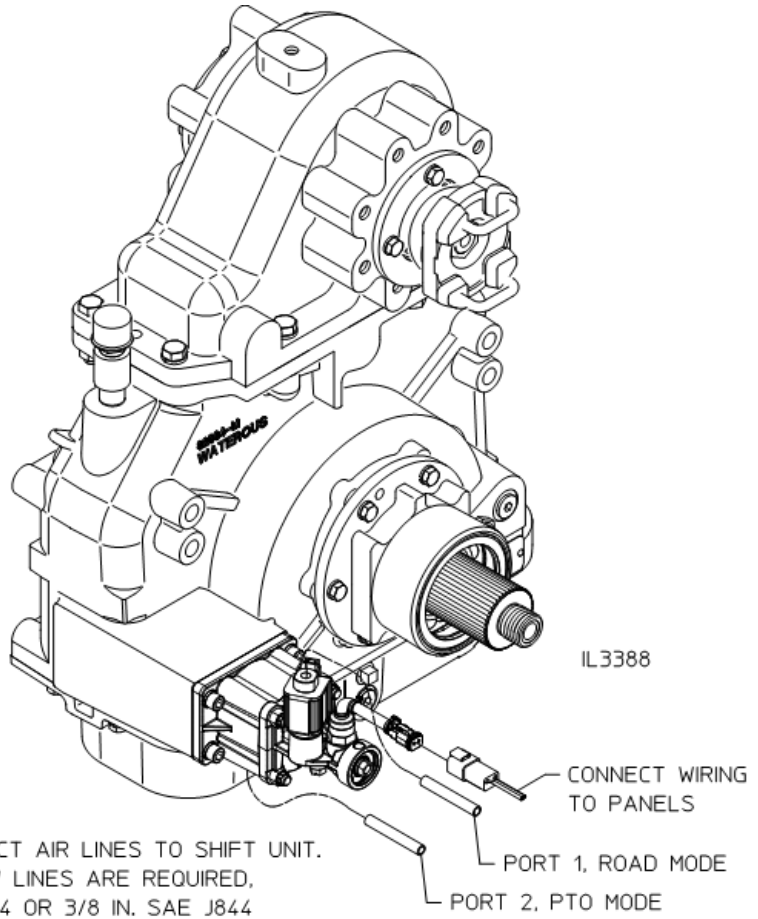
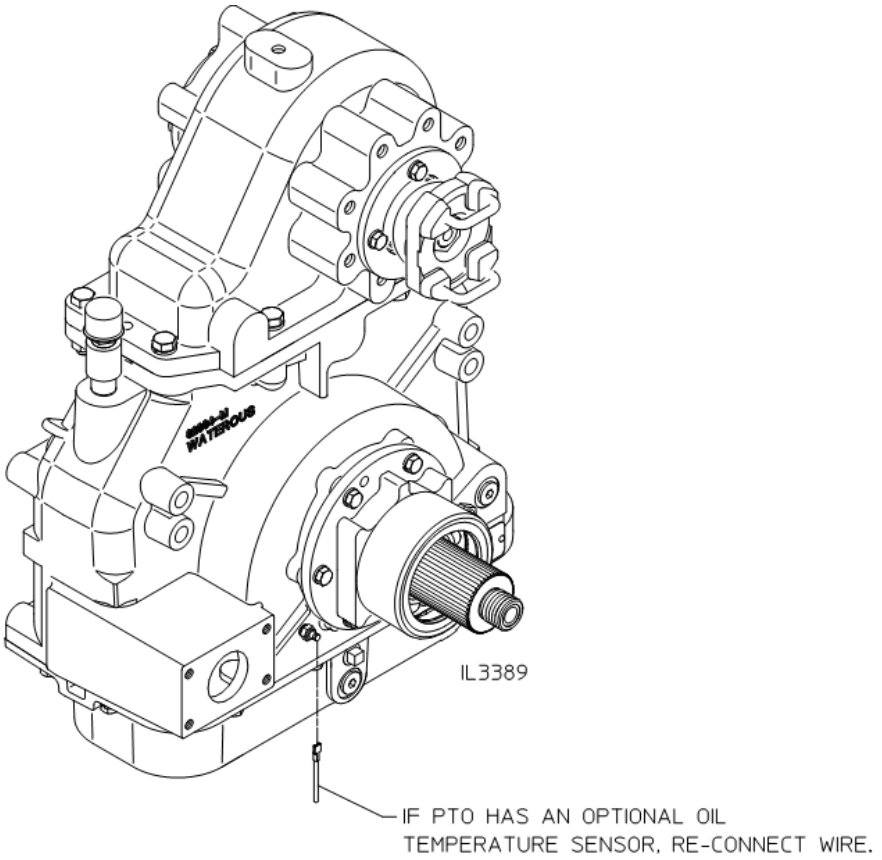
Reassembly - Installation of PTO in Vehicle (Continued)

Connection of Optional Accessories

Shift Unit



Oil Temperature Sensor

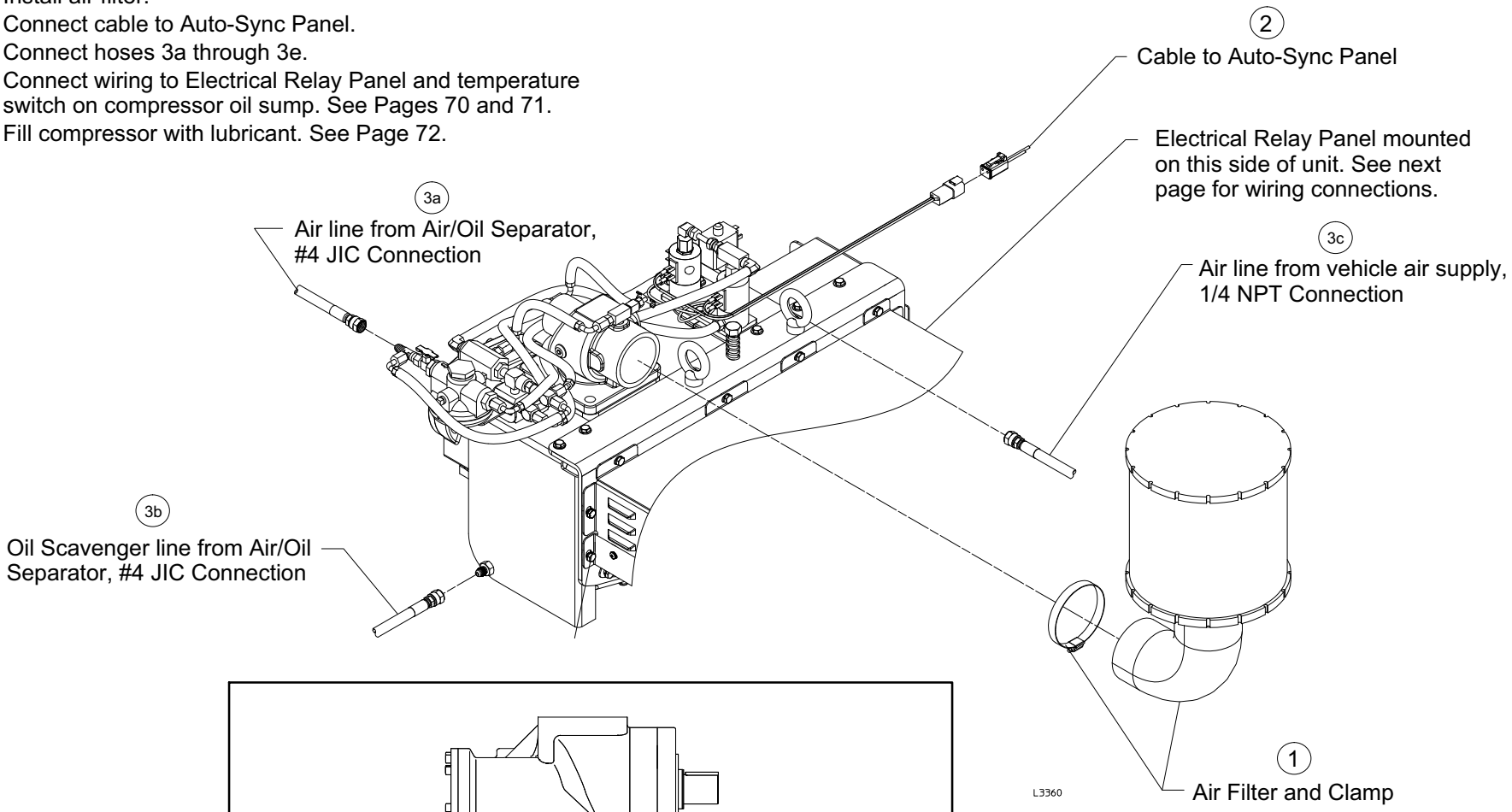


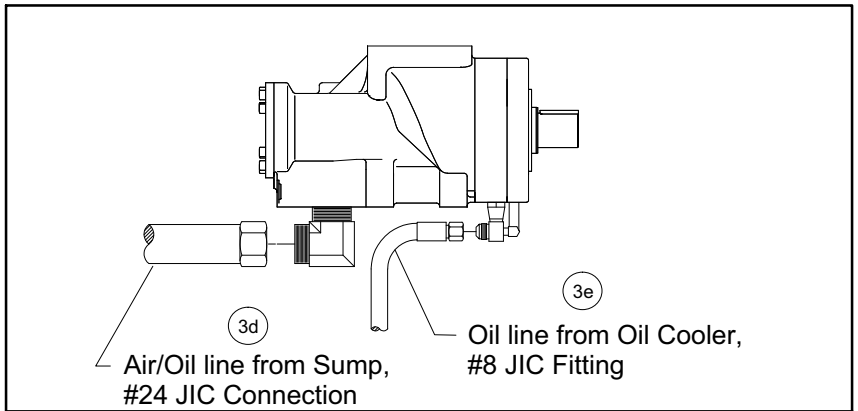
Reassembly - Installation of PTO in Vehicle (Continued)

Connection of Optional Accessories

Eclipse™ ES CAFS on Rear Output - Hoses and Cables

1. Install air filter.
2. Connect cable to Auto-Sync Panel.
3. Connect hoses 3a through 3e.
4. Connect wiring to Electrical Relay Panel and temperature switch on compressor oil sump. See Pages 70 and 71.
5. Fill compressor with lubricant. See Page 72.



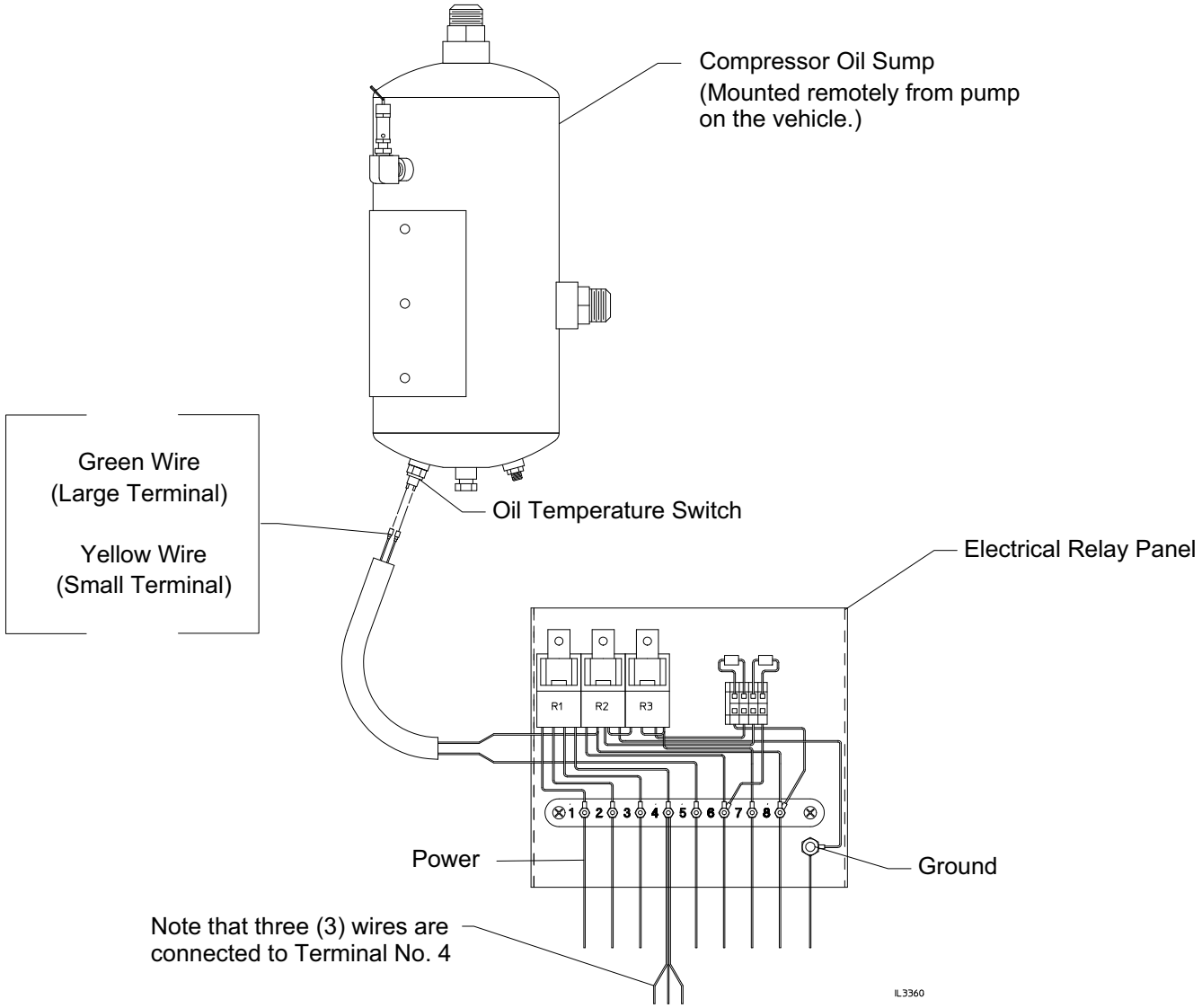


View of Compressor Behind Panel

Reassembly - Installation of PTO in Vehicle (Continued)

Connection of Optional Accessories

Eclipse™ ES CAFS on Rear Output - Electric Wiring

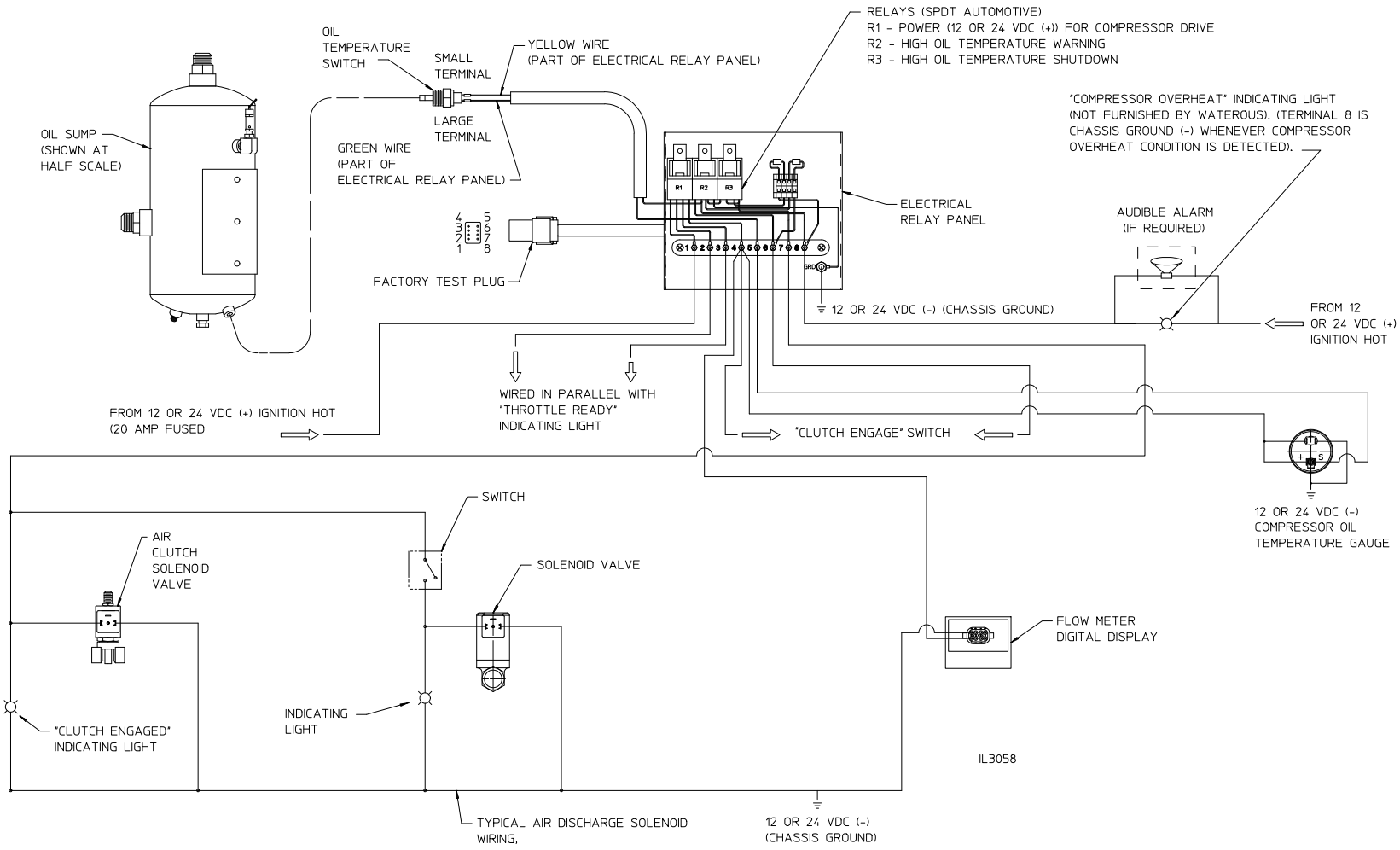


Reassembly - Installation of PTO in Vehicle (Continued)

Connection of Optional Accessories

Eclipse™ ES CAFS on Rear Output - Electric Wiring Continued

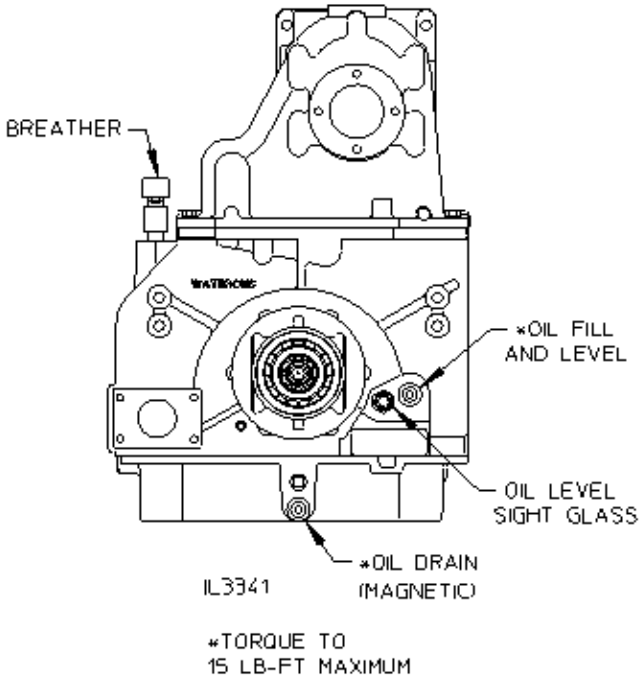
Wiring Schematic



Reassembly - Lubrication

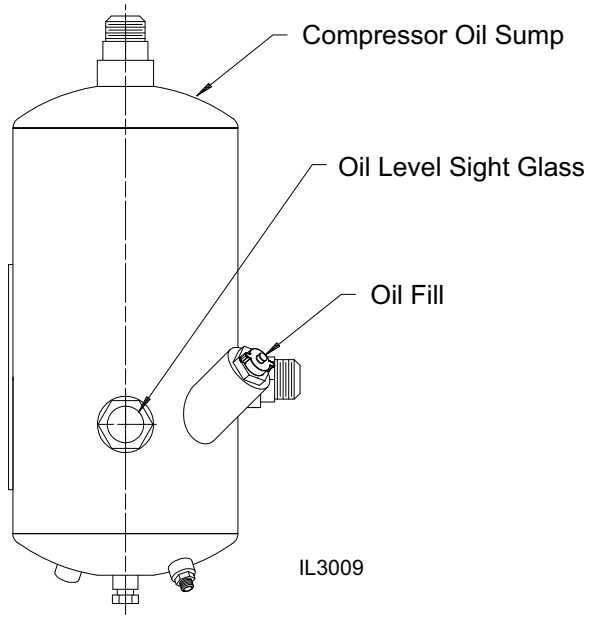
TC20 Power Take-Off

1. Fill the PTO through the oil level hole or by removing the breather and adding fluid through the opening. Any type of automatic PTO fluid (ATF) may be used. Capacity is approximately 6 quarts. Fill to the bottom of the threads in the oil level port.
2. Re-check all fasteners for tightness.
3. Check for fluid leaks.



Eclipse™ ES CAFS Unit

1. Fill the compressor sump with oil. Use ISO 68 viscosity oil. System holds approximately 2 to 3 gallons. The oil level should be approximately half way up the window in the sight glass.
2. Also change the spin-on oil filters located on the air/oil separator and oil cooler before starting up the system.
3. Run the compressor for two minutes and re-check the oil level. **Do Not Overfill.**
4. Check for fluid leaks.



Reassembly - Final Checks

Shift Indication Light Operation

Re-check for proper operation of shift mechanism and that the shift indicator light system is functioning properly.

Check the operation of the PTO shift indicating lights at least weekly as follows:

NOTE: Block wheels with wheel chocks before beginning.

1. With the PTO in the ROAD position, truck PTO in NEUTRAL and the parking brake engaged, ensure that the PUMP ENGAGED and OK TO PUMP lights in the cab are off.
2. Shift to PUMP following the shifting instructions section of this document.
   a. Ensure that the green PUMP ENGAGED and OK TO PUMP lights in the cab are on.
   b. Ensure that the green THROTTLE READY light on the operator's panel is on.
3. Apply the service (foot) brake and release the parking brake.
   a. Ensure that the green OK TO PUMP light in the cab is off.
   b. Ensure that the green THROTTLE READY light on the operator's panel is off.
4. Engage the parking brake and shift truck PTO to NEUTRAL.
   a. Ensure that the green OK TO PUMP light in the cab is off (automatic truck PTO only).
5. Shift to ROAD following the shifting instructions section of this document.
   a. Ensure that the green PUMP ENGAGED and OK TO PUMP lights in the cab are off.
   b. Ensure that the green THROTTLE READY light on the operator's panel is off.

Eclipse™ ES CAFS Unit

1. Engage water pump and CAFS unit per appropriate operation instructions. Operate system for ten (10) minutes.
2. Check polychain belt tension:
   a. Remove belt cover and apply a 10 pound load to the belt midway between the drive and driven sprockets. The belt should deflect .250 to .313 inches.
   b. Adjust belt tension if necessary. See Page 62 for instructions.