



INSTRUCTION MANUAL

SERIES 3E ROTOR SIZES 118 AND 118P

WARNING

READ CA-1 AND THIS INSTRUCTION MANUAL BEFORE
INSTALLATION, OPERATION OR MAINTENANCE

INSTRUCTIONS 3E-B (R-3)

This manual now is
identified as part no.
SRM00017

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April, 1997

FOREWORD

The instructions given herein cover generally the operation and maintenance of subject equipment. Should any questions arise which may not be answered specifically by these instructions, they should be referred to Imo Pump for further detailed information and technical assistance. 704-289-6511, Ext. 343, 349 or 358.

This manual cannot possibly cover every situation connected with the operation, adjustment, inspection, test overhaul and maintenance of the equipment furnished. Every effort is made to prepare the text of the manual so that engineering and design data is transformed into the most easily understood wording. Imo Pump in furnishing the equipment and this manual, must presume that the operating and maintenance personnel assigned thereto have sufficient technical knowledge and experience to apply sound safety and operational practices which may not be otherwise covered herein.

In application where Imo Pump furnished equipment is to be integrated with a process or other machinery, these instructions should be thoroughly reviewed to determine the proper integration of the equipment into the overall plant operational procedures. On critical or dangerous equipment, provide suitable safety and emergency systems to protect personnel and property from injury due to pump malfunction. If pump handles flammable, toxic, corrosive or explosive fluids, provide for safety in the event of pump leakage or malfunction.

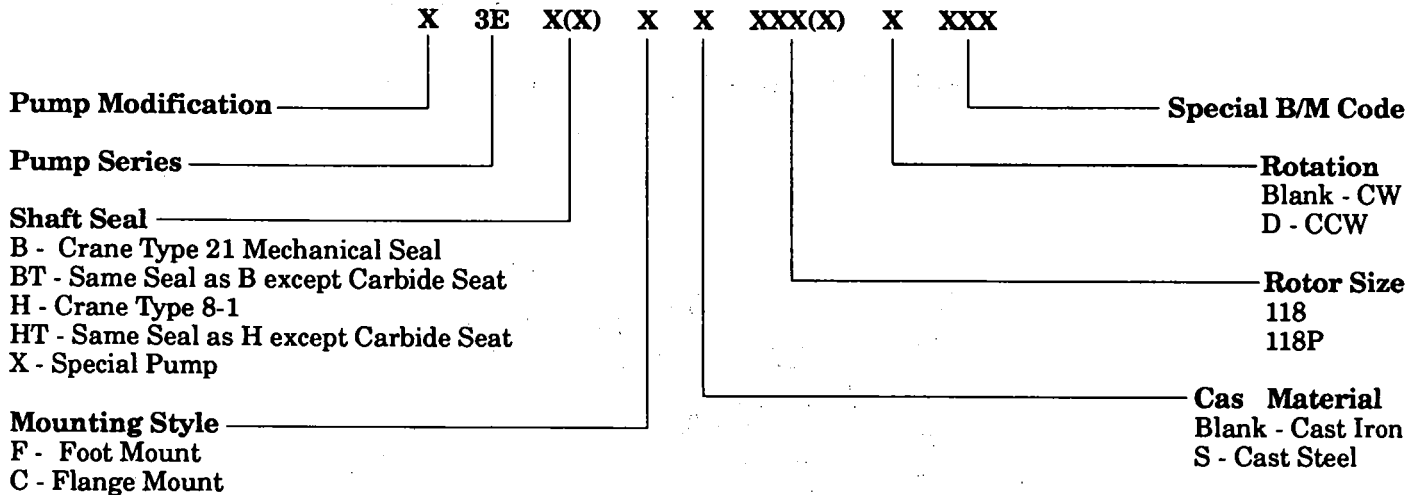
If the installation, operation and maintenance instructions are not correctly and strictly followed and observed, serious damage to the pump could result. Imo Pump cannot accept responsibility for unsatisfactory performance or damage resulting from failure to comply with instructions.

This instruction manual covers the 3E Series Imo pumps. Specific models covered by this manual are identified in Table 1. The model of each particular pump is identified on the pump end cover. Refer to Figure 1 for definitions of model designators. Refer to assembly drawing corresponding to your pump model, Figures 5 through 15, as you use this instruction manual. If your pump type is not specifically identifiable in this manual, contact Imo Pump Service Department with pump model and serial number for assistance, 704-289-6511, Ext. 343, 349 or 358.

**Table 1
3E SERIES PUMP MODELS**

ROTOR SIZES 118 and 118P					
PUMP MODEL*	FIGURE NUMBER	PUMP MODEL*	FIGURE NUMBER	PUMP MODEL*	FIGURE NUMBER
C3EBC	5	C3EX	13	D3EHCS	6
C3EBCX	5	C3ENC	14	D3EHCST	6
C3EBF	7	D3EBCS	6	D3EHFS	8
C3EHC	5	D3EBTCS	6	D3EICS	12
C3EHF	7	D3EBFS	8	D3EXCS	6
C3EIC	11	D3EBTFS	8	E3EBC	15

* Pump model letters precede rotor size.



**Figure 1. Definitions of Model Designators
STRUCTURAL LIMITS**

Operating conditions, such as speed, fluid viscosity, inlet pressure, discharge pressure, temperature, filtration, duty cycle, mounting, drive type, etc. are interrelated. Due to these variable conditions, the specific application may be different from that of the structural limitations. This equipment must not be operated without verification that operating requirements are within published capabilities as shown in the appropriate pump data (available from local Imo Pump offices and representatives listed in CA-1 manual). *Under no circumstances are the following structural limitations to be exceeded.*

MAXIMUM SPEED: Contact the Imo Pump for Rating Tables. For No. 6 fuel oil, crude oil and other fluids known to contain fine abrasives, pump speed should not exceed 1800 RPM.

VISCOSITY: 2.0 cst (33 SSU) Minimum
 3000 SSU maximum for type B mechanical seal. 25,000 SSU maximum for type H mechanical seal. Type B mechanical seal is not recommended for use when using No. 6 fuel oil regardless of specified operating viscosity range.

TEMPERATURE: Type B Mechanical Seal Pump – 0° to 180°F
 Type H Mechanical Seal, Integral Mount and Packing Pumps – 0° to 250°F

SUCTION: 25 PSIG Maximum
DRIVE: Direct Only

DISCHARGE PRESSURE: 150 PSIG (Maximum)
FILTRATION: Light fluids – 60 mesh
 Heavy fluids – 1/16 to 1/8-inch

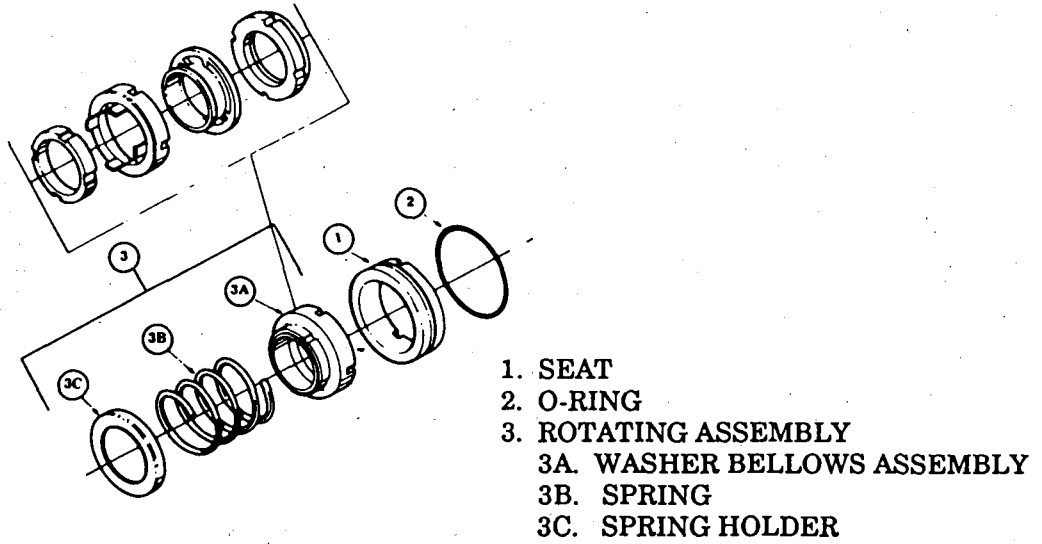


FIGURE 2. Crane Type 21 Mechanical Seal

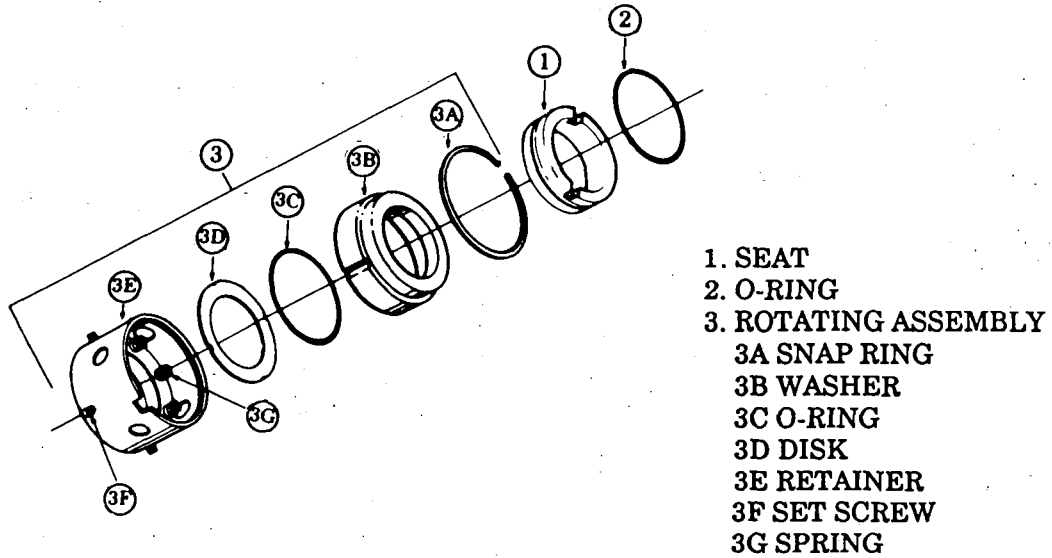


FIGURE 3. Crane Type 8-1 Mechanical Seal

MAINTENANCE

General. To perform maintenance on the Series 3E pumps, the following initial conditions shall be completed prior to the maintenance action: Close the inlet and outlet valves and tag "Out of Service." De-energize pump drive motor controller and tag "Out of Service." Vent all pressure from pump housing. Remove pump from driver and remove coupling from pump. Remove coupling key (013).

SERVICING MECHANICAL SEAL AND BEARING (Figures 5 through 8, 14 and 15)

Removal of Seal and Bearing: Complete **General** steps, then remove retainer bolts (006) and retainer (012). Grasp power rotor (007) and pull the assembled power rotor (007) from pump. Disassemble power rotor as follows:

- (a) Remove retaining ring (015) from groove of power rotor. Support sleeve subassembly (092 or 093) and press power rotor (007) from bearing (011) and sleeve subassembly (092 or 093). Remove bearing (011) from sleeve subassembly (092 or 093). Remove mechanical seal seat (1, Figures 2 and 3) with O-ring (2, Figures 2 and 3) from sleeve subassembly (092 or 093) and remove O-ring from seat, if required. Remove O-ring (094) from groove of sleeve (092 or 093).
- (b) Remove rotating assembly (3, Figures 2 and 3) of mechanical seal (016) from power rotor (007) as outlined below.
 - (1) **Crane Type 21 (Figure 2).** Slide rotating assembly 3 from power rotor (007).
 - (2) **Crane Type 8-1 (Figure 3).** Loosen setscrews (3F) and slide rotating assembly (3) from rotor (007).

NOTE

Idler stop (009) and sleeve (025) are factory assembled on power rotor (007) and should not be removed.

Installation of Seal and Bearing: Clean and inspect each part for burrs or nicks. Using a buffing wheel, remove all burrs. Particular attention must be given to the keyway and retaining ring groove of power rotor (007) and sleeve (025) to ensure all sharp edges are removed. Sharp edges on sleeve (025) may cut or shave mechanical seal when it is placed into the installed position. Wipe all parts with lubricating oil (SAE-30) prior to installing.

- (a) With power rotor (007) and mechanical seal rotating assembly (3, Figures 2 and 3) coated with lubricating oil, install the rotating assembly (3, Figures 2 and 3) on power rotor (007) as follows:
 - (1) **Crane Type 21 (Figure 2).** Slide rotating assembly (3) on sleeve (025) until rotating assembly (3) is positioned next to idler stop (009).
 - (2) **Crane Type 8-1 (Figure 3).** Slide rotating assembly (3) on sleeve (025) until rotating assembly (3) is positioned next to idler stop (009). Tighten setscrews (3F).
- (b) Slide mechanical seal O-ring (2, Figures 2 and 3) in O-ring groove of mechanical seal seat (1, Figures 2 and 3). Align seat (1, Figures 2 and 3) slot with spring pin (095) located in sleeve subassembly (092 or 093) and slide assembled seat in sleeve subassembly. Apply lubricating oil on running faces of mechanical seal seat (1, Figures 2 and 3). Install O-ring (094) in groove of sleeve (092 or 093). Install assembled sleeve subassembly (092 or 093) on power rotor (007) with seal seat (1, Figures 2 and 3) contacting installed rotating assembly (3, Figures 2 and 3).

- (c) Support power rotor (007) and press ball bearing (011) on power rotor (007) shaft, pressing only on bearing inner race until bearing just passes retaining ring (015) groove in power rotor. Install retaining ring (015) in groove of power rotor (007), ensuring that ball bearing (011) is contacting retaining ring (015) and ball bearing is bottomed out against the sleeve subassembly (092 or 093).
- (d) Install assembled power rotor, centering each part as it enters cover (004). NOTE: Sleeve subassembly (092 or 093) drain port is to be aligned with drain port in cover (004).
- (e) Rotate power rotor to ensure freedom of rotation.
- (f) Install retainer (012) on cover (004) using bolts (006). Tighten bolts (006) to a torque value of 40 lbs. inch (± 5 lbs. inch).
- (g) Install key (013) and coupling hub on power rotor (007). Install pump on driver and check alignment as described in CA-1 manual. Prime pump to expel all air prior to starting.

NOTE

Do not force or drive hub onto pump shaft. Pump is designed for slide fit coupling hub.

DISASSEMBLY AND ASSEMBLY PROCEDURES (Figures 5 through 8)

Disassemble pump by first completing steps outlined in Removal of Mechanical Seal and Bearing. Continue to disassemble pump as follows:

- (a) Remove bolts (027) and cover (004) from case (001). Remove O-ring (026) from either case (001) or cover (004).
- (b) Remove bolts (003) and cover (002) from case (001). Clean Loctite gasket eliminator from cover (002) and flange of case (001).
- (c) Remove idlers (008) from idler bores.
- (d) **Steel Case Pump Only (Figures 6 or 8).** Remove housing (032) with O-ring (033) from case (001). Remove O-ring (033) from groove of housing (032).

Prior to assembly of pump, check each part and remove any burrs by buffing. Wipe all parts with lubricating oil (SAE-30) prior to assembly. Rotate power rotor frequently during assembly to ensure freedom of rotation. Assemble pump as follows:

- (a) **Steel Case Pump Only (Figure 6 or 8).** Install O-ring (033) in groove of housing (032) and install housing (032) in case (001), ensuring that anti-rotation groove in housing (032) is aligned with anti-rotation boss in case (001).
- (b) Install idlers (008) in idler bores.
- (c) Wipe all traces of oil from mating flange of cover (002) and flange of case (001). Apply a thin coat of Loctite gasket eliminator No. 504 to cover (002) and flange of case (001). Install cover (002) to case (001) using bolts (003). Torque bolts (003) to a torque value of 170 lbs. inch (± 5 lbs. inch).
- (d) Install O-ring (026) over cover (004) flange. Install cover (004) with drain port down to case (001) using bolts (027). Torque bolts (027) to a torque value of 170 lbs. inch (± 5 lbs. inch).

NOTE

Cover (004), aligned with drain in sleeve subassembly (093), is equipped with a drain port that prevents fluid being pumped from contaminating ball bearing (011) if mechanical seal failure occurs. Install cover (004) on pump so that drain opening will be down when pump is installed.

NOTE

When pumping clean lubricating oil, the seal drain port in cover (004) may be installed in any altitude.

- (e) Complete assembly of pump by following steps outlined in Installation of Seal and Bearing.

DISASSEMBLY AND ASSEMBLY PROCEDURES (Figures 11 through 15)

Prepare pump for disassembly following **General** steps.

(Figure 13). Remove adapter (028) and gasket (018) from flange of case (001). NOTE: Adapter (028) is retained by special mounting of pump.

Complete disassembly of Figures 9 through 15 pumps as follows:

- (a) Remove bolts or capscrews (027), **(Figure 13 through 15)** and cover (004) from case (001). **(Figures 14 and 15 Only)**. Follow steps (a) and (b) of servicing mechanical seal and bearing, **(Figures 5 through 8, 14 and 15)**. Remove O-ring (026) from either cover (004) or case (001). **(Figures 11 through 15)**. Clean Loctite compound from heads of capscrews or bolts (027).
- (b) **(Figures 14 through 15 Only)**. Power rotor (007) has previously been removed in step (a) above. All other figures, grasp power rotor (007) and pull power rotor (007) and idlers (008) from pump. DO NOT permit idlers to fall as they are removed from pump.

NOTE

Figures 9 and 10 are deleted due to design change.

(Figures 11 through 14). Idler stop (009) and piston (024) or sleeve (025) are factory assembled on power rotor (007) and should not be removed.

- (c) Remove bolts (003) and cover (002). Clean Loctite gasket eliminator No. 504 from cover (002) and flange of pump case (001).
- (d) **(Figure 14 Only)**. Install O-ring (005) into cover (002).
- (e) **Steel Case Pump Only (Figure 12)**. Remove housing (032) from case (001). Remove O-ring (033) from groove of housing (032).

Prior to assembly of pump, check each part and remove any burrs by buffing. Wipe all parts with lubricating oil (SAE-30) prior to assembly. Rotate power rotor (007) frequently during assembly to ensure freedom of rotation. Assemble pump as follows:

- (a) **Steel Case Pumps Only (Figure 12)**. Install O-ring (033) in groove of housing (032) and install housing (032) in case (001), ensuring that anti-rotation groove in housing (032) is aligned with anti-rotation boss in case (001).
- (b) **(Figure 14 Only)**. Install O-ring (005) into cover (002) instead of applying Loctite. All other figures, wipe all traces of oil from mating flange of cover (002) and pump case (001) and apply a thin coat of Loctite gasket eliminator No. 504 to both cover (002) and case (001) using bolts (003). Torque bolts (003) to 170 lbs. inch (± 5 lbs. inch).
- (c) **(Figures 14 through 15 Only)**. Install idler rotors only into idler bores in this step. All other figures, mesh idlers (008) with power rotor (007) and install assembly into pump rotor bores.
- (d) Install O-ring (026) on cover (004) flange.
- (e) **(Figures 11 through 15)**. Apply Loctite gasket eliminator No. 510 under heads of capscrews or bolts (027).
- (f) Install cover (004) on case (001) using bolts or capscrews (027, Figure 13 through 15). Torque bolts or capscrews (027) to 170 lbs. inch (± 5 lbs. inch). **(Figures 5 through 8, 14 and 15 Only)**. Complete assembly of pump by following steps (a) through (g) outlined in installation of seal and bearing found on pages 2 and 3 of this manual.
- (g) **(Figure 13)**. Install gasket (018) and adapter (028) on flange of pump case (001). NOTE: Adapter (028) is retained by special mounting of pump.
- (h) Install key (013) and coupling hub on power rotor (007). Install pump on driver and check alignment as described in CA-1 manual. Prime pump to expel all air prior to starting.

TABLE 2
LIST OF MATERIAL FOR FIGURES 5 THROUGH 15

001		Case	020		Nameplate
002	(2)	Cover	021		Drive Screw
003		Bolt (4)	026	(1)	O-ring
004	(2)	Cover	027		Bolt (4)
005		O-ring	027		Capscrew
006		Bolt (4)	028		Adapter
007	(2)	Power Rotor Assembly	032	(2)	Housing
008	(2)	Idler (2)	033	(1)	O-ring
011	(1)	Ball Bearing	090		Caplug
012		Retainer	091		Caplug
013		Key	092		Sleeve Sub-Assembly
015	(1)	Retaining Ring	093		Sleeve Sub-Assembly
016	(1)	Seal	093		O-ring
018		Gasket	094	(1)	O-ring
019		Nameplate			

Quantities are one (1) except when noted in parentheses after part description.

(1) Minor Repair Kit items (iron and steel case pumps).

(2) Major Repair Kit items (steel case pumps only). Items marked (1) also included in Major Repair Kit.

REPAIR KITS

Minor Repair Kits are available for iron and steel case pumps. Major Repair Kits are available for steel case pumps only. Major Repair Kits are not available for iron case pumps because major repairs are not considered economical. If extensive repair is required to an iron case pump, the pump should be discarded and a new pump purchased. Repair parts are available in kit form only.

ORDERING INSTRUCTIONS

(1) Give the number of this instruction book.

(2) Give the model number of pump for which kit is desired.

(3) Identify the kit (Minor or Major) required.

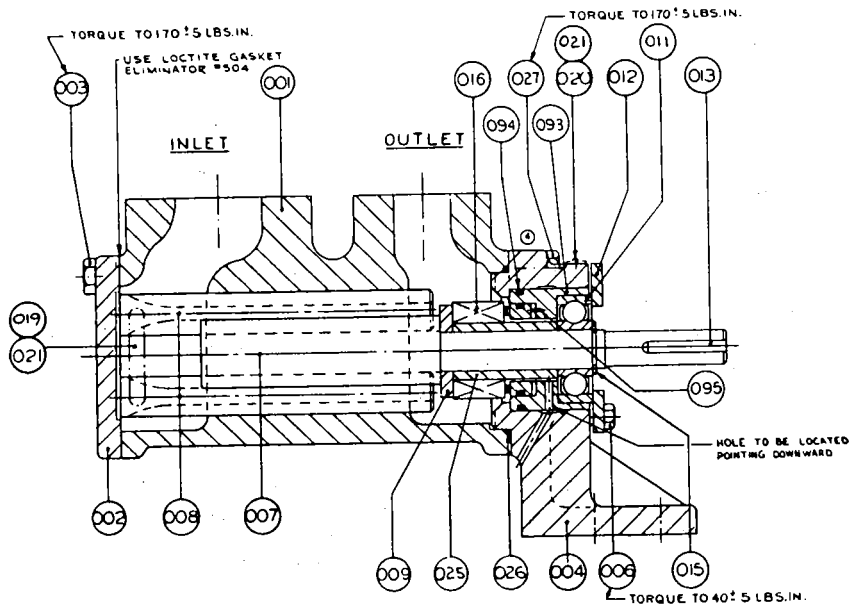


FIGURE 7. Assembly Drawing SC-6120

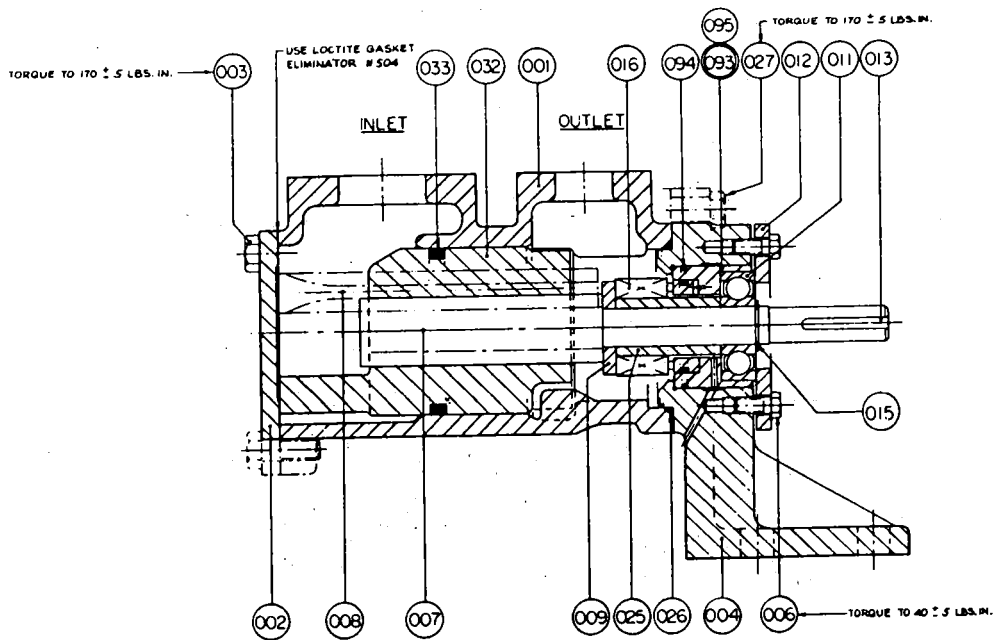


FIGURE 8. Assembly Drawing SC-6139

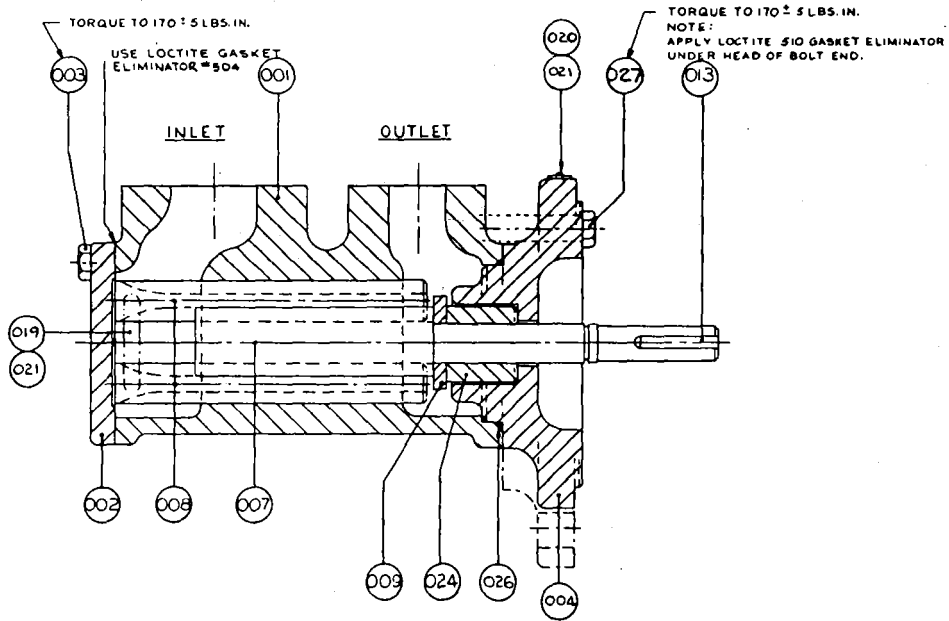


FIGURE 11. Assembly Drawing SC-6122

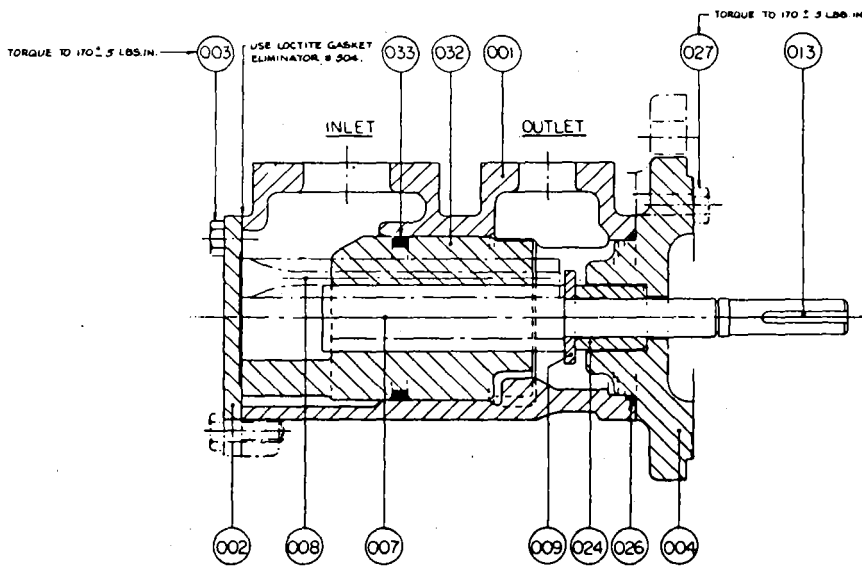


FIGURE 12. Assembly Drawing SC-6140

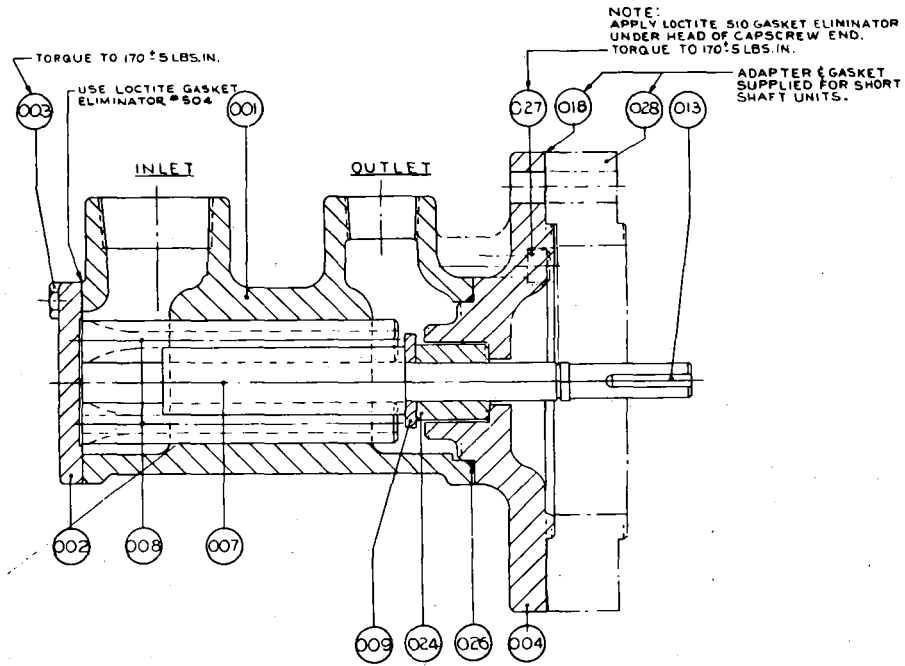


FIGURE 13. Assembly Drawing SC-6121

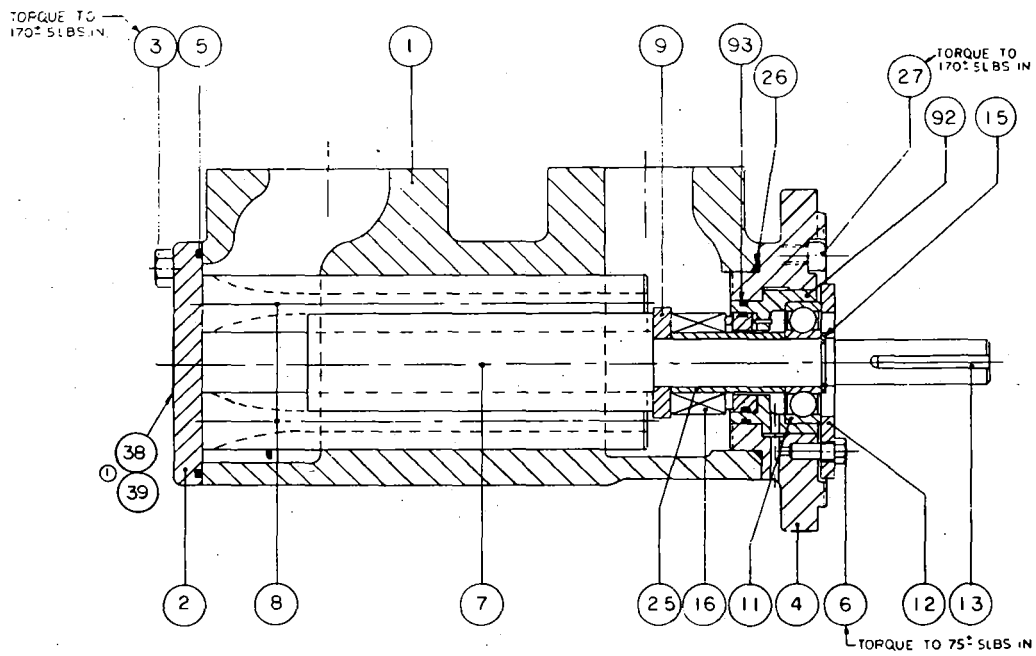


FIGURE 14. Assembly Drawing SC-6150

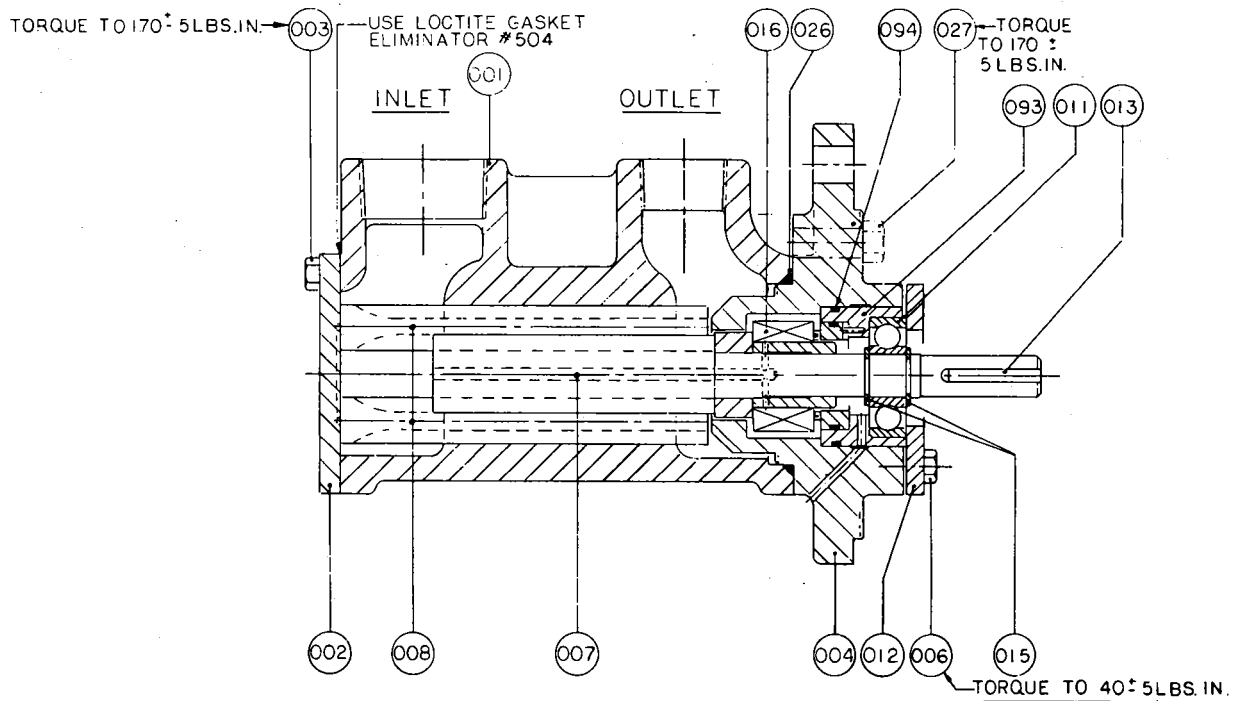


FIGURE 15. Assembly Drawing SC-6149