

# STANADYNE<sup>®</sup> SERVICE BULLETIN

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SUPERSEDES: S.B. 438R9 dated 02/27/04

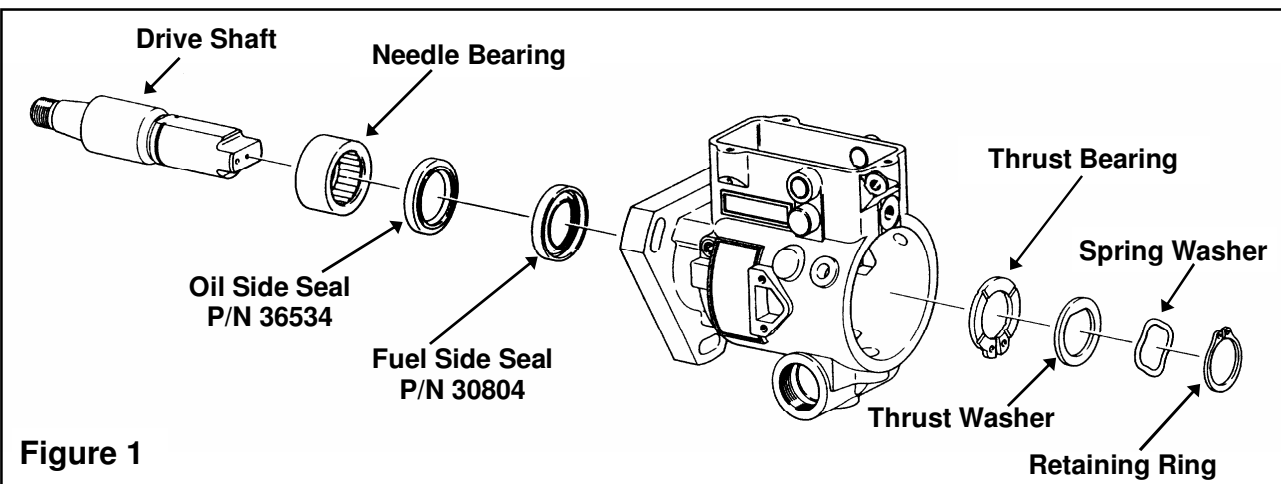
PUMP MODELS AFFECTED: ALL DB4, DE AND DS

## SUBJECT: DRIVE SHAFT AND DRIVE SEAL SERVICE PROCEDURES

This bulletin is to be used in conjunction with the respective Operation and Instruction Manual (99689 (DB4), 99646 (DS) and 99807 (DE)) for the servicing of DB4, DS and DE drive shaft and drive seal arrangements.

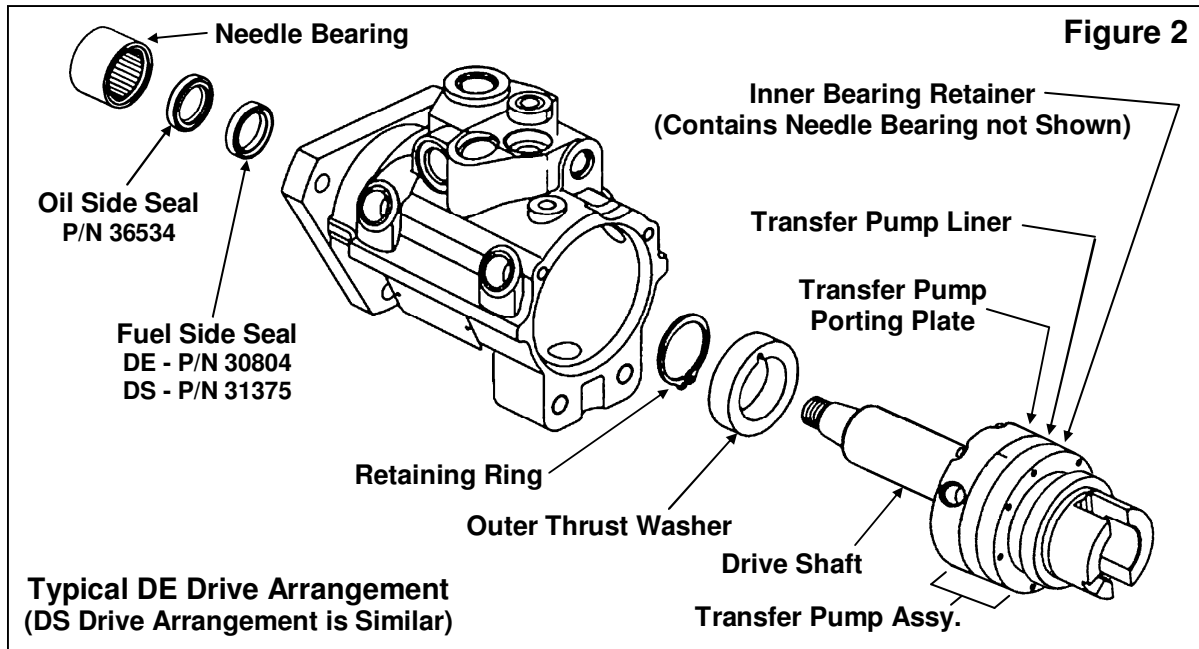
### Drive Arrangement - DB4

The DB4 pump drive shaft is retained by an internal thrust arrangement consisting of a stationary thrust bearing, a rotating thrust washer, a spring washer, and a retaining ring as shown in Figure 1. Drive shaft sealing is accomplished by two lip type seals which are pressed into the front of the pump housing below the needle bearing. The needle bearing is engine oil lubricated and supports the drive shaft. A weep hole in the pump housing prevents fuel leakage from entering the engine and provides a means for visual seal leakage detection.



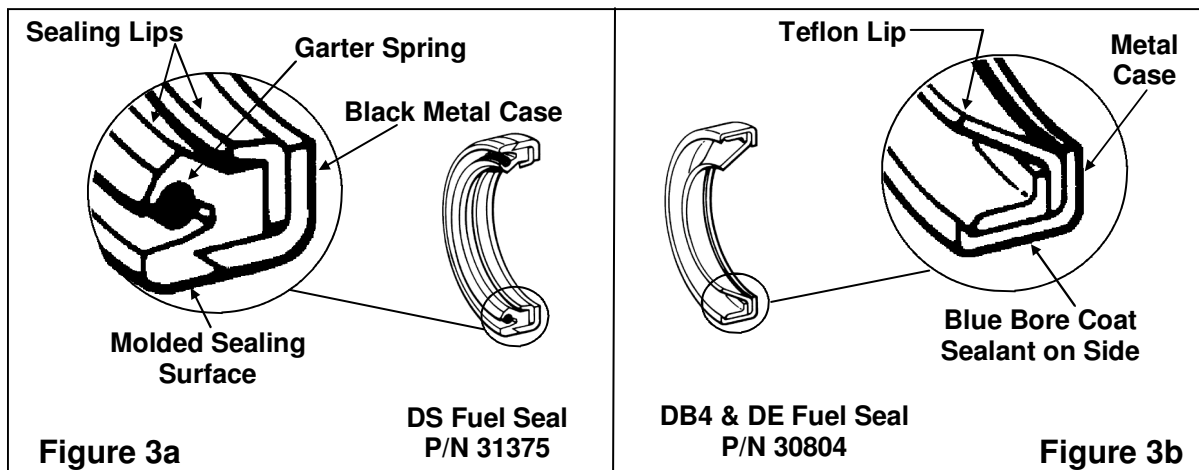
### Drive Arrangement - DS & DE

The DE and DS pump models share similar sealing and internal thrust control designs. Drive shaft sealing is accomplished by two lip type seals pressed into the front of the pump housing, as shown in Figure 2. The transfer pump assembly is driven by the drive shaft and also maintains axial thrust through bearing surfaces on the porting plate and inner bearing retainer assembly. The drive shaft is supported by two bearings: the same engine oil lubricated needle bearing used in DB4 pump models, and also by a smaller fuel oil lubricated needle bearing within the transfer pump assembly.



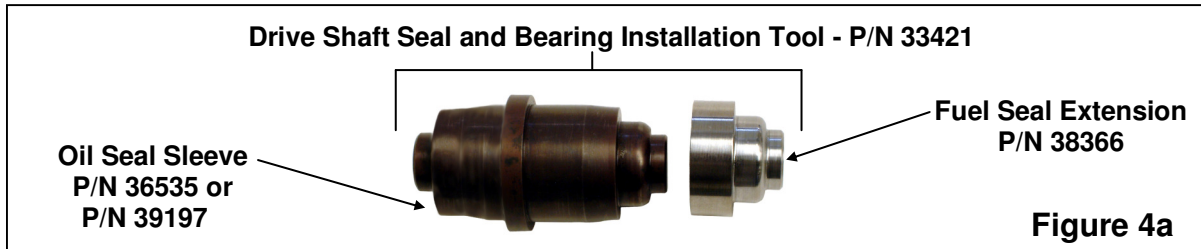
### Fuel Side Seals and Seal Spacer

The fuel side seal used in DS pump models (P/N 31375) is a dual lip type seal with a black metal case and a black rubber molded sealing surface on the outer case wall (Reference Figure 3a). The 31375 fuel seal was originally introduced as a replacement for the single Teflon lip type fuel seal (P/N 30804) shown in Figure 3b. However, it was found that the seal could stiffen when exposed to certain fuels and some DB4 applications experienced fuel leakage at the weep hole. Consequently, the DB4 pump models were reverted back to the use of the 30804 fuel seal (P/N 30804) shown in Figure 3b. This seal has a blue bore coat sealant bonded to the outer diameter of the metal case and is used in all DB4 and DE pump models.

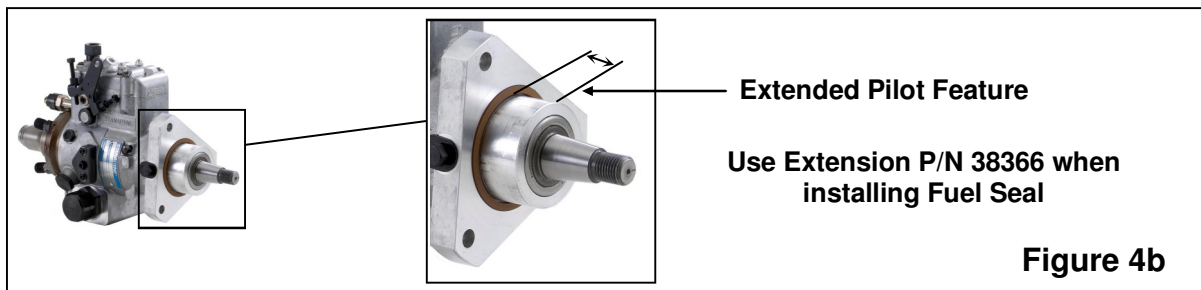


Originally, DB4 and DS pump models were equipped with a white polymer seal spacer (P/N 30445) positioned between the fuel seal and the oil seal. In the late

1990's, the seal spacer was eliminated. As a result, a new seal and bearing installation tool was introduced to ensure correct seal positioning. The 33421 Drive Shaft Seal and Bearing Installation Tool, shown in Figure 4a, superseded the original seal and bearing installation tool (P/N 28316) and is used for all DB4, DS and DE pump models.



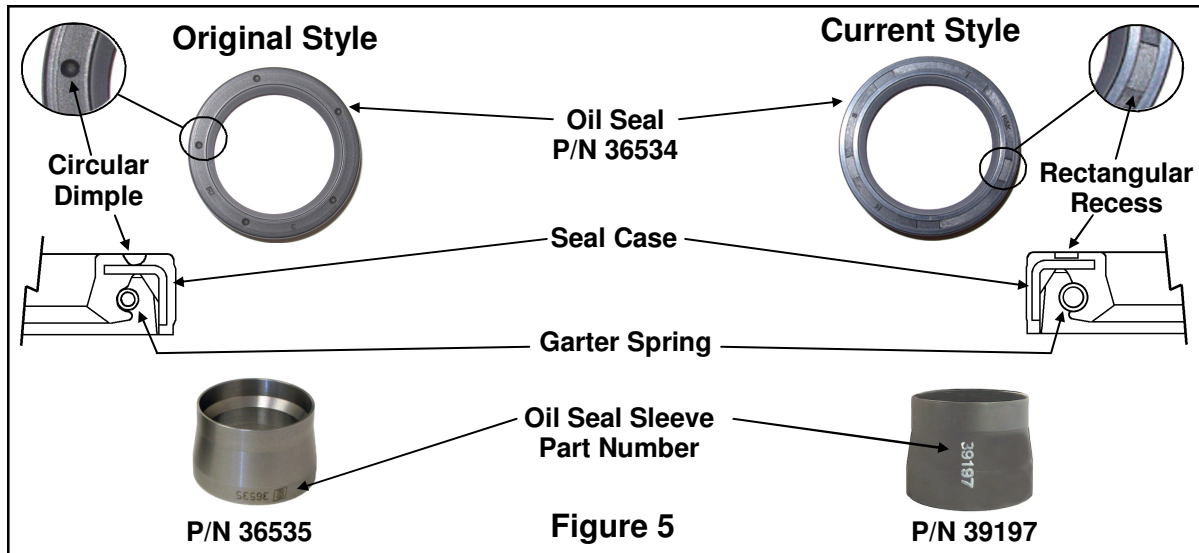
Please note that some DB4 housing assemblies have an extended pilot feature, as shown in Figure 4b. When installing the fuel side seal in these housing assemblies use the 38366 Fuel seal Extension (Reference Figure 4a) on the end of the 33421 to position the fuel side seal correctly



## Oil Side Seals

To reduce the possibility of seal distortion during pump assembly, a new oil side seal (P/N 36534) was introduced in 2004 for use in all DS and DB4 pump models. Recently, supplier changes to the manufacture of this seal have affected the size of the garter spring and seal case (Reference Figure 5). These changes were significant enough to prevent the current style of 36534 seals from correctly fitting onto the existing oil seal sleeve (P/N 36535). Consequently, a oil seal sleeve (P/N 39197) with a thinner lip has been released to prevent seal and/or housing bore damage during oil seal installation. The oil seal sleeves can be identified by the part number printed on the side and the oil seals can be distinguished by the shape of the recessed area on the face of the seal case, as shown in Figure 5.

This is a running parts change (the oil side seal part number has not changed) so the 39197 oil sleeve will now be considered a required tool for all authorized service agencies. However, please retain the 36535 oil seal installation sleeve until stocks of the original style 36534 oil seal are depleted. At which time, the 36535 sleeve may be discarded.



**IMPORTANT:** Use of the wrong oil side seal sleeve could result in damage to the seal and/or housing bore.

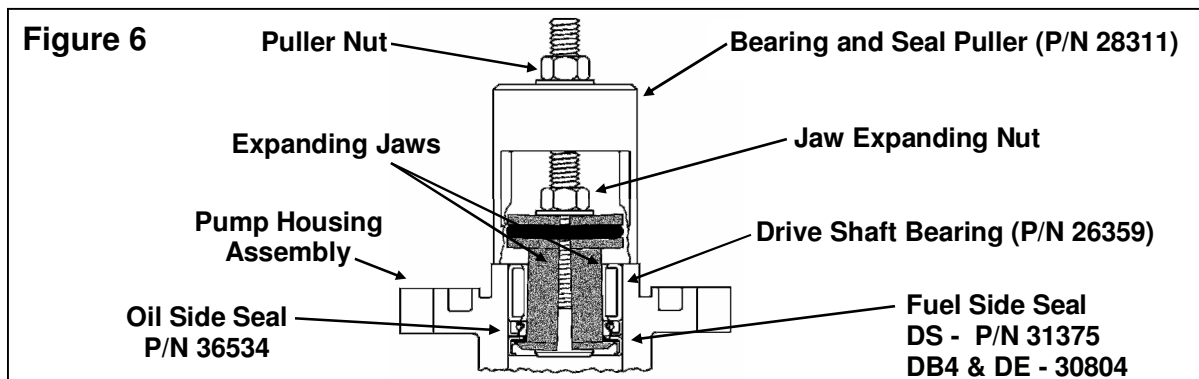
The DE pump models were originally specified with a slightly larger outside diameter oil side seal (P/N 35494), which is identified by the orange bore coat material on the seal case. Recently, all DE pump models have reverted to the use of the 36534 oil side seal for both production and service. The 33421 Drive Shaft Seal and Bearing Installation Tool (with the oil seal sleeves outlined in the previous section) is used for servicing all DE pump models.

### Drive Shaft Removal

Reference the respective Operation and Instruction Manual (99689 (DB4), 99646 (DS) and 99807 (DE)) for specific pump disassembly and drive shaft removal instructions.

### Seal/Bearing Removal

Use the Drive Shaft Seal and Bearing Puller (P/N 28311) to remove the drive shaft seals and bearing from DB4, DS and DE pumps (Reference Figure 6). The tool removes both seals, the spacer (if present), and the bearing simultaneously



from the housing. Refer the respective Operation and Instruction Manual (99689 (DB4), 99646 (DS) and 99807 (DE)) for applicable for instructions on using this puller.

**IMPORTANT:** Never reuse seals or bearings after they have been removed from a pump housing due to the distortion caused during the removal process.

### Seal and Bearing Installation

1. Place the pump housing on an arbor press with the housing flange facing upwards. *NOTE: Be sure the housing rests flat on the arbor plate and that the seal bore of the housing is clean and dry.*
2. **Fuel Side Seal:** Insert the fuel seal (DS-P/N 31375, DB4 & DE-P/N 30804) onto the end of the 33421 installation tool or onto the 38366 extension as required (Reference Figure 4b). The seal case will be facing the tool and the open side of the seal (lip/garter spring side) will be facing outward.

**IMPORTANT:** Ensure the housing bore is clean and dry prior to installing the seals.

3. Position the installation tool and seal above the pump housing as shown in Figure 7. Guide the tool and seal into the housing bore and press the seal down until the tool flange bottoms against the pump housing.

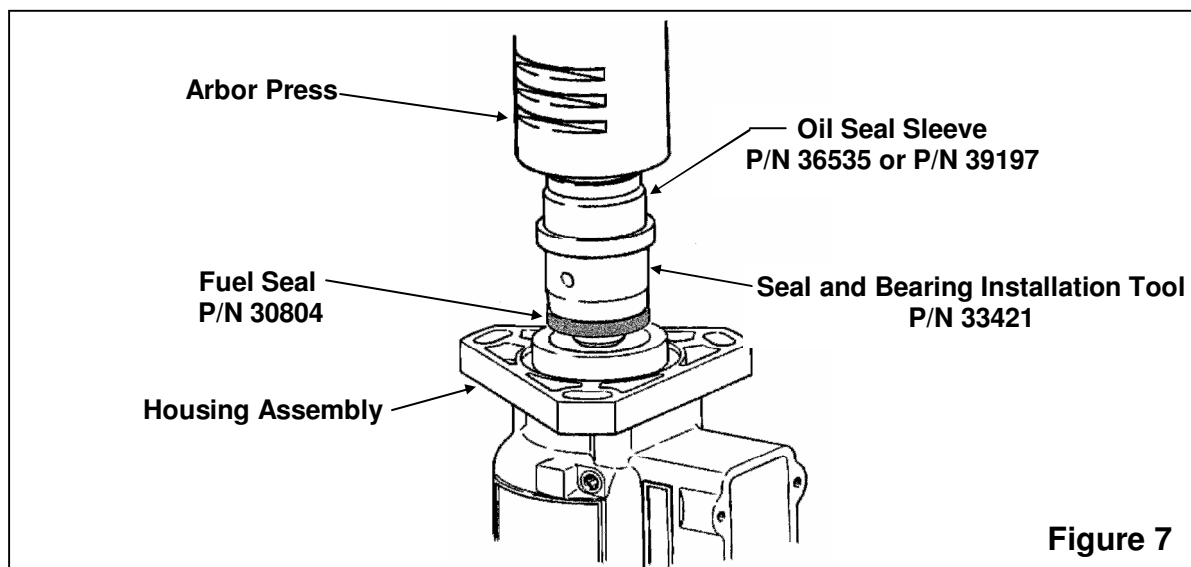
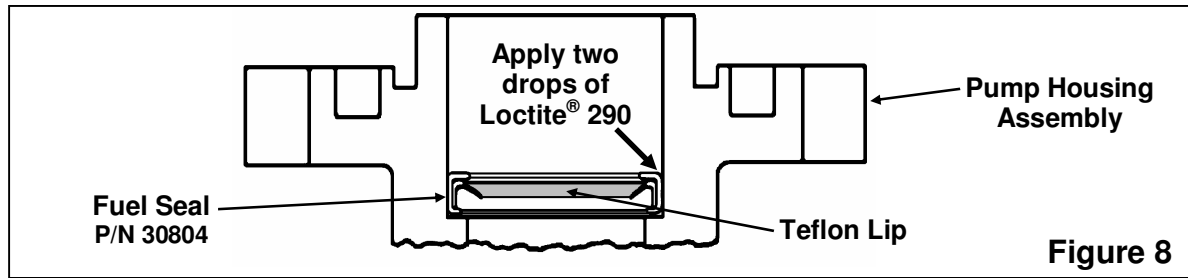


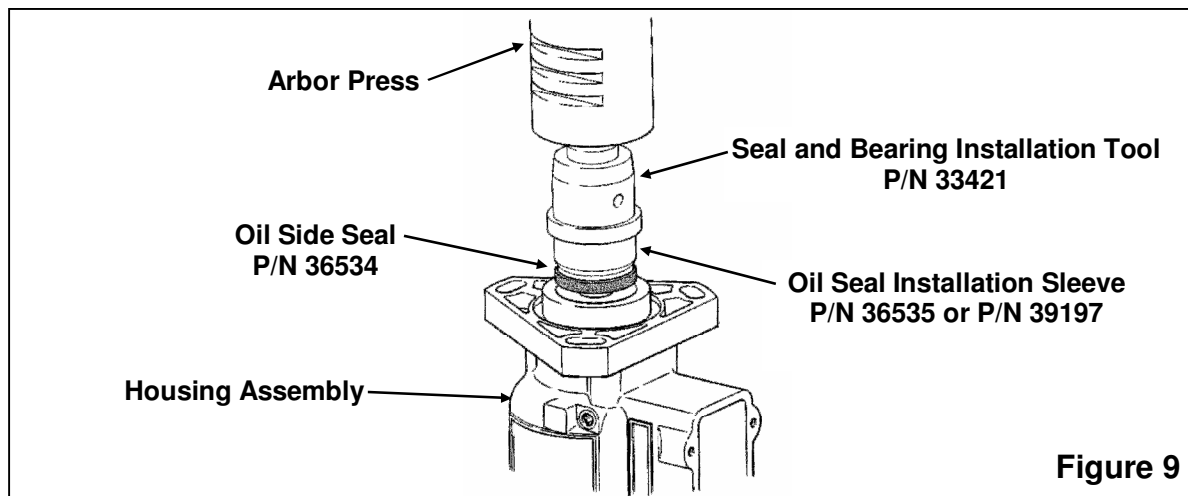
Figure 7

4. **DB4 Pumps Only** - Clean the housing bore and apply a maximum of two (2) drops of Loctite® 290 (P/N 21915) to the area where the seal case mates with the pump housing (Reference Figure 8). Rotate the housing to distribute the Loctite® evenly and allow it to cure for approximately 15 minutes with the seal bore facing upward.



**IMPORTANT: Do not allow Loctite® 290 to get on the lip of the seal**

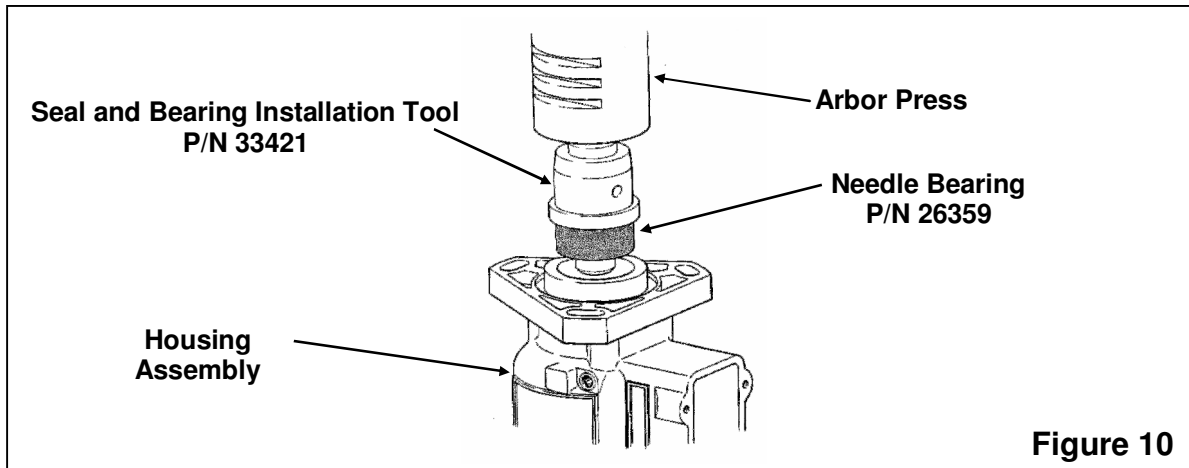
5. **Oil Side Seal:** Select the proper oil seal sleeve for the style of 36534 oil seal being installed (Ref. Figure 5) and insert it onto the end of the 33421 seal and bearing installation tool. Place the open side of the seal (lip/garter spring side) over the lip of the installation sleeve so that the seal sits squarely.
6. Guide the seal and tool into the pump housing as shown in Figure 9 and press the seal in until the flange on the tool bottoms against the housing.



7. **Drive Shaft Bearing:** Remove the oil seal sleeve (P/N 36535 or 39197) from the end of the 33421 seal and bearing installation tool. Slide the bearing onto the tool in place of the sleeve with the bearing part number facing toward the tool shoulder. Guide the bearing into the housing as shown in Figure 10 and press it in until the flange on the tool bottoms against the housing.

**IMPORTANT: When installed correctly, the drive shaft needle bearing will protrude approximately .045 inches (1.14 mm) from the end of the housing - this is a normal condition.**

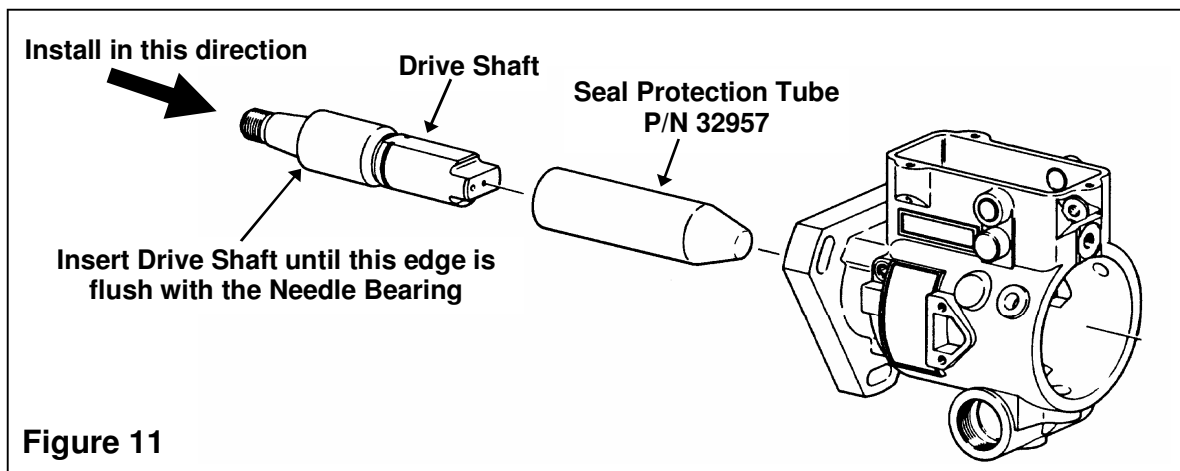
*NOTE: Some DB4 pump models used on VM Motori pump applications are not equipped with a drive bearing. Reference Service Bulletin 478 for specific service and bench testing information regarding these pump models*



**Figure 10**

### Drive Shaft and Thrust Component Assembly - DB4

1. A Drive Shaft Seal Protection Tube (P/N 32957) is used during drive shaft installation to prevent damage to the seals. Slide the protection tube over the shaft and wet them with calibrating fluid. Insert the protection tube and drive shaft into the end of the housing (Ref. Figure 11) until the largest diameter of the shaft is flush with the outer edge of the needle bearing. Hold the drive shaft and remove the tool through the inside of the housing.



**Figure 11**

2. Install the split thrust bearing (Reference Figure 1) into the counter bore inside the housing assembly using retaining ring pliers (P/N 20043).
3. Align the flat on the thrust washer with the flat on the drive shaft (Reference Figure 1) and slide the thrust washer onto the shaft. Place a wavy spring washer over the drive shaft and install the retaining ring into the groove on the drive shaft using retaining ring pliers (P/N 13337).

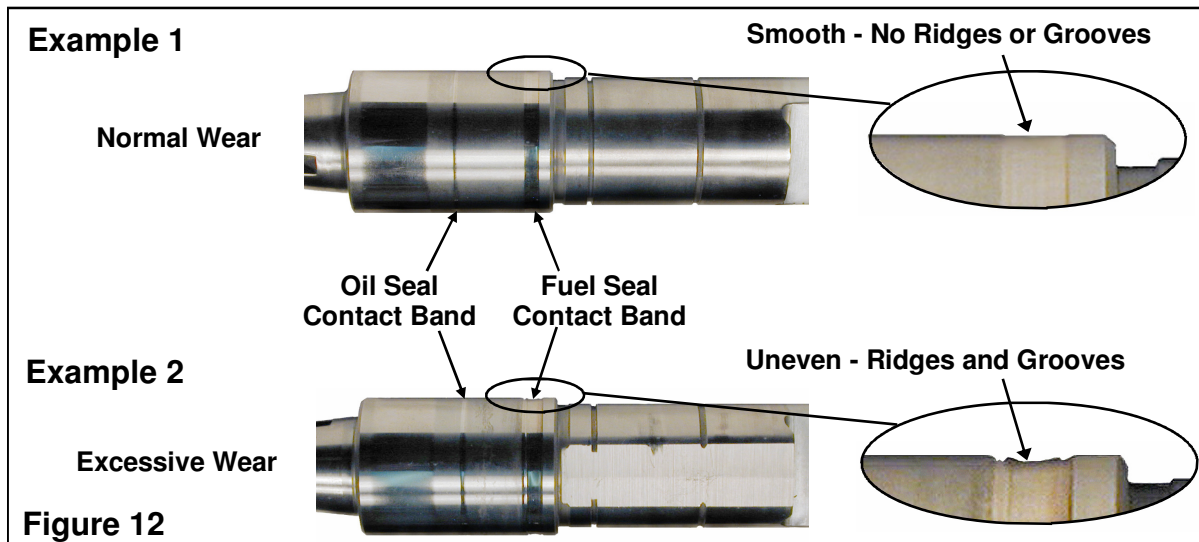
**IMPORTANT:** Do not tilt the housing rearward (head bore down) without the head and rotor assembly installed and secured. The drive shaft and thrust components could fall out of the housing through the head bore.

## Drive Shaft and Thrust Component Assembly - DS & DE

Refer the respective Operation and Instruction Manual (99646 (DS) or 99807 (DE)) for applicable instructions on drive component assembly.

### Re-use of Drive Shafts - (Reference Figure 12)

During normal pump operation, contact marks/bands are created on the drive shaft by seal lip contact. Re-using a drive shaft that shows normal wear patterns (Example 1) with new drive shaft seals is an acceptable service practice. Drive shaft replacement should not be considered solely based on seal contact wear unless it is excessive and exhibits uneven ridges and grooves as shown Example 2 of Figure 12.



### Warranty

If a DB4, DS, or DE pump is received for service with a customer complaint of weep hole leakage (fuel or engine oil), and it is within the Stanadyne warranty period, the pump does not have to be tested to verify the complaint (Operation Code 01A). A warranty claim may be submitted for the labor operations outlined below. *Note: Reference Section 4.7 of your Stanadyne Service Policies and Procedures Manual (99666) for time allowances. The Stanadyne on-line warranty program will automatically calculate time allowances.*

### Labor Operations for DB4, DE, or DS Drive Shaft Seal Replacement (When customer complaint is weep hole leakage)

Labor Operation	Description
06	Replace drive shaft seals
51, 51A, or 51B (Dependent on Model Type)	Install pump on test bench, calibrate and leak test.
00	Administrative time



**Technical Support Group  
Product Support Department**

<b><u>Revisions</u></b>	<b><u>Date</u></b>	<b><u>Changes</u></b>
7	1/98	Reverted to use of P/N 30804 Seal for all DB4 pumps Introduce Drive Shaft Seal/Bearing Installation Tool 33421 for all DB4 Models.
8	1/00	Update to include use of 290 Loctite® during 30804 DB4 Fuel Side Seal installation.
9	2/04	Add DE pump models, Oil side seal changes, and Drive Shaft Re-use information. Introduced 36535 oil side seal installation sleeve. Changed warranty procedures.
10	9/07	Change oil side seal information. Introduce installation sleeve 39197 and extension 38366