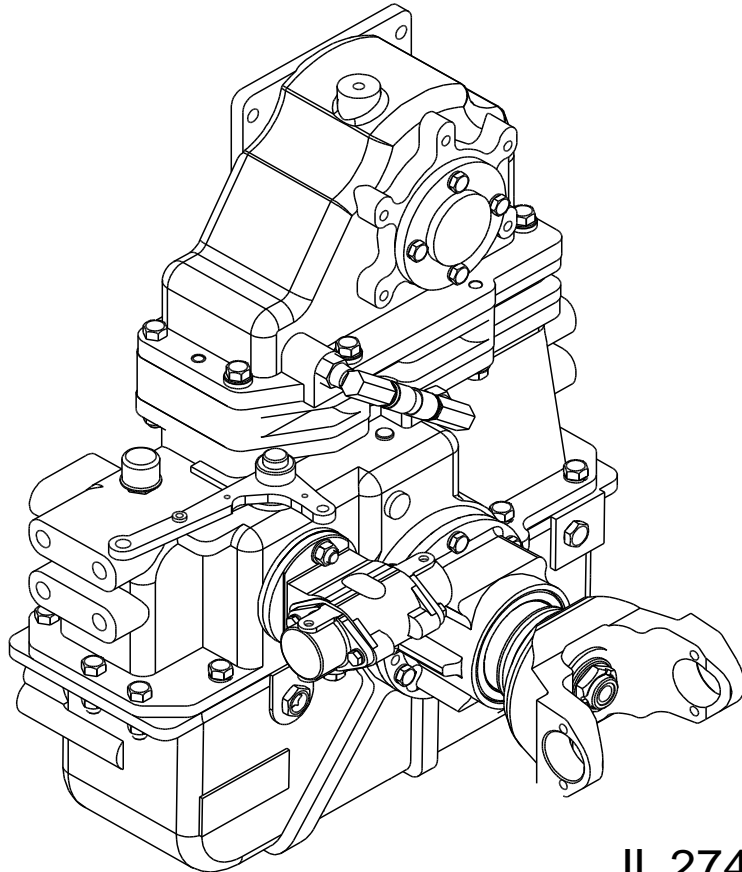


# C10 Chain Drive Transmission Overhaul Instructions

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NOTE: Instructions subject to change without notice

F-1031, Section 4314 (1/9/18)

## Introduction

This instruction provides the necessary steps required to overhaul the C10 transmission. These instructions are divided into Disassembly and Reassembly sections. Also, refer to the Service Parts List (SPL documents) furnished with your C10 transmission to aid in further part identification and repair parts ordering.

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## General Description

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The Waterous C10 is a chain driven transmission with a housing constructed of high-strength aluminum. Drive and driven sprockets are made of hardened steel and have ground bores. Shafts are made of alloy steel

forgings, hardened and ground to size. A passive lubrication system eliminates the need for a separate oil pump. The shift mechanism is a constant-mesh, two-position sliding collar that engages all teeth simultaneously.

**Note that the majority of C10 fasteners are metric.**

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## Disassembly

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Before beginning the disassembly process, drain the fluid from the transmission by removing the drain plug. Note that these instructions apply for out of chassis overhaul of the unit.

### Propeller Shaft Disconnect and Accessory Removal

#### ***Propeller Shaft Disconnect***

Disconnect the propeller shafts.

#### ***Electrical Connections***

Disconnect the tachometer cable, shift wiring and electric shift override linkage.

#### ***Shift Unit***

Remove the pneumatic shift unit from the transmission by removing the two hex nuts and washers. Note that the adjusting screw retainers are exposed when the shift unit is removed. Special care should be taken to prevent the retainers from falling out of the transmission.

### Eclipse CAFSystem™ Removal from Transmission

To remove the Eclipse CAFSystem from the transmission, perform the following steps:

1. Remove air connections from the air clutch assembly.
2. Remove the Polychain cover assembly by unscrewing the four (4) hex nuts.
3. Loosen the 1-29/32" hex screw on the idler sprocket assembly. This releases the idler sprocket assembly for adjustment.

4. Loosen tension on the Polychain by turning the Polychain tension screw, counter clockwise.
5. Remove the Polychain from the air clutch assembly, driven sprocket and idler sprocket.
6. Remove the four (4) cap screws that attach the transmission to the pump.
7. Remove the transmission from the pump. Note that the air clutch assembly will remain on the transmission.

### Eclipse ES CAFSystem™ Removal from Transmission (See Figure 1)

To remove the Eclipse ES CAFSystem from the transmission, perform the following steps:

1. Support the Eclipse ES unit with a lifting strap placed under the air compressor. Two other eyeloops are also provided for lifting (see Figure 1).
2. Remove all electrical and air connections.

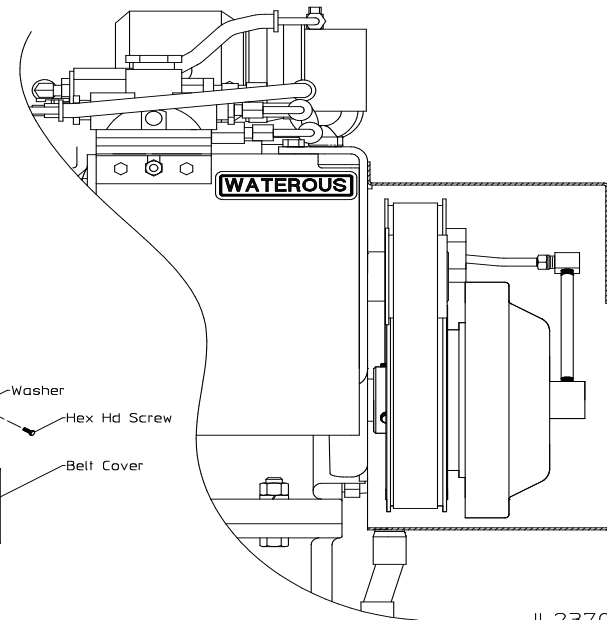
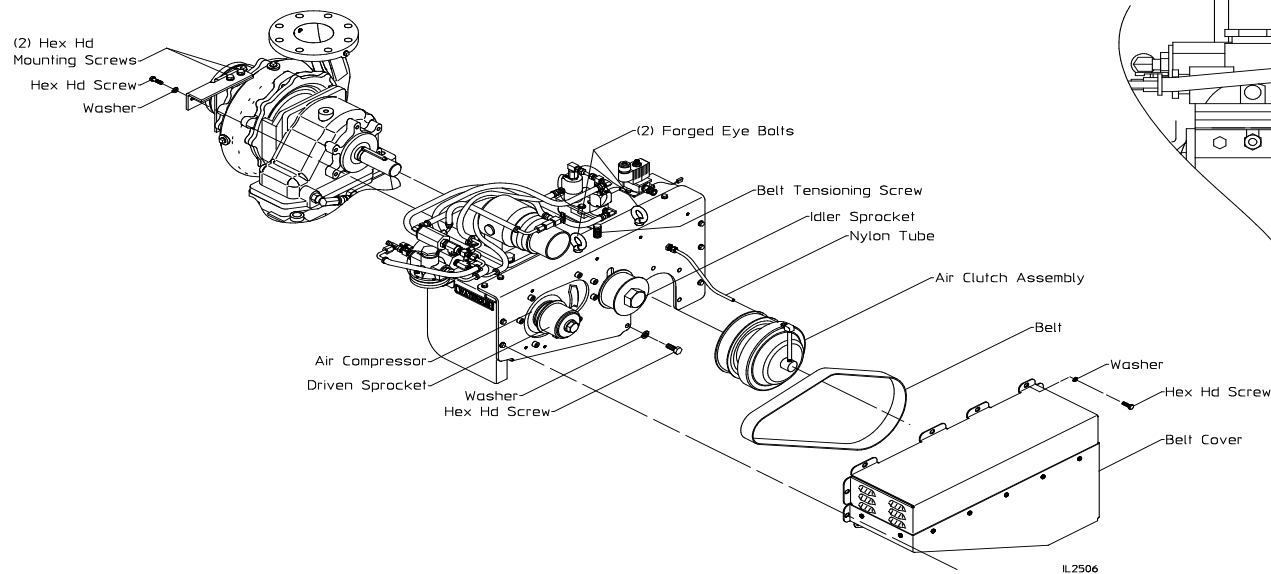
3. Remove the Polychain cover assembly by unscrewing the ten (10) hex hd screws.
4. Remove the nylon tube from the air clutch assembly.
5. Loosen the 1-29/32" hex screw on the idler sprocket assembly. This releases the idler sprocket assembly for adjustment.

6. Loosen tension on the Polychain by turning the Polychain tension screw, counter clockwise.
7. Remove the Polychain from the air clutch assembly, driven sprocket and idler sprocket.
8. Loosen the set screw that holds the air clutch assembly to the transmission driven shaft. (See Figure 2).
9. Remove the hex head screw that attaches the air clutch assembly to the anti-rotation bracket (leave grommet attached to anti-rotation bracket).

10. Remove the air clutch assembly from the transmission.
11. Remove the five (5) hex hd screws that attach the Eclipse ES unit to transmission.
12. Remove the compressor bracket that supports the Eclipse ES unit to the transmission.
13. Lift the unit off the transmission.

**Figure 1. Eclipse ES CAFSystem™ Removal**

**Figure 2. Eclipse ES - Air Clutch Assembly (Side View)**



## Pump Removal from Transmission for Separable Impeller Shafts

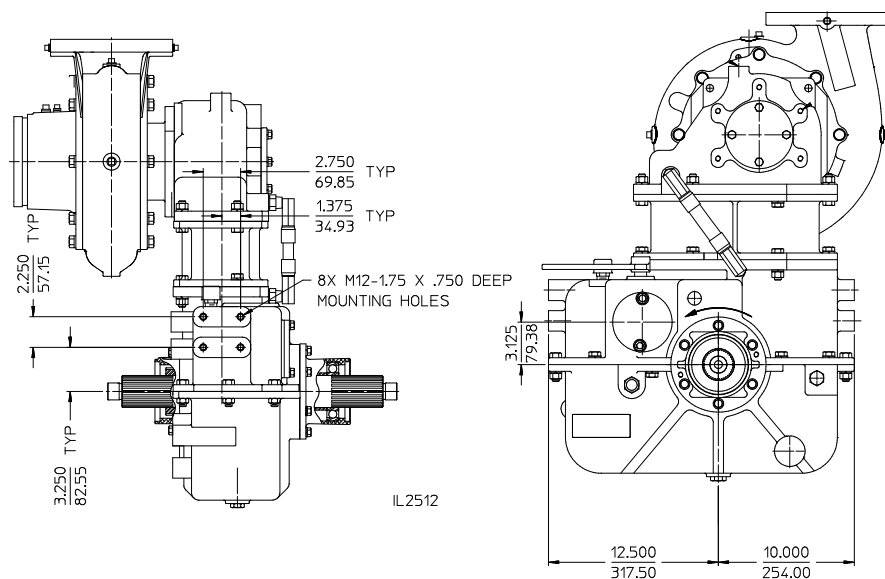
Refer to the pump overhaul instructions for information on how to remove the pump from the transmission.

### Disassembly of the C10 Transmission

The C10 consists of three sections; the cap, the mid-section and the bottom section. The order of disassembly is bottom section, mid-section and then cap.

**NOTE: Out of chassis overhaul will require supporting the transmission initially in an upside down position, possibly attaching it direct to an engine overhaul stand at the face of the cap (fabrication of an adapter would be required) or using the side mounting pads (see Figure 3).**

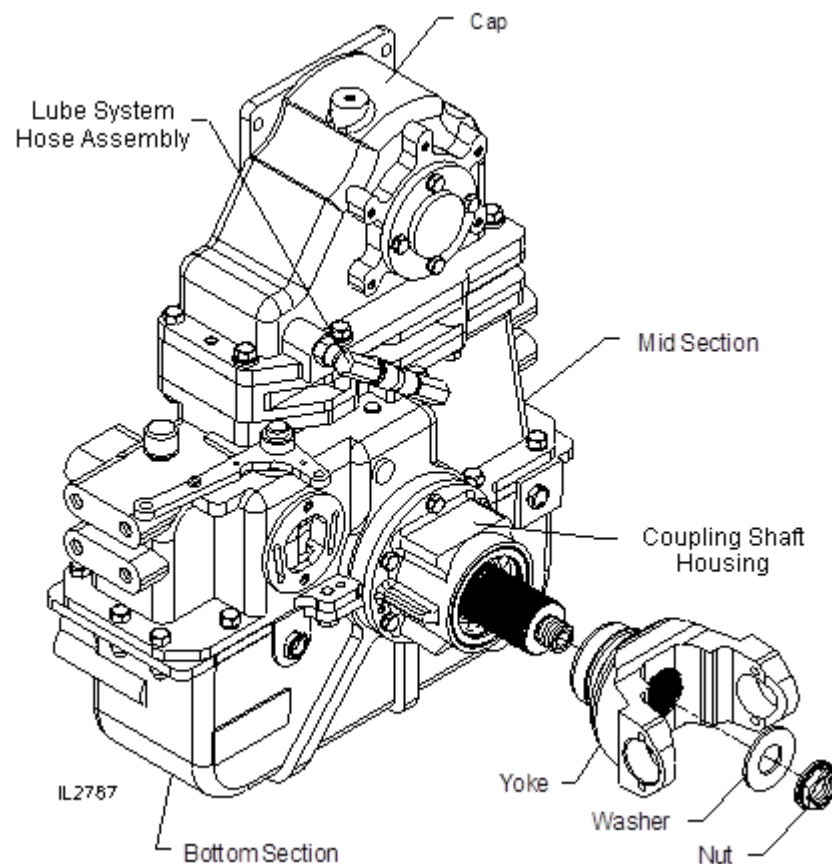
**Figure 3. Supporting Transmission (CXC10 Shown)**



### Removal of End Yokes

1. Remove the end yokes from the drive and coupling shafts. Do not reuse self-locking nuts. Apply lubricating oil to the threads before moving. Apply anti-seize to the threads before installing a new self-locking nut.
2. Remove the lube system hose.

**Figure 4. Removal of End Yokes**

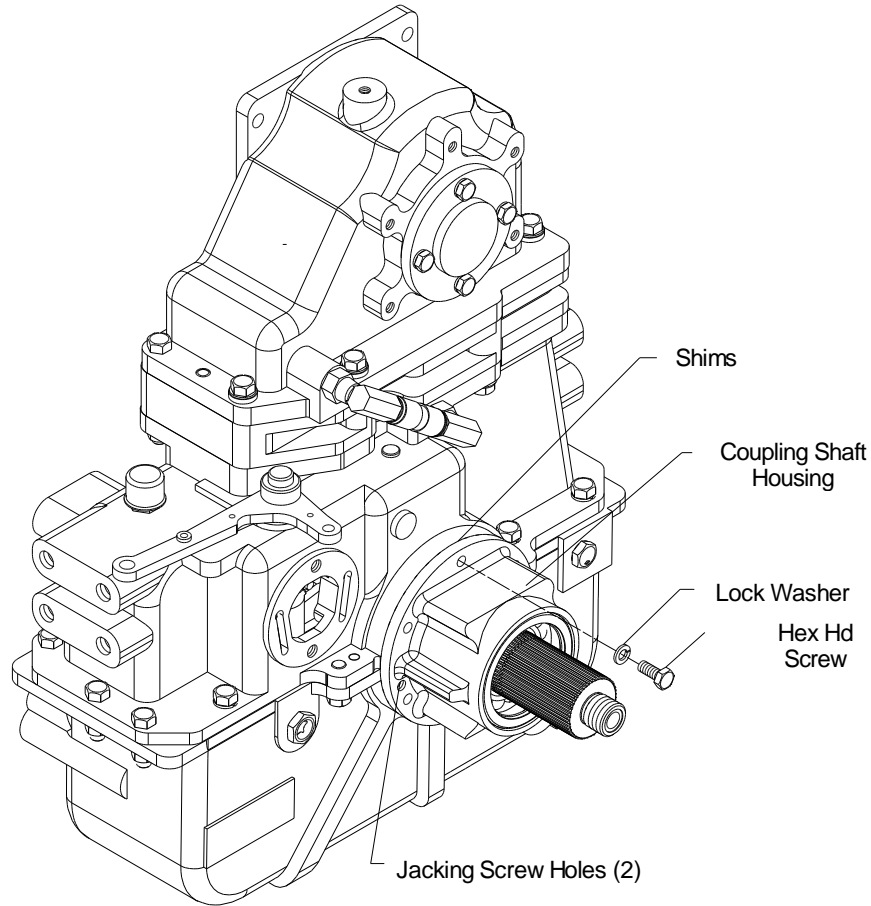


### **Coupling Shaft Housing Removal**

1. Remove the hex head screws and lock washers attaching the coupling shaft housing to the mid-section.
2. Remove the coupling shaft housing, O-ring and shims. Note that jacking screw holes are provided.

**NOTE: The coupling shaft and its associated parts may come with the housing. If not, pull on the coupling shaft to remove.**

**Figure 5. Removal of Coupling Shaft Housing**

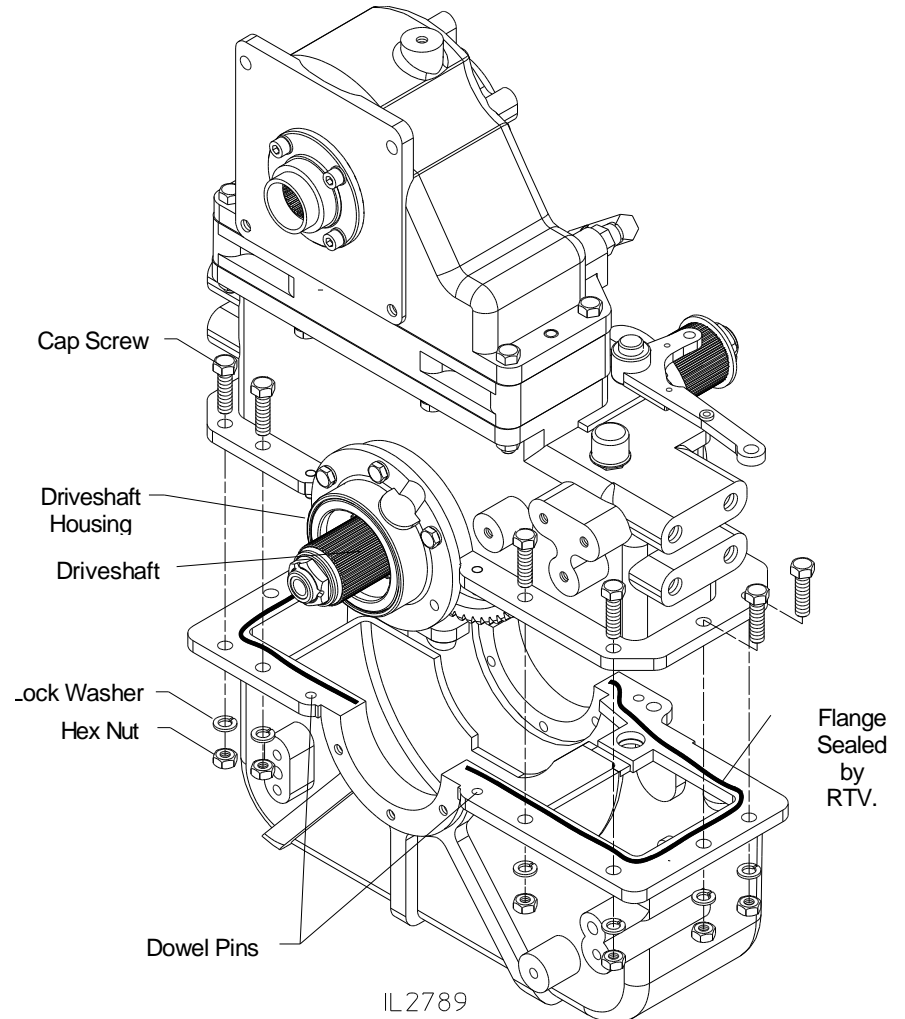


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### **Removing the Bottom Section**

1. Invert the case.
2. Remove lower cap screws connecting the driveshaft housing to the bottom section. Loosen cap screws connecting housing to case mid-section.
3. Remove the cap screws, nuts and lock washers attaching the bottom section to the mid-section.
4. Drive the four dowel pins out of the bottom section flange.
5. Remove the bottom section from the mid-section.

**Figure 6. Removal of the Bottom Section**

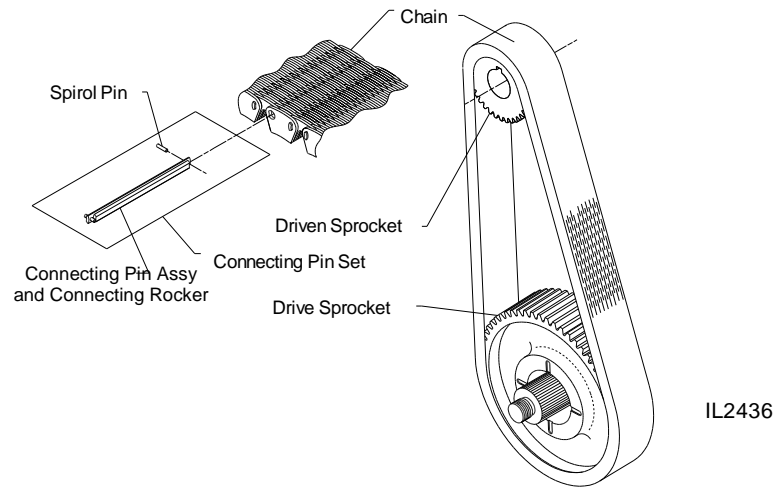


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## Removal of Chain

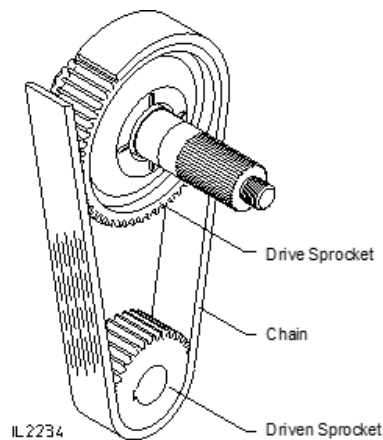
1. Rotate the drive shaft until removable connecting pin set of the chain is visible at the drive sprocket. The removable connecting pin set has a spirol pins on both ends holding it in place (see Figure 7).

**Figure 7. Removable Connecting Pin Set**



2. Remove the tapped in spirol pin on one end, tap both the connecting pin assembly and connecting rocker out of the chain links. Disengage the chain from the drive and driven sprocket and remove from the case.

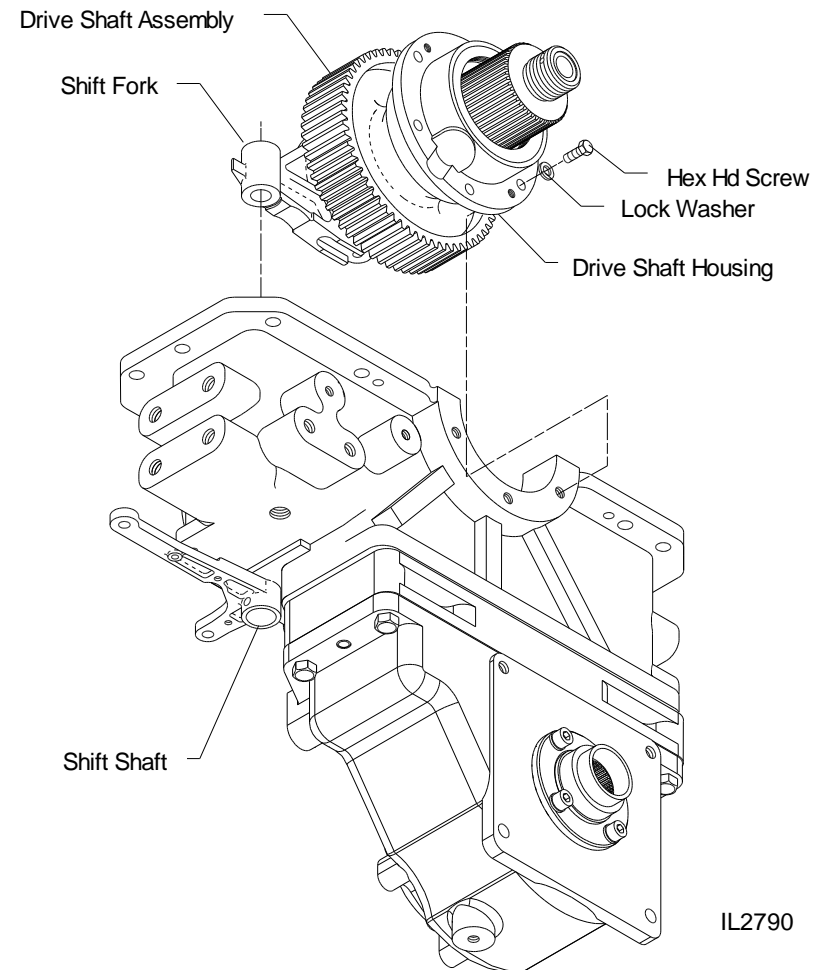
**Figure 8. Chain Removal**



## Removal of Drive Shaft and Housing

1. Remove the remaining hex head screws and lock washers attaching the drive shaft housing to the mid-section. The housing, drive shaft, drive sprocket, shift collar and associated parts can now be removed as a unit from the mid-section. The shift fork will slip off the shift shaft when the drive shaft assembly is lifted out.

**Figure 9. Removal of Drive Shaft and Housing**



## Removal of Shift Components

1. Remove the shift shoe from the locking arm.
2. Slip locking arm off pivot pin.

**NOTE: The pivot pin and shift shaft bushing (typically pressed into the bottom section) need only be removed if bent or otherwise damaged.**

3. Remove the shoulder screw that attaches the sector gear and shift lever to the shift shaft and remove the sector gear, shift lever and spacer.
4. Reposition mid and cap section assembly on the supports so that the cap portion is on top or set the assembly on a bench.
5. Remove spirol pin attaching the shift arm to the shift shaft (Figure 10b) if necessary.
6. Remove the shift arm, shift lock spring and shift shaft.

Figure 10a. Removal of Shift Component - (Internal)

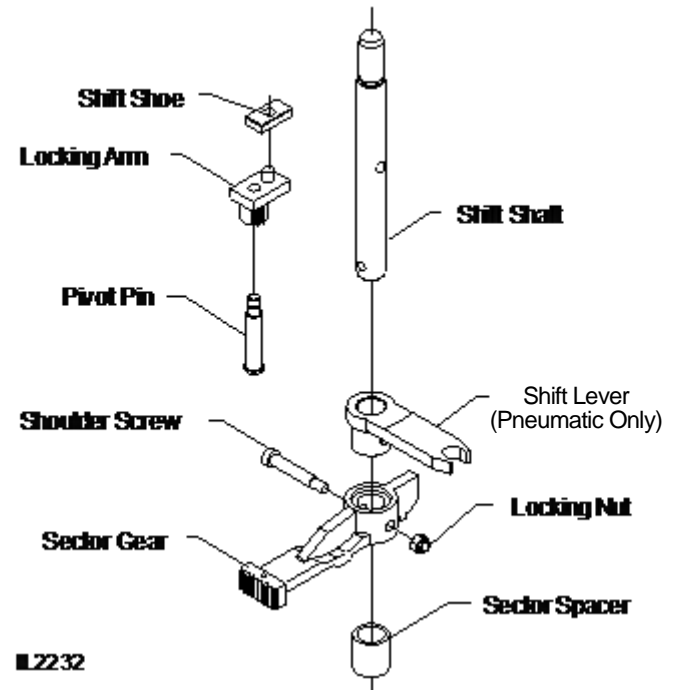
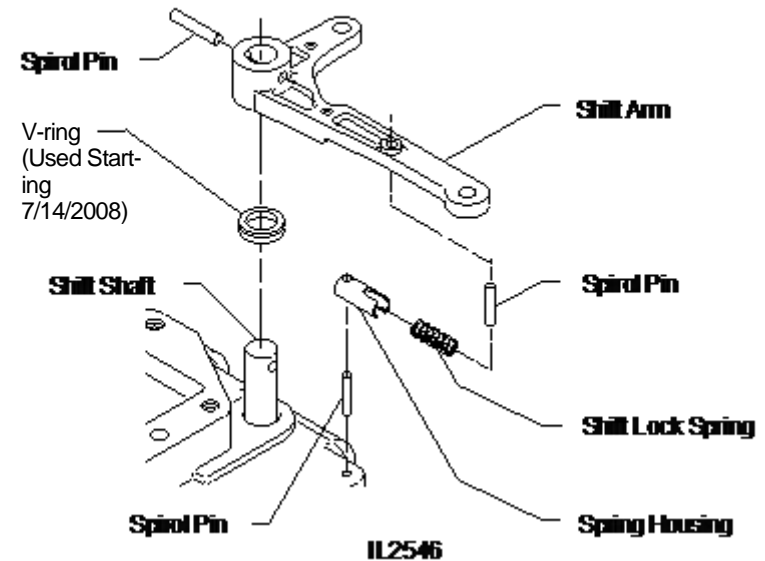


Figure 10b. Removal of Shift Components (External)



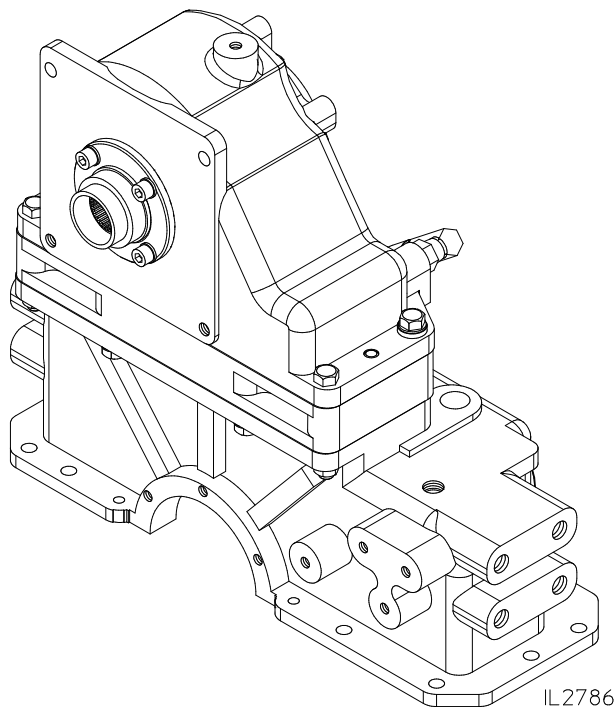
### Removal of Mid-Section from Cap

The cap does not need to be removed from the mid-section unless either is being replaced. **NOTE: Removal will make it easier to handle the assembly during driven shaft removal and reassembly.**

1. Remove cap screws and nuts that attach the cap to the mid-section.
2. Remove cap with driven shaft from the mid-section. Rapping the cap with a soft hammer will break adhesion with the shims, spacers and mid-section.

**NOTE: Do not drive the dowels through the flange of the cap deeper into the mid-section or spacer plates.**

**Figure 11. Removal of Mid-Section from Cap**



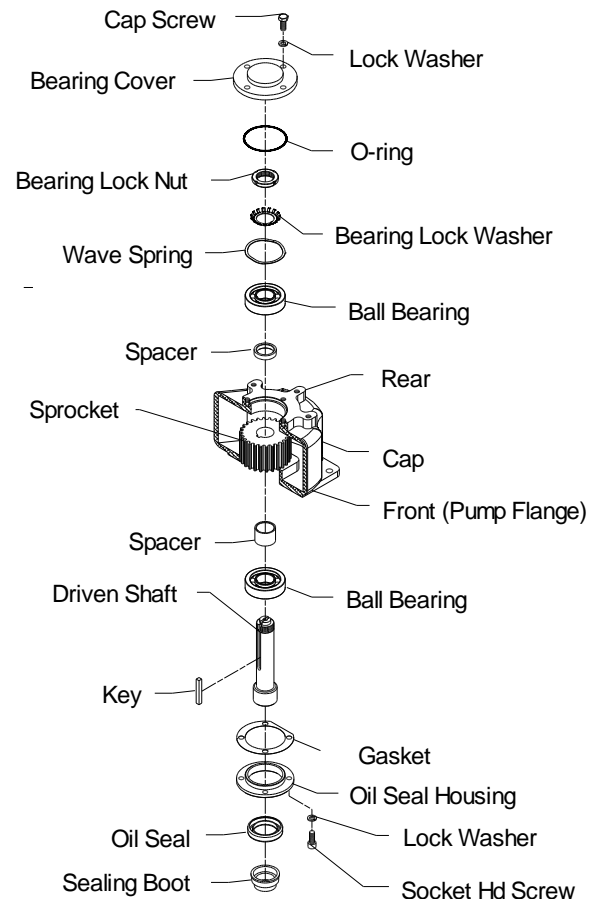
1. Remove any shims and spacers from the top of the mid-section.
2. The quantity and thickness of shims and spacers depends on transmission model and ratio.

### Disassembly of Driven Shaft Assembly

#### Separable Shaft

1. Remove the four cap screws from the bearing cover and the four socket hd screws from oil seal housing. Remove cover and housing from cap.
2. Straighten tab of the bearing lock washer from slot in bearing lock nut and then remove the lock nut, lock washer and wave spring.
3. Under a press, support the assembly on the front (pump flange) face side of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprockets.
4. Remove the ball bearing, spacers and sprocket from cap.

**Figure 12. Driven Shaft Disassembly - Separable Shaft**

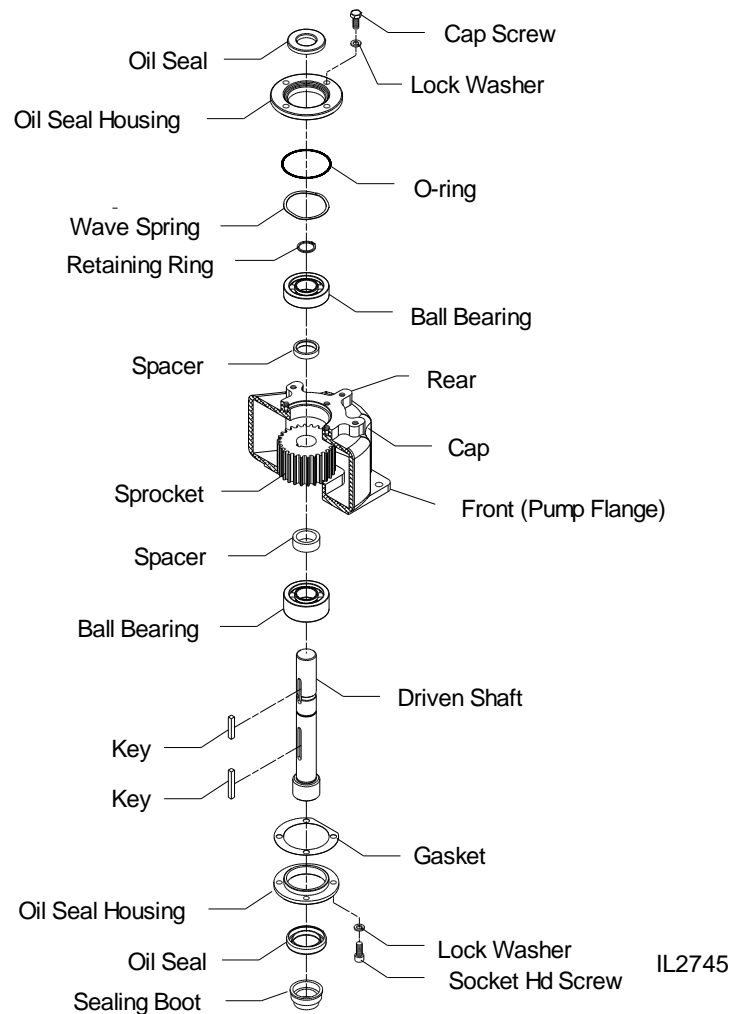




## Separable Shaft - Eclipse

1. Remove the four cap screws and four socket hd 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 (pump flange) face of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprockets.
4. Remove the ball bearing, spacer and sprocket from cap.

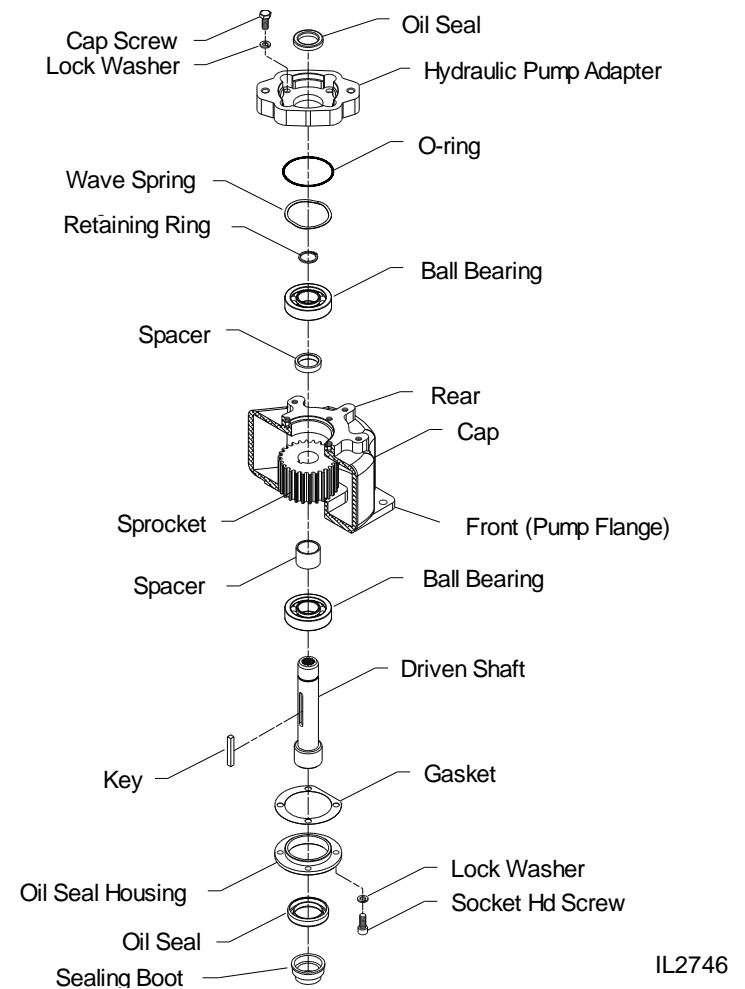
**Figure 13. Driven Shaft Disassembly - Eclipse**



## Separable Shaft - Hydraulic Adapter

1. Remove the four cap screws from the hydraulic pump adapter and the four socket hd 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 (pump flange) face of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.

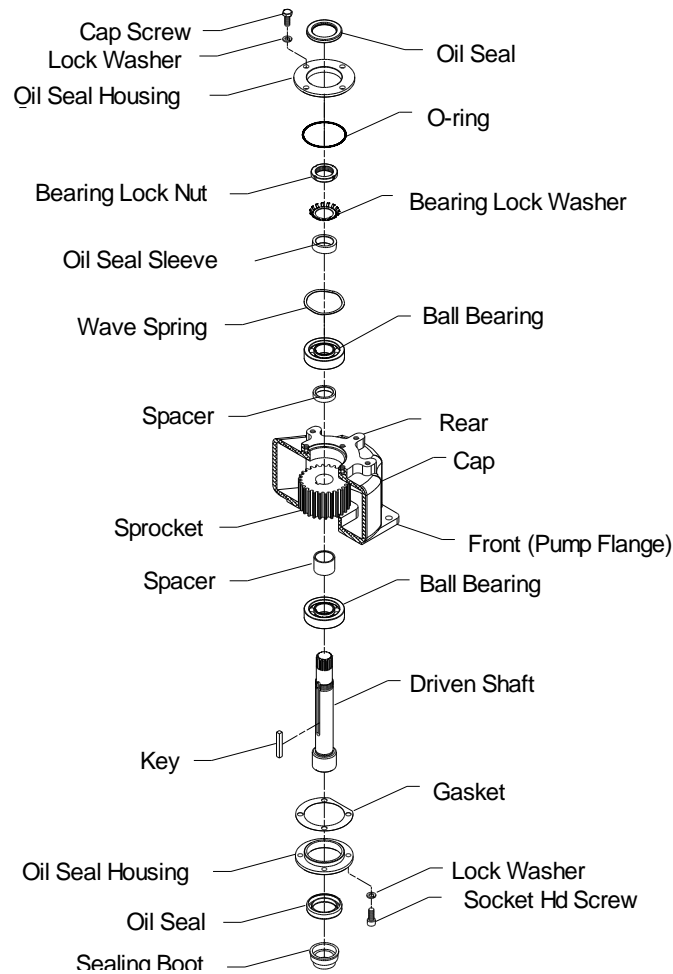
**Figure 14. Driven Shaft Disassembly - Hydraulic Adapter**



## Separable Shaft - Combination Pump

1. Remove the four cap screws and four socket hd screws that fasten the oil seal housings to the cap. Remove housings.
2. Straighten tab of the bearing lock washer from slot in bearing lock nut and then remove the lock nut, lock washer and wave spring.
3. Under a press, support the assembly on the front (pump flange) face of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.

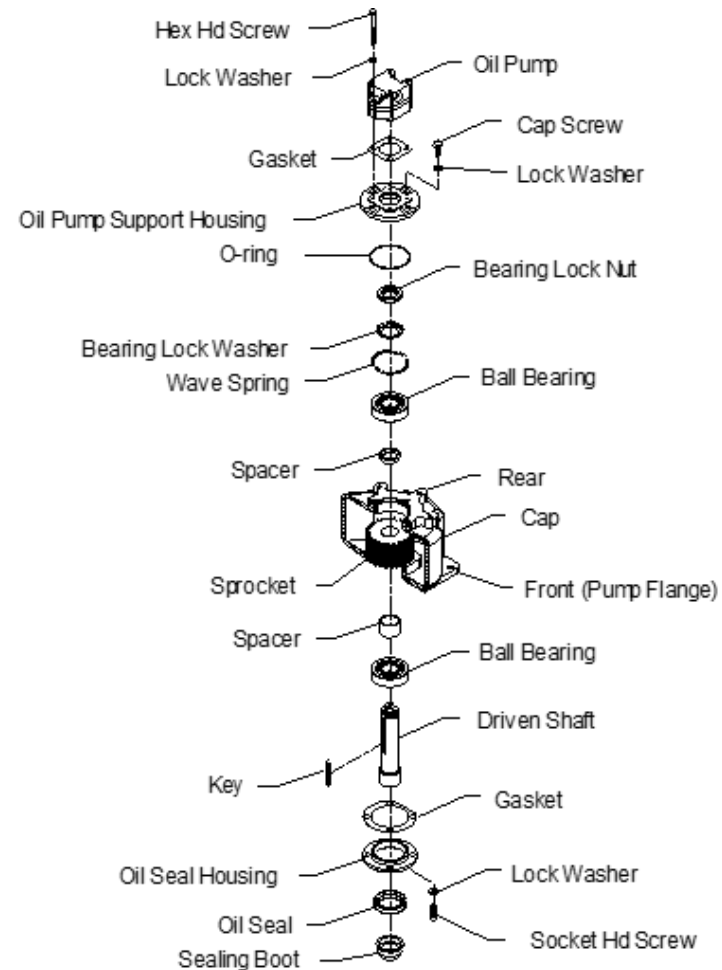
**Figure 15. Driven Shaft Disassembly - Combination Pump**



## Separable Shaft - Oil Cooler

1. Remove the four hex hd screws from the oil pump and the four socket hd screws from the oil seal housing. Remove oil pump and housing from cap.
2. Straighten tab of the bearing lock washer from slot in bearing lock nut and then remove the lock nut, lock washer and wave spring.
3. Under a press, support the assembly on front (pump flange) face of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.

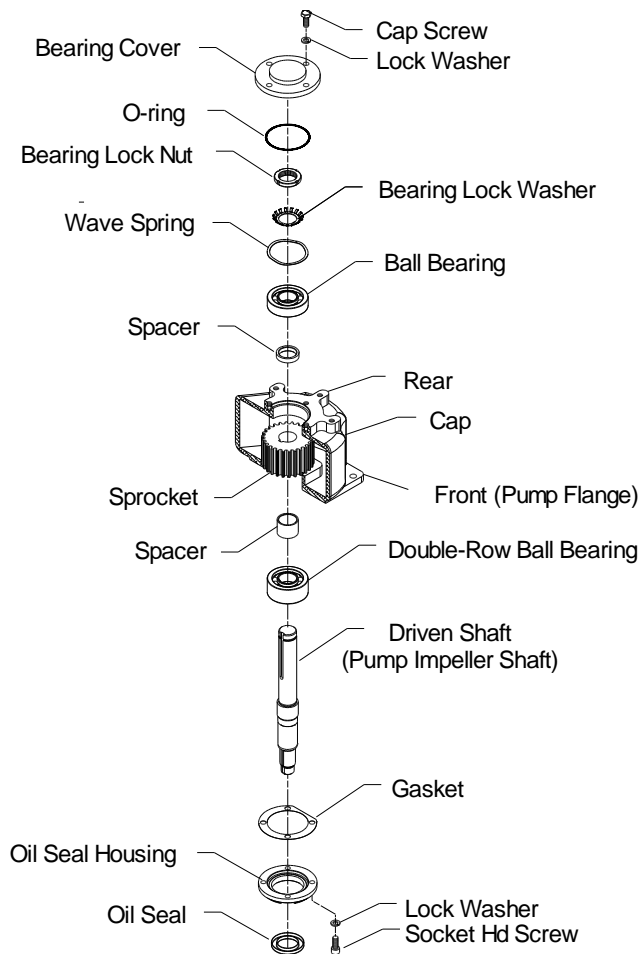
**Figure 16. Driven Shaft Disassembly - Oil Cooler**



### One-Piece Shaft (CG, CX, S100 Models)

1. Remove the four cap screws from the bearing cover and the four socket hd screws from the oil seal housing. Remove cover and housing from cap.
2. Straighten tab of the bearing lock washer from slot in bearing lock nut and then remove the lock nut, lock washer and wave spring.
3. Under a press, support the assembly on the front (pump flange) face of the cap and apply a press load to the end of the driven shaft to press the shaft out of the ball bearing, spacers and sprocket.
4. Remove the ball bearing, spacers and sprocket from cap.

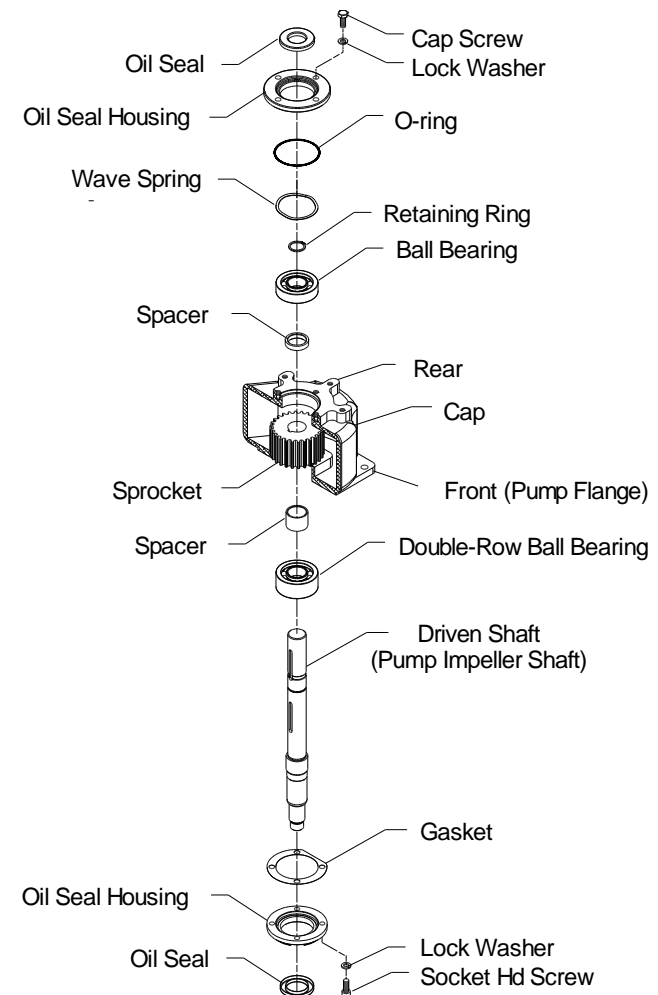
**Figure 17. Driven Shaft Disassembly - One-Piece Shaft (CG, CX, S100)**



### Eclipse ES Mounted CAFS (CX, S100 Models)

1. Remove the four cap screws and four socket hd 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 (pump flange) side of the case and apply a press load to the end of the driven shaft and press the shaft out of the ball bearing, spacers and sprocket. Rear ball bearing and retaining ring will come out with the driven shaft. Remove from shaft.
4. Remove the ball bearing, spacers and sprocket from cap.

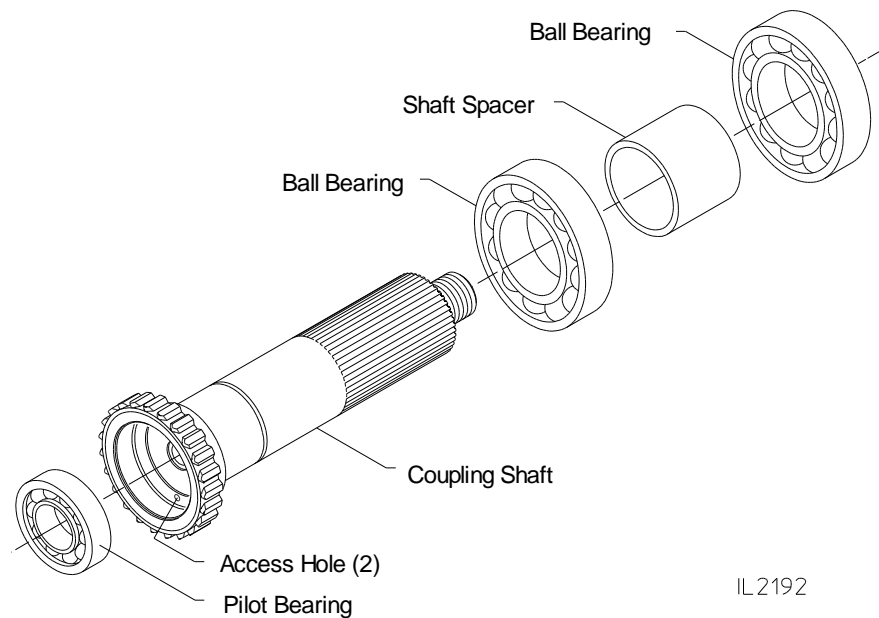
**Figure 18. Driven Shaft Disassembly - Eclipse ES (CX, S100 Models)**



### Disassembly of Coupling Shaft Assembly

1. Press coupling shaft housing off of ball bearings if not previously removed.
2. Pull outer ball bearing from the shaft.
3. 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.
4. Tap out pilot bearing if still in coupling shaft by using a punch through the two access holes in the coupling shaft.

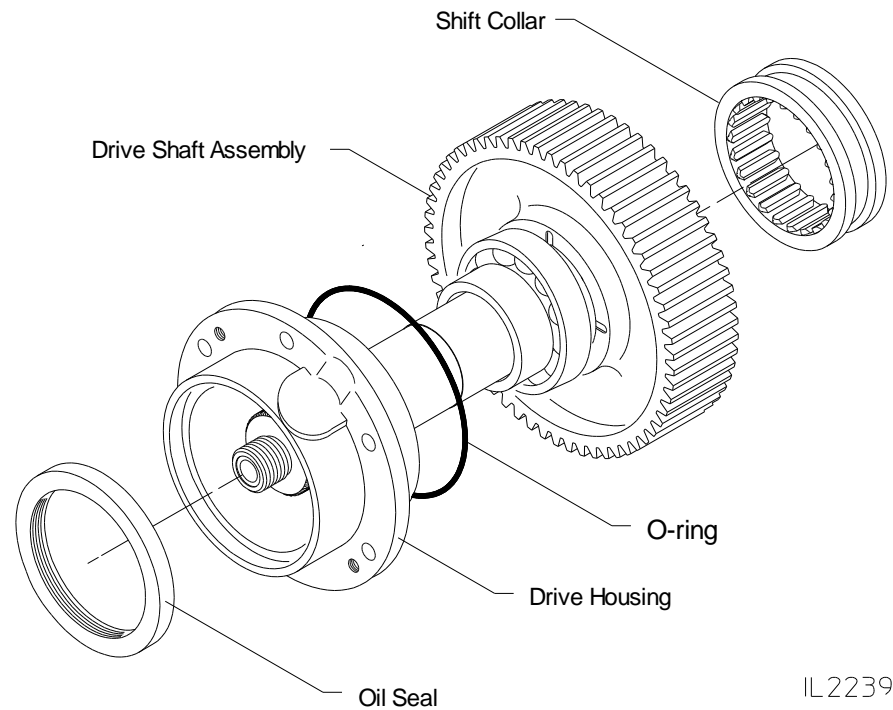
Figure 19. Coupling Shaft Disassembly



### Disassembly of Drive Shaft Assembly

1. Slide shift collar from teeth on the drive shaft.  
**NOTE: If the transmission is equipped with an electronic tachometer, remove the pick-up from the housing prior to removal of the driveshaft housing to avoid damage.**
2. Press drive shaft housing from drive shaft assembly and press the oil seal from housing. Discard the oil seal.
3. Remove the tachometer pulse generator (if equipped) with a suitable puller (see Figure 21).

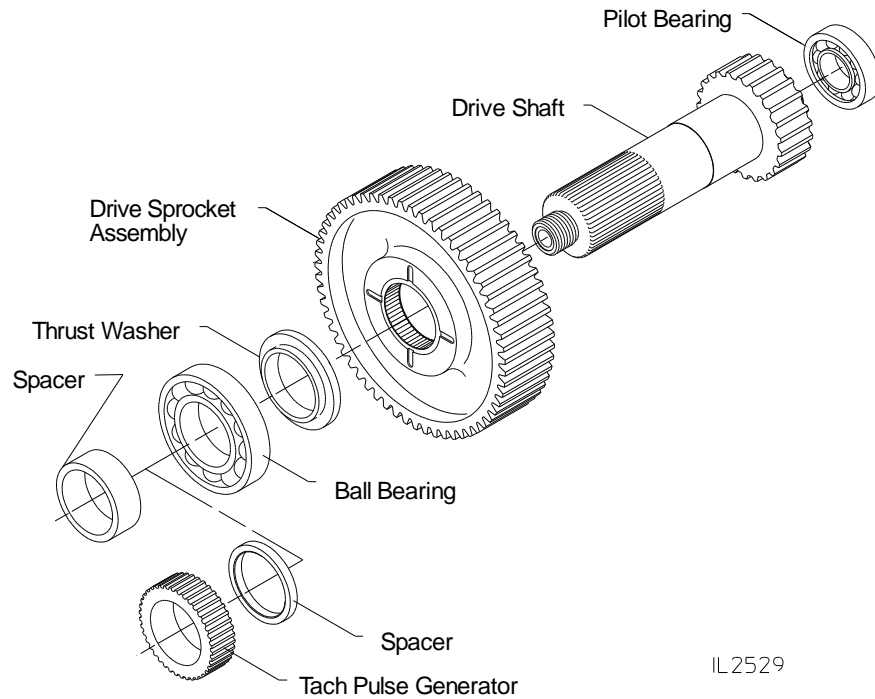
Figure 20. Drive Shaft Disassembly - Shift Collar Removal and Oil Seal



### Disassembly of Drive Shaft Assembly Cont'd

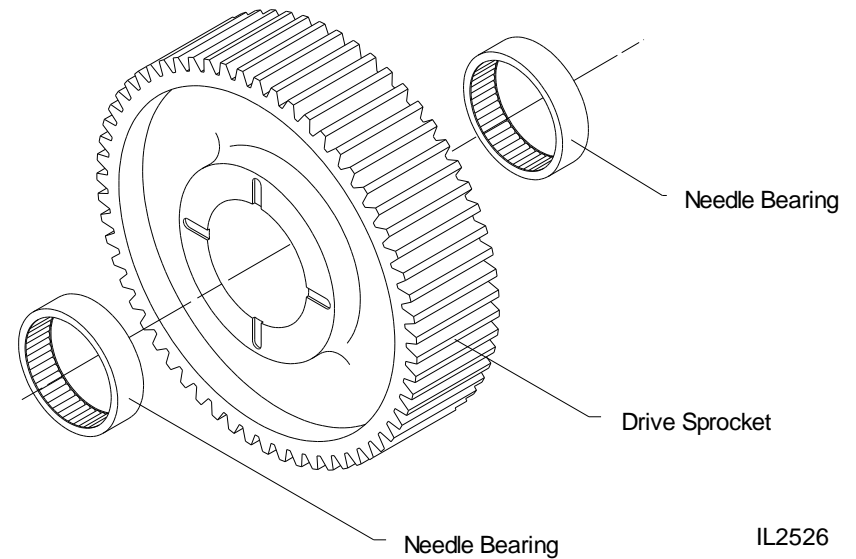
4. Remove spacer if applicable.
5. Place shaft and sprocket assembly in an arbor press in a vertical position with the threaded end up and supported on the bottom face of the sprocket. Press shaft out of drive sprocket assembly. Catch shaft to avoid damage.
6. Remove needle bearings from the sprocket.

**Figure 21. Drive Shaft Disassembly**



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**Figure 22. Needle Bearing Removal from Sprocket**



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### Inspection and Repair

Check the following:

- Bent shift forks
- Bent shift shaft
- Worn shifter shoes
- Loose shifter shoe studs
- Damaged locking arm assembly, sector gear or bent pivot pin
- Condition of oil hose
- Worn sprocket teeth
- Worn flanks on inner chain links
- Outside guide links of chain not retained by "riveted over" pins
- Wear on inner faces of outside guide links of chain
- Badly worn pointing on teeth of drive sprocket, coupling shaft and shift collar
- Damaged splines on drive and coupling shafts

Before reassembly, make sure all reusable parts have been cleaned and are kept free of dirt during reassembly.

## Reassembly

### Guidelines for Installing Ball Bearings, Oil Seals, O-Rings and Hardware

#### Installing Ball Bearings

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

**Shaft** - grease shaft and ball bearing bore.

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

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

**NOTE: Wherever silicone or sealant is referenced, use Loctite Ultra Blue RTV Silicone Sealant or equivalent, unless otherwise specified.**

#### Installing Oil Seals

Before installing a new oil seal in its housing, apply a thin coat of 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 preventing damage to the O-ring.

#### Installing Hardware

Torque specifications for screws: M10 36-40 lb-ft.

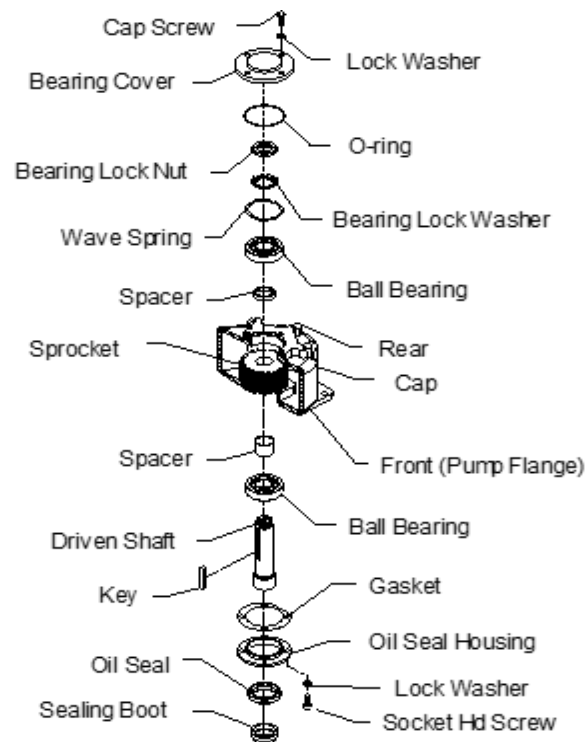
M12 64-69 lb-ft.

### Reassembly of the Driven Shaft

#### Separable Shaft

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

Figure 23. Reassembly of the Driven Shaft - Separable Shaft

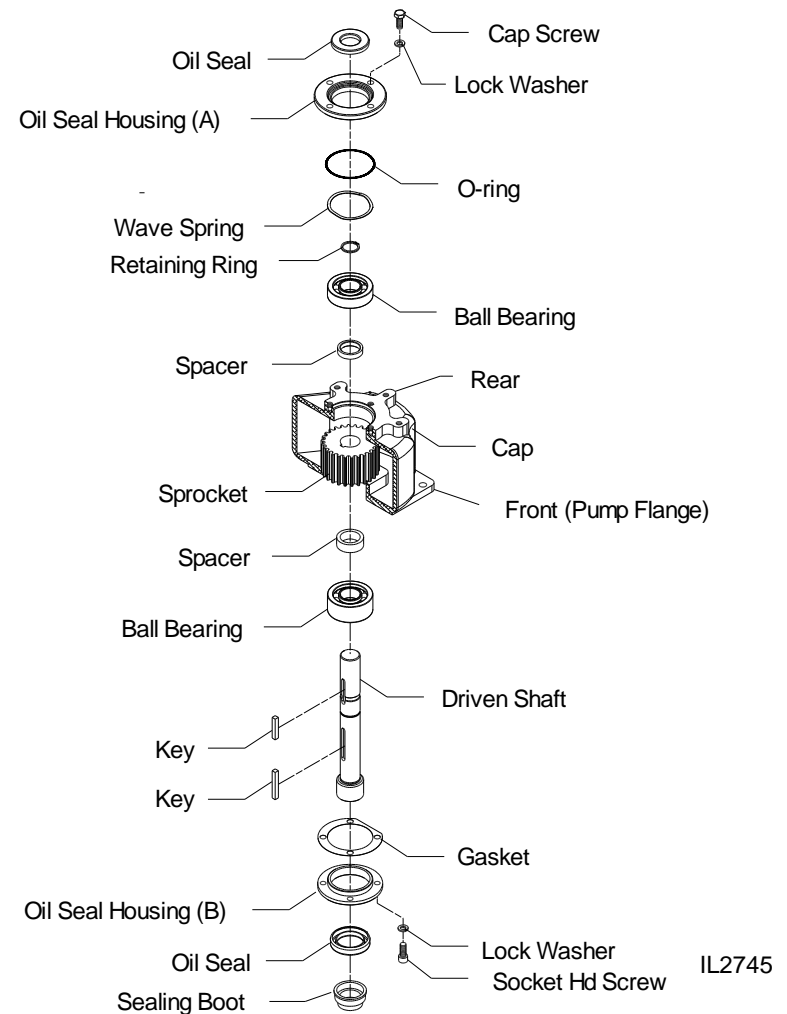


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## Separable Shaft - Eclipse

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

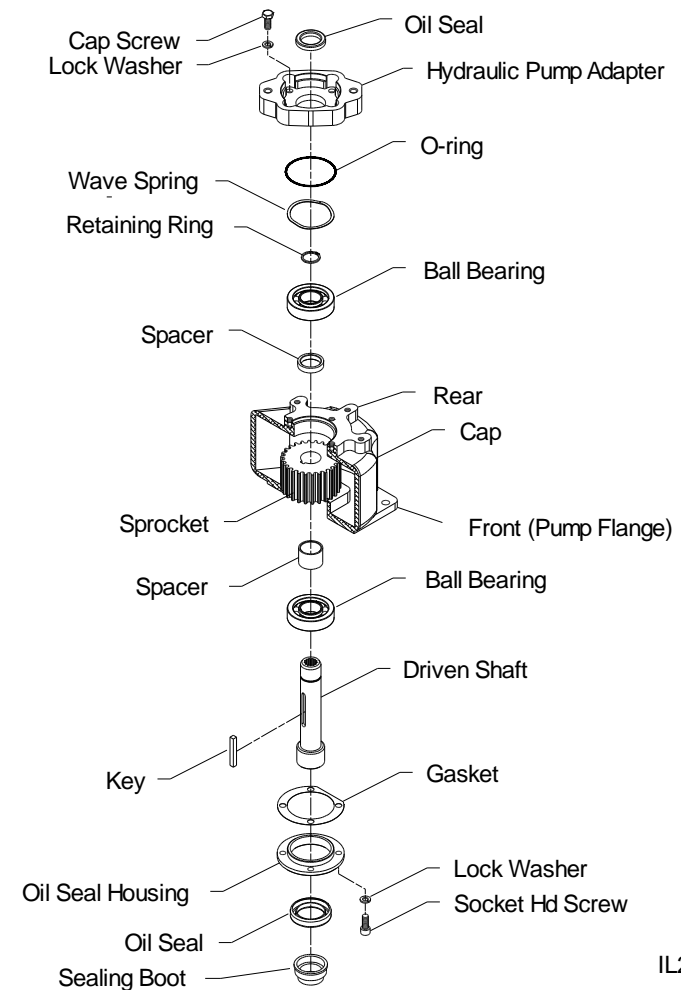
Figure 24. Reassembly of the Driven Shaft - Eclipse



## Separable Shaft - Hydraulic Adapter

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

Figure 25. Reassembly of the Driven Shaft - Hydraulic Adapter



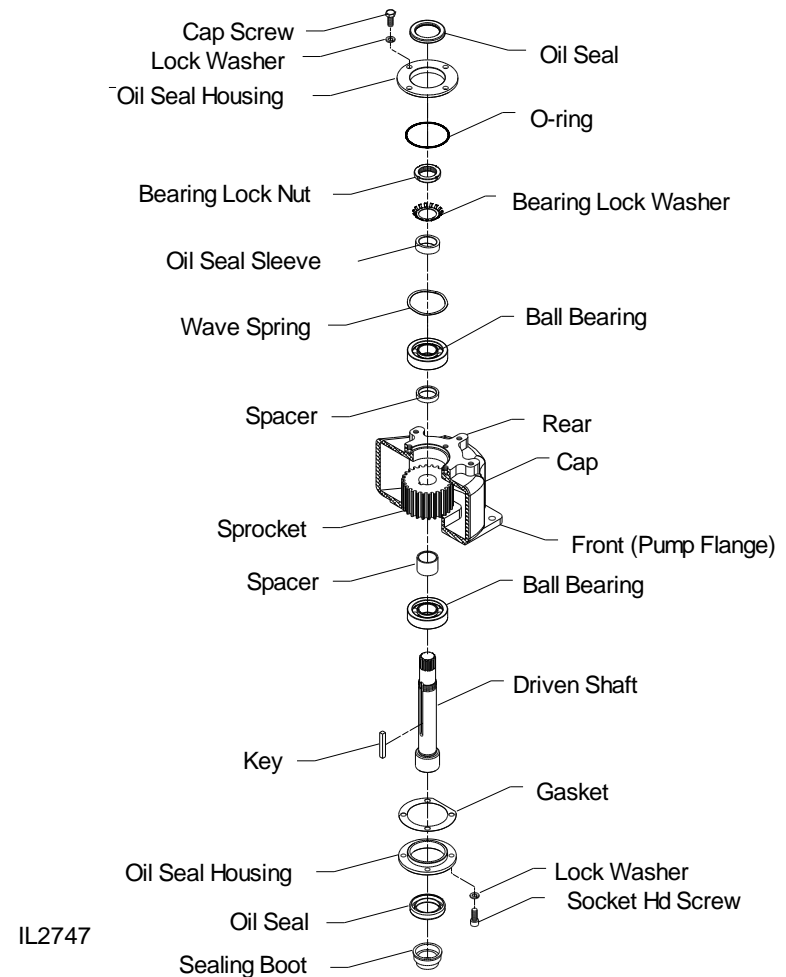
IL2746



## Separable Shaft - Combination Pump

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. Tap the key into place.
4. Place high pressure grease in the rear bore of the cap.
5. Tap the ball bearing into place.
6. Set the oil seal housing (A) on cap and secure with cap screws and lock washers. Hand tighten only at this stage of reassembly.
7. With the cap resting on its rear face, position the spacers and driven sprocket inside the cap.
8. Take the driven shaft, ball bearing and key assembled previously and from the front (pump flange) face of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacers and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install gasket and oil seal in the oil seal housing (B).
11. Install the oil seal housing (B) using four socket hd screws.
12. Tap end of driven shaft towards oil seal housing (B) to seat assembly.
13. Remove the 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. Install sealing boot.

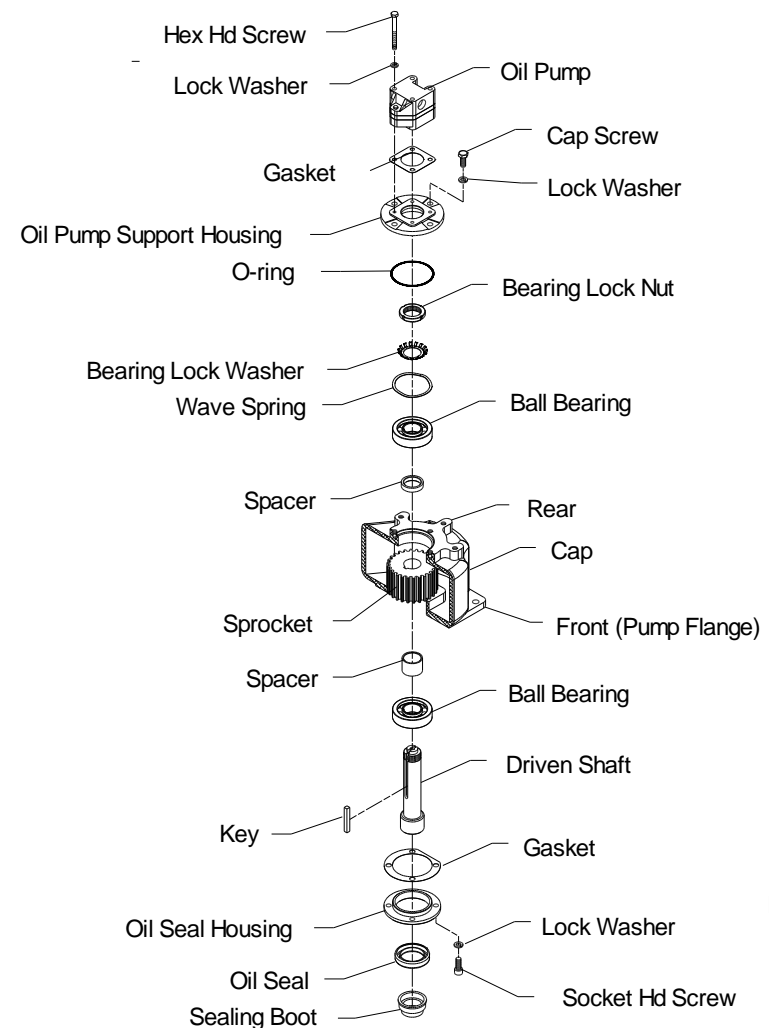
**Figure 26. Reassembly of the Driven Shaft - Combination Pump**



## Separable Shaft - Oil Cooler

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

**Figure 27. Reassembly of the Driven Shaft - Oil Cooler**

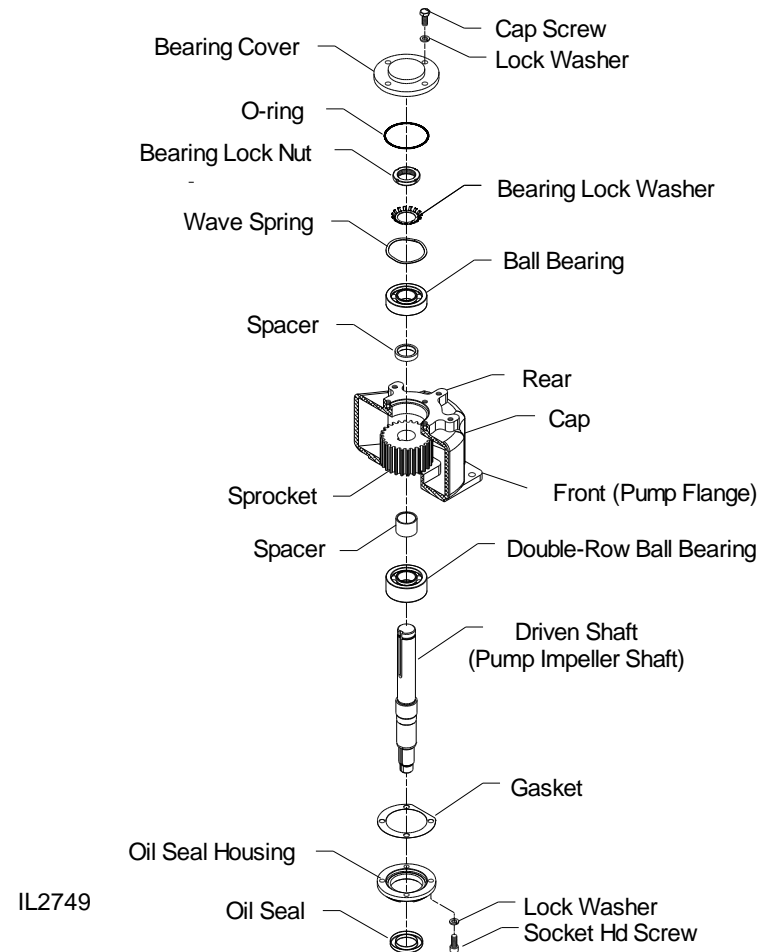


IL2748

### One-Piece Shaft (CG, CX, S100 Models)

1. Use high pressure grease to coat the driven shaft.
2. Press the double-row ball bearing to the shoulder of the driven shaft.
3. Tap the key into place.
4. Place high pressure grease in the rear bore of the cap.
5. Tap the ball bearing into place.
6. Set the bearing cover on rear face of cap and secure with the cap screws and lock washers. Hand tighten only at this stage of reassembly.
7. With the cap resting on the rear face, position the spacers and driven sprocket inside the cap.
8. Take the driven shaft, double-row ball bearing and key assembled previously and from the front (pump flange) face of the cap, slide the shaft through the bore in the cap into the bore of the driven sprocket, spacers and ball bearing lining up the key in the shaft with the keyway in the sprocket.
9. Tap into place until the shaft seats.
10. Install gasket and oil seal in the oil seal housing.
11. Install oil seal housing.
12. Tap lock nut end of driven shaft towards oil seal housing to seat assembly.
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. Install wave spring and bearing cover.

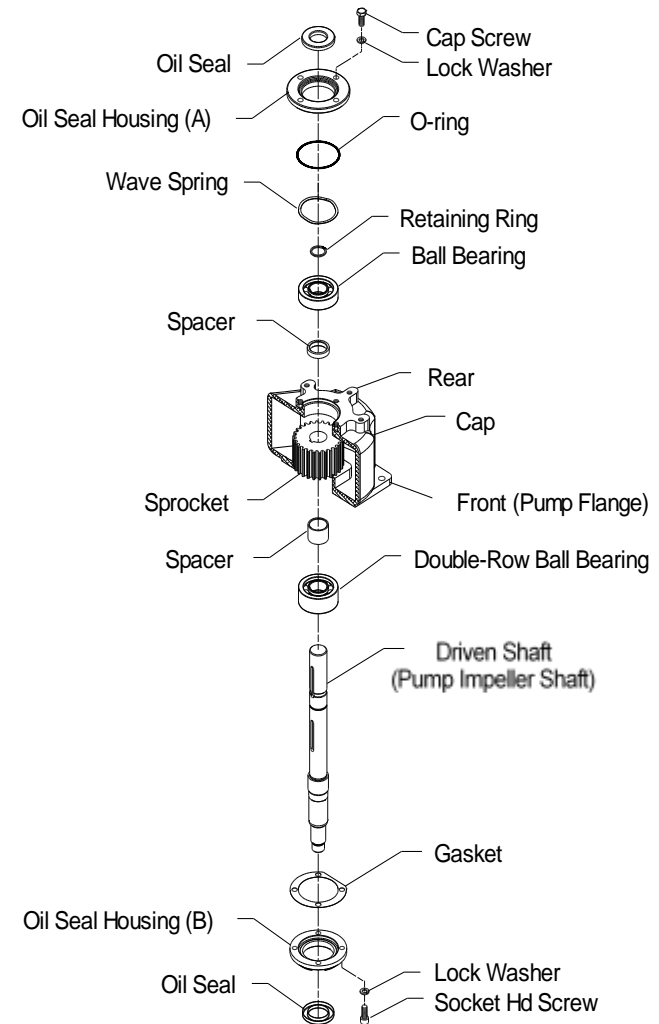
**Figure 28. Reassembly of the Driven Shaft - One-Piece Shaft (CG, CX, S100 Models)**



## Eclipse ES Mounted CAFS (CX, S100 Models)

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

**Figure 29. Reassembly of the Driven Shaft - Eclipse ES (CX, S100 Models)**

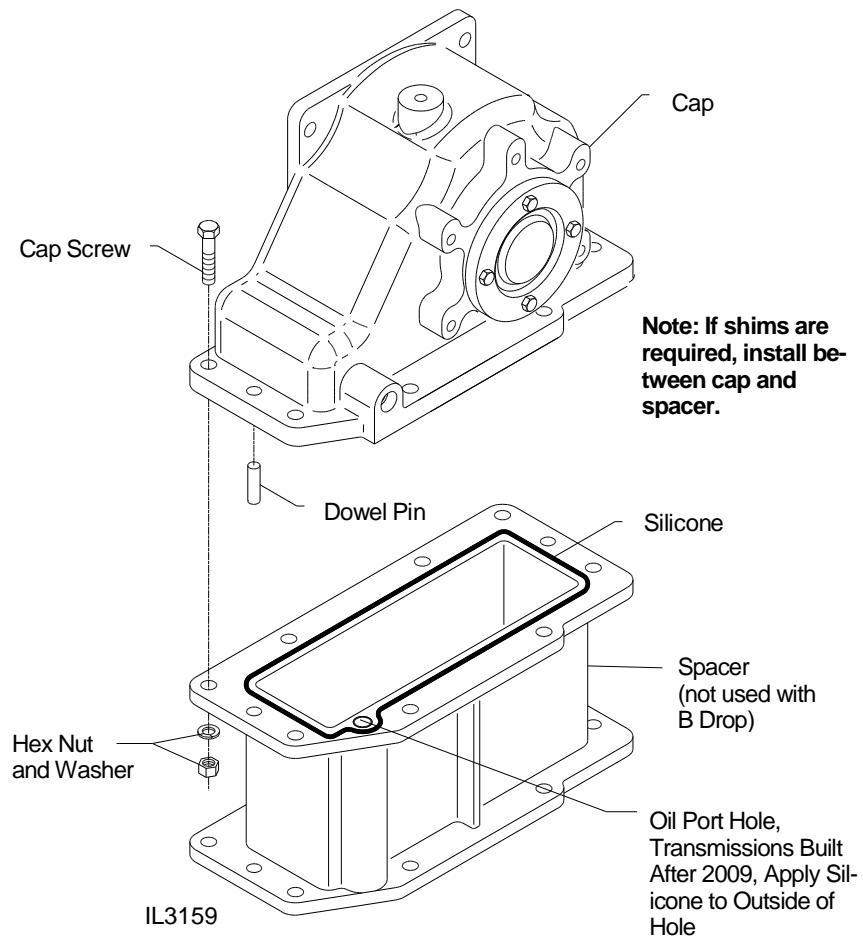


IL2750

## Dowel Pins and Spacer Installation (Extended Drop Chain Cases)

1. Place high pressure grease on the dowel pin holes and install into the cap.
2. Apply a thin film of silicone inside bolt hole pattern and outside the oil port hole as shown in Figure 30.
3. If shims are required, apply bead of silicone inside bolt pattern on spacer, then lay shims on the spacer or mid-section on B drop (see Service Parts List SPL82890 for shims).
4. Position cap on spacer and tap dowel pins into place.
5. Secure with appropriated hardware (see Service Parts List SPL82890 - C10 Transmission or SPL82821 - Eclipse ES).

**Figure 30. Dowel Pins and Spacer Installation (for Extended Drop Chain Cases - C, D & E Drop)**



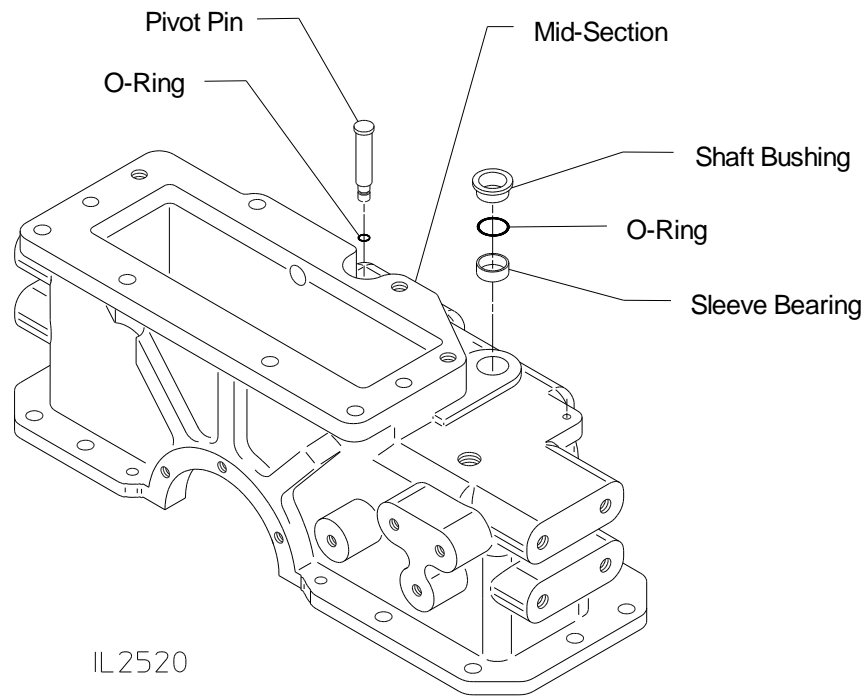
## Reassembly of the Shift Assembly

1. File and clean sealing surfaces of the mid-section and clean out any metal chips or shavings.
2. Apply a small amount of grease to the O-ring and install on the groove of the pivot pin. Apply Loctite #242 to the pivot pin and install the pivot pin per Figure 31 into the mid-section.

**NOTE: Avoid getting Loctite #242 on O-ring surface.**

3. Install the sleeve bushing 1/2" down into the shift shaft bore. Apply silicone sealant to the outside diameter of the flange bearing and then install it into the shift shaft bore. Make sure there is a 1/8" gap between the bushing and bearing.
4. Apply a small amount of grease on the O-ring and install between the bushing and bearing.
5. Install spirol pin in mid-section.
6. Install the spring housing into the spirol pin.

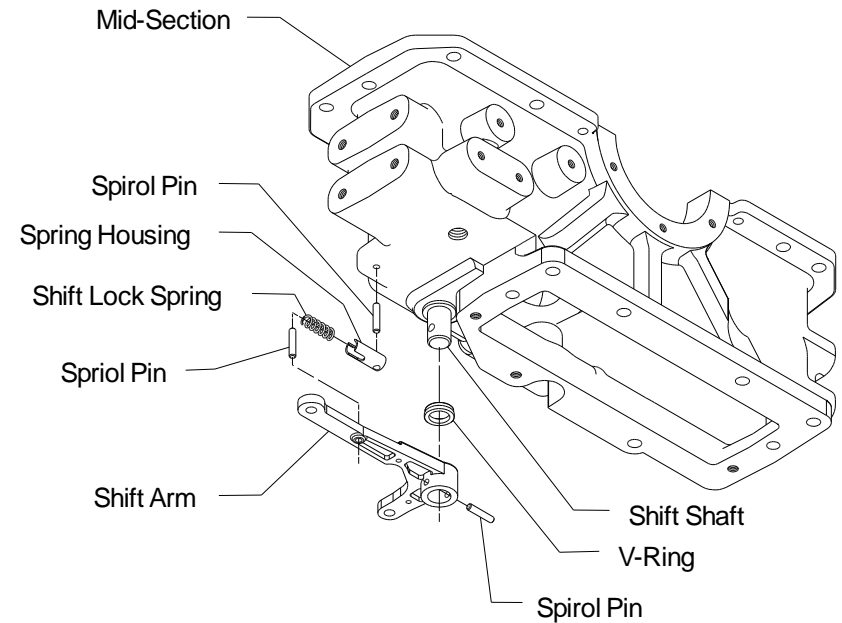
**Figure 31. Pivot Pin, Shaft Bushing and Sleeve Bearing Installation**



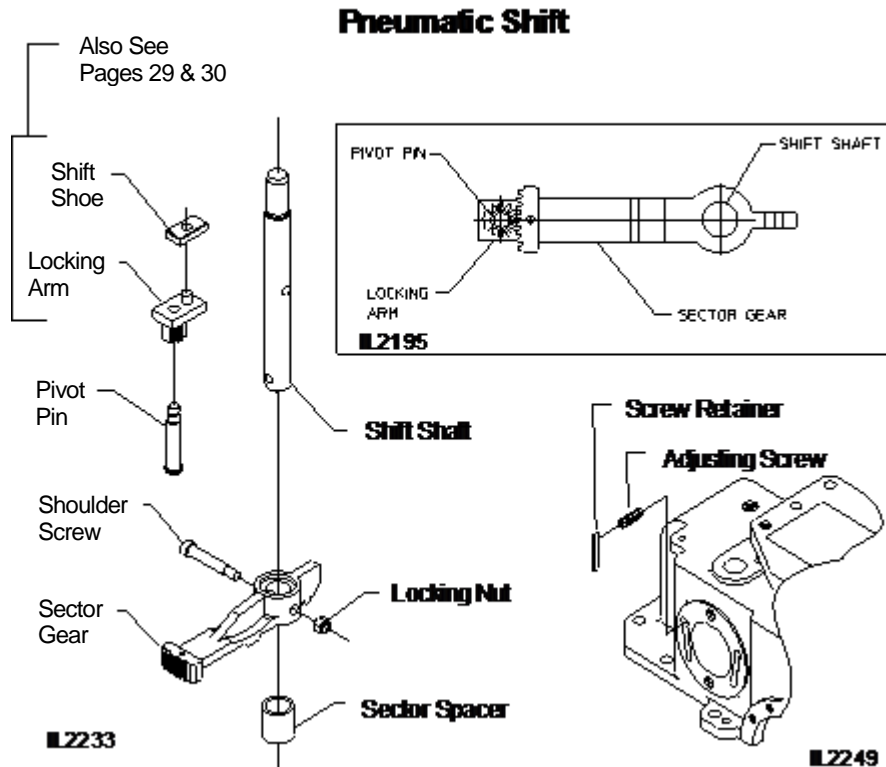
## Shift Assembly

1. Invert mid-section.
2. Attach shift arm to shift shaft with spirol pin (see Figure 32).
3. Install shift lock spirol pin in shift arm.
4. Grease the shift shaft.

**Figure 32. Shift Arm Assembly**



**Figure 33. Shift Assembly**

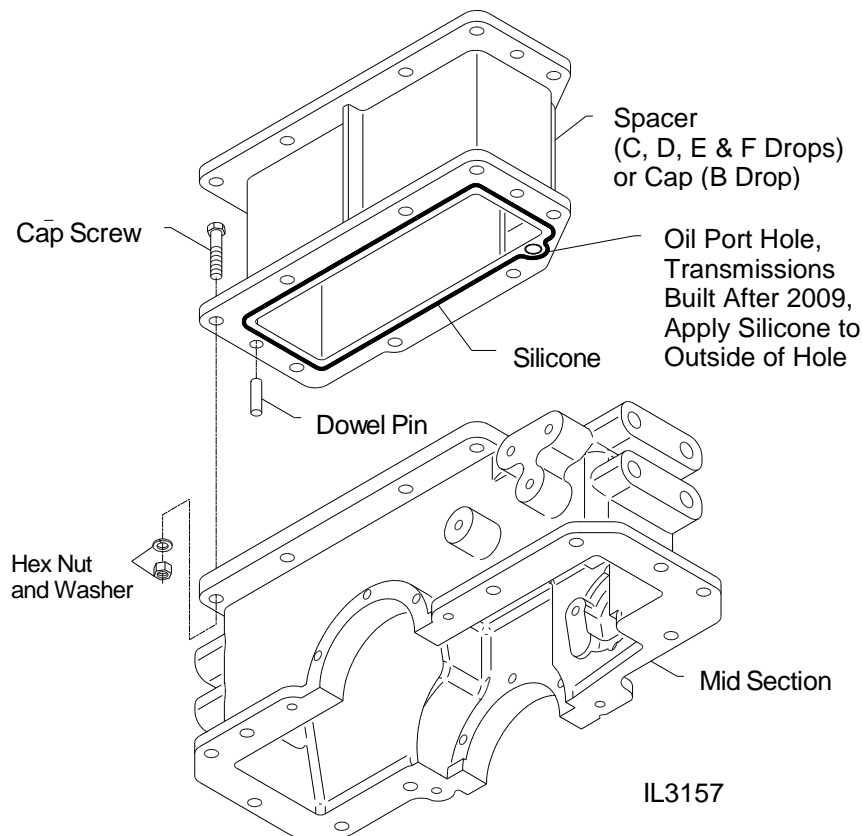


5. Slide the shift lever into the sector gear aligning the holes (see Figure 33).
  6. Set shift lever/sector gear over the shift shaft opening in the mid-section.
  7. Slide shift shaft up through the shift shaft opening, engaging spacer and shift lever or shift lever/sector gear.
  8. Install the shift lock spring into the spring housing (see Figure 32).
  9. Engage shift arm spiro pin with the shift lock spring (see Figure 32).
  10. Rotate the shift arm to compress the shift lock spring into the housing. Line up the holes in the shift lever/sector gear and install shoulder screw and locking nut.
  11. Install the locking arm onto the pivot pin (see Figure 33) and mesh the teeth with the sector gear. Proper alignment is important. The center tooth space in the sector gear should be centered with the locking arm.
  12. Install the shift shoe assembly on the pin of the locking arm.
- NOTE: Shift shoe can be installed with the counter bore either up or down.**
- NOTE: Shift mechanism may not shift smoothly until bottom cover is installed.**
13. Install adjusting screws in the mid-section and adjust so the locking arm is rotatable slightly less than 90° each direction (see Figure 33).
  14. Install screw retainers. Place a dab of grease on the retainers to hold them in place until the shift unit or cover can be installed.
  15. Check assembly for proper shifting.

## Reassembly of the Cap and Mid-Section

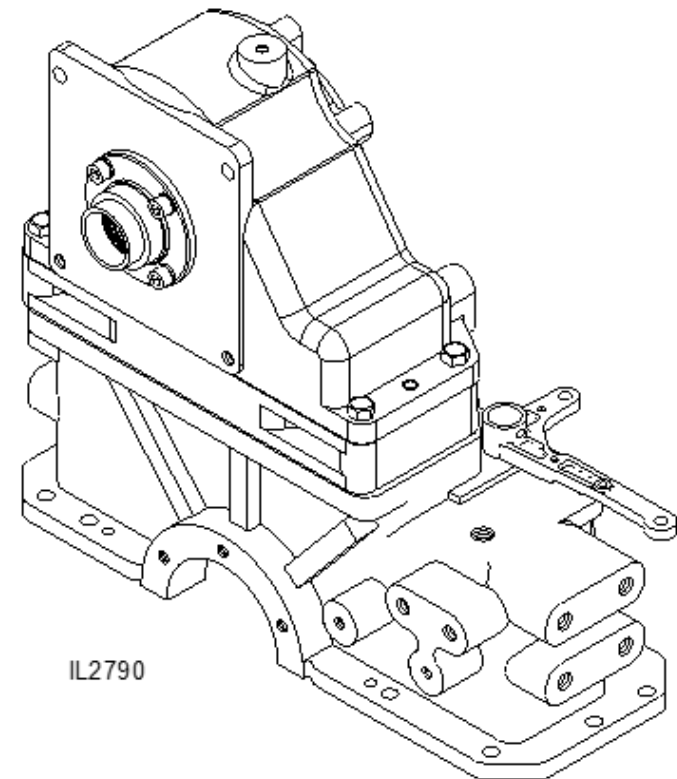
1. Make sure the face of the mid-section is clean and free of nicks and burrs.
2. Clean shims or spacer. If assembly includes a spacer, grease dowel pin holes in mid-section and install dowel pins. If no spacer is required, grease dowel pin holes in cap and install dowel pins.
3. Apply a thin film of silicone inside bolt hole pattern and outside the oil port hole as shown in Figure 34.
4. If no spacer is being used and shims are required, install shims on the mid-section. Apply a bead of silicone inside the bolt hole pattern on top of shims.

**Figure 34. Mid-Section Assembly**



5. Install cap or cap and spacer to mid-section.
  - a. Cap only: Position cap on mid-section and tap dowel pins into mid-section.
  - b. Cap with spacer: Position cap assembly on the dowels previously installed in the mid-section and tap down into place.
6. Install appropriate hardware.
7. Support the mid-section and cap assembly in an upside down position.

**Figure 35. Cap and Mid-Section Assembly**



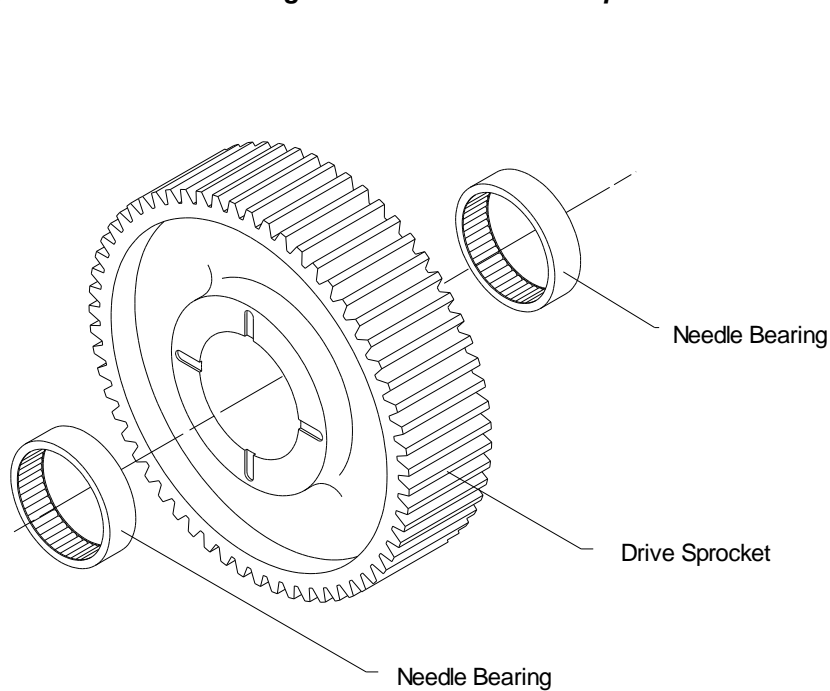


## Reassembly of the Drive Shaft and Drive Shaft Housing

### Drive Shaft Assembly

1. File and clean the sprocket faces and check teeth for burrs.
2. Use high pressure grease in the bore of the drive sprocket.
3. Press the needle needle bearings into each end of the bore of the drive sprocket. Press rounded end of needle bearing into sprocket bore. Needle bearings should set just below the slots in the sprocket.

**Figure 36. Needle Bearing Installation into Drive Sprocket**



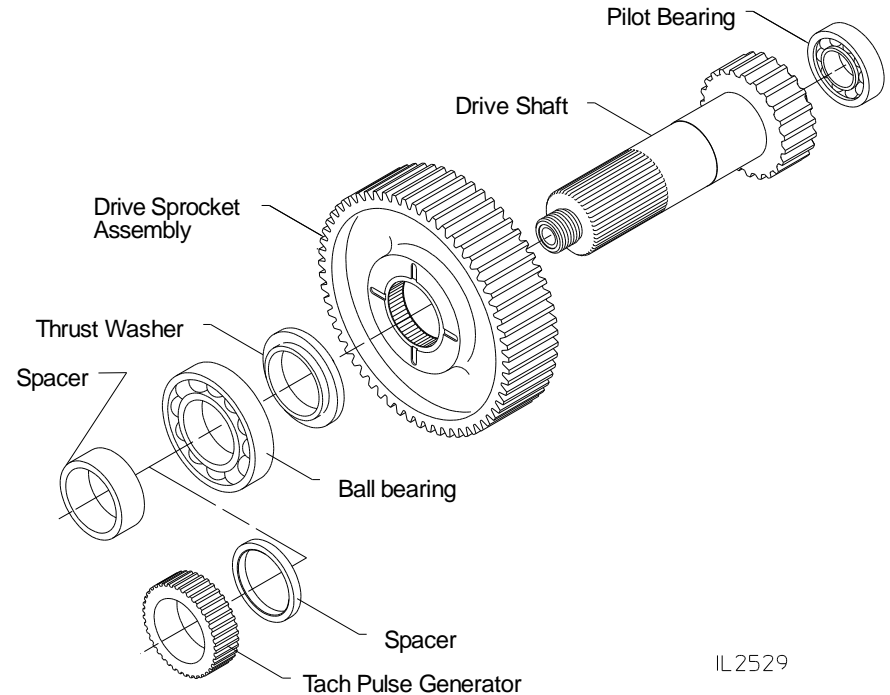
IL2526

4. Install pilot bearing on end of drive shaft.
5. Use high pressure grease on the drive shaft and press into the drive sprocket assembly.
6. Check the shift collar (not shown) for proper fit. Do not install at this time.

7. Install the thrust washer onto the drive shaft.
8. Apply grease and install the ball bearing.
9. If the tachometer option is used, add the tach pulse generator and spacer required. If no tach is required, install appropriate spacer.

**NOTE: Drive sprocket assembly should turn freely.**

**Figure 37. Drive Shaft Installation into Drive Sprocket**

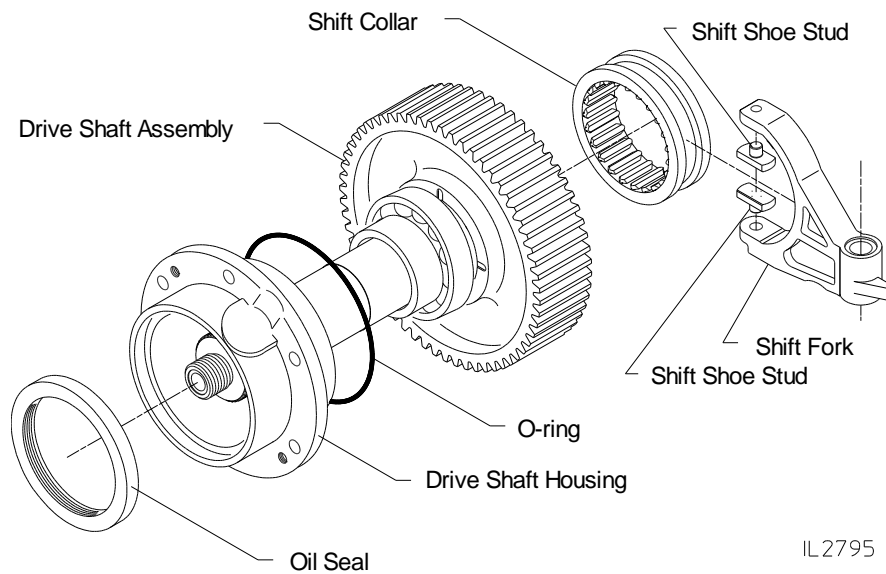


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### Drive Shaft Housing Assembly

1. Apply a light coat of silicone to the housing bore and install the oil seal.
2. Apply grease to the O-ring and insert into the housing.
3. Use high pressure grease in the bore of the housing and press the housing onto the drive shaft assembly.
4. Add the shift collar onto the drive line.
5. Check the shift fork shoes for free movement.
6. Grease the shift shoe studs and insert into shift fork.
7. Slide the shift fork onto the shift collar.

**Figure 38. Drive Assembly into Drive Housing**

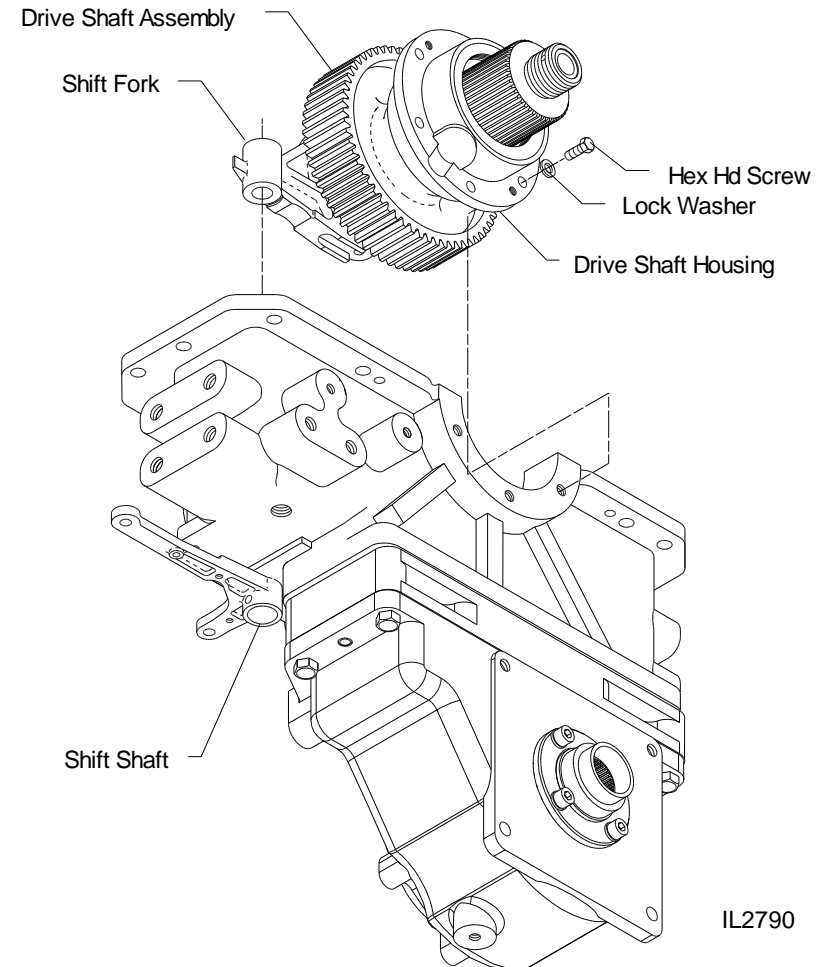


IL2795

### Drive Shaft/Housing Assembly Installation

1. Apply grease to stud on the shift shoes for temporary installation. Then, install the drive shaft assembly into the mid-section and onto the shift shaft. Make sure the shift shoe on the locking arm is mated with the slot in the fork. The drive shaft housing should be seated.
2. Install hex head screws and lock washers to secure the drive housing to the mid-section. Do not completely tighten. Leave a small gap between the drive shaft housing and mid-section flange to allow installation of the bottom cover.

**Figure 39. Drive Shaft/Housing Assembly Installation**

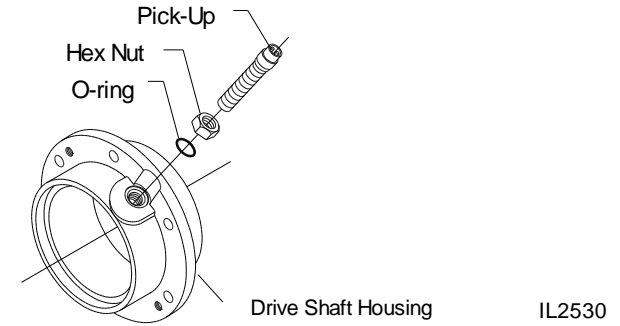


IL2790

### Optional Electronic Tachometer

1. Install the O-ring onto the tachometer pick-up.
2. Rotate drive shaft until tach tooth lines up with the tach opening.
3. Install the tachometer pick-up into the drive shaft housing until it contacts the tach pulse generator. Turn back 1/2 turn.
4. Tighten hex nut.

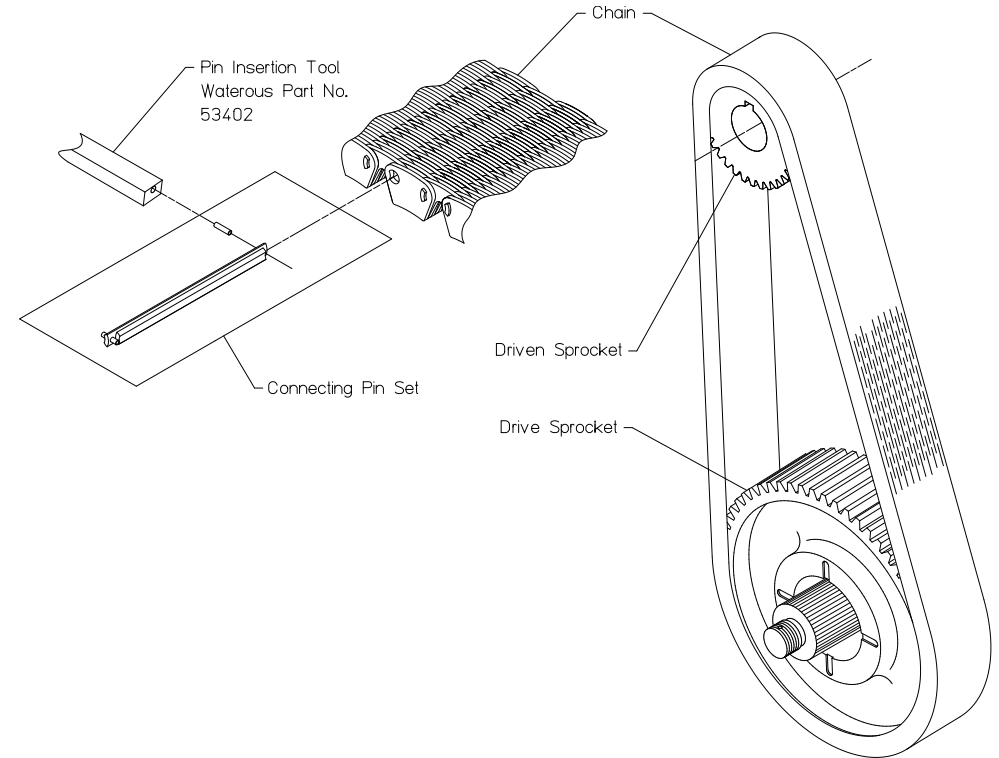
Figure 40. Optional Electronic Tachometer



### Installing the 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 (see Figure 41).
2. Insert the connecting pin rocker partway through the holes in the joining end links being careful of orientation (see Figure 43). The connecting rocker must be on the side of the guide link opposite the joining end with the connecting rockers wide curved surface towards the center of the hole.
3. Insert the connecting pin assembly alongside the connecting rocker. The two wide curved surfaces of the connecting pin and connecting rocker must face each other.
4. After the connecting pin assembly and connecting rocker have been pushed all the way through the joining ends of the chain, insert the spirol pin into the open hole at the end of the connecting pin assembly (see Figure 43). 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.

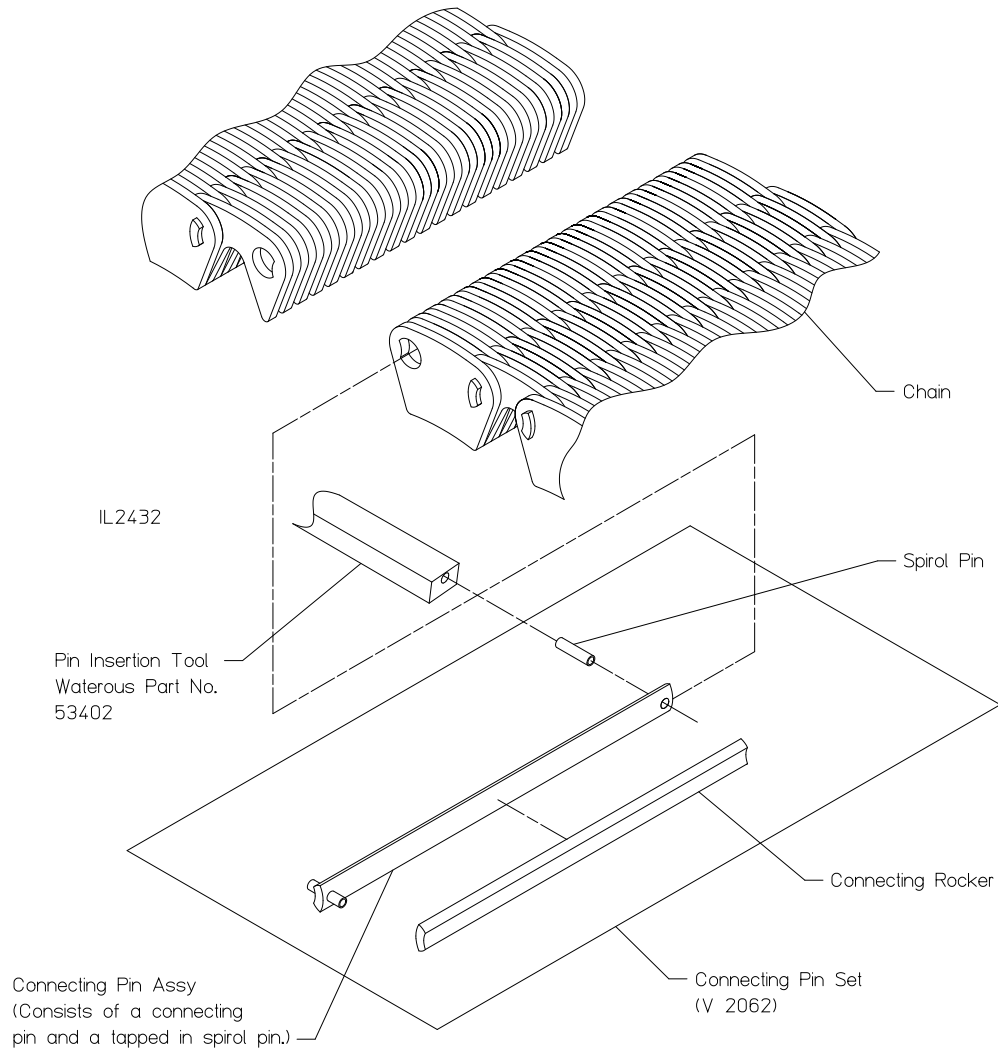
Figure 41. Installing the Chain



IL2431

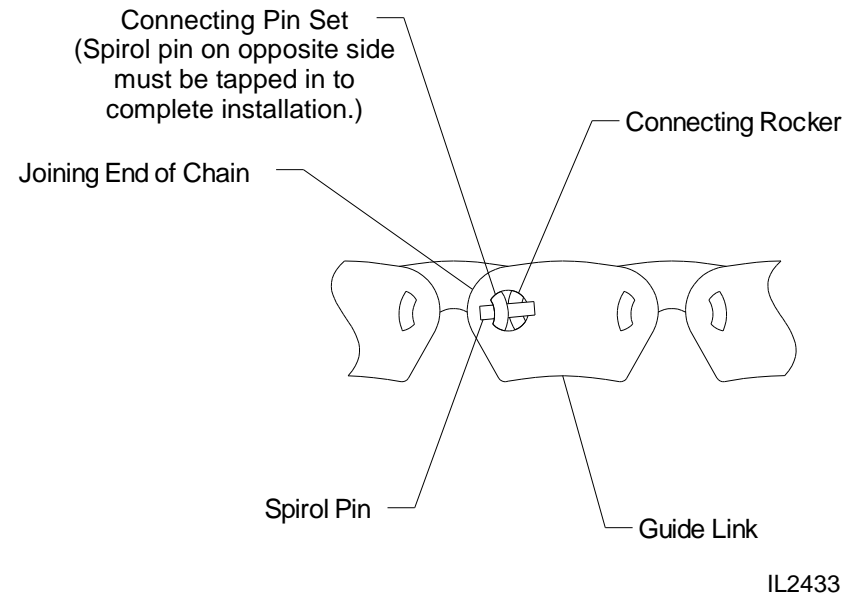
Drop	Max Deflection (In.) (Both Directions)
B	1.75
C	1.75
D	1.75
E	2.0
F	2.0

**Figure 42. Connecting Pin Set**



The connecting pin set contains one connecting pin assembly,  
one connecting rocker and one spirol pin.

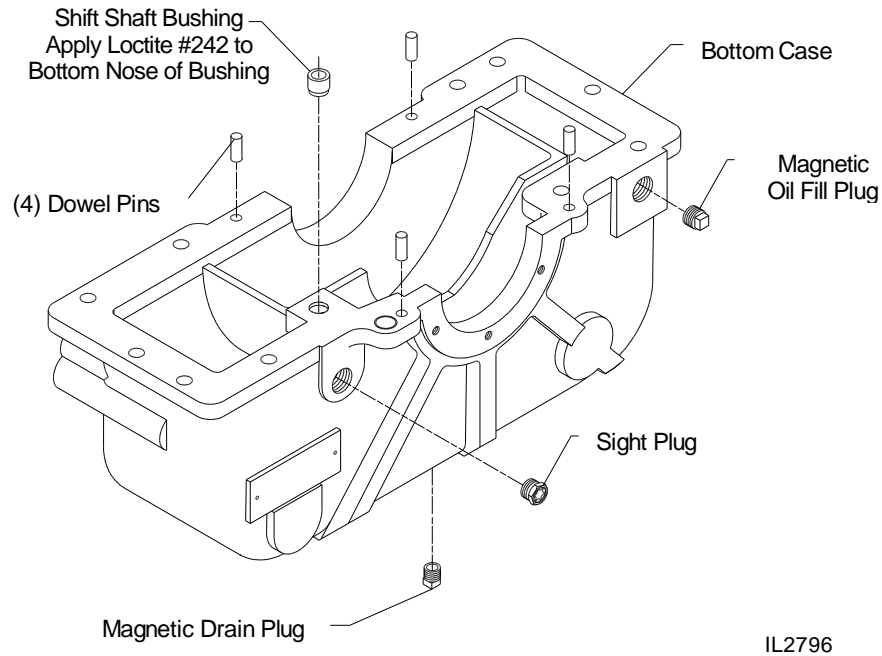
**Figure 43. Connecting Pin Orientation**



## Reassembly of the Bottom Section to the Cap and Mid-Section

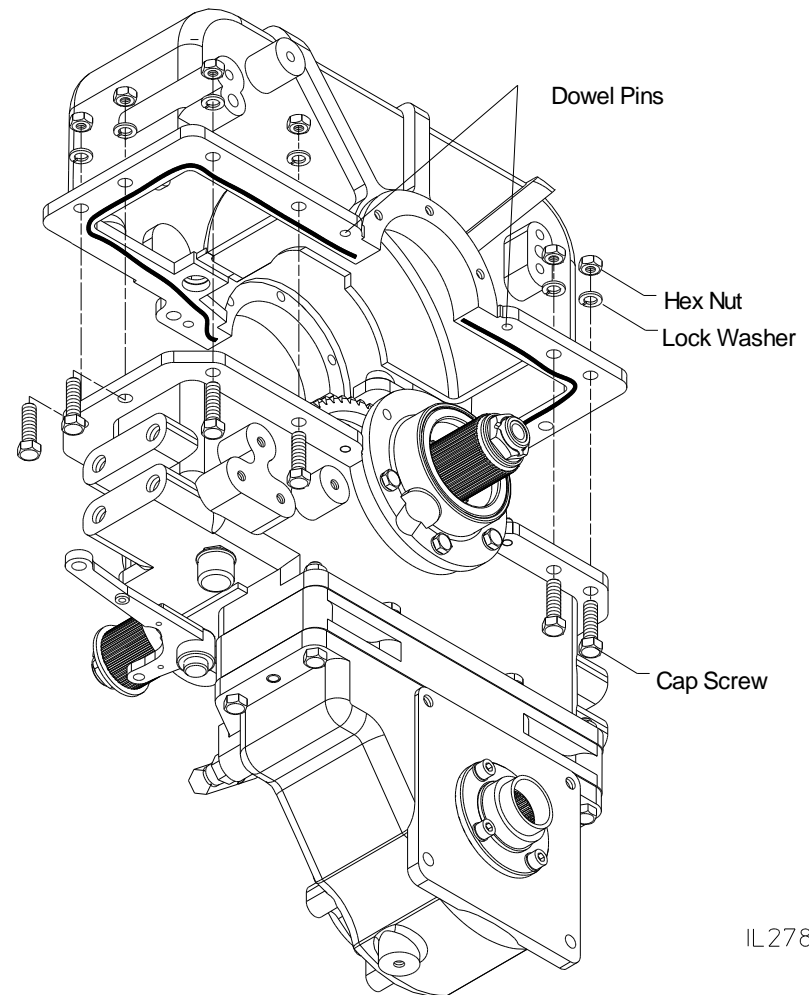
1. Apply Loctite #242 to the shift shaft bushing and install into the bottom of the case.
2. Apply pipe joint compound to the sight plug.
3. Install the sight and magnetic plugs in the case.

**Figure 44. Assembling Items on the Bottom Section**



4. Tap back the drive shaft assembly to allow for the bottom section installation.
5. Apply silicone around the inside of the bolt hole pattern as shown in Figure 45.
6. Install the bottom section onto the mid-section. Be sure to engage the shift shaft with shift shaft bushing.
7. Install four dowel pins into place.
8. Secure the bottom section to the mid-section with fasteners.

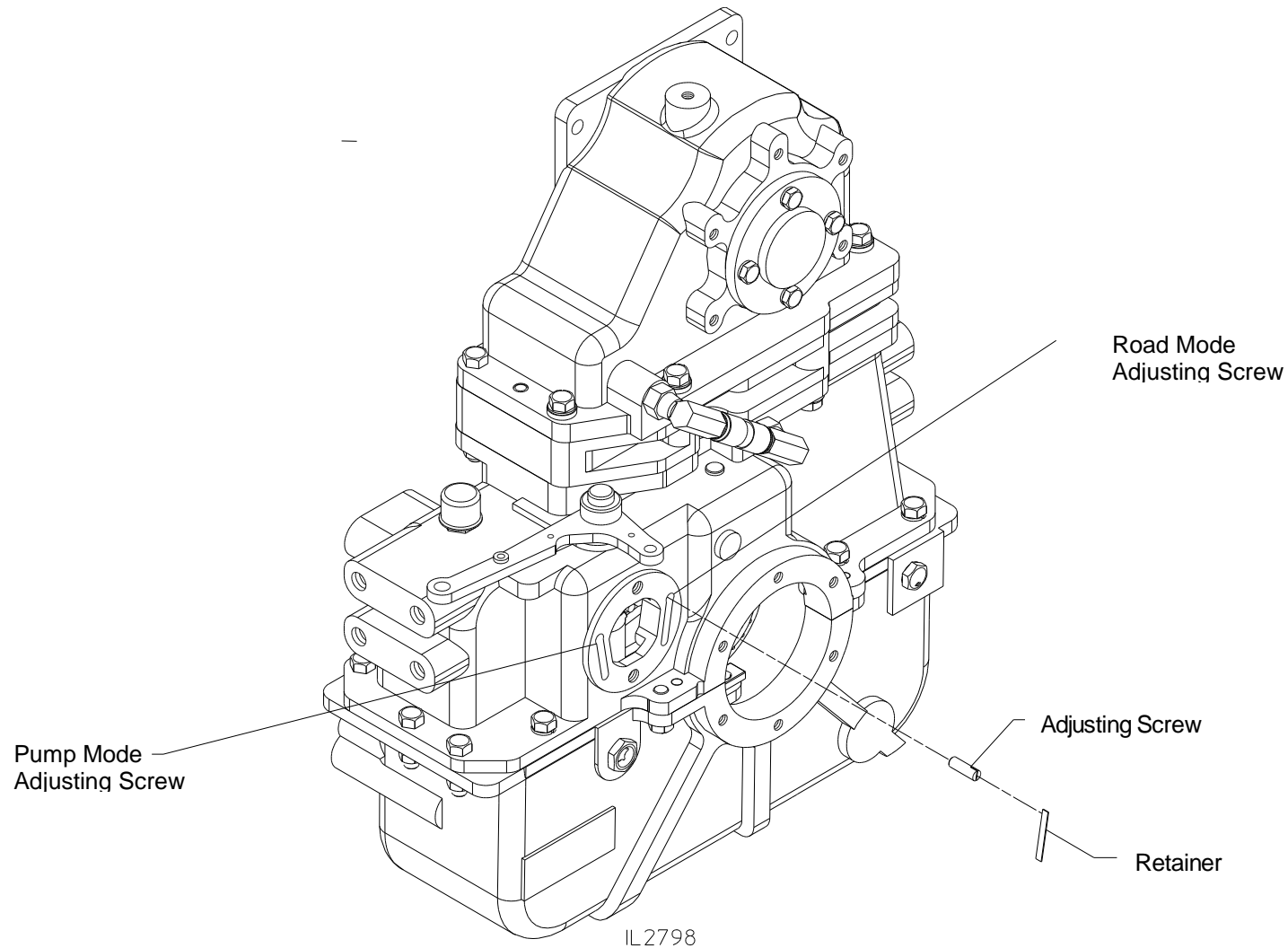
**Figure 45. Assembling Bottom Section to the Cap and Mid-Section**



## Shift Position Adjustments

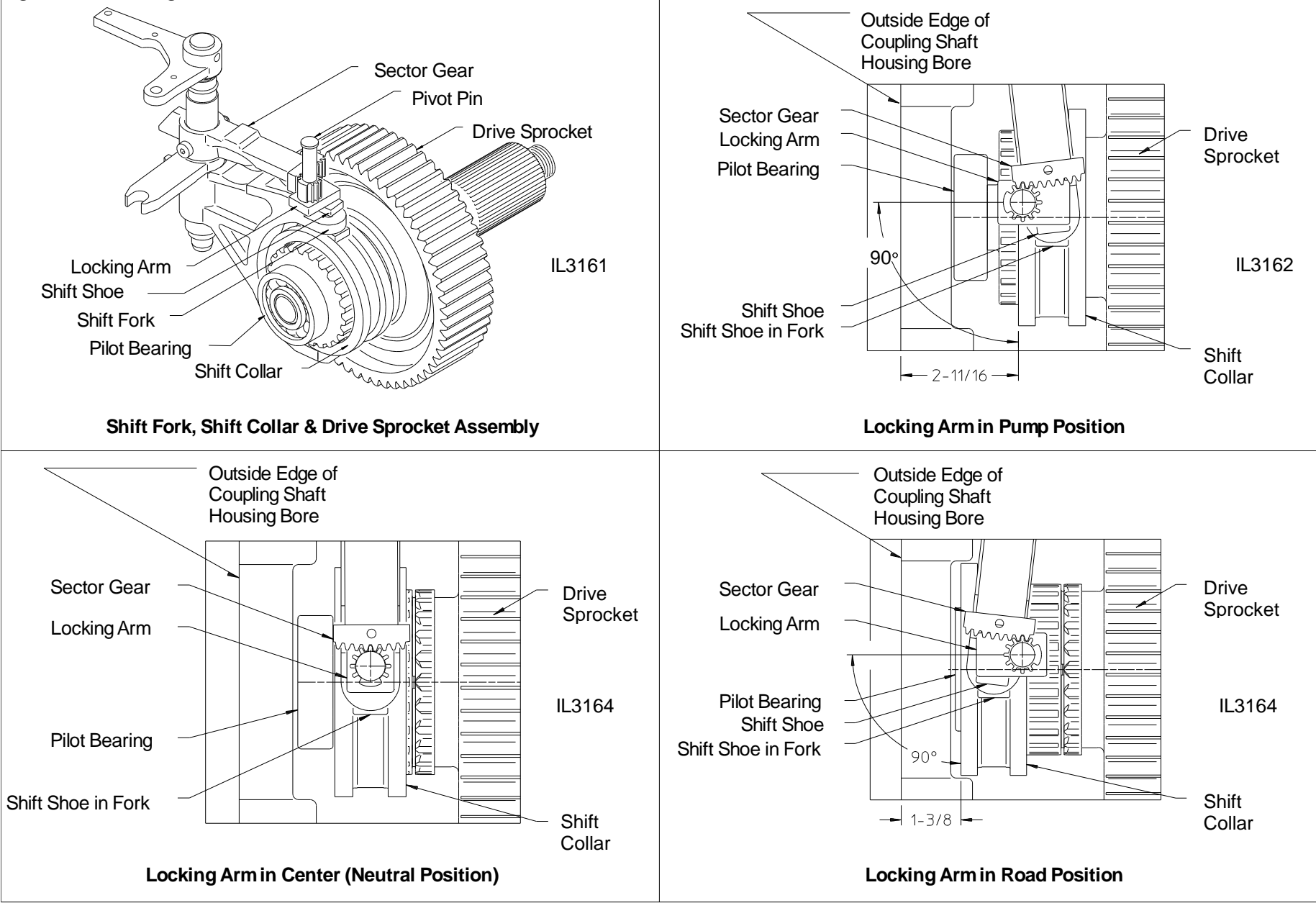
1. Check the distance from shift collar to face of coupling shaft housing bore. Distances should read as follows:
    - ROAD mode: 1-3/8 inches (right adjusting screw)
    - PUMP mode: 2-11/16 inches (left adjusting screw) -
- **NOTE: Locking arm must not rotate beyond 90° from center position to avoid disengagement of shift shoe. See Figure 47 on next page.**
2. Adjust as necessary.
  3. Install retainers. Apply grease into the slots to help secure retainers.

**Figure 46. Retainer Installation**



# Shift Position Adjustments (Continued)

Figure 47. Locking Arm Rotation Restrictions

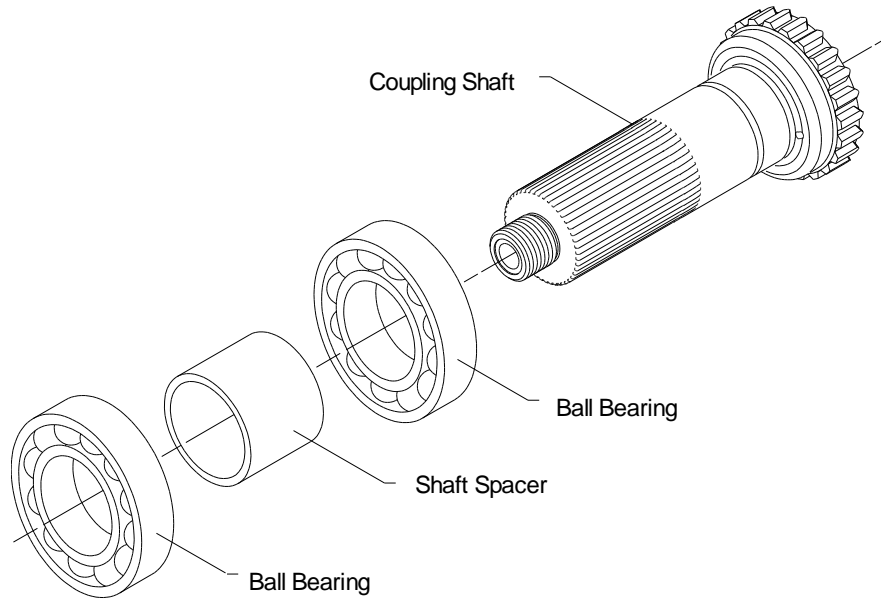


## Coupling Shaft and Housing Assembly

### Coupling Shaft Assembly

1. Use high pressure grease and press ball bearing, spacer and ball bearing onto shaft.

**Figure 48. Coupling Shaft Assembly**

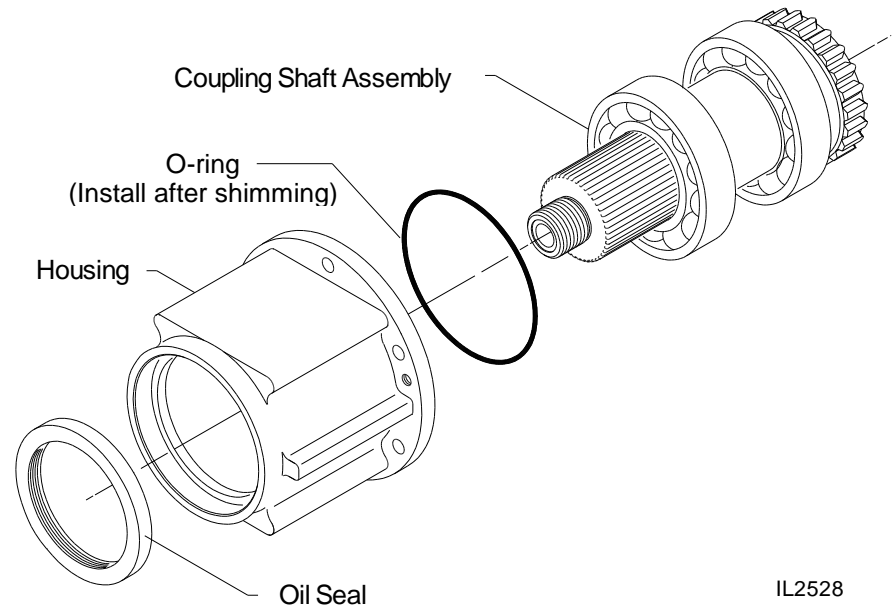


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### Coupling Shaft Housing Assembly

1. Coat the seal outer diameter evenly with sealant. Be sure that the seal, shaft and housing are clean. Always install a seal with the seal lip facing in. Apply force to the outer edge of the seal and press in evenly.
2. Use high pressure grease in bore of the coupling housing and press coupling shaft assembly into place.

**Figure 49. Coupling Shaft Housing Assembly**



IL2528



## Coupling Shaft Housing Assembly to Case Assembly

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

- .005" Blue
- .007" Natural
- .010" Brown

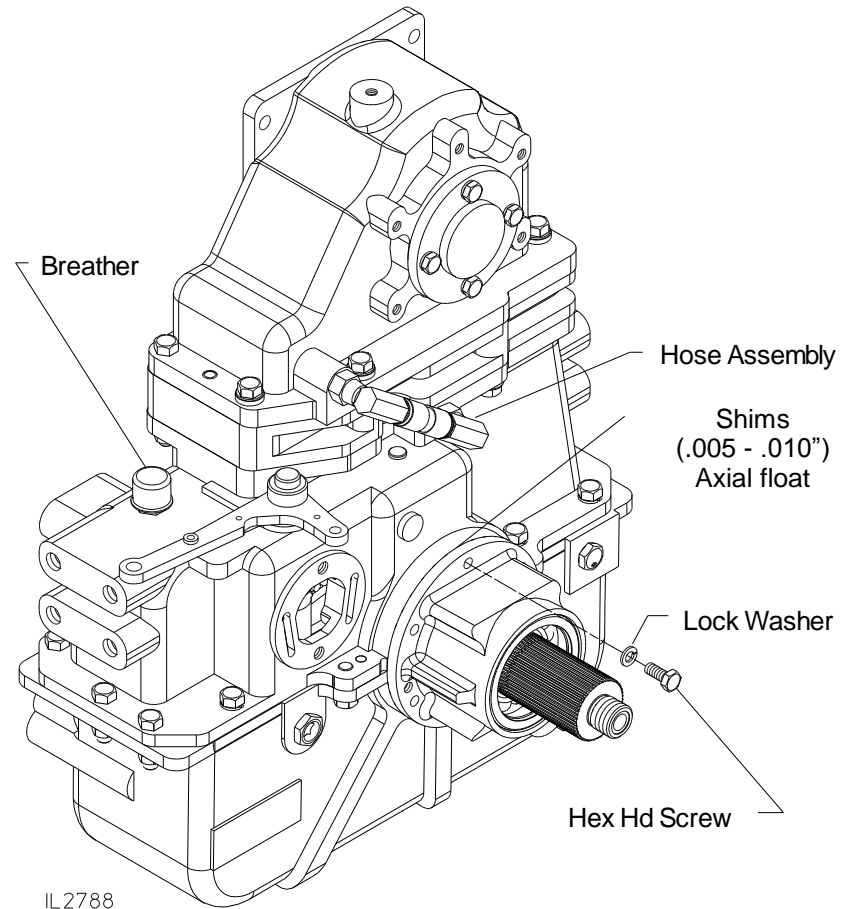
The correct thickness of shims can be determined as follows:

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 drive line all the way forward. Do not overtighten causing bending or breakage of the coupling shaft housing.
2. Measure the gap 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 - .010 in.
3. Remove the coupling shaft assembly 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. shims. No harm will result from a small amount of additional axial float but ball bearing life will be shortened if ball 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 housing.
5. Coat O-ring with grease and install O-ring on housing.
6. Install the coupling shaft housing assembly.
7. Install fasteners.

Figure 50. Assembling Coupling Shaft Housing to Case



## Breather and Hose Assembly Installation

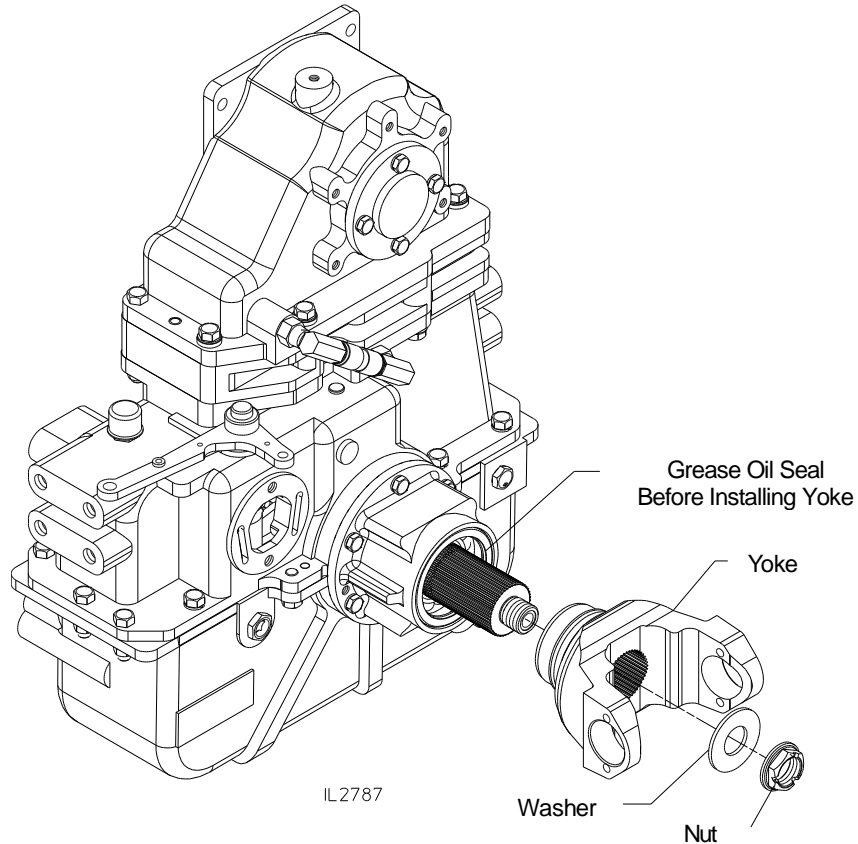
1. Apply thread sealer to breather and install.
2. Connect hose assembly from the cap to the mid-section.

## Reassembly of Miscellaneous Items and Accessories

### End Yoke Assembly

1. Slide yoke onto the coupling shaft and drive shaft.
2. Secure in place using washers and self-locking nuts. Anti-seize should be applied to the threads before installing a self-locking nut. Do not reuse self-locking nuts. Torque to 475-525 lb-ft.

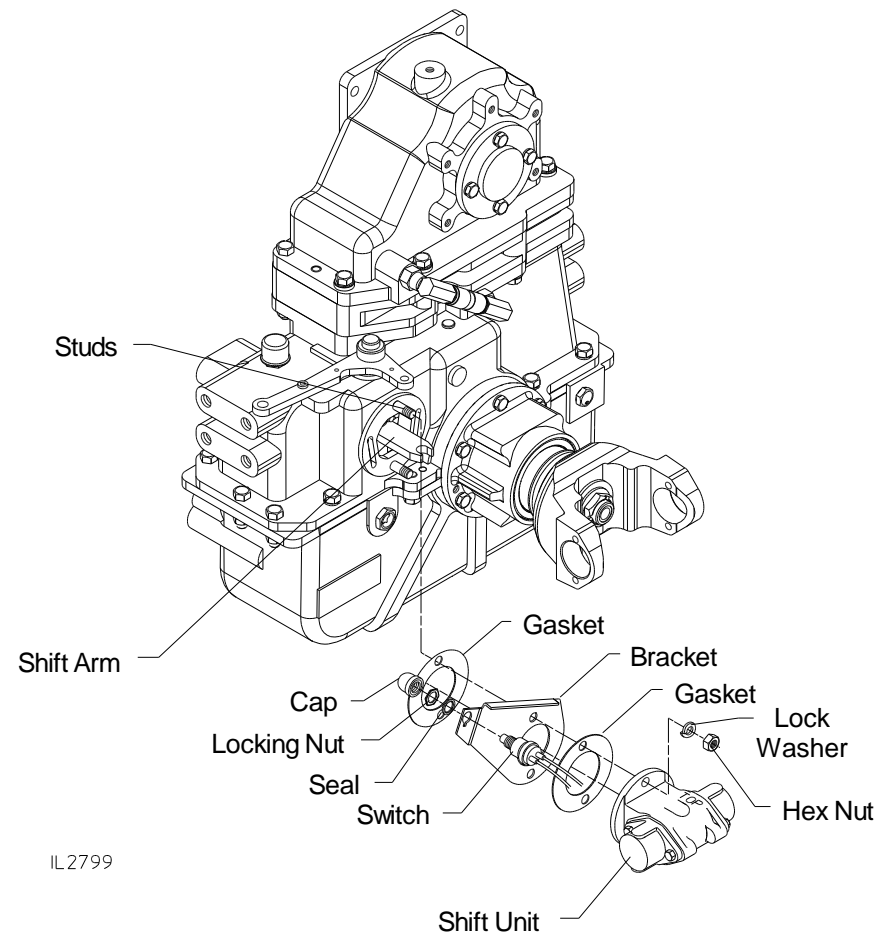
**Figure 51. End Yoke Assembly**



### Shift Accessory Assembly

1. Attach the switch to the switch bracket using a seal and locking nut. Install the cap.
2. Set the gasket on the mid-section.
3. Align the shift arm with the piston in the shift unit and install bracket, gasket and shift unit to the case with lock washers and hex nuts. Note that the word "TOP" cast into the shift unit.
4. Test the shift operations as required.

**Figure 52. Shift Assembly**



## Eclipse CAFSystem™ Installation onto Transmission

To install the Eclipse CAFSystem onto the transmission, perform the following steps:

**NOTE: If air clutch was not removed from the transmission during the overhaul procedure, proceed to step 4.**

**NOTE: Apply anti-seize to shaft before installing air clutch.**

1. Apply Loctite 609 to keyway, install key and align clutch assembly. Push assembly into place.

**NOTE: Locate clutch assembly to ensure proper interface between set screw and its seating hole.**

2. Lock air clutch assembly into place for final polychain adjustment using set screw (use Loctite 242).

3. Attach the transmission and air clutch assembly to the pump using four (4) cap screws.
4. Install the Polychain onto the air clutch assembly, driven sprocket and idler sprocket.
5. Attach air connections to the air clutch assembly.
6. Tighten Polychain until taut using the Polychain tensioning screw. Polychain tension may be checked by applying a 10 lb. load to the Polychain, mid-span between drive and driven sprocket. The Polychain should deflect .250 to .313".
7. Tighten the large hex head screw on the idler sprocket.
8. Attach the Polychain cover using the four hex nuts and lock washers.
9. See Lubrication and Final Checks section for final polychain adjustment.

## Eclipse ES CAFSystem™ Installation onto transmission (See Figure 1)

To install the Eclipse ES CAFSystem onto the C10 transmission, perform the following steps:

1. Support the Eclipse ES unit with a lifting strap placed under the air compressor. Two other eyeloops are provided for lifting (see Figure 1).
2. Lift the unit onto the C10.
3. Install the compressor bracket that supports the Eclipse ES unit to the C10.
4. Install the five (5) hex hd screws that attach the Eclipse ES unit to the C10.

**NOTE: Apply anti-seize to shaft before installing air clutch.**

5. Apply Loctite 609 to keyway, install key and align clutch assembly. Push assembly into place.

**NOTE: Locate clutch assembly to ensure proper interface between set screw and its seating hole.**

6. Lock air clutch assembly into place for final polychain adjustment using set screw (use Loctite 242).
7. Install the Polychain onto the air clutch assembly, driven sprocket and idler sprocket.
8. Connect the nylon tube to the air clutch assembly.
9. Tighten Polychain until taut using the Polychain tensioning screw. Polychain tension may be checked by applying a 10 lb. load to the Polychain, mid-span between drive and driven sprocket. The Polychain should deflect .250 to .313".
10. Tighten the large hex head screw on the idler sprocket.
11. Reconnect all electrical and air connections.
12. See Lubrication and Final Checks section for final polychain adjustment.

## Propeller Shaft Connection and Accessory Installation

### **Electrical Connections**

Connect the tachometer cable, electric shift wiring and primer motor wiring as required.

### **Primer**

Connect the priming pump and hose to the priming pump.

### **Pneumatic Shift**

- Connect power supply and truck transmission interfaces.
- SAE J1402 air brake hose recommended, 1/4" to 3/8". Connect air lines from main truck supply.

### **Drain Valve**

Connect the manifold drain valve.

### **Propeller Shaft**

Connect the propeller shafts to the drive and coupling shafts

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## Lubrication and Final Checks

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1. Fill the transmission through the fluid level hole or by removing the breather and adding fluid through this opening. Any type of automatic transmission fluid (ATF) can be used. Capacity is approximately 12 quarts (fill to the bottom of threads of the oil level port).
2. Recheck fasteners for tightness.
3. Check for fluid leaks.
4. Recheck for proper operation of shift mechanism and that the shift indicator light system is functioning properly.

### **Indicating Lights Operation**

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

**NOTE: Block wheels with wheel chocks before beginning.**

- a. 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.
- b. Shift to PUMP following the shifting instructions section of this document.
  1. Ensure that the green PUMP ENGAGED and OK TO PUMP lights in the cab are on.
  2. Ensure that the green THROTTLE READY light on the operator's panel is on.
- c. Apply the service (foot) brake and release the parking brake.
  1. Ensure that the green OK TO PUMP light in the cab is off.

2. Ensure that the green THROTTLE READY light on the operator's panel is off.

- d. Engage the parking brake and shift truck transmission to NEUTRAL.
  1. Ensure that the green OK TO PUMP light in the cab is off (automatic truck transmission only).
- e. Shift to ROAD following the shifting instructions section of this document.
  1. Ensure that the green PUMP ENGAGED and OK TO PUMP lights in the cab are off.
  2. Ensure that the green THROTTLE READY light on the operator's panel is off.

### **Eclipse Units Only**

5. Engage water pump and CAFS per appropriate operating instructions. Operate system for ten (10) minutes.
6. Check Polychain tension. Apply a 10 lb. load to the Polychain, mid-span between drive and driven sprocket. The Polychain should deflect .250 to .313. Adjust tension with Polychain tensioning screw. When tension is correct, loosen large hex head screw on the idler sprocket and apply a bead of Loctite 243 Blue to the threads. Tighten hex head screw.
7. Install the Polychain cover.