



INSTRUCTION BULLETIN

No. 1699
Machine: 92 Cessna, 527 D
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Installation Instructions for Piston Propelling Pump Seal Kit SK1699 and Accessory Gear Pump Seal Kit 1700.


This kit contains seals needed for piston pumps 62584 or 65144 and gear pump 65145.

HYDRAULIC PROCEDURES:

- Cleanliness is extremely important when repairing hydraulic components. Work in a clean draft-free area. Dirt and foreign material in the hydraulic system can damage equipment and impair operation.
- Thoroughly clean the outside of the part before disconnecting hydraulic hoses or fittings.
- Cap or plug all disconnected hydraulic hoses.
- In cleaning parts, use dry, filtered compressed air. Do not use rags that contain lint.
- Discard all hydraulic fluid drained from the system. Replace with new, approved hydraulic fluid.

DISASSEMBLY:

1. Turn off the engine and set the parking brake.


 **CAUTION:** Always turn off the engine and set the parking brake before working on the machine.

2. Drain and discard all hydraulic fluid from the system.
3. Before disconnecting hoses to the pump, mark all lines for later identification.
4. Disconnect the foot pedal linkage from the pump control arm (Fig. 1).
5. Remove the two screws that attach the pump mounting plate to the engine bellhousing (Fig. 2).
6. Remove the pump by pulling it straight out from the engine. The pump splined drive shaft should slip out of the coupling. It should not be necessary to remove the pump coupling from the flywheel.
7. Remove the two bolts that attach the accessory pump to the main pump (Fig. 1).

DISASSEMBLY OF PISTON PUMP 62584 or 65144 (Fig. 3):

1. Clamp the end of the drive shaft in a protected jaw vise with the pump body up. Remove the four capscrews (47 and 48) from the adaptor plate of the pump.

2. Tap the adaptor (42) with a plastic mallet to loosen it. Pull the adaptor straight up until it is free.
3. Remove spring retainers (45 & 46), spring (44), and poppet (43) from adaptor assembly (42).
4. Remove the two check valve assemblies (3) from the back plate. Take care not to lose the pins and balls.
5. Use the screw driver slots in the housing to pry up on the back plate (32) or tap with a plastic mallet to loosen the plate. Pull the back plate straight up to remove. Remove the gasket (29).
6. Remove the plug assemblies (36), springs (34), and relief valve assemblies (33) from the back plate.
7. Remove the pump from the vise. Take out the rotating assembly and keep it intact.
8. If the pistons (18) did not come out with the piston block, you can remove them, the spider (19), and the spider pivot (20).
9. The piston block assembly (27) need not be disassembled unless the pins (23) or spring (25) are damaged.

 **CAUTION:** The spring (25) is highly compressed and the snap ring (26) should not be removed without first compressing the spring (25). In order to compress the spring, you need:

- (2) 3/8 ID x 1-1/8 OD flat washers
- (1) 3/8 x 3-1/4 NC capscrew
- (1) 3/8 NC nut

- a. Place one of the flat washers over the 3/8 x 3-1/4 capscrew. Insert this through the center of the piston block.
- b. Place the other washer over the capscrew and let it rest on the three pins.
- c. Screw the nut on and compress the spring inside the piston block.
- d. Use a pair of snap ring pliers to remove the internal snap ring.
- e. Remove the bolt and the two washers.

- f. Remove the washer (24), spring (25), washer (24) and three pins (23), and the internal pin keeper (22).
10. Remove snap ring (1) from the housing. Press shaft (7) from the housing (9) and remove the shaft seal (2) and washer (3).
11. Remove snap ring (4) from the shaft and remove thrust washers (5) and thrust bearing (6).
12. To remove the camplate (17) from the housing, remove the two snap rings (14). Remove two covers (13 & 15) and the two o-rings (12). Remove the inner race (11) and two needle bearings (10). The cam plate can be slid to one side and removed.

NOTE: The two camplate pivot bearings are a loose slip fit; do not be concerned if they are not tight.

INSPECT PARTS FOR WEAR:

1. Check the charge pump relief valve seat inside the charge pump adaptor to see if it is smooth and free of burrs or other defects.
2. Inspect the charge pump relief valve poppet (43) and spring (44).
3. Inspect the check valve assembly (30) to see that the ball seat is in good condition and that the ball moves freely.
4. Inspect the flat surfaces of the back plate (32). The finish on the piston block side should be smooth and free of grooves. If not, the back plate should be replaced. The cam stop should be tight in the back plate.
5. Inspect the piston block (21). The surface that contacts the back plate should be smooth and free of grooves.
6. The pistons (18) should move freely in the piston block bore. If they are sticky, examine the bore for scoring or contamination.
7. Examine the outside diameter of the pistons for wear or deep scratches. The shoes should be snug on the ball end of the pistons. The flat surfaces of the shoes should be flat and smooth.

NOTE: Do not lap the piston shoes.

8. The spider (19) should be flat. It should show no signs of cracks or wear in the pivot area.
9. The pivot (2) should be smooth and show no signs of wear.
10. Check the camplate for signs of scoring on the finished shoe surface.
11. Look for fretting in the bearing and spline area of the shaft (7).

12. Inspect the thrust bearing (6) and washers (5) for wear.
13. Inspect the housing assembly needle bearing (8). The needles are all right if they do not exhibit excessive play and remain in the bearing cage.

REASSEMBLY:

1. Clean all parts in a suitable solvent. Lubricate all critical moving parts before reassembly. Dip gaskets, o-rings, and seals in clean hydraulic fluid.
2. If necessary, install new needle bearings in the housing.
3. The camplate pivot bearings (10) are slip fit; the shaft bearing (8) is press fit. Install with the numbered end of the bearing outward.
4. Install a new o-ring (16) on the camplate trunnion arm.
5. Insert the camplate into the housing (9).
6. Insert the needle bearings (10) over the arm and slide into the housing.
7. Install new o-rings (12) around the outside diameter of the cam pivot bearings. Install sleeve cover (15) and secure with snap ring (14).
8. On the other side of the housing, install bearing (10), inner race (11), o-ring (12), and trunnion cover (13). Secure in housing with snap ring (14). The chamfered inside diameter of the race should be inward.
9. Install snap ring (4) on shaft (7). Install thrust washer (5), thrust bearing (6), and second thrust washer (5). Secure with second snap ring (4).
10. Install shaft in housing and install washer (3), shaft seal (2), and retain with snap ring (1).

NOTE: If possible, use shaft seal driver or arbor press to install shaft seal.

11. To reassemble the piston block assembly, compress the pin keeper (22) and install in the spline of the piston block. Install three pins (23) with the head end to the inside of the block and install in the special grooves of the piston block spline.
12. Install the washer (24), spring (25), and second washer (24) in the piston block. Use the two 3/8 ID washers and the 3/8 x 3-1/4 capscrew to compress the spring and retain with snap ring (26). Remove the 3/8 x 3-1/4 capscrew and the two washers.
13. Install the pivot (2), spider (19) and the piston assemblies (18) in the piston block.

14. Install the rotating assembly (28) in the housing assembly. The piston shoes must be in contact with the camplate. Be sure all parts are properly positioned.
15. Clamp the pump assembly in a protected jaw vise with the open end of the housing up.
16. Install the new gasket (29).
17. Install the back plate (32).
18. Install ball and pin in check valve housing if removed.
19. Install new o-ring (37) and backup washer (38) on check valve assembly (39). Install o-ring nearest pin. Install in back plate (32) with pin in back plate.
20. Install new o-ring (41) in groove in adaptor (42). Hold in place with clean grease.
21. Assemble adaptor on pump back plate. Retain with four cap screws (47 & 48) and torque to 27-31 ft lbs.
22. Install relief valve assemblies (33) in back plate.
23. Install new o-rings (35) and springs (34) on plugs (36). Install plugs (36) in back plate and torque to 55-60 ft lbs.
24. Remove pump from vise and install poppet (43), spring (44), spring retainer (45) and spring retainer (46).

DISASSEMBLY OF ACCESSORY PUMP 65145 (Fig. 4):

1. Clean outside of pump thoroughly.
2. Clamp pump in vise, shaft down.
3. Remove tie bolts (1) 4 each and (2) 4 each.
4. Use sharp tool to mark across front plate, body and back plate. This will assure proper reassembly.
5. Remove pump from vise. Hold pump in hands and bump shaft against wooden block to separate front plate (15) from back plate (3). Body (5) will remain with either front plate or back plate.
6. To separate body from section it remains with, place drive gear (7) in bearing and tap protruding end with plastic hammer.
7. Remove o-ring (4) from back plate assembly.
8. Remove diaphragm (9) from front plate by prying with sharp tool.
9. Remove springs (13) 2 each and steel balls (14) 2 each from front plate.
10. Lift back-up gasket (10) and protector gasket (11) from front plate (15).

11. Lift diaphragm seal (12) from front plate.
12. Remove shaft seal (16) from front plate.

INSPECTION

GENERAL

1. Clean and dry all parts with dry, filtered, compressed air.
2. Remove nicks and burrs from all parts with emery cloth. Rewash parts and redry.

GEAR ASSEMBLY

1. Inspect drive gear shaft (7) for breaking or fretting in spline area. Check smooth surface for cracks.
2. Inspect both the drive gear and idler gear shafts at bearing points and seal areas for rough surfaces and excessive wear.
3. If shafts measure less than .6850 in bearing area, the gear assembly should be replaced. (One gear assembly may be replaced separately; shafts and gears are available as assemblies only.)
4. Inspect gear face for scoring and excessive wear.
5. If gear width is below .636, gear assembly should be replaced.
6. Assure that snap rings are in grooves on either side of drive and idler gears.
7. If edge of gear teeth are sharp - break edge with emery cloth. Wash gears free of metallic particles and dry.

FRONT PLATE AND BACK PLATE

1. Oil grooves in bearings in both front plate and back plate should be in line with dowel pin holes and 180° apart. This positions the oil grooves closest to the respective dowel pin holes.
2. If I.D. of bearings in front plate or back plate exceed 0.691 in, front or back plate should be replaced. (Bearings are not available as separate items.)
3. Bearings in front plate should be flush with islands in groove pattern.
4. Check for scoring on face of back plate - if wear exceeds 0.0015 in, back plate should be replaced.

BODY

1. Check inside gear pockets for excessive scoring or wear.
2. Body should be replaced if I.D. of gear pocket exceeds 1.719.

REASSEMBLY

1. The diaphragm (9), back-up gasket (10), diaphragm seal (12), protector gasket (11), o-ring (4) and shaft seal (16) should be replaced as new parts.
2. Tuck diaphragm seal (12) into grooves in front plate with open part of "V" section down. (Use dull tool.)
3. Press protector gasket (11) and back-up gasket (10) into diaphragm seal.
4. Drop steel balls (14) into respective seats and place spring (13) over balls.
5. Place diaphragm (9) on top of back-up gasket - bronze face up.
6. Entire diaphragm must fit inside the raised rim of the diaphragm seal.
7. Dip gear assemblies into oil and slip into front plate bearings.
8. Install dowel pins (6) in body (5).
9. Apply a thin coat of heavy grease to both milled faces of body. Slip body over gears onto front plate - half moon port cavities in body must face away from front plate; note small drilled hole in one of cavities. This hole must be on pressure side of pump.
10. Install o-ring (4) in groove in back plate (3).
11. Slide back plate over gear shafts until dowel pins are engaged.
12. Install bolts (1 & 2) and torque evenly to 25 - 28 ft lbs.
13. Work shaft seal (16) over drive gear shaft (7) taking care not to cut rubber sealing lip. (Oil seal liberally before assembly.)
14. Seat shaft seal (16) by tapping with plastic hammer.
15. Rotate pump shaft by hand or with pliers. Pump will have a small amount of drag, but should turn freely after short period of use.

PUMP INSTALLATION

1. Apply water-resistant grease to pump splined shaft of accessory pump, bolt to propelling pump. Apply grease to splined shaft of propelling pump.
2. Mount the repaired pump on the pump mounting plate. The pump splined drive shaft should slip into the coupling on the engine flywheel. The mounting plate will align the pump correctly with the engine, no adjustment is necessary.

3. Connect hydraulic lines to pump, following markings made during disassembly to insure correct connections.

NOTE: Fittings must be torqued to following values: When threading fittings into the Cessna pump, do not use excessive torque, this can damage the pump. Recommended torque is:

PORT LOCATION	SIZE	TORQUE
Main pump charge inlet port	3/4"-16	21-24 ft lbs
Main pump excess charge port	3/4"-16	21-24 ft lbs
Main pump case drain port	9/16"-18	10-12 ft lbs
Main pump propelling pressure ports	1-1/16"-12	40-45 ft lbs
Accessory pump suction port	1-1/16"-12	40-45 ft lbs
Accessory pump pressure port	7/8"-14	27-30 ft lbs

4. Fill pump case through plugged opening in top of pump with hydraulic fluid.

NOTE: Use TENNANT® Hydraulic Fluid.

5. Connect foot pedal linkage to pump control lever.
6. Set parking brake. Start engine and check for correct operation. Adjust pump control arm centering bracket, if necessary, so that machine does not creep when directional control pedal is in "neutral" position. Check for leaks at all hydraulic connections to pump.

HYDRAULIC FLUID LEAKS

Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.



WARNING: Escaping hydraulic fluid under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Before applying pressure to the system, be sure all connections are tight and that lines, pipes, and hoses are not damaged.

If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.

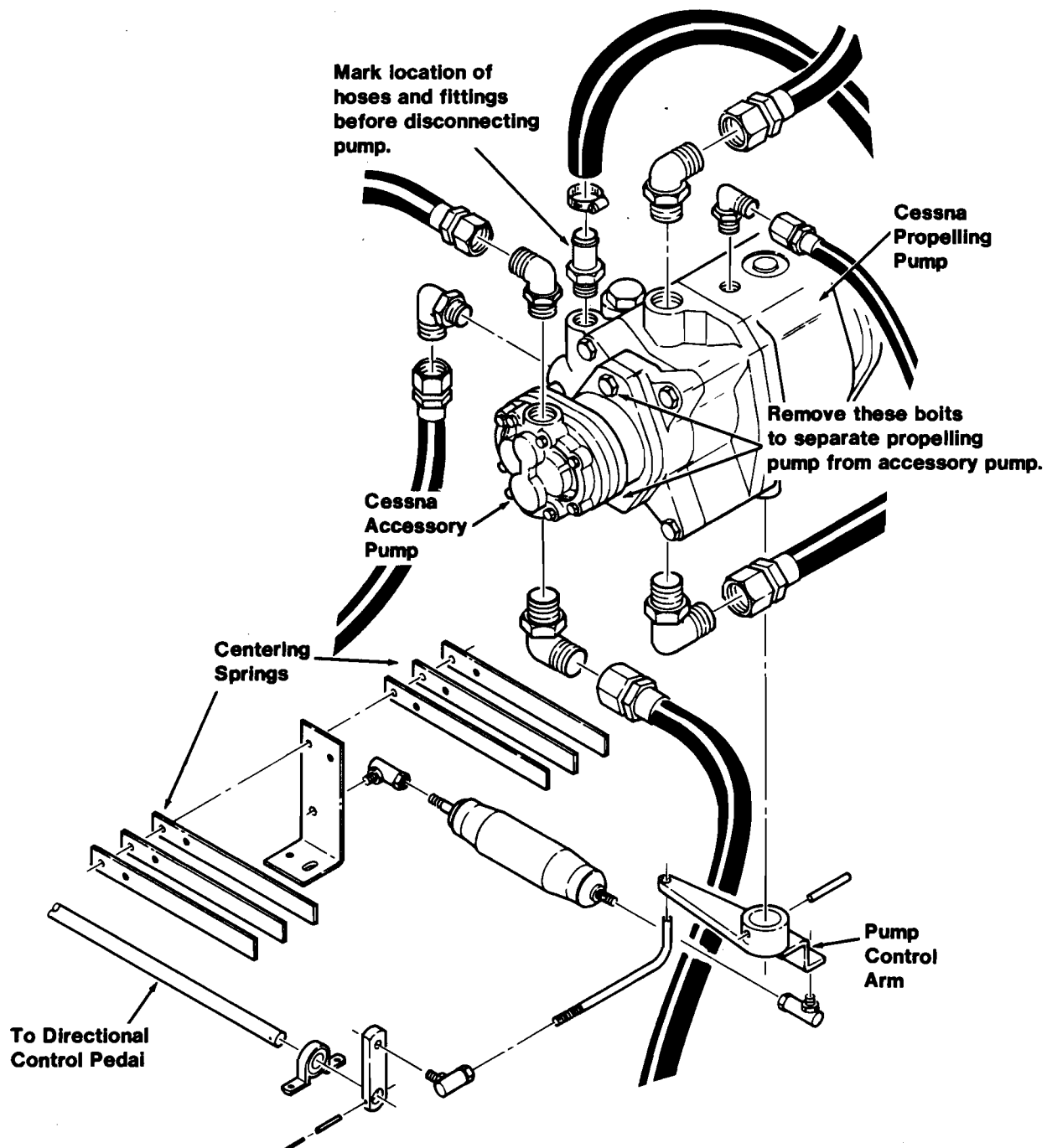


FIG. 1 - PUMP CONNECTIONS

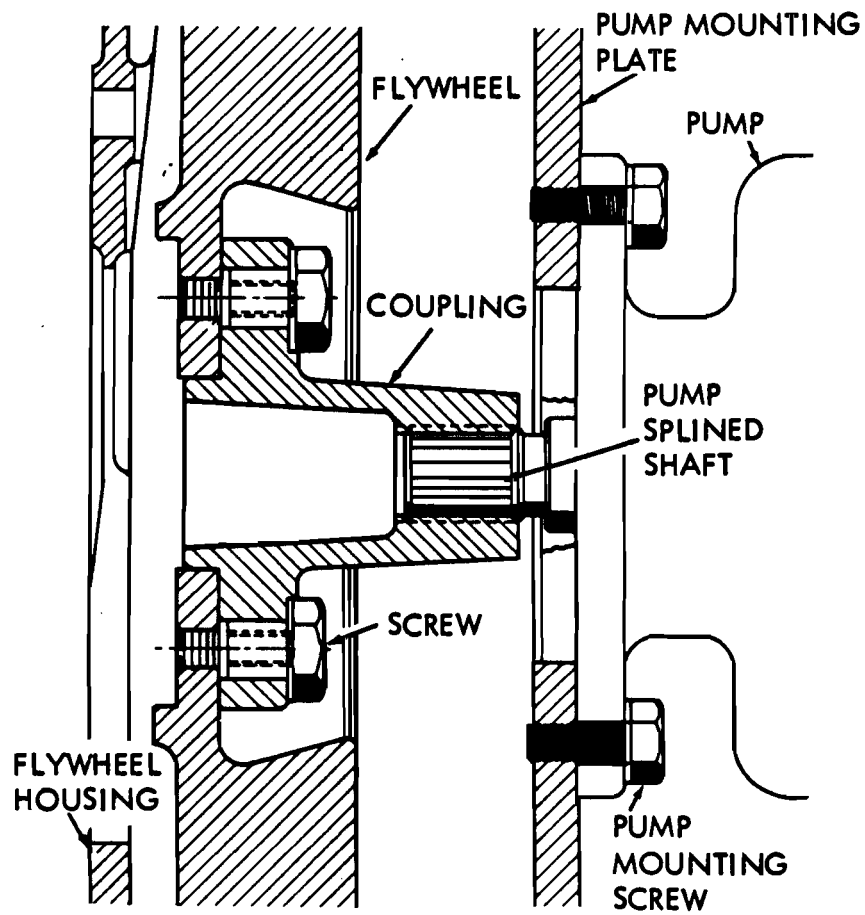
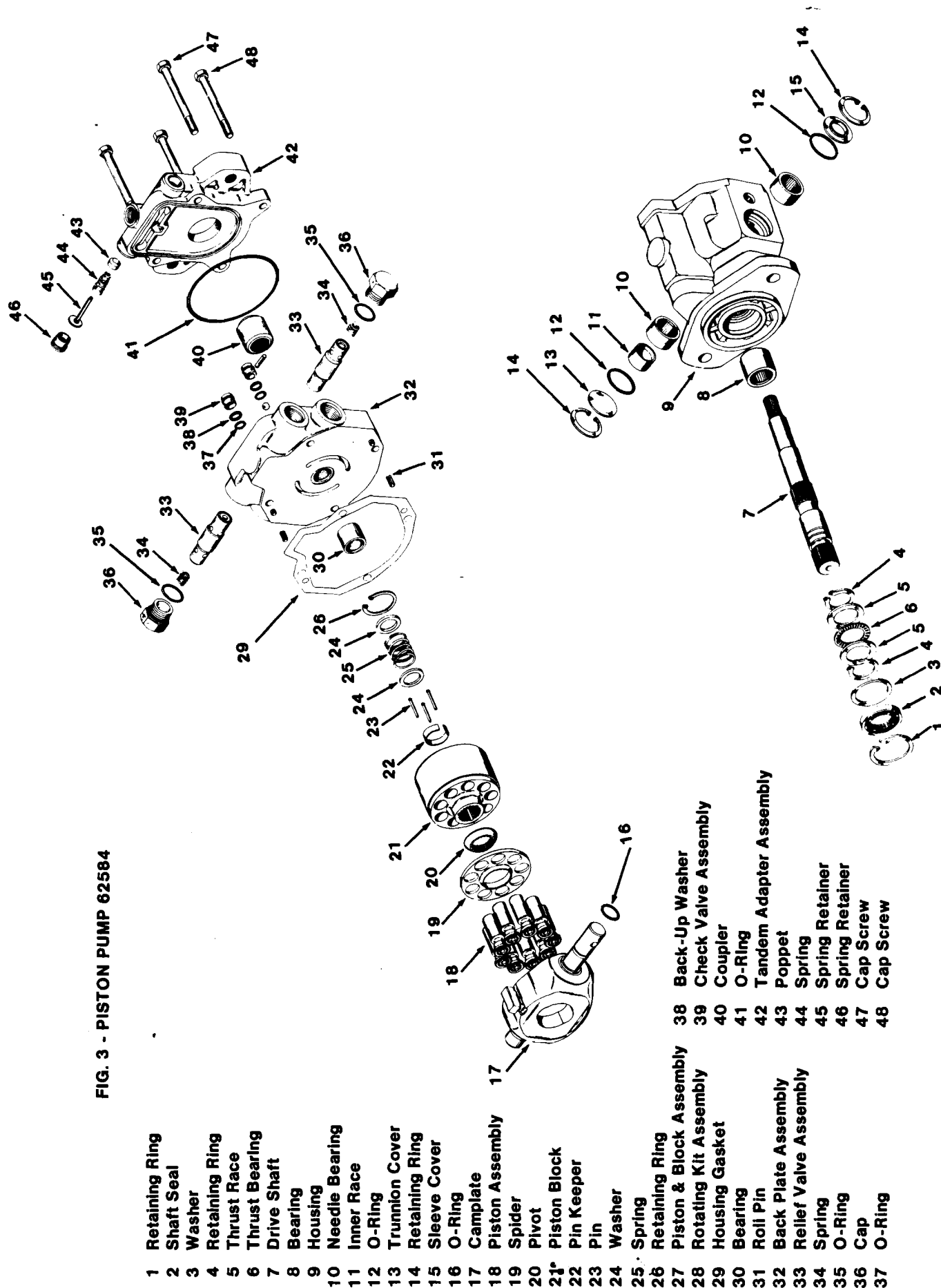


FIG. 2 - CROSS SECTION OF PUMP MOUNTING

FIG. 3 - PISTON PUMP 62584



- | | |
|----------------------------|----------------------------|
| 1 Retaining Ring | 38 Back-Up Washer |
| 2 Shaft Seal | 39 Check Valve Assembly |
| 3 Washer | 40 Coupler |
| 4 Retaining Ring | 41 O-Ring |
| 5 Thrust Race | 42 Tandem Adapter Assembly |
| 6 Thrust Bearing | 43 Poppet |
| 7 Drive Shaft | 44 Spring |
| 8 Bearing | 45 Spring Retainer |
| 9 Housing | 46 Spring Retainer |
| 10 Needle Bearing | 47 Cap Screw |
| 11 Inner Race | 48 Cap Screw |
| 12 O-Ring | |
| 13 Trunnion Cover | |
| 14 Retaining Ring | |
| 15 Sleeve Cover | |
| 16 O-Ring | |
| 17 Camplate | |
| 18 Piston Assembly | |
| 19 Spider | |
| 20 Pivot | |
| 21 Piston Block | |
| 22 Pin Keeper | |
| 23 Pin | |
| 24 Washer | |
| 25 Spring | |
| 26 Retaining Ring | |
| 27 Piston & Block Assembly | |
| 28 Rotating Kit Assembly | |
| 29 Housing Gasket | |
| 30 Bearing | |
| 31 Roll Pin | |
| 32 Back Plate Assembly | |
| 33 Relief Valve Assembly | |
| 34 Spring | |
| 35 O-Ring | |
| 36 Cap | |
| 37 O-Ring | |

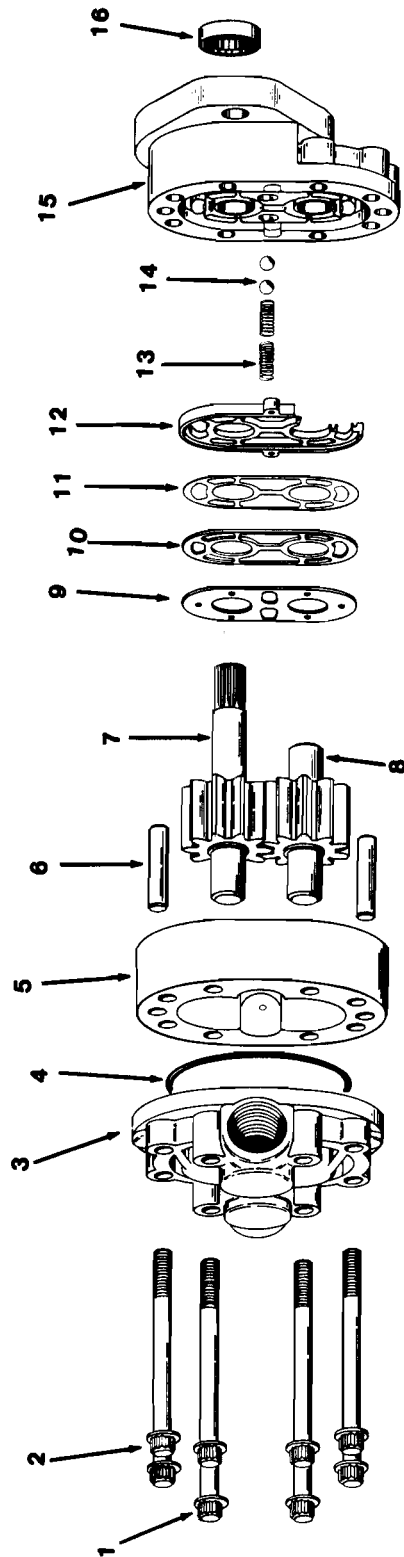


FIG. 4 - ACCESSORY PUMP 65145

- 1 Cap Screw
- 2 Cap screw
- 3 Back plate assembly
- 4 O-Ring
- 5 Body
- 6 Dowel P'n
- 7 Drive Gear Assembly
- 8 Idler Gear Assembly

- 9 Diaphragm
- 10 Back-Up Gasket
- 11 Protector Gasket
- 12 Diaphragm Seal
- 13 Spring
- 14 Steel Ball
- 15 Front Plate
- 16 Shaft Seal

BILL OF MATERIAL FOR SK1699

KEY	TENNANT® PART NO.	MACHINE SERIAL NUMBER	DESCRIPTION	QTY.
1		(-)	RETAINING RING	1
2		(-)	SHAFT SEAL	1
4		(-)	RETAINING RING	2
12		(-)	O-RING, 3/32 x 1-7/16" I.D.	2
14		(-)	RETAINING RING	2
16		(-)	O-RING, 3/32 x 13/16" I.D.	1
29		(-)	HOUSING GASKET	1
35		(-)	O-RING, 3/32 x 7/8" I.D.	2
37		(-)	O-RING, 1/16 x 7/16" I.D.	2
38		(-)	BACK-UP WASHER	2
41		(-)	O-RING, 3/32 x 4-1/2" I.D.	1
		(-)	O-RING, 1/16 x 7/8" I.D.	1
		(-)	RETAINING RING	1
		(-)	LOCK RING	1

BILL OF MATERIAL FOR SK1700

KEY	TENNANT® PART NO.	MACHINE SERIAL NUMBER	DESCRIPTION	QTY.
4		(-)	O-RING, 1/16 x 3" I.D.	1
9		(-)	DIAPHRAGM	1
10		(-)	BACK-UP GASKET	1
11		(-)	PROTECTOR GASKET	1
12		(-)	DIAPHRAGM SEAL	1
13		(-)	SPRING	2
14		(-)	STEEL BALL	2
16		(-)	SHAFT SEAL	1

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