SECTION 6. REPAIR AND OVERHAUL

6.1 SAFETY NOTICE

Avoid contact with rotating output coupling and always shut down engine when doing even minor inspection of repair. Avoid contact with metal surfaces as operating temperature may exceed 200 degrees.

6.2 TABLE: REPLACEMENT WEAR LIMITS

ITEM		NEW DIMENSIONS MIN.	NEW DIMENSIONS MAX.	REPLACEMENT WEAR LIMIT
REDUCTION GEARS BACKLASH (PAIRS)		.004	.008	.030
SHAFT, PINION	O.D. AT FORWARD BUSHING	1.1215	1.1225	1.1200
	O.D. AT REAR BUSHING	1.0840	1.0865	1.0800
	O.D. AT FRONT BEARING	1.9560	1.9585	1.9500
BUSHING, REAR COMMUTATOR I.D.		1.9595	1.9700	1.9720
BUSHING, FORWARD COMMUTATOR I.D.		1.1240	1.1260	1.1200
CLUTCH PACK	THICKNESS: FORWARD PACK (COMPRESSED)	1.697	1.730	1.560
	THICKNESS: REVERSE PACK (COMPRESSED)	1.151	1.260	1.051
CLUTCH DISC	THICKNESS: BRAKING	.130	.140	.120
	DRIVEN, THIN STEEL	.088	.100	.070
	DRIVEN, THICK STEEL	.140	.165	.130
OIL PUMP				IF DEEP GROOVES ARE PRESENT, OR MORE THAN .006" CLEARANCE EXISTS BETWEEN O.D. OF GEARS AND BODY.
SELECTOR VALVE				IF DEEP GROOVES ARE PRESENT (.025" DEEP)
DRIVING DRUM AT SPLINES, AT DISC I.D. DRIVEN DRUM SPLINES, AT DISC I.D.				IF GROOVES ARE PRESENT VERTICAL TO THE SPLINE.
ALL SPLINED PARTS I.E. STUB SHAFT, DRUMS, GEARS.				REPLACE IF FIT IS NOT SNUG.

6.3 CLUTCH ASSEMBLY

A) DISASSEMBLY

1. Remove socket head cap screws, Lock washers, and Allen nuts securing both clutch flanges to bevel gear carrier.

2. Lift off clutch flanges and clutch discs.

3. Press and remove bearing and driving gear from both forward and reverse clutch flanges.

4. Remove locknuts, clutch identification tag and cap screws from outer perimeter of cylinders.

5. Separate and remove cylinders.

6. Remove and discard quad rings from bevel gear carrier. (Always replace with new quad rings to avoid internal leaks).

7. Remove cap screws and locknuts securing pinion shafts in bevel gear carrier and remove bevel pinion shaft knockout puller; (special tool no. 1-90008-0000). Take care not to lose any needle bearings or washers. (See below).

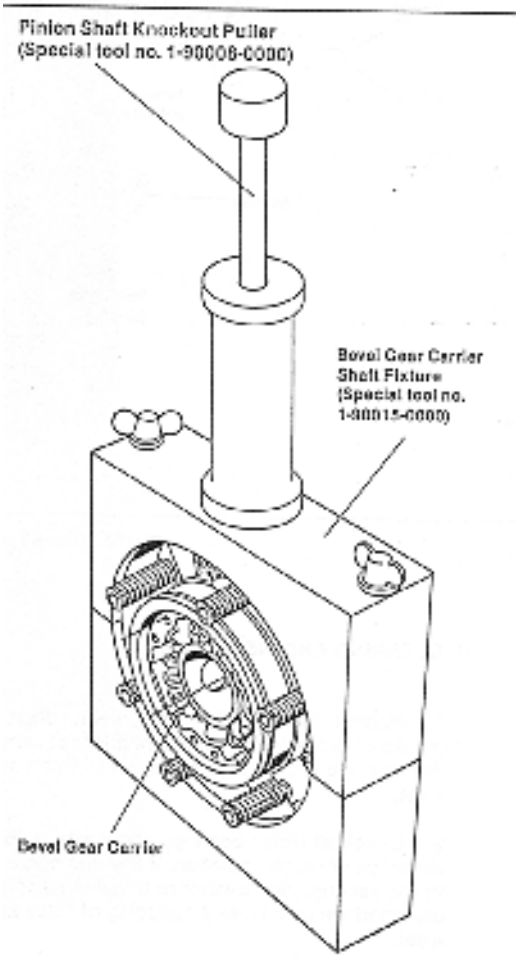
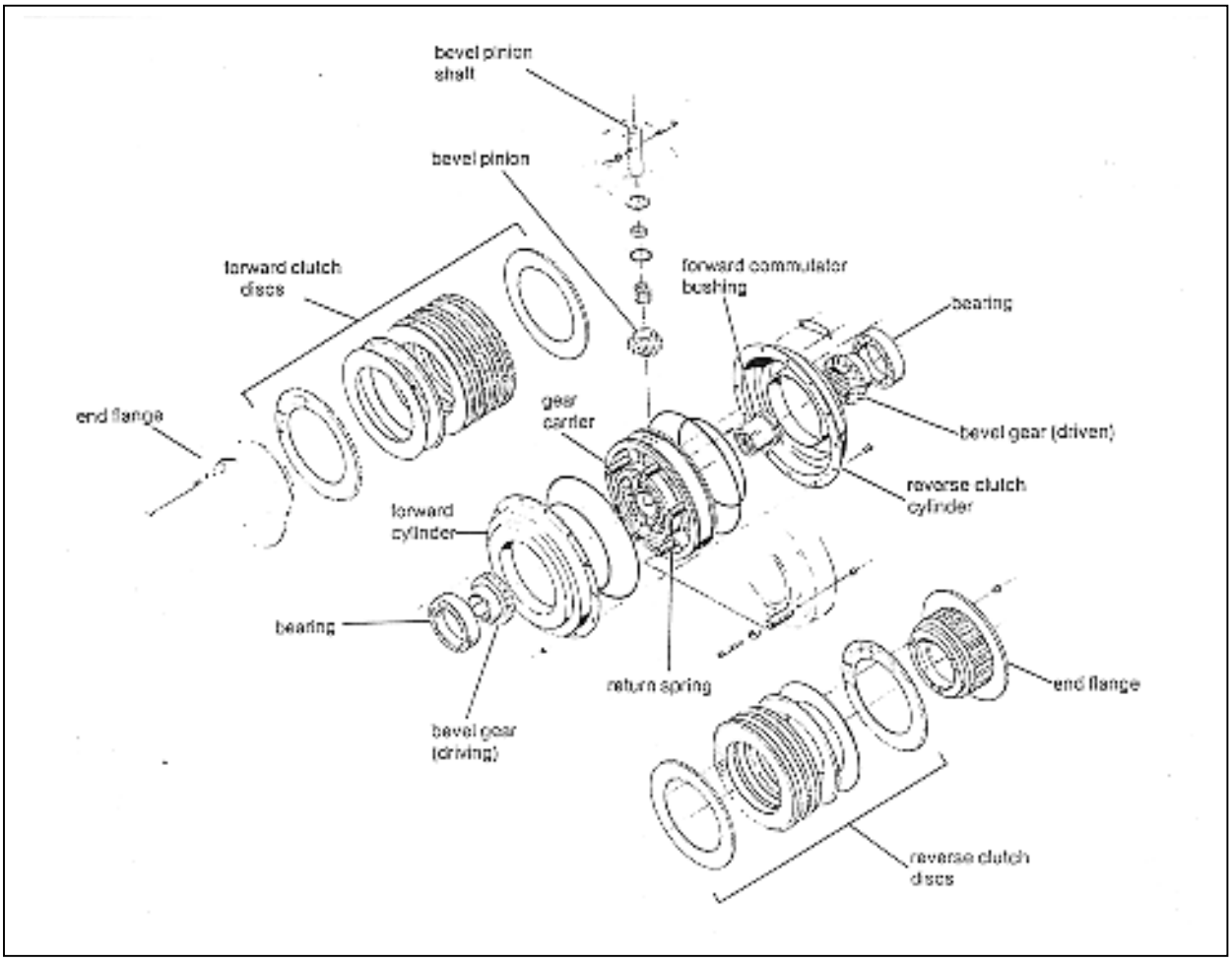


Fig.22 Removal of pinion shaft

SECTION 6. REPAIR AND OVERHAUL



B) CLEANING AND INSPECTION

1. Inspect bevel pinions for wear, chips, and breaks or out of round condition. If there is any damage, we recommend replacing all three as a set.

2. Check all pinion bearings and washers for distortion or rough operation. If any one needle thrust bearing, pilot washer or thrust washer is damaged we recommend replacing all three as a set.

3. Clean all parts with a good grade cleaning solvent or diesel fuel. Blow dry with compressed air.

1. Inspect all oil passages in bevel gear carrier to see that they are free from obstruction.

2. Inspect bevel gear carrier for cracks, chips or worn mounting surfaces. Pay special attention to quad rings grooves. Discard carrier if damaged.

3. Inspect forward commutator busing for chips, heat scores, scratches, distortion or wear (see wear limits, page 16). Repair or replace as necessary.

4. Inspect all hardware and springs for wear or distortion (see wear limits, page 16). Repair or replace as necessary.

5. Remove clutch discs from flanges and inspect discs for broken teeth, heat scores or wear (see wear limits, page 16). Replace as necessary.

6. Inspect driving gear, and driven gear, for Wear, chips or cracks. If either one is damaged we recommend replacing both as a set.

7. Check both clutch flange ball bearings for wear, distortion, or rough operation. Again we recommend replacement of both bearings if
8. either one shows wear.

9. Inspect forward and reverse clutch flanges for wear, cracks or distortion and make certain all oil passages are free from obstructions.

NOTE:
The reverse clutch flange can be identified by the spring pins in the three oil passages.

10. Inspect both clutch cylinders for cracks, distortions or scratches. Repair or replace as necessary.

C) ASSEMBLY

1. In order to install a new commutator bushing the bushing should be frozen. This will allow ease of fit and will help prevent scoring of the bevel gear carrier bore. Freezing may be accomplished with a solution of alcohol and water, or dry ice.

NOTE:
The bevel gear carrier may be heated in hot oil or hot water (275°F: 135°C maximum).

2. Line up notches in flanged end of bushing with roll pins in bevel gear carrier. Press in new bushing on side of carrier stamped 'REV'. Until it seats in bore. The roll pins will lock the bushing in place and insure line up of oil holes in the bushing and bevel gear Carrier.

3. Installation of pinion shafts:

   a). To prevent damage to gear carrier and bearings, the carrier should again be heated to expand the bore diameter.

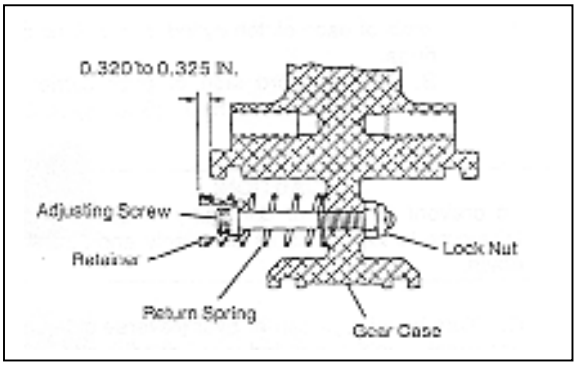
   b). Apply lubricant on shafts and bores to ease fit.

   c). Stand carrier on end, with a shaft bore down, position thrust washer, pilot waster, and needle thrust bearing in round recess of gear carrier. Insert needle bearing into pinion gear and slip gear (teeth up) into position over needle thrust bearing. Holding these parts securely, rotate carrier 180°, and tap pinion into place. The pinion shaft knockout puller may be used as a hammer being careful not to damage needle bearing.

   Gloves may be required since gear carrier is hot

   d). Repeat steps B and C for each of the two remaining pinion shafts.

A. Secure shafts with cap screws and locknuts.



4. Replacement of return springs and retainers:
   A. Insert return spring retainers into return springs and secure in gear carrier using cap screw alternating from forward to reverse side of bevel gear carrier. Tighten cap screws until top of spring retainer protrudes .320 to 3.25 inches (8.12-8.26mm) From face of bevel gear carrier hub (see figure 24). For setting the spring properly lay 'return spring adjustment gauge' (special tool no, 1-90000-0000) on the bevel gear carrier hub and tighten cap screws until top of spring retainer is flush with top surface of 'adjustment gauge' (check with straight edge). Repeat for each spring.
   B. Hold cap screws in place with 3/16" Allen wrench, install locknuts and tighten.

5. Apply lube in quad ring grooves in bevel carrier and slip on four new quad rings avoiding twists in the rings.

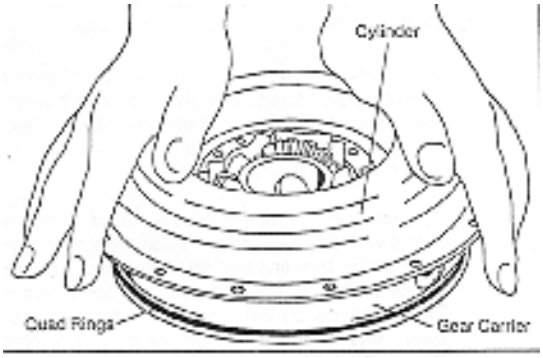


Fig. 25. Pressing Cylinder on Bevel Gear Carrier

SECTION 6. REPAIR AND OVERHAUL

6.To install cylinders:

a). Apply a light coat of lubricant on inner walls of each clutch cylinder as well as quad rings.

b). With forward side of gear carrier up. Press cylinder on by hand. (See figure 25).

CAUTION:
To prevent twisting or damage of quad rings, take care to slip cylinders on evenly and straight down.

c). Turn bevel gear carrier over (reverse side up) and press remaining cylinder on, checking to see that cap screw holes in both cylinders are aligned properly.

d). Insert cap screws and locknuts and tighten to 10 foot-pounds torque.

7. Press roller bearing into forward clutch flange with thrust side of bearing (marked 'thrust here') toward seat of flange; Press bevel gear into ball bearing. See fig. 26.

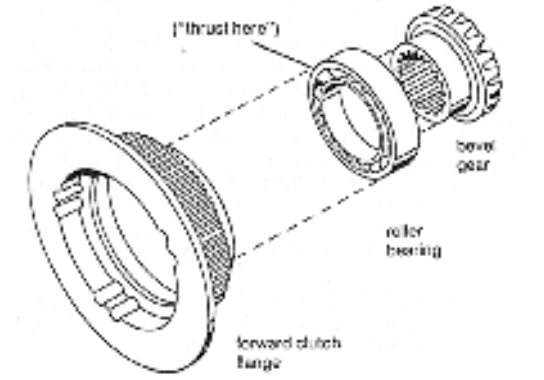


Fig. 26. Clutch Flange, Bearing and Bevel Gear

8. Likewise press the other ball bearing into reverse clutch flange with thrust side of bearing toward seat of flange. The press bevel gear into ball bearing. Check that roller bearings on both flanges are well sealed.

9. Arrange the driving friction discs (external tooth) with the steel driven discs (internal tooth) against the forward and reverse clutch flanges in one of the appropriate configurations below. This depends on the type of driving disc your gear uses (bronze, organic or graphitic). See figures 29&30.

a) Units Employing Bronze Driving Discs-

FORWARD

1.)Position the metallic bronze driving disc against the face of the forward clutch flange, followed alternately by six (6) think steel driven discs and six (6) metallic bronze driving discs, followed by one (1) thick steel driven disc.

REVERSE

2.) Position the metallic bronze driving disc against the reverse clutch flange, followed alternately by four (4) think steel driven discs and four (4) metallic bronze driving discs, followed by one (1) thick steel driven disc.

b.) Unit Employing Organic Driving Discs (red)-

FORWARD

1.) Position the sintered bronze driving disc against the face of the forward clutch flange, followed alternately by six (6) thin steel driven discs and six (6) organic drive discs, followed by one (1) thick steel driven disc.

REVERSE

2.) Position the sintered bronze driving disc against the reverse clutch flange, followed alternately by four (4) thin steel driven discs and four (4) organic driving discs, followed by one (1) thick steel driven disc.

c.) Units Employing Graphitic Driving Discs (Brown)-

FORWARD

1.)Position the graphitic impregnated driving disc against the face of the forward clutch flange, followed alternately by six (6) think steel driven discs and six (6) graphitic-driving discs, followed by one (1) thick steel driven discs.

REVERSE

2.) Position the graphitic impregnated driving disc against the face of the reverse clutch flange followed alternately by four (4) thin steel driven discs, and four (4) graphitic driving discs, followed by one (1) thick steel driven disc.

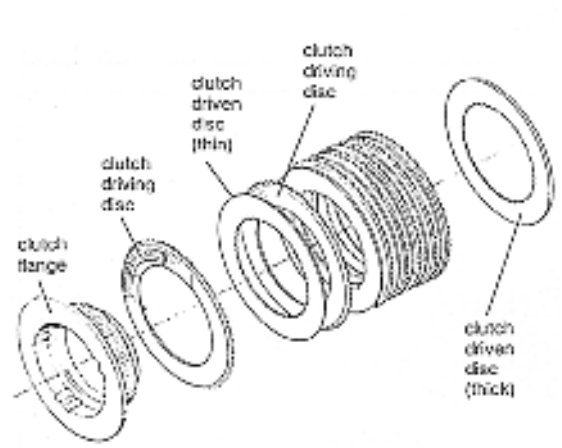


Fig. 27. Assembly of Forward Clutch Discs

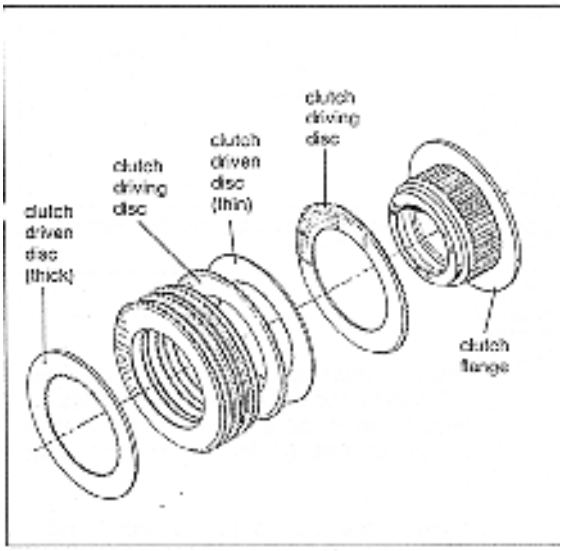


Fig. 28. Assembly of Reverse Clutch Discs

10. Position reverse clutch flange (5 driving discs) on reverse side of gear carrier (flange on bushing is on reverse side). Position forward clutch flange (7 driving discs) and fasten both flanges to gear carrier with six (6) cap screws (through forward flange) and six (6) Allen nuts (against reverse flange) and tighten to 23 to 25 foot-pounds torque.

11. Check for free movement of gears in clutch assembly.

12. Test plug (special tool no. 1-90012-0000) can be used to check if cylinders hold pressure. Clutch assembly is now ready for installation in marine gear.

6.2 OIL PUMP ASSEMBLY

A. RELIEF PLUNGER

1. With oil pump in place on marine gear remove relief stop, dome nut, relief valve spacer and accompanying washers. See fig. 29. **NOTE:** UNSCREW RELIEF STOP CAREFULLY BECAUSE PRESSURE RELIEF SPRING IS UNDER TENSION.

2. Check relief plunger to see if it is free moving. If not, inspect plunger for burrs, heat scores. Or distortions. Burrs may be removed with fine crocus cloth. Otherwise plunger should be replaced.

3. Clean all parts with a good grade cleaning solvent or diesel fuel. Blow dry with compressed air.

4. Generously lubricate relief plunger with oil or Vaseline, insert plunger, cup end first, from relief stop end. Check plunger for free movement.

5. Apply washer on adjustment stop and screw relief stop into cover just enough to start threads.

6. If pressure relief spring was removed insert it into opposite side of cover, screw pressure relief screw into relief valve spacer just enough to start threads.

7. Install relief valve spacer with pressure screw and washer.

8. Cap and lock pressure relief screw with dome nut and washer.

B. OIL PUMP DISASSEMBLY

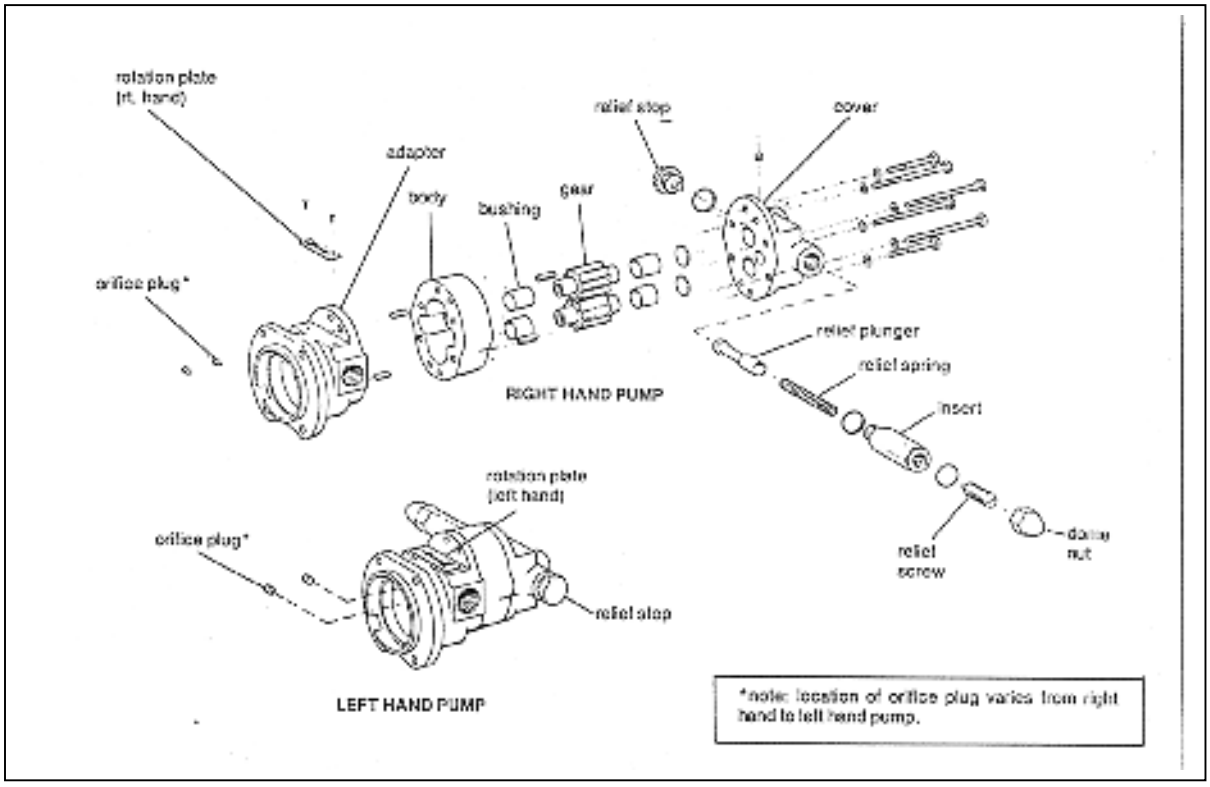
1. Remove oil pump assembly and oil cooler bracket from main housing cover by removing upper cap screws (2), lover cap screws (2) and attached hoses.

2. Remove cap screws (6) and lock washers (6) securing pump cover, pump body and pump adapter.

3. Using a soft hammer, separate cover, body and adapter from spring pins. **NOTE:** FOR REASSEMBLY PUNCH MARK ALONG SIDE OF COVER, BODY AND ADAPTER.
4. Remove pump gears resting in adapter.

5. Remove relief stop, dome nut, relief valve and accompanying washers. **NOTE:** UNSCREW RELIEF STOP WITH CARE AS PRESSURE RELIEF SPRING IS UNDER TENSION.

SECTION 6. REPAIR AND OVERHAUL



6.Unscrew and separate pressure relief screw from relief valve insert and push pressure relief spring toward center of cover to push out relief plunger

C. CLEANING AND INSPECTION

1. Remove all permatex and clean all parts with good grade cleaning solvent or diesel fuel. Blow dry with compressed air.

2. Inspect gears and oil pump body for damage or excess wear. See replacement wear limits chart, page 16.

3. Inspect cover and adapter for wear caused by gears. Note: if grooving does not exceed .030": both surfaces can be repaired by grinding smooth (.030"max.cut).

4. Inspect bushings (2) in cover for wear, out of round condition of burrs. If bushings are damaged or if expansion plugs (2) are worn or loose, order cover with flat discs and finish reamed bushings installed. (refer to wear limits page 16).

5. Inspect bushings (2) in adapter for wear, out of round condition of burrs. If bushing is damaged, order adapter with finish-reamed bushings installed. (refer to wear limits page 16).

6. Check relief plunger for free movement in cover bore. Replace if necessary.

7. Inspect all mating surfaces for smoothness.

D. ASSEMBLY

1. Generously lubricate pump gears with lubriplate, Vaseline, or engine weight oil and position them in adapter. **NOTE:** BE SURE SPLINE ENDS (INSIDE DIAMETER OF PUMP GEARS) ARE TOWARD COVER.

2. To both mating surfaces of body, sparingly apply **a very thin coat** of 'Super 300' permatex or equivalent. Too much sealer can prevent pump from functioning.

3.Place body on adapter and cover on body following punch marks.

4. Secure cover and body to adapter with cap screws and lock washers,-finger tight.

5. Dive two spring pins into cover and body until
flush.

6. With spring pin driver (Special Tool no. 1-90009-0000) drive spring pins (2) down through cover into body and adapter until mark on spring pin driver is even with top of holes in cover (13/16 inches from surface).

7. Insert long splined end of pump shaft through adapter into pump gear and revolve shaft to check ease of operation.

8. Tighten all six cap screws to 8 foot-pounds torque.

9. Remove any excess permatex from seams with solvent.

10. Recheck for ease of operation

11. Generously lubricate relief plunger with Vaseline or lubriplate and position cup end first in bore of cover from relief stop end. Check to make sure plunger slides freely.

12. Apply washer and screw relief stop just enough to start threads.

13. Insert pressure relief spring into opposite side of cover.

14. Screw pressure relief screw into relief valve insert just enough to start threads.

15. Install insert and washer with pressure screw in place.

16. Tighten relief stop and relief valve insert. Do not tighten relief screw.

17. Cap and lock pressure relief screw with dome nut and washer, and re-check for ease of operation.

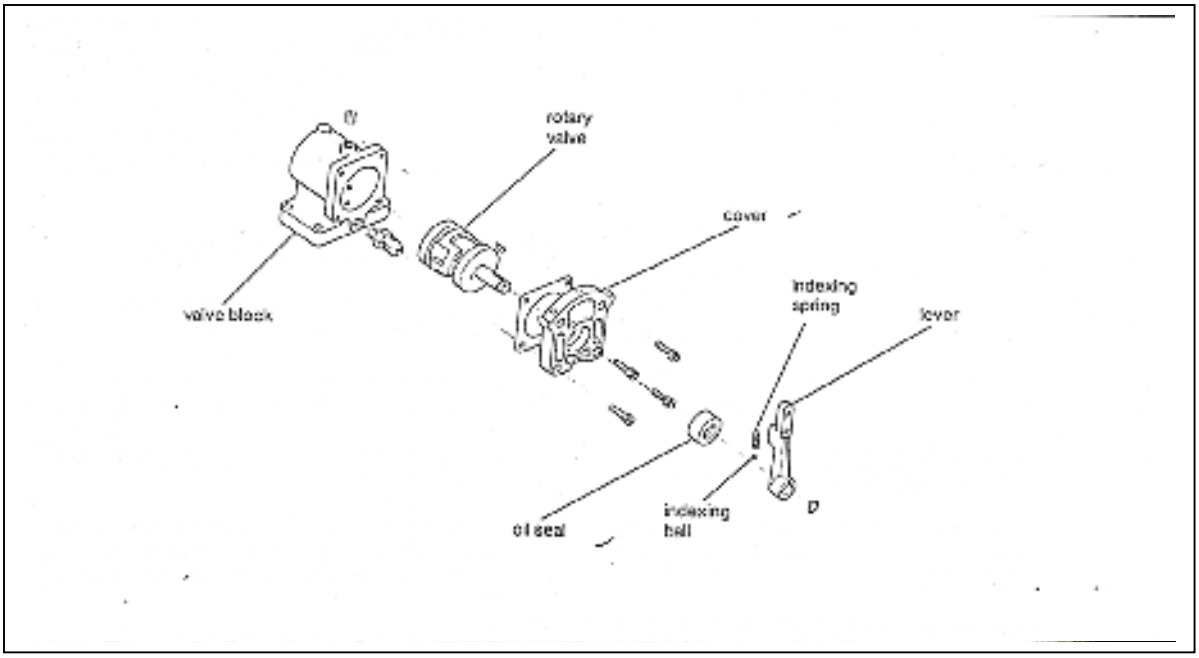
18. Apply a thin coat of lubriplate, Vaseline, or grease to hold new gasket on adapter.

19. Install oil pump (with new gasket) and oil cooler bracket. Secure in position with lock washers and cap screws. Tighten to 18 foot-pound torque.

NOTE:
To convert a right hand pump to a left hand pump; 1) the small plugs in the pump adapter must be switched, 2) the cover must be rotated 180°, 3) plumbing must be changed as shown on page 40.

6.5 SELECTOR VALVE ASSEMBLY

Figure 30. Selector Valve assembly



SECTION 6. REPAIR AND OVERHAUL

A. REMOVAL

1. Disconnect hoses and control linkage from lever on selector valve.

2. Remove cap screws and lock washers and lift off selector valve and base plate being very careful to keep gaskets in proper configuration for replacement. (They may be fixed in position with wire, etc.)

B. DISSASSEMBLY

1. Remove snap ring from rotor and note position of keyways on lever to rotor. (Match mark if desired). Remove lever from rotor being careful not to lose indexing ball and spring.

2. Remove key from rotor shaft

3. (Note position of cover). Remove cover, cover gasket, and rotor from block. (Note relative position
of keyway to rotor and lever, match mark if desired.

C. CLEANING AND INSPECTION

1. Clean all parts thoroughly with oil and clean all oil ports. Blow dry with compressed air.

2. Inspect rotor and valve block for scoring. Excessive scoring indicates replacement, as valves are not repairable.

3.Inspect oil seal in cover. If it is worn or shows evidence of leaking, replace it

NOTE:
On all fittings use Permatex 'Super 300' sealant, graphite paste, or equivalent**. Caution**: don not use no.1 Permatex or Teflon tape.

1. If necessary install new seal in cover. Press seal in until it bottoms in bore (rubber face out). Apply lubricant to seal.

2. Insert rotor shaft through oil seal in cover.

3. Install lever with indexing ball and spring and make sure that keyway in rotor shaft remains upright.

4. Tap control lever into position with a soft hammer and secure with snap ring.

5. Position new cover gasket on pilot face of cover.

6. Install rotor with cover into selector valve body. Secure cover with four cap screws. Tighten to 4 foot-pounds torque.

7. Check for correct assembly by moving lever back and forth. Selector valve is now ready to be installed on main housing. See fig. 31.

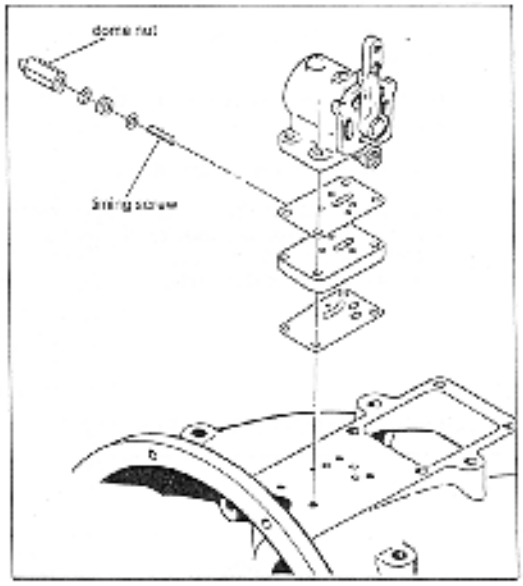


Fig. 31. Installation of Selector Valve

6.6 REMOVAL OF MARINE GEAR

1. Remove drain plug at bottom rear of main housing and drain oil from sump.

2. Disconnect all oil lines from oil pump and control valve, and remove water lines to cooler.

3. Disconnect control linkage from lever on selector valve.

4. Remove selector valve and base plate and be very careful to keep gaskets in proper configuration for future replacement. Refer to fig. 31.

5.Remove side inspection covers.

6. Scribe alignment mark across outside

diameter of flanges on output coupling and propeller shaft coupling for exact refit. Disconnect propeller shaft coupling from output coupling.

7. Remove or push propeller shaft back to obtain maximum clearance and remove pilot ring resting between propeller coupling and output drive coupling. NOTE: protect mating faces of couplings and pilot rings to insure proper refit and alignment.

8. Remove oil cooler, oil pump and oil pump drive shaft at this time. If shaft cannot be completely removed, pull it out as far as possible to prevent bending forward end of shaft during removal.

9. Screw two 3/8"-16 eye bolts into lifting holes on top of main housing and connect hoist so it supports housing.

10. Remove cap screws and lock washers holding main housing of marine unit to oil dam.

11. Insert screwdriver or similar object through inspection cover opening to hold clutch assembly inside forward drum. Slowly move main housing aft and away from oil dam leaving clutch assembly inside forward drum and on stub shaft.

CAUTION:
Clutch must be maintained in forward drum to prevent falling.

12. Remove clutch from forward driving drum.

13. Remove snap ring from groove on stub shaft.

14.Remove forward clutch driving drum.

NOTE:
In most cases removal of oil dam and stub shaft is not necessary unless further inspection of stub shaft and labyrinth seal indicate damage.

6.7 REDUCTION GEARBOX

A. OUTPUT COUPLING AND COVER

1. Remove cotter pin from output shaft.

2. Hold output coupling securely (With "coupling holder" special tool no. 1-90010-0000) and remove slotted nut and flat washer

3. With suitable puller, pull drive coupling from output shaft.

4. Remove key

5. Inspect seal ring and replace if necessary

6. Tip unit to rest on bell end and remove bearing cap.

a.) Note number and thickness of shims under bearing cap in the event bearing are re-used.

7. Remove cap screws and tap main housing cover from dowels with a soft hammer or use tapped holes available for jacking screws.

8. Remove idler from housing (idler units only).

9. Remove output shaft from main housing. Inspect bearing and replace if necessary and inspect gear teeth for excessive wear (refer to wear limits chart, page 16).

B. PINION SHAFT AND RELATED PARTS

NOTE:
The pinion shaft assembly can be removed and replaced without removing the main housing cover on the 10200 models (excepts 11/2 to 1 ratios without an idler gear.

1. To remove pinion shaft from cover:

a). Release bearing locknut on pinion shaft by bending or punching tang of lock washer.

b). Unscrew bearing locknut with spanner wrench and remove keyed flat washer.

c). With a suitable press, extract the pinion shaft out of the bearing retainer. See fig. 32, page 25.

NOTE:
Care should be taken to prevent damaging bronze bushing in threaded end of shaft.

2.Remove bearings from pinion shaft. Inspect and replace as necessary.

3.Inspect pinion teeth and front and rear commutator surfaces for excess wear
(See wear limits chart page 16)

NOTE:
The bearing spacer, two tapered cones and the two tapered cups constitute a matched set: if any one part is damaged the entire set must be replaced.

4.Inspect busing on threaded end of pinion shaft for chips or distortion. If damaged remove and press in new finish reamed bushing until it bottoms in bore.

SECTION 6. REPAIR AND OVERHAUL

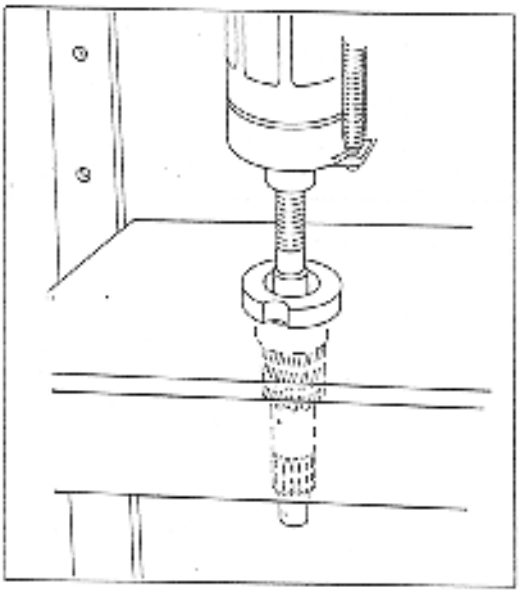


Fig. 32. Extracting Pinion Shaft

5. Inspect front pinion bearing (in housing) for roughness. Replace if necessary by removing snap ring.

6.Carefully remove snap ring from aft end of rear commutator bushing. Carefully remove inner sleeve (with piston rings). See figure 33

NOTE:
If front face of outer shell is grooved, shell must be replaced. Check inner bore of sleeve (see wear limits chart, p.16) replace any cracked or broken piston rings.

- Clean all parts with solvent or diesel fuel and blow-dry with compressed air.

C. HOUSING PARTS

1. Clean Oil breather.

2. Flush clean and inspect main housing.

a.) Clean sump.

b.)Check front bell end for nicks and burrs.

c.)Inspect aft end mounting surface. Use a flat file to deburr in all of the above cases.

d.) Clean all internal oil passages from selector valve through upper part of housing. See fig.34

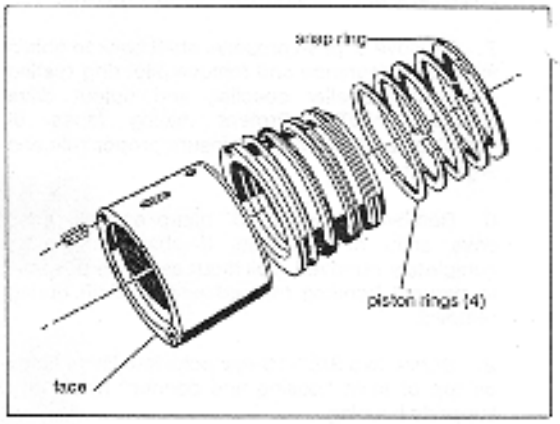


Fig. 33. Rear Commutator Bushing

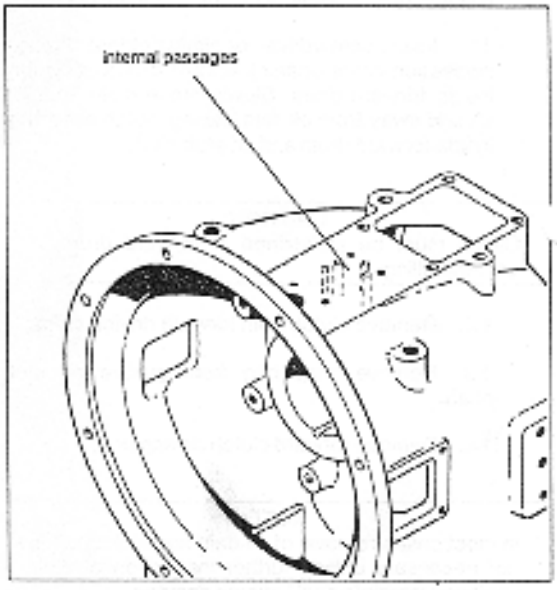


Fig. 34. Internal oil passages

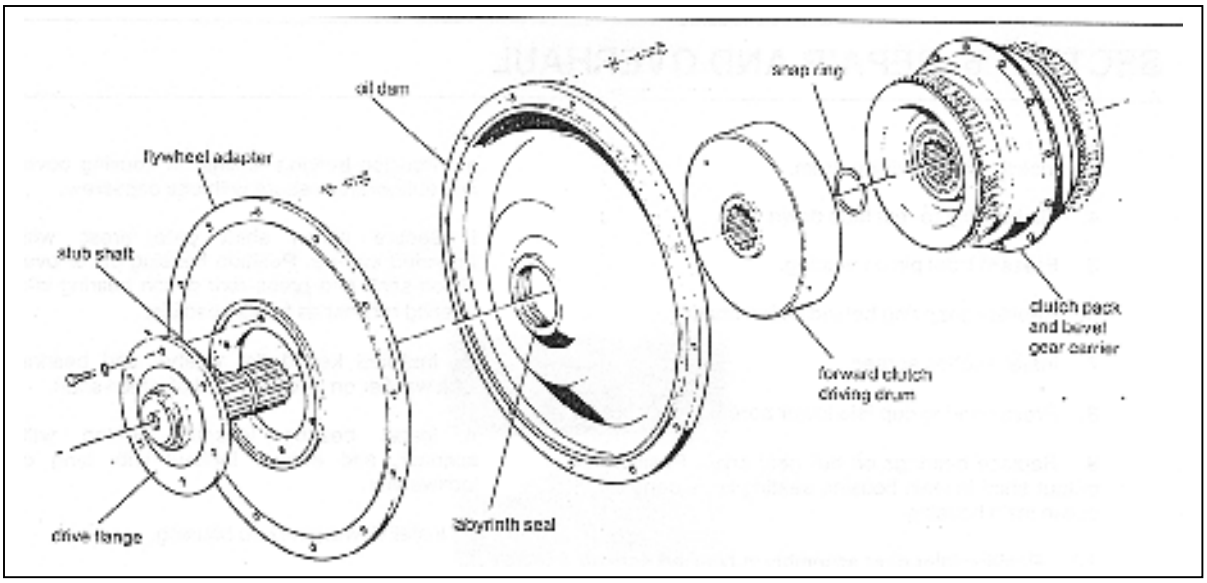
3.Clean and inspect cover. Check front and rear mating surfaces and file smooth with a flat file if necessary.

4.Clean oil suction screen.

5. Inspect reverse drum for grooves or excess wear.

6. Inspect mating surfaces of output coupling and propeller coupling and file smooth if necessary.

7.Inspect and clean pilot ring



6.8 ADAPTER GROUP

1.Clean and inspect stub shaft (Mounted on engine flywheel) and forward clutch driving drum. Check fit on splines between driving drum and stub shaft. Replace as necessary if fit is not snug.

2. Remove oil dam and inspect labyrinth oil seal on inside diameter (Some special units have a positive seal installed). Repair or replace as necessary (Wear or damage to seal indicates misalignment- Check further!) (See fig.35).

3. While oil dam is removed, inspect flywheel adapter and drive flange for distortion or rough mounting surfaces. Repair or replace as necessary.

6.9 RE-ASSEMBLY

1. Place housing on press with oil dam mounting face up.

2. Press in rear commutator bushing as follows:

NOTE:
To ease installation, housing may be heated and bushing cooled.

a). Place commutator bushing over bore of housing with snap ring end down.

b.). Set guide (3/16" brass or steel rod, bent to a right angle) as shown to insure line up of spring pin groove in bore and commutator shell groove. See fig.36

c). Set 1/8" flat stock, round or shim stops on each side of bore as shown to limit depth pressed.

d). Apply lubricant to bushing and press it down to stops.

e). Punch spring pin into groove flush with housing surface.

NOTE:
Check to see that commutator sleeve floats inside commutator shell.

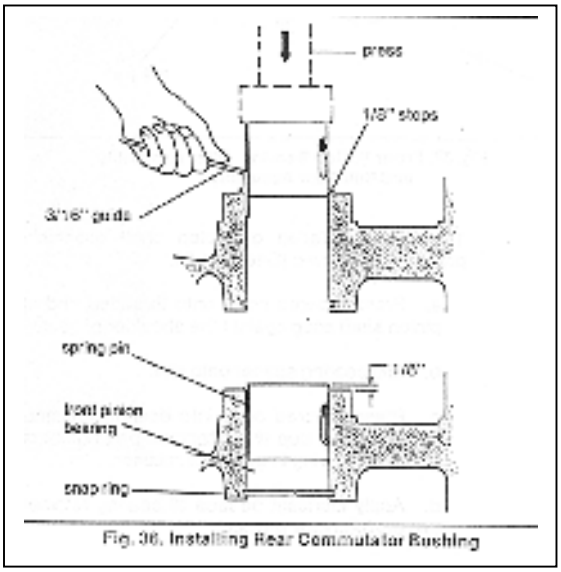


Fig. 36. Installing Rear Commutator Bushing

SECTION 6. REPAIR AND OVERHAUL

3. Install reverse driving drum.

4. Tip housing to rest face down.

5. Press in front pinion bearing

6. Replace snap ring behind pinion bearing

7. Install suction screen

8. Press bearing cup into lower bore of housing

9. Replace bearings on bull gear shaft. Position output shaft in main housing seating large cone in cup in main housing.

10. Position idler gear assembly in housing bore with “long shaft end” towards cover.

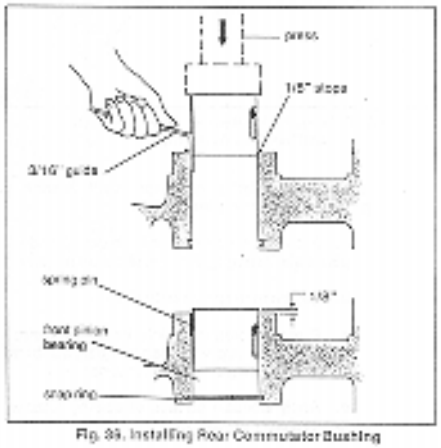


Fig. 38. Installing Rear Commutator Bushing

11. For installation of pinion shaft assembly proceed as follows: (see fig.38).

a). Press tapered cone onto threaded end of pinion shaft snug against the shoulder of gear.

b). Slip bearing spacer onto shaft.

c). Press tapered cups into bearing retainer. Position each cup with stamped part numbers against snap ring in center of retainer.

d). Apply lubricant on face of bearing retainer and position new gasket.

e). Position bearing retainer in housing cover and temporarily secure with one cap screw.

f). Secure pinion shaft onto press with threaded end up. Position housing cover over pinion shaft and press rear pinion bearing into bearing retainer as far as possible.

g). Installed keyed flat washer and bearing lock washer on threaded end of pinion shaft.

h). Install bearing locknut, tighten with spanner, and secure locknut with tang of lock washer.

i). Install dowel pins into housing.

j). Apply lubricant on mating surface of housing and apply gasket

k). Place cover (with pinion bearings) on housing, rotating pinion shaft to engage teeth. Use a soft hammer to tap cover in position on dowels.

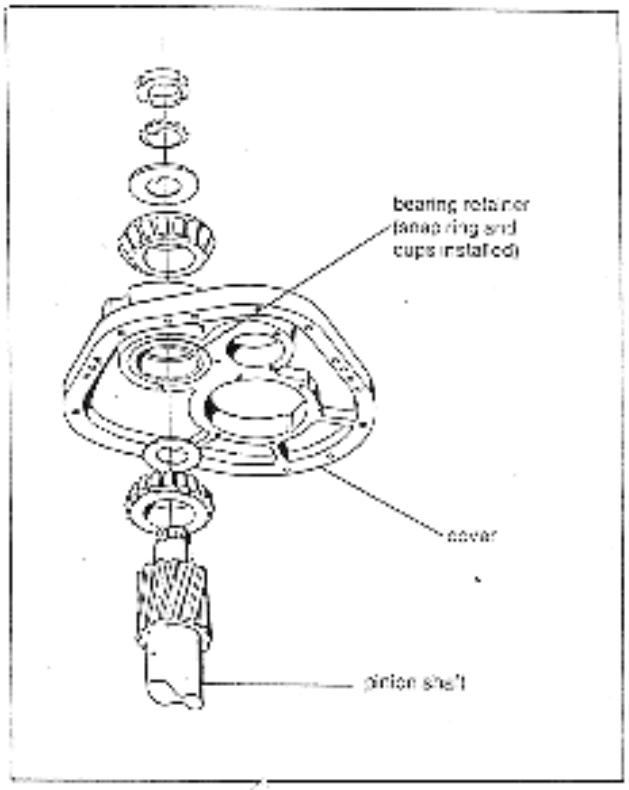


Fig. 39. Installation of Pinion Shaft Assembly

12. Check for free movement of pinion shaft and secure cover with lock washers and cap screws (tighten to 18 foot-pounds for 10200 series and to 31-foot pounds torque for 10700 series).

13. Install bearing cup into rear cover.

14. Press new oil seal into bearing cap retainer.

15. Position new seal ring on output shaft just above tapered cone (model 10200 only). Be certain it is not twisted.

16. Install shim pack under bearing retainer. Allowing .000-002" end play (see fig.39). secure with cap screws and washers.

17. To check endplay:

a). Start hex nut on output shaft.

b). Protect tapered surface of shaft with cloth and tap shaft side to side with soft hammer.

c). Raise output shaft (see fig.39). Endplay should be .000-.002".

18. Lubricate inside surface of new oil seal in bearing cap.

19. Install key in output shaft

20. Heat output coupling in hot oil or water ((200F/93C) Maximum) to insure proper fit and place hot coupling on output shaft aligning keyway with key (model 10200 only); for model 10700; align cotter pin cutouts with cotter pin hole in output shaft. Tap into position with soft hammer.

21. Install flat washer and slotted nut and tighten, aligning grooves in nut with cotter pin hole in output shaft.

22. Install cotter pin to secure output coupling and rotate coupling and shaft to insure free movement.

23. Install breather in main housing.

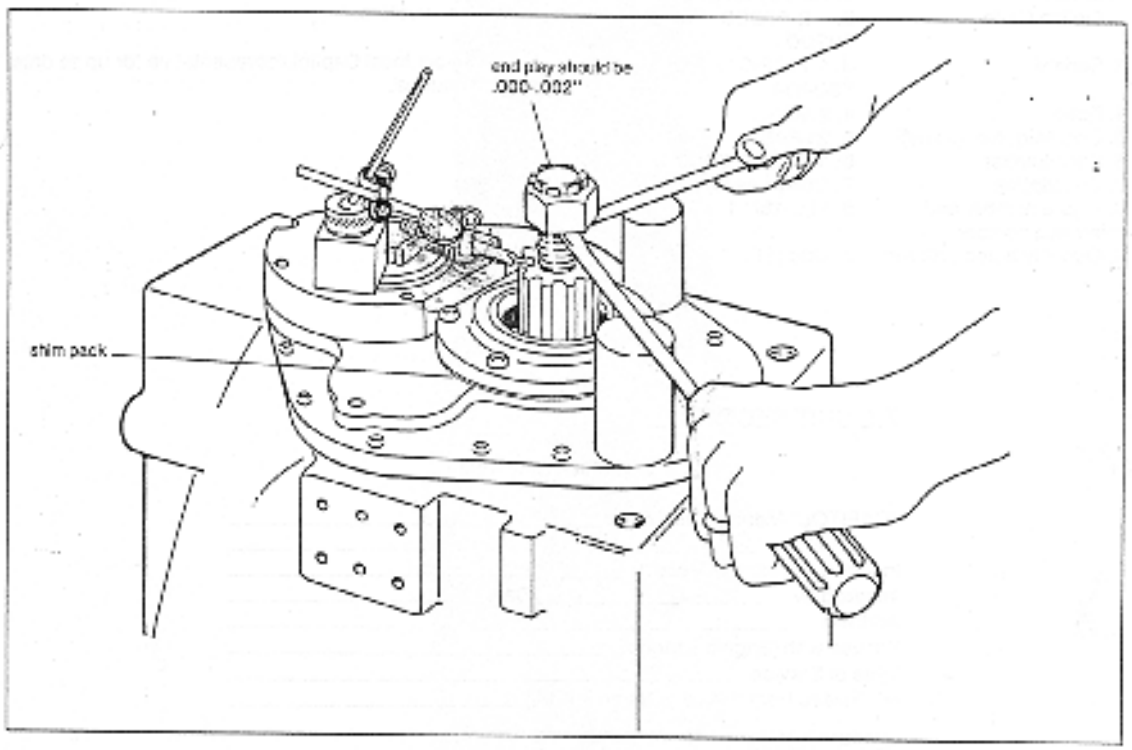


Fig. 39. Checking end play