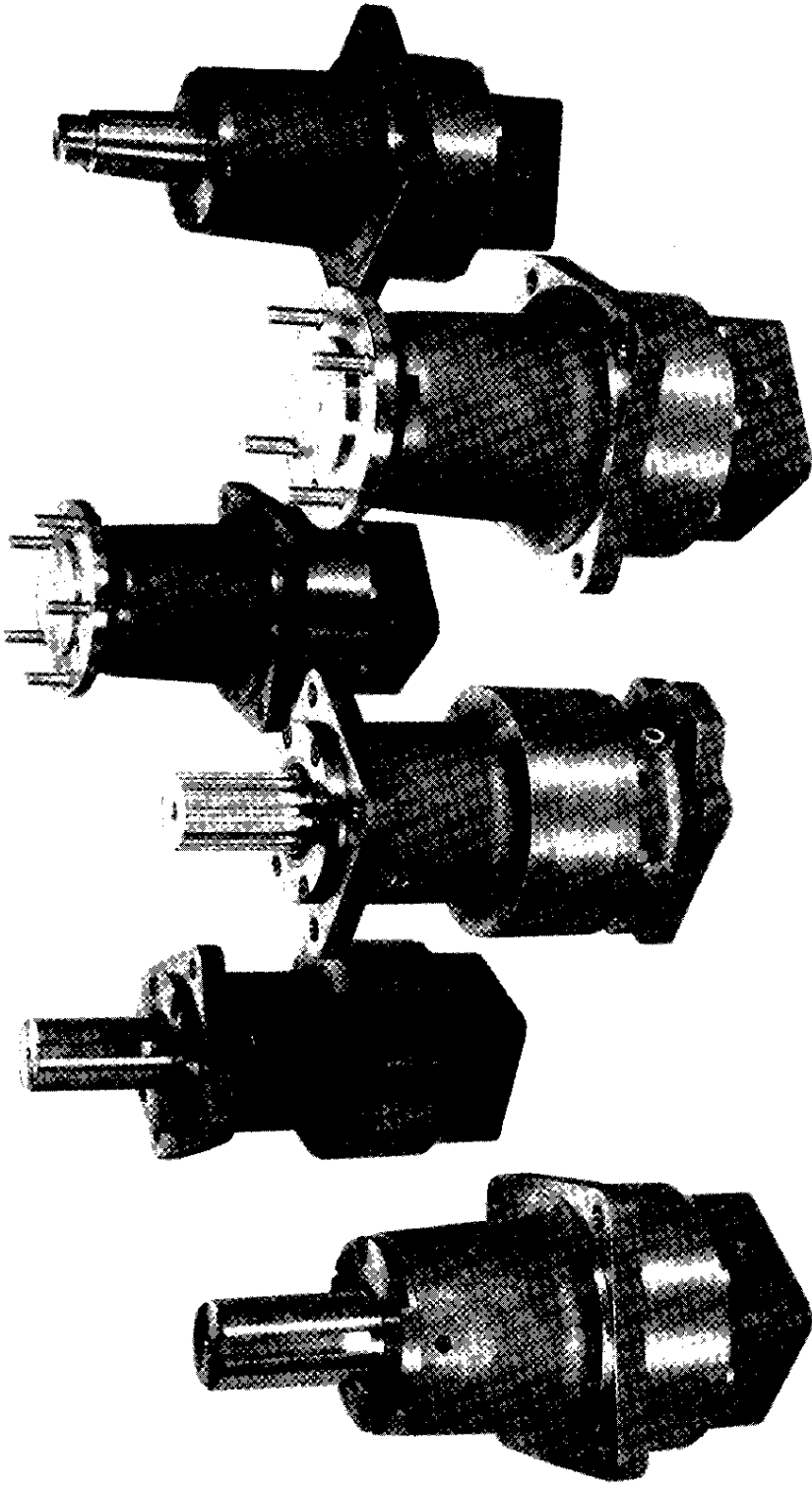


Model 16

*Parts and Lubrication Information
Assembly/Disassembly Instructions*



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LUBRICATION INSTRUCTIONS

HECO planetary speed reducers may be lubricated as a self-contained unit (standard hydraulic motor), or as an integral part of the hydraulic system (bearingless motor).

In applications where the speed reducer is lubricated as a self-contained, horizontal unit, it is recommended that the unit be half-filled with EP (1) oil (see chart for amount and proper grade gear oil). Self-contained, vertical installations (output shaft down) require the unit to be filled to the center line of the upper planetary gear train. For self-contained vertical installations (output shaft up) consult HECO. When installed as a self-contained unit, ensure adequate ventilation is provided to allow for lubricant expansion.

The oil should be changed after the first 50 hours and 100 hours of operation, and every 1000 hours thereafter. Oil should be drained while the unit is at operating temperature. The unit should be cleaned with flushing oil (use of solvents should be avoided). NOTE: The importance of a thorough gear case cleaning with flushing oil during the first lubricant change cannot be overemphasized. If the maximum oil operating temperature is exceeded, change oil immediately.

In applications where the speed reducer is lubricated by oil flow from the bearingless hydraulic motor, a petroleum based hydraulic oil with EP(1) additives should be used. Ensure that a minimum oil flow of 2 GPM is maintained, a separate case

drain line should be connected directly from the top of the reducer (ensure the reducer remains full) to the oil reservoir.

For maximum cooling and lubrication the case drain should be connected to the drain port at the opposite end of the reducer from the hydraulic motor. Reducer case pressure must not exceed 20 PSI with the standard shaft seal or 50 PSI with the optionally available high pressure seal installed.

(1) Extreme Pressure Lubricants --- These lubricants are petroleum base liquids with chemical additives, such as, sulfur phosphorous or similar materials or soluble compounds which produce a protective film to withstand high pressures.

TOTAL CAPACITY
 40 oz. (12 dl.)
 105 oz. (31 dl.)
 105 oz. (31 dl.)
 200 oz. (60 dl.)
 170 oz. (50 dl.)
 170 oz. (50 dl.)
 230 oz. (68 dl.)

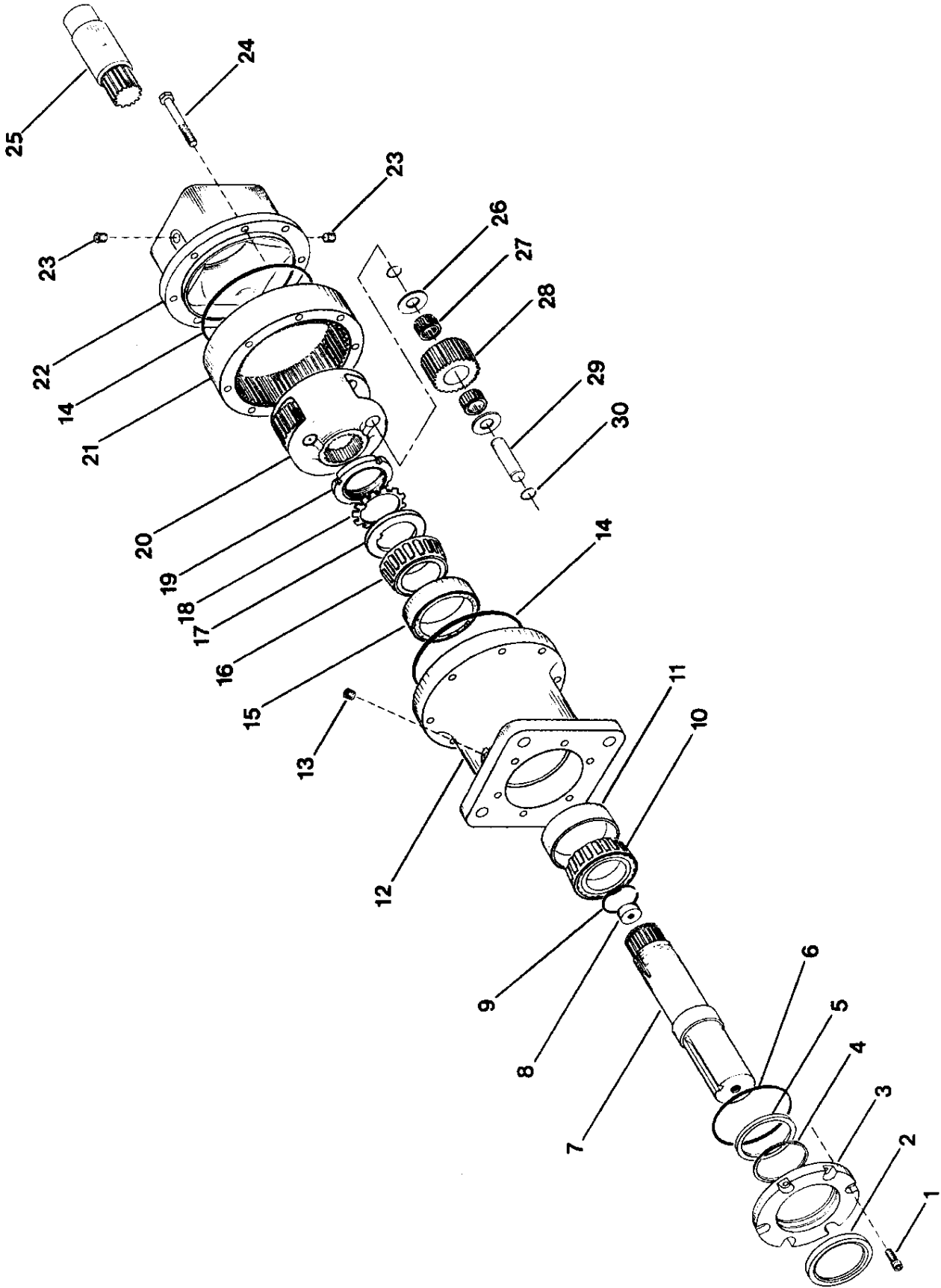
HORIZONTAL OPERATION (1/2 FULL)
 20 oz. (6 dl.)
 50 oz. (15 dl.)
 50 oz. (15 dl.)
 100 oz. (30 dl.)
 85 oz. (25 dl.)
 85 oz. (25 dl.)
 115 oz. (34 dl.)

Model 16
 Model 20
 Model 20D
 Model 50
 Model 50D
 Model 52D
 Model 52T

MAXIMUM OIL TEMPERATURE
 140°F (60°C) continuous
 170°F (76°C) intermittent
 Consult HECO for higher temperatures

OIL GRADE — Double Reduction (RPM Out)
 0-40 RPM — AGMA #5
 40-60 RPM — AGMA #1
 60 + — Consult HECO

OIL GRADE — Single Reduction (RPM Out)
 0-25 RPM — AGMA #5
 25-100 RPM — AGMA #3
 100-200 RPM — AGMA #1
 200 + — Consult HECO



Model 16

ITEM #	PART #	DESCRIPTION	QTY/ASSY
1.	151110	Cap Screw	6
* 2.	151060	Shaft Seal (Not Available in Viton)	1
3.		Seal Carrier	1
	150560	Standard	
* 4.	150590	High Pressure	1
	151050	Backup Ring (Not Used on High Pressure Seal)	
* 5.	153010	Quad Ring	1
	153015	Quad Ring Viton	
	153030	High Pressure Lip Seal (Not Available in Viton)	1
* 6.	151330	O Ring Viton	1
	151335	Output Shaft	
7.	150530	2.250" Straight Keyed	1
	150540	2.250" Tapered	
	150990	16T 8/16 Spline	
	150570	4-Bolt Flange (Includes 151210 Hub Stud)	
	151210	Hub Stud	4
	152240	5-Bolt Flange (Includes 151210 Hub Stud)	
	151210	Hub Stud	
8.	150152	Thrust Plug	1
9.	150110	Retaining Ring	1
10.	151180	Cone	2
11.	151280	Cup	2
12.		Bearing Housing	1
	150520	Front Flange	
	150550	Center Flange	
13.	151290	Pipe Plug	3
* 14.	151020	O Ring	2
	151025	O Ring Viton	
15.	151280	Cup	2
16.	151180	Cone	2
17.	151630	Keyed Washer	1
18.	151620	Lock Washer	1
19.	151380	Lock Nut	1
20.	150040	Planet Carrier	1
21.	150030	Internal Gear	1
22.		Motor Adapter	1
	152050	SAE A 2-Bolt	
	150640	SAE B 2-Bolt	
	150180	SAE B 4-Bolt	

ITEM #	PART #	DESCRIPTION	QTY/ASSY
	152090	SAE C 2/4-Bolt	
	150901	Modified SAE A 4-Bolt	
23.	151290	Pipe Plug	3
24.	151100	Bolt	8
	151080	Stud — SAE C 2/4-Bolt Only	8
25.	151090	Nut — SAE C 2/4-Bolt Only	8
		Sun Gear Kit (Input Shaft Adapter) (See Separate Sheet for Kit Parts)	1
	16B	7/8" — 13T Spline	
	16C	1" — 15T Spline	
	16D	1" Straight Keyed	
	16E	Char-Lynn 2000 Bearingless	
	16F	Char-Lynn 4000 Bearingless	
	16H	1 1/4" Straight Keyed	
	16I	1 1/4" — 14T Spline	
	16M	1" SAE 6B Spline	
	16O	7/8" Straight Keyed	
	16P	1 1/8" Straight Keyed	
26.	151120	Thrust Washer	6
27.	151130	Planet Bearing	6
28.	150050	Planet Gear	3
29.	150080	Planet Pin	3
30.	151070	Retaining Ring	6
31.		Motor Seal/Gasket	
32.		Motor Bolt and Seal Kit (Motor Bolt and Seal Kits — Includes all Bolts, "O" Rings, Gaskets, etc. necessary to mount hydraulic motor to the gear reducers.) (See Parts Price List for Motor Bolt and Seal Kit Prices)	
	BK16-0		
	BK16-2		
	BK16-4		
	BK16-5		
	BK16-6		
	15930	Seal Kit — Buna	
	15932	Seal Kit — Viton	
	15935	High Pressure Seal Kit	
		* Items which are included in Seal Kits	

NOTE: Shaft seals may be replaced by removing the seal carrier from the shaft end of the unit. It is not necessary to disassemble unit to change the shaft seals unless the unit has a flanged output shaft.



Model 16 Disassembly Instructions

Warning:

Standard safety practices must be followed during the procedures described herein. Eye protection is mandatory.

Disassembly Note:

Clean exterior of unit prior to attempting disassembly. Remove unit to a clean work area.

1. Clamp mounting flange in vice shaft down taking care not to damage output shaft surface.
2. Remove pipe plug (13 or 23) from case and drain oil from unit. Retain oil for analysis.
3. Remove remaining two pipe plugs in housing (12) and motor adapter (22).
4. Remove hydraulic motor and examine for failures. Our experience indicates that motor failure is the most common cause of reducer failure.
5. Remove sungear (25).
6. Remove eight bolts (24) from motor adapter (22). (Fig. 1)
Note: Code 6, 2/4 SAE/C motor adapter, remove nuts from studs (24). (Fig. 1)

(continued)

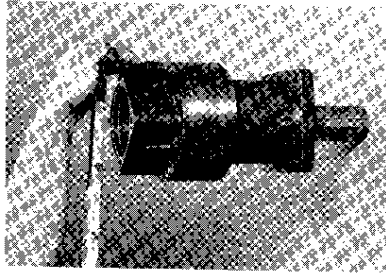


Fig. 1

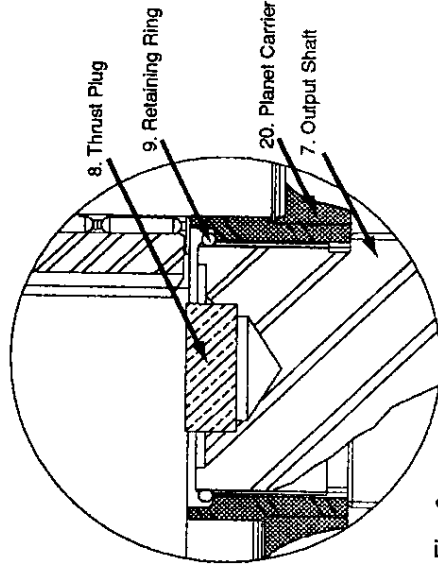


Fig. 2



Model 16 Assembly Instructions

Warning:

Standard safety practices must be followed during the procedures described herein. Eye protection is mandatory.

Assembly Note:

Carefully inspect each item and clean prior to assembly.

1. Lubricate planet bearings (27) and slip into planet gear (28). (Fig. 9)
2. Lubricate thrust washers (26), place one washer on each side of planet gear (28). Place planet gear and thrust washer in planet carrier (20). (Fig. 9)
3. Lubricate planet pin (29) and insert into planet pin hole in planet carrier (20) from splined side of carrier. Drive planet pin (29) through thrust washers and planet gear, into opposite planet pin hole in carrier housing. (Fig. 5 & 9)
4. Secure planet pin (29) with retaining rings (30) on each end of planet pin. (Fig. 9)
5. Repeat steps 1-4 for installation of two remaining planet gears. At this point, carrier assembly (20) is complete.

(continued)

Model 16 Disassembly, Continued

7. Remove motor adapter (22) from internal gear (21).
8. Lift internal gear (21) from housing (12).
9. Remove 'O' rings (14) from internal gear (21).
10. Remove retaining ring (9) from groove in shaft (7).
 Note: (9) is a wirelock retaining ring that retains the planet carrier assembly (20) on the output shaft (7). This locking ring must be pried out of the locking ring groove to remove the planet carrier assembly (20). This typically is accomplished by inserting two long screwdrivers between the planet gears and carefully working the wirelock out of the locking groove. (Fig. 2 & 3)
11. Lift planet carrier assembly (20) from shaft (7).
12. Bend tab on lock washer (18) away from lock nut (19).
13. Using a spanner wrench or HECO tool #19150, unscrew lock nut (19) and remove lock washer (18) and keyed washer (17). (Fig. 4)
14. Take unit out of vice and turn it over. Remove six cap screws (1) from seal carrier (3). (Fig. 7)
15. Remove seal carrier (3) from housing (12).
16. Remove 'O' ring (6), quad and backup ring or high pressure seal (4 & 5) and shaft seal (2) from seal carrier (3) and discard. (Fig. 8)

(continued)

Model 16 Assembly, Continued

6. Stand output shaft in vice or press and press thrust plug (8) into shaft (7). (Fig. 2)
7. Using an appropriate tool, press bearing cups (11) and (15) into the housing.
 Important Note: Insure cups are square with counterbore before seating.
8. Press bearing cone (10) onto end of output shaft (7) using appropriate tool. Seat bearing cone against shoulder on shaft.
 Note: If flange shaft unit is being assembled the assembled seal carrier must be in position prior to installing bearing cone (10). (See instructions 20, 21, 22 for assembly detail)
9. Stand output shaft (7) and assembled cone securely in vice with input spline of shaft up.
10. Stand housing (12) on shaft. Seat bearing cone (10) against bearing cup (11) in housing.
11. Press bearing cone (16) onto end of shaft (7) or heat bearing cone (16) to approximately 180°-200° and slip into place. (HECO recommends heating the bearing cone) Seat bearing cone against its cup in housing.
 Install keyed washer (17) and lock washer (18) on threaded end of shaft. Apply never-seize or similar lubricant on threads and thread lock nut (19) onto shaft. It is important to rotate housing to seat bearings while tightening lock nut until housing resists rotation and end play is minimal. (Fig. 4 & 6)

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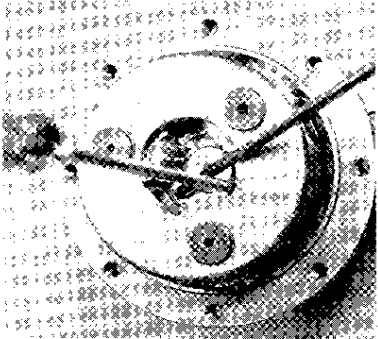


Fig. 3

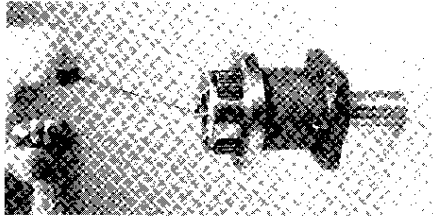


Fig. 5

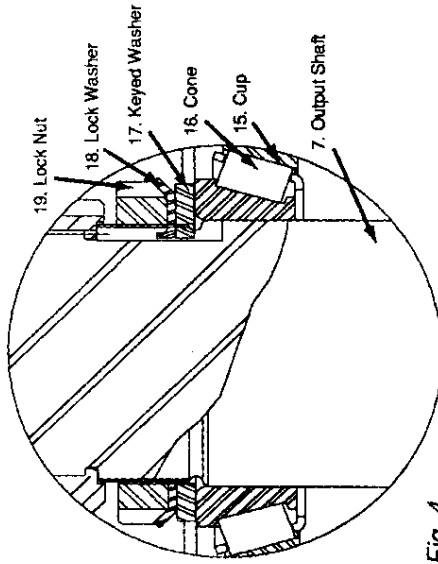


Fig. 4

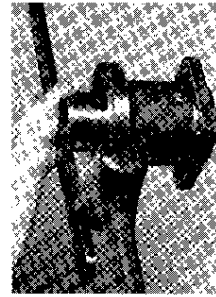


Fig. 6

Model 16 Disassembly Instructions, Continued

Model 16 Assembly Instructions, Continued

17. Support housing (12) with output shaft down and press shaft (7) out of housing from input end of shaft. Note: Shaft may come out with bearing cone (16) attached. Remove bearing cone carefully to avoid damage to shaft.
18. Carefully drive bearing cups (11 & 15) out of housing (12).
19. Remove two retaining rings (30) from ends of planet pins (29). (Fig. 9)
20. Support planet carrier (20) spline side down and drive planet pins (29) out of planet carrier (20). (Fig. 9 & 5)
21. Remove planet gears (28) and thrust washers (26) from planet carrier. (Fig. 9)
22. Remove planet bearings (27) from planet gears (28).
23. Examine brass thrust plug (8) in end of shaft (7). (Fig. 2) If wear is apparent, remove by inserting a 1/4" self tapping screw and jacking the plug out of the shaft.
24. Clean and examine all parts for wear or failure. *(disassembly complete)*

13. Locate tab on lock washer in line with slot on lock nut and bend tab into slot to prevent lock nut from loosening. (Fig. 4)
14. Lubricate spline end of shaft (7), lay retaining ring (9) on end of shaft. Slide planet carrier assembly spline onto shaft spline. Reach through the planet carrier and seat retaining ring (9) into groove at end of shaft (7). (Fig. 2) This is best accomplished using two long screwdrivers. (Fig. 3)
15. Lubricate 'O' rings (14). Place one 'O' ring (14) around pilot on bearing housing. Note: Check for sharp edges or burrs on housing pilot.
16. Place internal gear (21) into mesh with planet gears (28) of planet carrier assembly. Line up holes in internal gear with holes in housing (12).
17. Place other 'O' ring (14) on pilot of motor adapter (22). Note: Check for sharp edges or burrs on housing pilot.
18. Place motor adapter pilot into counterbore of internal gear (21). Line up holes in motor adapter with matching holes in internal gear. Insert eight grade 5 cap screws (24) with lock washers, in holes. Tighten to 60-75 ft. lbs. torque. (Fig. 1)
Note: 2/4C motor adapter requires eight grade 8 studs rather than cap screws. (Fig. 1)

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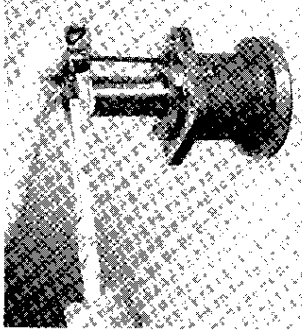


Fig. 7

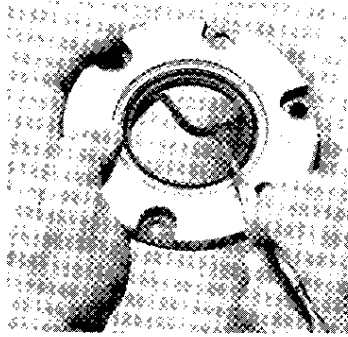
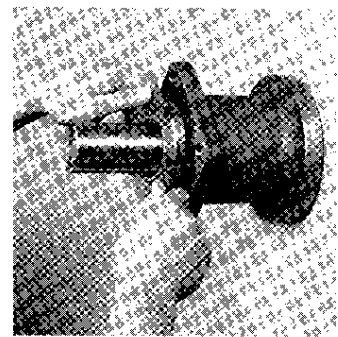
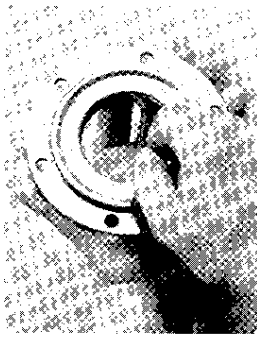


Fig. 8



Model 16 Assembly Instructions, Continued

19. Turn unit over and stand on motor adapter end.
20. Lubricate backup ring (4), quad ring (5) and 'O' ring (6). Insert backup ring and quad ring in groove of seal carrier. (Fig. 10) Place 'O' ring (6) on seal carrier pilot. (Fig. 8)
 Note: High pressure seal carrier uses 1 poly seal in place of quad ring and backup ring. (Fig. 11)

Note: Check for sharp edges or burrs on housing pilot.

21. Press seal (2) into its counterbore in seal carrier. (Fig. 10) The open face of the seal should be up. This seal functions as a wiper only and is installed to keep contaminants out of the unit.

22. Lubricate output shaft (7) and shaft seal (2). Place seal carrier (3) with backup ring, quad ring and 'O' ring installed, over output shaft (7) and carefully slide seal carrier into position. (Fig. 8) Line up holes, insert six socket grade 8 head cap screws (1) in holes and tighten to 20-25 ft. lbs. torque. (Fig. 7) Tighten pipe plugs (13 & 23) into holes in housing (12) and motor adapter (22) using a thread sealing compound.

At this point unit assembly is complete.

24. Note: Before placing unit in service, insure unit is filled with correct amount and grade of gear lubricant. See lubrication instructions for further information.

(assembly complete)

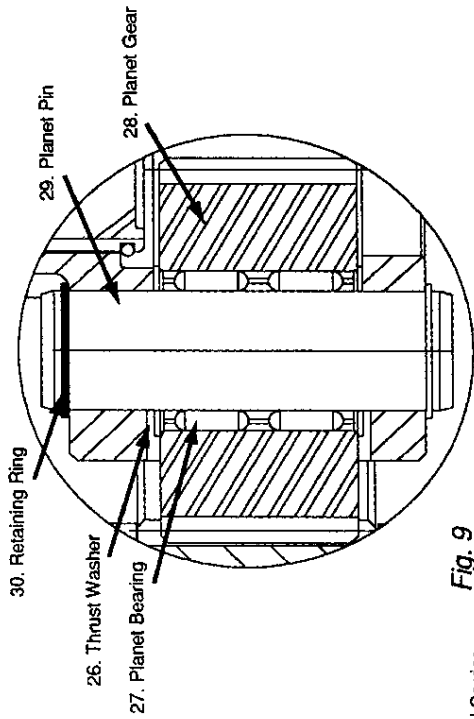


Fig. 9

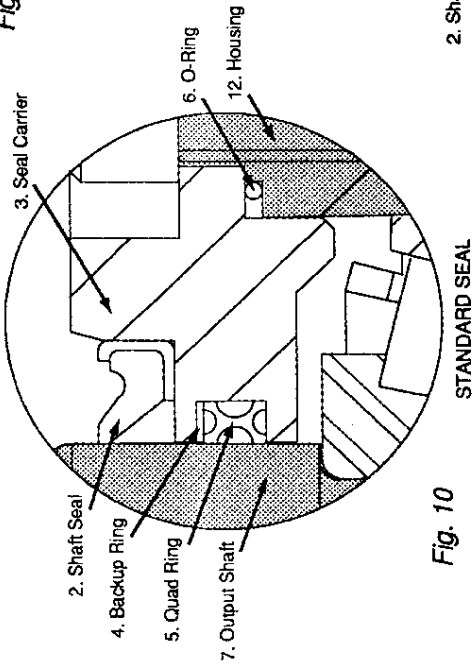


Fig. 10

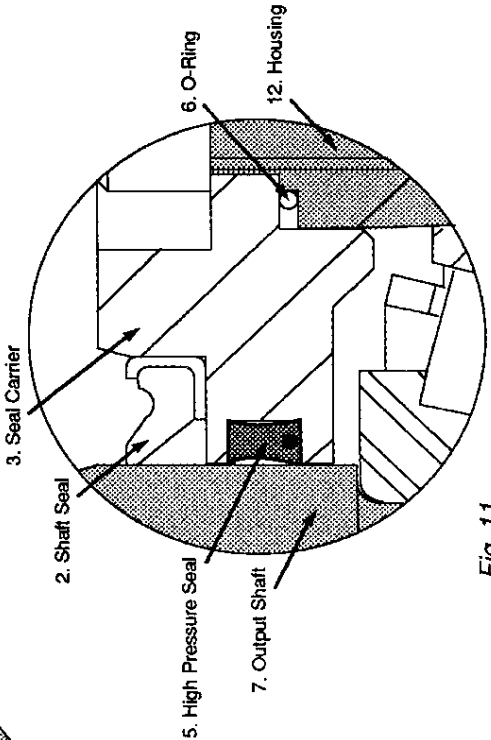


Fig. 11

HIGH PRESSURE SEAL