C20 Series Chain Drive Transmission
Overhaul Instructions

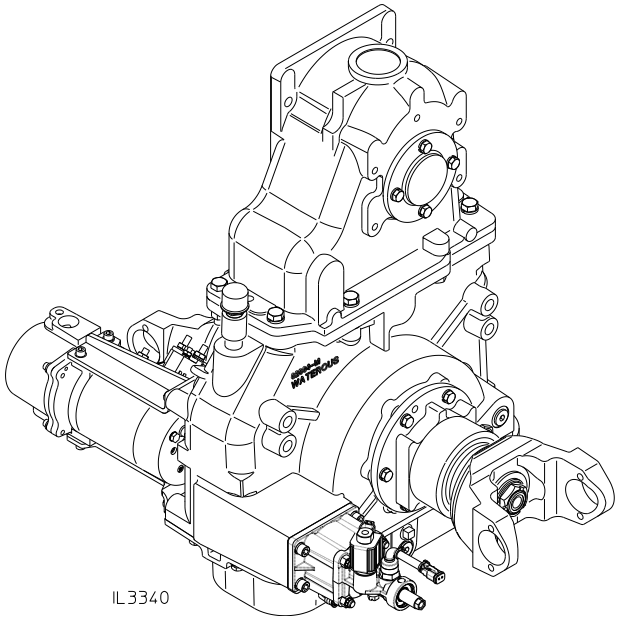


Table of Contents

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

NOTE: Instructions subject to change without notice

F-1031, Section 4315 (Revised: 10/14/21)

Waterous Company, 125 Hardman Avenue South, South St. Paul, Minnesota 55075 USA (651) 450-5000

www.waterousco.com

Table of Contents

Disassembly

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

Reassembly

Introduction

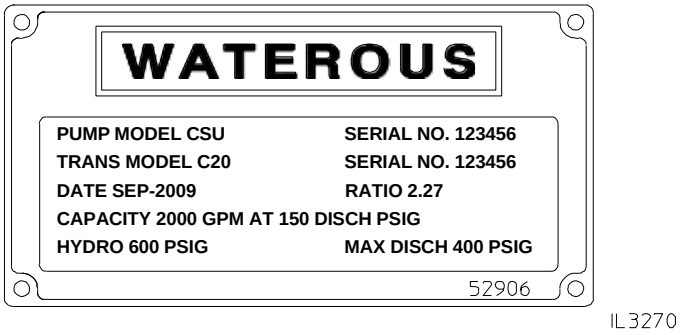
This instruction provides the necessary steps involved to overhaul the C20 Series Transmission. Note that the instructions are divided into Disassembly and Reassembly instructions.

Ordering Repair Parts

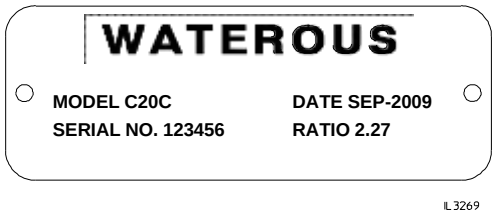
Refer to C20 Series Transmission Service Parts List furnished with your pump for identification of individual components. When ordering repair parts, furnish the reference number of the component (from Service Parts List) along with the Pump Model or Transmission Model serial number. Gasket and O-ring 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 34-35, 65 and 67-68).

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

CM, CMU, CS and CSU Pump Models

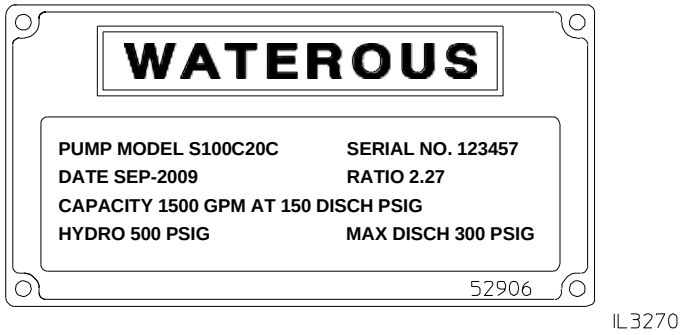


Serial Plate Located on Operator's Panel



Serial Plate Located on Transmission

CMH, CMUH, CSH, CSUH, CG, CX & S100 Models



Serial Plate Located on Operator's Panel

⚠ WARNING

Pressure Hazard. May result in personal injury.

Prior to connection or removal of hoses, caps or other closures with pump intake or pump discharge connections, relieve pressure by opening drains or bleeder valves. Bleeder valves should also be used while filling a hose connected to an intake with water.

⚠ 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 transmission.

⚠ WARNING

Pump Body / Transmission Temperature Hazard. May result in serious burns.

The pump body / transmission may be warm from operation. Make sure that the pump body / transmission has cooled sufficiently prior to removal or repair.

Tools and Equipment

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

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 9 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 transmission 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 transmission is a good policy.

Installing Ball Bearings

Most Waterous transmissions 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

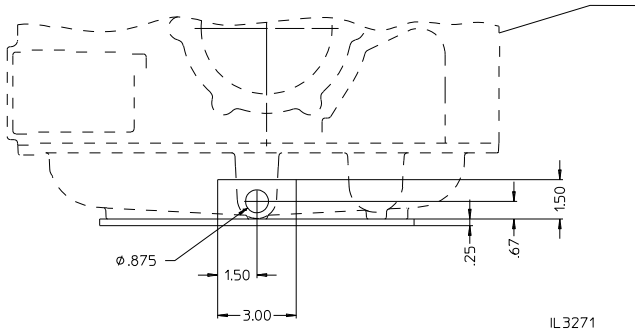
Do not reuse self-locking nuts. Apply lubrication oil to the threads before removing. Apply anti-seize to the threads before installing a new self-locking nut.

Transmission Case Support Bracket

On transmissions built prior to January 1, 2011.

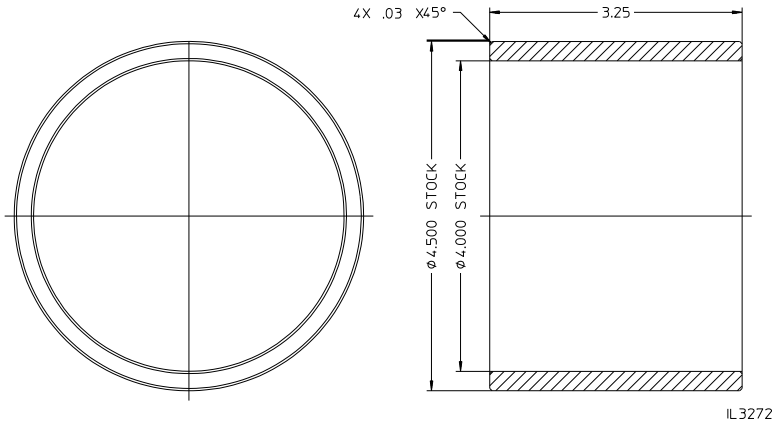
Reference Page 20.

Bracket is not available from Waterous and must be fabricated.

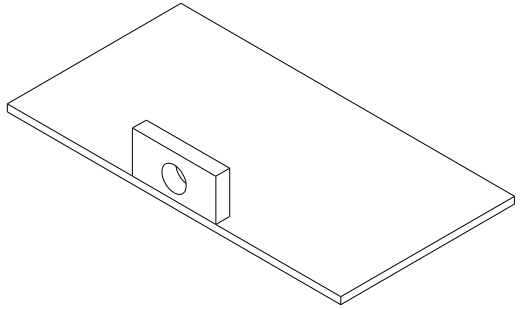


Drive (Input) Shaft Removal Sleeve

Waterous Part No. 63431



Material: 4 in. Schedule 40 PVC Pipe



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

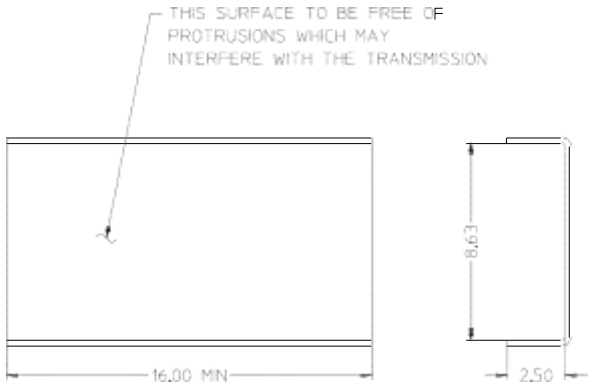
Material: 1/4 in. and 1/2 in. Mild Steel Plate

Transmission Case Support Bracket

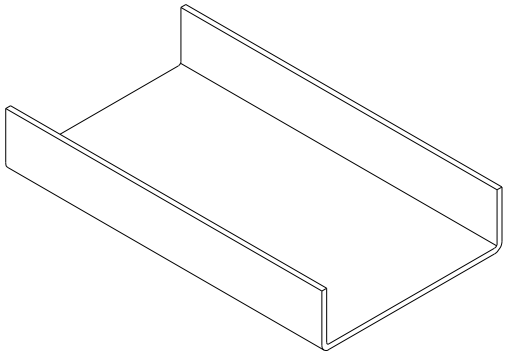
On transmissions built after January 1, 2011.

Reference Page 21.

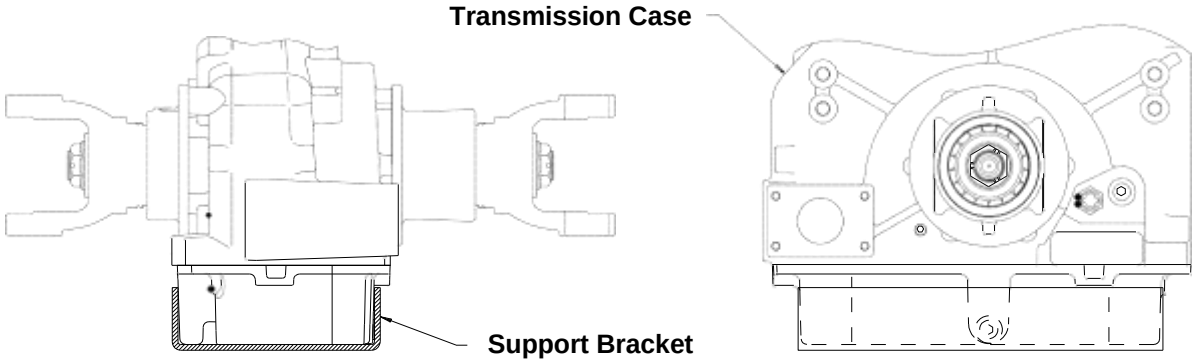
Bracket is not available from Waterous and must be fabricated.



SUPPORT BRACKET LAYOUT



Material: 1/4 in. Mild Steel Plate



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Special Tools Continued

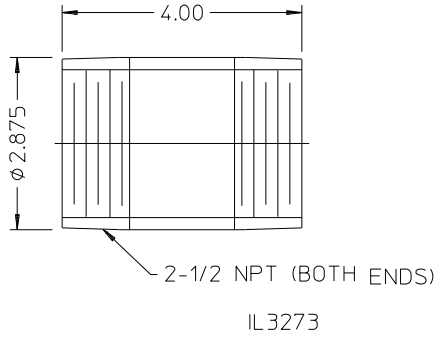
Drive (Input) Shaft Installation Sleeve Assembly

Waterous Part No. 63432

Reference pages 71-75 and 77-79.
This sleeve is used when installing the Driveline in the transmission case.
This sleeve is available from Waterous or may be fabricated per the diagrams below.

Pipe Nipple

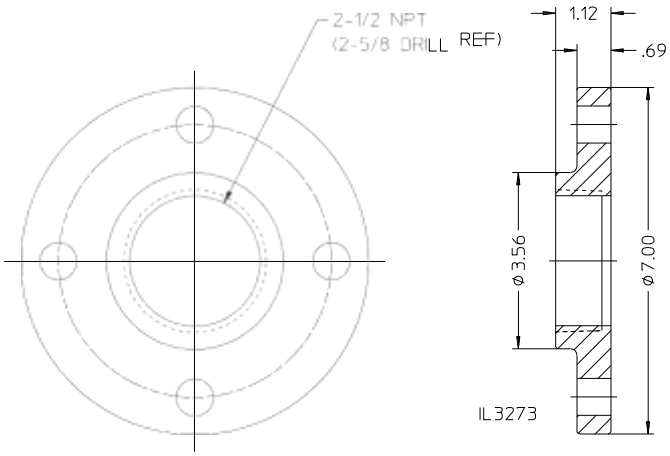
(Reference Waterous Part No. W 6040-64)



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

Pipe Flange

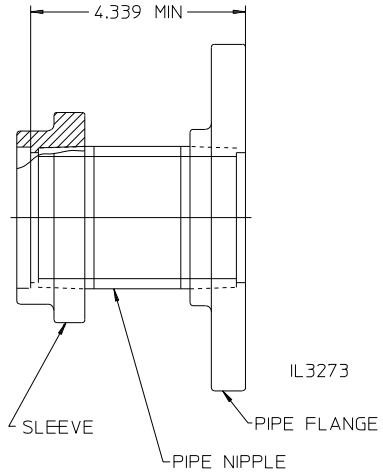
(Reference Waterous Part No. V 3743)



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

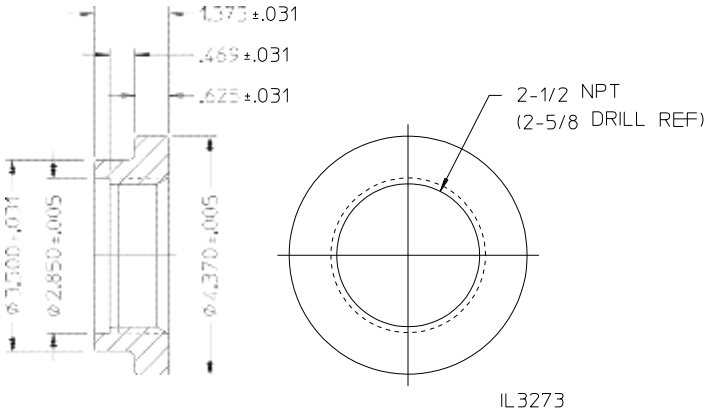
Assembly

(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 64.

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 64.

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.

C20 Transmission Tool Kit

Waterous Part No. K1151

Includes the following tools:

Drive (Input) Shaft Removal Sleeve

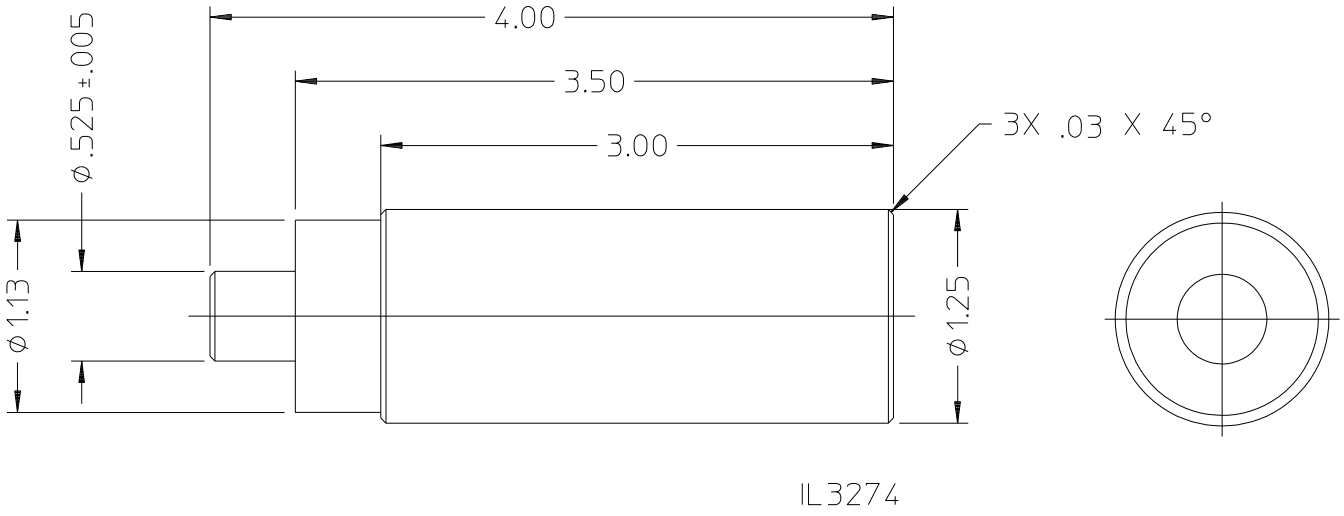
Waterous Part No. 63431

Drive (Input) Shaft Installation Sleeve Assembly

Waterous Part No. 63432

Silicone Sealant Application Tools

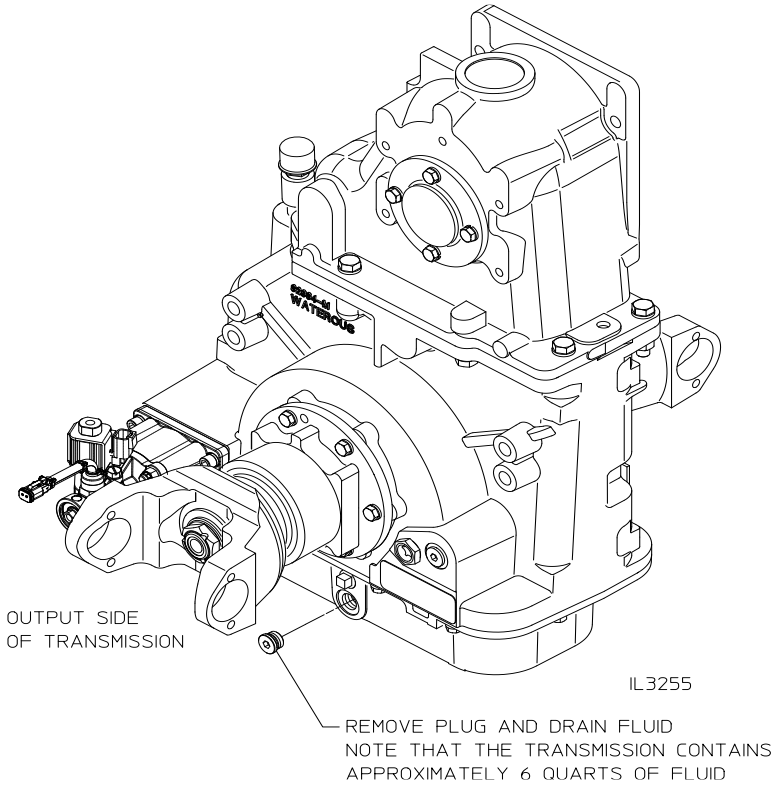
Waterous Part No.'s V 3722 and 63596



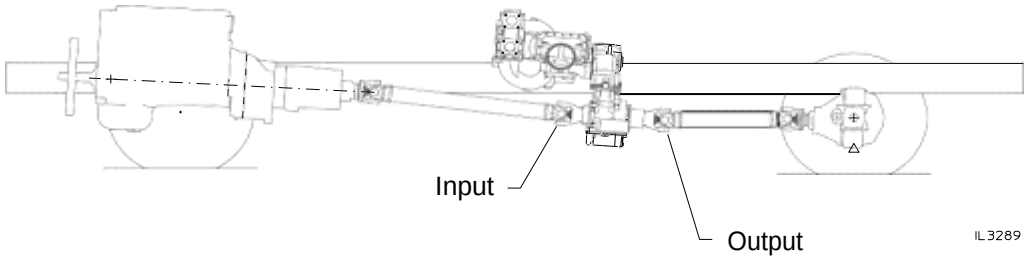
UNLESS OTHERWISE NOTED, DIMENSIONAL TOLERANCE IS ±.031.

Material: 1.250 Diameter Mild Steel Bar Stock

Drain Fluid from Transmission



Disconnect Propeller Shaft (Driveline)



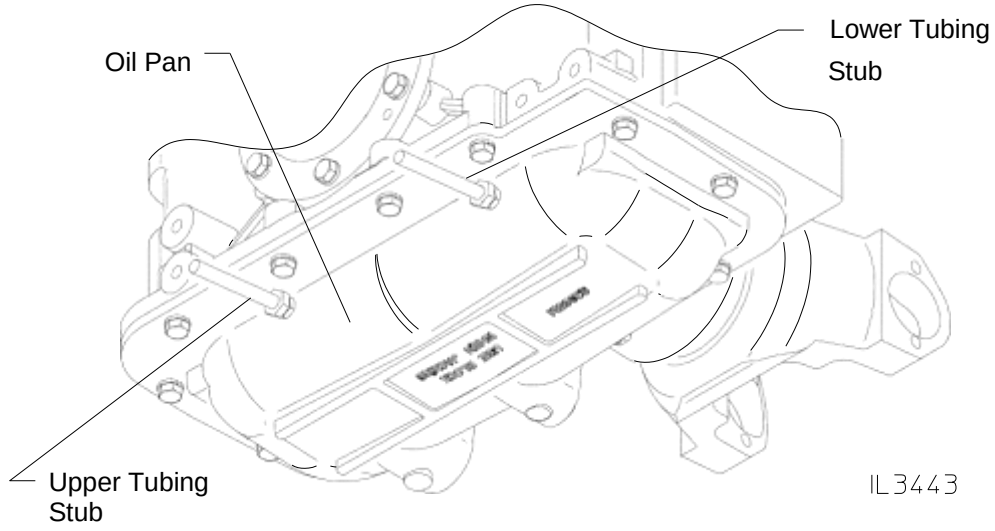
(Not required if transmission is configured with an input shaft only.)

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

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

Disconnect Cooling Lines from Transmission Oil Pan

Transmissions built between December 8, 2009 and January 1, 2011.

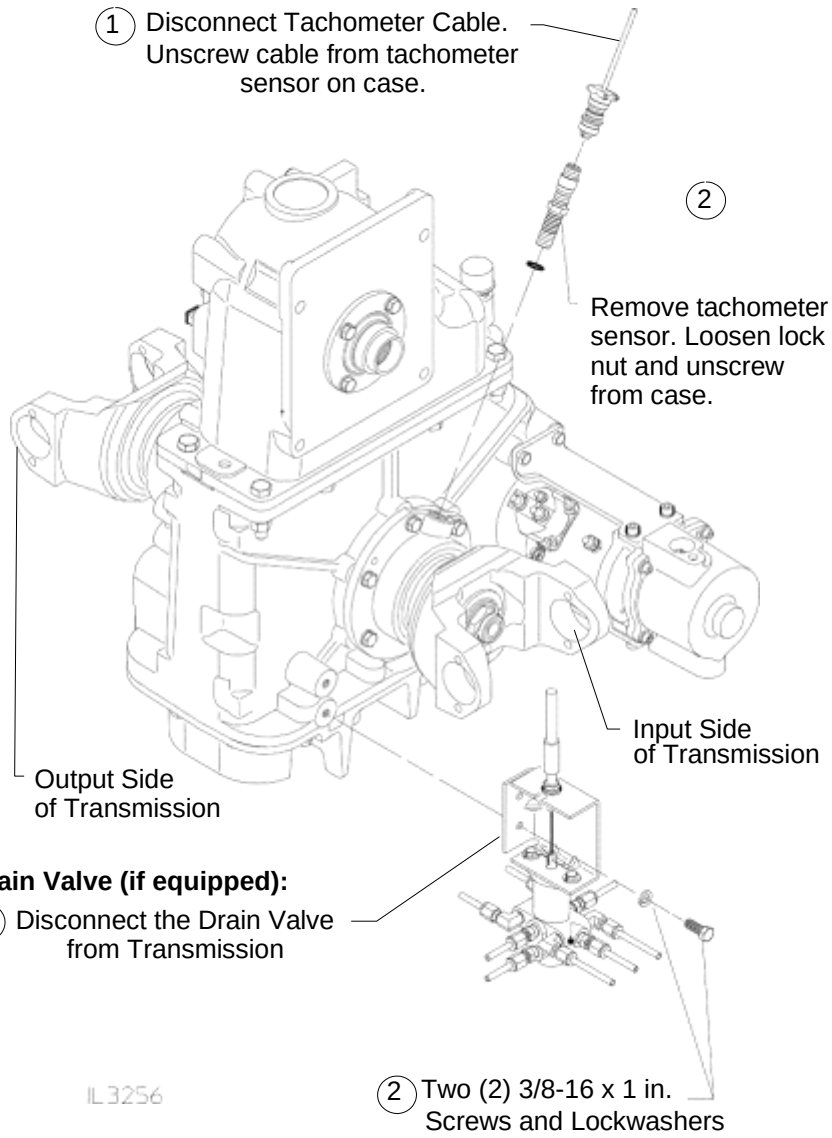


Disconnect flexible tubing from the two (2) 3/8” copper tubing stubs on the transmission oil pan.

Disassembly - Disconnect Optional Accessories

Tachometer and Drain Valve

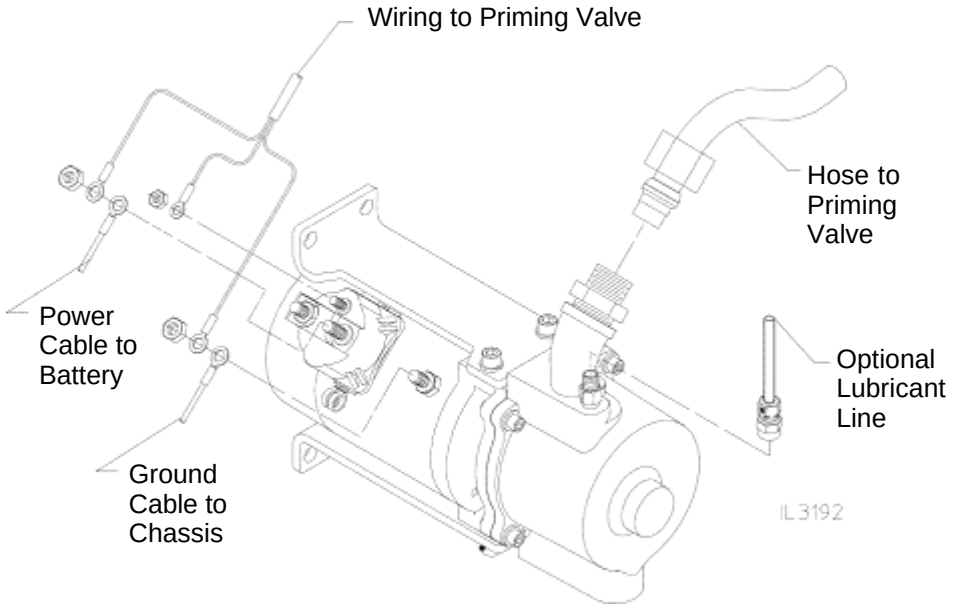
Tachometer (if equipped):



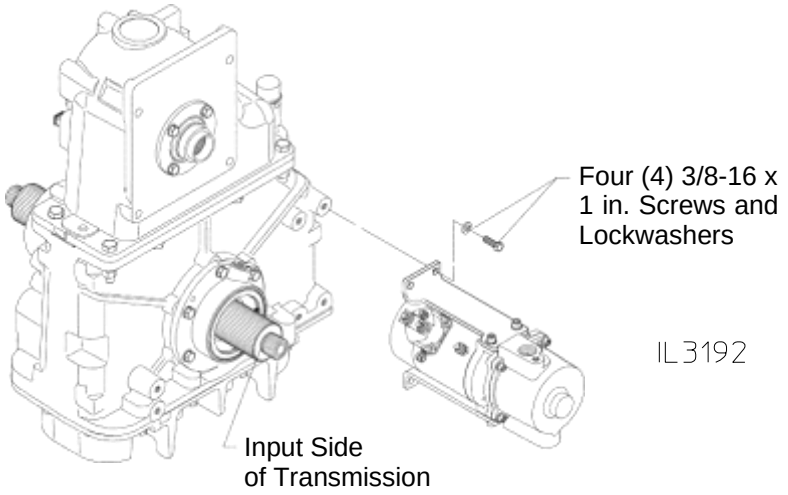
Drain Valve (if equipped):

1 Disconnect the Drain Valve from Transmission

Priming Pump - Disconnect Wiring and Hoses

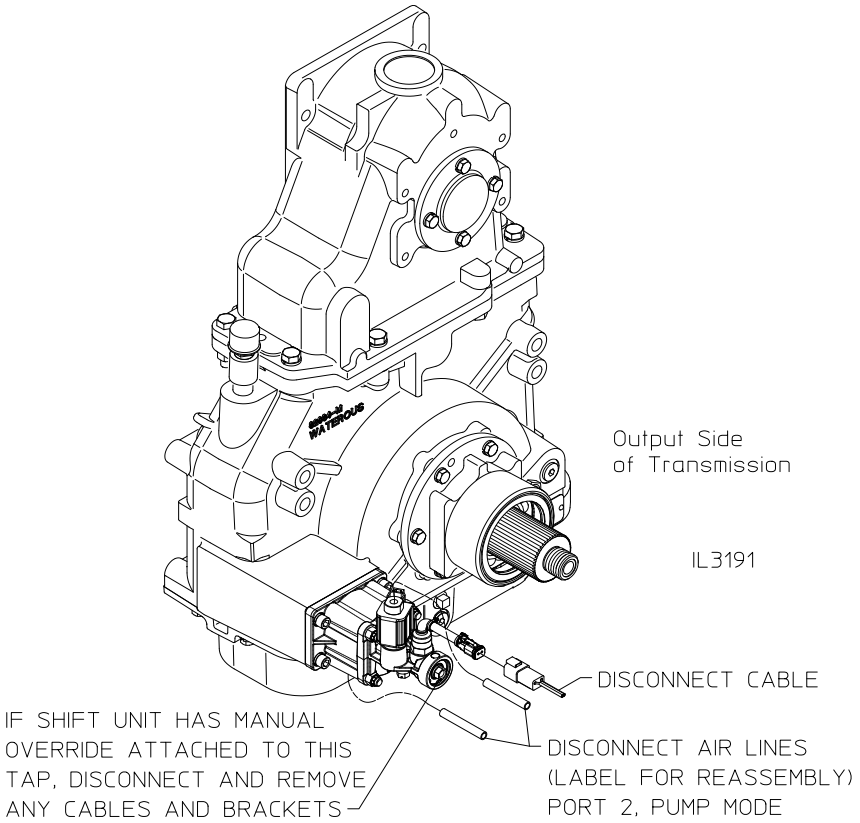


Priming Pump - Remove Priming Pump from Transmission

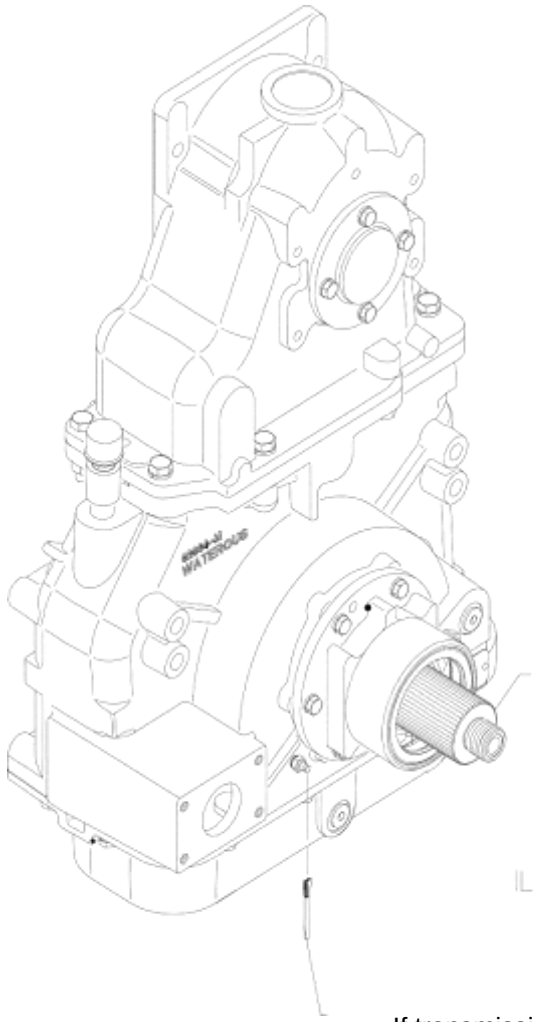


Disassembly - Disconnect Optional Accessories

Shift Unit



Oil Temperature Sensor

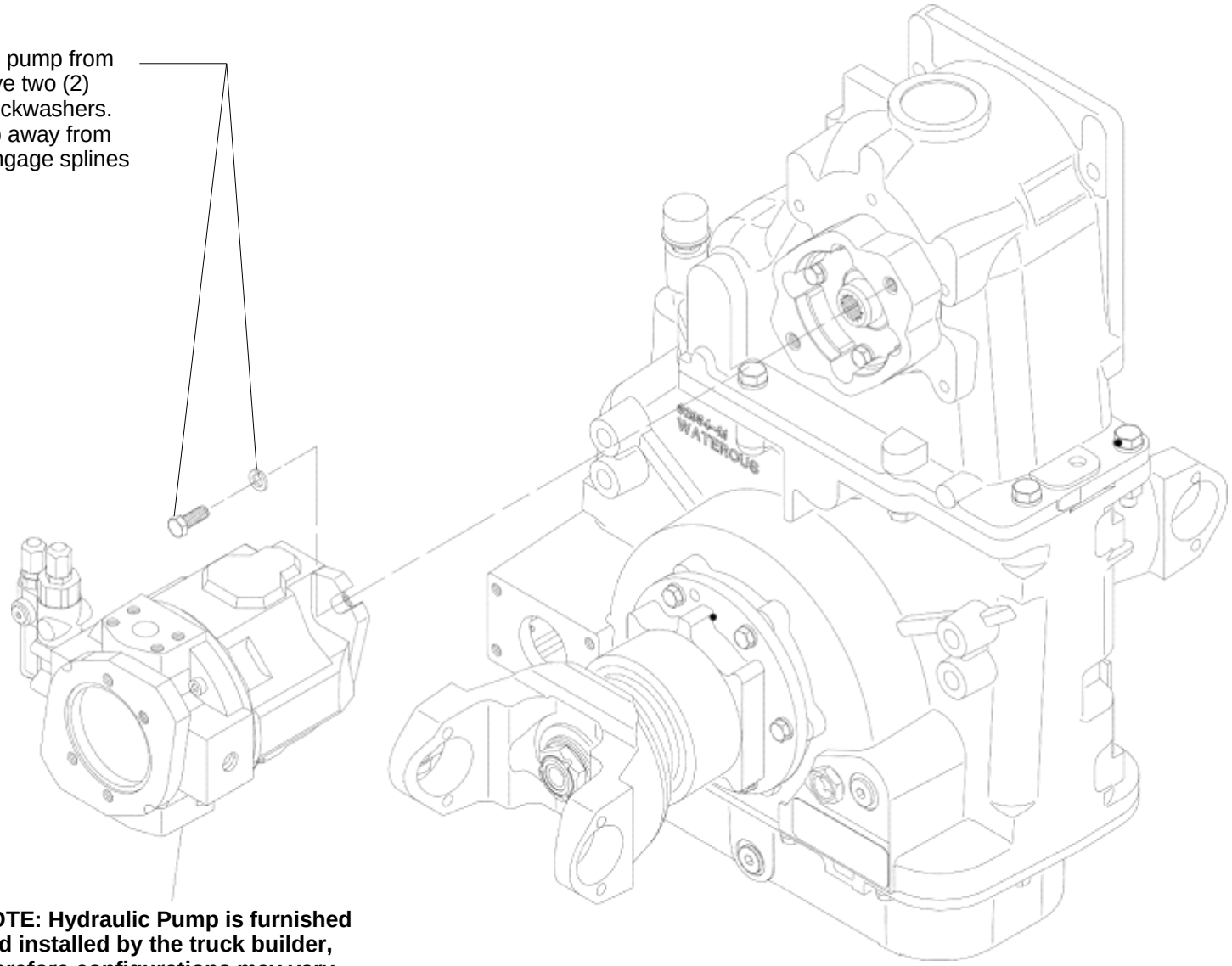


If transmission has a temperature sensor installed here, disconnect

Disassembly - Disconnect Optional Accessories

Hydraulic Pump on Rear or Front Output

Disconnect hydraulic pump from transmission. Remove two (2) 1/2-13 screws and lockwashers. Slide hydraulic pump away from transmission 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.

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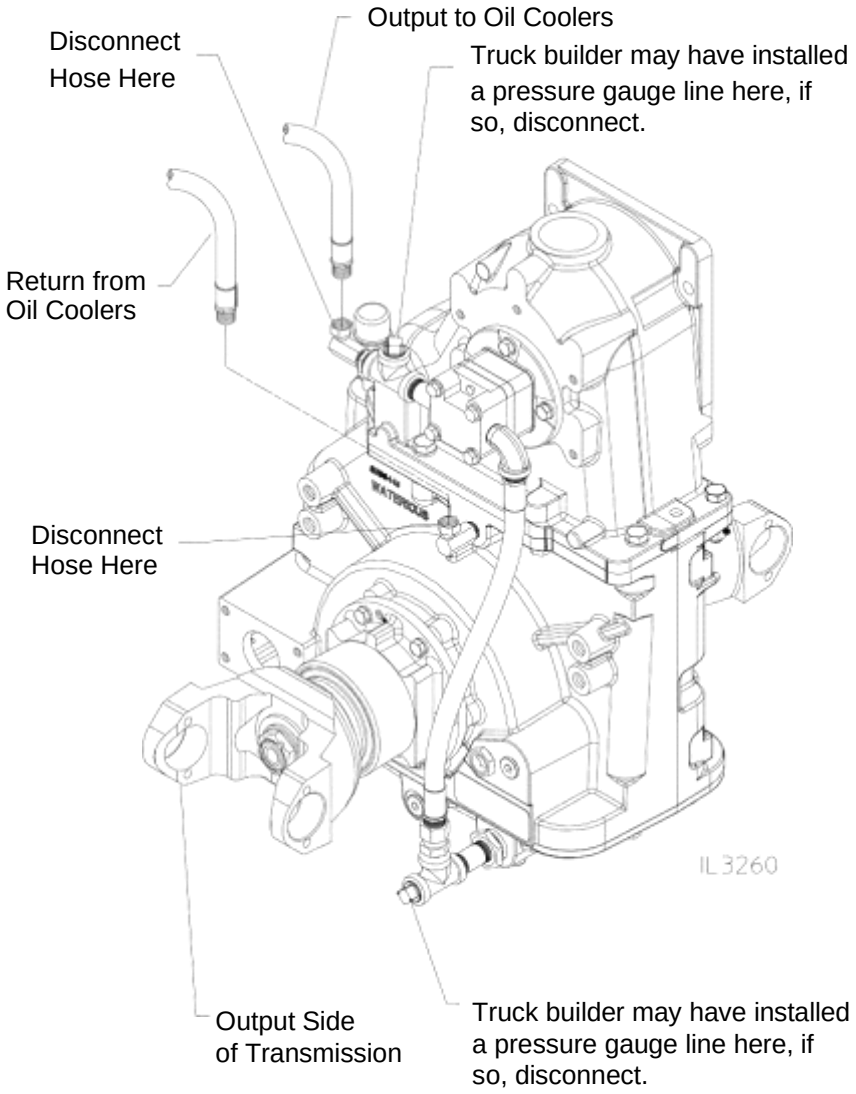
Disassembly - Disconnect Optional Accessories

Oil Cooler Pump on Rear Output

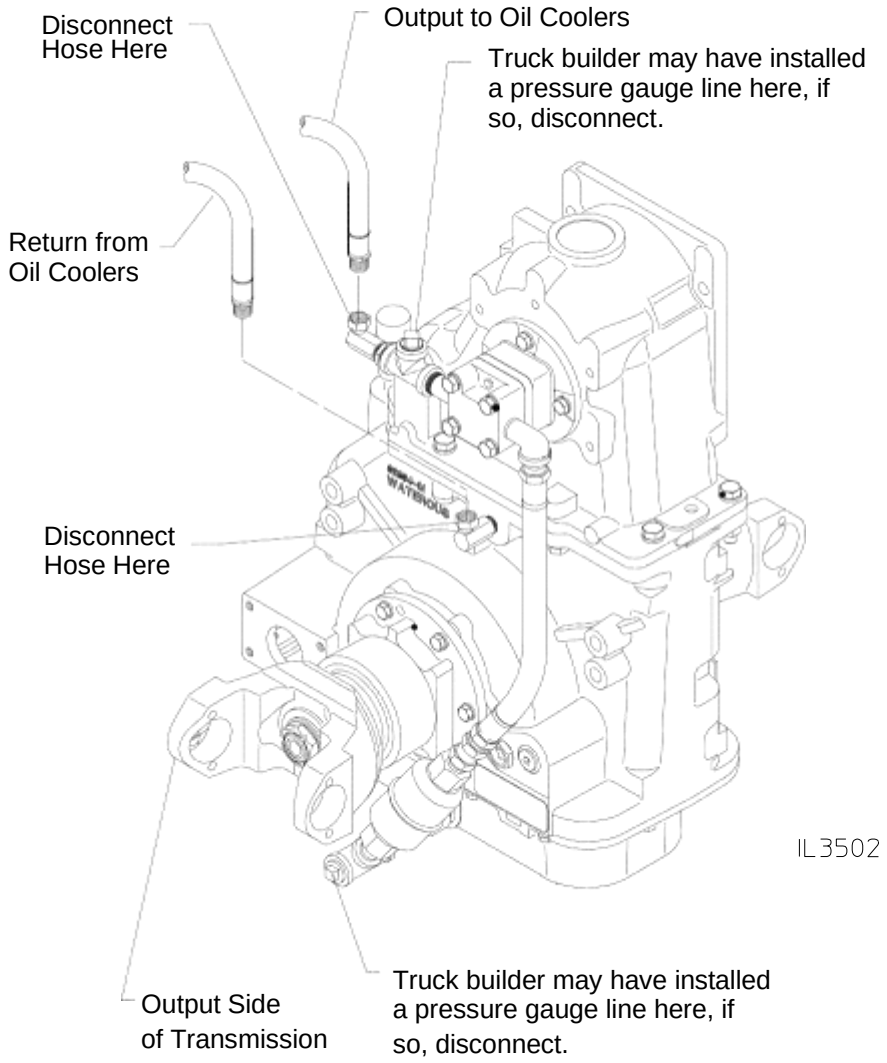
Transmissions Built Prior to January 1, 2011.



NOTE: Labeling hoses will ease re-assembly.

Oil Cooler Pump on Rear Output

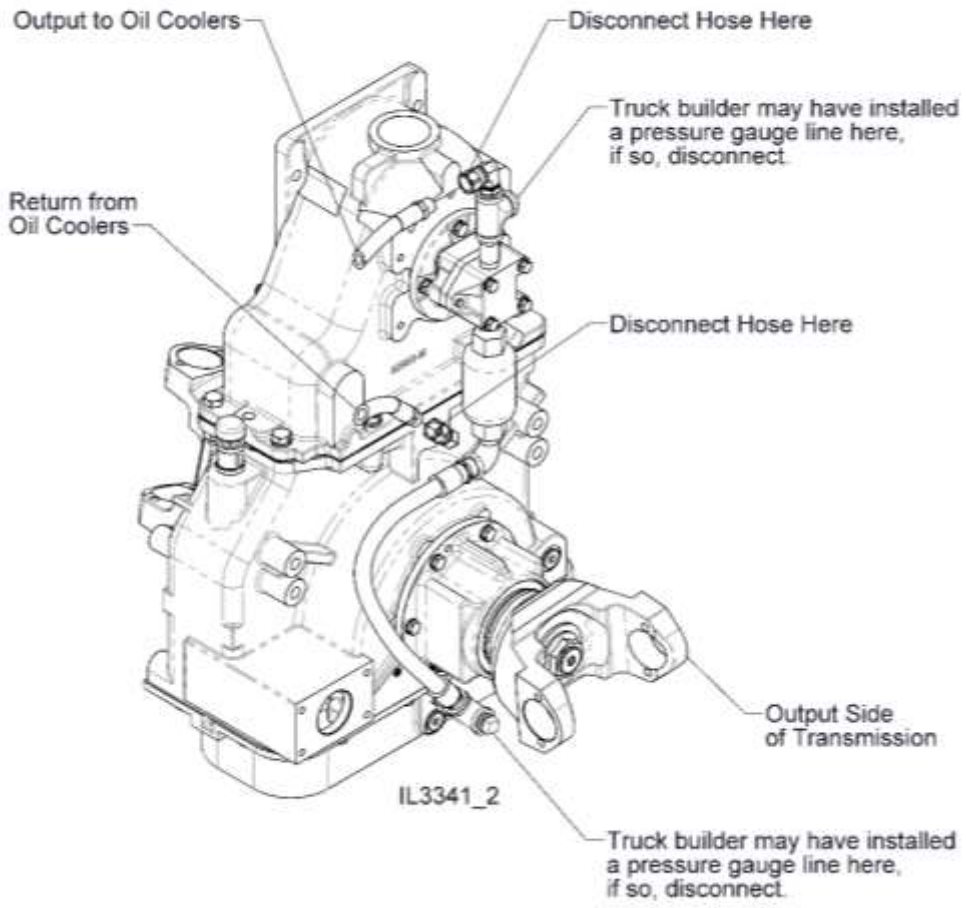
Transmissions Built January 1, 2011 to April 8, 2020.



NOTE: Labeling hoses will ease re-assembly.

Oil Cooler Pump on Rear Output

Transmissions Built After April 8, 2020.

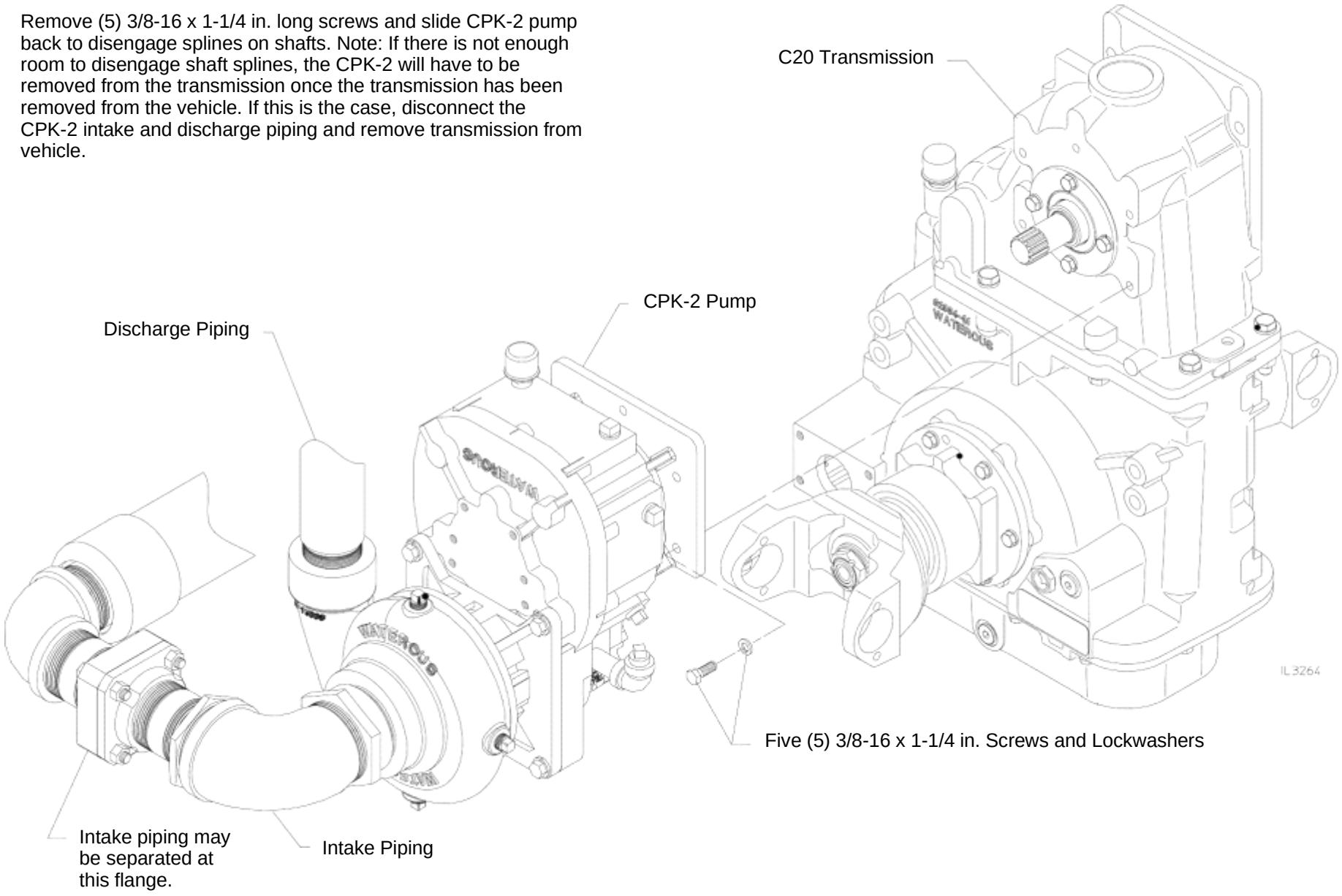


NOTE: Labeling hoses will ease re-assembly.

Disassembly - Disconnect Optional Accessories

Combination Pump on Rear Output

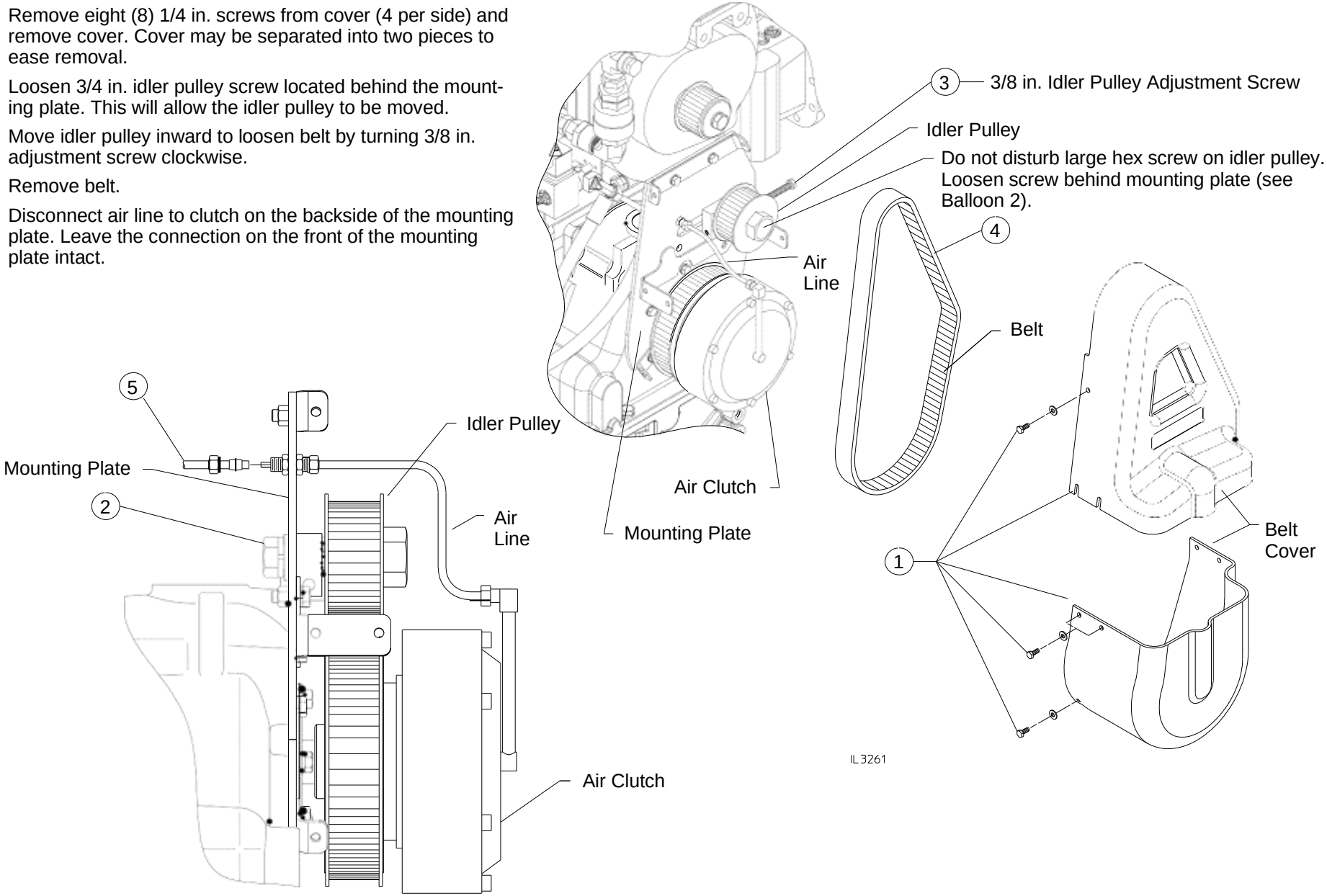
Remove (5) 3/8-16 x 1-1/4 in. long screws and slide CPK-2 pump back to disengage splines on shafts. Note: If there is not enough room to disengage shaft splines, the CPK-2 will have to be removed from the transmission once the transmission has been removed from the vehicle. If this is the case, disconnect the CPK-2 intake and discharge piping and remove transmission from vehicle.



Disassembly - Disconnect Optional Accessories

Eclipse™ CAFS on Rear Output

1. Remove eight (8) 1/4 in. screws from cover (4 per side) and remove cover. Cover may be separated into two pieces to ease removal.
2. Loosen 3/4 in. idler pulley screw located behind the mounting plate. This will allow the idler pulley to be moved.
3. Move idler pulley inward to loosen belt by turning 3/8 in. adjustment screw clockwise.
4. Remove belt.
5. Disconnect air line to clutch on the backside of the mounting plate. Leave the connection on the front of the mounting plate intact.



Disassembly - Disconnect Optional Accessories

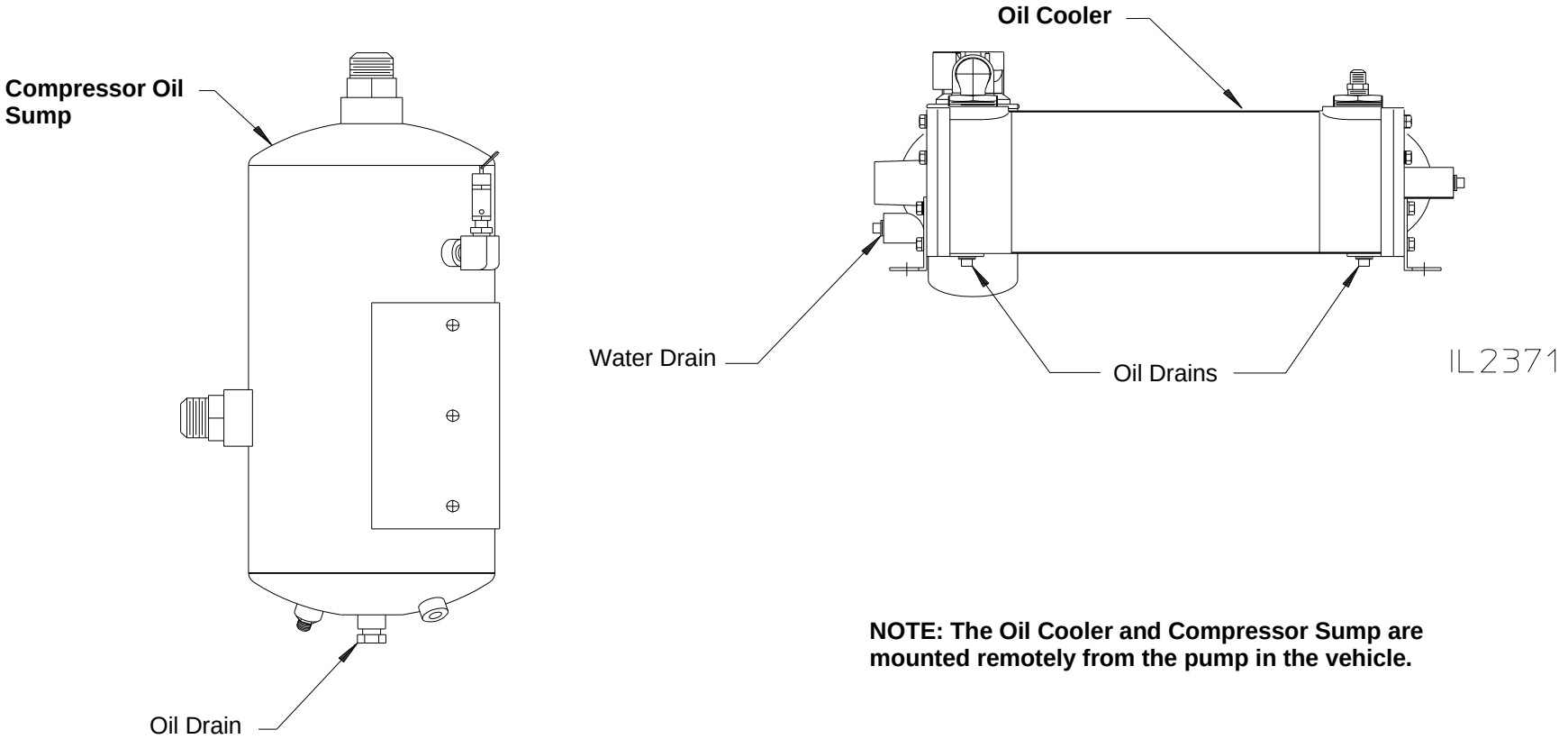
Eclipse™ ES CAFS on Rear Output

Drain Compressor and Oil Cooler

⚠ WARNING

Electrical Hazard. Possible electrical shock.
Disconnect electrical power to Eclipse$_M$ ES unit (wire connected to Terminal No. 1 on Electrical Relay Panel (see Page 19) 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 pump in the vehicle.

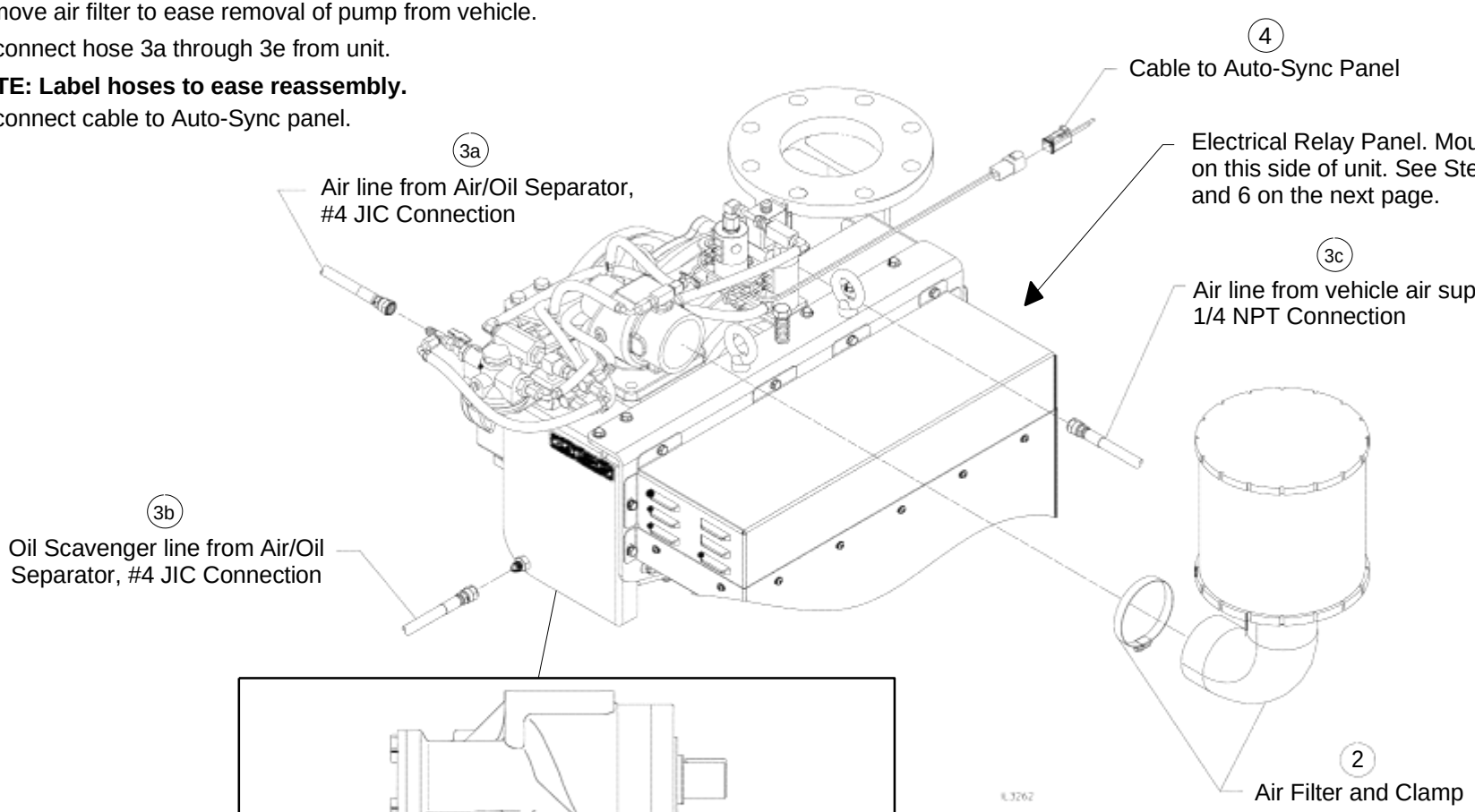
Disassembly - Disconnect Optional Accessories

Eclipse™ ES CAFS on Rear Output (Continued)

Remove 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

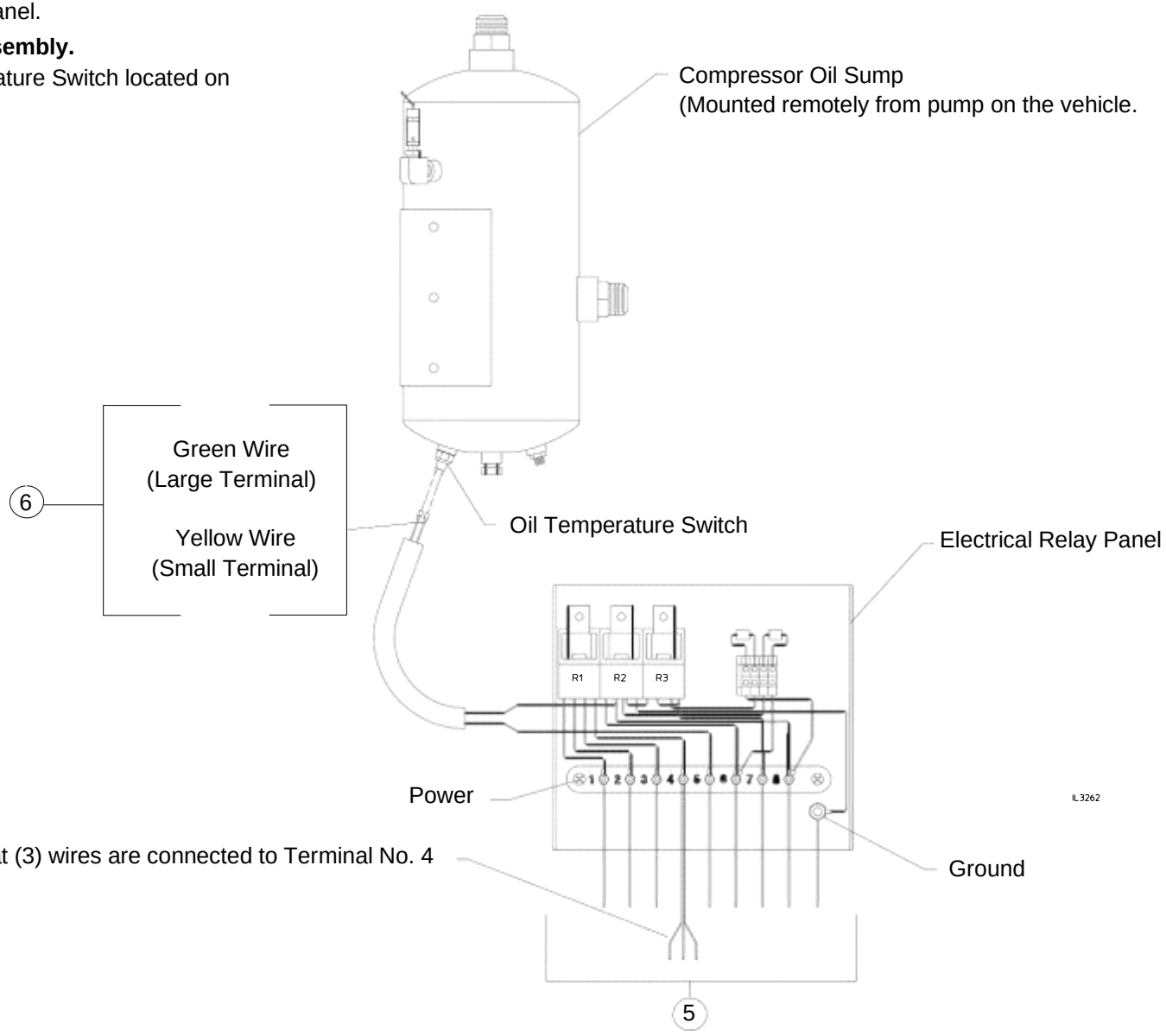
Eclipse™ ES CAFS on Rear Output (Continued)

Disconnect Wiring

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

   NOTE: Label wires to ease reassembly.

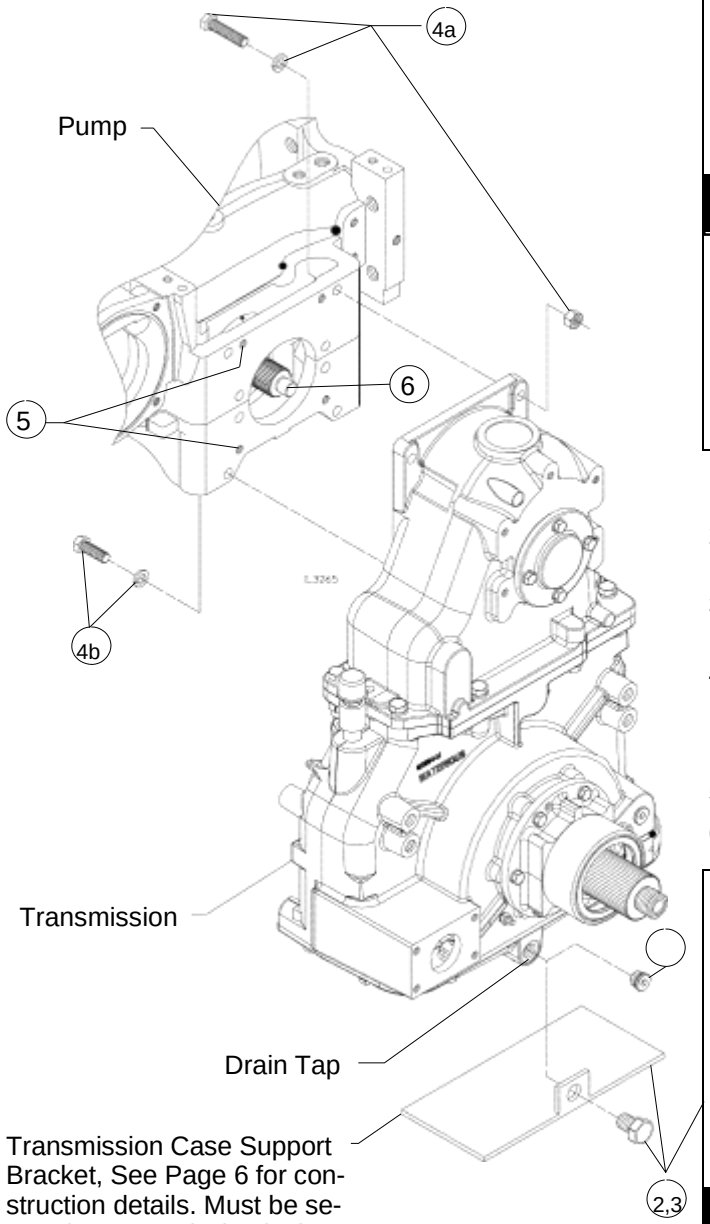
6. Disconnect wires from Oil Temperature Switch located on the compressor oil sump.



Disassembly - Remove Transmission from Vehicle

Transmission Mounted on Rear of Pump - Transmissions Built Prior to January 1, 2011

CM, CMU, CS and CSU Pump Models



CMH, CMUH, CSH and CSUH Pump Models

The transmission is a non-separable impeller shaft design and therefore cannot be removed independently from the pump.

1. The transmission must be separated at the cap/case flange and the case removed from the vehicle.
2. The cap must be removed with the pump impeller shaft assembly.
3. See the pump overhaul instructions for details.

CG, CX and S100 Pump Models

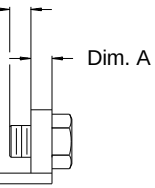
The transmission is a non-separable impeller shaft design and therefore cannot be removed independently from the pump.

1. Remove the pump and transmission as one unit.
2. Once the pump and transmission are free of the vehicle, remove the pump from the transmission.
3. See the pump overhaul instructions for details.

1. Remove drain plug from case.
2. Place a transmission jack with transmission case support bracket attached (see Page 6 for construction details) under the transmission.
3. Install a 3/4-16 screw through the bracket and into the drain tap to secure bracket. See detail below to determine length of screw.
4. Remove pump mounting hardware:
   a. Top Two (2) Holes: Two (2) 1/2-20 x 2-1/4 in. screws, nuts and washers.
   b. Lower Two (2) Holes: Two (2) 1/2-13 x 1-1/2 in. screws and lockwashers.
5. Use four (4) 1/2-13 jacking screw holes in pump flange to separate pump from transmission.
6. Pull transmission away from pump to disengage spline on shaft.
7. Lower transmission from vehicle.
8. Remove bracket and re-install drain plug once transmis-

3/4-16 screw should not extend beyond tap threads.

Length should be 1/2 in. plus Dim. A or 1 in. if bracket is built to diagram on Page 6.

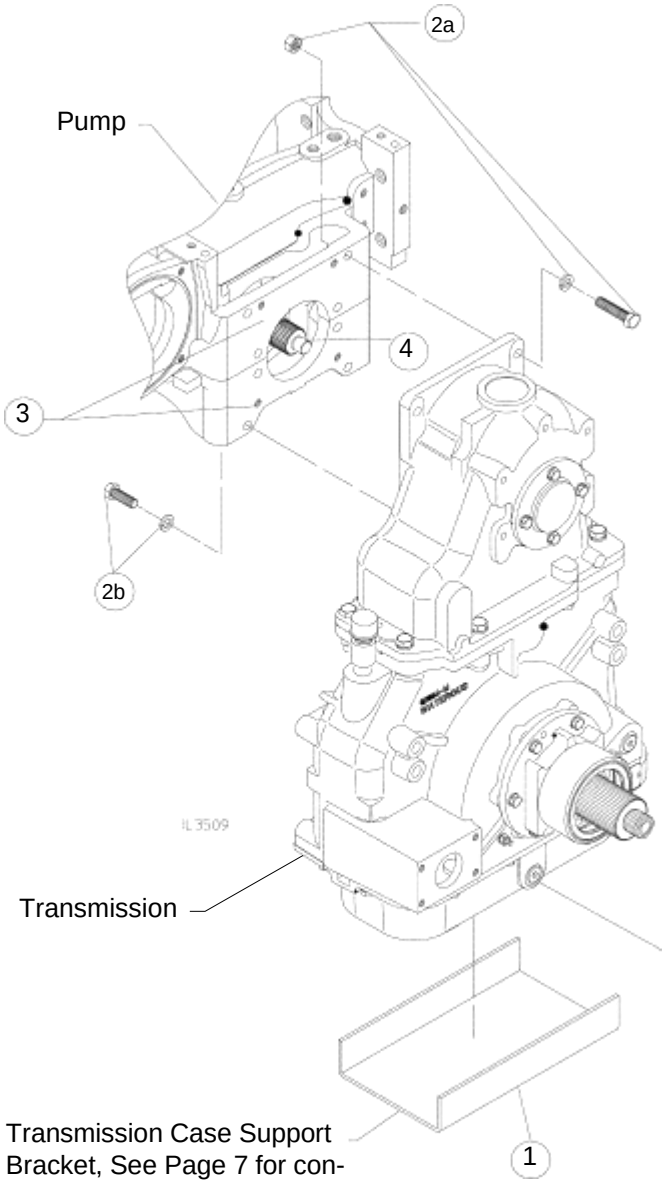


Determining Length of 3/4-16 Screw

Disassembly - Remove Transmission from Vehicle

Transmission Mounted on Rear of Pump - Transmissions Built After January 1, 2011

CM, CMU, CS and CSU Pump Models



CG, CX and S100 Pump Models

The transmission is a non-separable impeller shaft design and therefore cannot be removed independently from the pump.

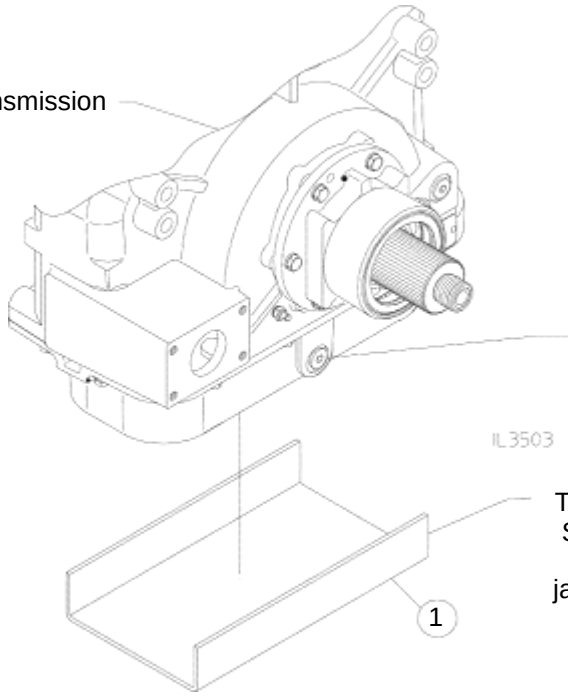
1. Remove the pump and transmission as one unit.
2. Once the pump and transmission are free of the vehicle, remove the pump from the transmission.
3. See the pump overhaul instructions for details.

1. Place a transmission jack with transmission case support bracket attached (see Page 7 for construction details) under the transmission.
2. Remove pump mounting hardware:
   a. Top Two (2) Holes: Two (2) 1/2-20 x 2-1/4 in. screws, nuts and washers.
   b. Lower Two (2) Holes: Two (2) 1/2-13 x 1-1/2 in. screws and lockwashers.
5. Use four (4) 1/2-13 jacking screw holes in pump flange to separate pump from transmission.
6. Pull transmission away from pump to disengage spline on shaft.
7. Lower transmission from vehicle.

Disassembly - Remove Transmission from Vehicle

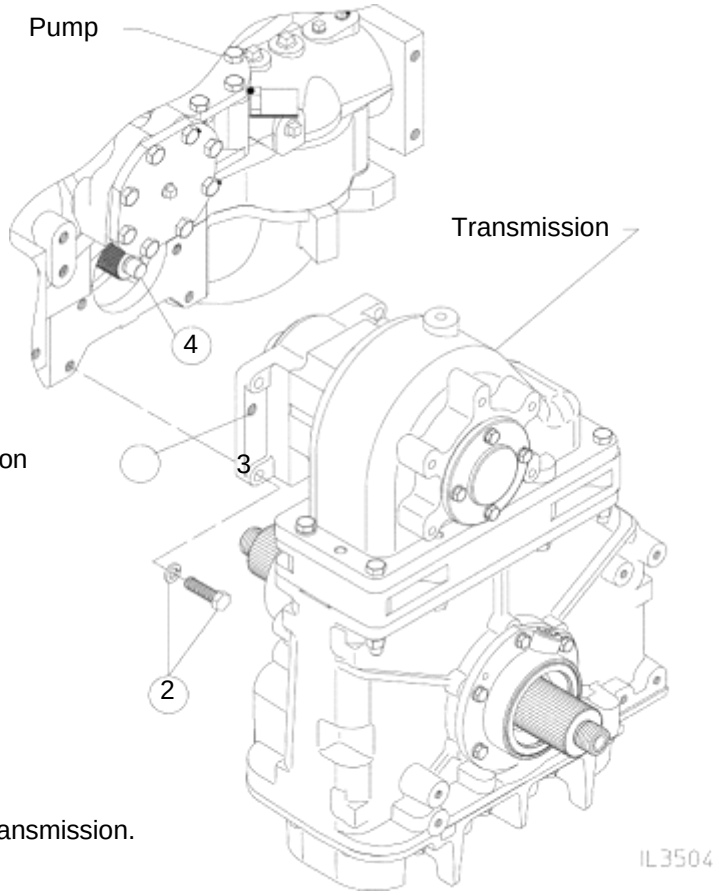
Transmission Mounted on Front of Pump

CM, CMU, CS and CSU Pump Models



1. Place a transmission jack with transmission case support bracket (see Page 7 for construction details) under the transmission.

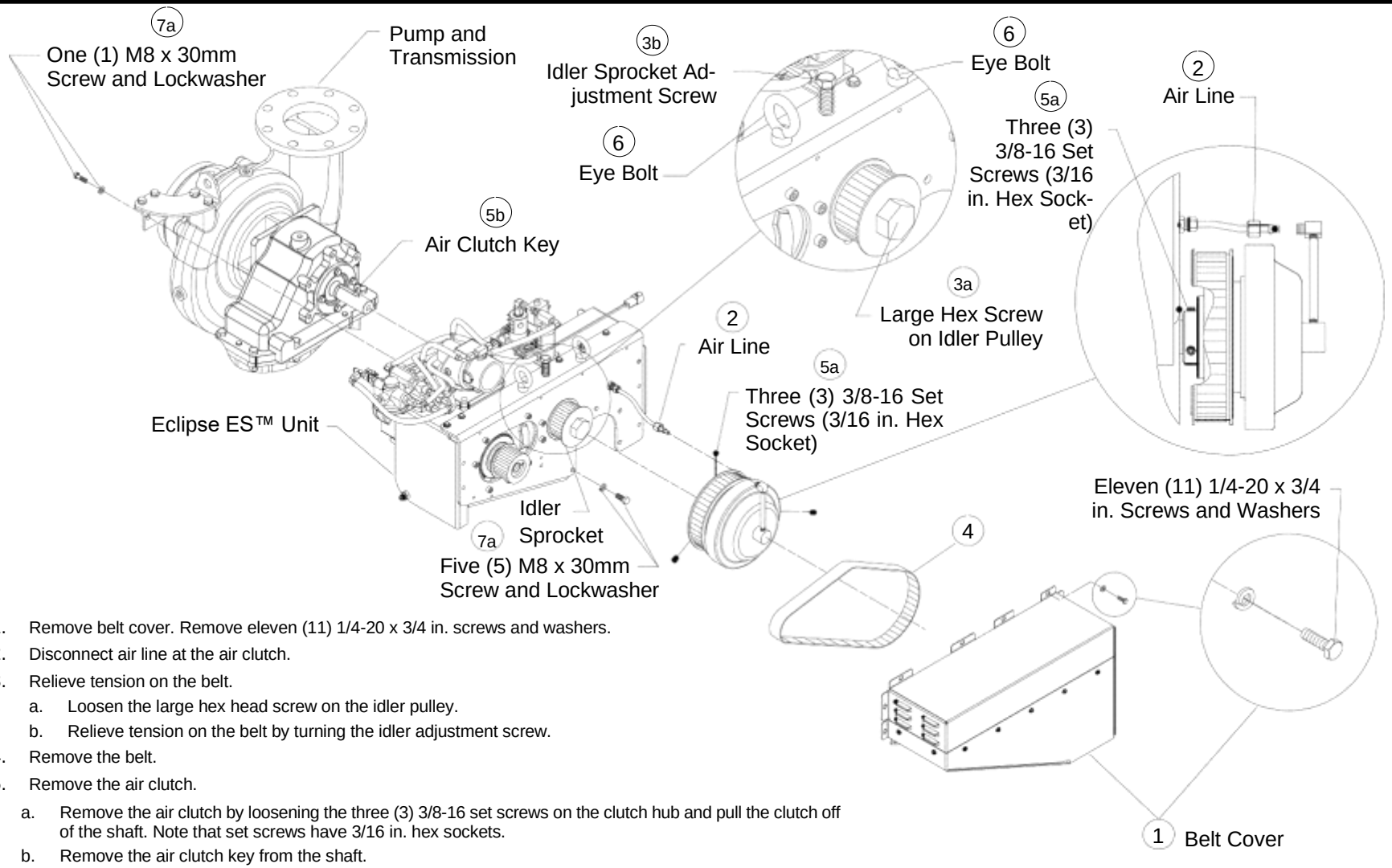
Transmission Case Support Bracket, See Page 7 for construction details. Must be secured to transmission jack.



5. Remove pump mounting hardware:
   a. Top Two (2) Holes: Two (2) 1/2-13 x 1-3/4 in. screws and lockwashers.
   b. BottomTwo (2) Holes: Two (2) 1/2-13 x 1-3/4 in. screws and lockwashers.
3. Use two (2) 1/2-13 jacking screw holes in transmission adapter to separate pump from transmission.
4. Pull transmission away from pump to disengage spline on shaft.
8. Lower transmission from vehicle.
9. Remove bracket and re-install drain plug once transmission is clear of the vehicle.

Disassembly - Remove Eclipse™ ES Unit from Transmission

CX and S100 Pump Models



1. Remove belt cover. Remove eleven (11) 1/4-20 x 3/4 in. screws and washers.
2. Disconnect air line at the air clutch.
3. 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.
4. Remove the belt.
5. Remove the air clutch.
   a. Remove the air clutch by loosening the three (3) 3/8-16 set screws on the clutch hub and pull the clutch off of the shaft. Note that set screws have 3/16 in. hex sockets.
   b. Remove the air clutch key from the shaft.
6. 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.
7. Remove the Eclipse ES unit from the pump/transmission.
   a. Remove the five (5) M8 x 30mm screws and washers from the ES unit side of the pump.
   b. Remove the M8 x 30mm screw and washer from the opposite side of the pump.

Disassembly - Remove Transmission from Pump

CM, CMU, CS and CSU Pump Models

The transmission is separated from the pump while on the vehicle.
See Page 20 and 21.

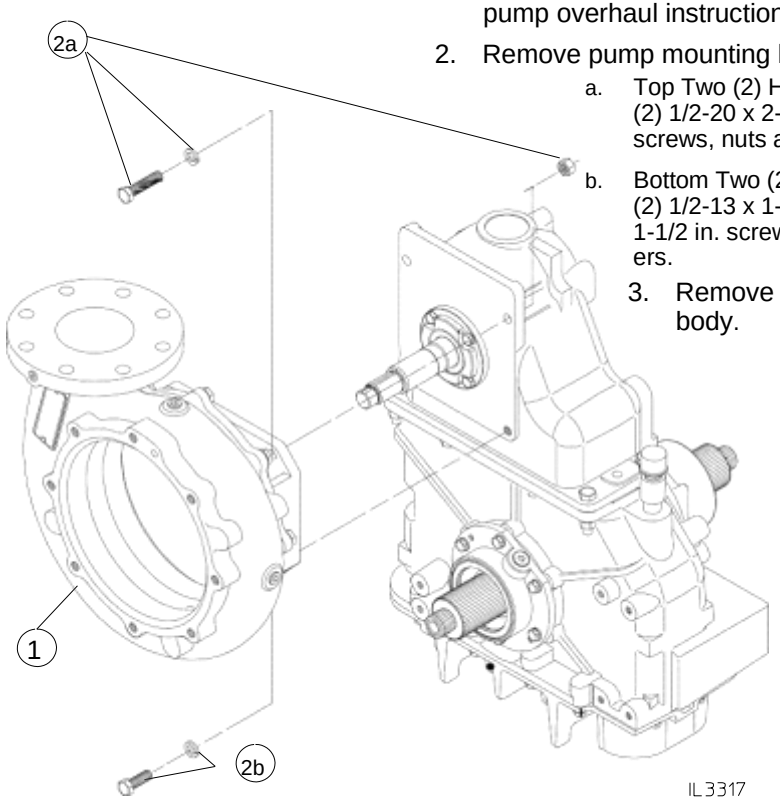
CMH, CMUH, CSH, CSUH Pump Models

The transmission is a non-separable impeller shaft design and therefore cannot be removed without the pump.

See the pump overhaul instructions for additional information.

CG and CX Pump Models

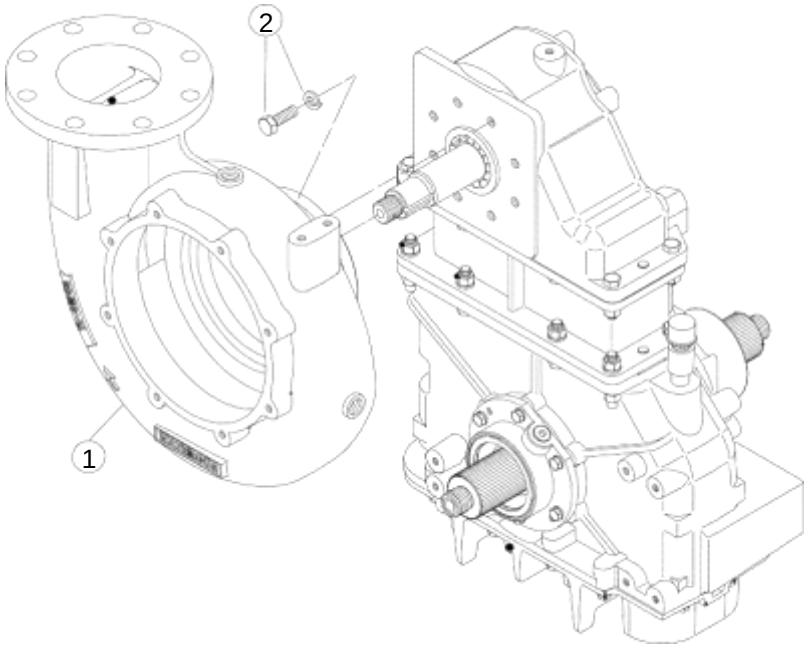
1. Remove pump, intake adapter, impeller and mechanical seal. See pump overhaul instructions.
2. Remove pump mounting hardware.
   a. Top Two (2) Holes: Two (2) 1/2-20 x 2-1/4 in. screws, nuts and washers.
   b. Bottom Two (2) Holes: Two (2) 1/2-13 x 1-1/4 in. or 1-1/2 in. screws and washers.
3. Remove pump body.



IL3317

S100 Pump Models

1. Remove intake adapter, impeller and mechanical seal. See pump overhaul instructions.
2. Remove pump mounting hardware: Eight (8) 1/2-13 x 1-1/2 in. screws and washers.
3. Remove pump body.

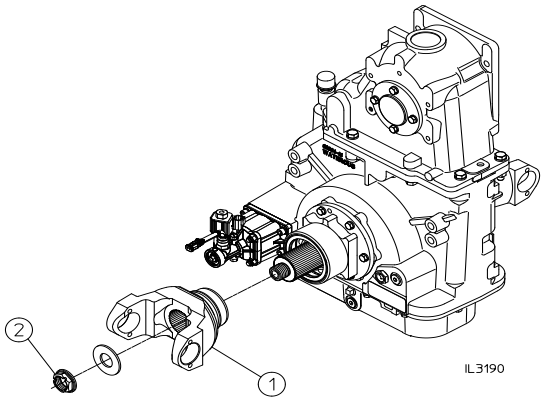


IL3319

Disassembly - Remove Driveline from Case

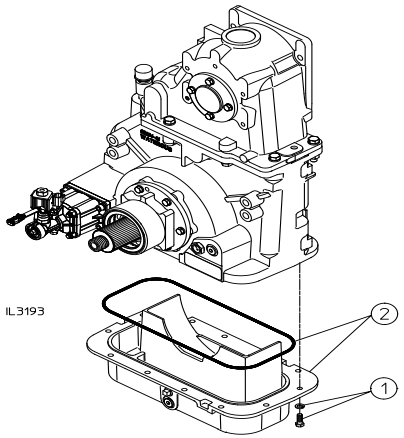
End Yokes or Companion Flanges

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



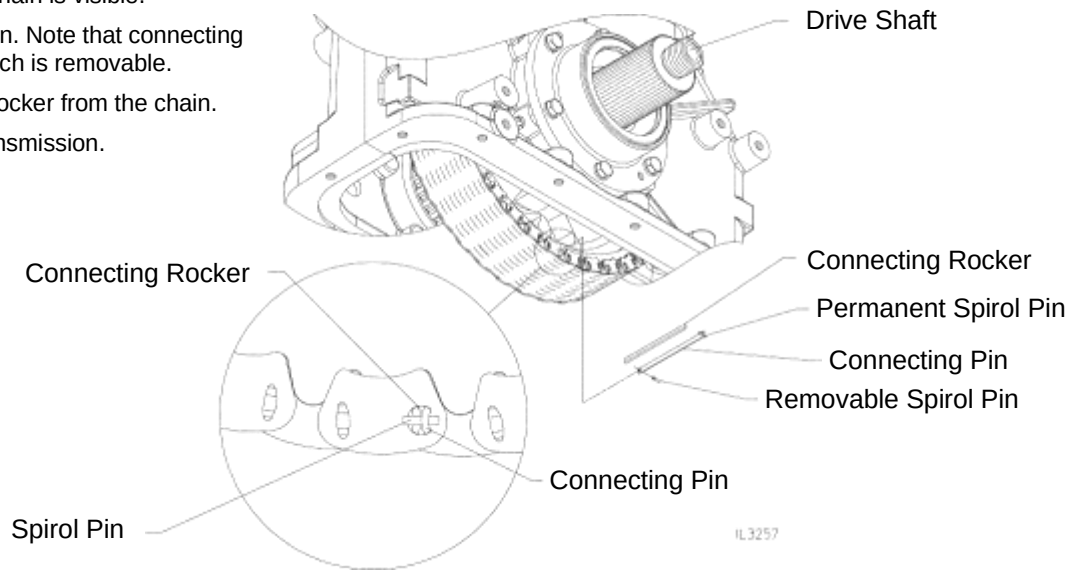
Oil Pan

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



Chain

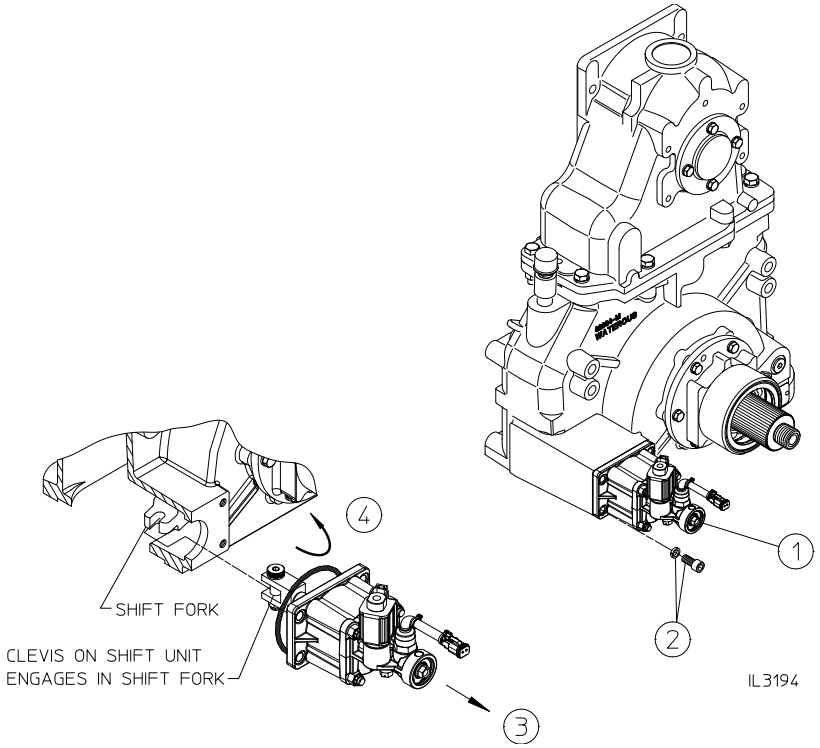
1. Rotate drive shaft until connecting pin in chain is visible.
2. Drive out spirol pin in end of connecting pin. Note that connecting pin has two (2) spirol pins, only one of which is removable.
3. Drive the connecting pin and connecting rocker from the chain.
4. Separate ends of chain and pull out of transmission.



Disassembly - Remove Driveline from Case (Continued)

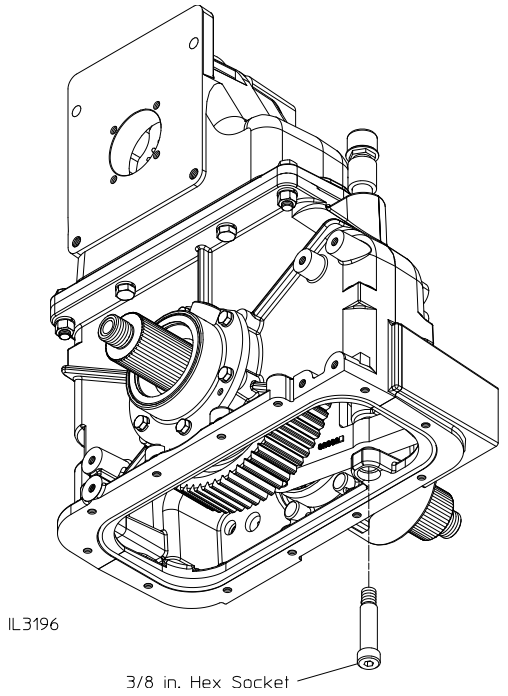
Shift Unit

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

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



Disassembly - Remove Driveline from Case (Continued)

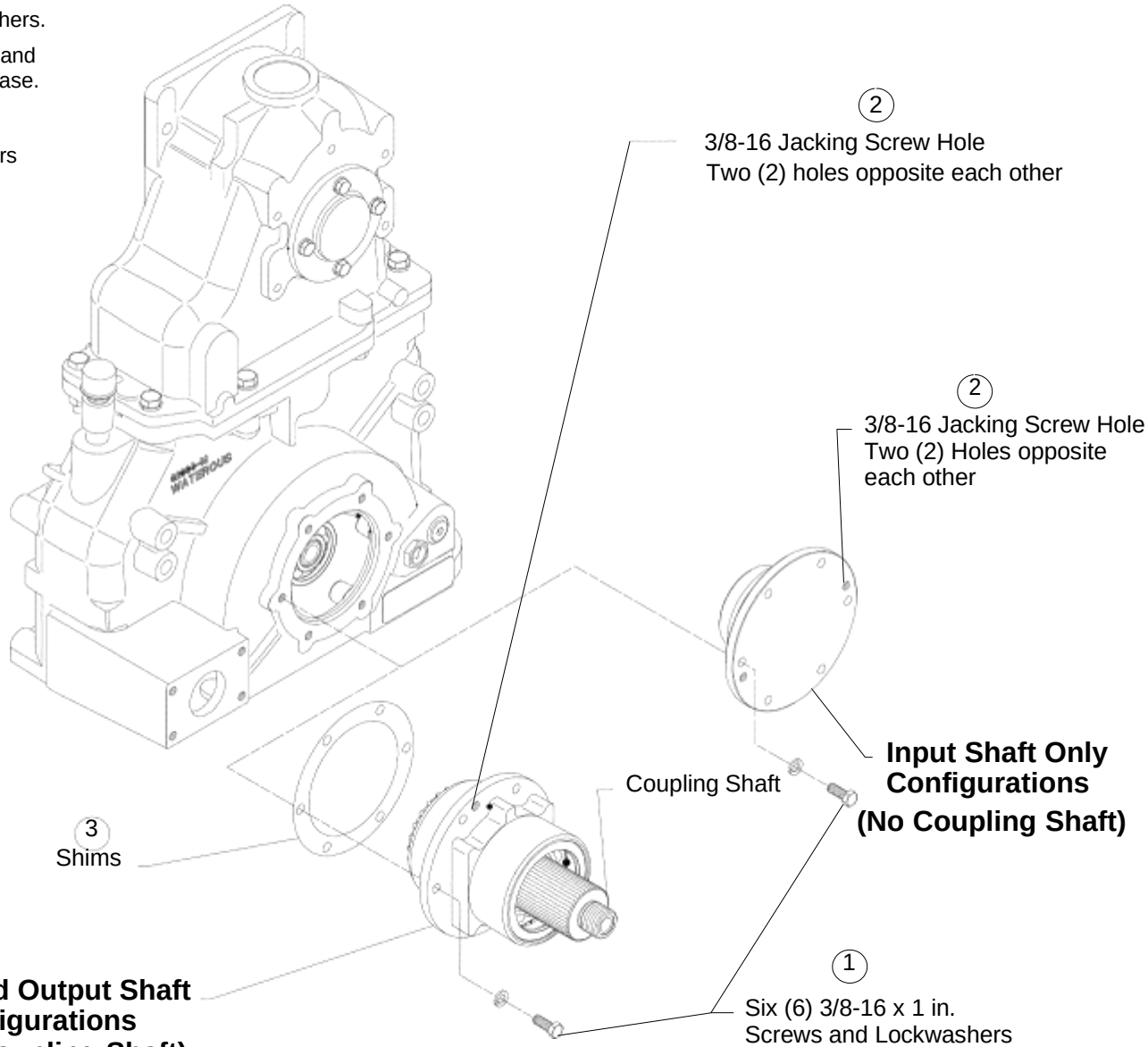
Remove Coupling (Output) Shaft

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:**

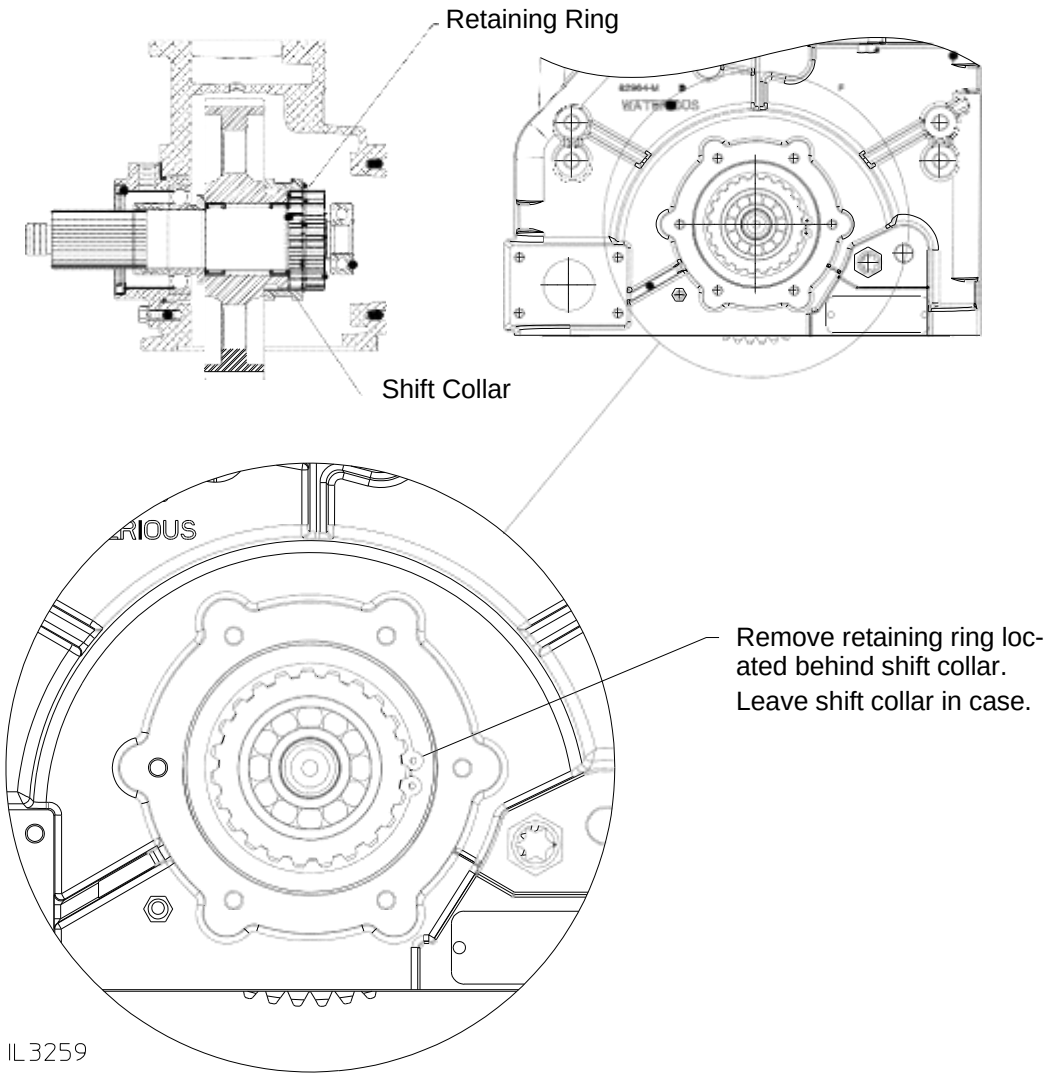
     Only the housing will be removed.
3. Transmissions built after March 12, 2013 only: Remove shims.



Disassembly - Remove Driveline from Case (Continued)

Remove Drive (Input) Shaft

Shift Collar Retaining Ring (Input Shaft Only Configurations)



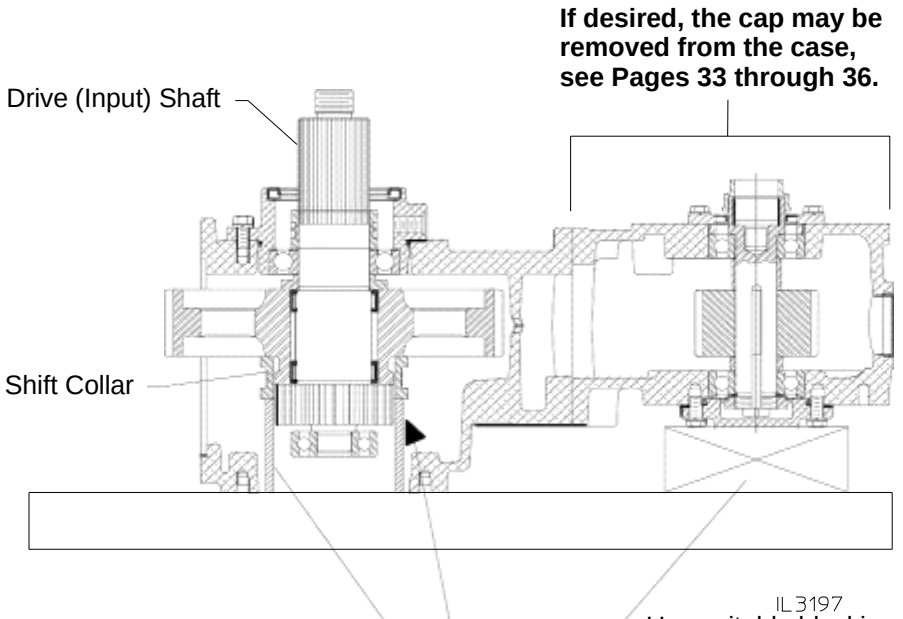
Disassembly - Remove Driveline from Case (Continued)

Remove Drive (Input) Shaft

Press 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.

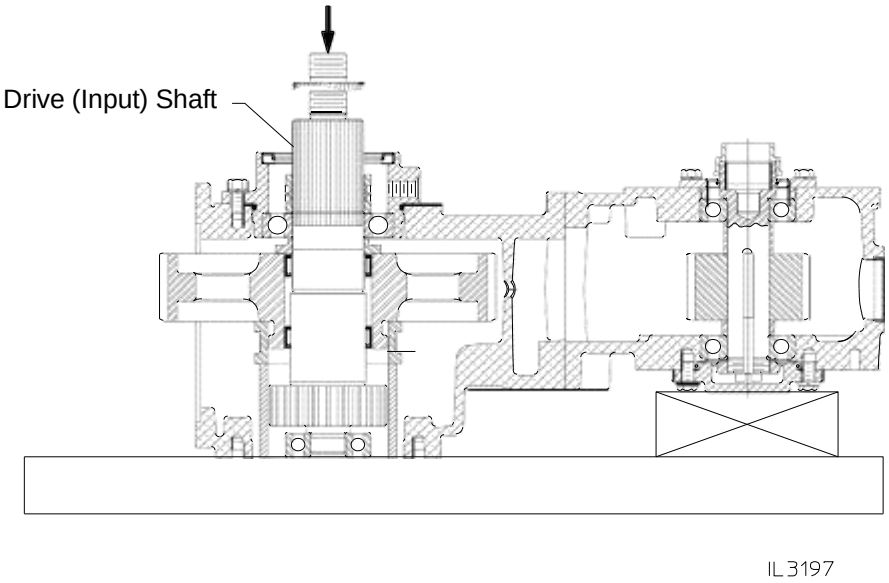


NOTICE

If shaft has a retaining ring behind the shift collar, it must be removed before shaft is pressed out of the case. See Page 28.

Step 2

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



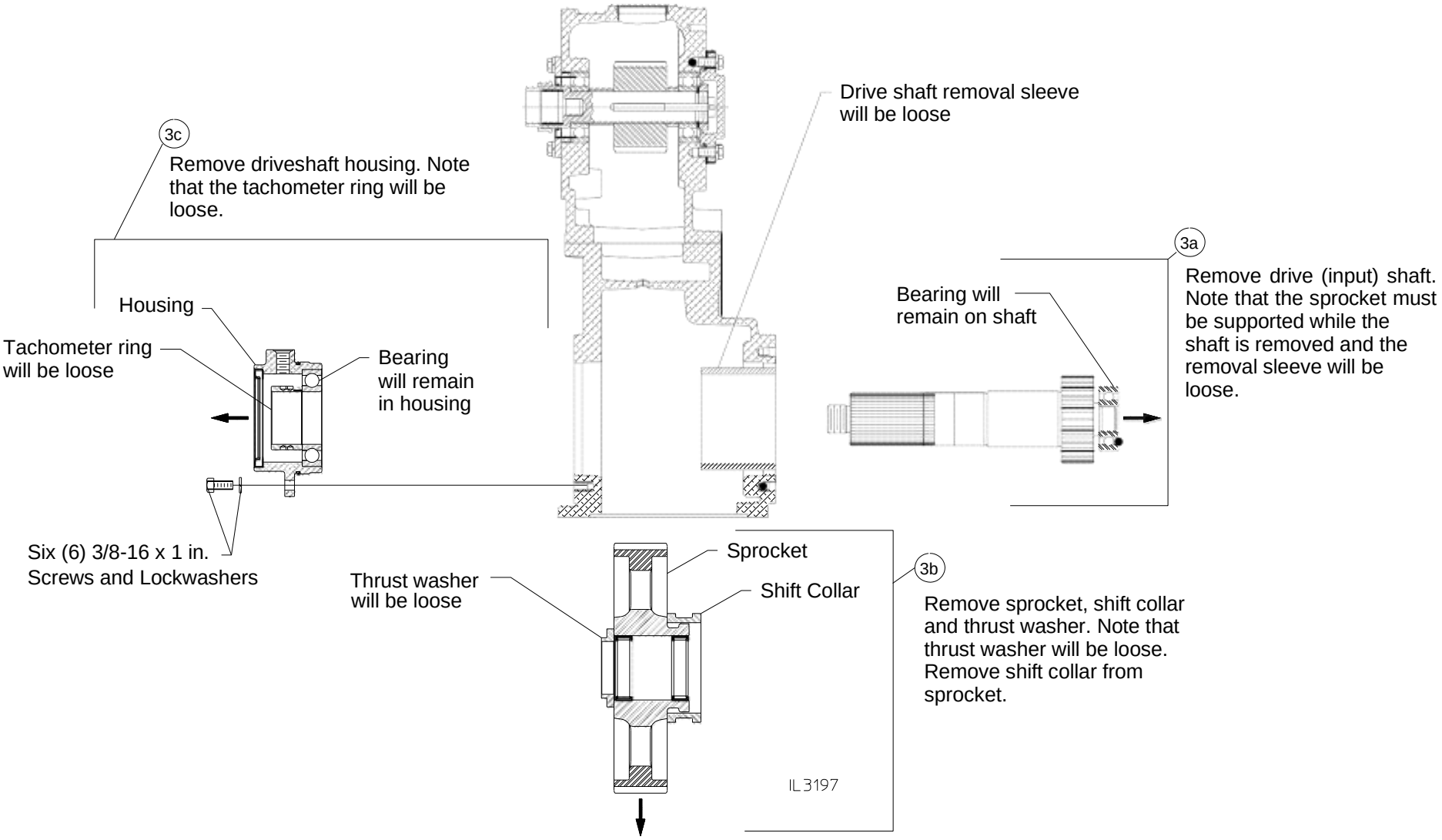
Disassembly - Remove Driveline from Case (Continued)

Remove Drive (Input) Shaft

Remove Drive Shaft, Sprocket and Housing

Step 3

Remove case from the press and remove components as shown.

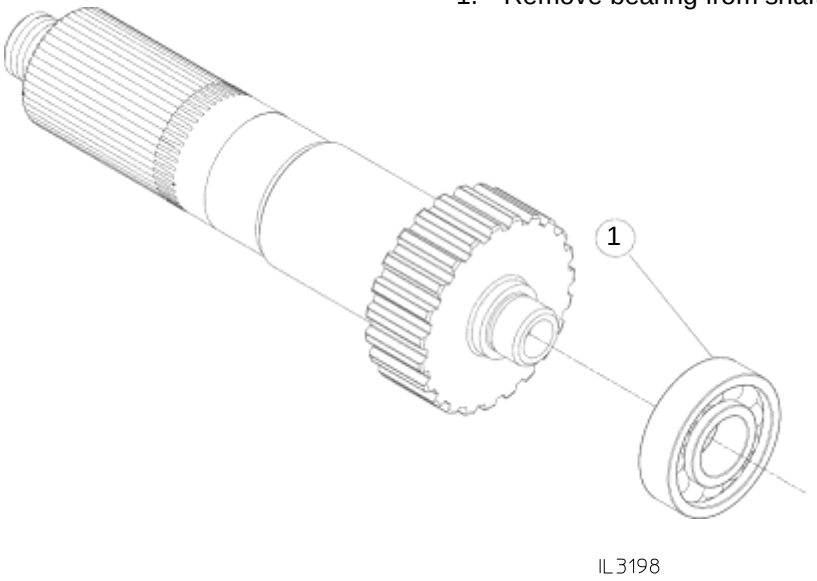


Disassemble Driveline Components

Drive (Input) Shaft

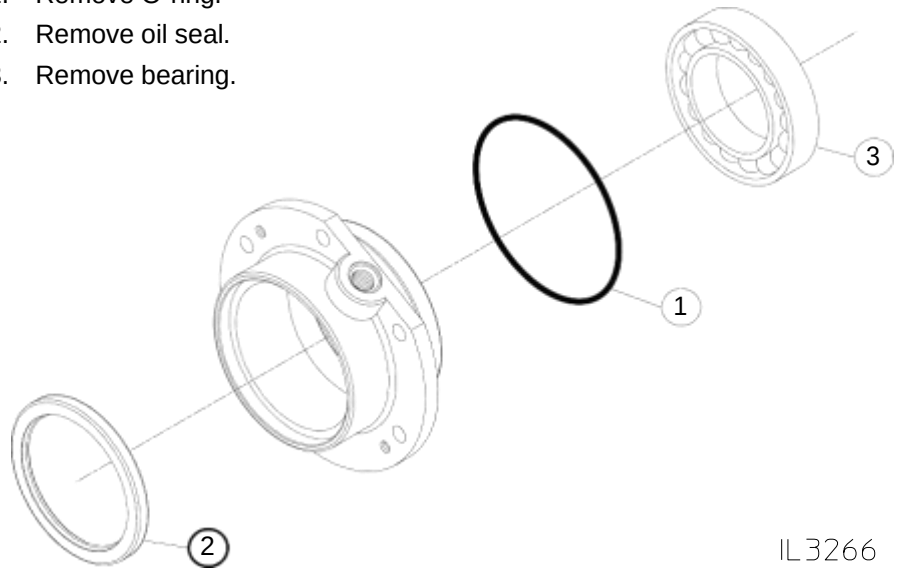
Shaft

1. Remove bearing from shaft



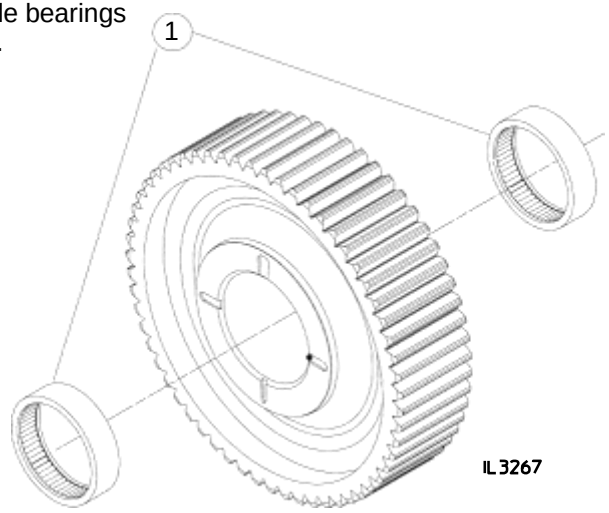
Housing

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



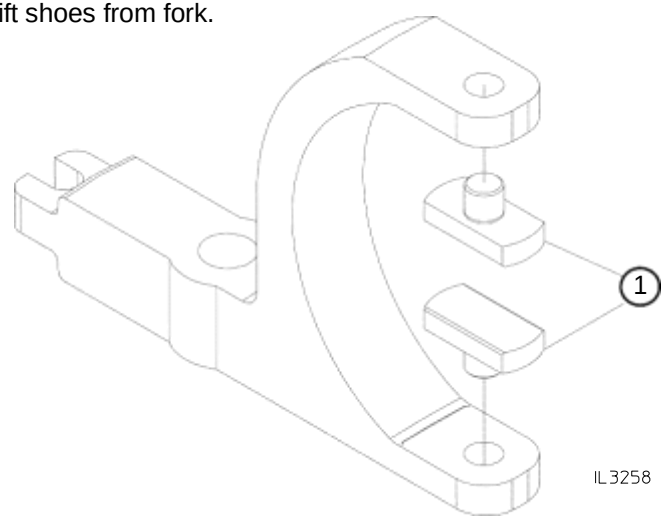
Sprocket

1. Remove both needle bearings from sprocket bore.



Shift Fork Shoes

1. Remove shift shoes from fork.

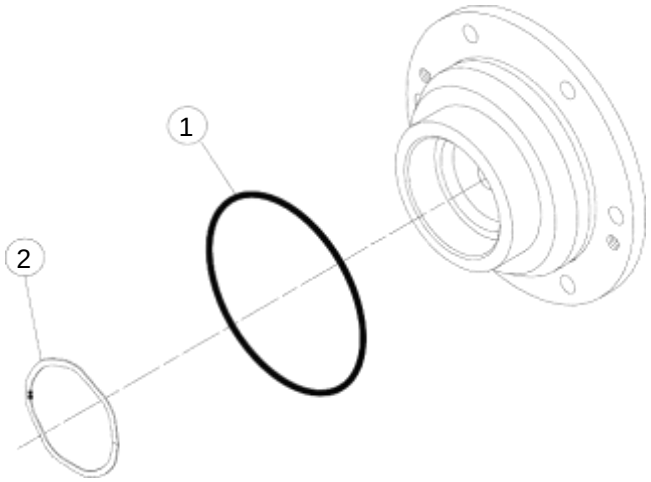


Disassemble Driveline Components (Continued)

Coupling (Output) Shaft

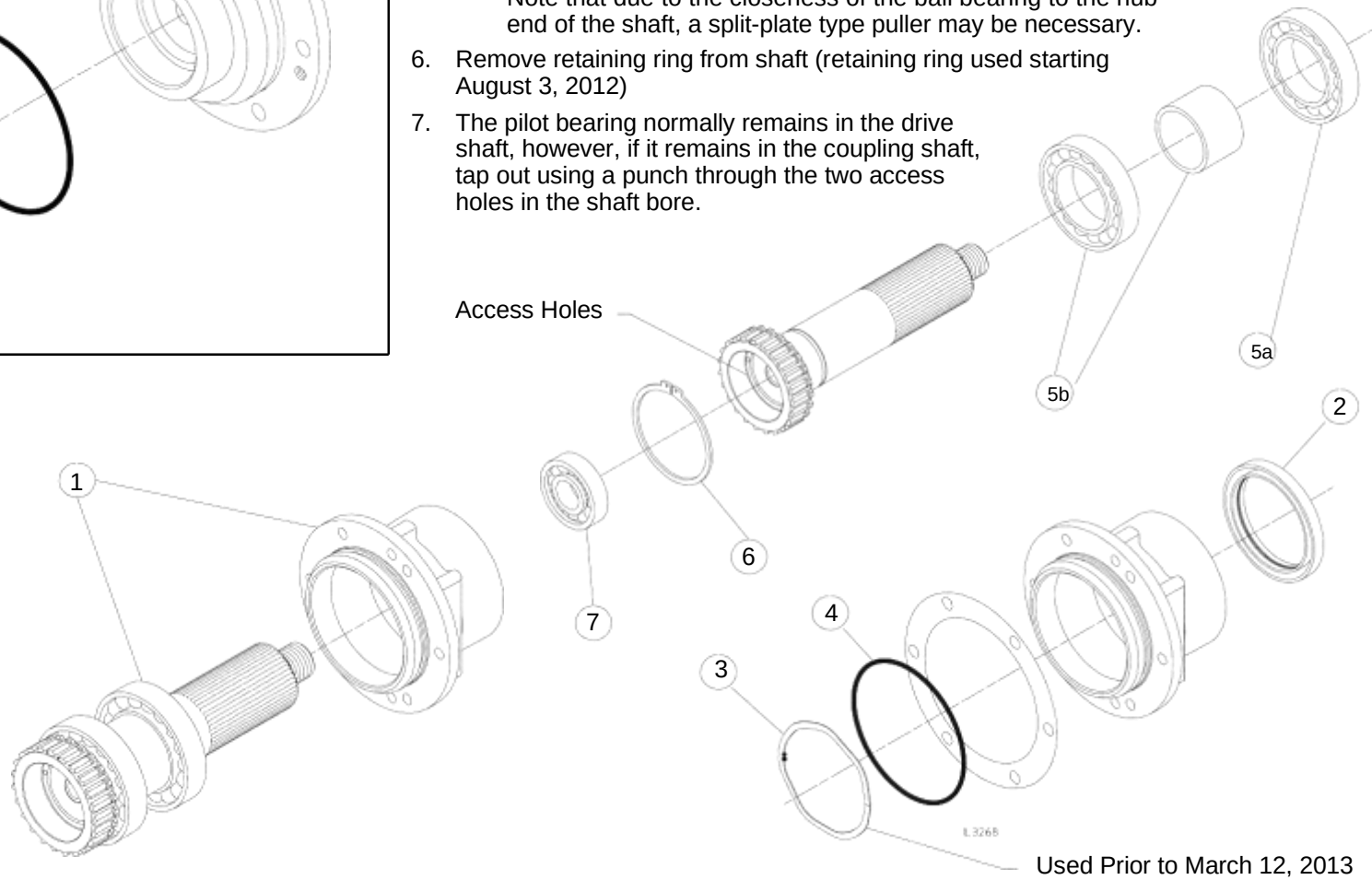
Input Shaft Only Configurations

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. (Transmissions 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. Remove retaining ring from shaft (retaining ring used starting August 3, 2012)
7. 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.



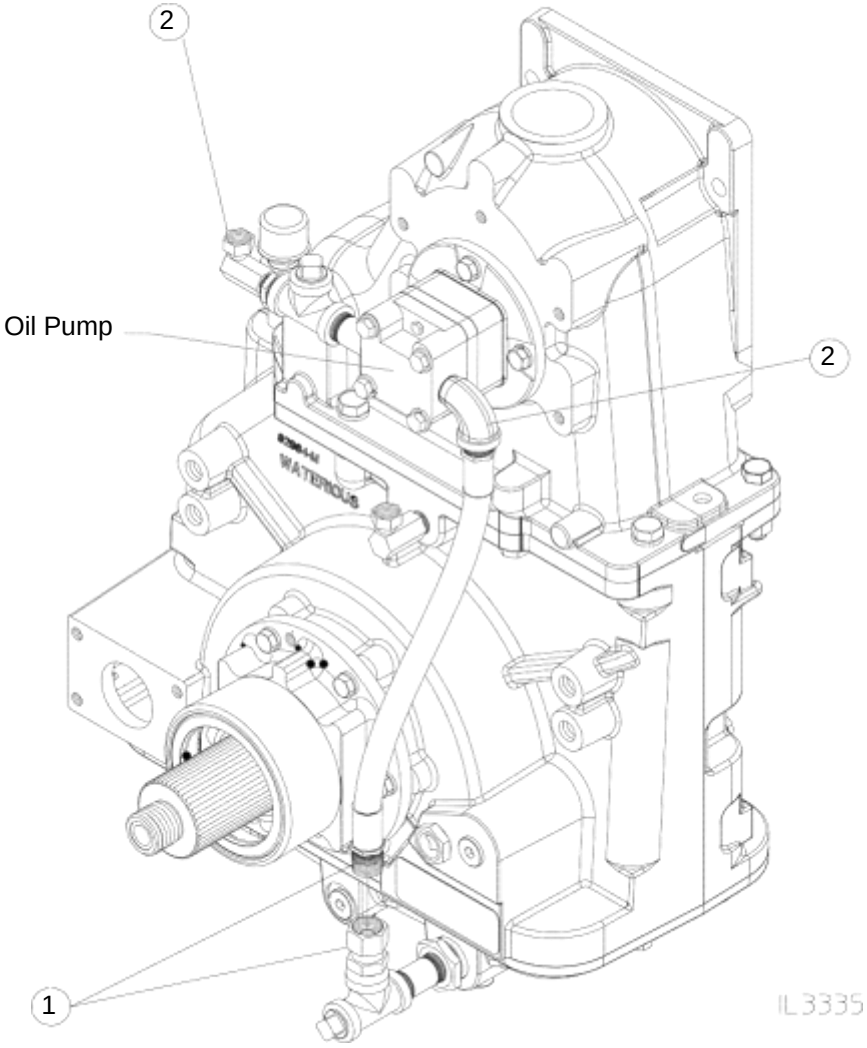
Disassembly - Remove Driven (Impeller) Shaft

Remove Cap from Case - CM, CMU, CS and CSU Pump Models

Disconnect Optional Oil Cooler

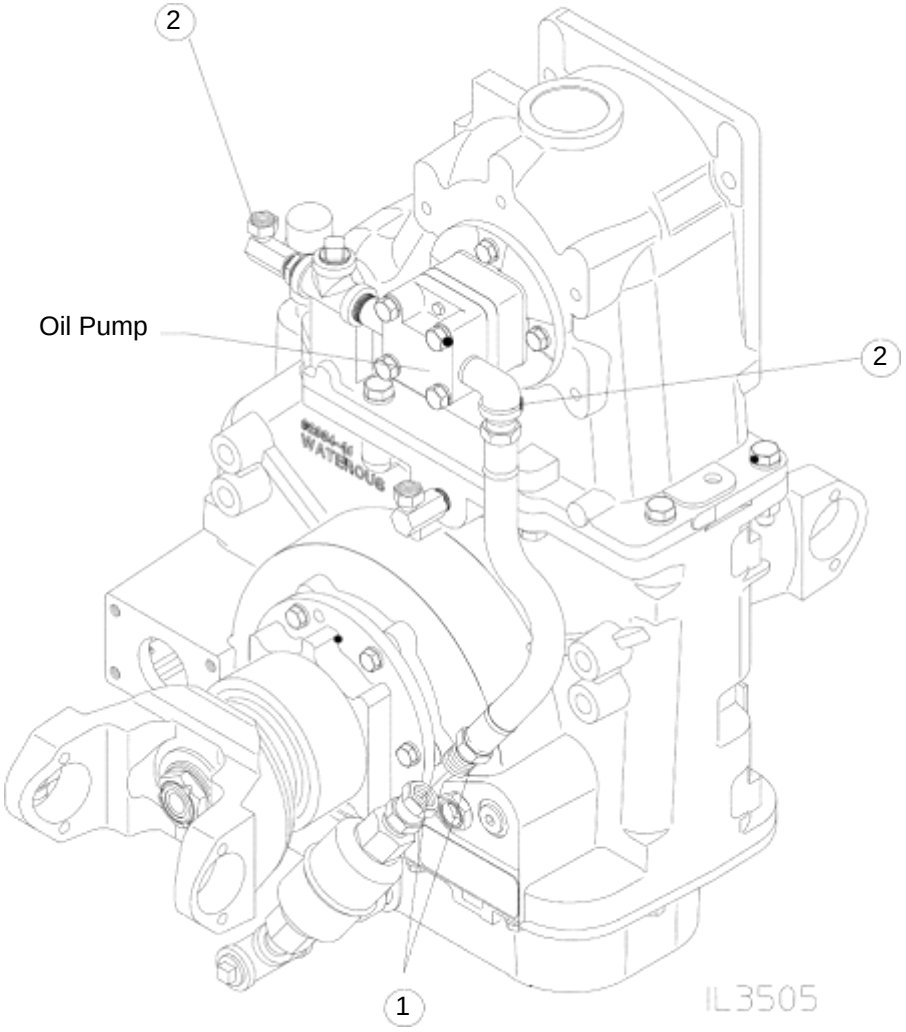
On Transmissions Built Prior to January 1, 2011

1. Disconnect hose at the swivel connection.
2. The fittings attached to each side of the oil pump may be left in place.



On Transmissions Built January 1, 2011 to April 8, 2020

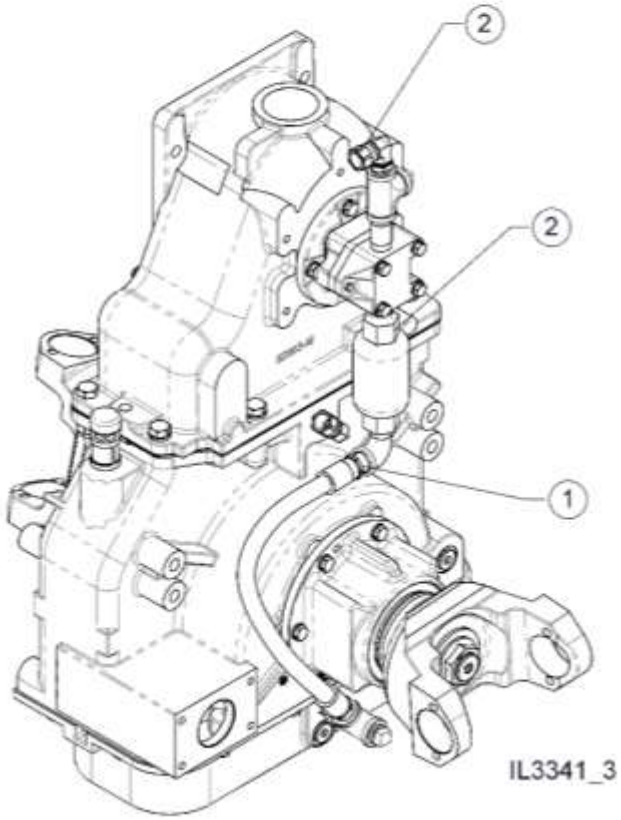
1. Disconnect hose at the swivel connection.
2. The fittings attached to each side of the oil pump may be left in place.



Disconnect Optional Oil Cooler

On Transmissions Built After April 8, 2020.

1. Disconnect hose at swivel connection.
2. The fittings attached to each side of the oil pump may be left in place.

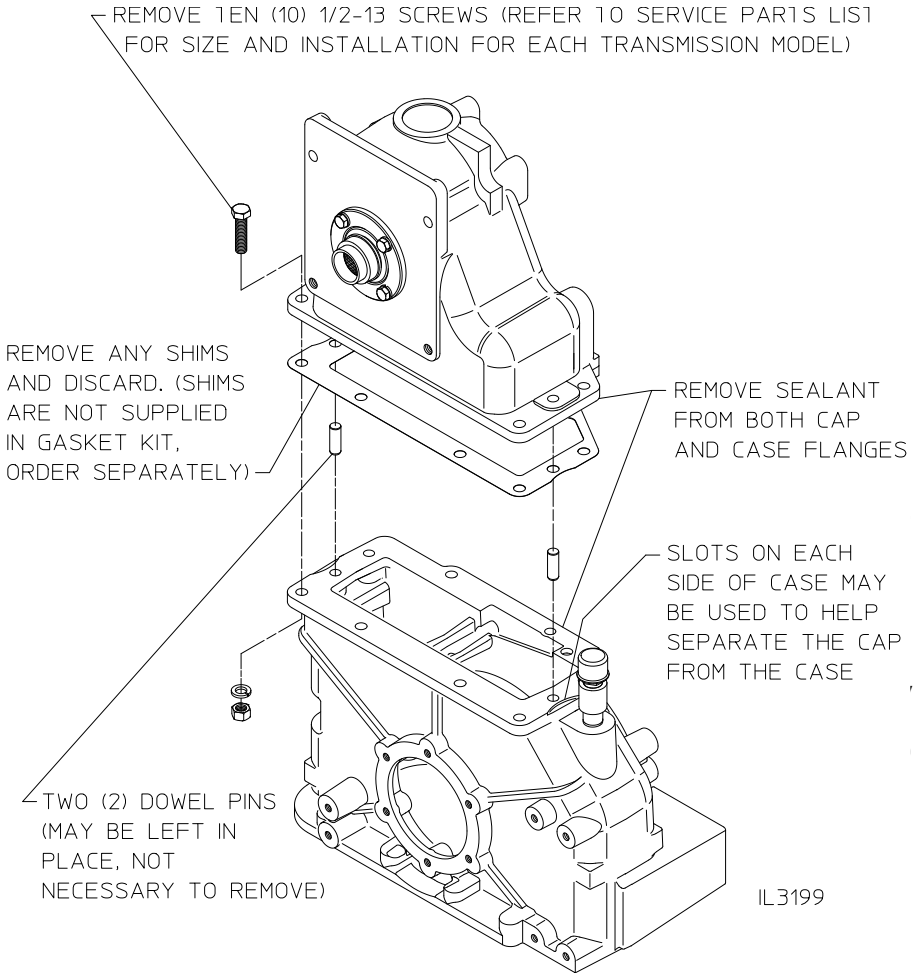


Disassembly - Remove Driven (Impeller) Shaft (Continued)

Remove Cap from Case - CM, CMU, CS, CSU, CG and CX Pump Models

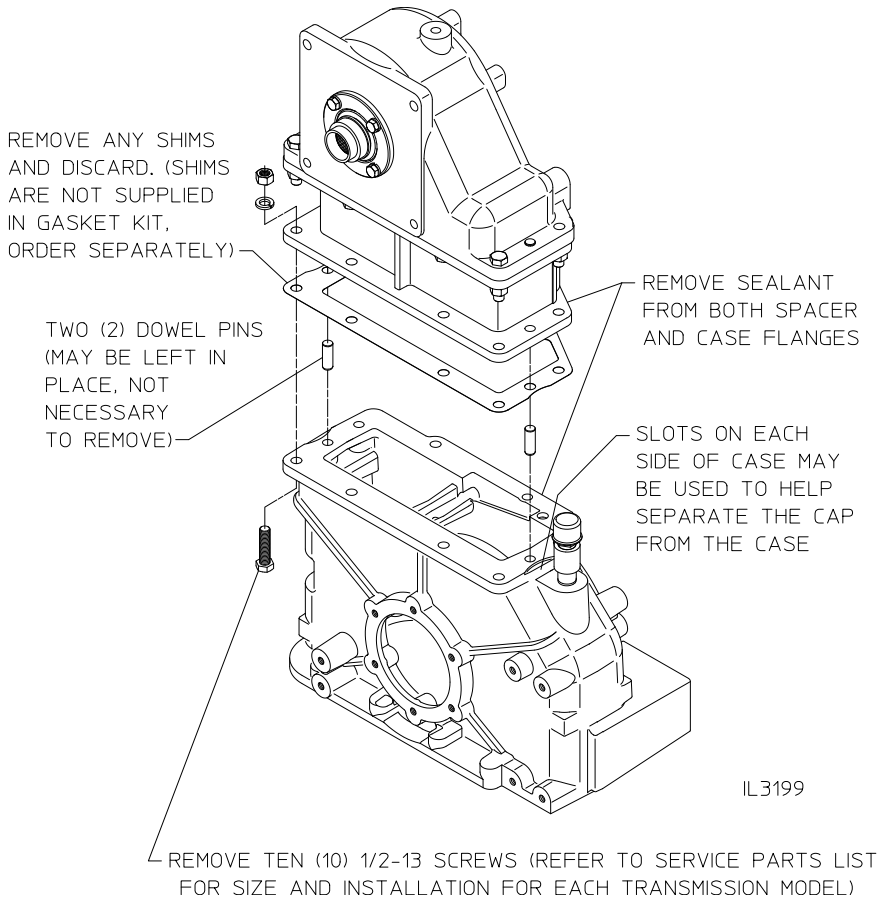
C20B, C20C and C20D Transmission Models

NOTE: Removal of cap from case makes it easier to handle assembly but is not required.



C20E and C20F Transmission Models

NOTE: Removal of cap from case makes it easier to handle assembly but is not required.

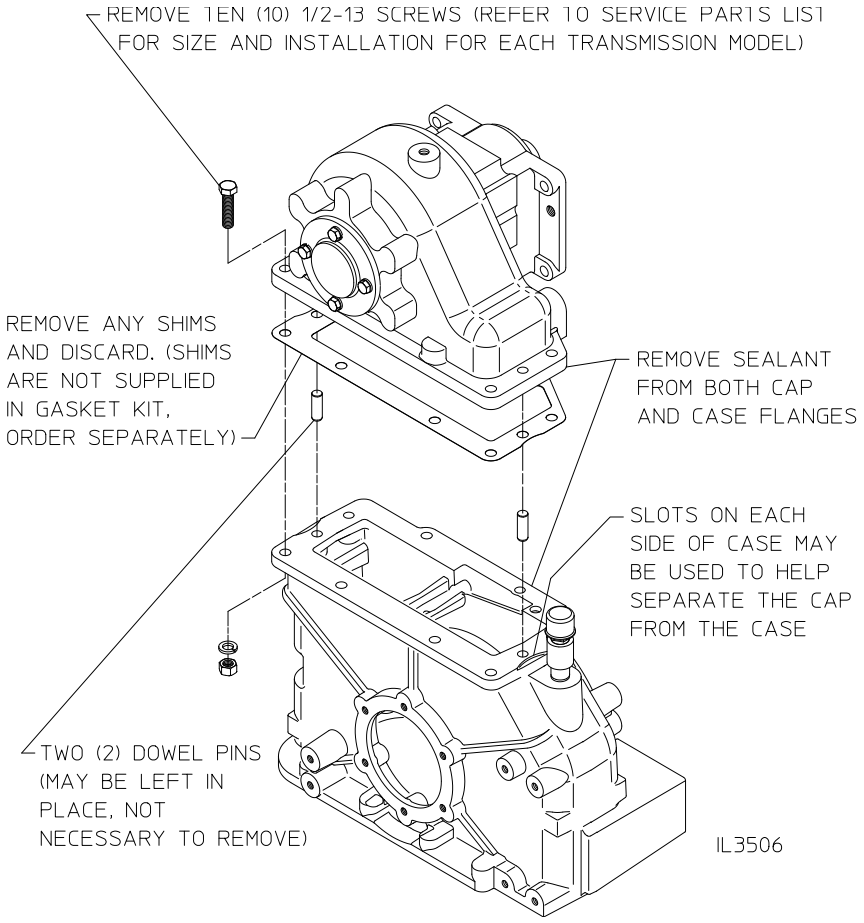


Disassembly - Remove Driven (Impeller) Shaft (Continued)

Remove Cap from Case - Transmissions Mounted to the Front of CM, CMU, CS and CSU Pump Models

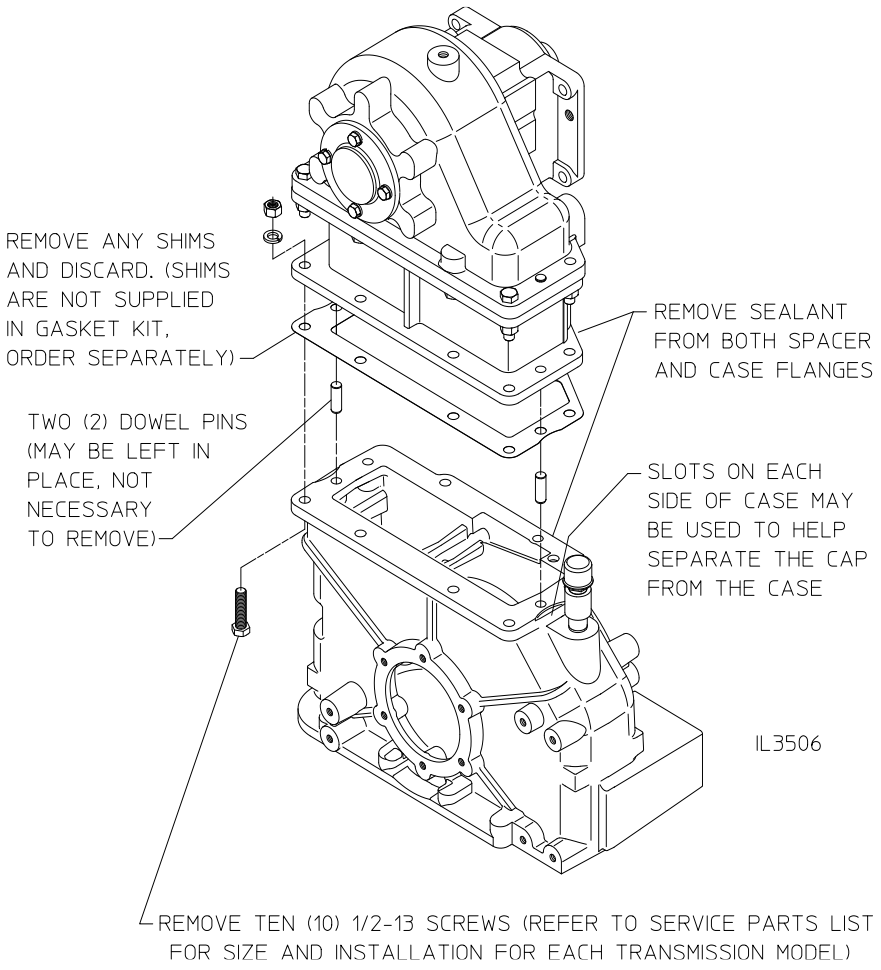
C20B Transmission Models

NOTE: Removal of cap from case makes it easier to handle assembly but is not required.



C20C, C20D, C20E and C20F Transmission Models

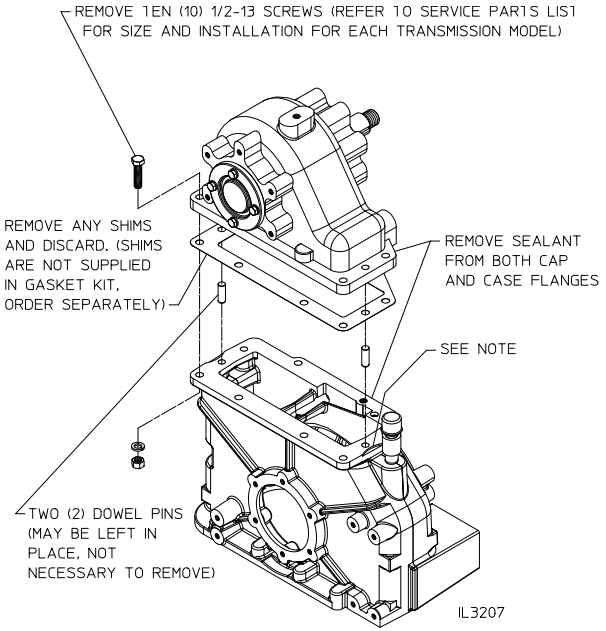
NOTE: Removal of cap from case makes it easier to handle assembly but is not required.



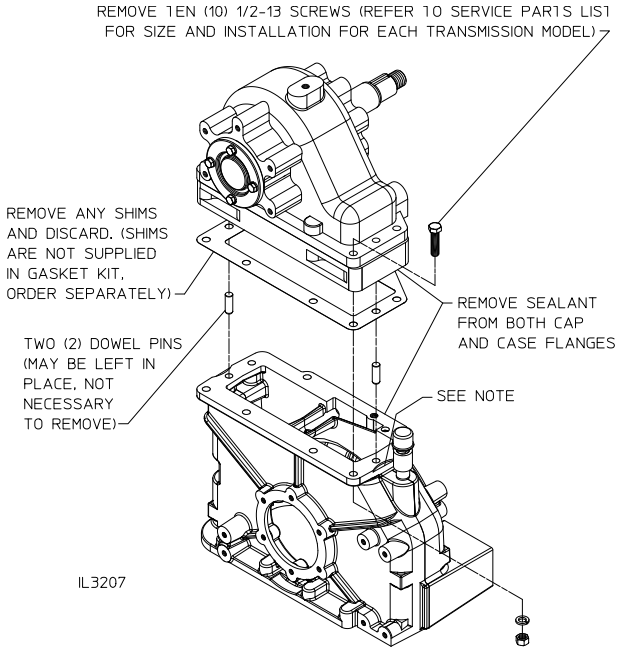
Disassembly - Remove Driven (Impeller) Shaft (Continued)

Remove Cap from Case - S100 Pump Models

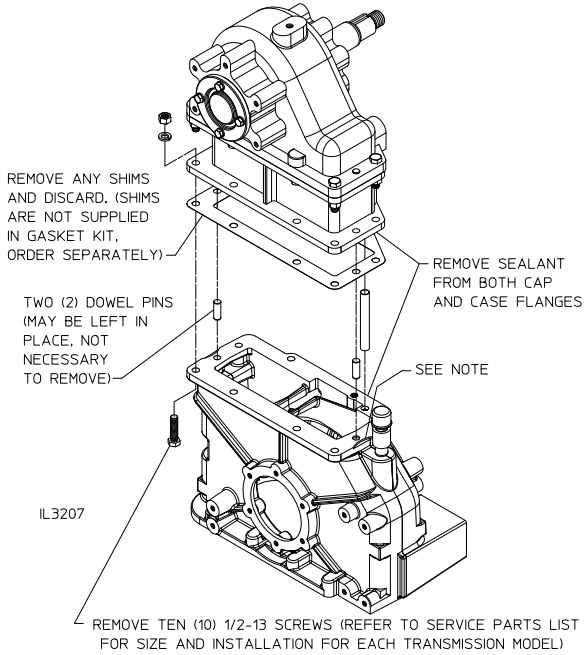
C20B Models



C20C Models



C20D, C20E and C20F Models

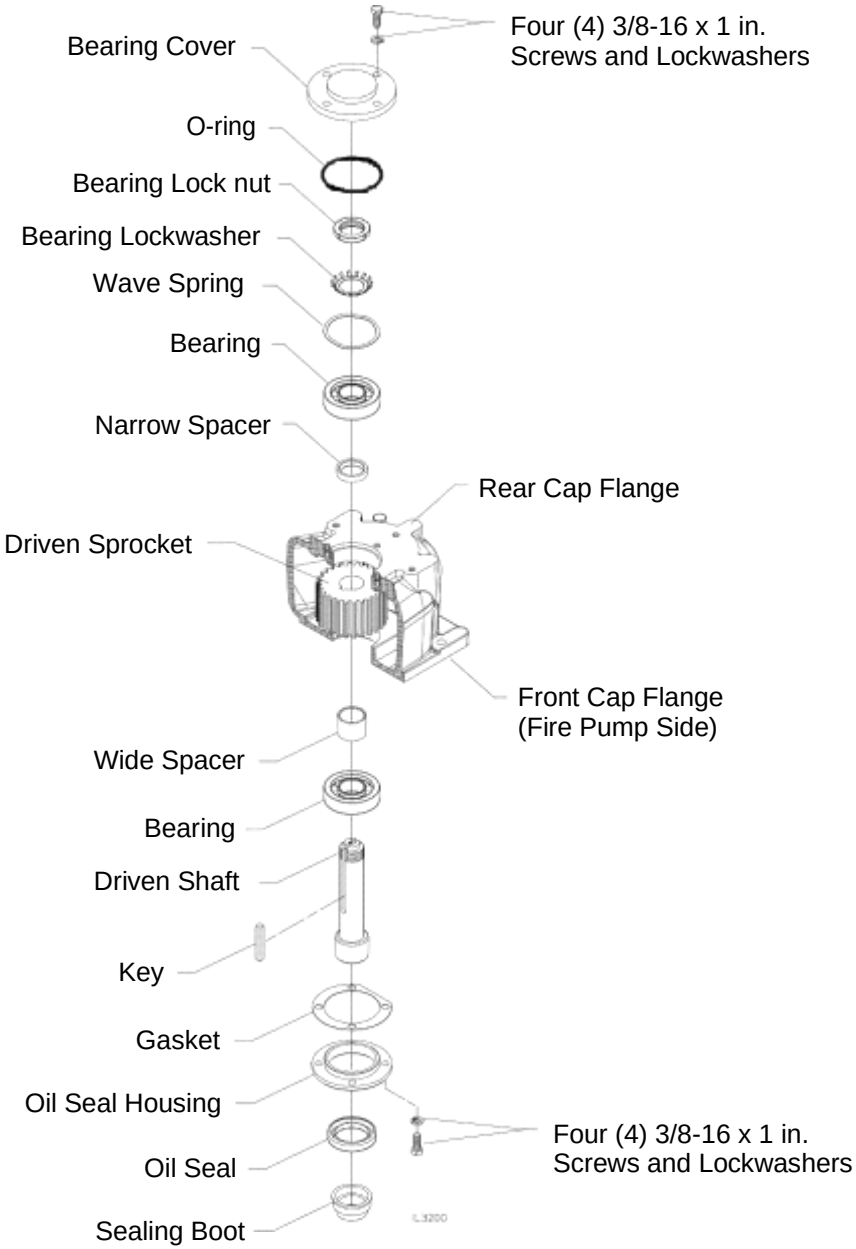


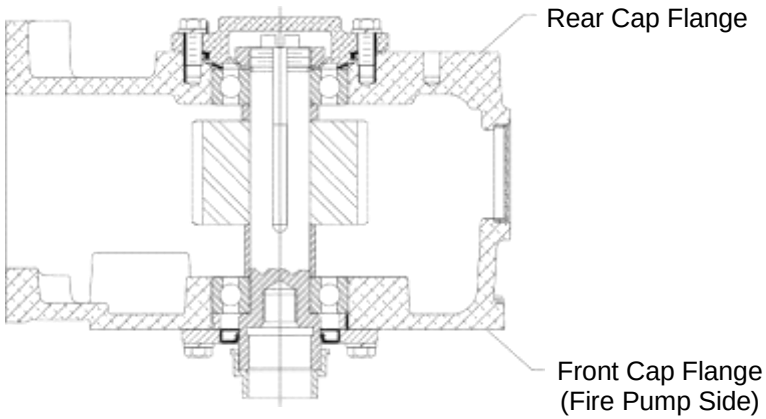
Note: Slots on each side of the case may be used to help separate the cap from the case.

Disassembly - Disassemble Cap

CM, CMU, CS and CSU Pump Models - Transmission Mounted on Rear of Pump

Blank Rear Output





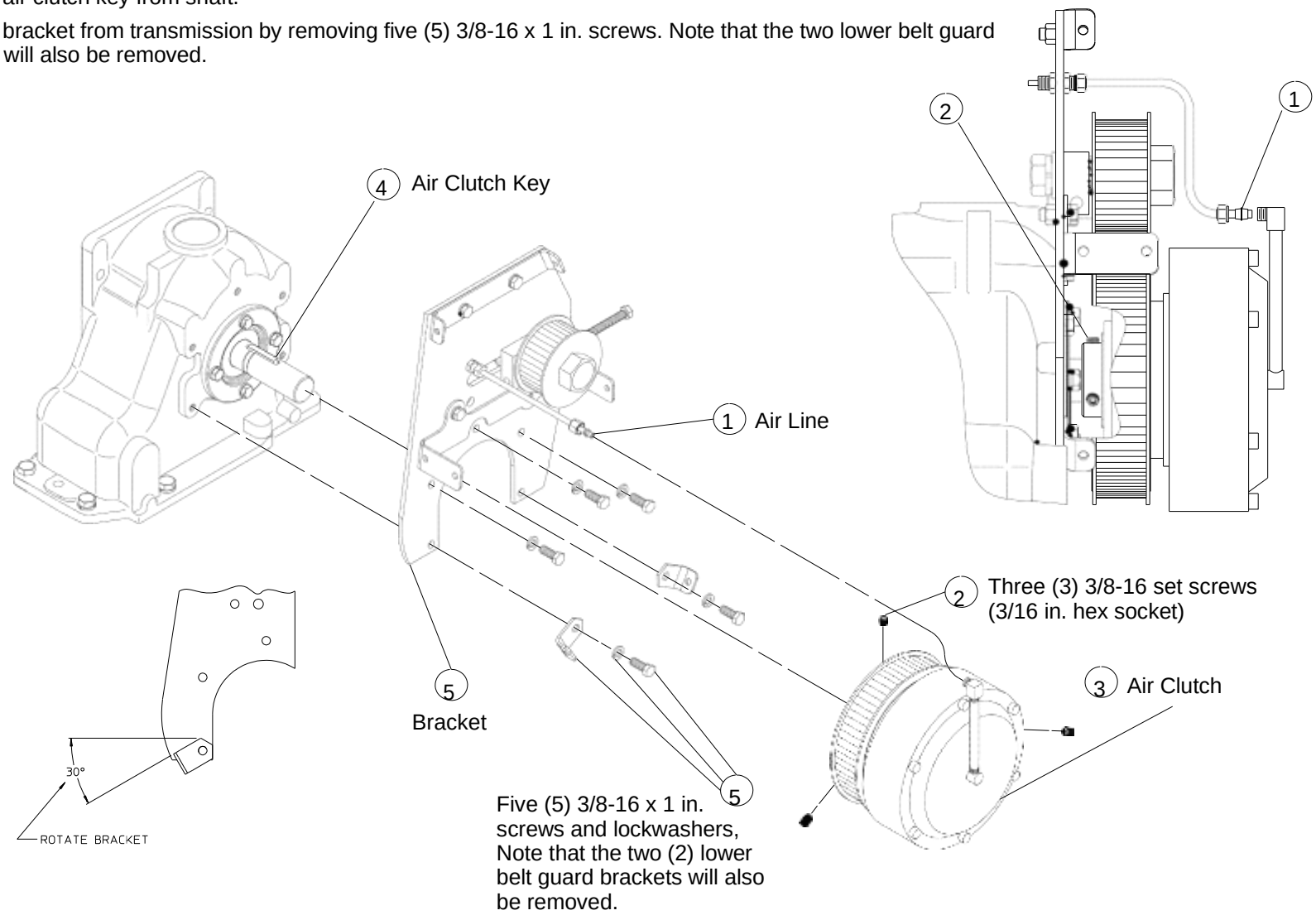
1. Remove the four (4) screws from the bearing cover and the four (4) screws from oil seal housing. Remove cover and housing from cap.
2. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the lock nut, lockwasher and wave spring. **NOTE: To remove nut, tap nut with a punch and hammer.**
3. Under a press, support the assembly on the front cap flange and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the driven shaft.

Disassembly - Disassemble Cap (Continued)

CM, CMU, CS and CSU Pump Models - Transmission Mounted on Rear of Pump

Eclipse™ CAFS on Rear Output - Remove Air Clutch

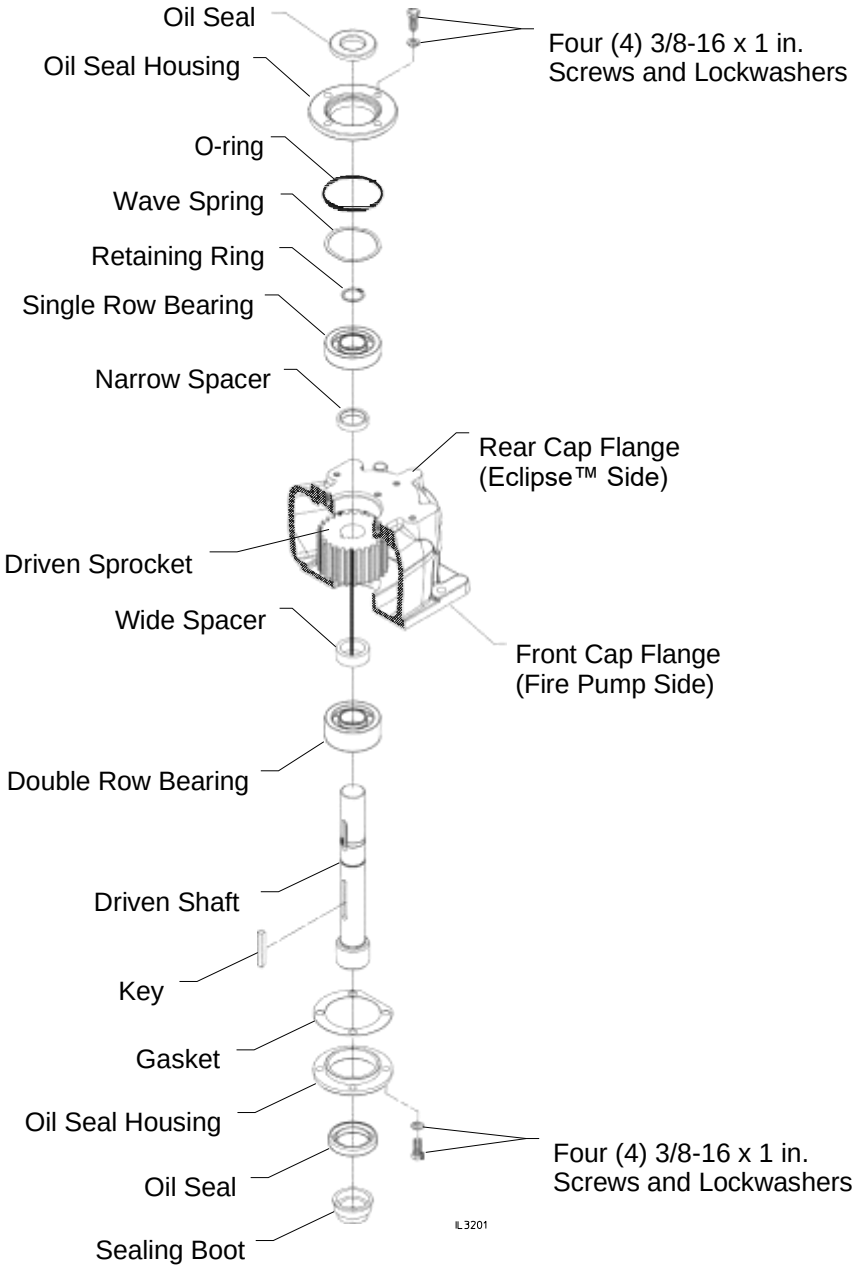
1. Disconnect air line to clutch.
2. Loosen three (3) 3/8-16 set screws which attach clutch to shaft. Note that set screws have 3/16 in. hex sockets.
3. Remove air clutch from shaft by pulling straight back.
4. Remove air clutch key from shaft.
5. Remove bracket from transmission by removing five (5) 3/8-16 x 1 in. screws. Note that the two lower belt guard brackets will also be removed.

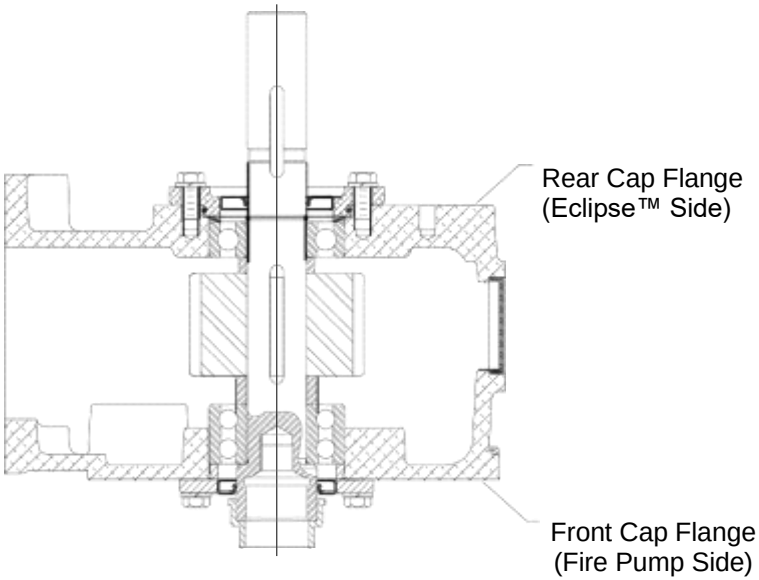


Disassembly - Disassemble Cap (Continued)

CM, CMU, CS and CSU Pump Models - Transmission Mounted on Rear of Pump

Eclipse CAFS on Rear Output - Disassemble Cap



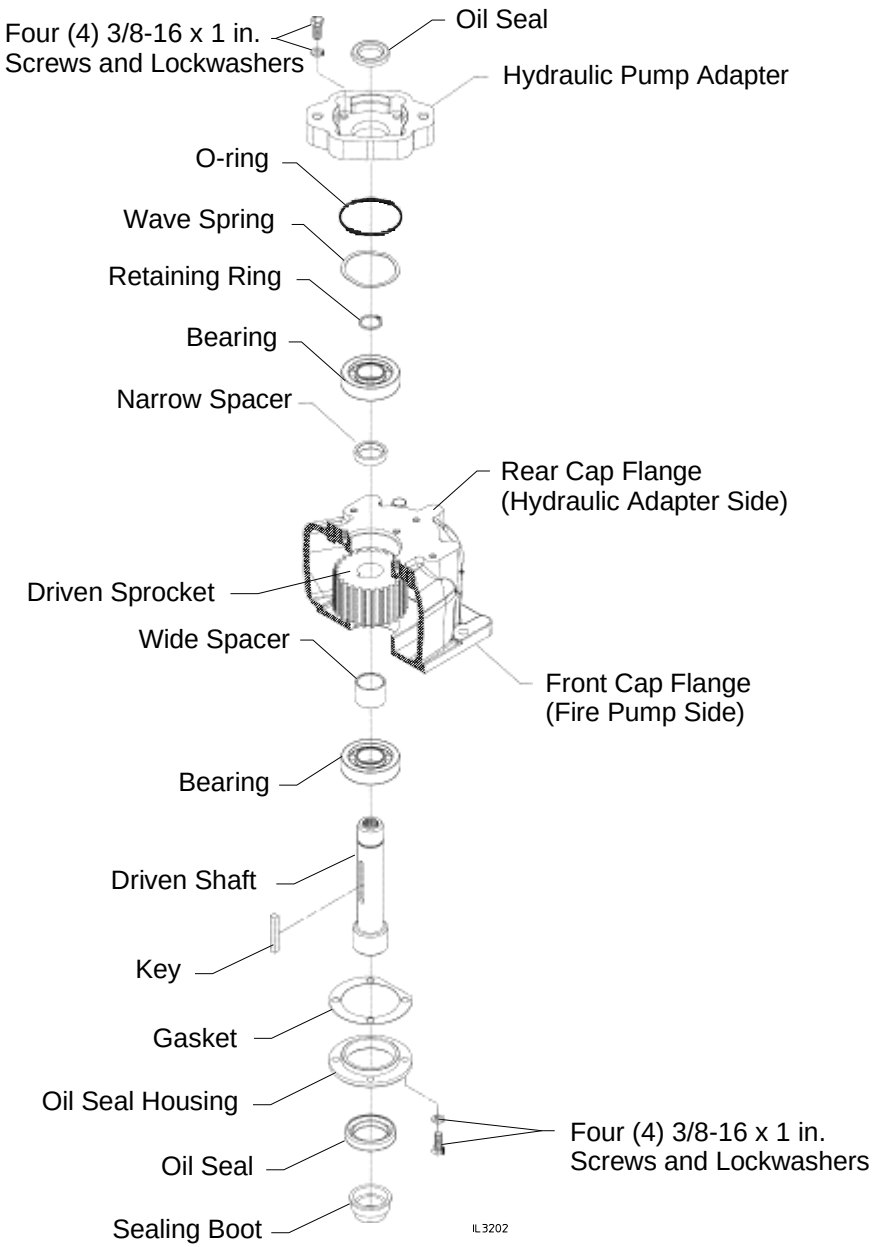


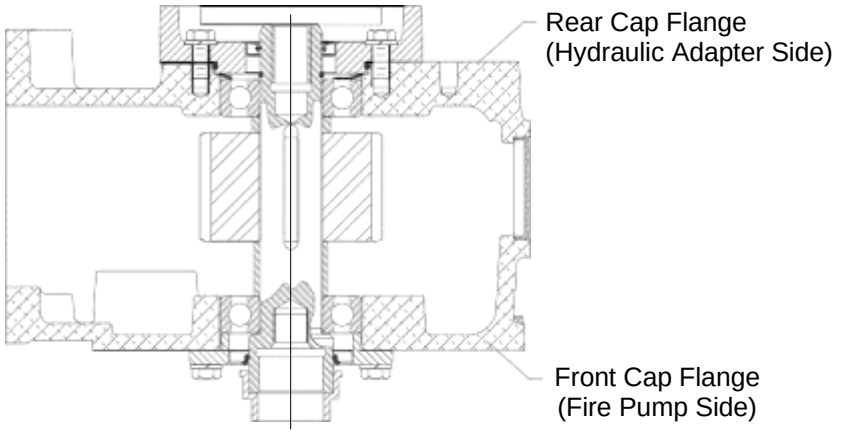
1. Remove the eight (8) screws that fasten the oil seal housings to the cap. Remove housings.
2. Remove the retaining ring and wave spring.
3. Under a press, support the assembly on the front cap flange and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the driven shaft.

Disassembly - Disassemble Cap (Continued)

CM, CMU, CS and CSU Pump Models - Transmission Mounted on Rear of Pump

Hydraulic Pump on Rear Output



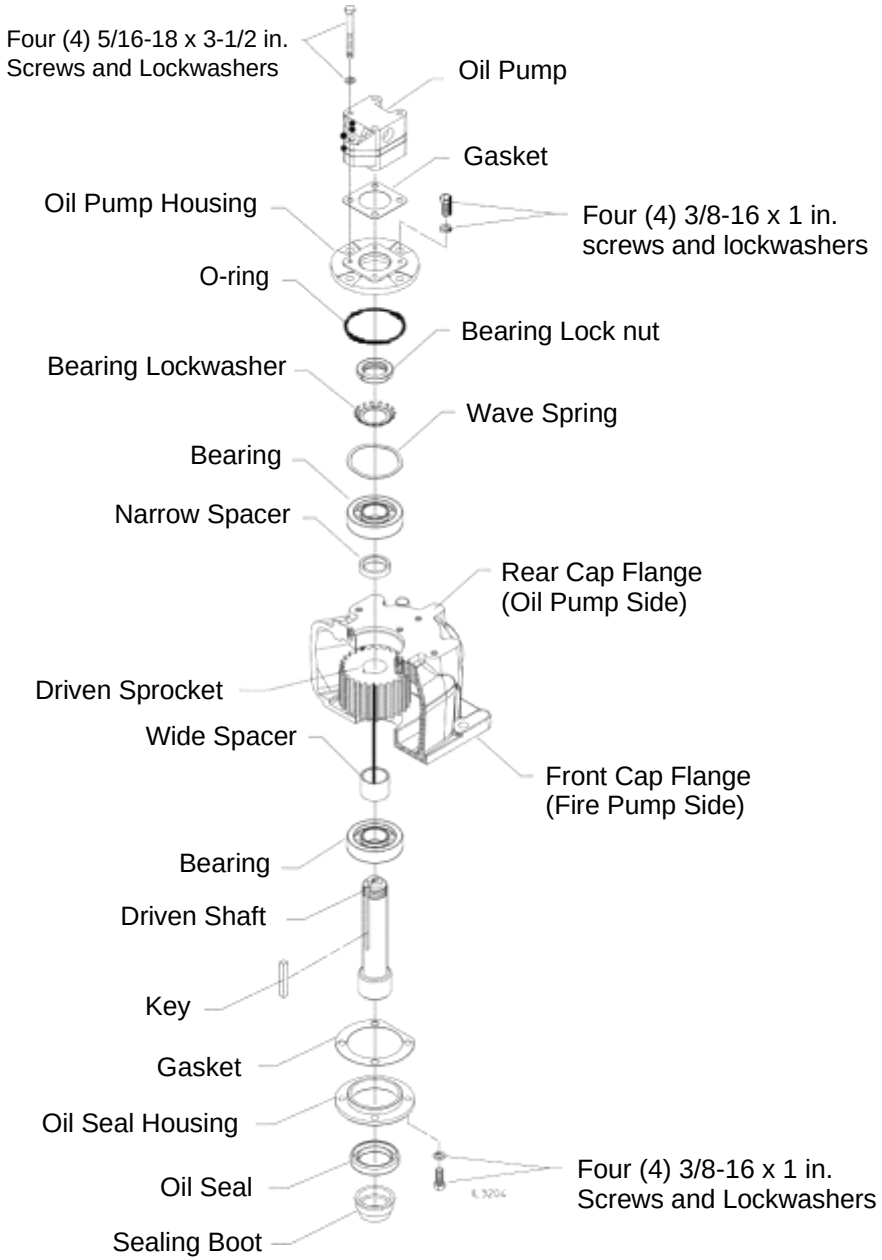


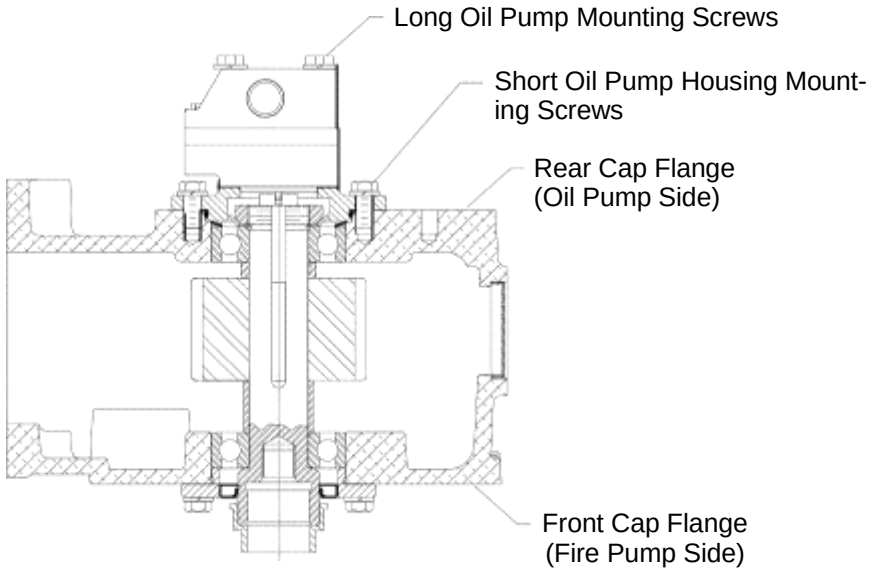
1. Remove the four (4) screws from the hydraulic pump adapter and the four (4) screws from the oil seal housing. Remove adapter and housing from cap.
2. Remove the retaining ring and wave spring.
3. Under a press, support the assembly on the front cap flange and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the driven shaft.

Disassembly - Disassemble Cap (Continued)

CM, CMU, CS and CSU Pump Models - Transmission Mounted on Rear of Pump

Oil Cooler Pump on Rear Output



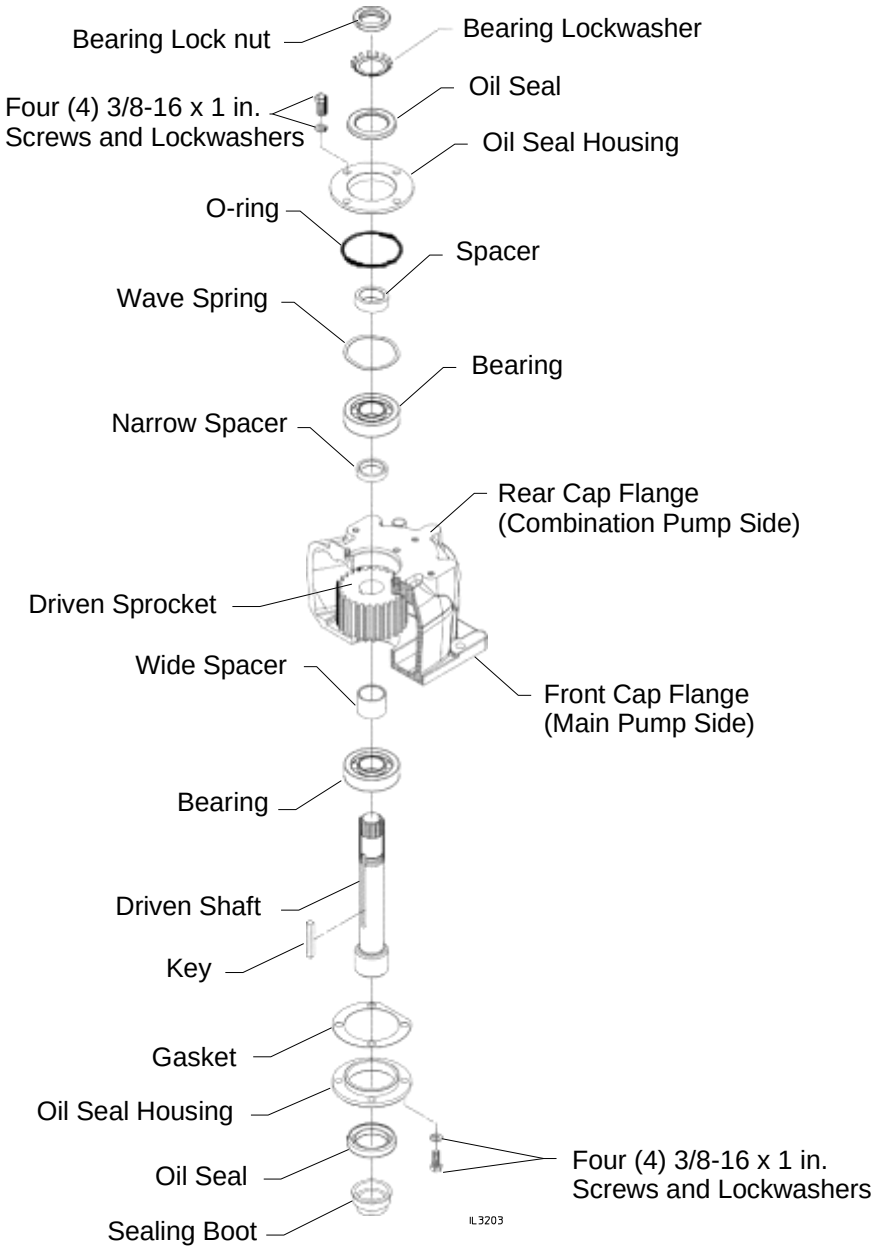


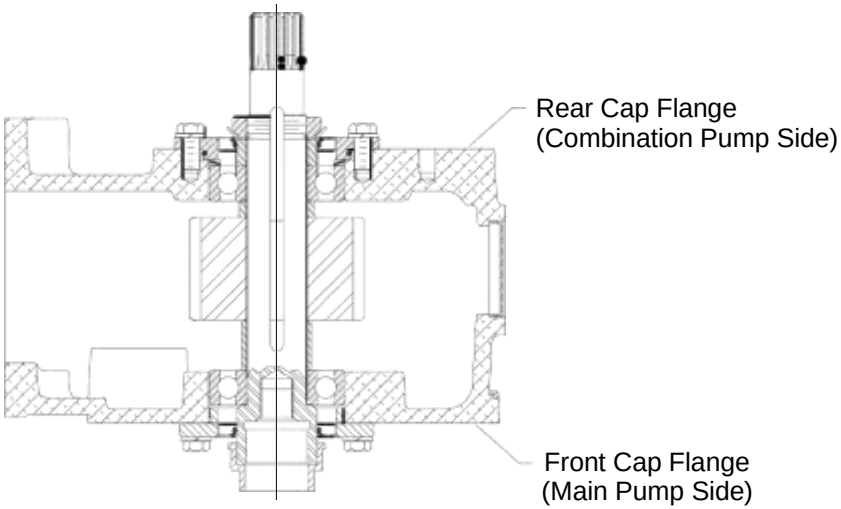
1. Remove the four (4) long screws connecting the oil pump to oil pump housing.
2. Remove the short four (4) screws from the oil pump housing. Remove oil pump and housing from cap.
3. Remove the four (4) screws from the oil seal housing on opposite side of cap.
4. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the lock nut, lockwasher and wave spring. **NOTE: To remove nut, tap nut with a punch and hammer.**
5. Under a press, support the assembly on the front cap flange and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
6. Remove the ball bearing, spacers and sprocket from cap.
7. Remove bearing and spacer from the driven shaft.

Disassembly - Disassemble Cap (Continued)

CM, CMU, CS and CSU Pump Models - Transmission Mounted on Rear of Pump

Combination Pump on Rear Output



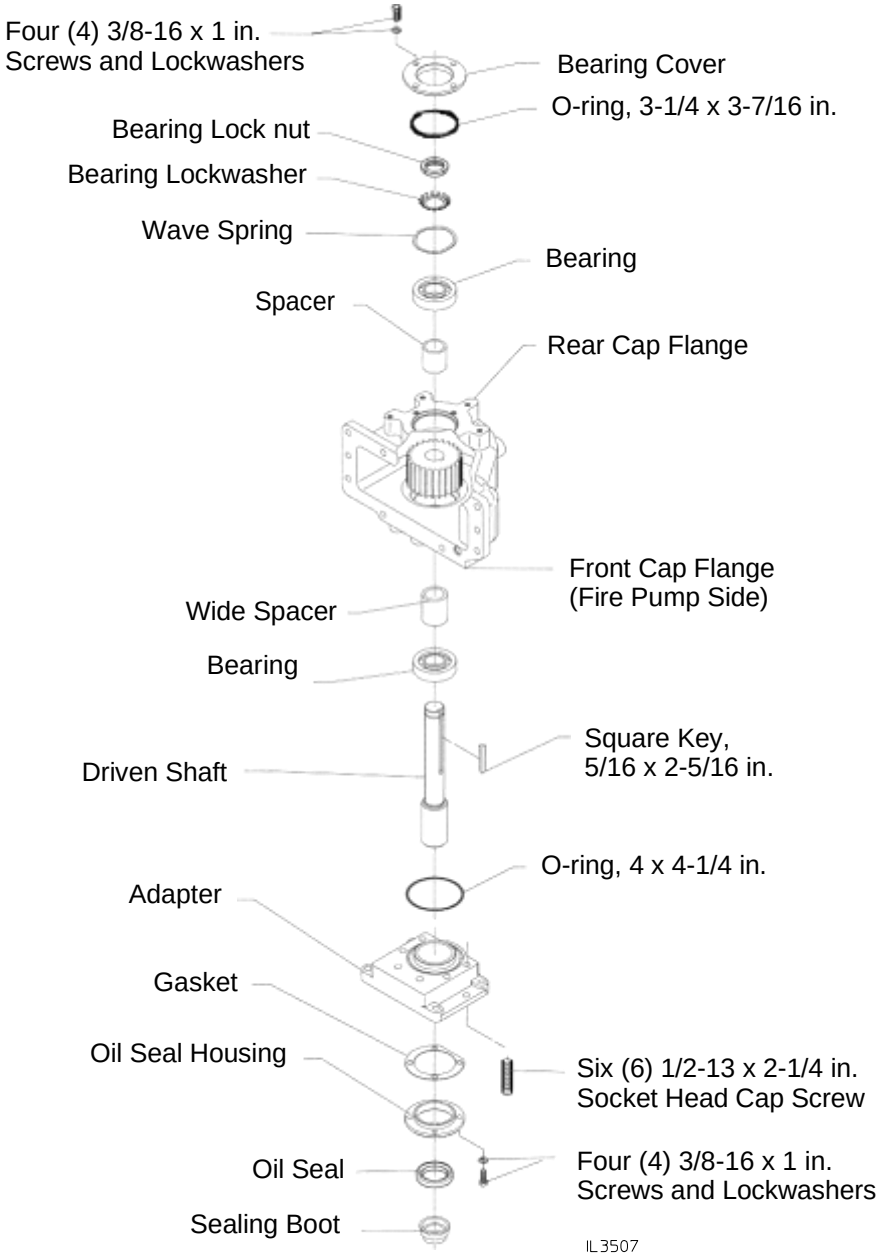


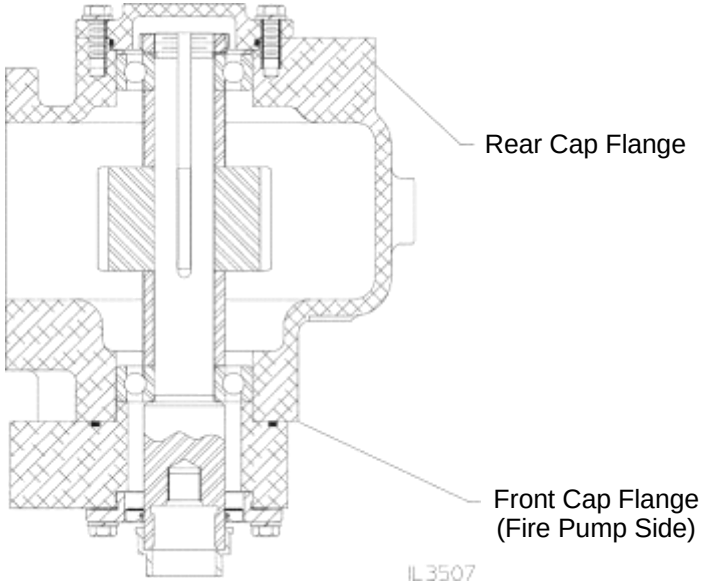
1. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the lock nut, lockwasher and wave spring. **NOTE: To remove nut, tap nut with a punch and hammer.**
2. Remove the eight (8) screws that fasten the oil seal housings to the cap. Remove housings.
3. Under a press, support the assembly on the front cap flange and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the driven shaft.

Disassembly - Disassemble Cap (Continued)

CM, CMU, CS and CSU Pump Models - Transmission Mounted on Front of Pump

Blank Front Output



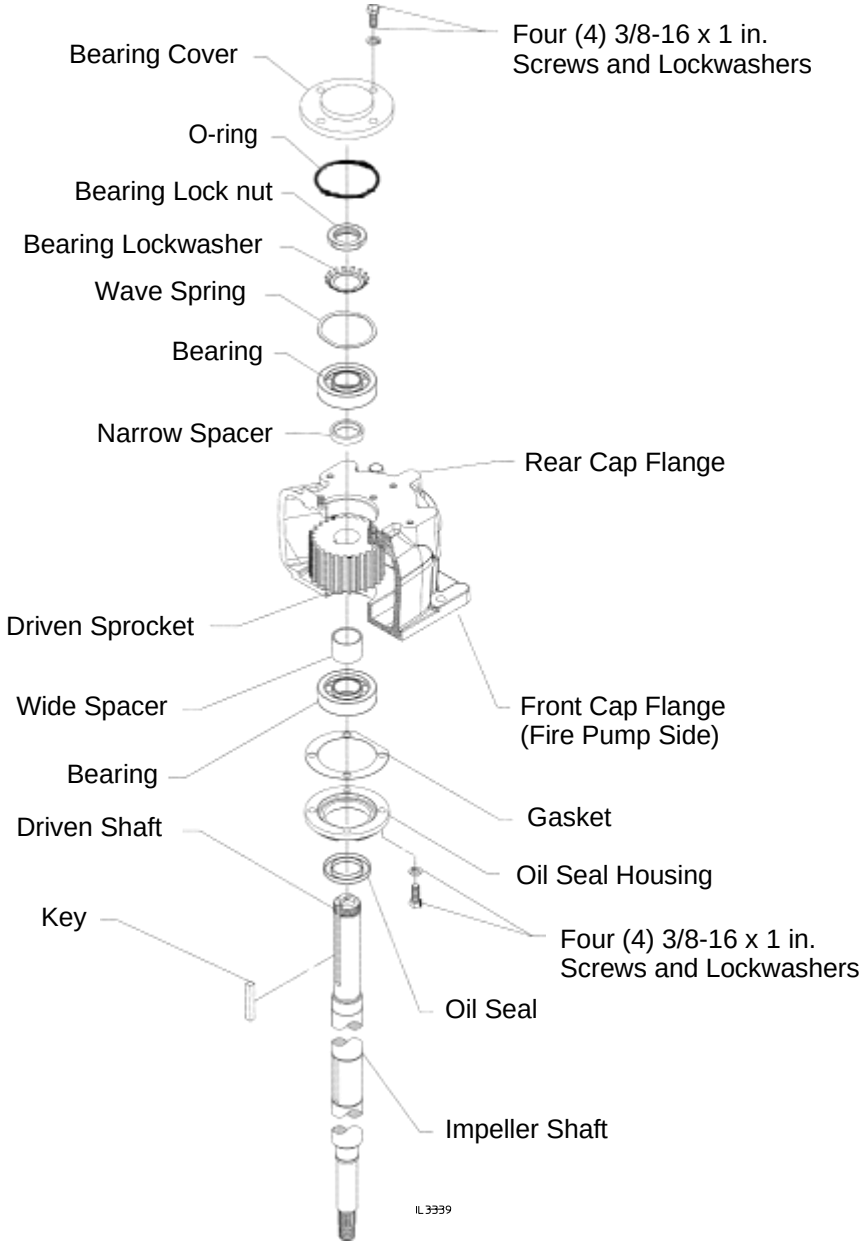


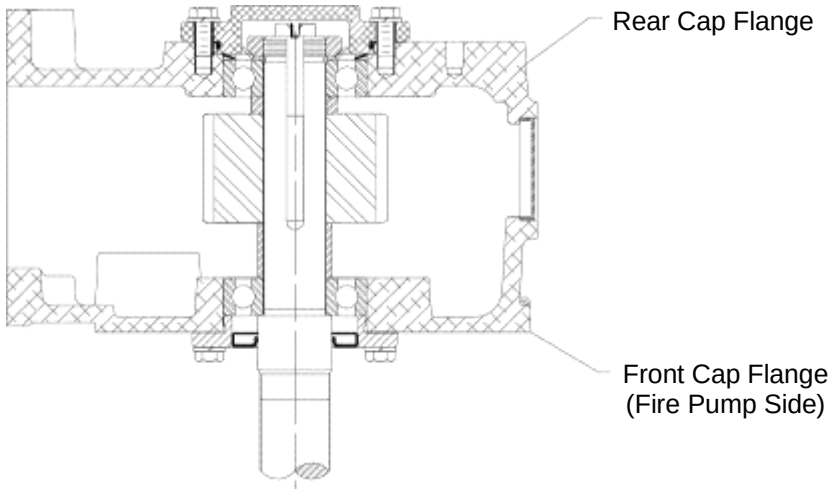
1. Remove the four (4) screws from the bearing cover and the four (4) screws from oil seal housing. Remove bearing cover and housing from cap.
2. Remove the six (6) socket head cap screws from the adapter and remove the adapter from the cap.
3. Push the tab of the bearing lockwasher out of the slot in the bearing lock nut. Remove lock nut, lockwasher and wave spring. **Note: To remove lock nut, tap nut with a punch and hammer.**
4. Under a press, support the assembly on the front cap flange and apply a press load to the end of the driven shaft. Press the shaft out of the top ball bearing, spacer, and sprocket. **Note: Press must have a hole large enough to allow the shaft, lower bearing and wide spacer to pass.**
5. Remove the top ball bearing, spacer and sprocket from inside of cap.
6. Slide the wide spacer off the shaft.
7. Under a press, support the bearing and press the shaft out of the lower bearing.

Disassembly - Disassemble Cap

CMH, CMUH, CSH and CSUH Pump Models

Blank Rear Output



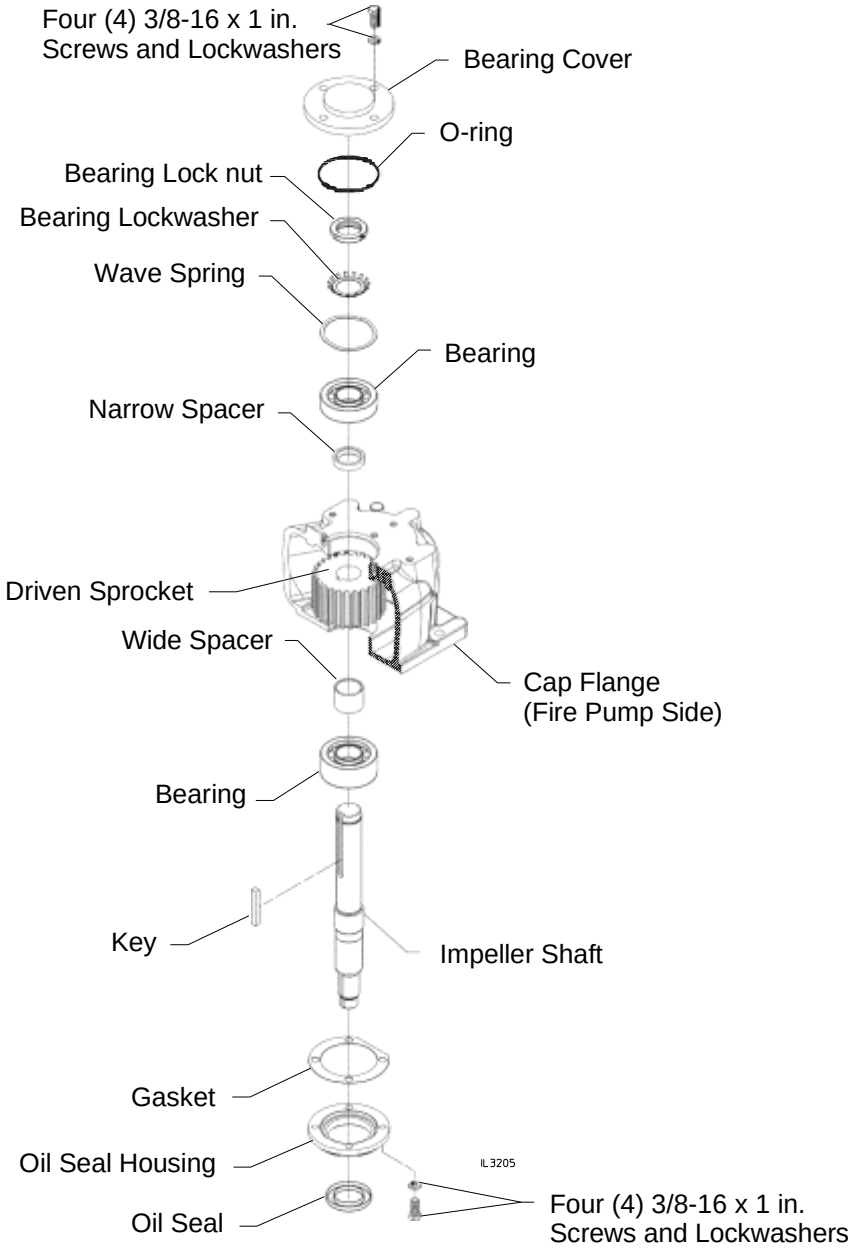


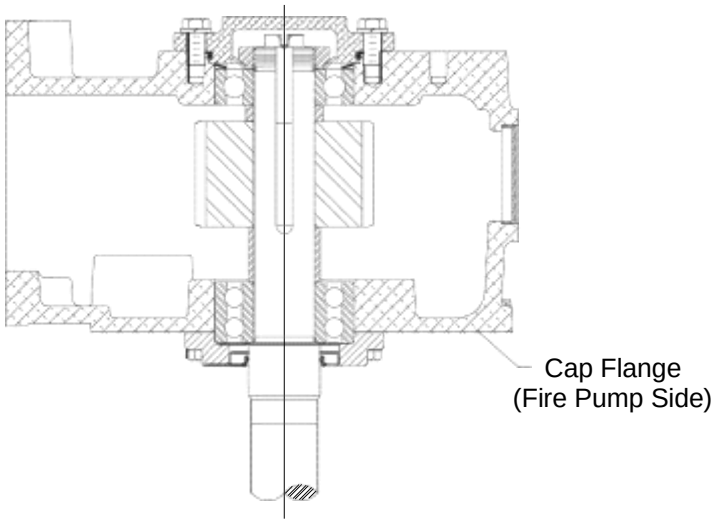
1. Remove the four (4) screws from the bearing cover and the four (4) screws from oil seal housing. Remove cover and housing from cap.
2. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the lock nut, lockwasher and wave spring. **NOTE: To remove nut, tap nut with a punch and hammer.**
3. Under a press, support the assembly on the front cap flange and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the driven shaft.

Disassembly - Disassemble Cap (Continued)

CG and CX Pump Models

Blank Rear or Front Output



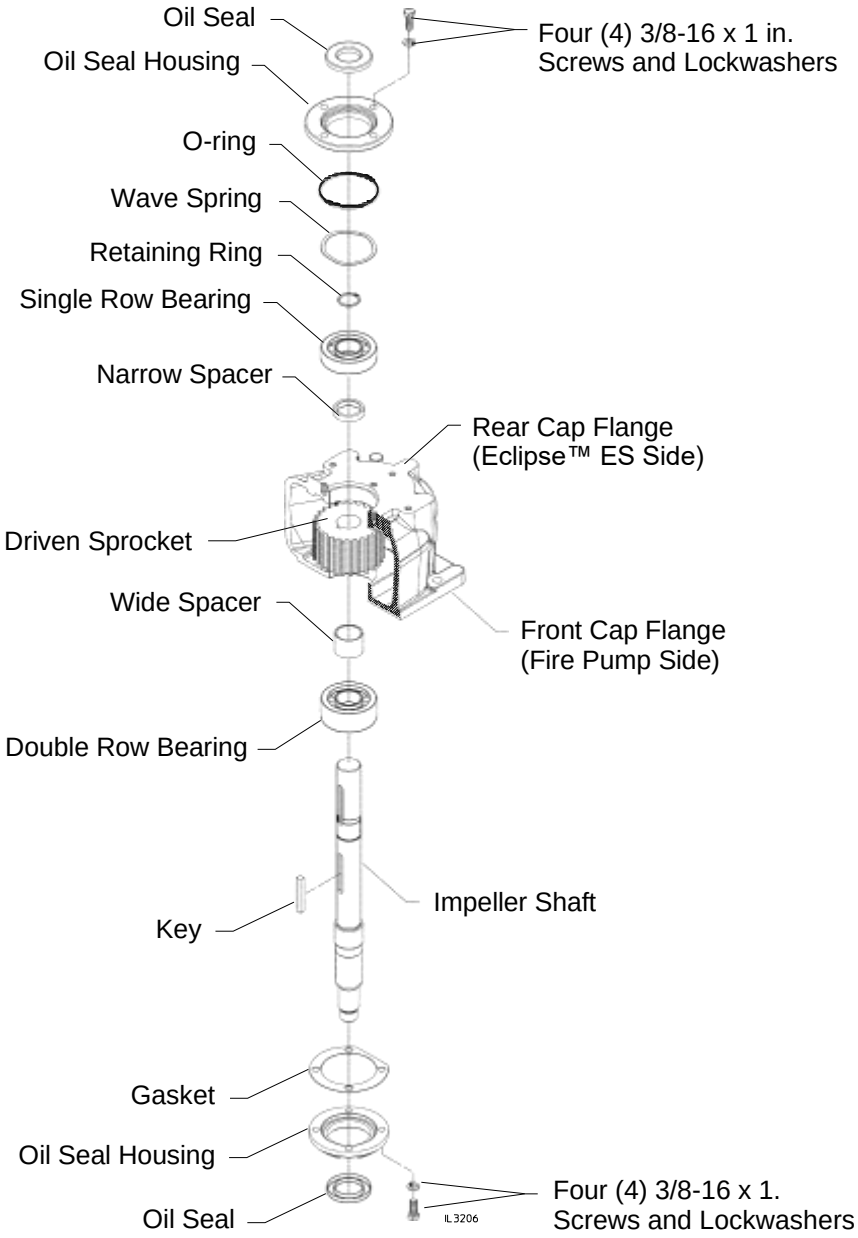


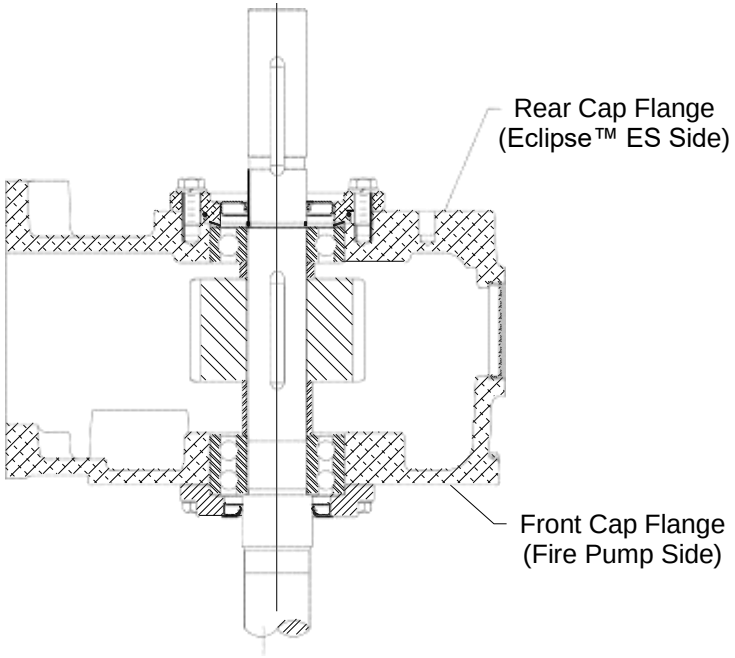
1. Remove the four (4) screws from the bearing cover and the four (4) screws from oil seal housing. Remove cover and housing from cap.
2. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the lock nut, lockwasher and wave spring. **NOTE: To remove nut, tap nut with a punch and hammer.**
3. Under a press, support the assembly on the cap flange (fire pump side) and apply a press load to the end of the impeller shaft to press the shaft out of the ball bearing, spacers and sprockets.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the impeller shaft.

Disassembly - Disassemble Cap (Continued)

CG and CX Pump Models

Eclipse ES CAFS on Rear Output - Disassembly of Cap



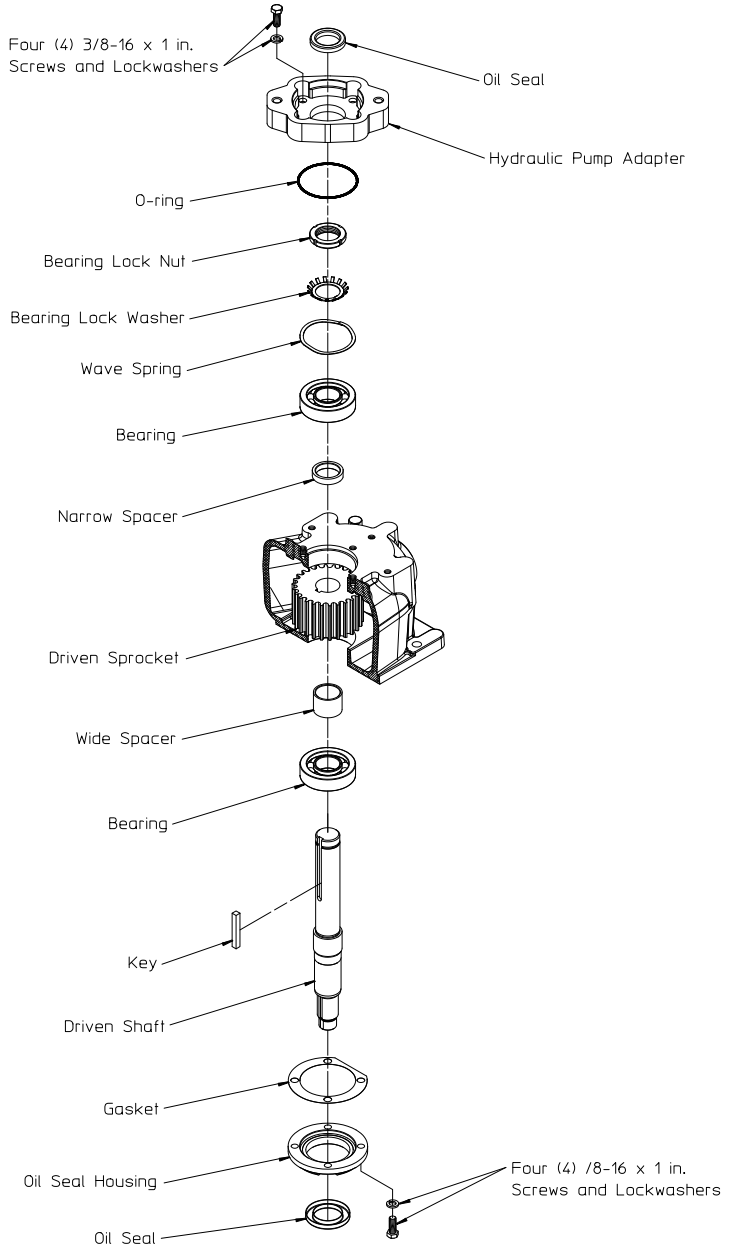


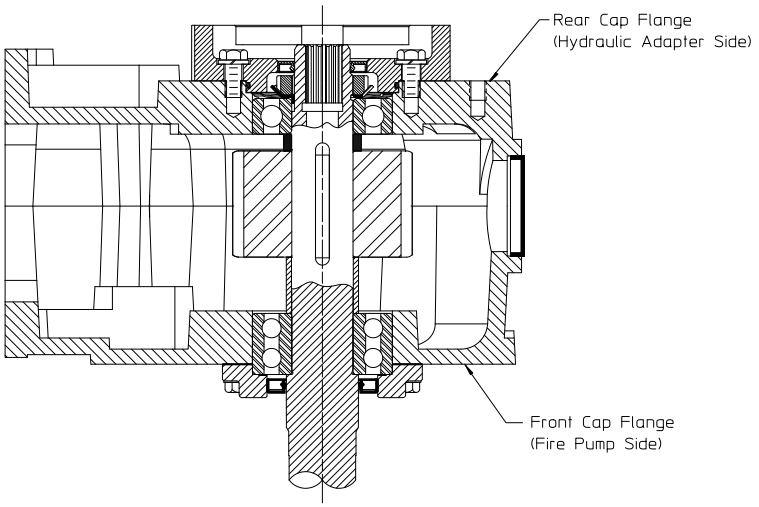
1. Remove the eight (8) screws that fasten the oil seal housings to the cap. Remove housings.
2. Remove the retaining ring and wave spring.
3. Under a press, support the assembly on the front cap flange and apply a press load to the end of the impeller shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the impeller shaft.

Disassembly - Disassemble Cap (Continued)

CX Pump Models

Hydraulic Pump on Rear Output





1. Remove the four (4) screws from the hydrulic pump adapter and the four (4) screws from the oil seal housing. Remove adapter and housing from cap.
2. Remove the bearing lock nut, bearing lock washer and wave spring.
3. Under a press, support the assembly on the front cap flange and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the driven shaft.

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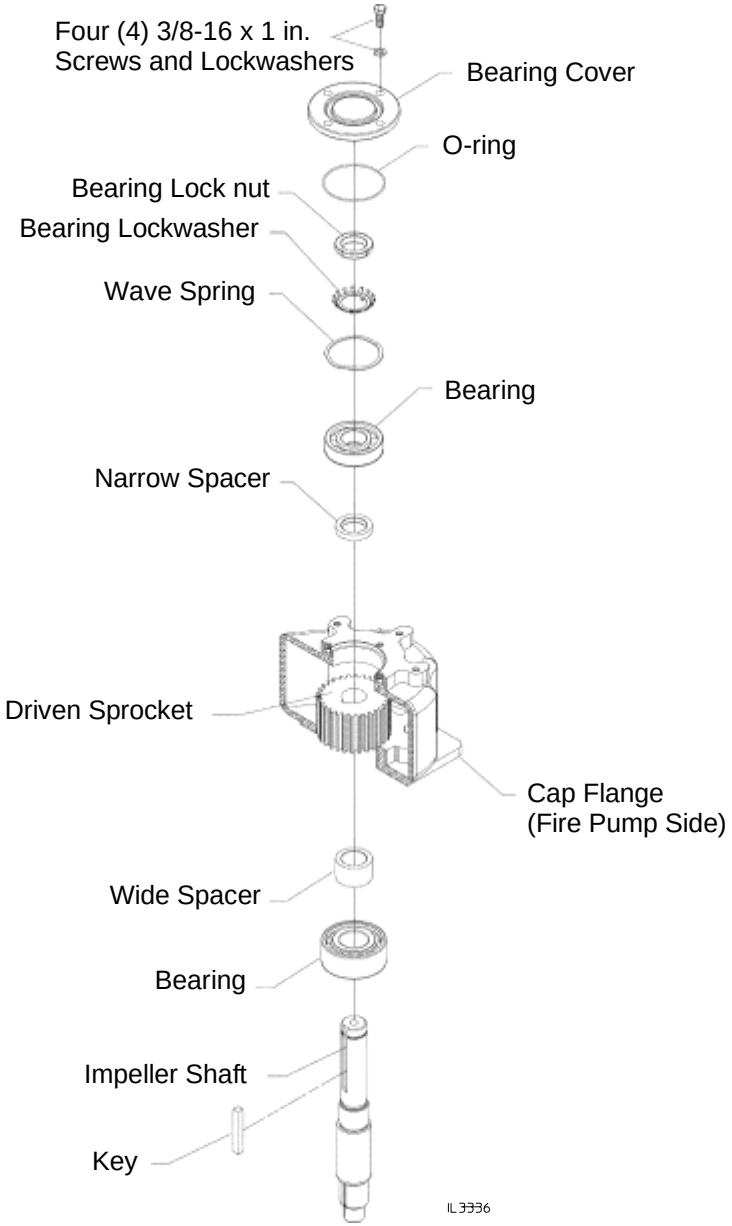
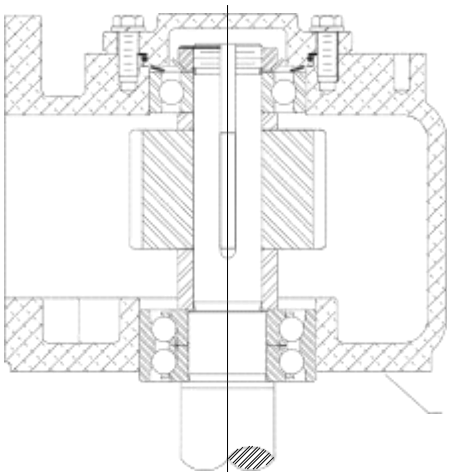
Disassembly - Disassemble Cap (Continued)

S100 Pump Models

Blank Rear or Front Output



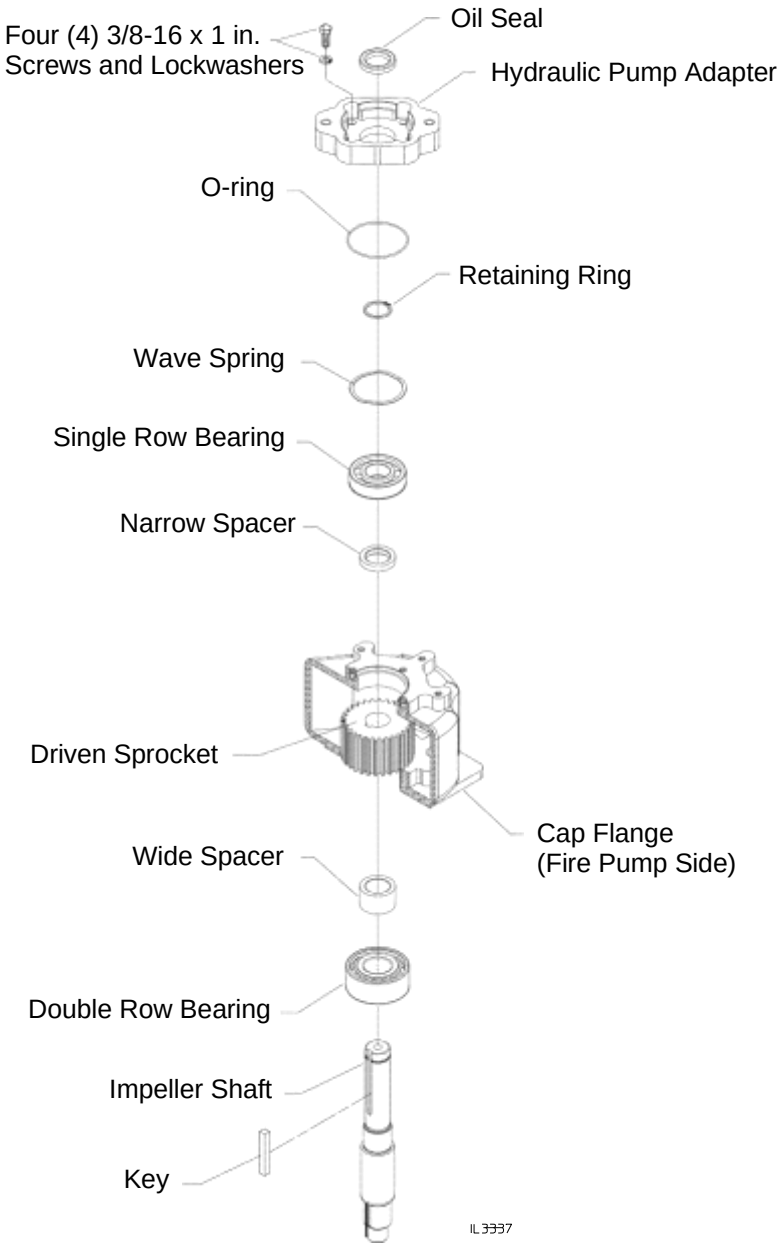


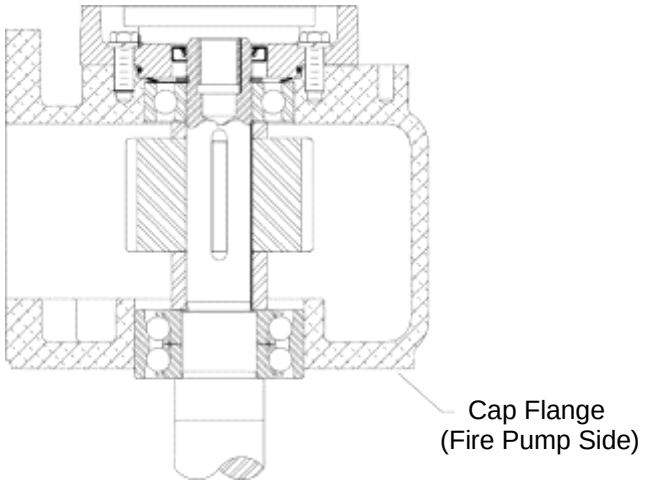
1. Remove the four (4) screws that fasten the bearing cover to the cap.
2. Straighten tab of the bearing lockwasher from slot in bearing lock nut and then remove the lock nut, lockwasher and wave spring. **NOTE: To remove nut, tap nut with a punch and hammer.**
3. Under a press, support the assembly on the cap flange (fire pump side) and apply a press load to the end of the impeller shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket.
5. Remove bearing and spacer from the impeller shaft.

Disassembly - Disassemble Cap (Continued)

S100 Pump Models

Hydraulic Pump on Rear Output



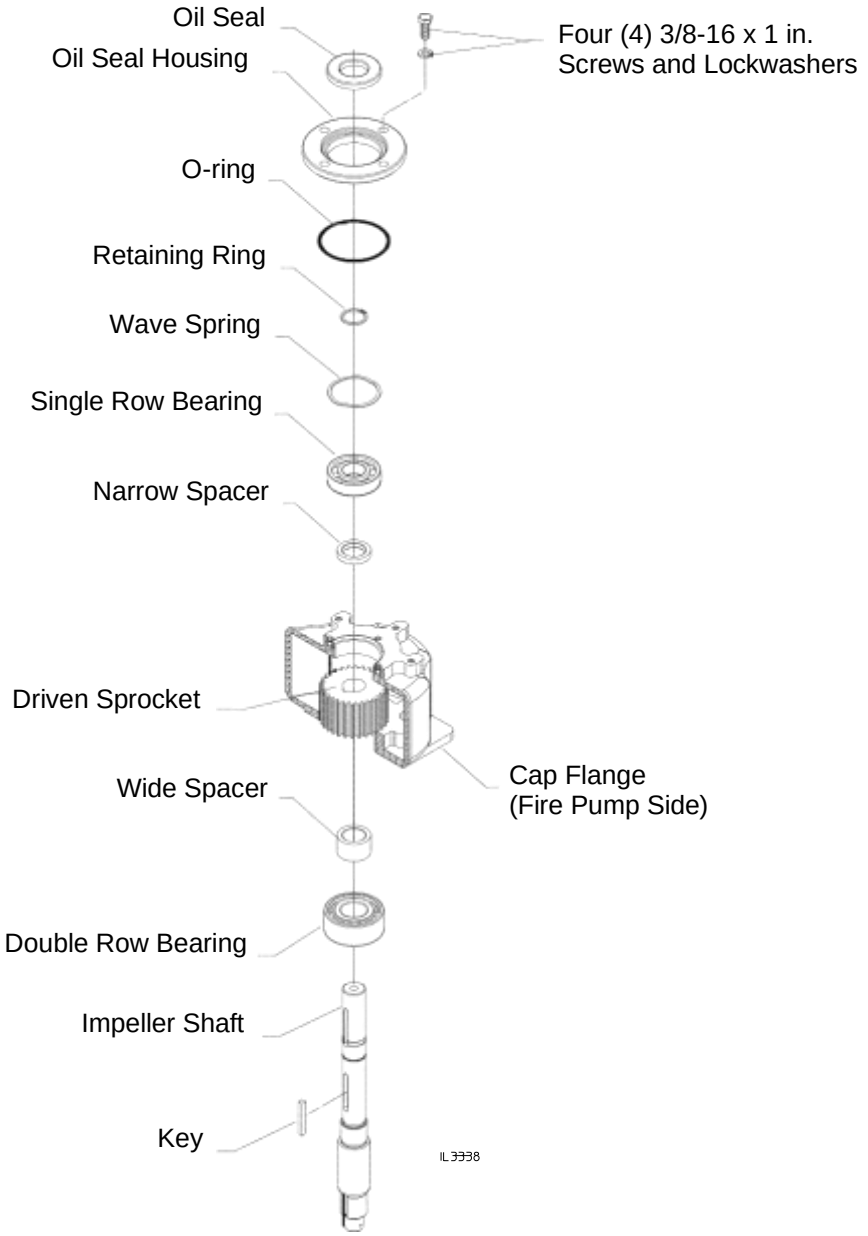


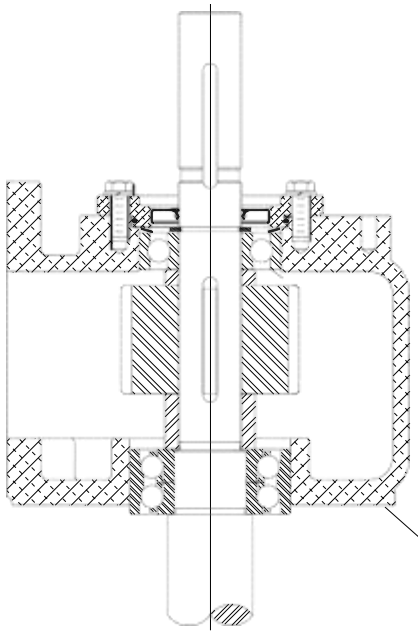
1. Remove the four (4) screws from the hydraulic pump adapter. Remove adapter.
2. Remove the retaining ring and wave spring.
3. Under a press, support the assembly on the cap flange (fire pump side) and apply a press load to the end of the impeller shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the impeller shaft.

Disassembly - Disassemble Cap (Continued)

S100 Pump Models

Eclipse™ ES CAFS on Rear Output





1. Remove the four (4) screws that fasten the oil seal housing to the cap. Remove housing.
2. Remove the retaining ring and wave spring.
3. Under a press, support the assembly on the cap flange (fire pump side) and apply a press load to the end of the driven shaft to press the impeller shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.
5. Remove bearing and spacer from the impeller 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 transmission 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 press-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 ing 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.

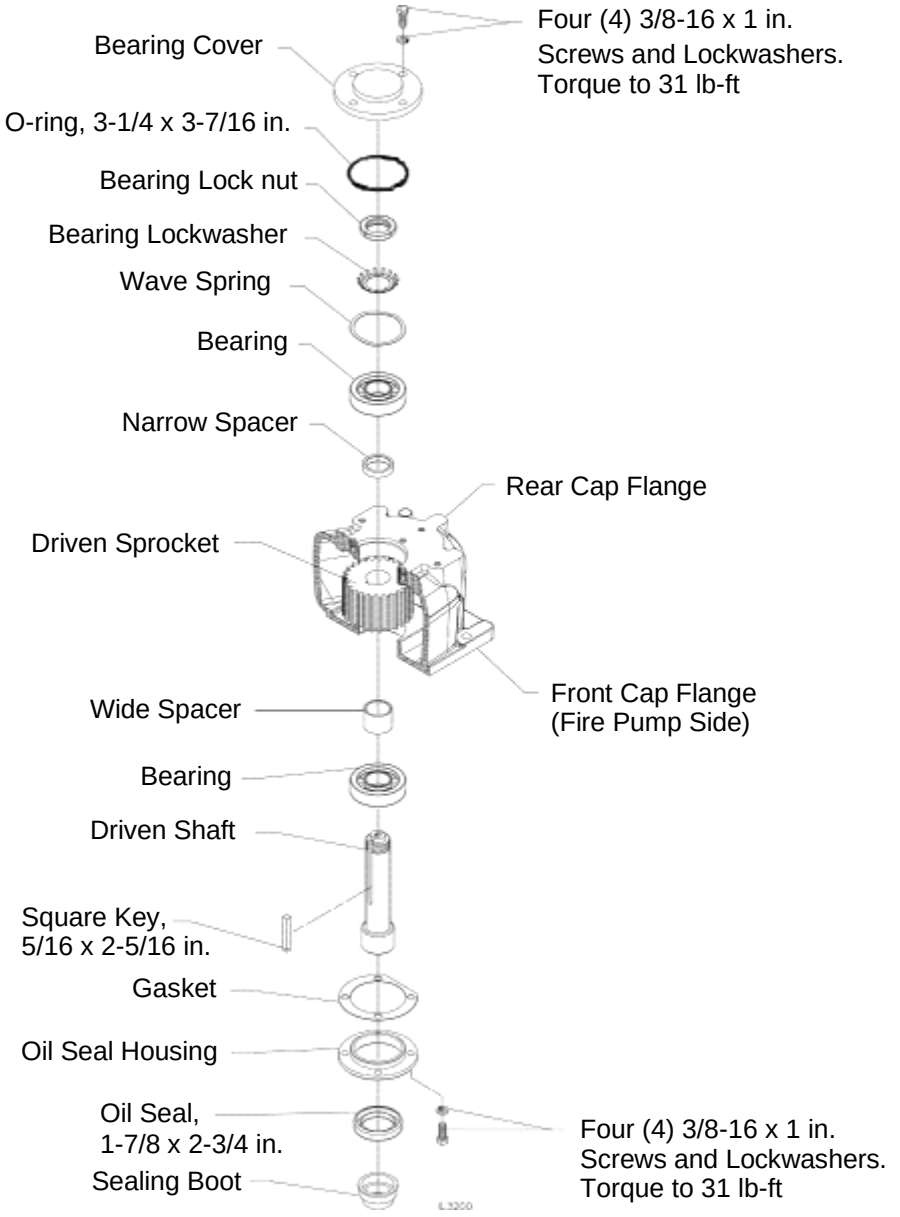
NOTES:

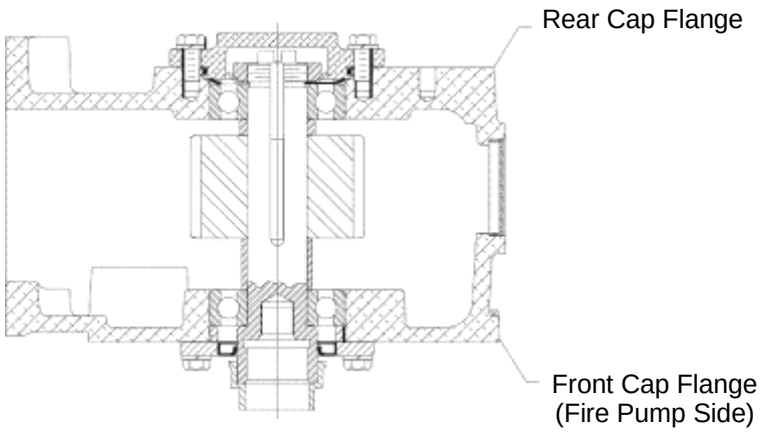
1. Wherever silicone or sealant is referenced, use Loctite Ultra Blue RTV Silicone Sealant or equivalent, unless otherwise specified.
2. Torque hardware to the values specified in the individual reassembly details.

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CM, CMU, CS and CSU Pump Models
Transmission Mounted on Rear of Pump

Blank Rear Output



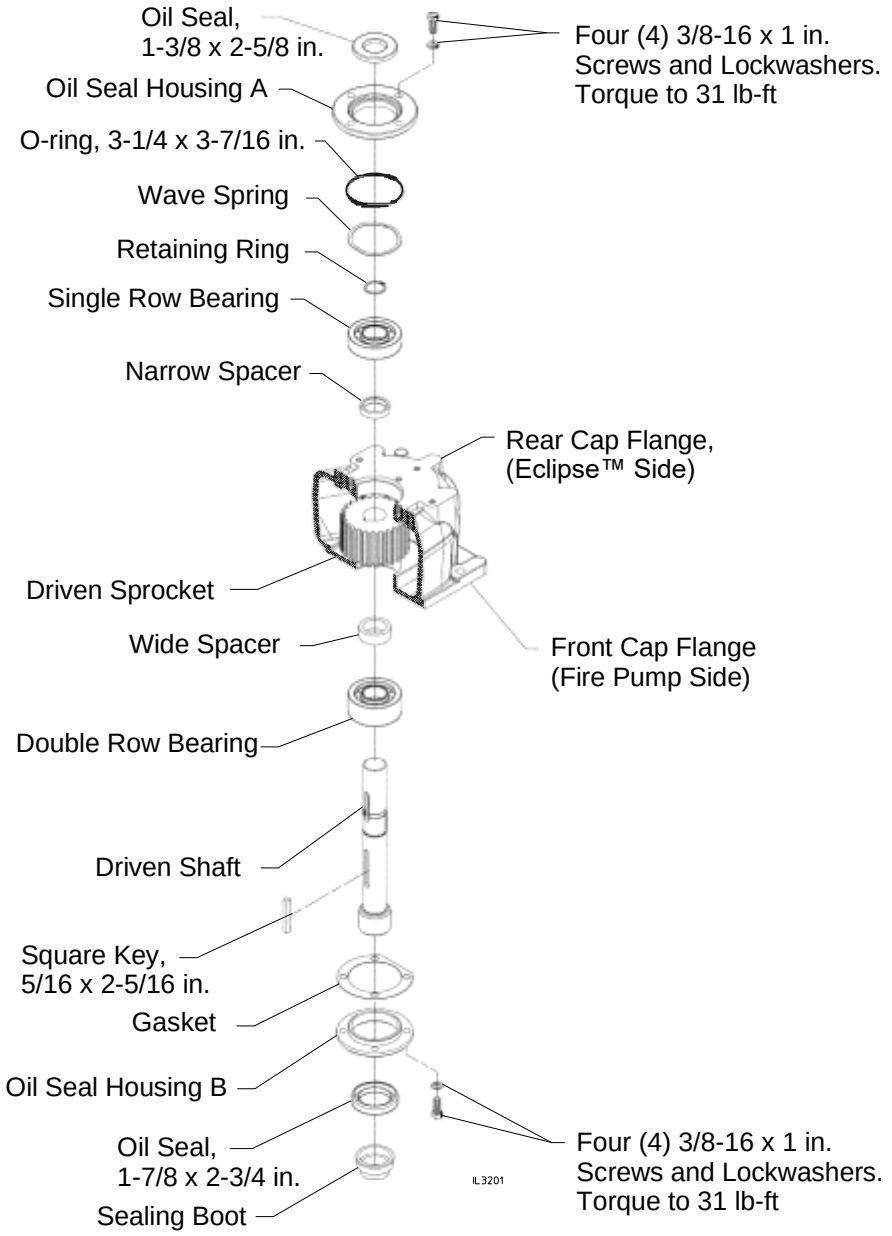


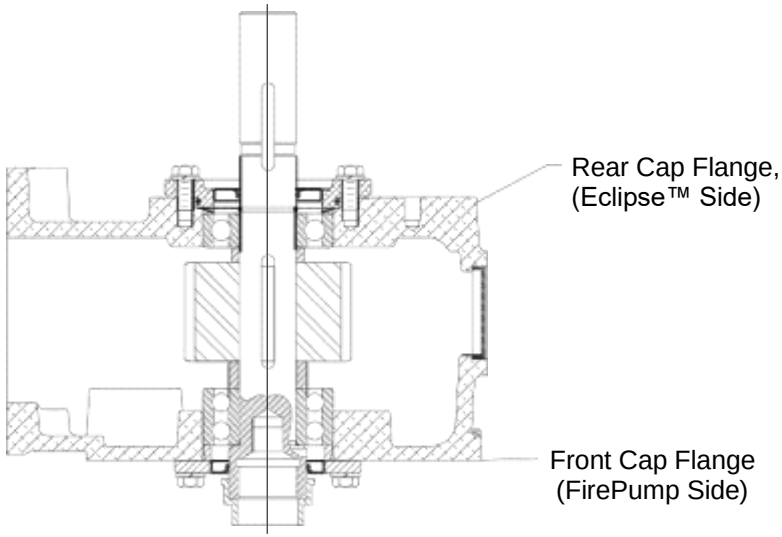
1. Use high pressure grease to coat the driven shaft.
2. Press the ball bearing to the shoulder of the driven shaft.
3. Install wide spacer.
4. Tap the key into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set the bearing cover on the rear cap flange and secure with the four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on the rear cap flange, position the narrow spacer and driven sprocket inside the cap.
9. Take the driven shaft, ball bearing, spacer and key assembled previously and slide the shaft through the bore in the front cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
10. Tap into place until the shaft seats.
11. Install gasket and oil seal in the oil seal housing.
12. Install oil seal housing.
13. Remove the bearing cover and install the O-ring, bearing lock washer and lock nut. Make sure the tang of the washer aligns with the keyway in the shaft.
14. 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.
15. Tap lock nut end of driven shaft towards oil seal housing to seat assembly.
16. Install wave spring and bearing cover.
17. Install sealing boot.

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CM, CMU, CS and CSU Pump Models

Eclipse™ CAFS on Rear Output - Assemble Driven Shaft





1. Use high pressure grease to coat the driven shaft.
2. Press the ball bearing to the shoulder of the driven shaft.
3. Install wide spacer.
4. Tap the key into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set the oil seal housing (A) in cap and secure with the four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on the rear cap flange, position the spacer and driven sprocket inside the cap.
9. Take the driven shaft, ball bearing, spacer and key assembled previously and slide the shaft through the bore in the front cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
10. Tap into place until the shaft seats.
11. Install gasket and oil seal in the oil seal housing (B).
12. Install oil seal housing (B).
13. Remove oil seal housing (A) and install retaining ring
14. Tap end of driven shaft towards oil seal housing (B) to seat assembly.
15. Install wave spring, O-ring and oil seal and install oil seal housing (A) onto cap.
16. Install sealing boot.

Reassembly - Assemble Driven (Impeller) Shaft

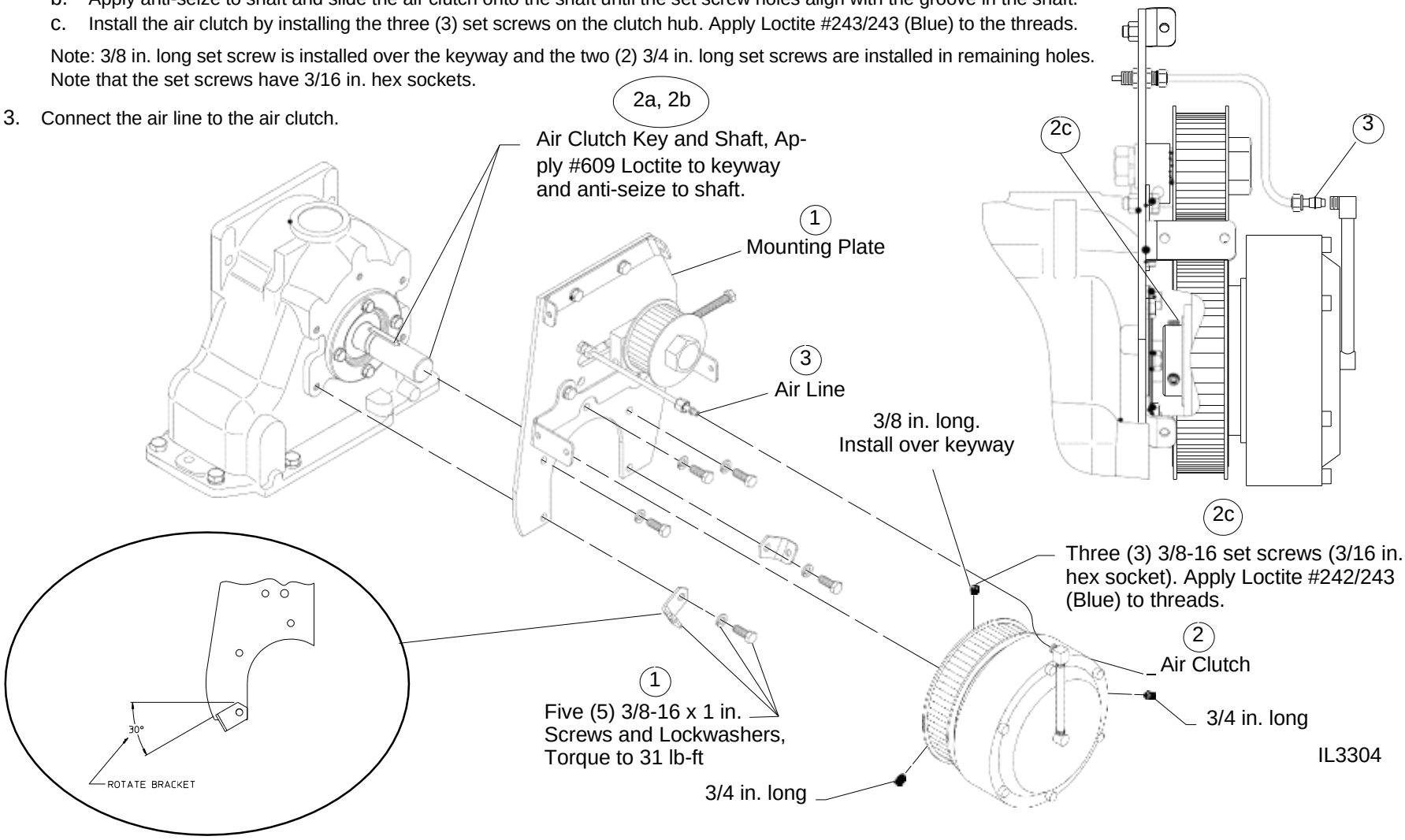
Assemble Cap - CM, CMU, CS and CSU Pump Models

Transmission Mounted on Rear of Pump

Eclipse$_{TM}$ CAFS on Rear Output - Install Air Clutch

1. Install mounting plate on transmission with the five (5) 3/8-16 x 1 in. screws and lockwashers. Note that the two (2) lower screws retain the lower belt cover brackets. Install the brackets per the detail. Torque screws to 31 lb-ft
2. Install the air clutch.
   a. Apply Loctite #609 to keyway in shaft and install the 5/16 x 1-3/4 in. square long key on air clutch key on the shaft.
   b. Apply anti-seize to shaft and slide the air clutch onto the shaft until the set screw holes align with the groove in the shaft.
   c. Install the air clutch by installing the three (3) set screws on the clutch hub. Apply Loctite #243/243 (Blue) to the threads.

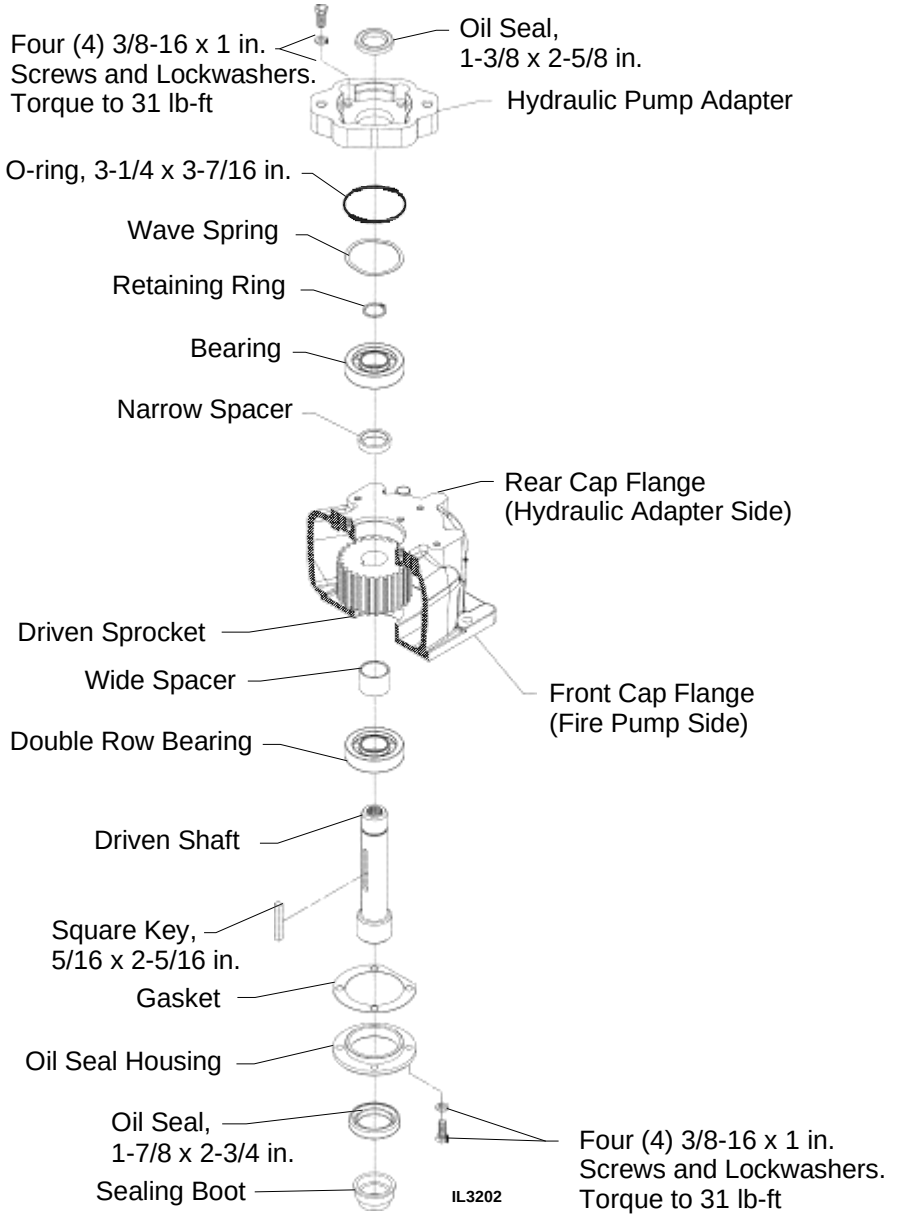
   Note: 3/8 in. long set screw is installed over the keyway and the two (2) 3/4 in. long set screws are installed in remaining holes. Note that the set screws have 3/16 in. hex sockets.
3. Connect the air line to the air clutch.

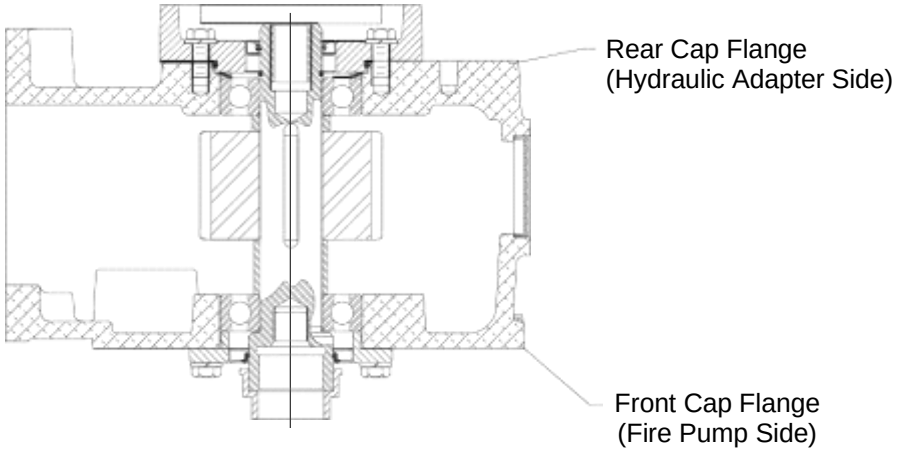


Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CM, CMU, CS and CSU Pump Models
Transmission Mounted on Rear of Pump

Hydraulic Pump on Rear Output



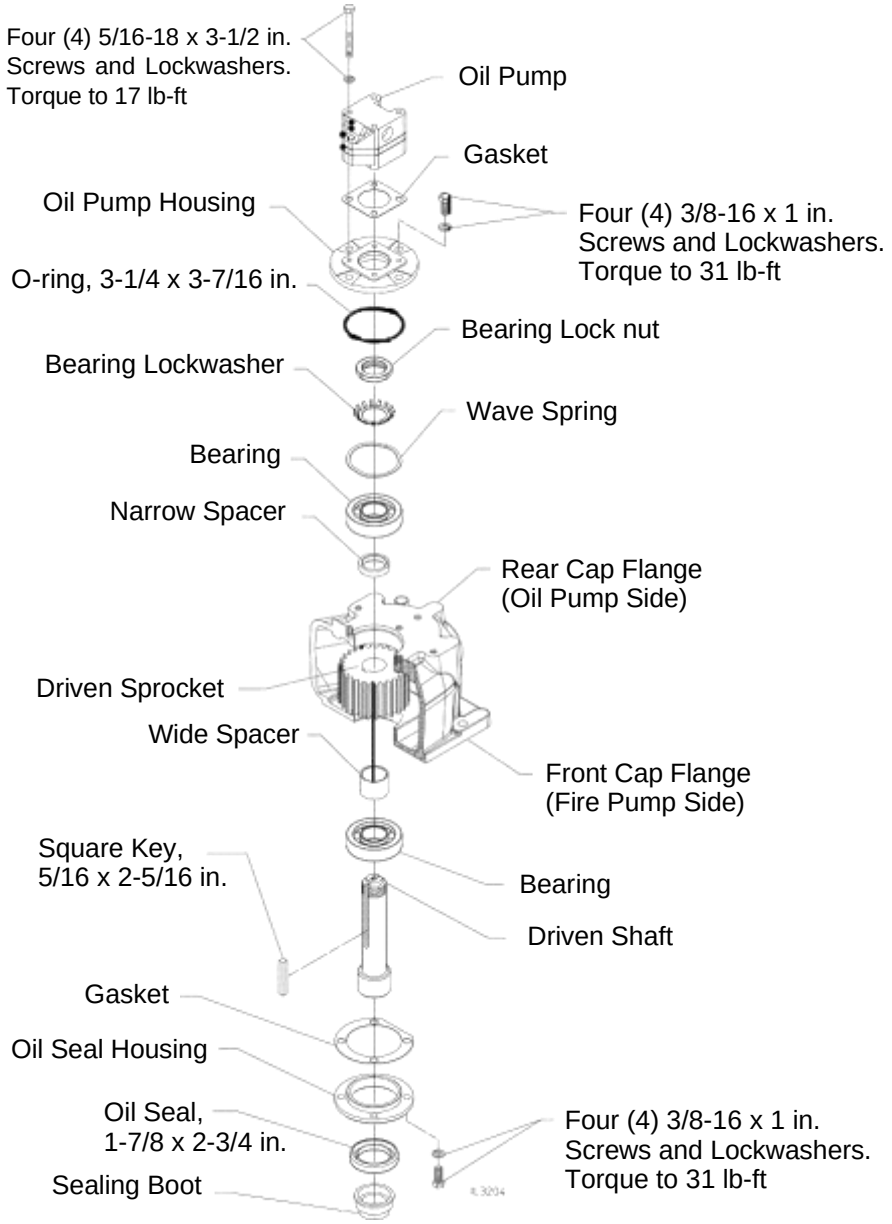


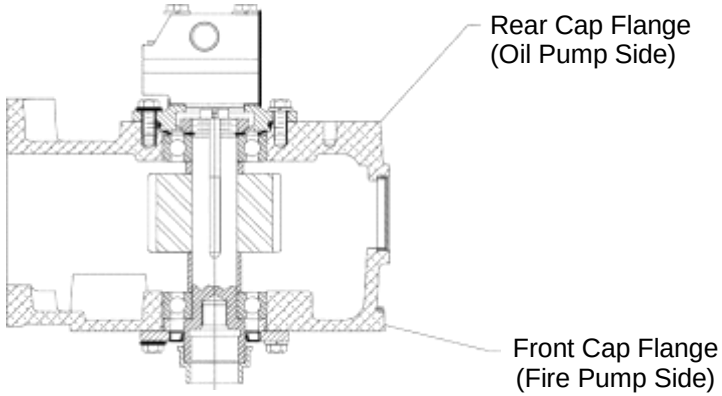
1. Use high pressure grease to coat the driven shaft.
2. Press the ball bearing to the shoulder of driven shaft.
3. Install wide spacer.
4. Tap the key into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set the hydraulic pump adapter on cap and secure with four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on the rear cap flange, position the narrow spacer and driven sprocket inside the cap.
9. Take the driven shaft, ball bearing, spacer and key assembled previously and slide the shaft through the bore in the front cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
10. Tap into place until the shaft seats.
11. Install O-ring and oil seal in the oil seal housing.
12. Install the oil seal housing.
13. Remove the hydraulic pump adapter and install retaining ring.
14. Tap internal splined end of driven shaft towards front face to seat assembly.
15. Install O-ring and oil seal in hydraulic pump adapter.
16. Install wave spring and hydraulic pump adapter.
17. Install sealing boot.

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CM, CMU, CS and CSU Pump Models
Transmission Mounted on Rear of Pump

Oil Cooler Pump on Rear Output





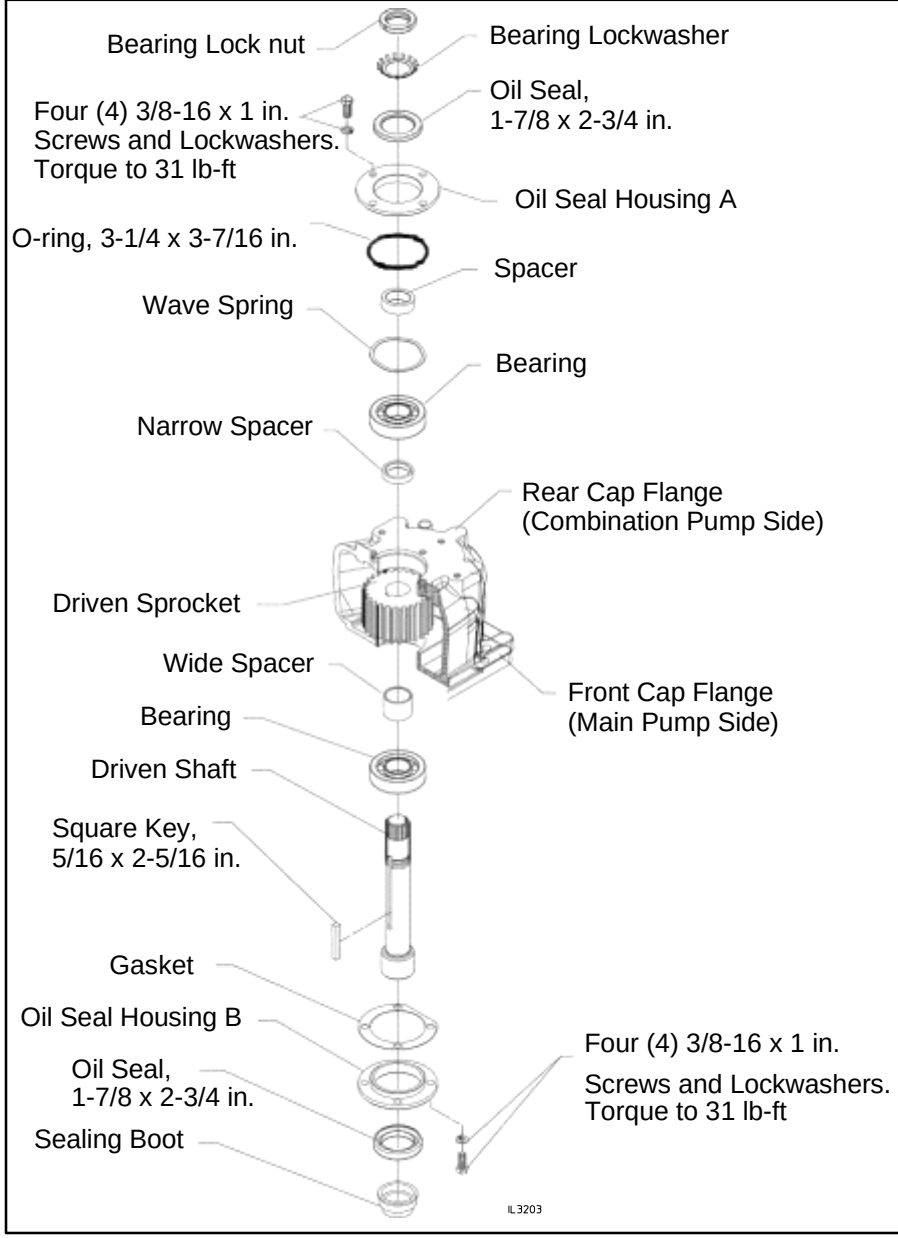
1. Use high pressure grease to coat the driven shaft.
2. Press the ball bearing to the shoulder of driven shaft.
3. Install wide spacer.
4. Tap the key into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set the oil pump housing on cap and secure with four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on its rear face, position the narrow spacer and driven sprocket inside the cap.
9. Take the driven shaft, ball bearing, spacer and key assembled previously and slide the shaft through the bore in the front cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
10. Tap into place until the shaft seats.
11. Install gasket and oil seal in the oil seal housing.
12. Install the oil seal housing.
13. Remove the oil pump adapter and install the bearing lock washer and lock nut. Make sure the tang of the washer aligns with the keyway in the shaft.
14. 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.
15. Tap internal splined end of driven shaft towards front face to seat assembly.
16. Install O-ring in oil pump housing
17. Install wave spring, oil pump housing.

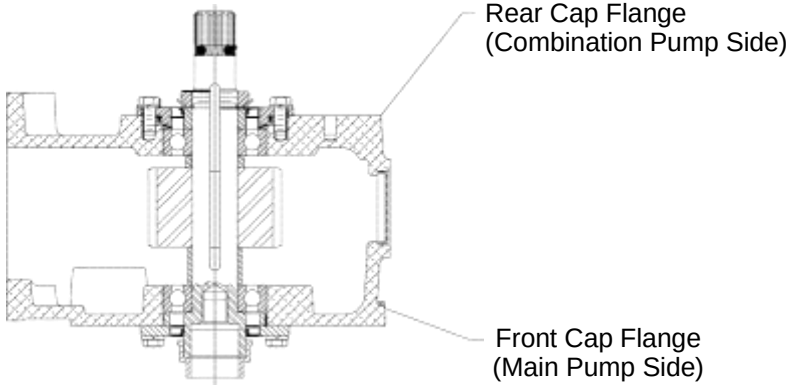
    NOTE: Do not install oil pump until drive line is reassembled.
18. Install oil pump and gasket, aligning the tang on the oil pump with the slot in the driven shaft.
19. Install sealing boot.

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CM, CMU, CS and CSU Pump Models
Transmission Mounted on Rear of Pump

Combination Pump on Rear Output



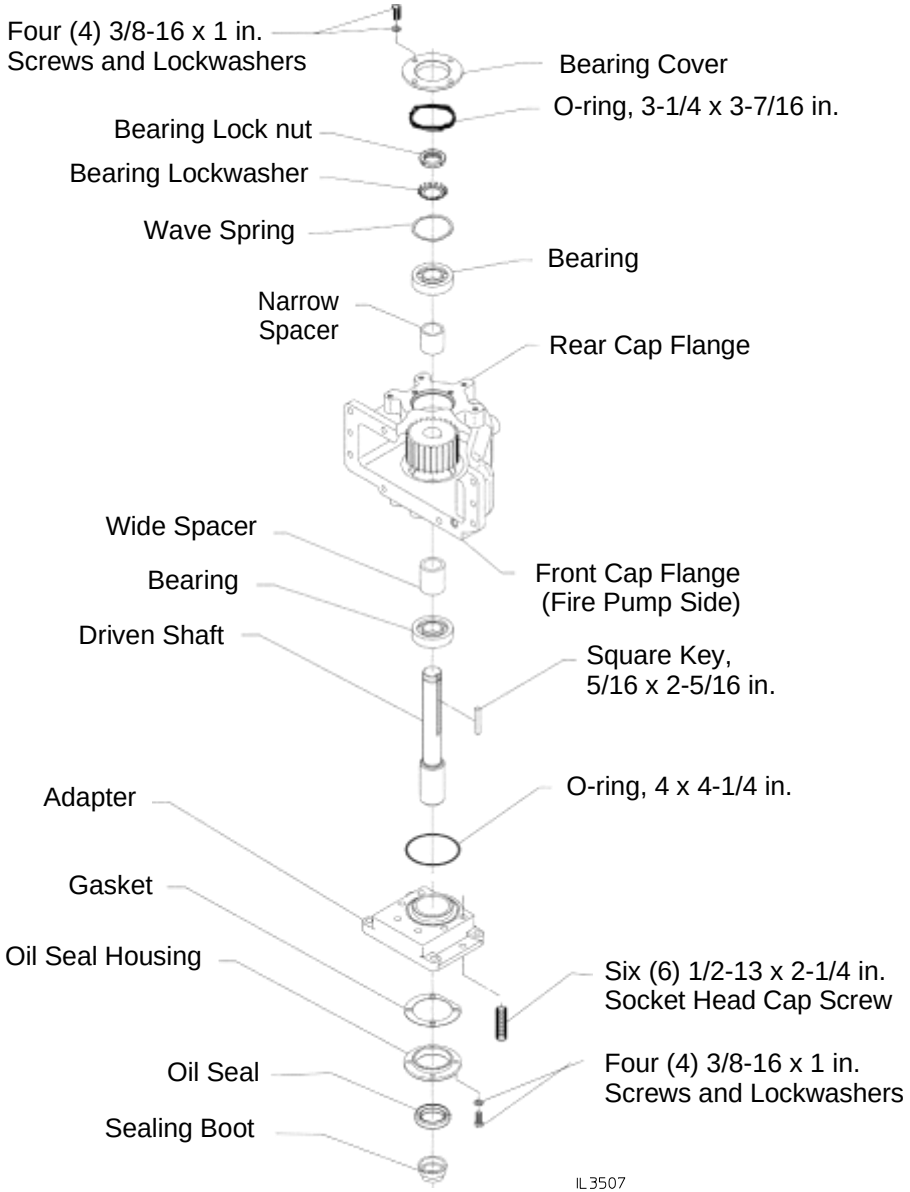


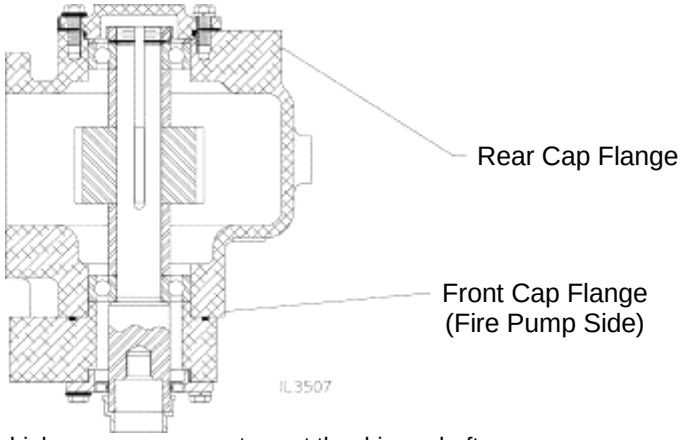
1. Use high pressure grease to coat the driven shaft.
2. Press the ball bearing to the shoulder on the internal spline end of the drive shaft.
3. Install wide spacer.
4. Tap the key into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set oil seal housing (A) on cap and secure with four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on the rear cap flange, position the narrow spacer and driven sprocket inside the cap.
9. Take the driven shaft, ball bearing, spacer and key assembled previously and slide the shaft through the bore in the front cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
10. Tap into place until the shaft seats.
11. Install gasket and oil seal in the oil seal housing (B).
12. Install oil seal housing (B).
13. Remove oil seal housing (A) and install oil seal.
14. Install wave spring, O-ring and and install oil seal housing (A) onto cap.
15. Reapply high pressure grease to coat the driven shaft and apply light oil on the oil seal lip and oil seal sleeve O.D.
16. Install oil seal sleeve onto shaft.
17. Install bearing lock washer and lock nut. Make sure the tang of the washer aligns with the keyway in the shaft.
18. 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.
19. Tap end of driven shaft towards oil seal housing (B) to seat assembly.
20. Install sealing boot.

Disassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CM, CMU, CS and CSU Pump Models
Transmission Mounted on Front of Pump

Blank Front Output



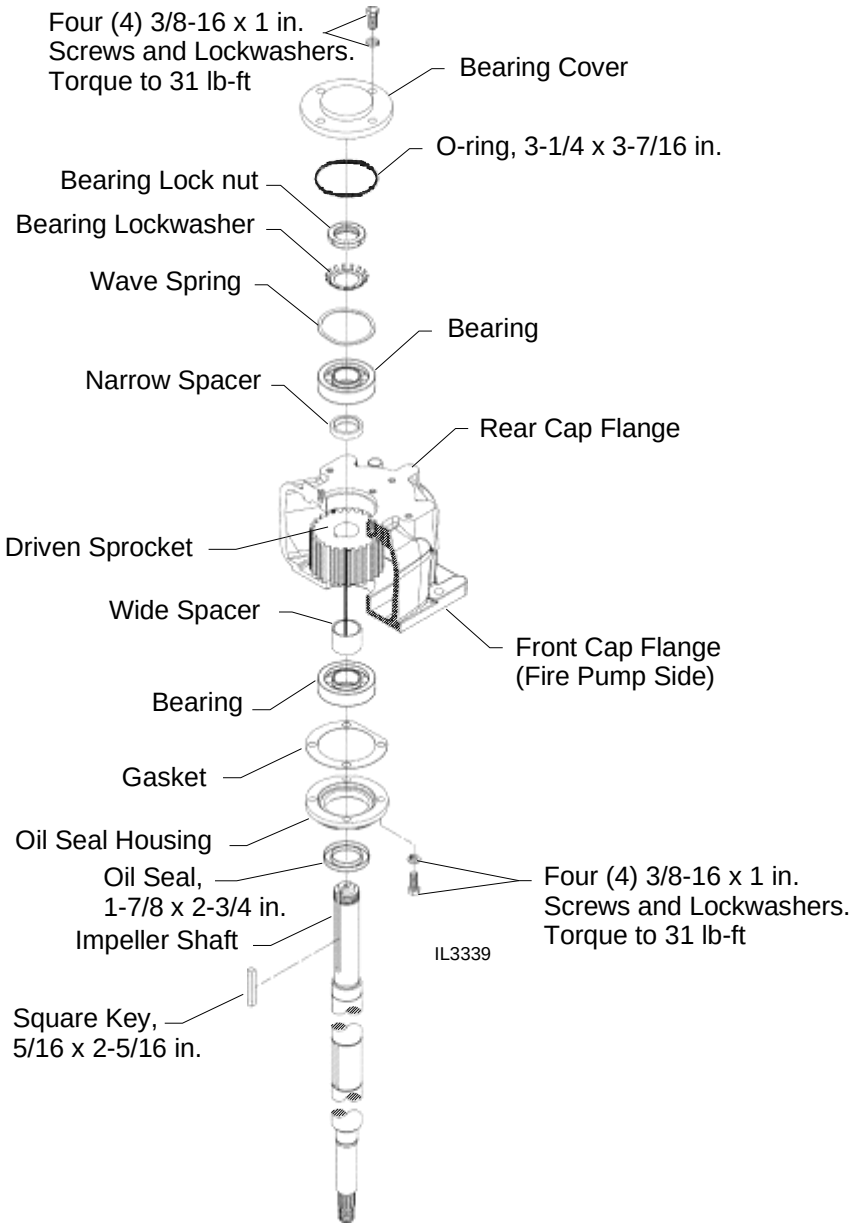


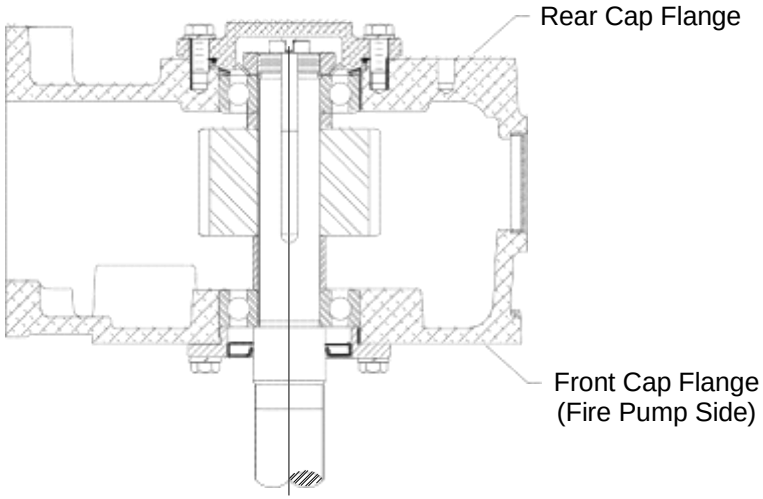
1. Use high pressure grease to coat the driven shaft.
2. Press the ball bearing to the shoulder of the driven shaft.
3. Install wide spacer on driven shaft.
4. Tap the key into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set the bearing cover on the rear cap flange and secure with the four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on the rear cap flange, install the adapter to the cap using six socket head cap screws. **Note: Apply Loctite #242 (Blue) to threads of the socket head cap screws before installing.**
9. With the cap still resting on the rear cap flange, position the narrow spacer and driven sprocket inside the cap.
10. Take the driven shaft, ball bearing, spacer and key assembled previously and slide the shaft through the bore in the front cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the key-way in the sprocket.
11. Tap into place until the shaft seats.
12. Install gasket and oil seal in the oil seal housing.
13. Install oil seal housing.
14. Remove the bearing cover and install the O-ring, bearing lock washer and lock nut. Make sure that the tang of the washer aligns with the keyway in the shaft.
15. 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.
16. Tap locknut end of driven shaft towards oil seal housing to seat assembly.
17. Install wave spring and bearing cover.
18. Install sealing boot.

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CMH, CMUH, CSH and CSUH Pump Models

Blank Rear Output



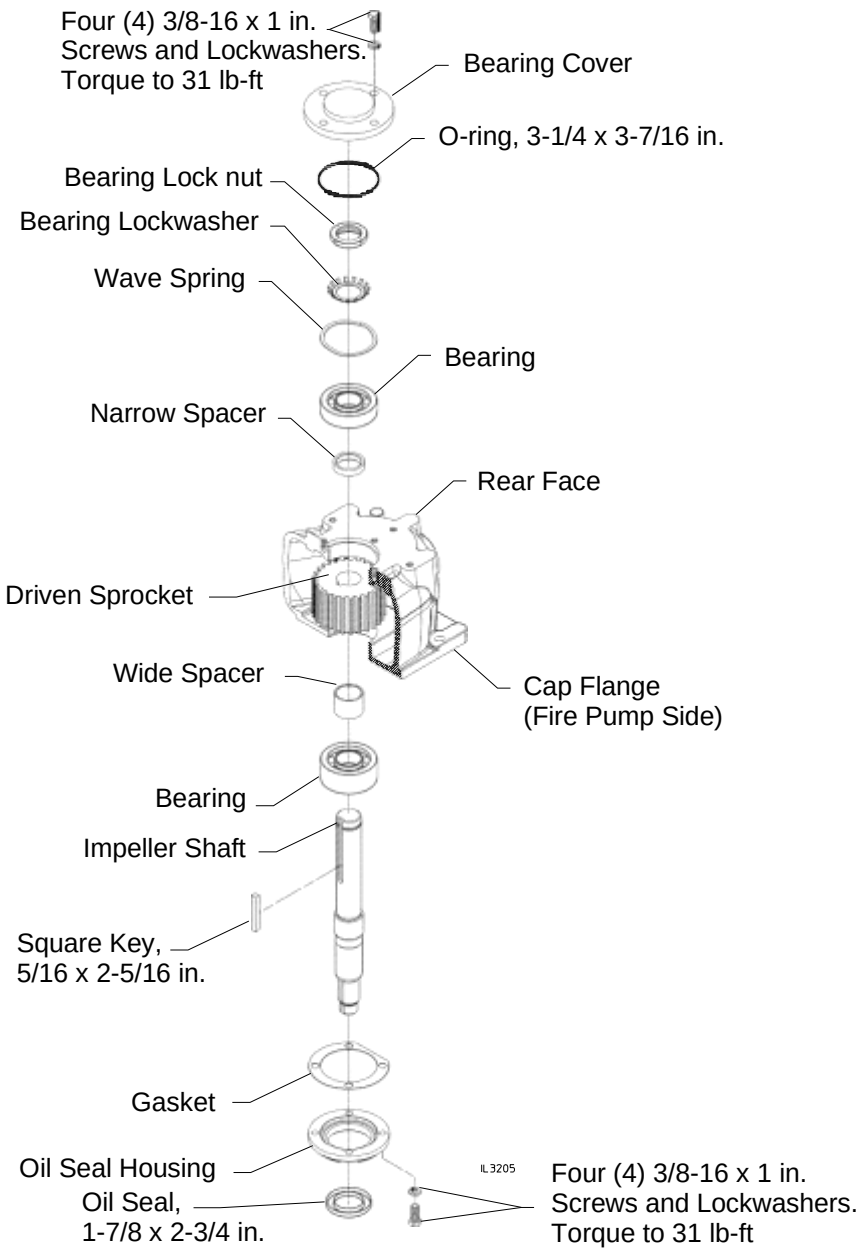


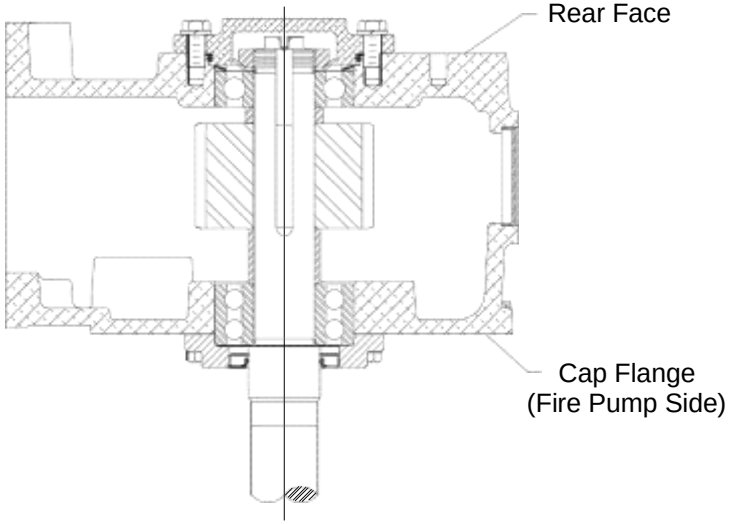
1. Use high pressure grease to coat the impeller shaft.
2. Press the ball bearing to the shoulder of the impeller shaft.
3. Install wide spacer.
4. Tap the key into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set the bearing cover on the rear cap flange and secure with the four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on the rear cap flange, position the narrow spacer and driven sprocket inside the cap.
9. Take the impeller shaft, ball bearing, spacer and key assembled previously and slide the shaft through the bore in the front cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
10. Tap into place until the shaft seats.
11. Install gasket and oil seal in the oil seal housing.
12. Install oil seal housing.
13. Remove the bearing cover and install the O-ring, bearing lock washer and lock nut. Make sure the tang of the washer aligns with the keyway in the shaft.
14. 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.
15. Tap lock nut end of impeller shaft towards oil seal housing to seat assembly.
16. Install wave spring and bearing cover.

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CG and CX Pump Models

Blank Rear or Front Output



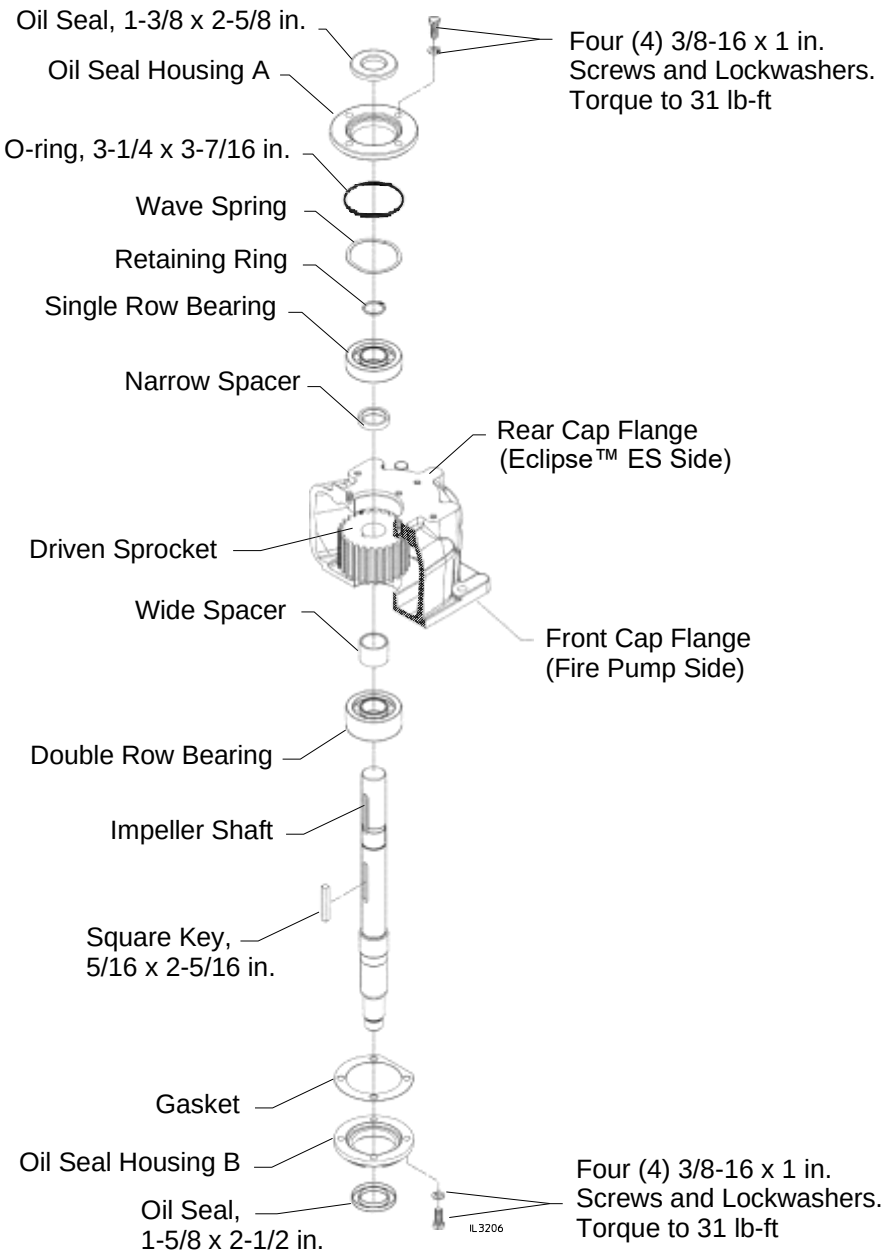


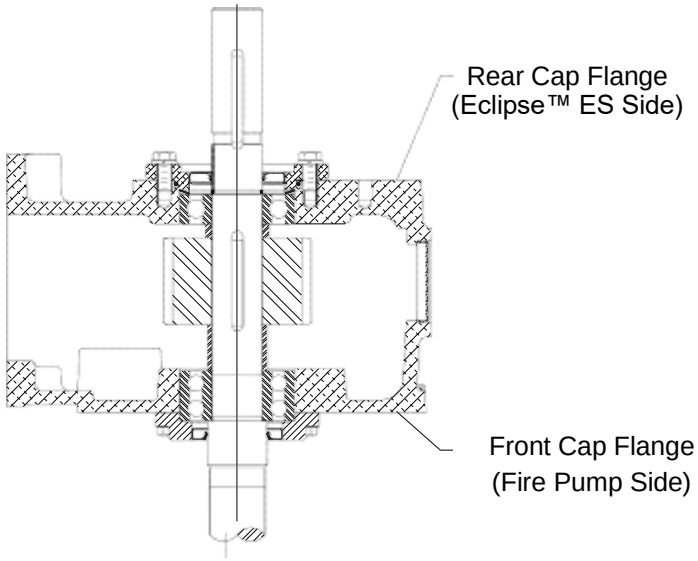
1. Use high pressure grease to coat the impeller shaft.
2. Press the double-row ball bearing to the shoulder of the impeller shaft.
3. Install wide spacer.
4. Tap the key into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set the bearing cover on the rear face and secure with the four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on the rear face, position the narrow spacer and driven sprocket inside the cap.
9. Take the impeller shaft, double-row ball bearing, spacer and key assembled previously and slide the shaft through the bore in the cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
10. Tap into place until the shaft seats.
11. Install gasket and oil seal in the oil seal housing.
12. Install oil seal housing.
13. Remove the bearing cover and install the O-ring, bearing lock washer and lock nut. Make sure the tang of the washer aligns with the keyway in the shaft.
14. 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.
15. Tap lock nut end of impeller shaft towards oil seal housing to seat assembly.
16. Install wave spring and bearing cover.

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - CG and CX Pump Models

Eclipse$_{TM}$ ES CAFS on Rear Output



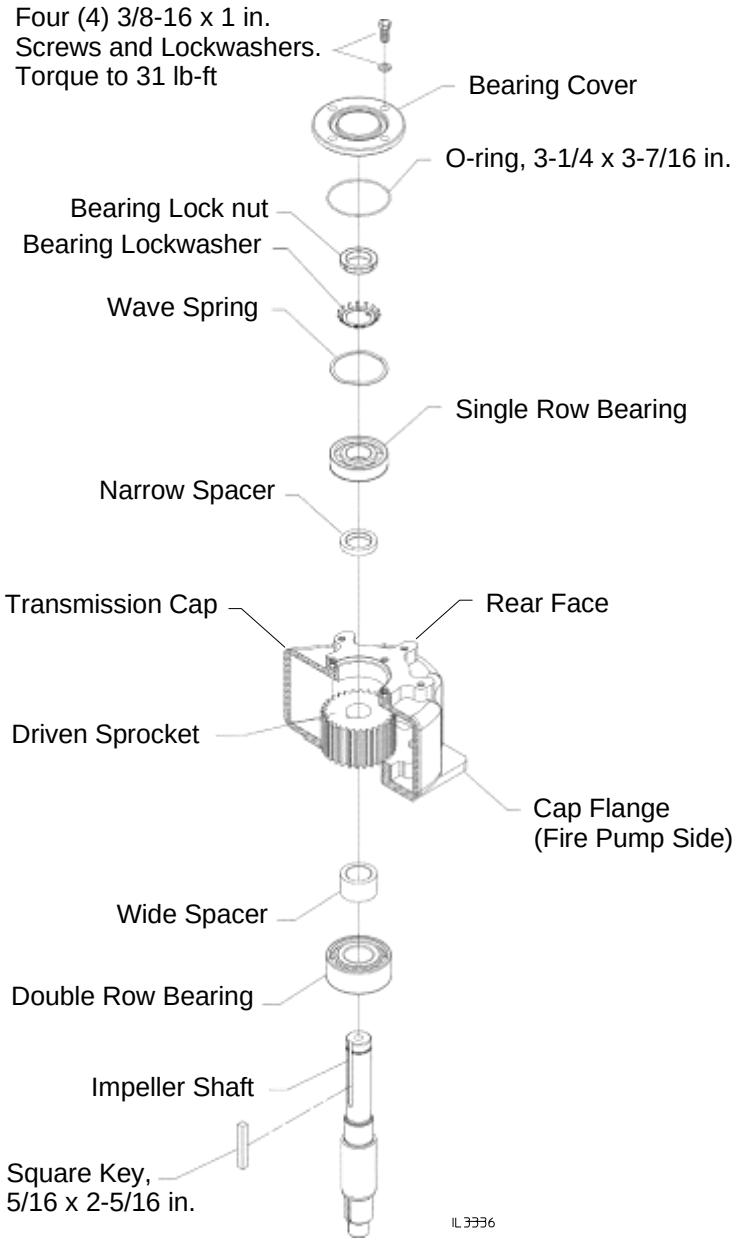


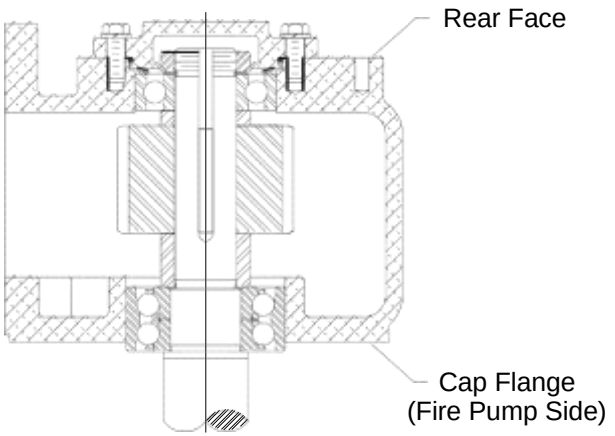
1. Use high pressure grease to coat the impeller shaft.
2. Press the double-row ball bearing to the shoulder of impeller shaft.
3. Install wide spacer.
4. Tap the key for the driven sprocket into place.
5. Place high pressure grease in the rear bore of the cap.
6. Tap the ball bearing into place.
7. Set oil seal housing (A) on the rear cap flange and secure with four screws and lock washers. Hand tighten only at this stage of reassembly.
8. With the cap resting on the rear cap flange, position the narrow spacer and driven sprocket inside the cap.
9. Take the impeller shaft, double-row ball bearing, spacer and key assembled previously and slide the shaft through the bore in the front cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
10. Tap into place until the shaft seats.
11. Install the oil seal in oil seal housing (B).
12. Install the gasket and oil seal housing (B).
13. Remove oil seal housing (A) and install the O-ring and oil seal.
14. Install retaining ring.
15. Tap end of impeller shaft towards oil seal housing (B) to seat assembly.
16. Install wave spring and oil seal housing (A).

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - S100 Pump Models

Blank Rear or Front Output



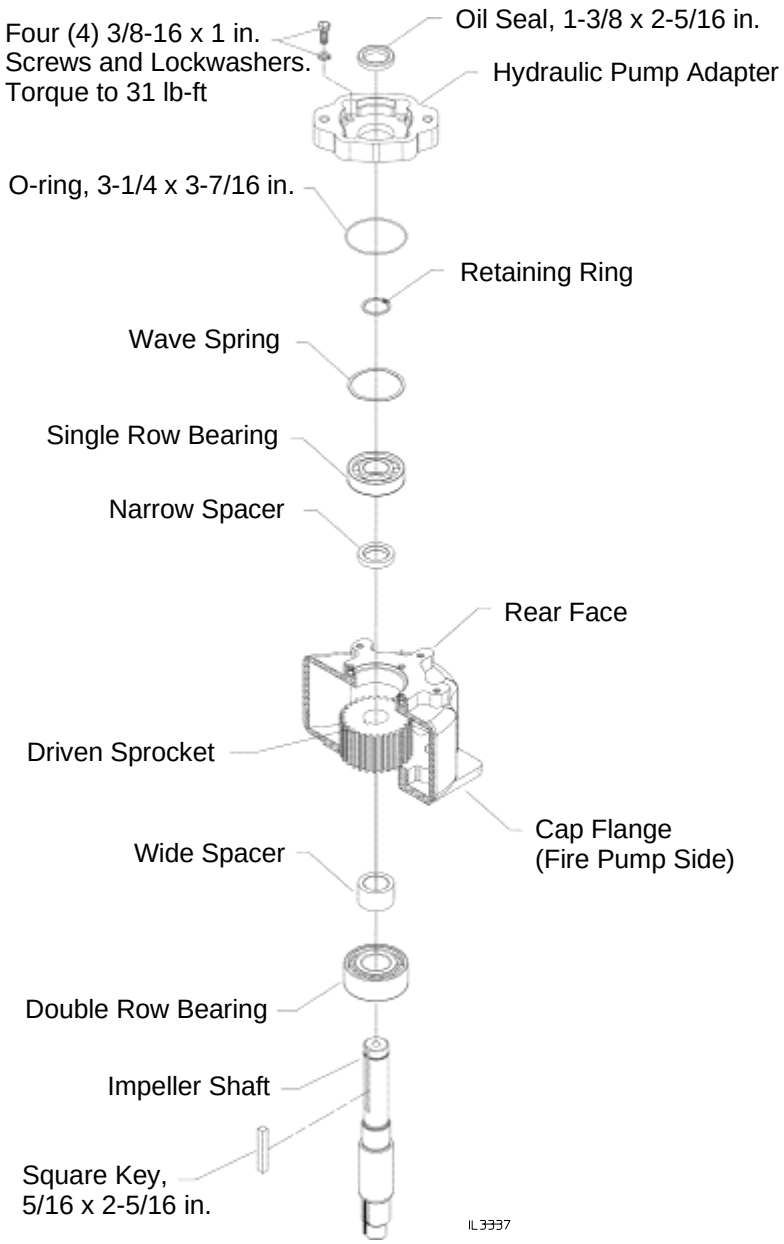


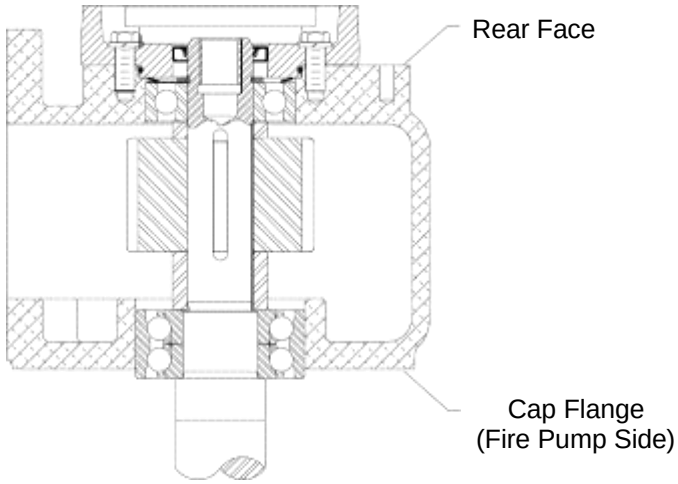
1. Remove the snap ring from the double row ball bearing and discard.
2. Use high pressure grease to coat the impeller shaft.
3. Press the double row bearing onto the shaft.
4. Install the wide spacer next to the bearing.
5. Tap the key into place.
6. Place high pressure grease in the rear bore of the cap.
7. Tap the bearing into place.
8. Set bearing cover on the rear face and secure with four screws and lock washers. Hand tighten only at this stage of reassembly.
9. With the cap resting on its rear face, position the narrow spacer and driven sprocket inside the cap.
10. Take the impeller shaft, double row bearing, spacer and key assembled previously and slide the shaft through the bore in the cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
11. Tap into place until the shaft seats.
12. Remove the bearing cover and install the bearing lock washer and lock nut. 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. Install wave spring and bearing cover.

Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - S100 Pump Models

Hydraulic Pump on Rear Output



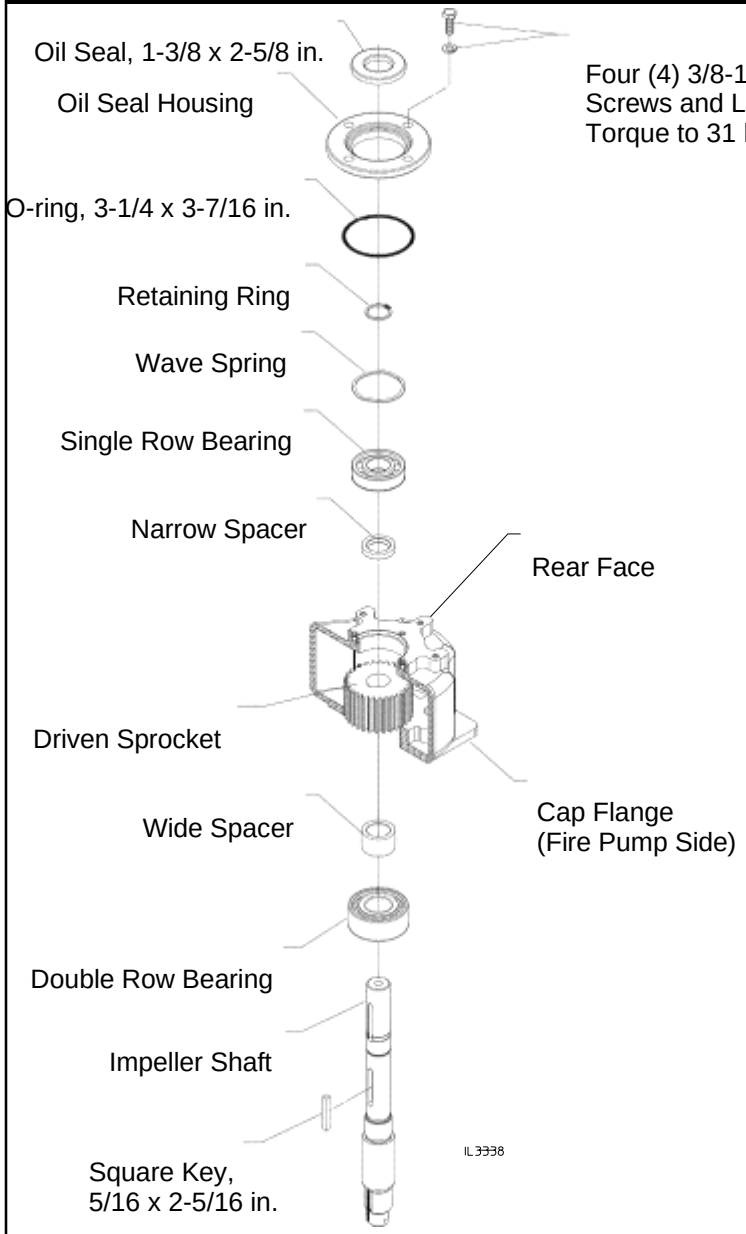


1. Remove the snap ring from the double row ball bearing and discard.
2. Use high pressure grease to coat the impeller shaft.
3. Press the double row bearing onto the shaft.
4. Install the wide spacer next to the bearing.
5. Tap the key into place.
6. Place high pressure grease in the rear bore of the cap.
7. Tap the bearing into place.
8. Set hydraulic pump adapter on the rear face and secure with four screws and lock washers. Hand tighten only at this stage of reassembly.
9. With the cap resting on its rear face, position the narrow spacer and driven sprocket inside the cap.
10. Take the impeller shaft, bearing, spacer and key assembled previously and slide the shaft through the bore in the cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprocket.
11. Tap into place until the shaft seats.
12. Remove the hydraulic pump adapter and install the retaining ring.
13. Install O-ring and oil seal in hydraulic pump adapter.
14. Install wave spring and hydraulic pump adapter.

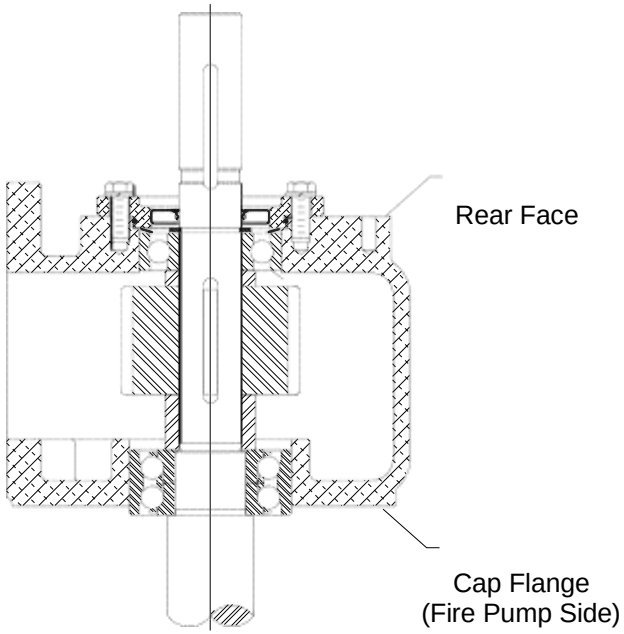
Reassembly - Assemble Driven (Impeller) Shaft

Assemble Cap - S100 Pump Models

Eclipse ES CAFS on Rear Output



Four (4) 3/8-16 x 1 in.
Screws and Lockwashers.
Torque to 31 lb-ft

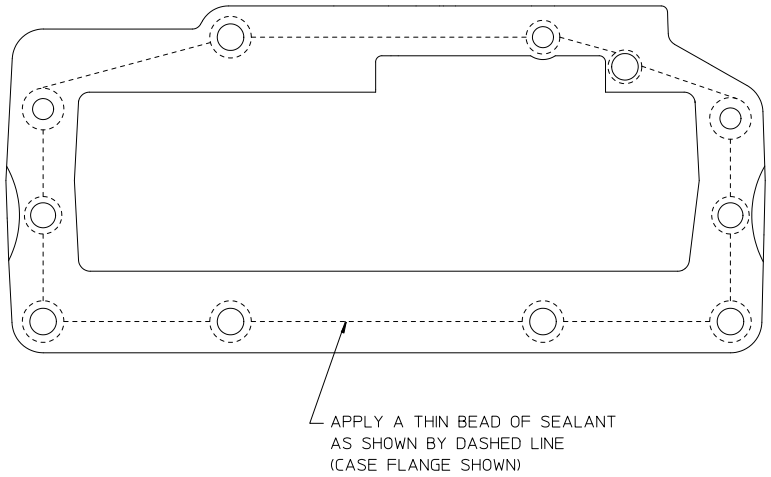


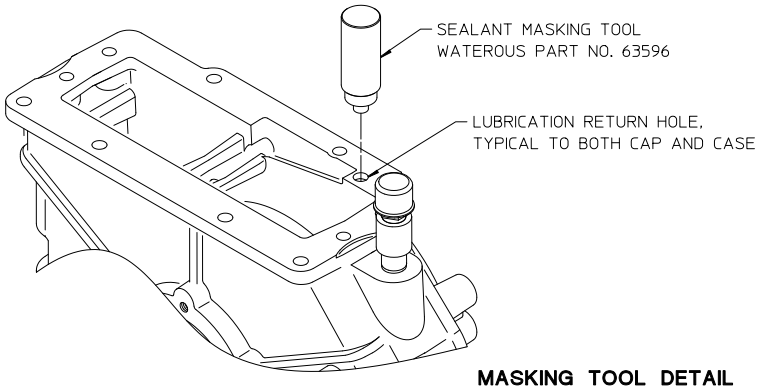
1. Remove the snap ring from double row ball bearing and discard.
2. Use high pressure grease to coat the impeller shaft.
3. Press the double-row ball bearing to the shoulder of impeller shaft.
4. Install wide spacer next to bearing.
5. Tap the key for the driven sprocket into place.
6. Place high pressure grease in the rear bore of the cap.
7. Tap the ball bearing into place.
8. Set the oil seal housing on the rear face and secure with four screws and lock washers. Hand tighten only at this stage of reassembly.
9. With the cap resting on the rear face, position the narrow spacer and driven sprocket in- side the cap.
10. Take the impeller shaft, double-row ball bearing, spacer and key assembled previously and slide the shaft through the bore in the cap flange into the bore of the driven sprocket, narrow spacer and ball bearing lining up the key in the shaft with the keyway in the sprock- et.
11. Tap into place until the shaft seats.
12. Remove the oil seal housing and install the O-ring and oil seal.
13. Install retaining ring.
14. Install wave spring and oil seal housing.

Reassembly - Attach Cap to Case

Apply Sealant to Flanges (All Pump Models)

APPLY LOCTITE® 518 OR EQUIVALENT TO MATING FLANGES AND BETWEEN SHIMS





MASKING TOOL DETAIL

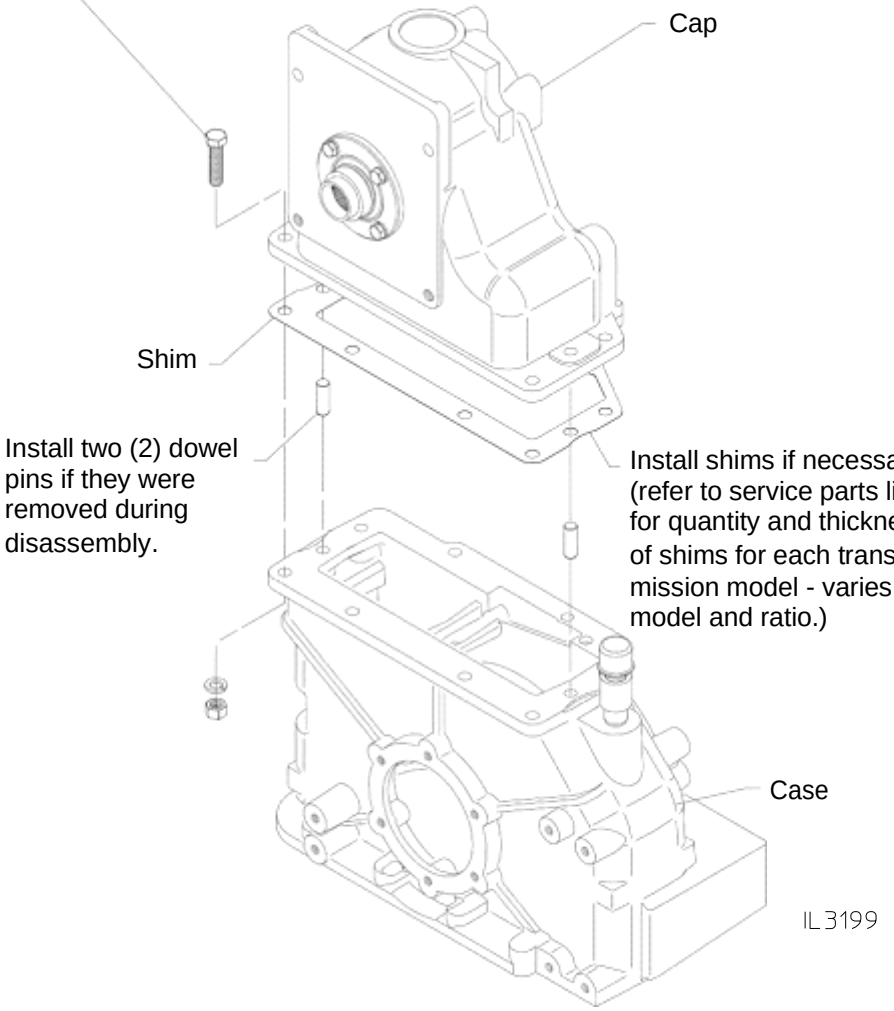
Reassembly - Attach Cap to Case (Continued)

CM, CMU, CS, and CSU Pump Models

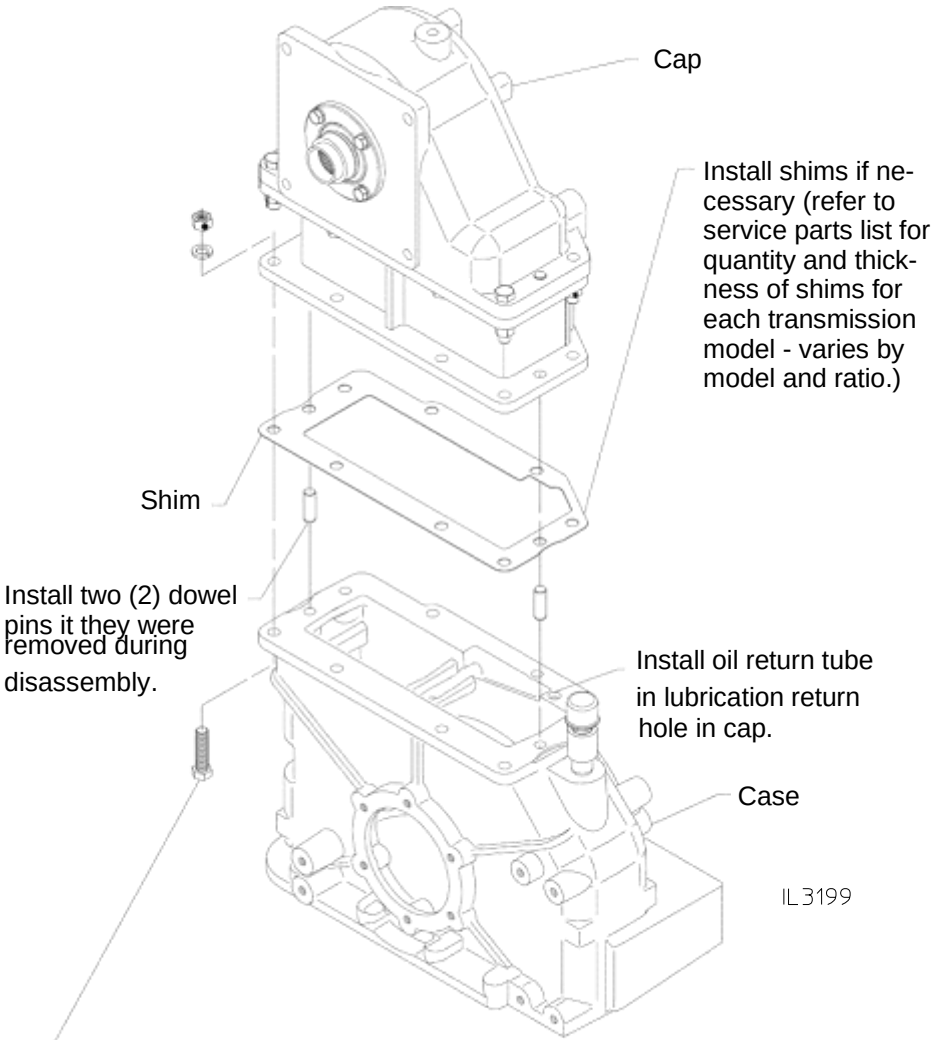
C20B, C20C and C20D Transmission Models

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

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



C20E and C20F Transmission Models



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

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

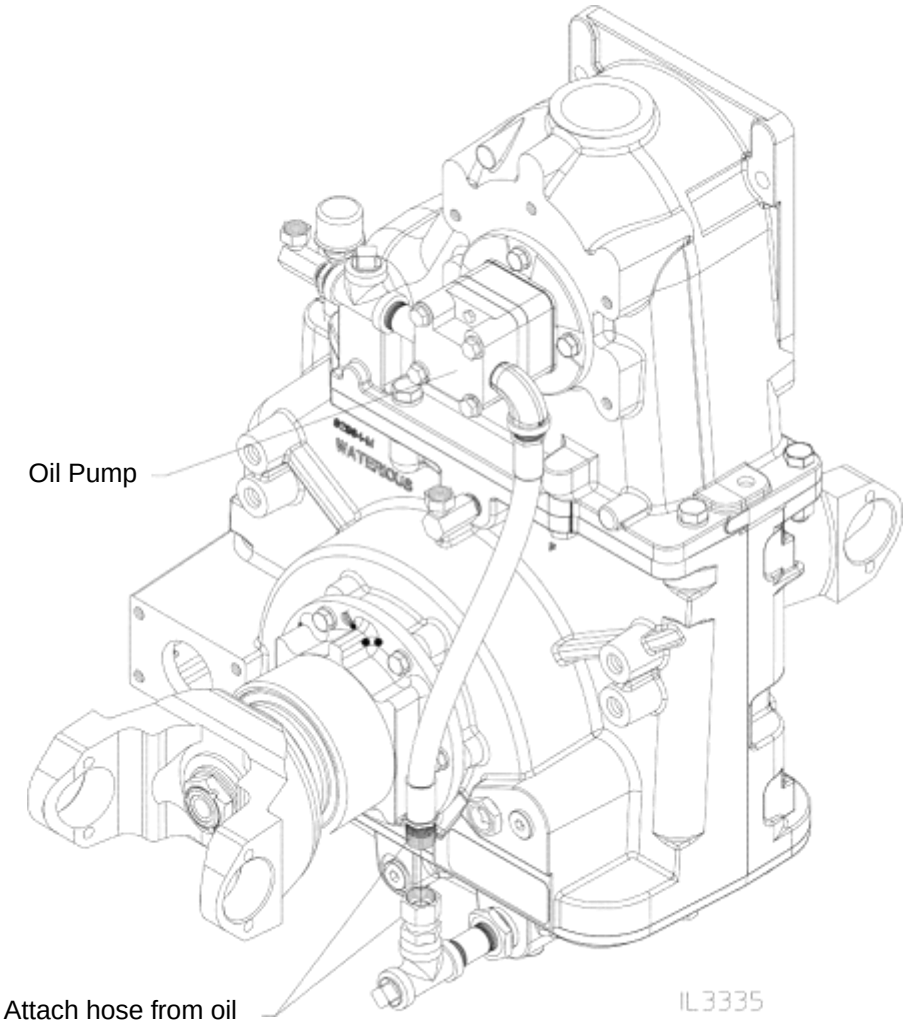
Reassembly - Attach Cap to Case (Continued)

CM, CMU, CS, and CSU Pump Models

Connect Optional Oil Cooler

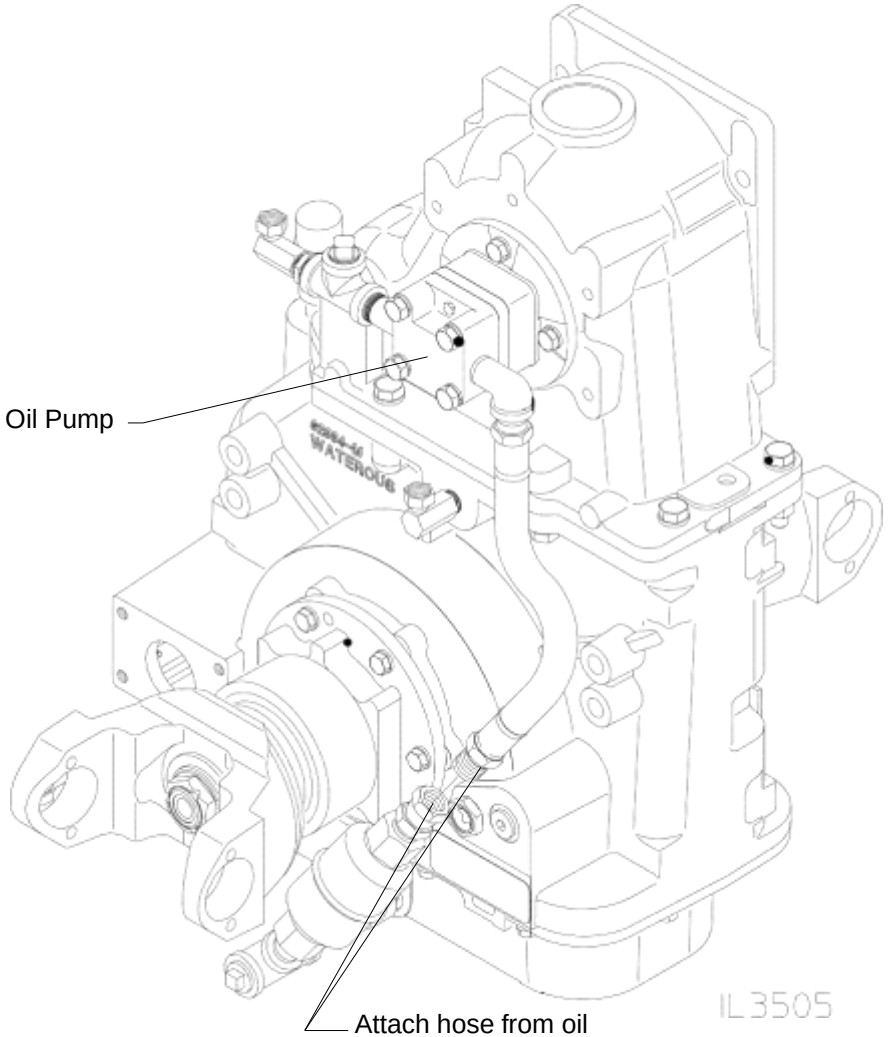
On Transmissions Built Prior to January 1, 2011

NOTE: This step should be performed after the driveline has been installed in the case.



On Transmissions Built January 1, 2011 to April 8, 2020

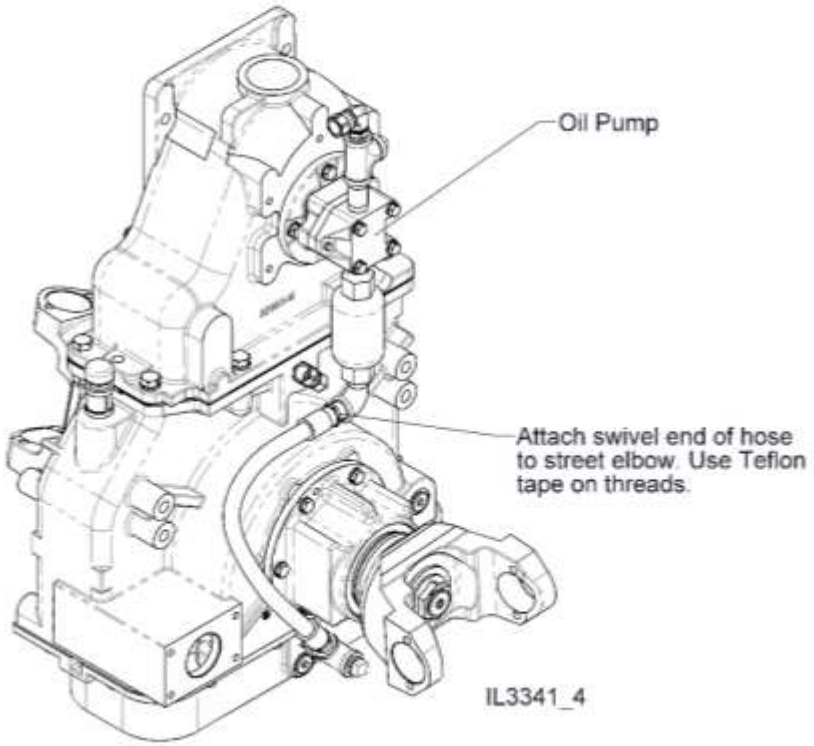
NOTE: This step should be performed after the driveline has been installed in the case.



Connect Optional Oil Cooler

On Transmissions Built After April 8, 2020.

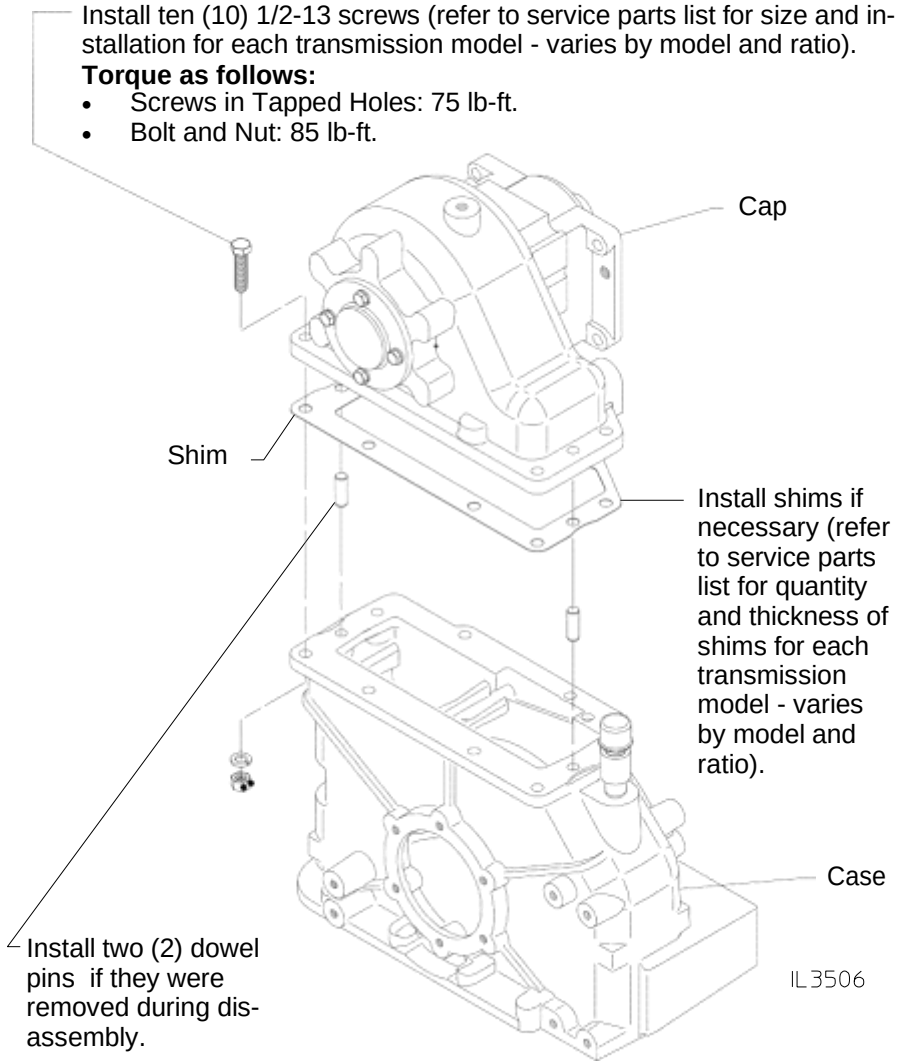
NOTE: This step should be performed after the driveline has been installed in the case.



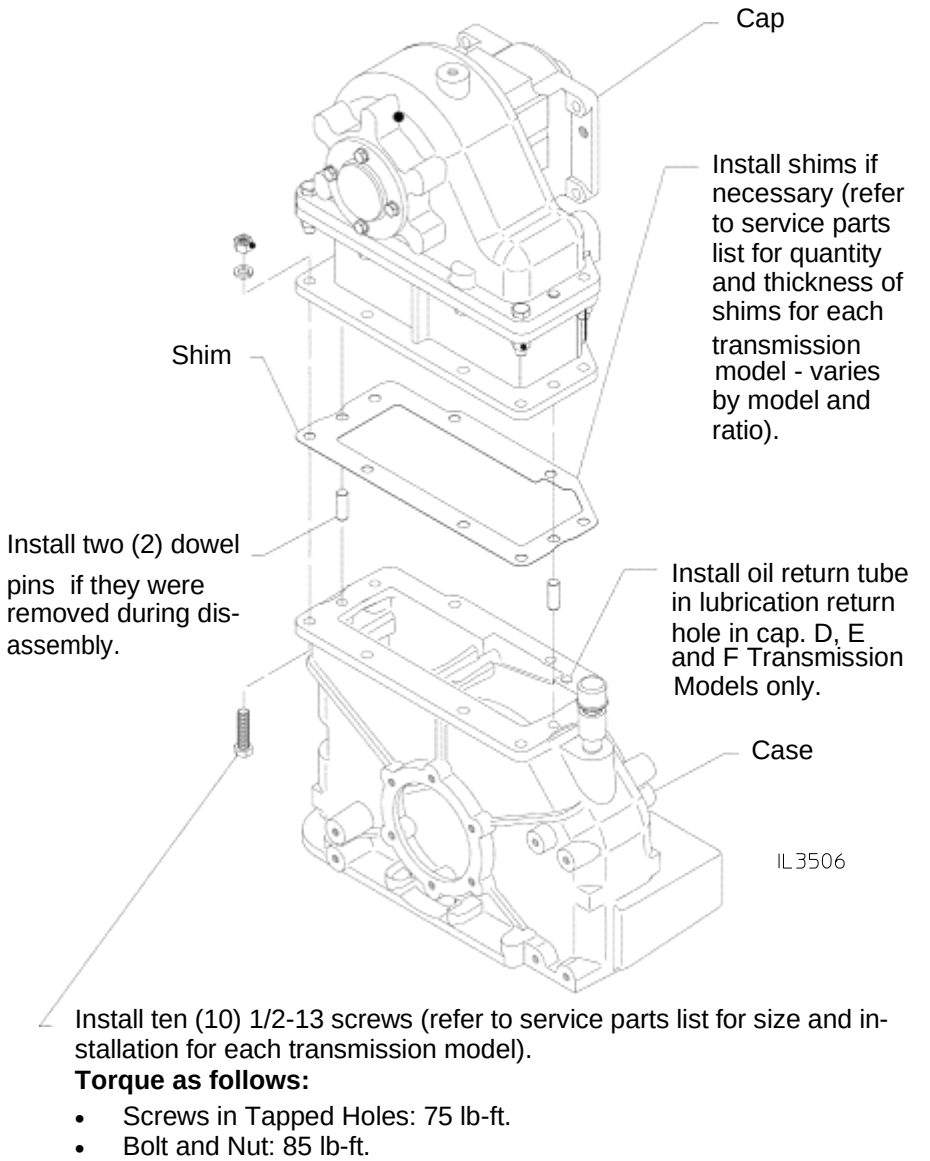
Reassembly - Attach Cap to Case (Continued)

Transmissions Mounted to the Front of CM, CMU, CS and CSU Pump Models

C20B Transmission Models



C20C, C20D, C20E and C20F Transmission Models



Reassembly - Attach Cap to Case (Continued)

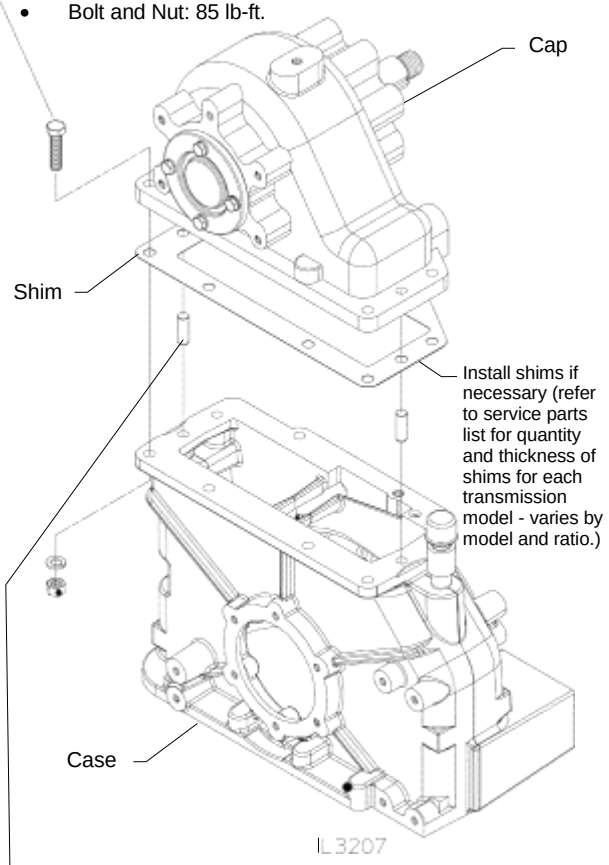
S100 Pump Models

C20B Models

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

Torque as follows:

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



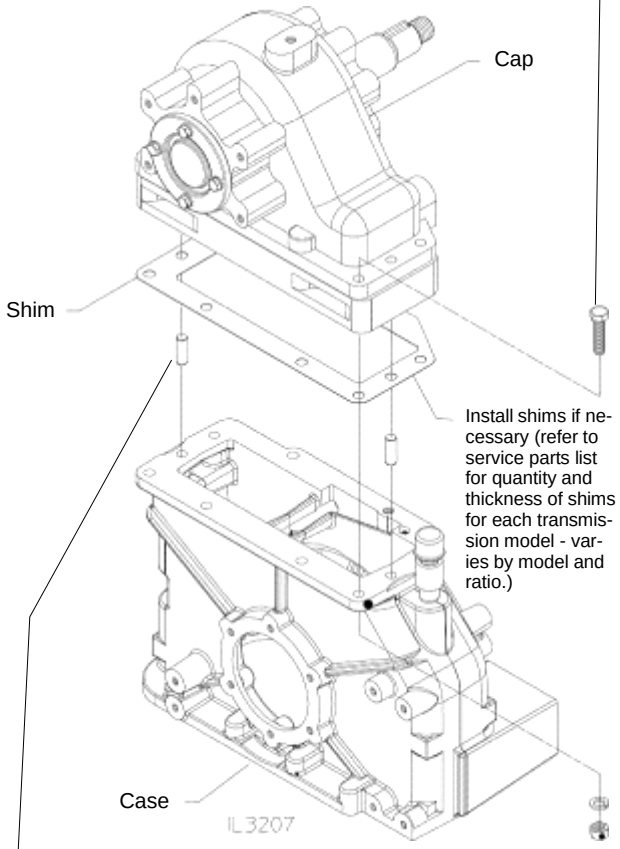
Install two (2) dowel pins if they were removed during disassembly.

C20C Models

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

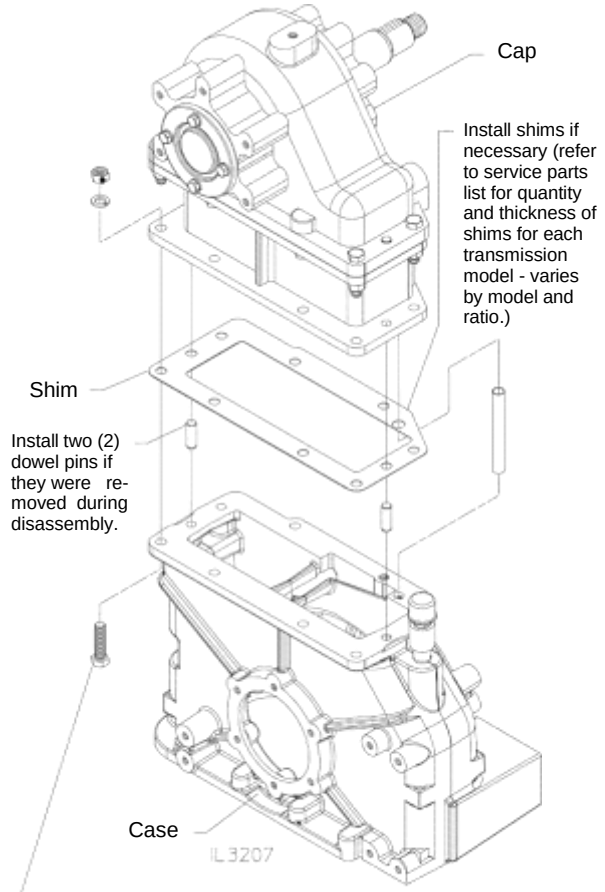
Torque as follows:

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



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

C20D, C20E and C20F Models



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

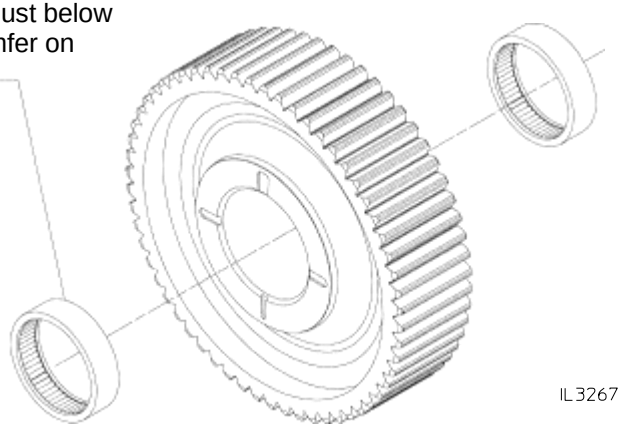
Torque as follows:

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

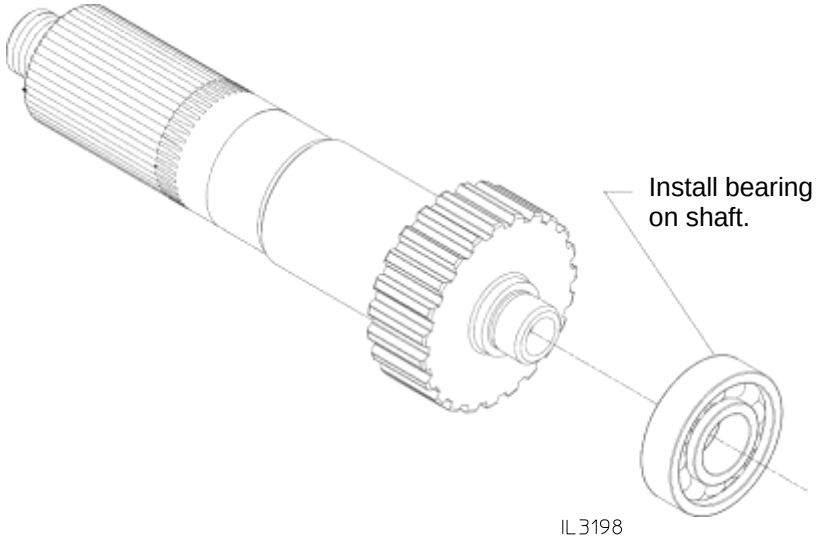
Reassembly - Assemble Driveline Components

Drive Sprocket

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

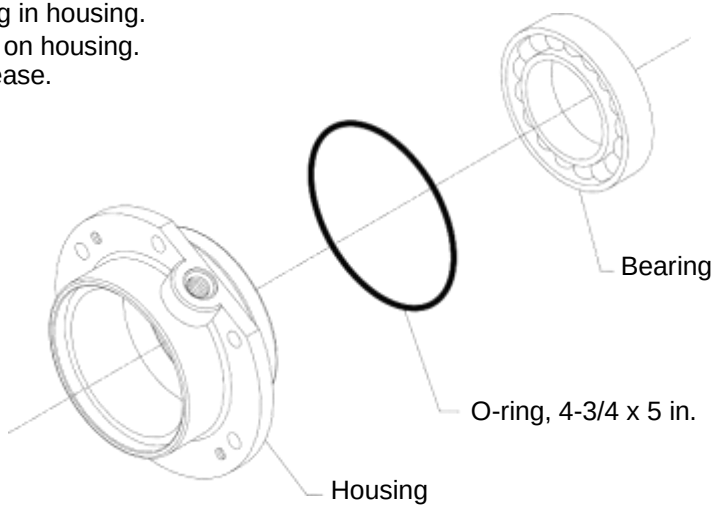


Drive Shaft

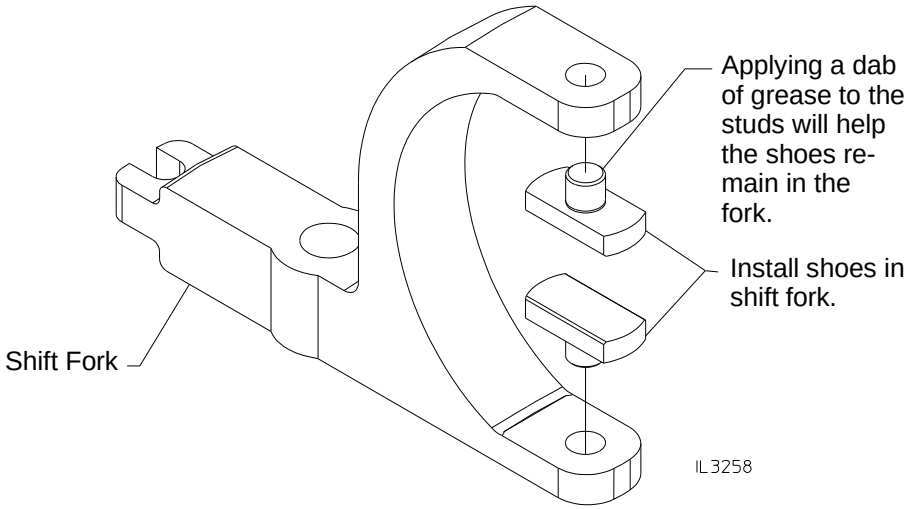


Drive Shaft Housing

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



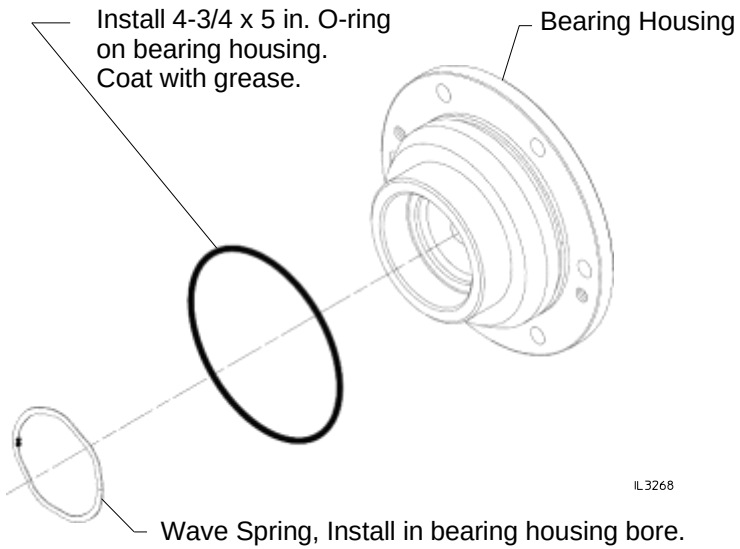
Shift Fork Shoes



Reassembly - Assemble Driveline Components (Continued)

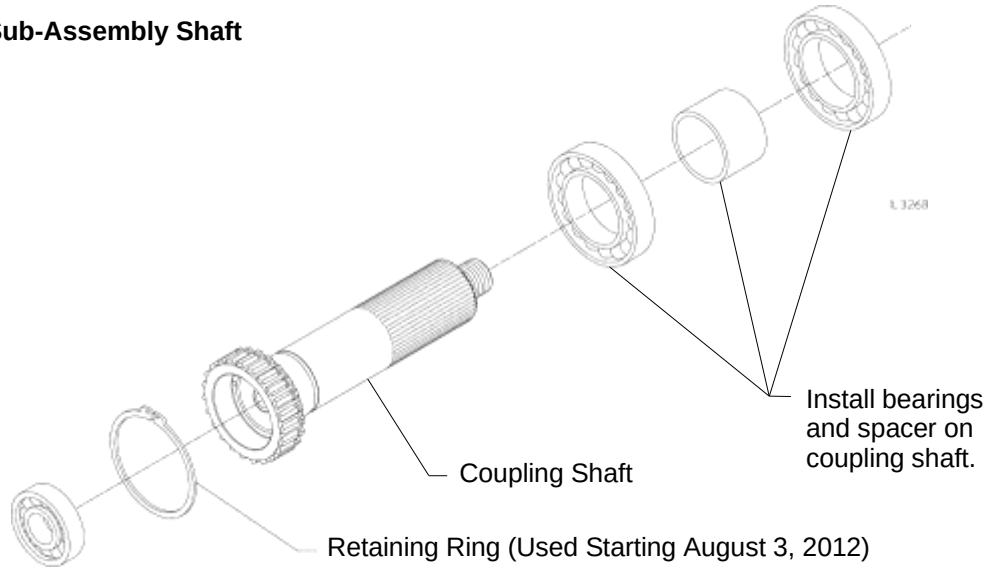
Coupling Shaft

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



Input and Output Shaft Configurations - Step 1

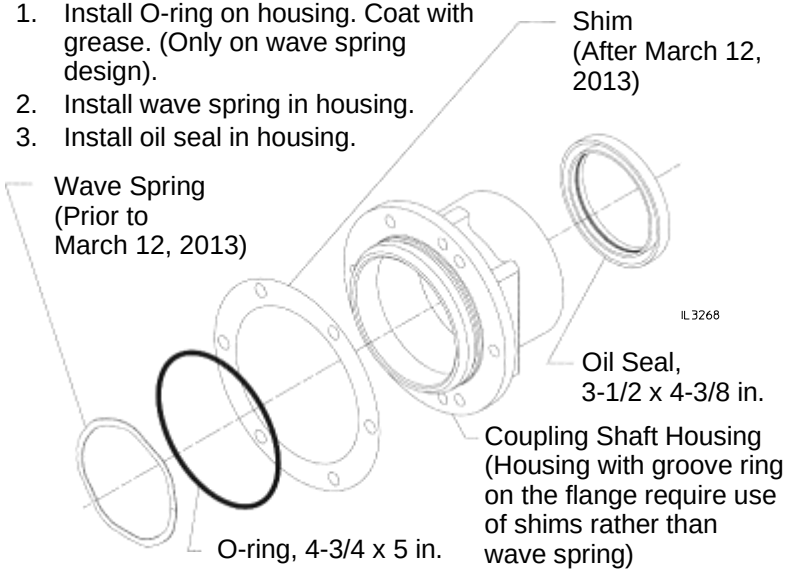
Sub-Assembly Shaft



Input and Output Shaft Configuations - Step 2

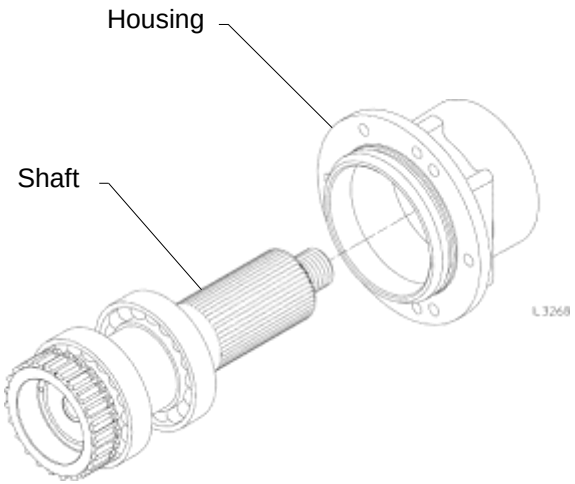
Sub-Assemble Housing

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

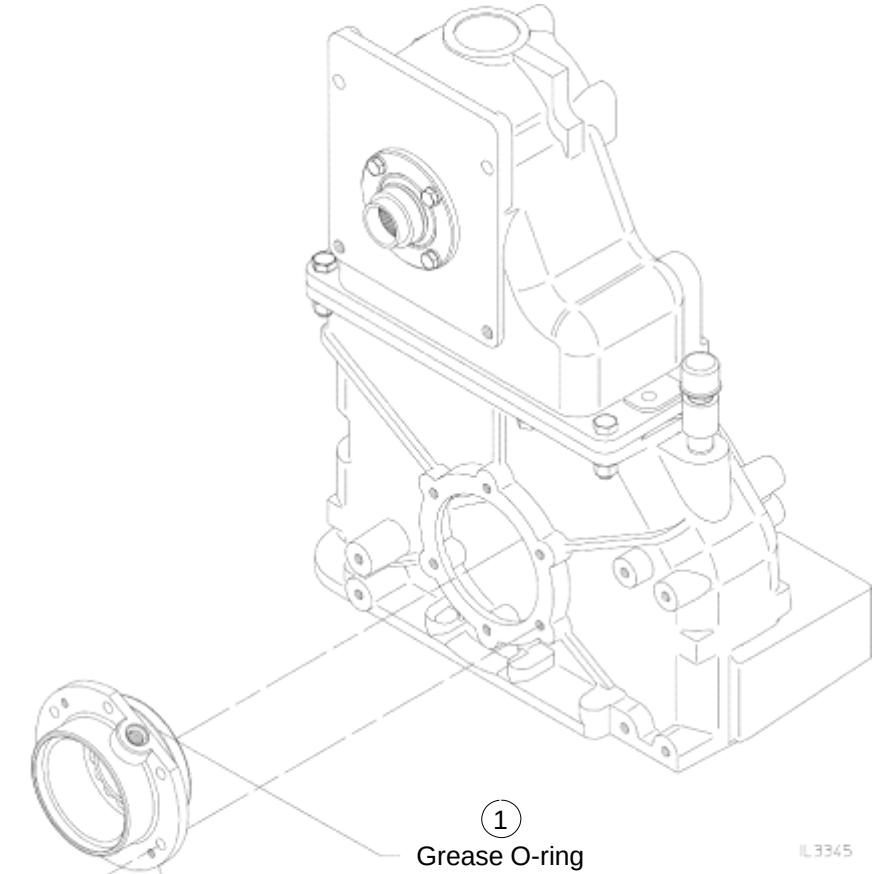
Install Shaft Sub-Assembly in Housing Sub-Assembly.



Reassembly - Installation of Driveline in Case

Drive (Input) Shaft

Install Drive Shaft Housing on Case

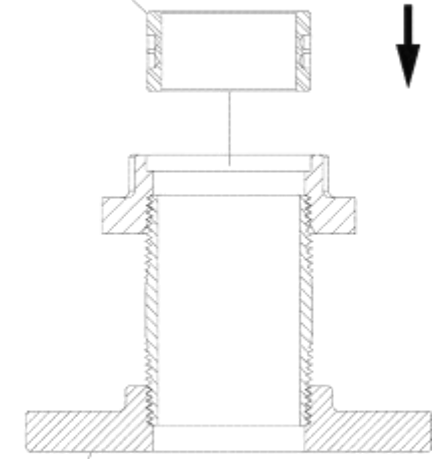


(1) Grease O-ring

(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

(3) Install tachometer ring in counterbore of drive shaft installation sleeve.

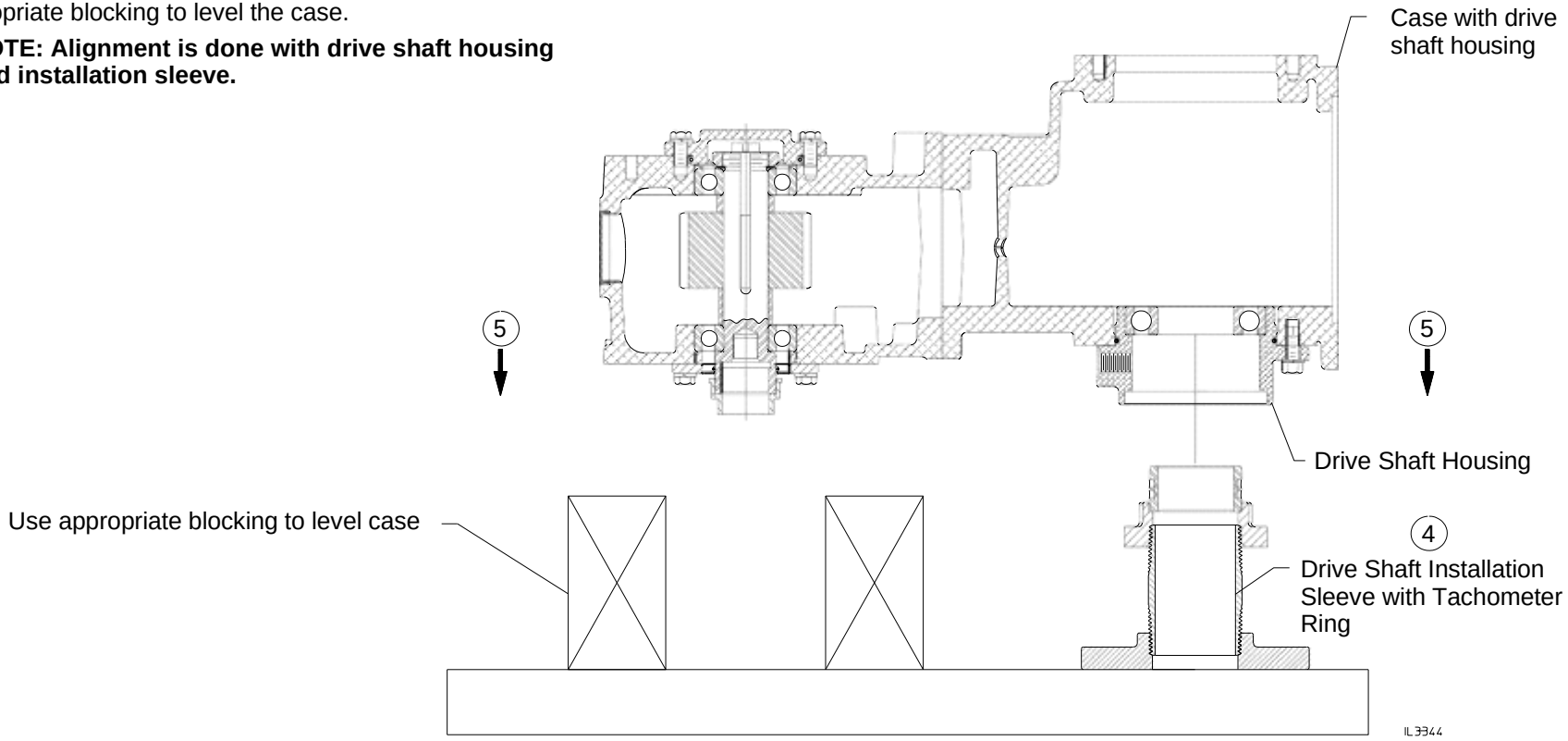


Drive Shaft Installation Sleeve, Waterous Part No. 63432, See Page 8.

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.

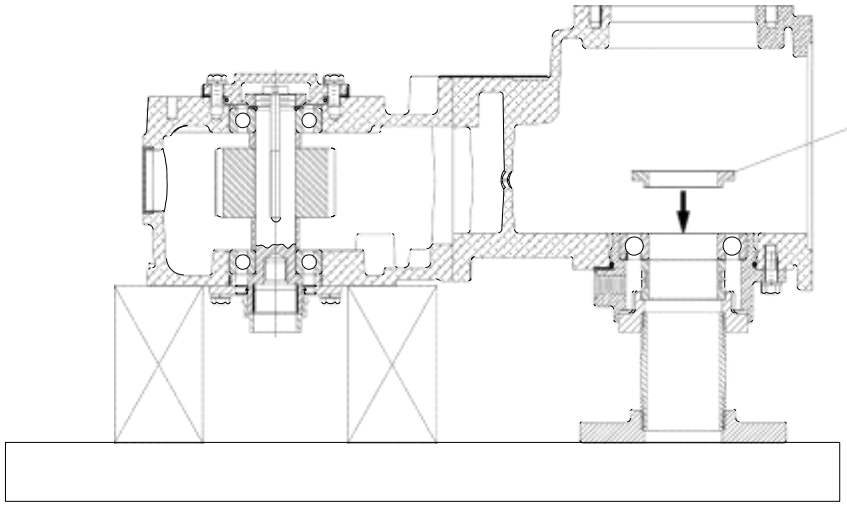
   NOTE: Alignment is done with drive shaft housing and installation sleeve.



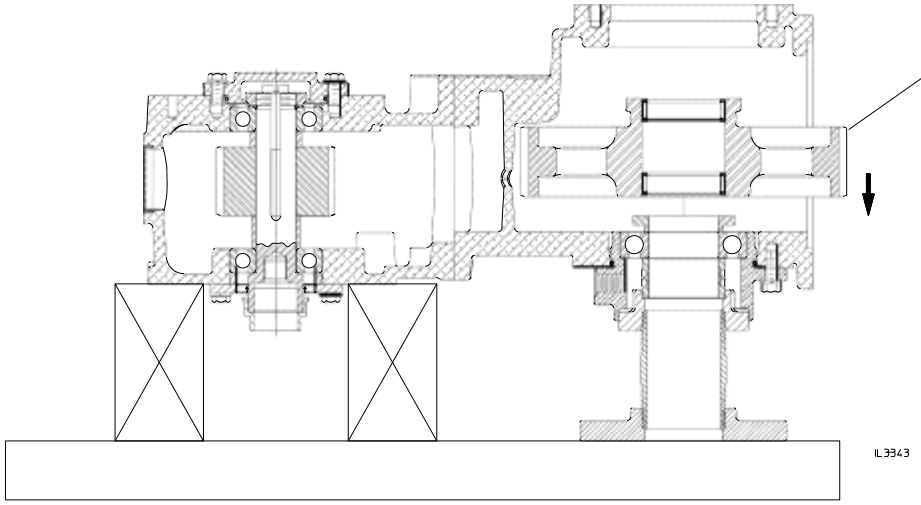
Reassembly - Installation of Driveline in Case (Continued)

Drive (Input) Shaft

Install Drive Sprocket



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

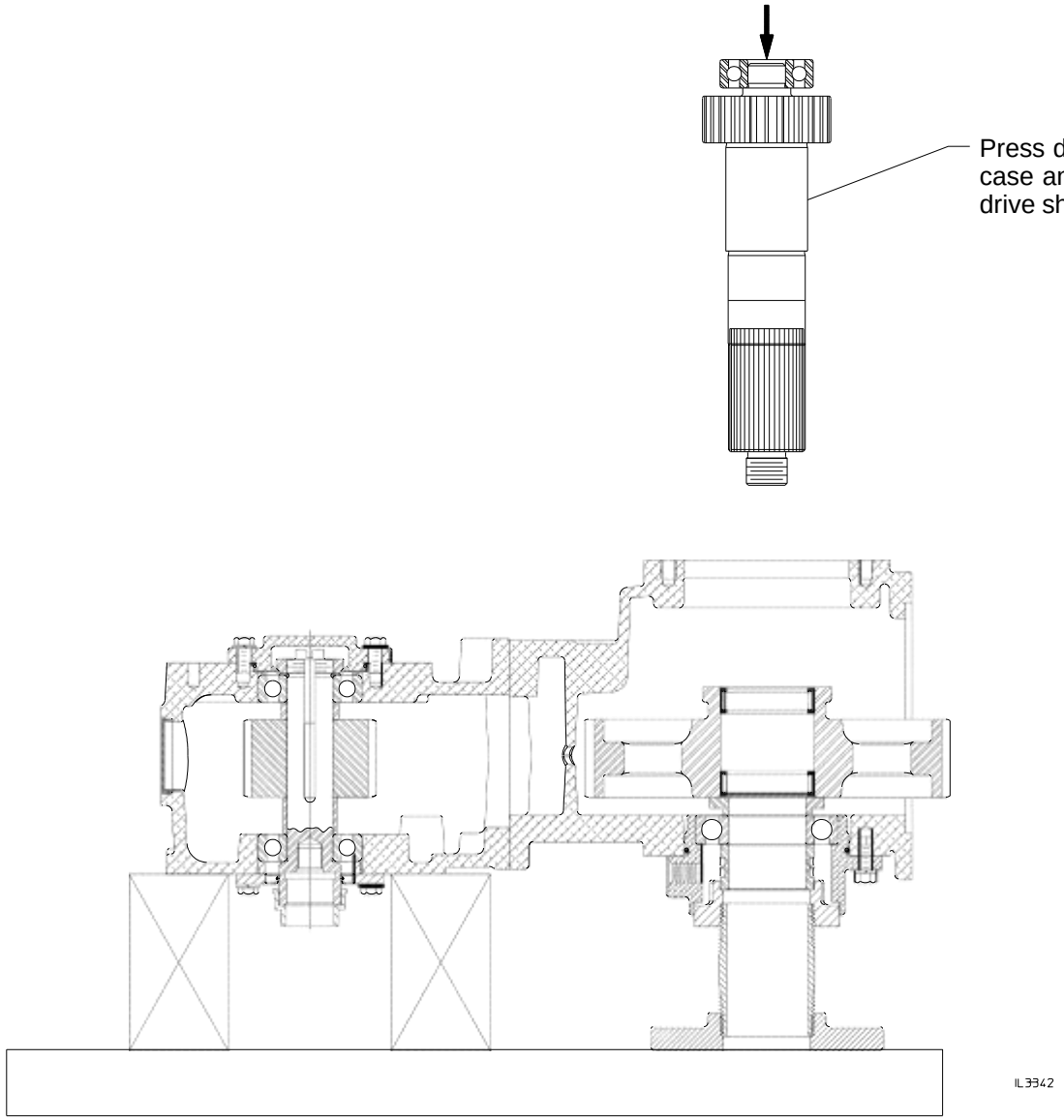


(7) Install drive sprocket in case centering bore with thrust washer.

Reassembly - Installation of Driveline in Case (Continued)

Drive (Input) Shaft

Install Drive Shaft in Case

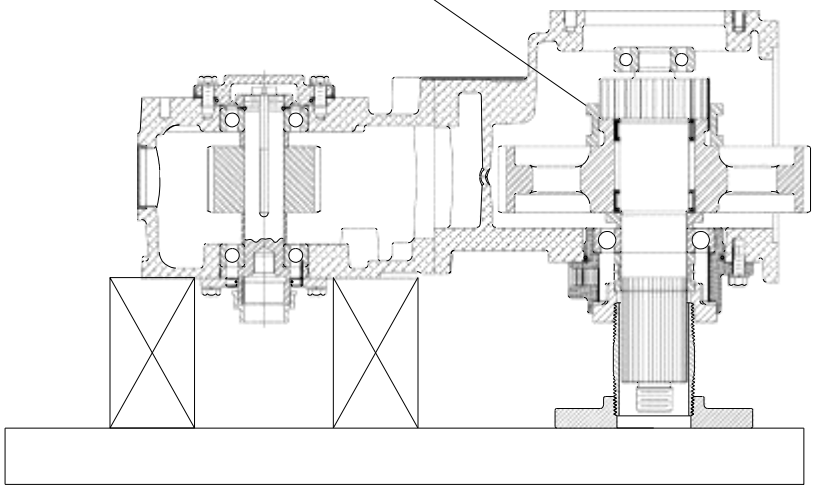


Reassembly - Installation of Driveline in Case (Continued)

Shift Collar

Input and Output Shaft Configuration

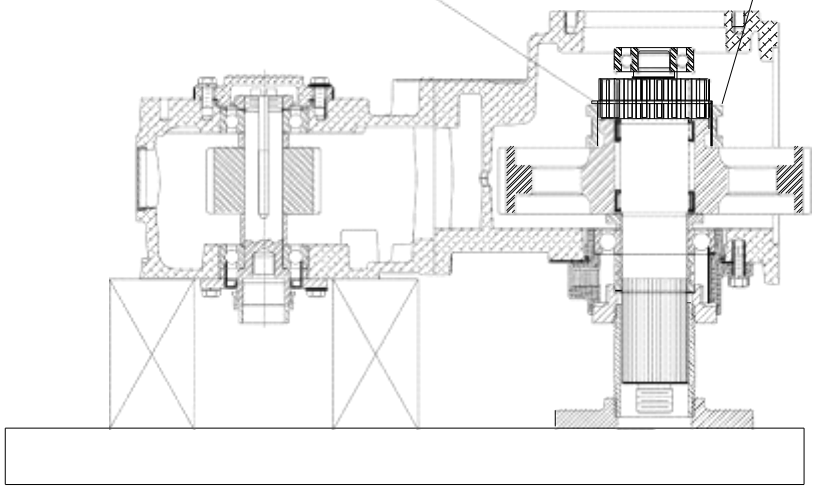
(9) Install shift collar on drive shaft, slide over spline teeth on both drive shaft and sprocket.



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.

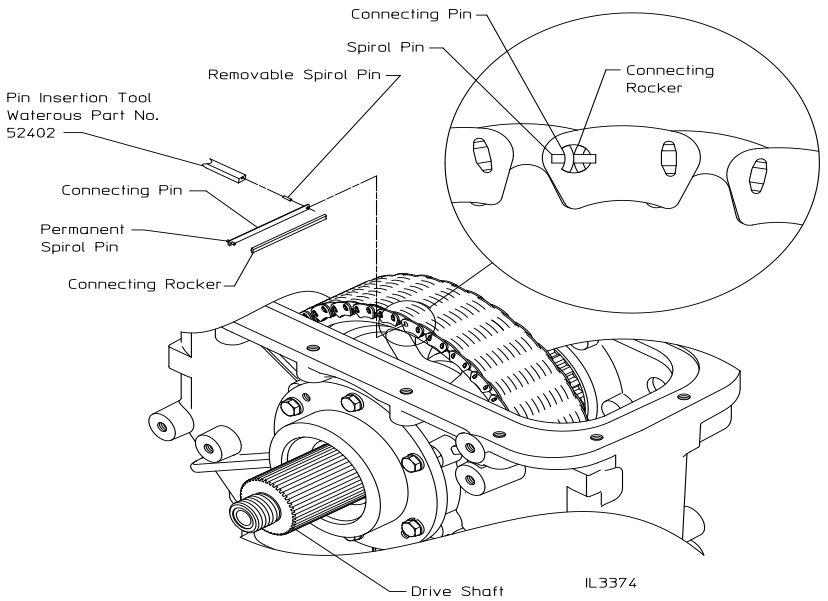


Reassembly - Installation of Driveline in Case (Continued)

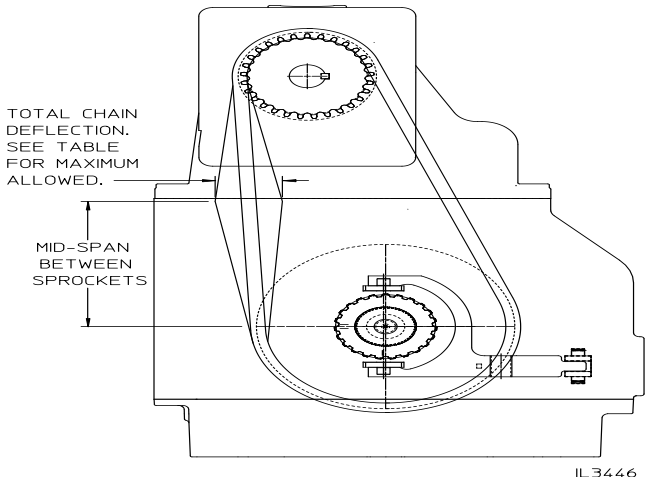
Chain

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 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 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 and connecting rocker have been pushed all the way through insert the spirol pin into the open hole at the end of the connecting pin. 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.



Transmission Model	Max. Deflection (In.)
C20B	1.75
C20C	1.75
C20D	1.75
C20E	2.0
C20F	2.0

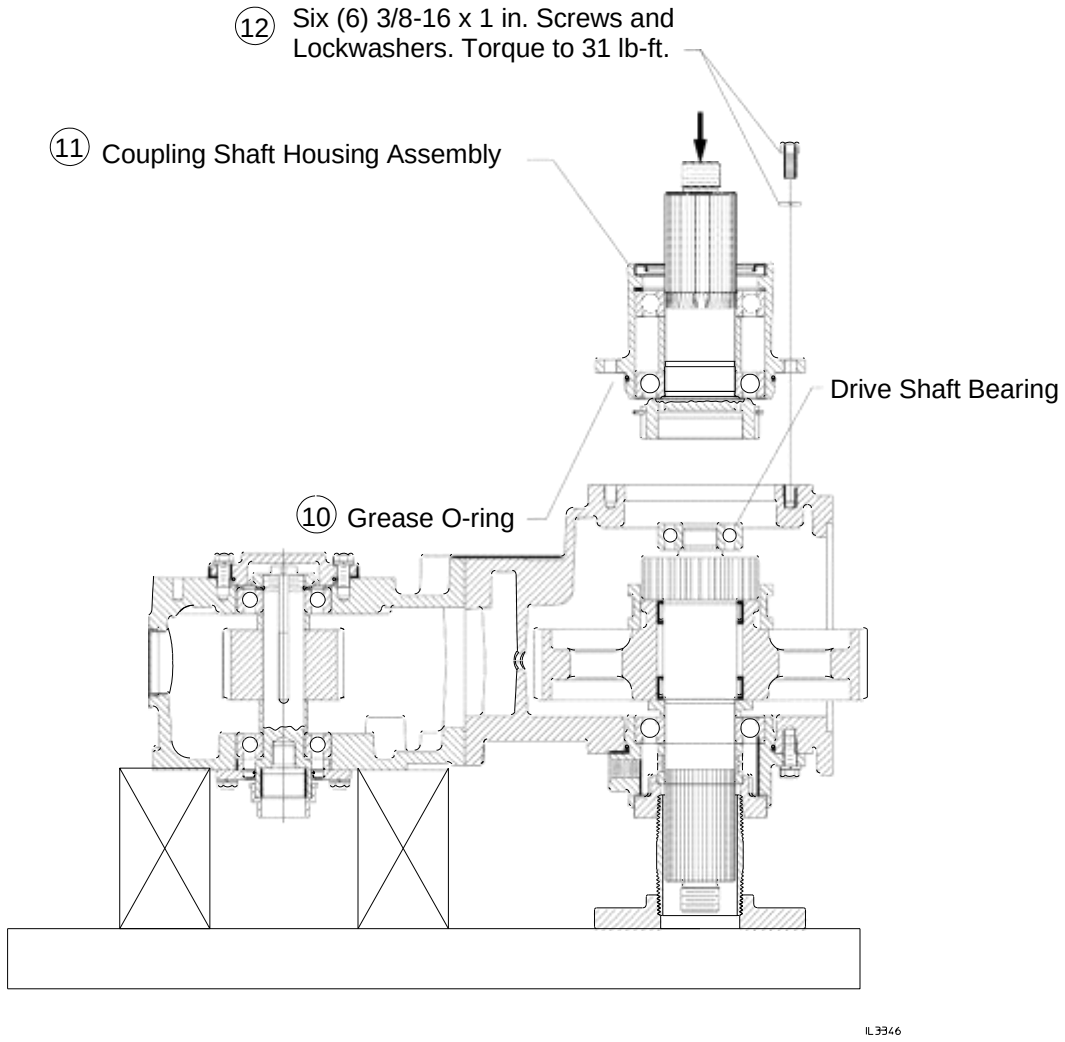


Reassembly - Installation of Driveline in Case (Continued)

Coupling (Output) Shaft

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

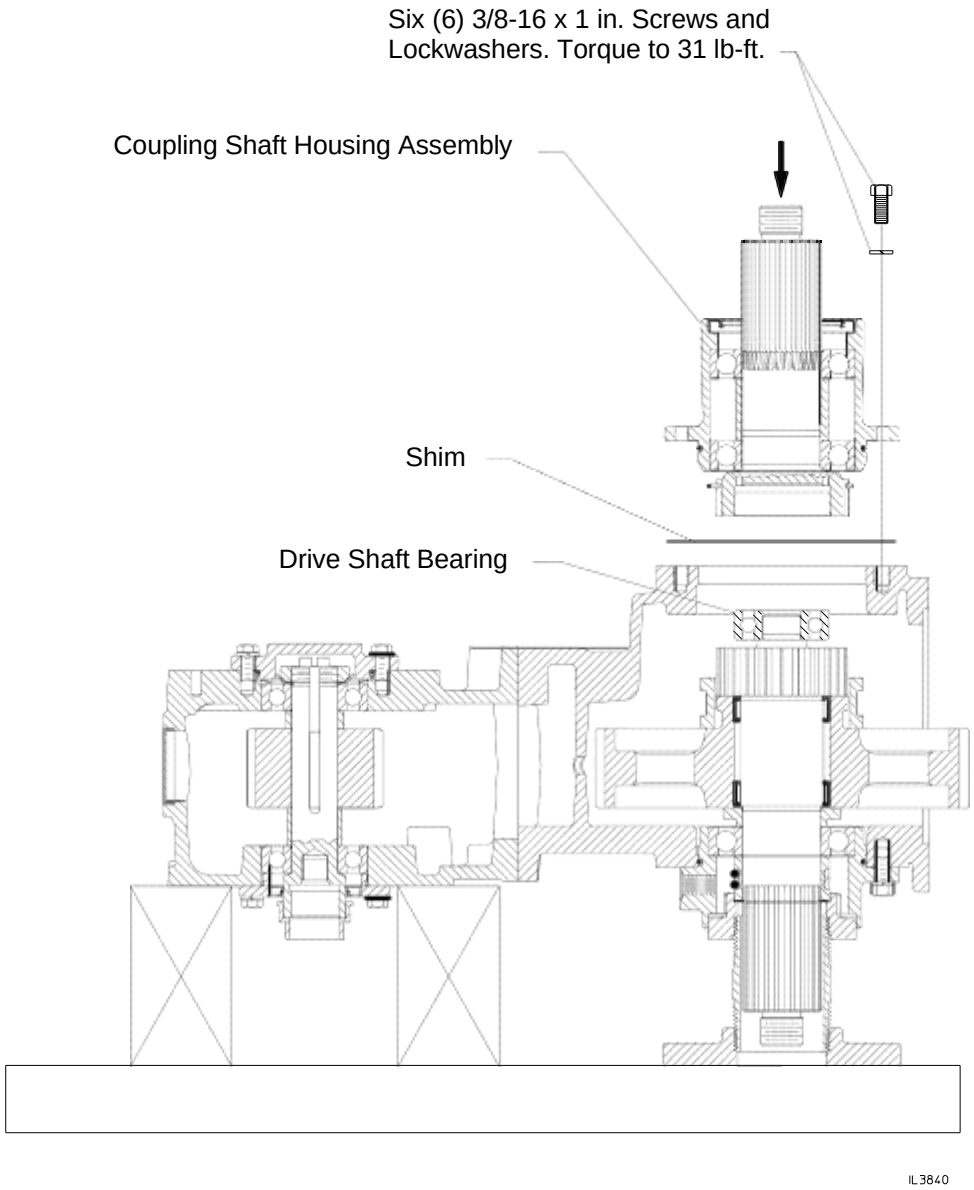
10. Grease O-ring on coupling shaft housing.
11. Press coupling shaft housing assembly on drive shaft bearing.
12. Install six (6) 3/8-16 x 1 in. screws and lockwashers. Torque to 31 lb-ft.



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.

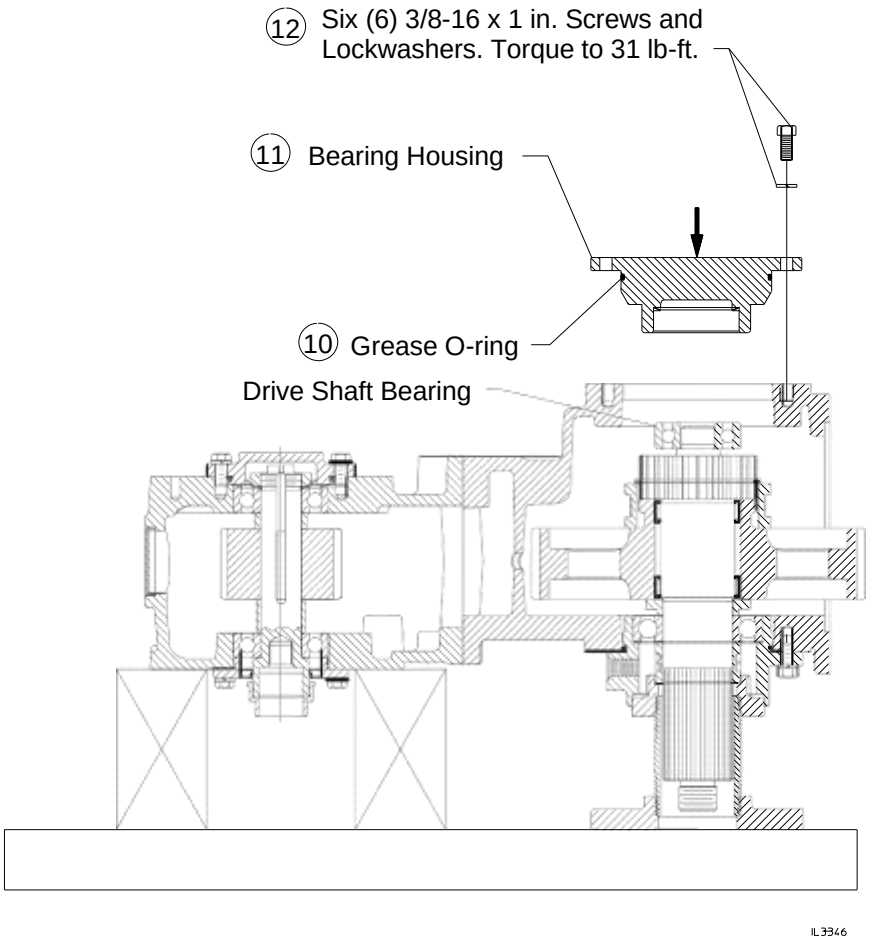
   Note: Field conditions may make it difficult to determine the correct amount of shims. If in doubt, add another .005 in. shim. No harm will result from a small amount of addition axial float but bearing life will be shortened if bearings are excessively preloaded.
4. Install the correct amount of shims 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.



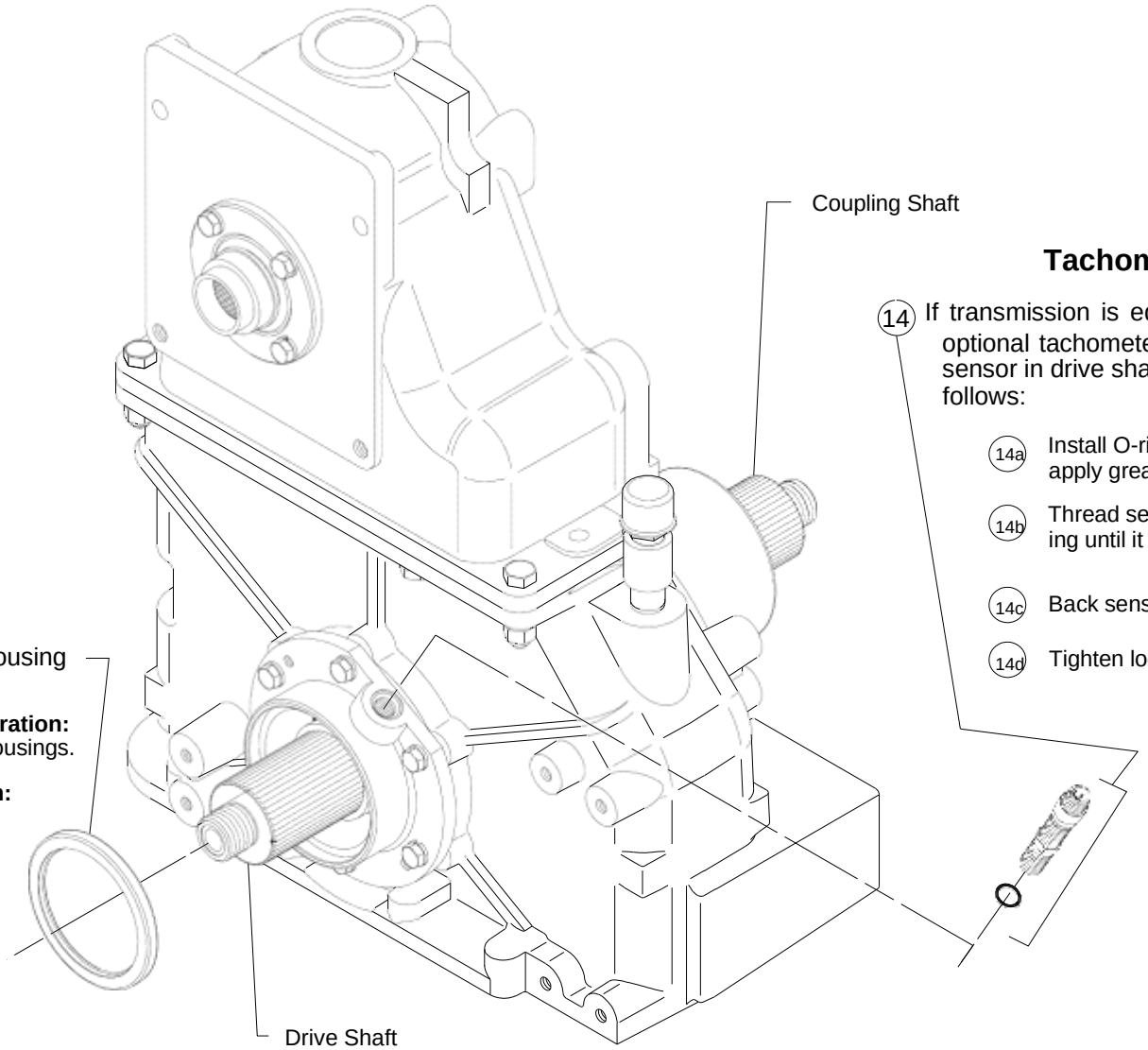
Reassembly - Installation of Driveline in Case (Continued)

Oil Seals and Tachometer

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:

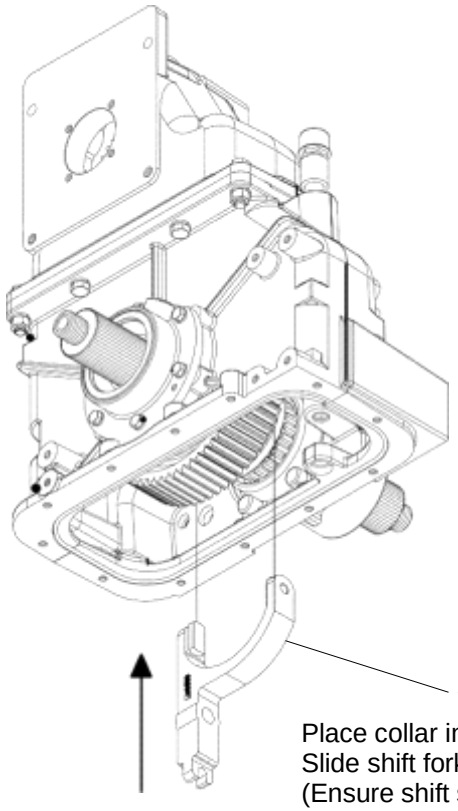
14 If transmission is equipped with an optional tachometer sensor, install sensor in drive shaft housing as follows:

- 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

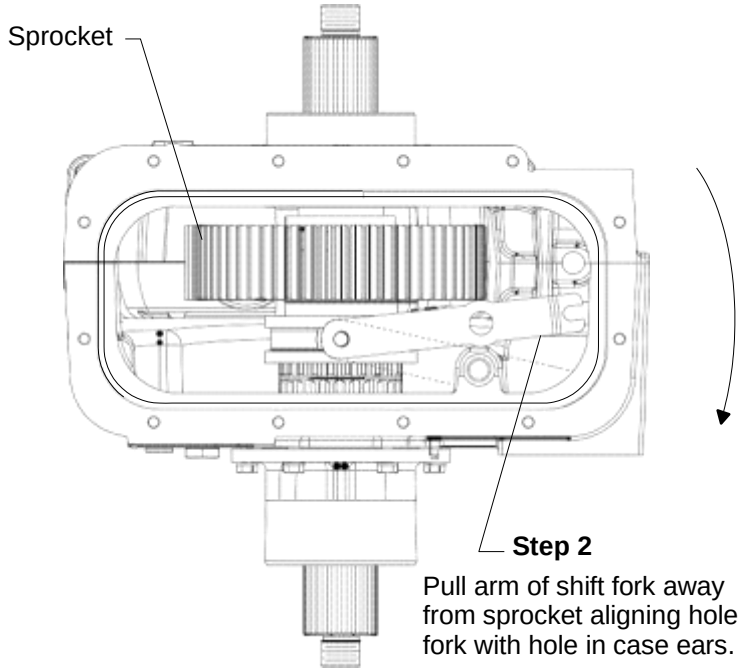
Step 1



Step 1

Place collar in PUMP position.
Slide shift fork onto shift collar in case.
(Ensure shift shoes are installed, see Page 69.)

Step 2



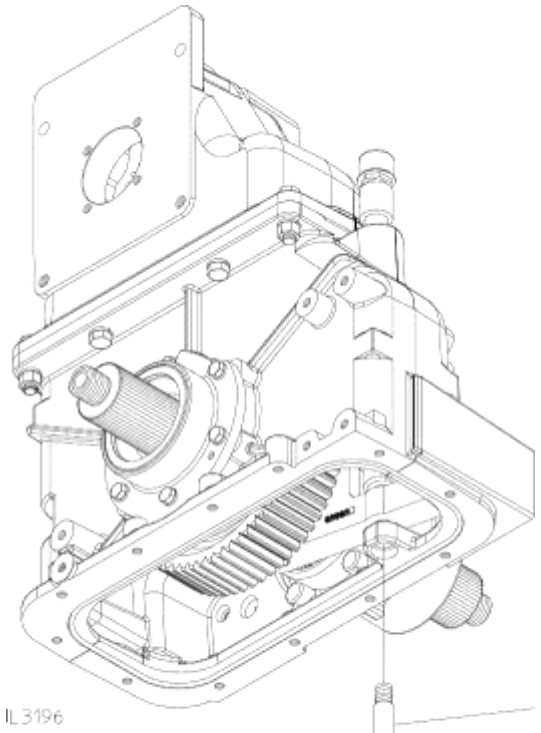
Step 2

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

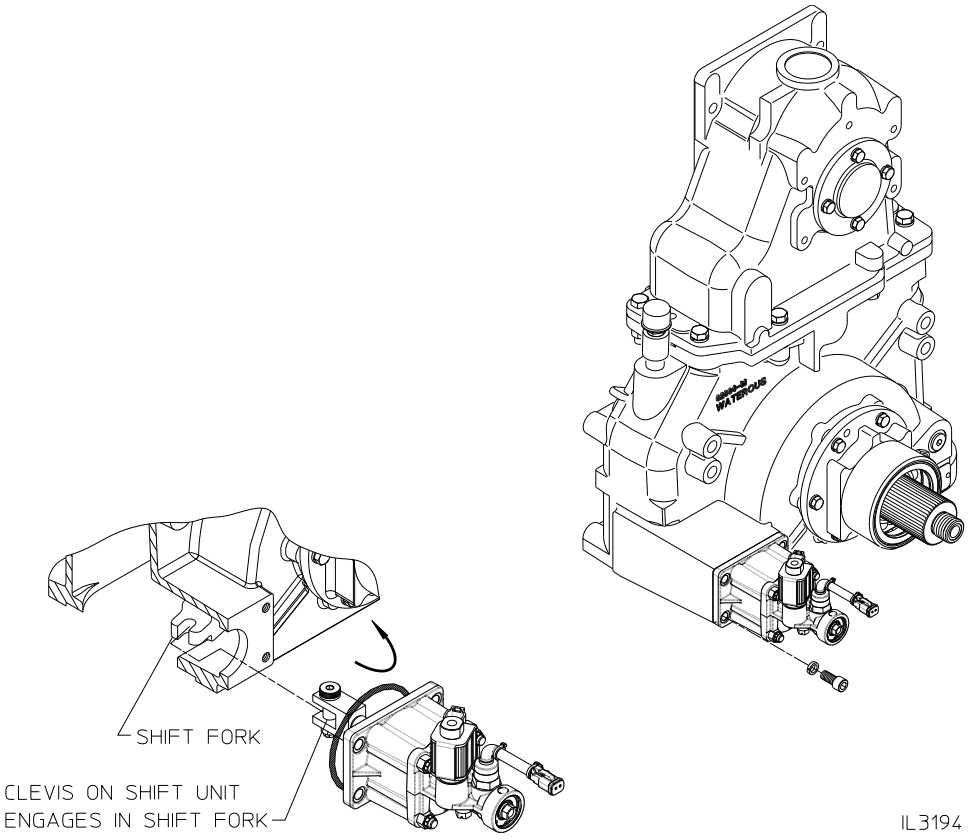


Step 3

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

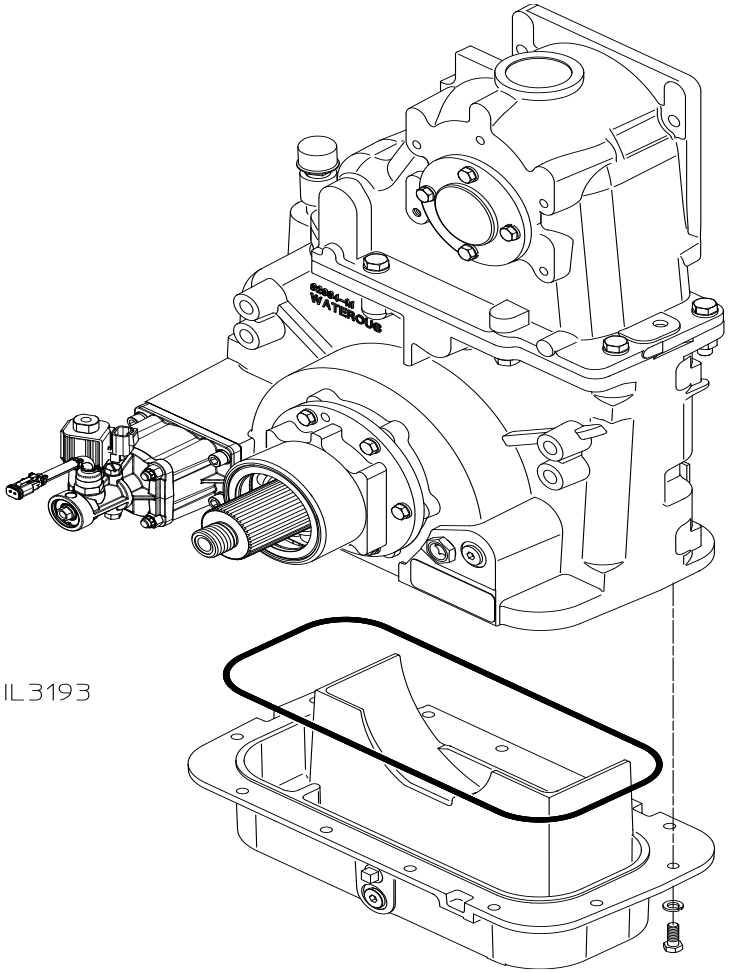
1. Install a new 1-13/16 x 2 in. O-ring on shift unit. Coat O-ring with grease.
2. Place shift unit in ROAD Mode by pushing override rod in.
3. Place shift fork in PUMP Mode by pushing fork arm towards end of case where the shift unit mounts.
4. Rotate shift unit towards case and engage clevis in shift 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

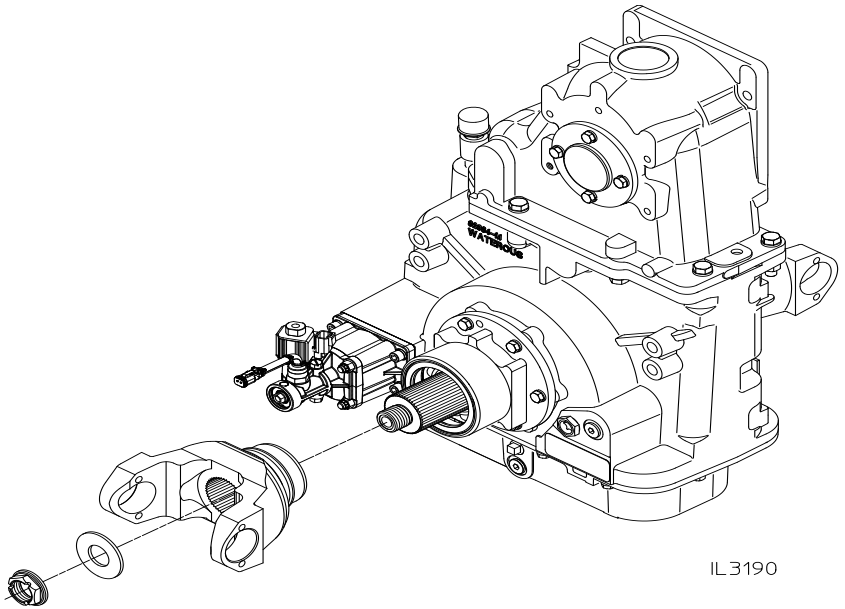
1. Install gasket on oil pan.
2. Attach oil pan to case with twelve (12) 3/8-16 x 1 in. screws and lockwashers. Torque to 31 lb-ft



End Yokes or Companion Flanges

Lubricate oil seal in housing.

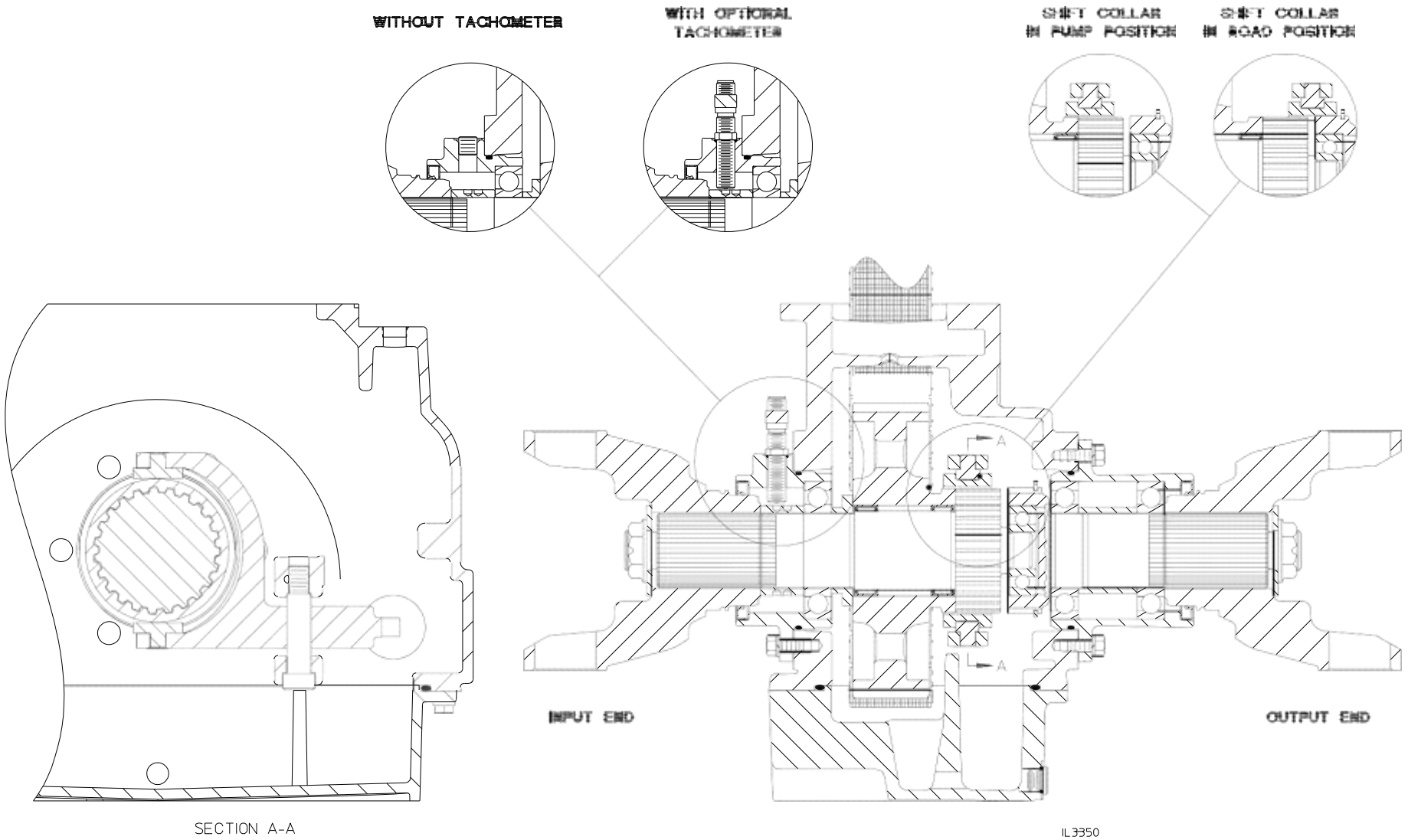
2. Install end yoke or companion flange on shaft.
3. Install lock nuts.
   a. Install washer.
   b. Install a new 1-1/4-18 self-locking nut. Torque to 475-525 lb-ft



Reassembly - Installation of Driveline in Case (Continued)

Cross-Section Diagram of Driveline

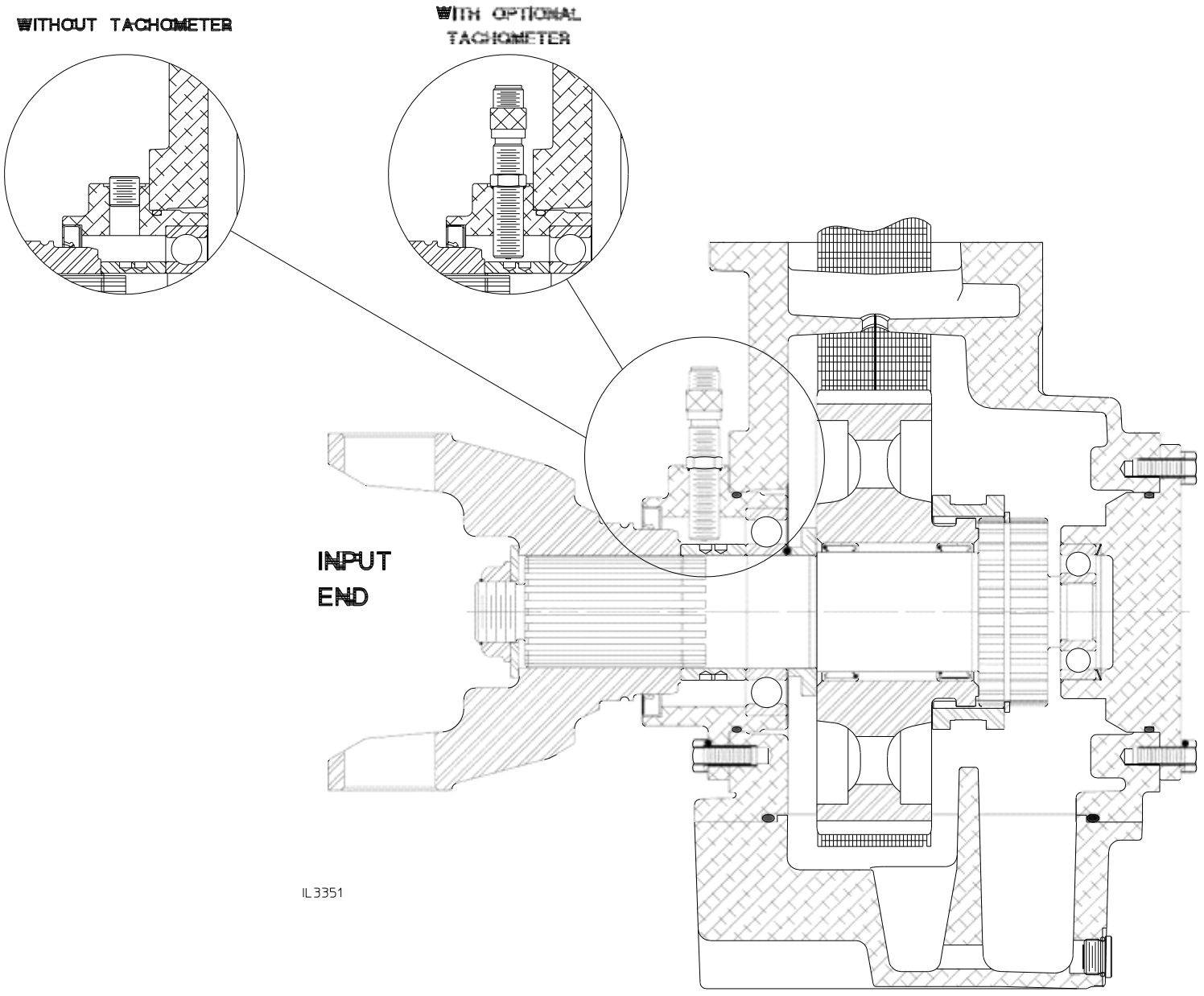
Input and Output Shaft Configurations



Reassembly - Installation of Driveline in Case (Continued)

Cross-Section Diagram of Driveline

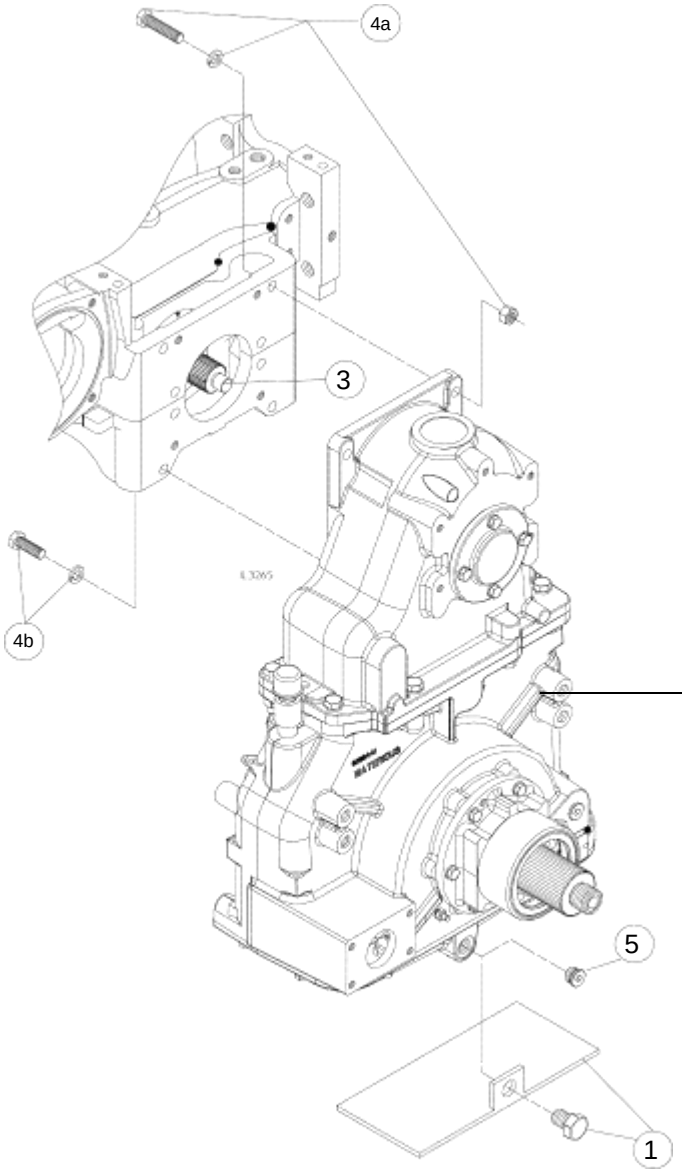
Input Shaft Only Configuration



Reassembly - Installation of Transmission on Pump

On Transmissions Built Prior to January 1, 2011

CM, CMU, CS and CSU Pump Models



1. Secure transmission to support bracket on transmission jack.
2. Raise transmission up into vehicle until transmission and pump flanges and shafts are aligned.
3. Push transmission back onto pump engaging the male spline on the impeller shaft with the female spline on the transmission driven shaft.

   NOTE: Ensure pump and transmission are within 1/8" before installing hardware.
4. Install pump mounted hardware as follows:
   a. Top Two (2) Holes: Two (2) 1/2-20 x 2-1/4 in. screws, nuts and washers. Apply Loctite Blue (#242) to threads and torque to 85 lb-ft
   b. Lower Two (2) Holes: Two (2) 1/2-13 x 1-1/2 in. screws and lockwashers. Apply Loctite Blue (#242) to threads and torque to 75 lb-ft
5. Remove bracket and re-install drain plug in case, torque to 15 lb-ft maximum.

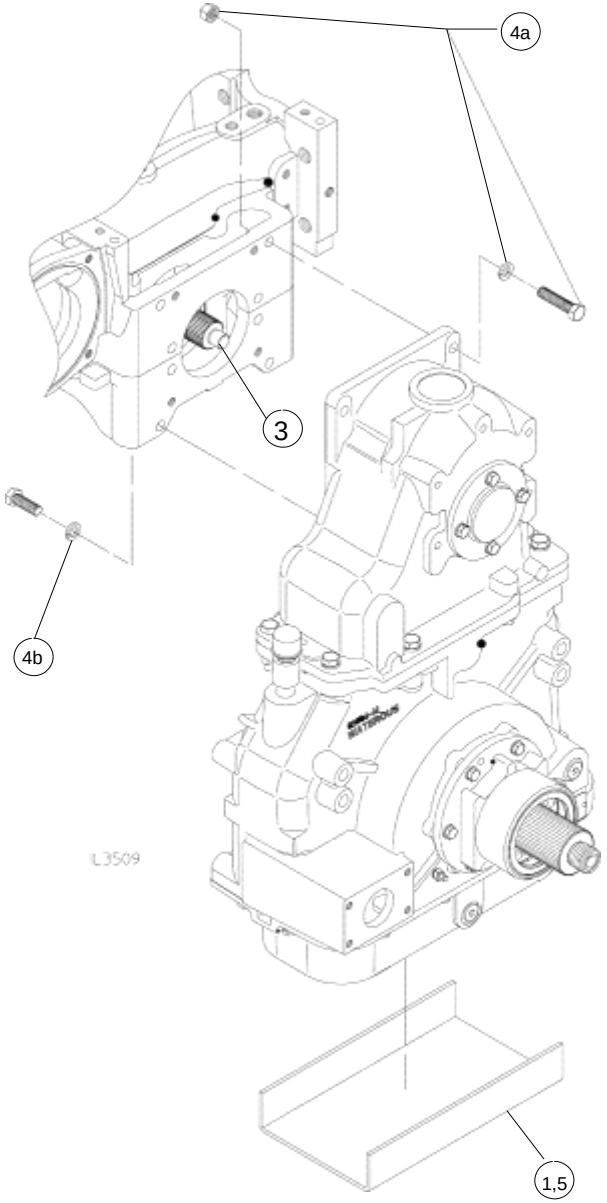
CMH, CMUH, CSH and CSUH Pump Models

Refer to the pump overhaul instructions.

Reassembly - Installation of Transmission on Pump

On Transmissions Built After January 1, 2011

CM, CMU, CS and CSU Pump Models



1. Place transmission with support bracket on transmission jack.
2. Raise transmission up into vehicle until transmission and pump flanges and shafts are aligned.
3. Push transmission back onto pump engaging the male spline on the impeller shaft with the female spline on the transmission driven shaft.

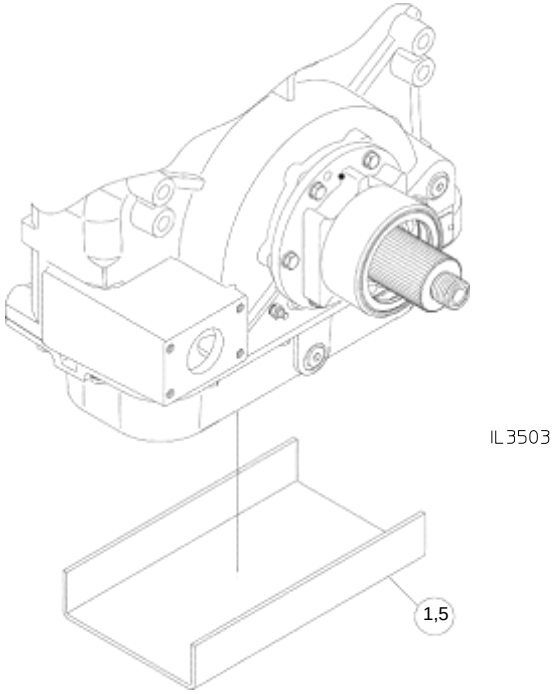
   NOTE: Ensure pump and transmission are within 1/8" before installing hardware.
4. Install pump mounted hardware as follows:
   a. Top Two (2) Holes: Two (2) 1/2-20 x 2-1/4 in. screws, nuts and washers. Apply Loctite Blue (#242) to threads and torque to 85 lb-ft
   b. Lower Two (2) Holes: Two (2) 1/2-13 x 1-1/2 in. screws and lockwashers. Apply Loctite Blue (#242) to threads and torque to 75 lb-ft
5. Remove support bracket.

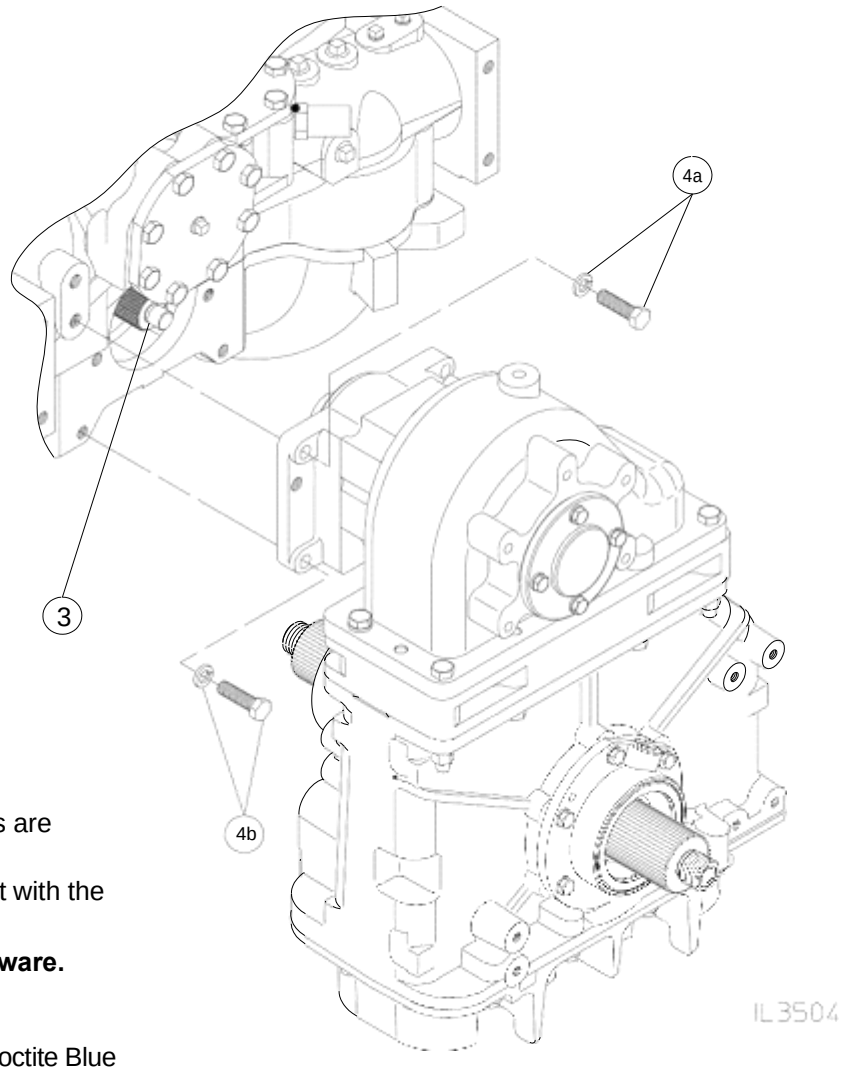
CMH, CMUH, CSH and CSUH Pump Models

Refer to the pump overhaul instructions.

Disassembly - Remove Transmission from Vehicle - *Transmissions Mounted to Front of Pump*

Transmissions Mounted to the Front of CM, CMU, CS and CSU Pump Models





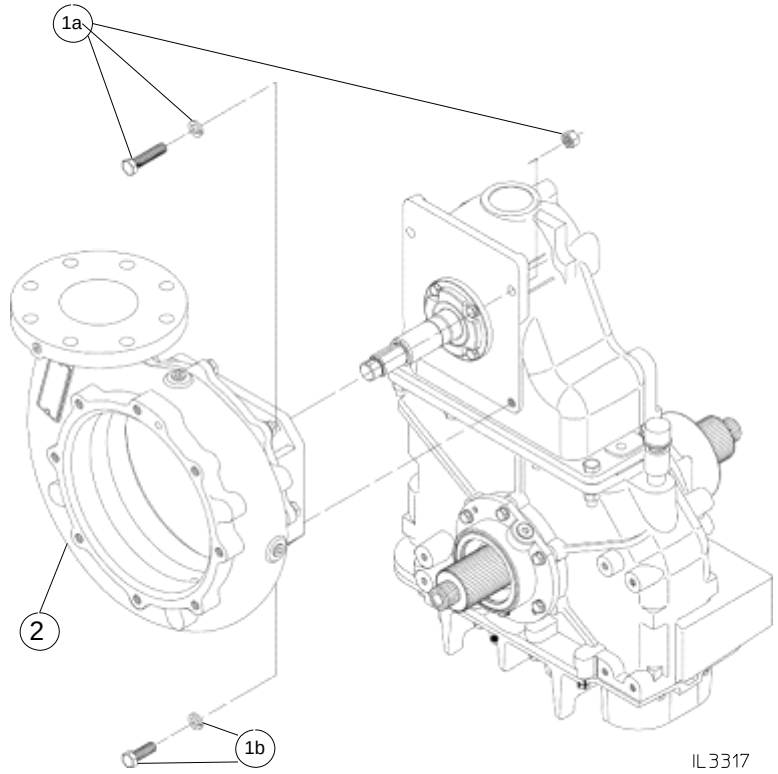
1. Place transmission with support bracket on transmission jack.
2. Raise transmission up into vehicle until transmission and pump flanges and shafts are aligned.
3. Push transmission back onto pump engaging the male spline on the impeller shaft with the female spline on the transmission driven shaft.

   NOTE: Ensure pump and transmission are within 1/8” before installing hardware.
4. Install pump mounted hardware as follows:
   a. Top Two (2) Holes: Two (2) 1/2-13 x 1-3/4 in. screws and lockwashers. Apply Loctite Blue (#242) to threads and torque to 85 lb-ft
   b. Lower Two (2) Holes: Two (2) 1/2-13 x 1-3/4 in. screws and lockwashers. Apply Loctite Blue (#242) to threads and torque to 75 lb-ft
5. Remove support bracket.

Reassembly - Installation of Transmission on Pump (Continued)

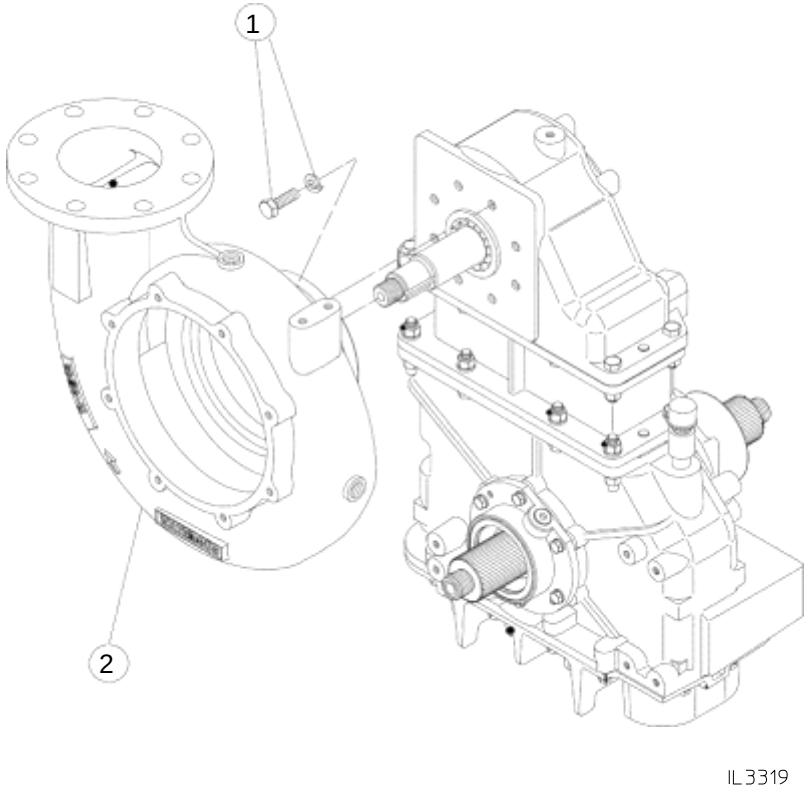
CG and CX Pump Models

1. Install pump body on transmission as follows:
   a. Top Two (2) Holes: Two (2) 1/2-20 x 2-1/4 in. screws, nuts and washers. Torque to 85 lb-ft
   b. Bottom Two (2) Holes: Two (2) 1/2-13 x 1-1/4 in. or 1-1/2 in. screws and washers. Torque to 75 lb-ft
2. Install pump mechanical seal, impeller and intake adapter. See pump overhaul instructions.



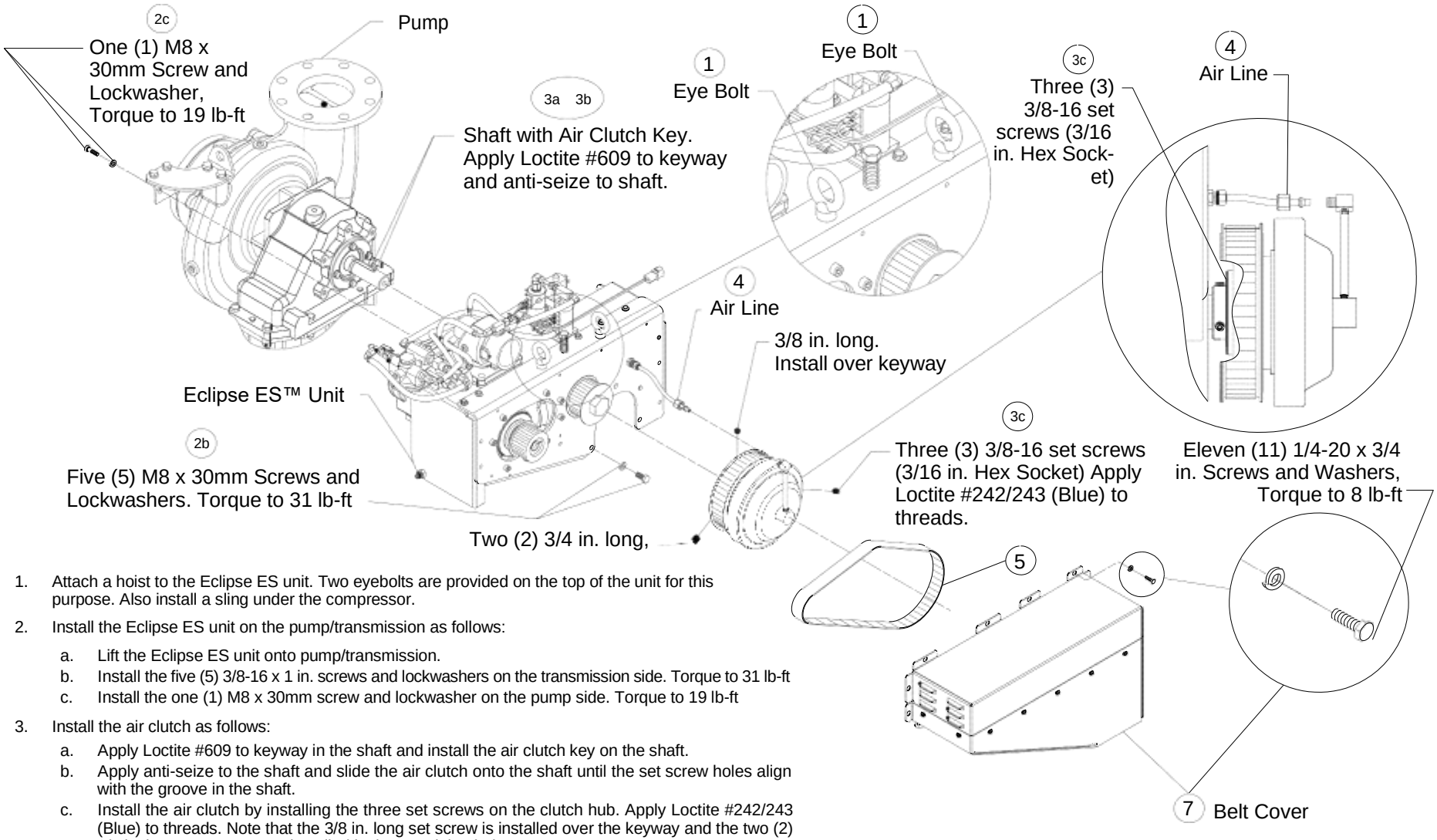
S100 Pump Models

1. Install pump body on transmission using eight (8) 1/2-13 x 1-1/2 in. screws and lockwashers. Torque to 75 lb-ft
2. Install pump mechanical seal, impeller and intake adapter. See pump overhaul instructions.



Reassembly - Installation of Transmission in Vehicle

Eclipse ES CAFS on Rear Output

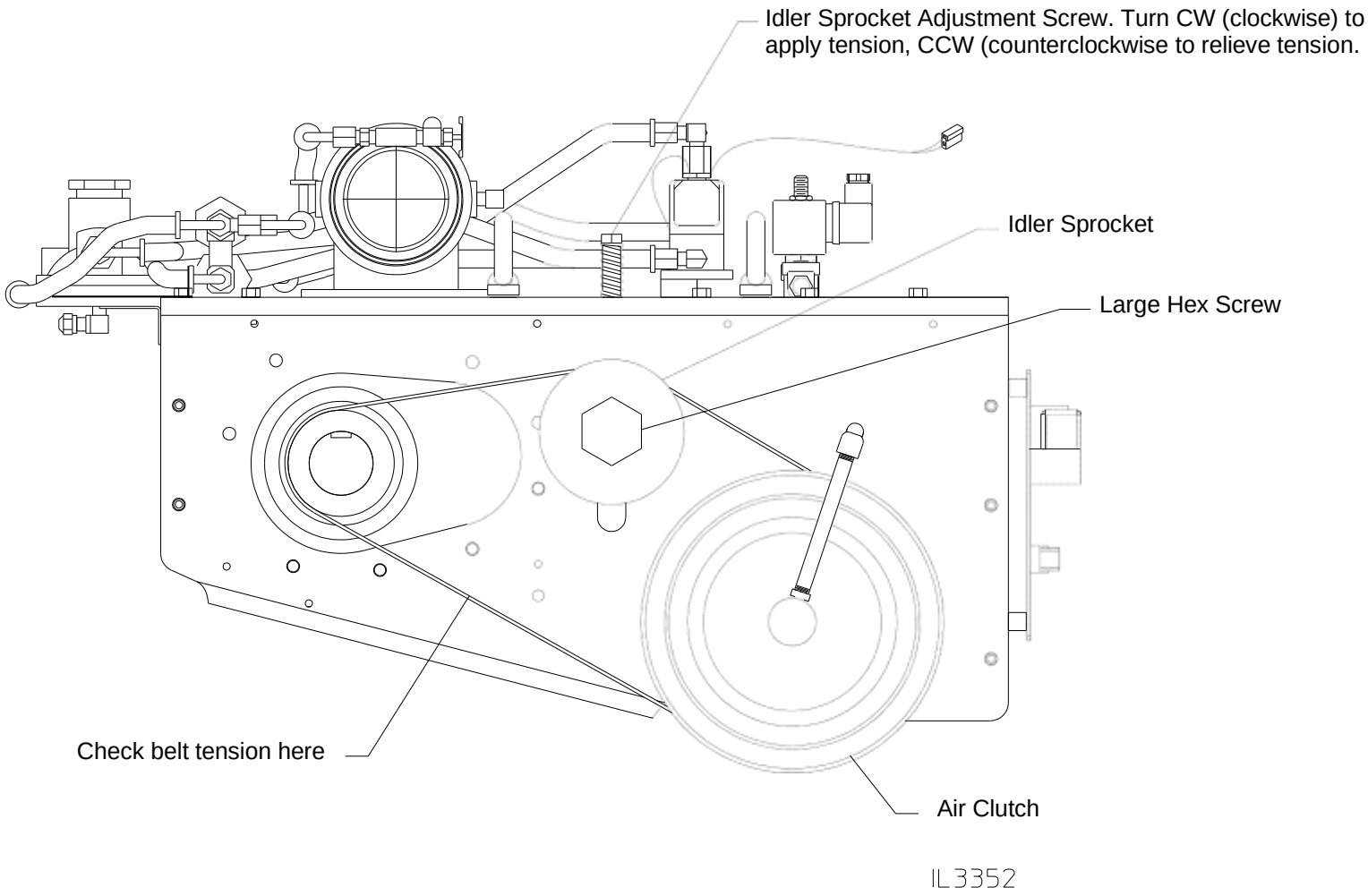


1. Attach a hoist to the Eclipse ES unit. Two eyebolts are provided on the top of the unit for this purpose. Also install a sling under the compressor.
2. Install the Eclipse ES unit on the pump/transmission as follows:
   a. Lift the Eclipse ES unit onto pump/transmission.
   b. Install the five (5) 3/8-16 x 1 in. screws and lockwashers on the transmission side. Torque to 31 lb-ft
   c. Install the one (1) M8 x 30mm screw and lockwasher on the pump side. Torque to 19 lb-ft
3. Install the air clutch as follows:
   a. Apply Loctite #609 to keyway in the shaft and install the air clutch 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 groove in the shaft.
   c. Install the air clutch by installing the three set screws on the clutch hub. Apply Loctite #242/243 (Blue) to threads. Note that the 3/8 in. long set screw is installed over the keyway and the two (2) 3/4 in. long set screws are installed in the remaining holes.
4. Connect the air line to the air clutch.
5. Install belt.
6. Adjust belt tension, see next page.
7. Install belt cover with eleven (11) 1/4-20 x 3/4 in. screws and washers. Torque to 8 lb-ft

Eclipse ES CAFS on Rear Output - Adjusting Belt Tension

Adjust belt tension as follows:

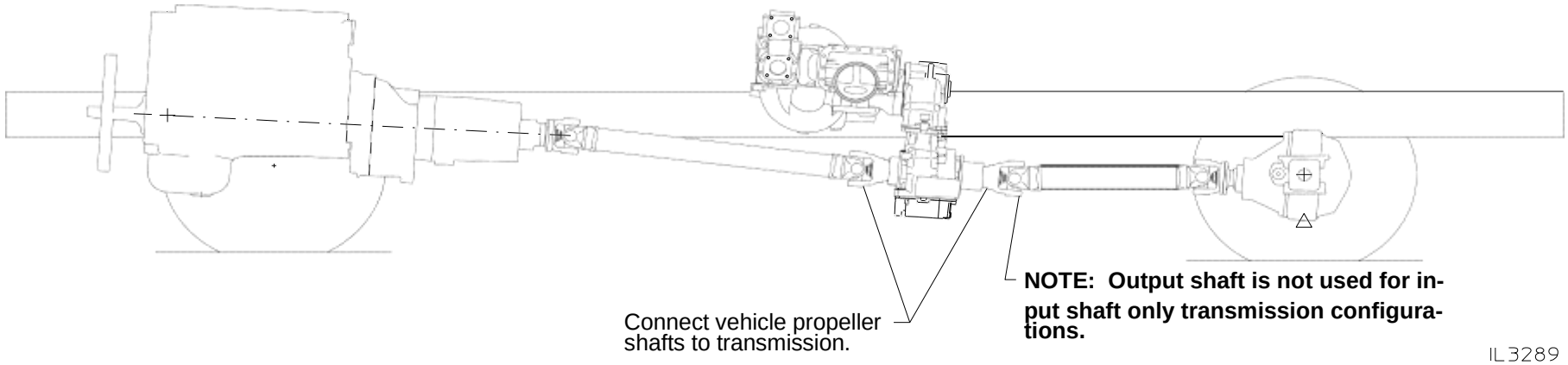
a. Loosen the idler sprocket by turning the large hex screw counterclockwise.
b. Turn the idler sprocket adjustment screw clockwise to apply tension to the belt. Check the belt tension by applying a 10 pound load to the belt midway between the drive and driven sprocket. The belt should deflect between .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 Transmission in Vehicle (Continued)

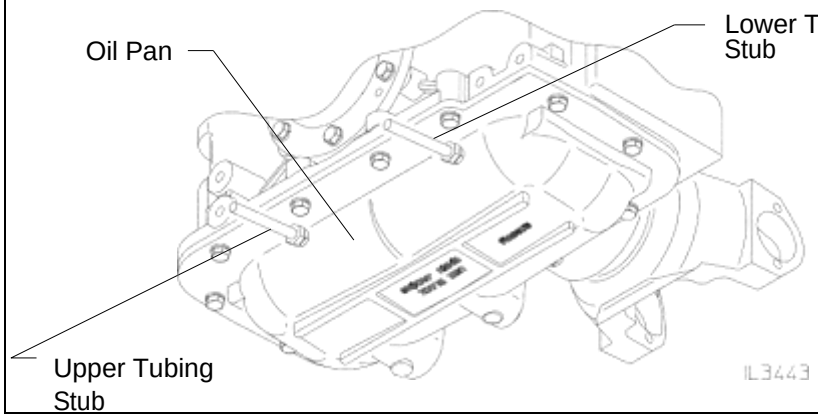
CM, CMU, CS and CSU Pump Models	CMH, CMUH, CSH and CSUH Pump Models
Transmission is installed in vehicle when attached to the pump. See Page 84 and 85.	See pump overhaul instructions.
CG and CX Pump Models	**S100 Pump Models**
Install pump and transmission assembly in vehicle using original mounting brackets. Reconnect intake and discharge piping.	Install pump and transmission assembly in vehicle using original mounting brackets. Reconnect intake and discharge piping.

Connection of Propeller Shaft (Driveline)



Connecting Cooling Lines to Transmission Oil Pan

Transmissions built between December 8, 2009 and January 1, 2011.



1. Connect oil cooler to a water supply as follows:

a. On units equipped with a Waterous transmission mounted cable operated drain valve, using flexible tubing, connect one tubing stub to a “Discharge” port on the drain valve and the other tubing stub to an “Intake” port. DO NOT connect either stub to an “Isolated” port.

b. On units not equipped with a Waterous transmission mounted cable operated drain valve, using flexible tubing, connect one tubing stub to an opening on the pump discharge. Connect the other tubing stub to an opening on the pump intake. Openings must be 1/4-inch NPT minimum to ensure adequate water flow through the cooler. Provisions must be made to drain the cooler at the lower tubing stub.

IMPORTANT: Use 3/8-inch minimum tubing and fittings to connect to tubing stubs.

Make sure all plumbing lines are free of low points to ensure proper drainage.

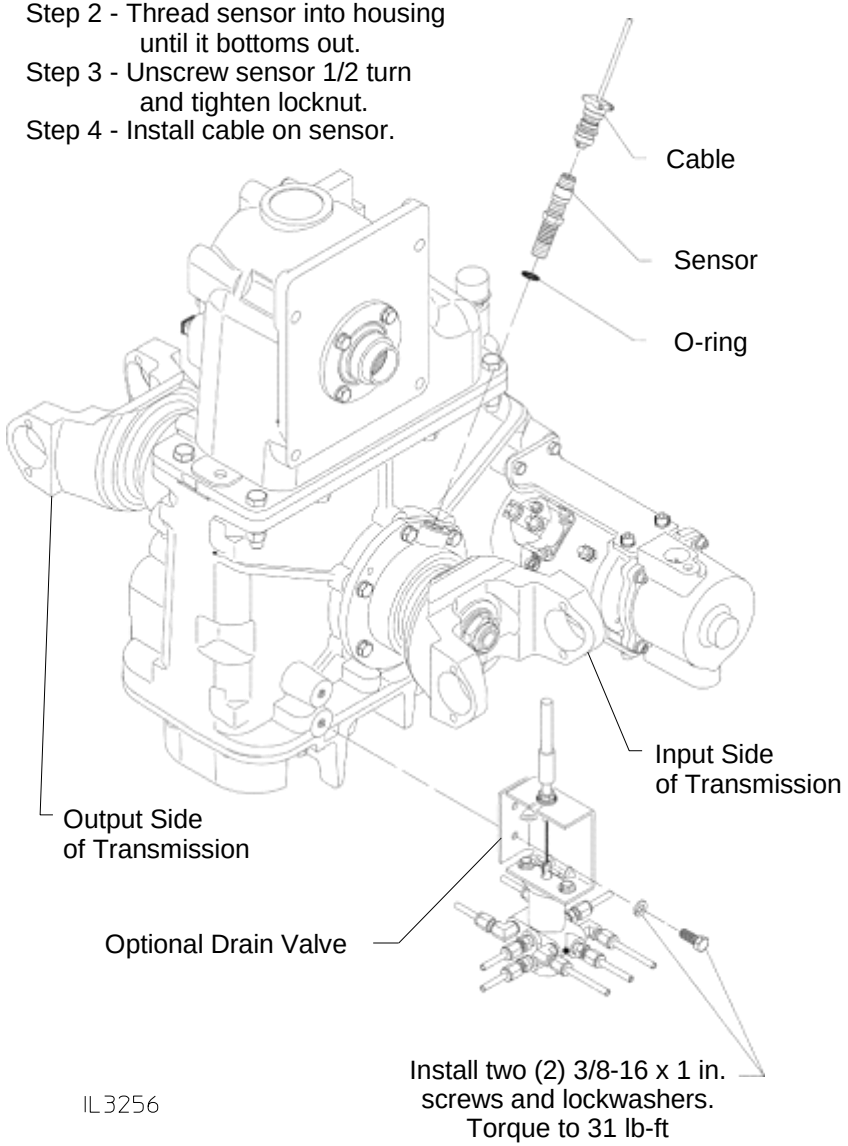
Reassembly - Installation of Transmission in Vehicle (Continued)

Connection of Optional Accessories

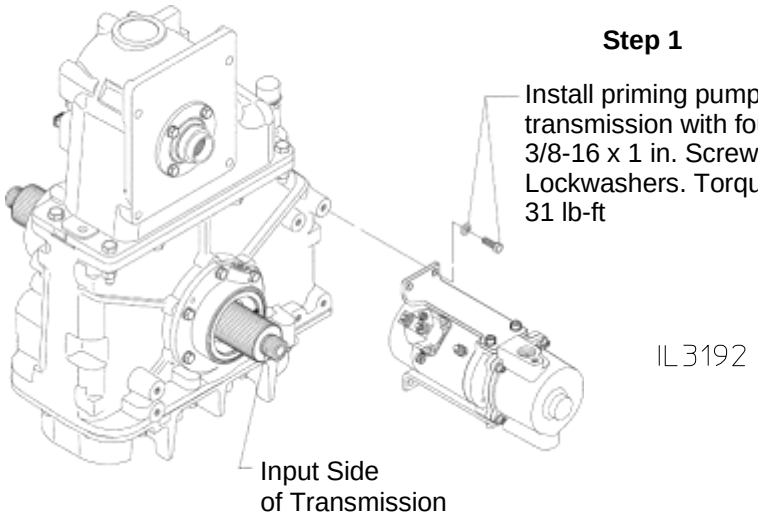
Tachometer Cable and Drain Valve

Optional Tachometer:

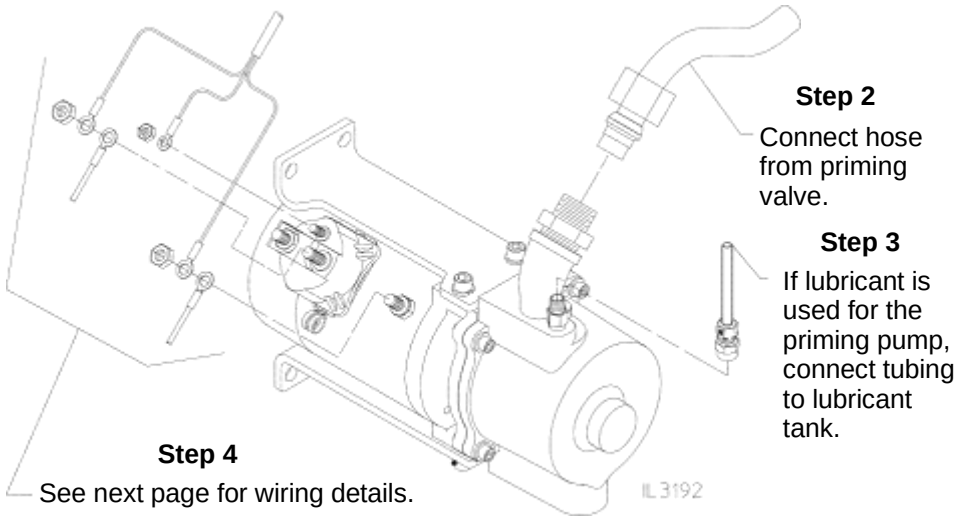
Step 1 - Install O-ring on sensor.
Step 2 - Thread sensor into housing until it bottoms out.
Step 3 - Unscrew sensor 1/2 turn and tighten locknut.
Step 4 - Install cable on sensor.



Priming Pump - Mounting on Transmission



Priming Pump - Hose Connections



Reassembly - Installation of Transmission in Vehicle (Continued)

Connection of Optional Accessories

Priming Pump - Wiring Connections

CONN-C W RNG O PR M NG PUMP MO OR

PRIMING VALV- WIRING

VARIATION 1
VAP PRIMING
VALVE

12 VOLT

WHITE (SEE NOTE 2)
RED (SEE NOTE 1)
BLACK WIRE TO GROUND STUD (SEE NOTE 1)

RED
WHITE
BLACK

24 VOLT

WHITE (SEE NOTE 2)
RED (SEE NOTE 1)
BLACK WIRE TO GROUND STUD (SEE NOTE 1)

VARIATION 2
MANUAL/ELECTRIC
PRIMING VALVE

12 VOLT

BLACK (SEE NOTE 2)
WHITE OR RED (SEE NOTE 1)

WHITE OR RED
BLACK

24 VOLT

BLACK (SEE NOTE 2)
WHITE OR RED (SEE NOTE 1)

VARIATION 3
SOLENOID ACTUATED
PRIMING VALVE

12 VOLT

BLACK (SEE NOTE 1)

WHITE (SEE NOTE 2)
RED (SEE NOTE 1)
BLACK WIRE TO GROUND STUD (SEE NOTE 1)

RED
WHITE
BLACK

24 VOLT

WHITE (SEE NOTE 2)
RED (SEE NOTE 1)
BLACK WIRE TO GROUND STUD (SEE NOTE 1)

A-1120

BA -RY AND GROUND CABL-

POWER CABLE TO BATTERY (SEE NOTE 1)

GROUND CABLE TO CHASSIS (SEE NOTE 1)

12 OR 24 VOLT MOTOR

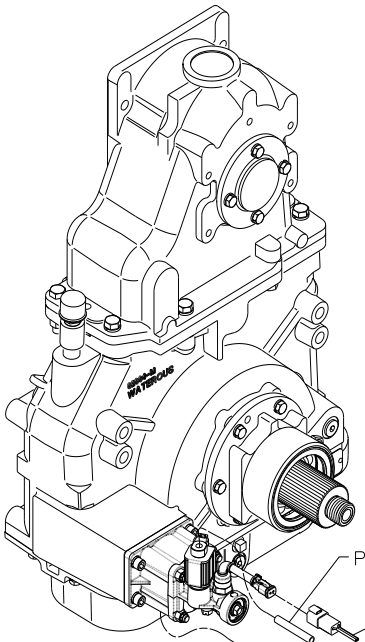
NOTES:
1. TIGHTEN TO 50-60 IN/LBS (4-5 FT/LBS)
   DO NOT OVER TIGHTEN
2. TIGHTEN TO 15-20 IN/LBS (1-2 FT/LBS)
   DO NOT OVER TIGHTEN

IL3349

Reassembly - Installation of Transmission in Vehicle (Continued)

Connection of Optional Accessories

Shift Unit



IL3191

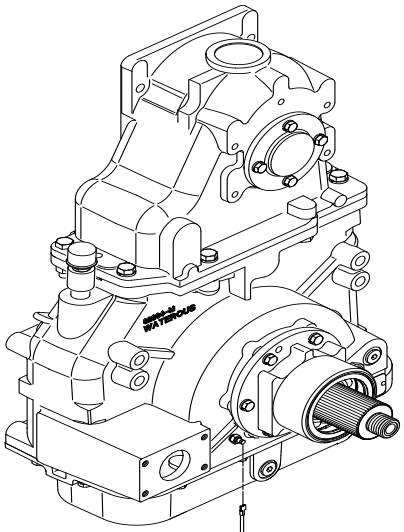
PORT 1, ROAD MODE

CONNECT WIRING TO PANELS

PORT 2, PUMP MODE

CONNECT AIR LINES TO SHIFT UNIT. IF NEW LINES ARE REQUIRED, USE 1/4 OR 3/8 IN. SAE J844 AIR BRAKE HOSE.

Oil Temperature Sensor



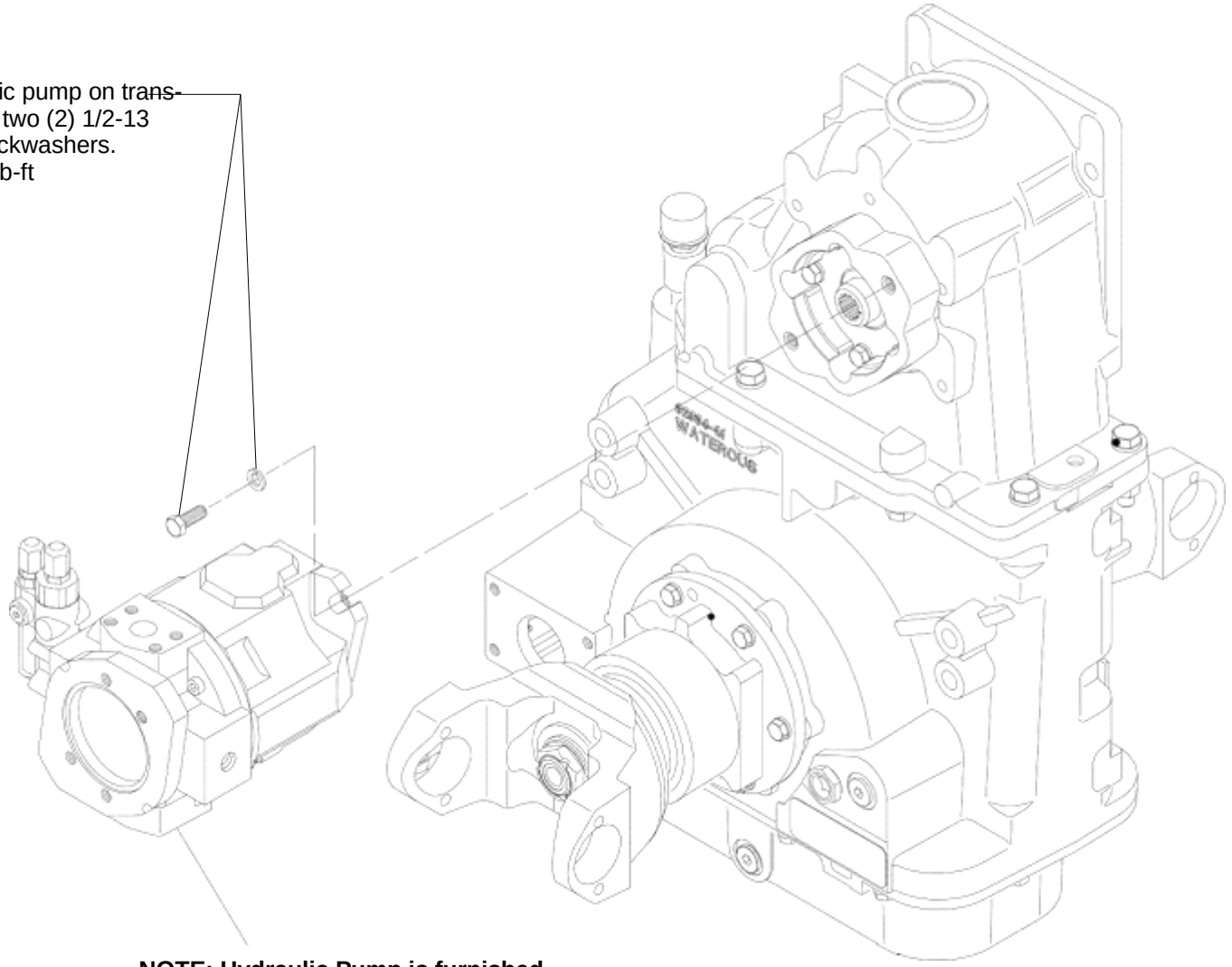
IL3290

SHIFT UNIT REMOVED FOR CLARITY

IF TRANSMISSION HAS AN OPTIONAL OIL TEMPERATURE SENSOR, RE-CONNECT WIRE

Hydraulic Pump on Rear or Front Output

Install hydraulic pump on transmission 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.

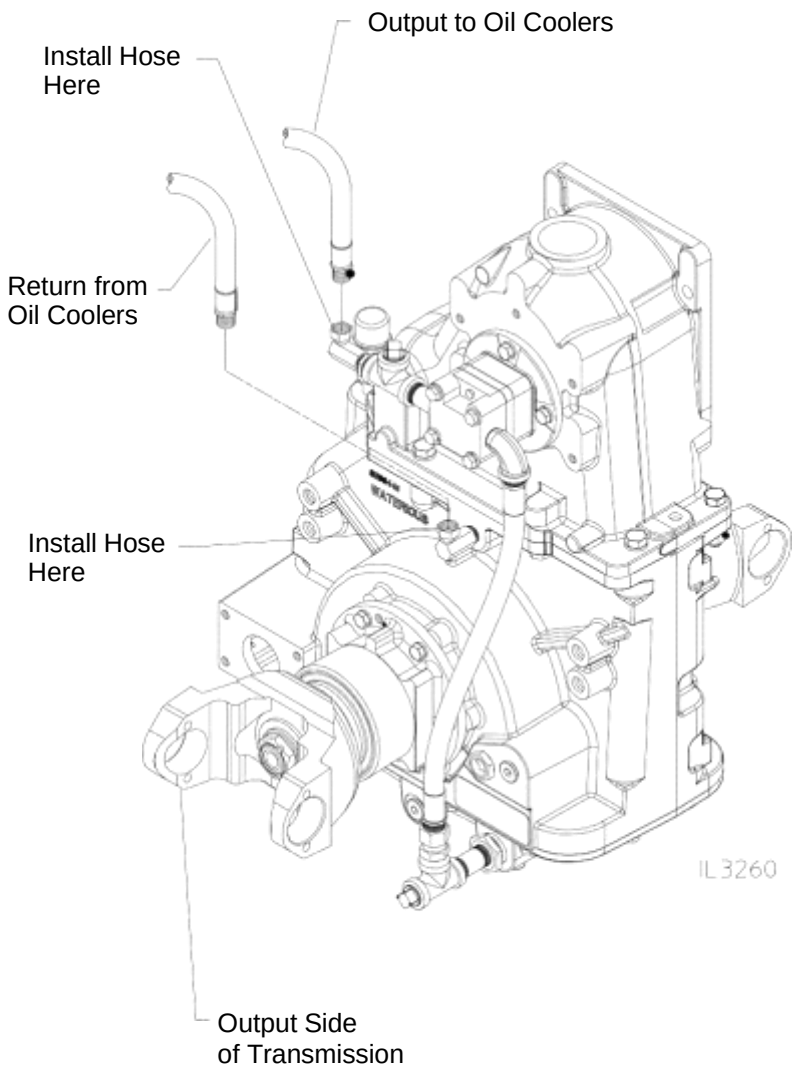
IL3263

Reassembly - Installation of Transmission in Vehicle (Continued)

Connection of Optional Accessories

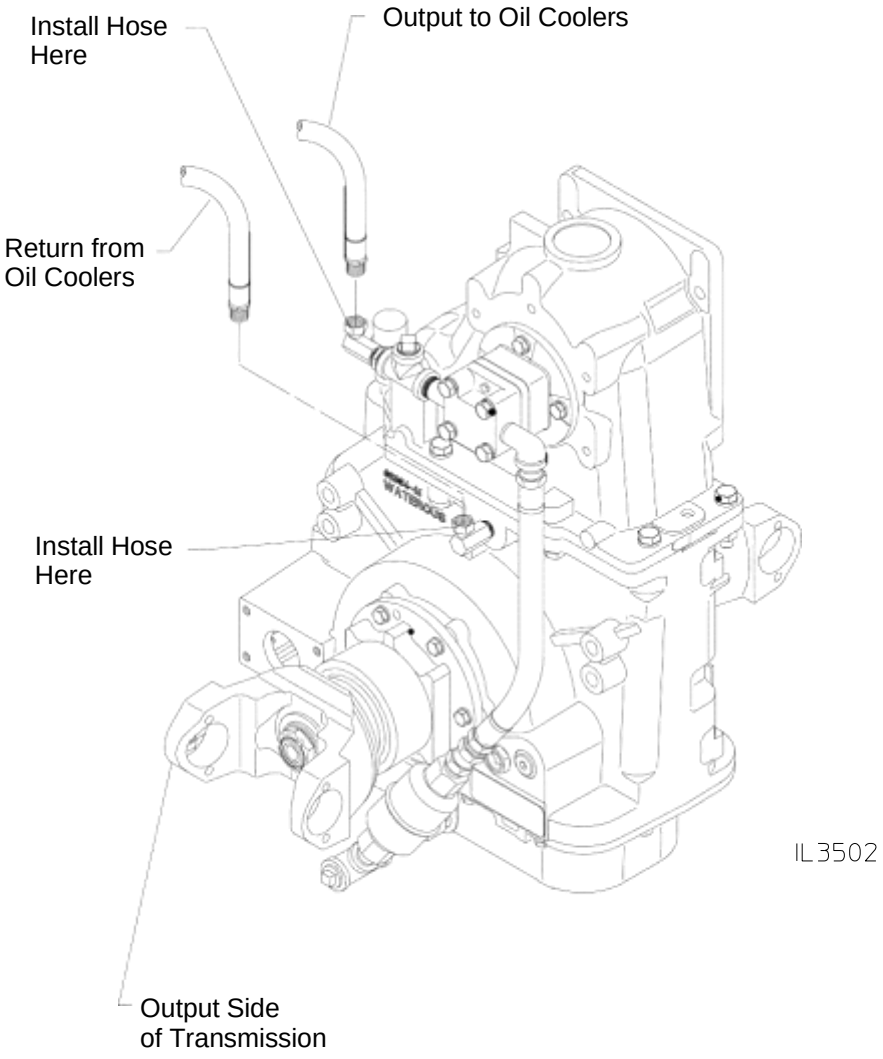
Oil Cooler Pump on Rear Output

Transmissions Built Prior to January 1, 2011.



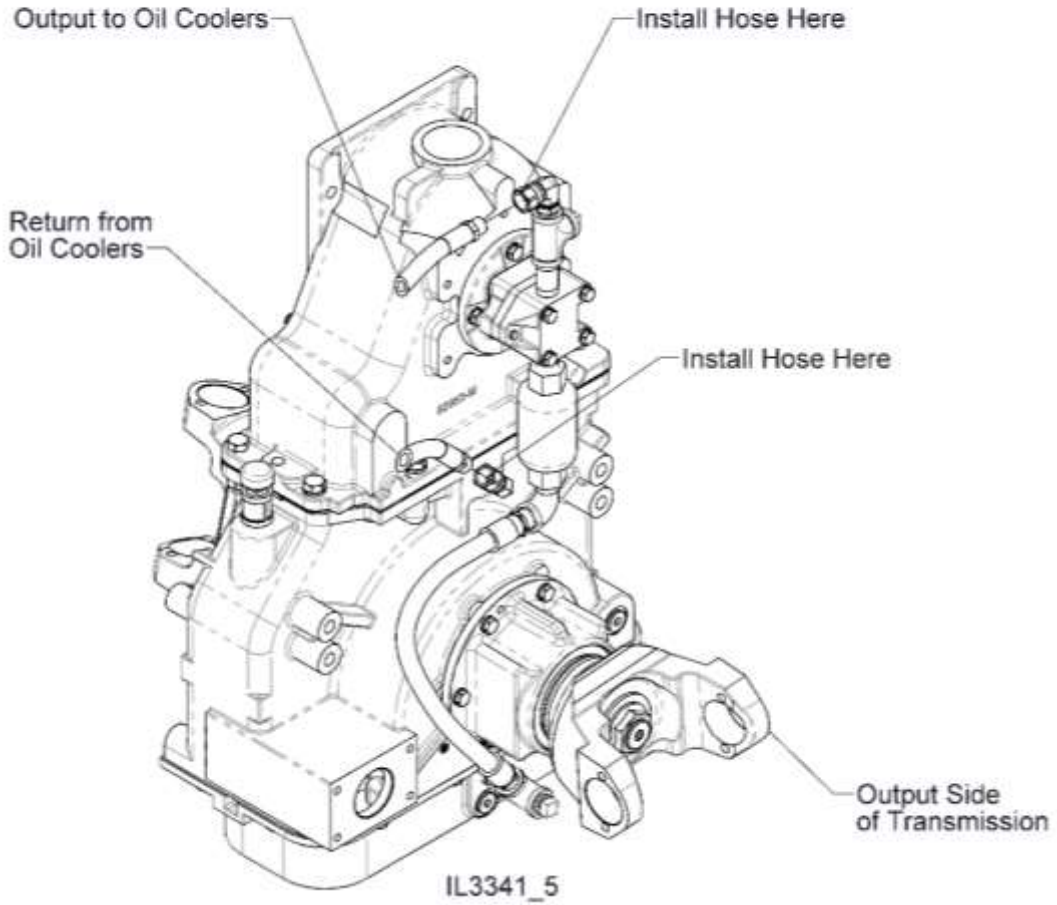
Oil Cooler Pump on Rear Output

Transmissions Built January 1, 2011 to April 8, 2020.



Oil Cooler Pump on Rear Output

Transmissions Built After April 8, 2020.

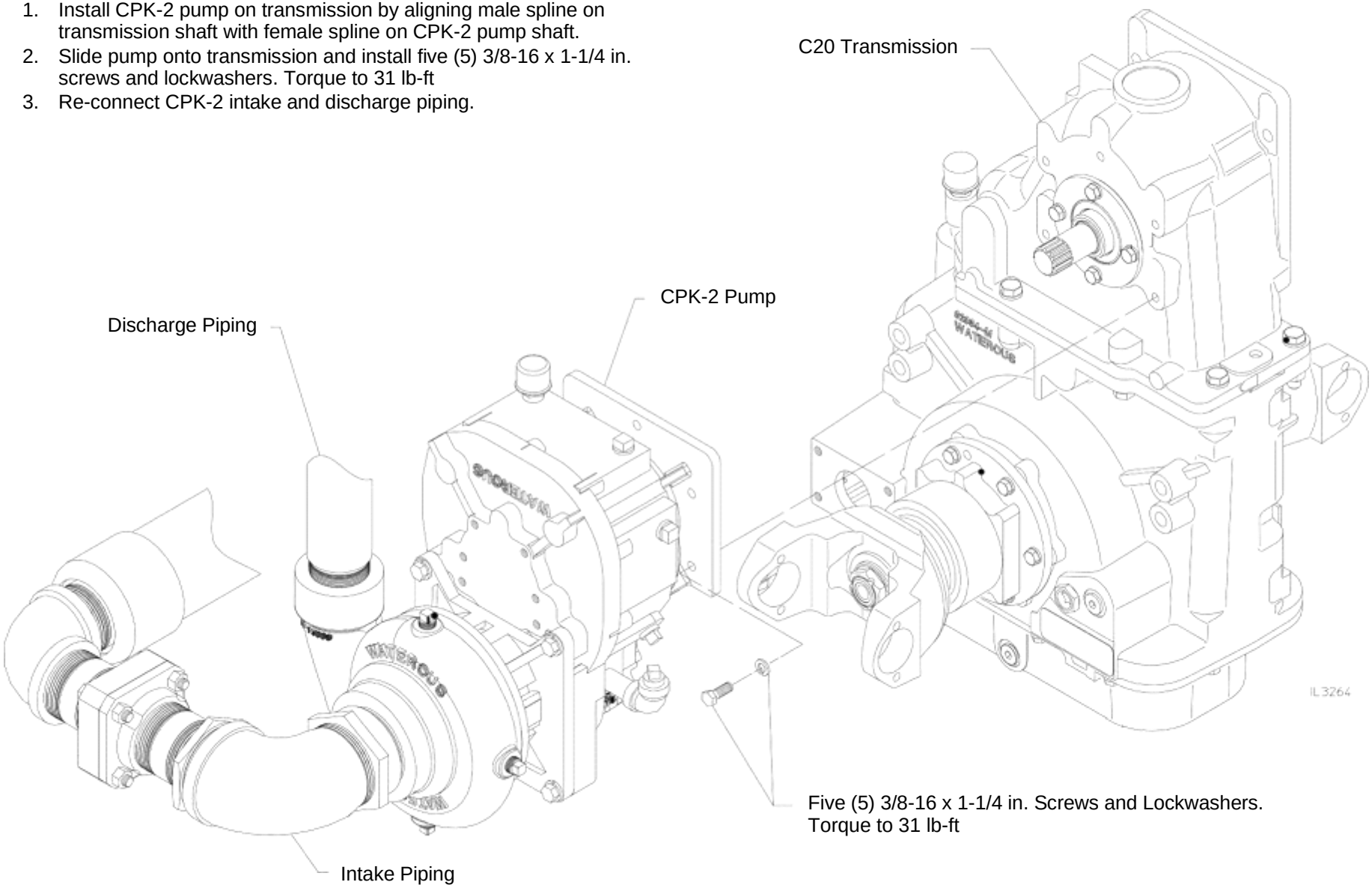


Reassembly - Installation of Transmission in Vehicle (Continued)

Connection of Optional Accessories

Combination Pump on Rear Output

1. Install CPK-2 pump on transmission by aligning male spline on transmission shaft with female spline on CPK-2 pump shaft.
2. Slide pump onto transmission and install five (5) 3/8-16 x 1-1/4 in. screws and lockwashers. Torque to 31 lb-ft
3. Re-connect CPK-2 intake and discharge piping.

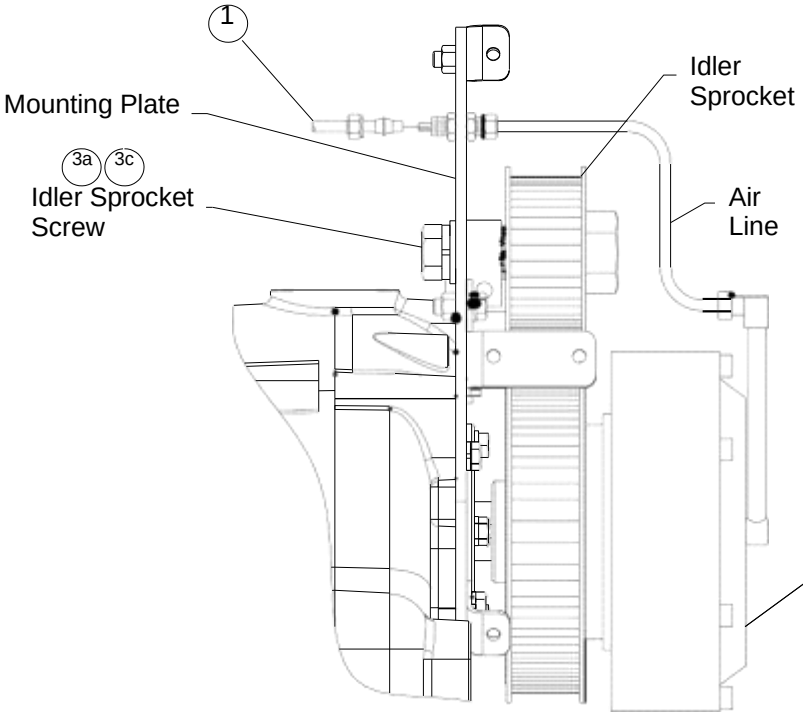


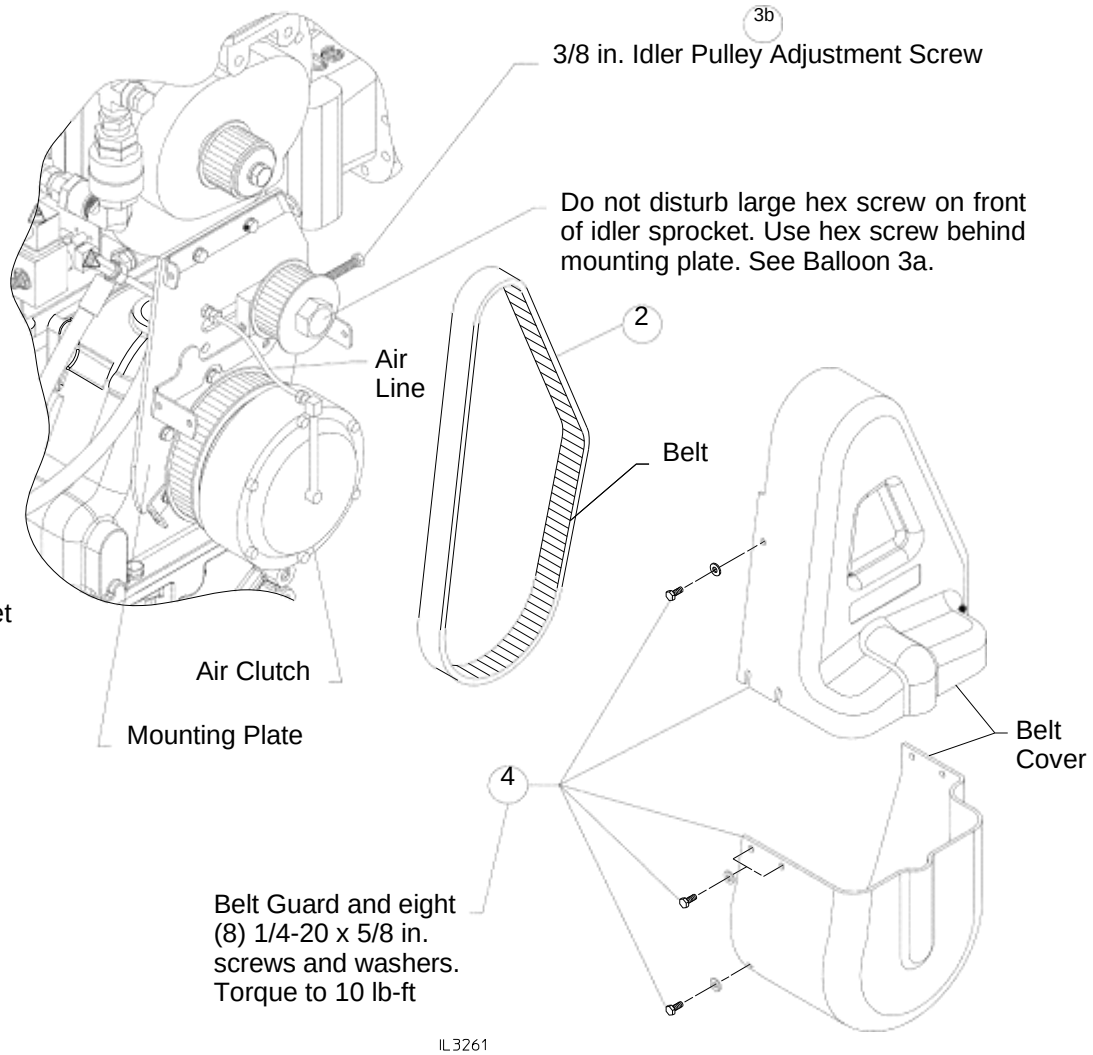
Reassembly - Installation of Transmission in Vehicle (Continued)

Connection of Optional Accessories

Eclipse™ CAFS on Rear Output

1. Connect clutch air line behind mounting plate.
2. Install belt.
3. Adjust belt tension as follows:
   a. Loosen idler sprocket screw on the back of the mounting plate.
   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 screw on the back of the mounting plate.
4. Install the belt guard using the eight (8) 1/4-20 x 5/8 in. screws and washers (4 per side). Torque to 10 lb-ft



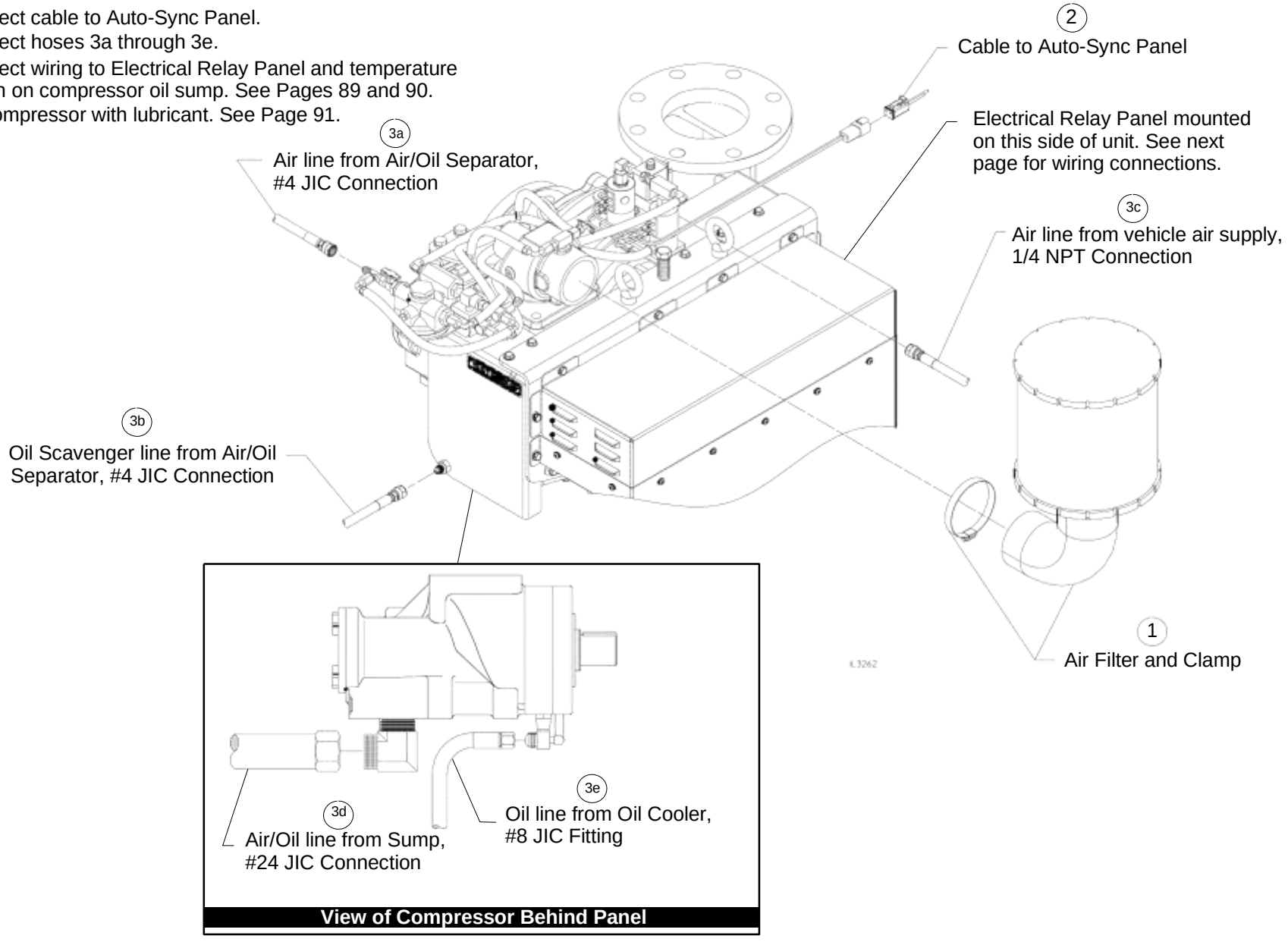


Reassembly - Installation of Transmission in Vehicle (Continued)

Connection of Optional Accessories

Eclipse ES CAFS on Rear Output - Hoses and Cables

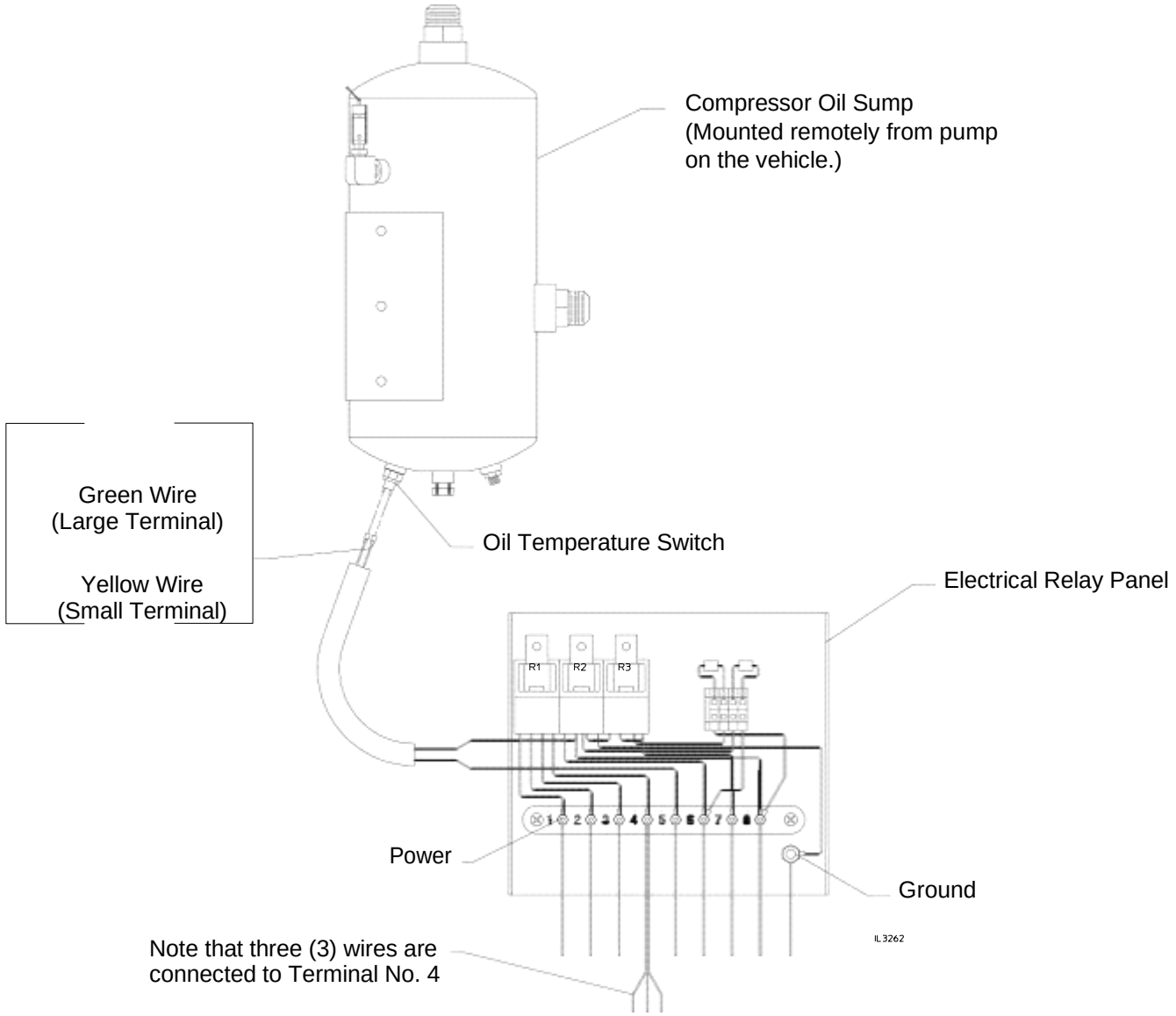
1. Install air filter.
2. Connect cable to Auto-Sync Panel.
3. Connect hoses 3a through 3e.
4. Connect wiring to Electrical Relay Panel and temperature switch on compressor oil sump. See Pages 89 and 90.
5. Fill compressor with lubricant. See Page 91.



View of Compressor Behind Panel

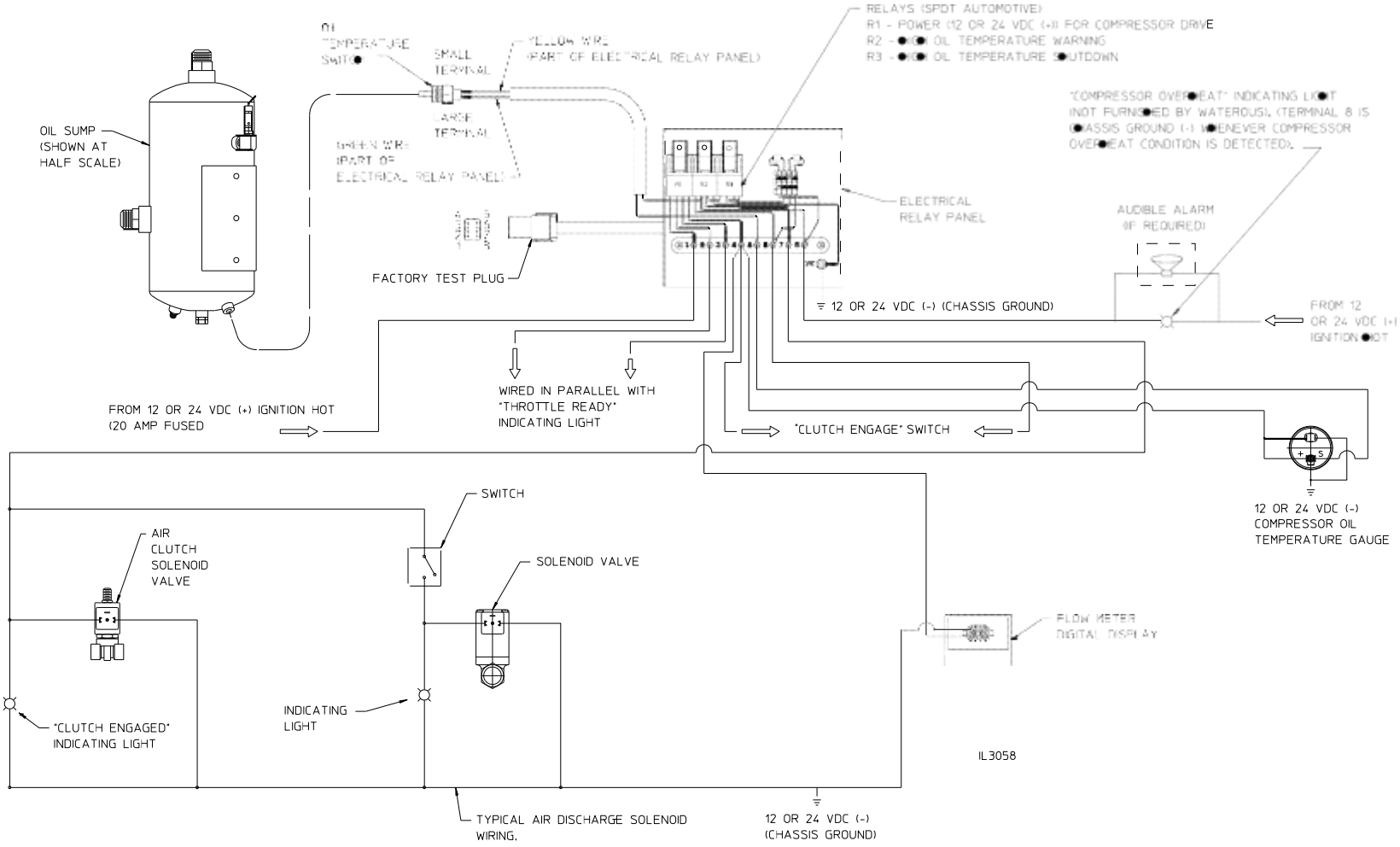
Connection of Optional Accessories

Eclipse ES CAFS on Rear Output - Electric Wiring



Eclipse ES CAFS on Rear Output - Electric Wiring Continued

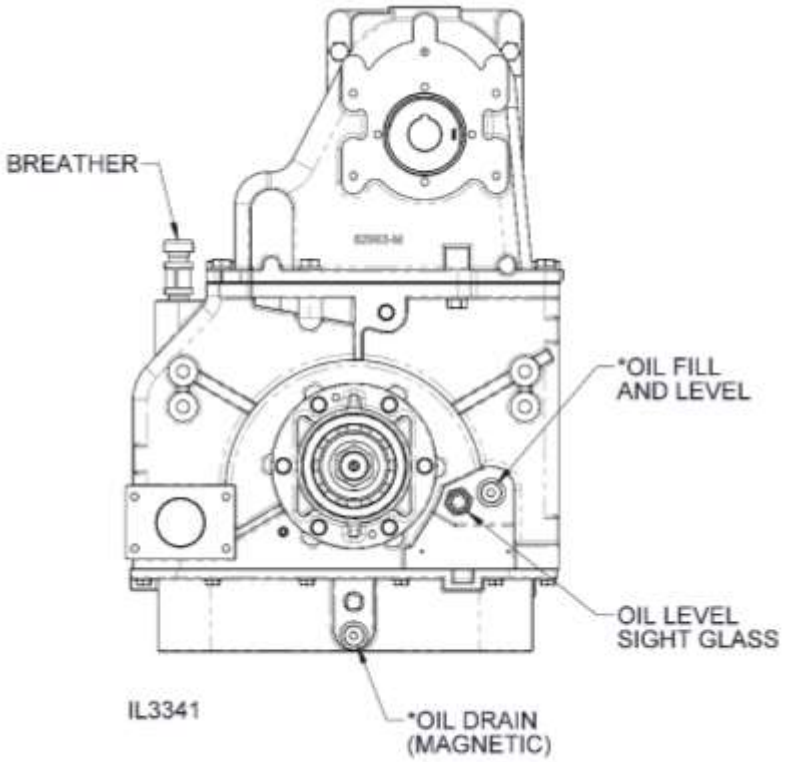
Wiring Schematic



Reassembly - Lubrication

C20 Transmission

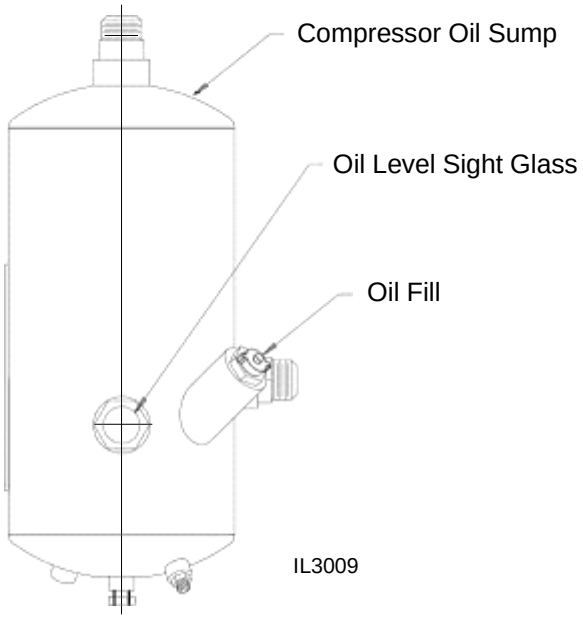
1. Fill the transmission through the oil level hole or by removing the breather and adding fluid through the opening. Any type of automatic transmission fluid (ATF) may be used. Capacity is approximately 6 quarts. Fill to the bottom of the threads in the oil level port.
2. Re-check all fasteners for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



*TORQUE TO 15 LB-FT MAXIMUM

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 pump shift indicating lights at least weekly as follows:

NOTE: Block wheels with wheel chocks before beginning.

1. With the pump in the ROAD position, truck transmission 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
   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 transmission to NEUTRAL.
   a. Ensure that the green OK TO PUMP light in the cab is off (automatic truck transmission only).
5. Shift to ROAD
   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 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 97 for instructions.

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 89 for instructions.