

PERMCO

The Sensible Choice



**197/257 Series
Service Manual**

Tool List

1. Arbor Press
2. Bearing Puller
3. Bushing Removal Kit (See Below)
4. Bushing Installation Kit (See Right)
5. Soft Face Hammer
6. Locktite #680
7. Medium Grit Stone
8. Oil and Grease
9. Torque Wrench
10. Bench Vise
11. Crayon or Marker

Bushing Insertion Kit for '197' Series T-1188

Quantity	Part Number	Description
1	T-1187	Bushing Insertion Tool
1	T-1186	Bushing Insertion Guide

Bushing Insertion Kit for '257' Series T-1175

Quantity	Part Number	Description
1	T-1172	Bushing Insertion Tool
1	T-1173	Bushing Guide

'197' Series Bushing Removal Kit #T-1164

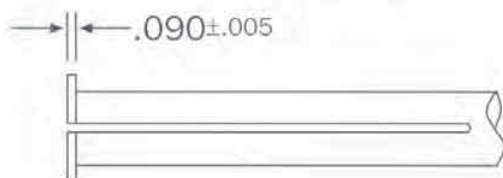
Quantity	Permco Part Number	OTC Part Number	Description
1	T-1166	41331	Bridge
1	T-1167	24835	Forcing Screw
1	T-1168	24836	Forcing Screw Nut
1	T-1169	28256	Actuator Pin
1	T-1170	33863	Collet
1	W033-11	—	Washer

'257' Series Bushing Removal Kit #T-1180

Quantity	Permco Part Number	OTC Part Number	Description
1	T-1166	41331	Bridge
1	T-1167	24835	Forcing Screw
1	T-1168	24836	Forcing Screw Nut
1	T-1169	28256	Actuator Pin
*1	T-1174	33864	Collet
1	W033-11	—	Washer

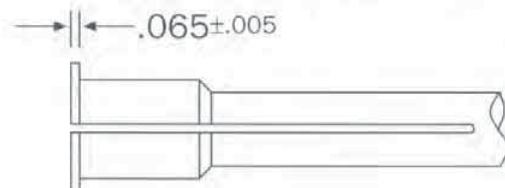
*Collet only required part if you have T-1164 Kit

197 Series Collet

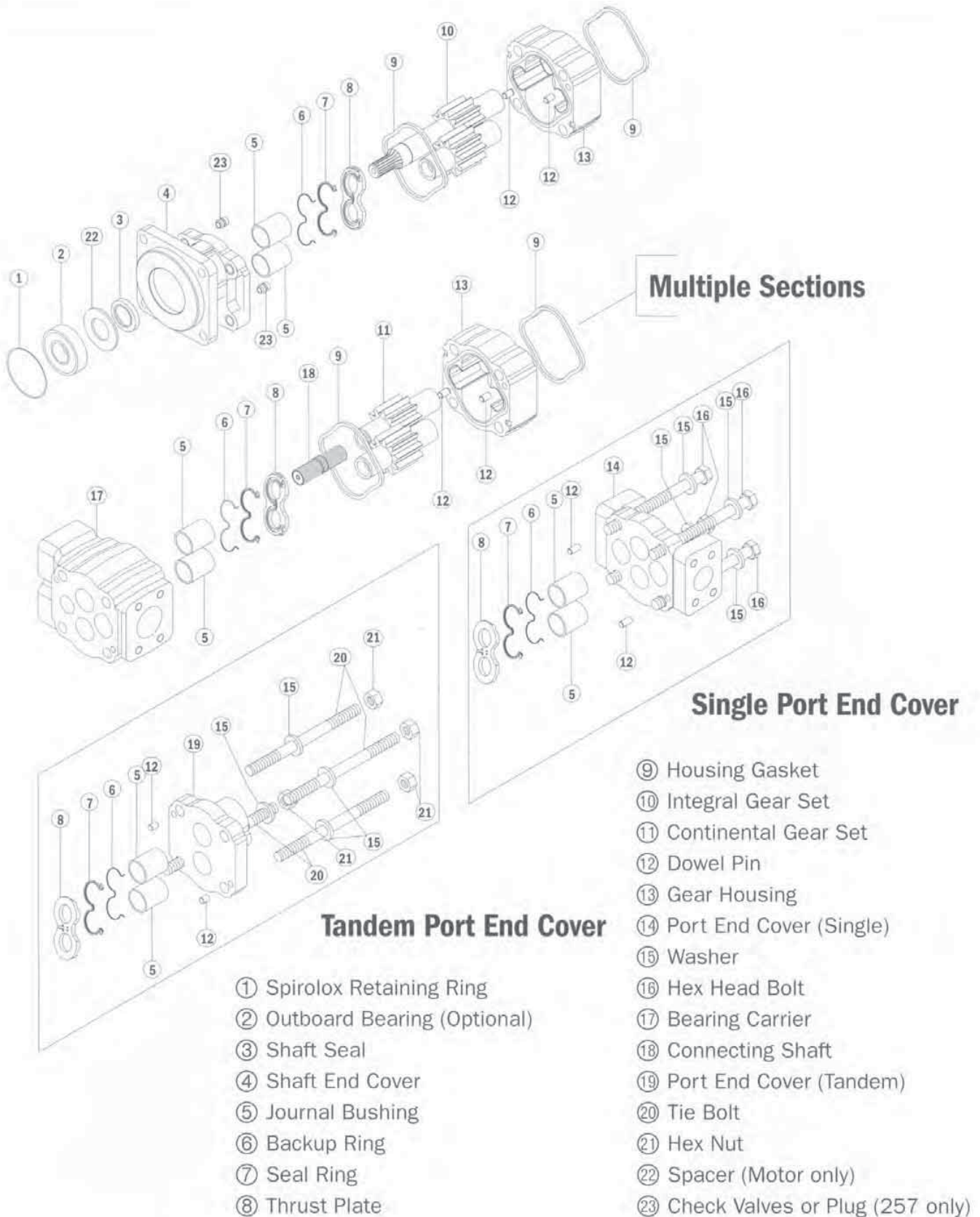


Required Modification to '197' Series Collet

257 Series Collet



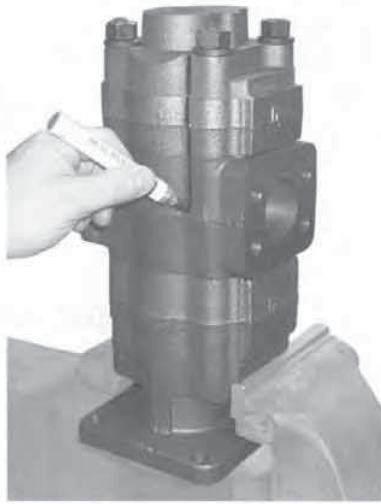
Required Modification to '257' Series Collet



Start Disassembly Here

1.

Place pump in vise as shown and scribe a line down the pump from port end cover to shaft end cover. This line will be used for reassembling.



2.

With a socket or impact wrench remove the 4 hex bolts and washers on single units (or the 4 hex nuts, washers and studs on multiple units).



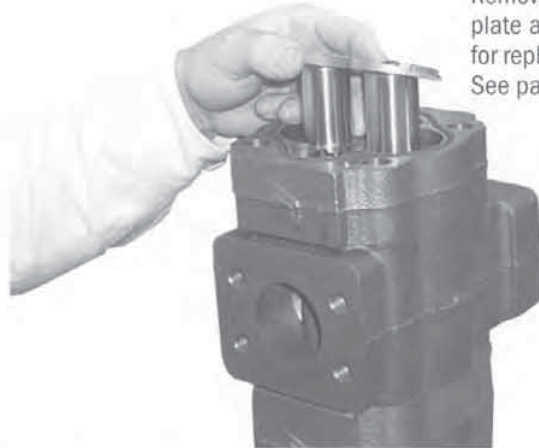
3.

Remove port end cover by inserting screwdrivers into pry-pockets on the sides of gear housing. Be careful not to damage machined surfaces.



4.

Remove the thrust plate and inspect for replacement. See page 9.



5.

Multiple Units Only Remove gear set keeping gears together. Remove thrust plate from bearing carrier. Examine gear set and thrust plate for replacement. See page 9.



6.

Multiple Units Only Lift gear housing from bearing carrier by using screwdrivers inserted into the pry-pockets. Examine for replacement. See page 9.



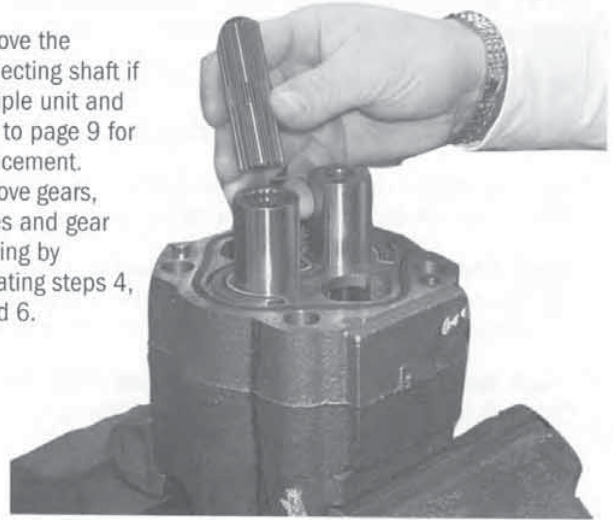
7.

Multiple Units Only
Lift bearing carrier
from gear housing.



8.

Remove the
connecting shaft if
multiple unit and
refer to page 9 for
replacement.
Remove gears,
plates and gear
housing by
repeating steps 4,
5 and 6.

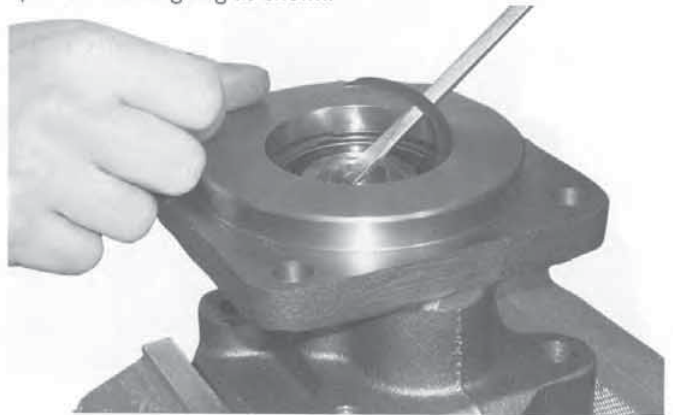


9.

Inspect all
bushings and
refer to page 9
for replacement.

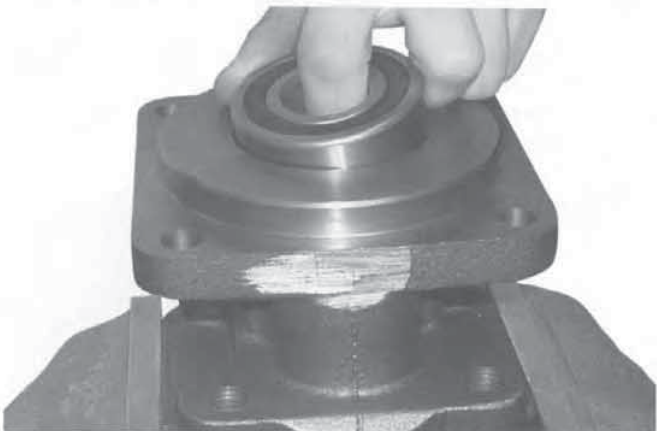
10.

If the unit is equipped with an outboard bearing first remove the spirolox retaining ring as shown.



11.

Use bearing puller to remove outboard bearing.



12.

Remove the shaft seal by placing
screwdriver against the back of
seal and tapping as shown.

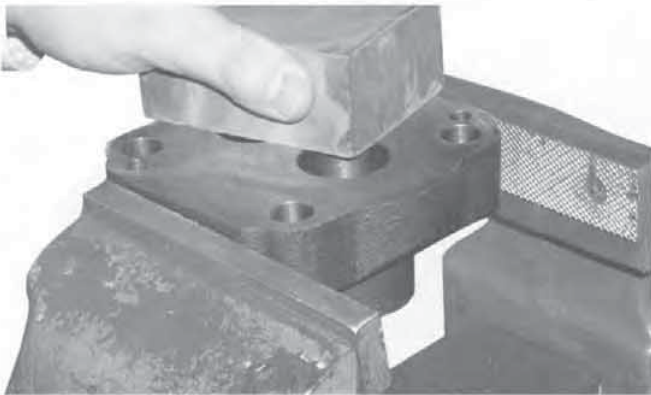


Single and Tandem Assembly

1. **Shaft End Cover, Gear Housing, Bearing Carrier, and Port End Cover:** Stone or file mating surfaces to remove any raised metal generated in shipping or handling.
2. **Gear Shafts, Gears:** Stone faces of gears to remove any raised metal generated in shipping or handling.
3. **Bearing Carrier and Port End Cover:** Probe all bushing drain passages to insure that none are blocked.
4. **Gear Housing:** Use a deburring knife to break the edge on the gear bores and dowel pin holes to ease assembly. Clean foreign material from dowel pin holes and gasket grooves.
5. **Shaft End Cover, Bearing Carrier, and Port End Cover:** Use a deburring knife to break edge of the bushing and dowel pin holes to ease assembly. Clean foreign material from dowel pin holes. Use a flapper wheel or emery cloth on edge of bushing bore to create a small radius.
6. **Shaft End Cover, Bearing Carrier, and Port End Cover:** Mark the faces to indicate low and high pressures. This will insure proper bushing orientation.

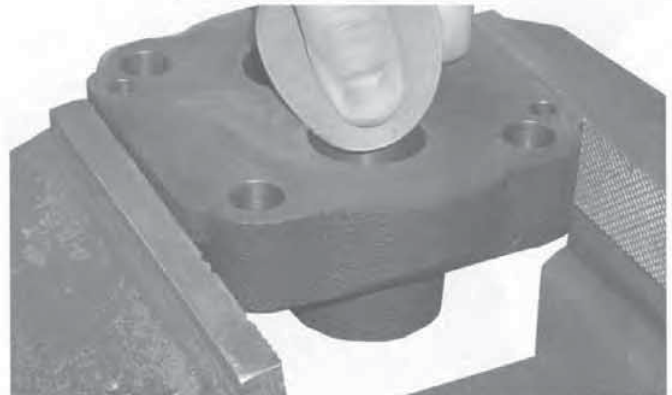
1.

Stone all faces with a medium grit stone.



2.

Deburr all bushing bores with emery cloth to assure bushings do not become galled during installation.



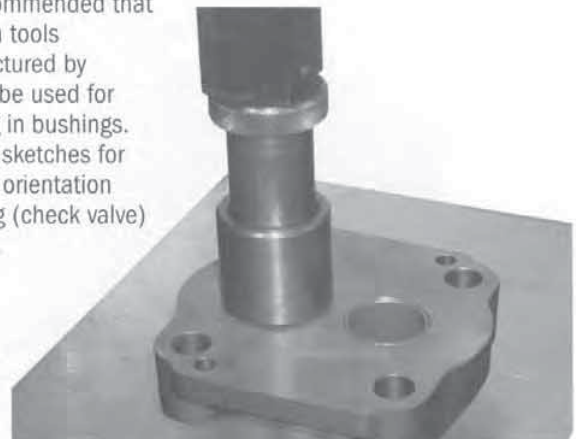
3.

Apply a thin film of Loctite #RC680 around O.D. of the lip seal. With metal side up press seal into bore until it is flush with recessed face of the bore.

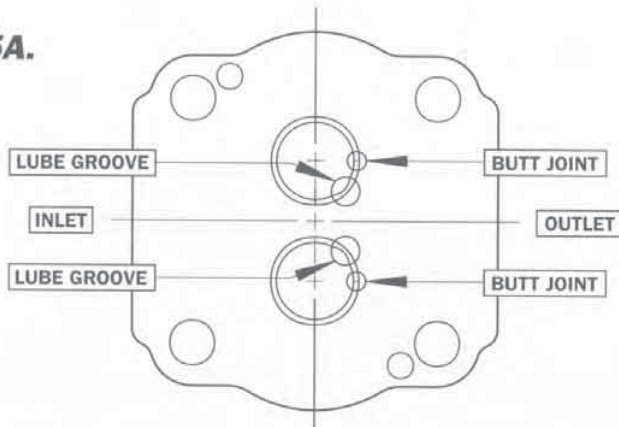


4.

It is recommended that insertion tools manufactured by Permco be used for pressing in bushings. Refer to sketches for bushing orientation and plug (check valve) location.

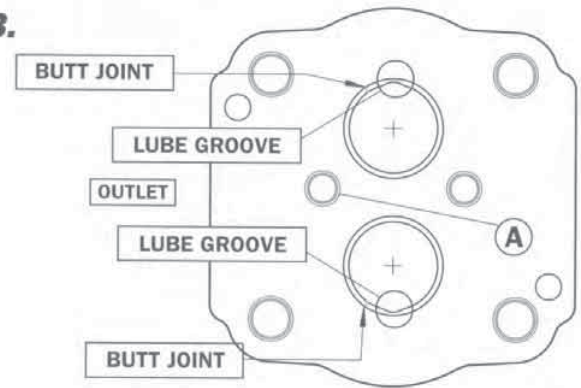


5A.

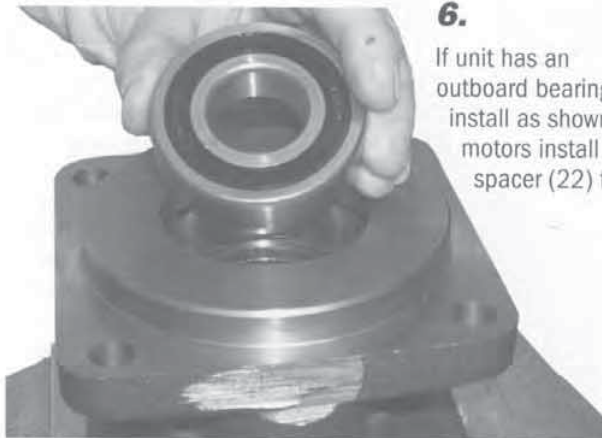


Install 197 series bushing lube grooves and butt joints as shown for optimum performance. However bushings may be installed per step 5B.

5B.

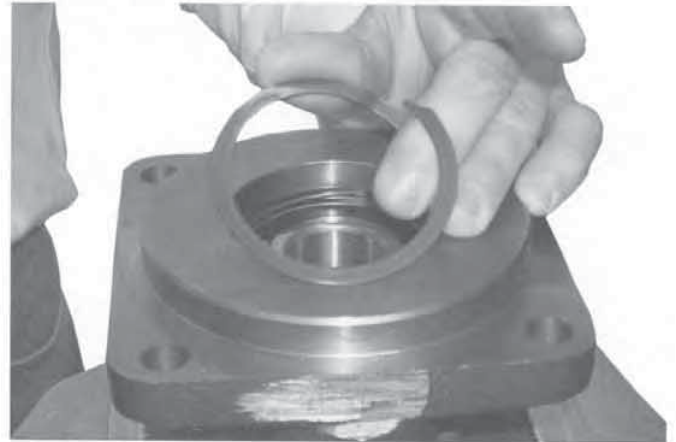


Install 257 series bushing lube grooves and butt joints as shown. Install plug in pump in outlet drain position "A". For motors, check valves will be installed in both drains.



6.

If unit has an outboard bearing install as shown. For motors install spacer (22) first.

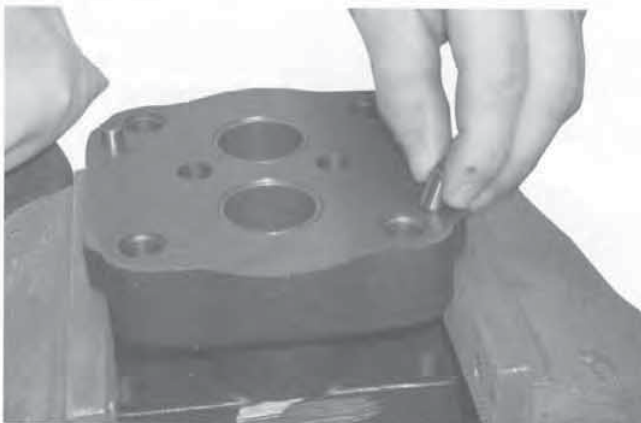


7.

Install spirolox retaining ring as shown.

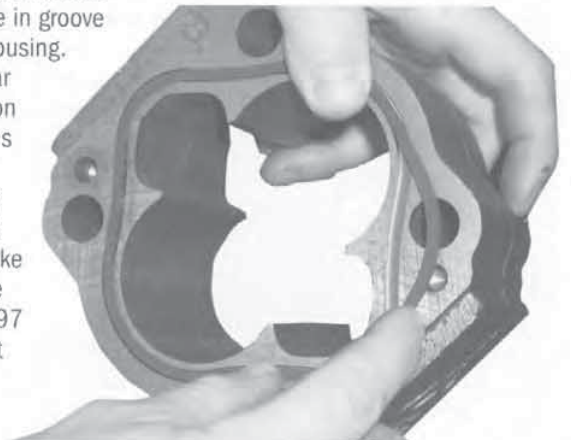
8.

Start pin in hole straight and tap lightly with a soft hammer.



9.

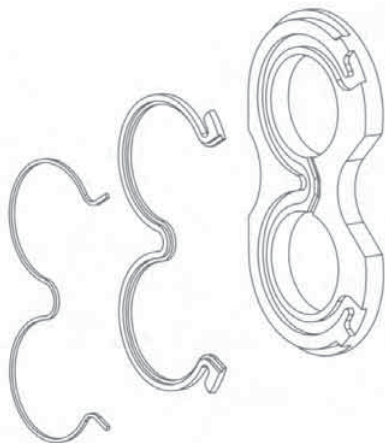
Grease gasket seals and place in groove of gear housing. Place gear housing on dowel pins and tap flush with shaft end cover. Make sure large core of 197 is on inlet side.



Single and Tandem Assembly

10.

Place a liberal amount of grease in plate groove. Place rubber element in groove with recess up for nylon backup. Place backup in recess of seal ring.



11.

Slip the thrust plate into the gear housing with the "T" or "U" shaped trapping pocket up and on the outlet side.



12.

Squirt oil into bushings and on thrust plates and slide gears into gear housing. For motors protect the seal by placing a sleeve onto gear as shown.



13.

Multiple Units Only Slide thrust plate over gears with seals facing up and trapping pocket on pressure side. Tap dowel pins into gear housing.



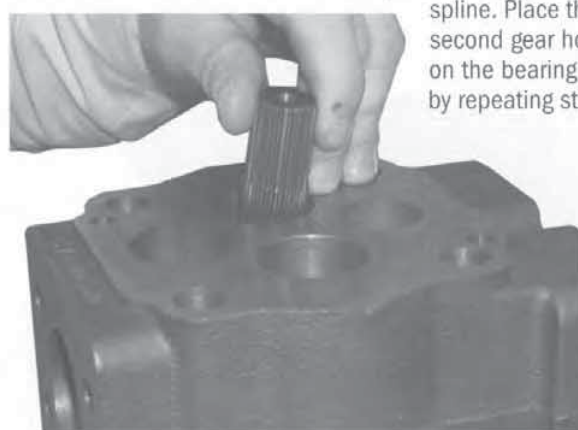
14.

Multiple Units Only Position bearing carrier over gear journals and dowel pins. Gently tap until the parts are together. Tap in dowel pins. Check bearing carrier port orientation.



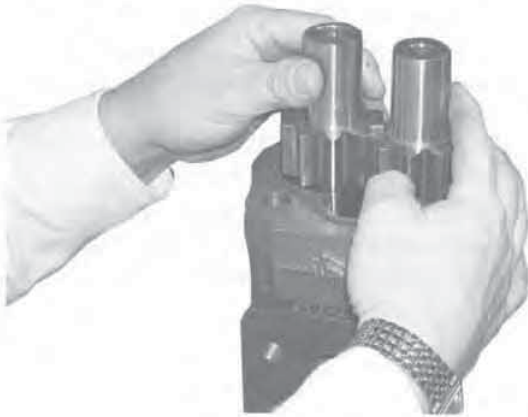
15.

Multiple Units Only Insert connecting shaft into the drive gear spline. Place the second gear housing on the bearing carrier by repeating step 9.



16.

Multiple Units Only Repeat steps 10,11,12 and 13 using continental gears in step 12. Tap in dowel pins.

**17.**

Position port end cover over gear journals and dowel pins. Gently tap until the parts are together.

**18.**

Place 4 washers on the port end cover. Thread the 4 fasteners into the shaft end cover and tighten alternately in a diagonal pattern. Rotate the drive shaft with vise grips and torque to 200 ft. lbs.

Guide for Replacing Parts

Thrust Plates

Replace plates if scored, eroded, pitted or discolored from heat.

Gears

Replace if any scoring on journals is found. Also fretting, nicking, scoring or grooving of teeth surface.

Gear Shafts

As above for gears and replace if any wear is found in seal area. Also replace if any wear on splines or keyway is found.

Gear Housings

If wear exceeds .005" below bore, replace.

Dowel Pins

If the dowel pin in casting is loose, the dowel pin or casting must be replaced.

Bushings

If scoring, discoloration or signs of copper showing through, replace. Also if gear set is replaced the bushings should also be replaced.

Startup and Break-in Procedure

1. Before you begin testing, unscrew the main relief valve on the circuit.
2. Run the pump for two minutes under no load conditions, low pressure and low rpm (600 rpm minimum). If everything seems to function properly and no unusual sounds are heard, you may commence testing per the procedure below.

The testing for the '197' and '257' series units should be closely followed to assure optimum performance. When testing a multiple unit, test one section

at a time. Be sure the other sections are being supplied with adequate oil during the test procedure.

The testing procedure involves loading and unloading the unit to prevent contamination of the bushings and bushing journals. In doing so, particles of contaminate generated during the load cycle will be flushed through the system during the no load cycle.

Do not test the unit above the working pressure of the destined application. This will minimize unnecessary housing wipe and assure optimum volumetric output.

Testing Procedure

0-15 seconds @ 0 psi	136-150 seconds @ 2500 psi
16-30 seconds @ 500 psi	151-165 seconds @ 0 psi
31-45 seconds @ 0 psi	166-180 seconds @ 3000 psi
46-60 seconds @ 1000 psi	181-195 seconds @ 0 psi
61-75 seconds @ 0 psi	196-210 seconds @ 3500 psi
76-90 seconds @ 1500 psi	211-225 seconds @ 0 psi
91-105 seconds @ 0 psi	226-240 seconds @ 4000 psi
106-120 seconds @ 2000 psi	241-255 seconds @ 0 psi
121-135 seconds @ 0 psi	256-270 seconds @ 4500 psi

Fluid Type and Temperature Conditions

1. The '197' Series and the '257' Series pumps and motors (257 Series only) are compatible with mineral base, water glycol and invert emulsion fluids. Fluids such as phosphate ester may be used in some applications. Please consult the factory prior to using this type of fluid.
2. Under normal operating conditions, fluid temperatures should not exceed 180°F (82°C) for mineral base fluids and 135°F (57°C) for water glycol and invert emulsions. If temperatures greater than these values are required for a particular application, please consult your Permco representative or call the factory.

It is recommended that a premium quality hydraulic fluid with a viscosity range of 150-300 SUS (32-65 cSt.) at 100°F (38°C) be used to assure optimum performance. The normal operating viscosity range is between 55-1000 SUS (9-220 cSt.) with a start up viscosity not to exceed 2000 SUS (440 cSt.).

3. To assure maximum performance and life, a 10 micron return line filter with a Beta 10 rating of 2.2 is required for the system. Testing and operating a new or serviced unit without proper filtration will lead to premature failure of the shaft journals and journal bushings.

197 Series

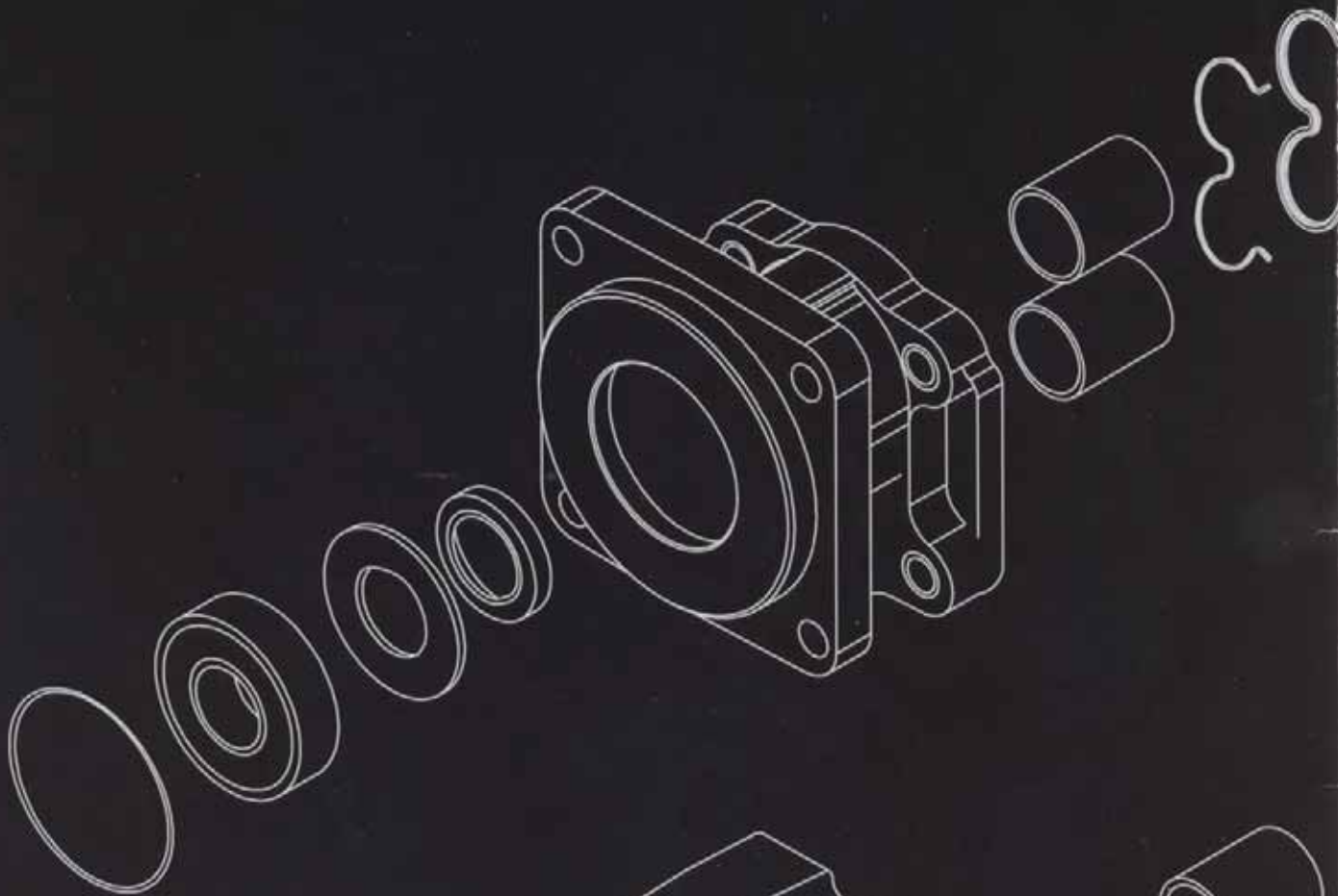
AVERAGE OUTPUT _____ GPM/LPM AT 3000 PSI/206.8 BAR
 OIL VISCOSITY _____ 150 SUS (32.1 cSt.) AT 100°F (37.8°C)
 OIL TEMPERATURE _____ 150°F (65.5°C)

Speed (RPM)	$\frac{1}{2}$	$\frac{3}{4}$	1	1$\frac{1}{4}$	1$\frac{1}{2}$	1$\frac{3}{4}$	2
600	1.7/6.4	2.5/9.5	3.3/12.5	4.2/15.9	5.6/21.2	6.8/25.7	8.2/31.0
1200	4.3/16.3	6.5/24.6	8.7/32.9	11.1/42.2	13.8/52.2	15.8/59.8	18.4/69.6
1800	7.0/26.5	10.5/39.7	14.1/53.4	17.8/67.5	21.2/80.2	24.9/94.2	28.7/108.6

257 Series

AVERAGE FLOW _____ GPM/LPM AT PRESSURE SHOWN IN CHART
 OIL VISCOSITY _____ 150 SUS (32.1 cSt.) AT 100°F (37.8°C)
 OIL TEMPERATURE _____ 150°F (65.5°C)

Speed (RPM)	$\frac{1}{2}$ 3000 PSI	$\frac{3}{4}$ 3000 PSI	1 3000 PSI	1$\frac{1}{4}$ 3000 PSI	1$\frac{1}{2}$ 3000 PSI	1$\frac{3}{4}$ 3000 PSI	2 3000 PSI	2$\frac{1}{4}$ 2750 PSI	2$\frac{1}{2}$ 2500 PSI
600	2.2/8.3	3.2/12.1	4.3/16.3	5.5/20.7	7.3/27.6	8.9/33.5	10.5/39.7	12.4/46.8	14.2/53.7
1200	5.6/21.2	8.5/32.2	11.3/42.9	14.5/54.8	18.0/68.1	20.6/78.0	24.0/90.8	27.1/102.6	30.4/115.1
1800	9.2/34.8	13.8/52.2	18.4/69.6	23.2/87.8	27.6/104.6	32.4/122.8	37.2/140.7	42.2/159.8	47.2/178.5



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