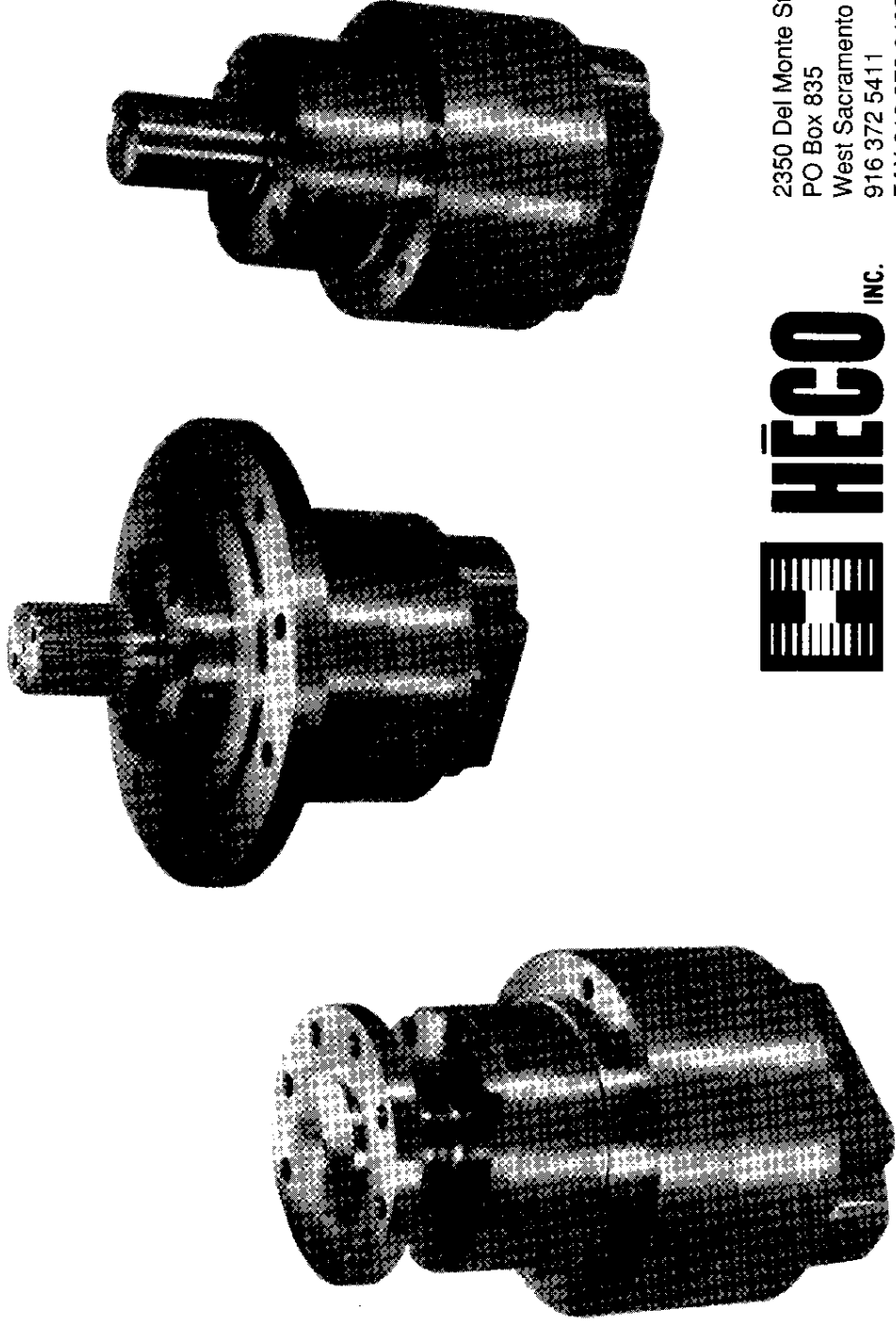


Model 20 & 20D

*Parts and Lubrication Information
Assembly/Disassembly Instructions*



2350 Del Monte Street
PO Box 835
West Sacramento CA 95691
916 372 5411
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Telex 377309

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.

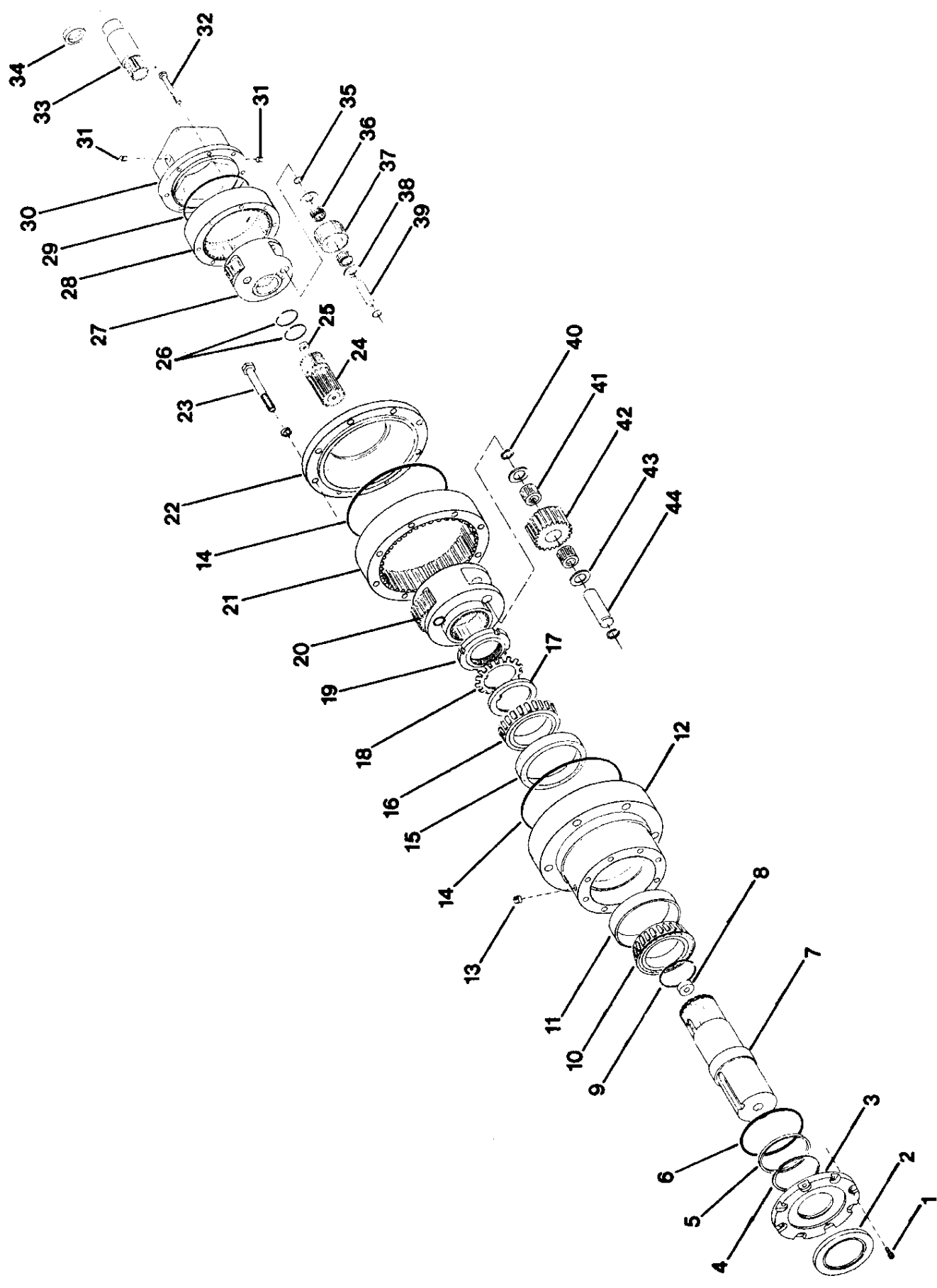
(1) Extreme Pressure Lubricants --- These lubricants are petroleum base liquids with chemical additives, such as, sulfur phosphorous or similar materials or soluble compounds which produce a protective film to withstand high pressures.

	HORIZONTAL OPERATION (1/2 FULL)	TOTAL CAPACITY
Model 16	20 oz. (6 dl.)	40 oz. (12 dl.)
Model 20	50 oz. (15 dl.)	105 oz. (31 dl.)
Model 20D	50 oz. (15 dl.)	105 oz. (31 dl.)
Model 50	100 oz. (30 dl.)	200 oz. (60 dl.)
Model 50D	85 oz. (25 dl.)	170 oz. (50 dl.)
Model 52D	85 oz. (25 dl.)	170 oz. (50 dl.)
Model 52T	115 oz. (34 dl.)	230 oz. (68 dl.)

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

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

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



Model 20 & 20D

ITEM #	PART #	DESCRIPTION	QTY/ASSY
1.	151110	Cap Screw	8
2.	201500	Shaft Seal — 2 Design (Not Available in Viton)	1
3.		Seal Carrier	1
	200640	Standard	
*	200650	High Pressure	1
	201190	Backup Ring	1
	201170	Quad Ring	1
	201175	Quad Ring Viton	1
	201220	High Pressure Lip Seal	1
	201160	O Ring	1
	201165	O Ring Viton	1
	200440	Output Shaft	1
	200210	2.750" Straight Keyed	
	200570	3.375" Straight Keyed	
	200630	23T 8/16 Spline	
8.	150152	8-Hole Flange	1
9.	200110	Thrust Plug	1
10.	201210	Retaining Ring	1
	201560	Cone - CF Housing	2
11.	201120	Cone - FF Housing	2
	201550	Cup - CF Housing	1
12.	200200	CF Housing	1
	200660	FF Housing	1
13.	201100	Pipe Plug	1
14.	201010	O Ring	2
	201015	O Ring Viton	2
15.	201120	Cup	2
16.	201210	Cone	2
17.	201280	Keyed Washer	1
18.	201060	Lock Washer	1
19.	201070	Lock Nut	1
20.	200050	Planet Carrier	1
21.		Internal Gear	1
D	200190	31.2:1	
D	200190	6:1	
	200040	24.96:1	
	200040	4.8:1	
22.		Motor Adapter	1
	200240	SAE C 2/4-Bolt	
23.	200701	Modified SAE A 4-Bolt	1
24.	200390	Transition Plate	8
	201090	Bolt — Motor Adapter/Transition Plate	1
	20F	Sun Gear Kit (Input Shaft Adapter)	8
	20G	6:1 Char-Lynn 4000 Bearingless	1
	20I6	6:1 Char-Lynn 5000 Bearingless	
	20I4	6:1 14T 12/24 Spline	
	200320	4.8:1 14T 12/24 Spline	1
D	200330	31.2:1 Intermediate Gear	1
D	200330	24.96:1 Intermediate Gear	1
D	150152	Thrust Plug	1

ITEM #	PART #	DESCRIPTION	QTY/ASSY
D 26.	150110	Retaining Ring	2
D 27.	150040	Planet Carrier	1
D 28.	150030	Internal Gear	1
* D 29.	151020	O Ring	2
	151025	O Ring Viton	
D 30.		Motor Adapter	1
D	152050	SAE A 2-Bolt	
D	150640	SAE B 2-Bolt	
D	150180	SAE B 4-Bolt	
D	152090	SAE C 2/4-Bolt	
D	150901	Modified SAE A 4-Bolt	
D 31.	151290	Pipe Plug	2
D	201100	Pipe Plug	2
D 32.	151100	Bolt	8
	151080	Stud — SAE C 2/4-Bolt Only	8
	151090	Nut — SAE C 2/4-Bolt Only	8
D 33.		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 8B Spline	
	16O	1 1/8" Straight Keyed	
	16P	1 1/8" Straight Keyed	
D 35.	151070	Retaining Ring	6
D 36.	151130	Planet Bearing	6
D 37.	150050	Planet Gear	3
D 38.	151120	Thrust Washer	3
D 39.	150080	Planet Pin	3
40.	201050	Retaining Ring	6
41.	201110	Planet Bearing	6
42.		Planet Gear	3
	200180	31.2:1	
	200180	6:1	
D	200080	24.96:1	
	200080	4.8:1	
43.	201150	Thrust Washer	6
44.	200100	Planet Pin	3
		(See Parts Price List for Motor Bolt and Seal Kit Prices.)	
	209320	Seal Kit — Buna	
	209330	Seal Kit — Viton	
	209350	Seal Kit — High Pressure	
D	209500	Seal Kit Double Reduction — Buna	
D	209550	Seal Kit Double Reduction — Viton	
D	209750	Seal Kit Double Red. — High Pressure	
		* Items which are included in Seal Kits	
		D Items for Model 20D only	



Model 20 & 20D Disassembly Instructions

Model 20 & 20D Assembly Instructions

Introduction:

The Model 20D joins a Model 20 planetary reducer with a Model 16 planetary reducer through the use of a transition plate (22) and an intermediate gear (24). **The instructions which apply only to the Model 20D are shown in bold type.**

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) from case and drain oil from unit. Retain oil for analysis. Remove remaining two pipe plugs (31) in motor adapter (30).
3. Remove hydraulic motor and examine for failures. Our experience indicates that motor failure is the most common cause of reducer failure.
4. Remove eight bolts (23) from motor adapter (30). (Fig. 1)
5. Remove motor adapter (30) from internal gear (21). **[Model 20D— Remove motor adapter (30) from small internal gear (28).]**

(continued)

Introduction:

The Model 20D joins a Model 20 planetary reducer with a Model 16 planetary reducer through the use of a transition plate (22) and an intermediate gear (24). **The instructions which apply only to the Model 20D are shown in bold type.**

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.

Instructions 1-6 are for Model 20D only. To continue, refer to number 7.

1. Lubricate planet bearings (36) and slip into planet gear (37). (Fig. 9)
2. Lubricate thrust washers (38), place one washer on each side of planet gear (37). Place planet gear and thrust washer in planet carrier (28). (Fig. 9)
3. Lubricate planet pin (39) and insert into planet pin hole in planet carrier (28) from splined side of carrier. Drive planet pin (39) through thrust washers and planet gear, into opposite planet pin hole in carrier housing. (Fig. 5 & 9)
4. Secure planet pin (39) with retaining rings (35) on each end of planet pin. (Fig. 9)
5. Repeat steps 1-4 for installation of two remaining planet gears. At this point, small carrier assembly is complete.

(continued)

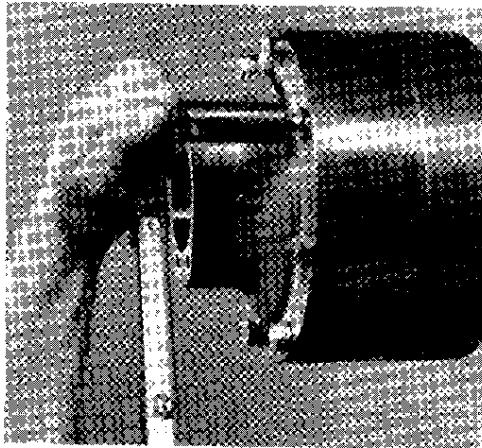


Fig. 1

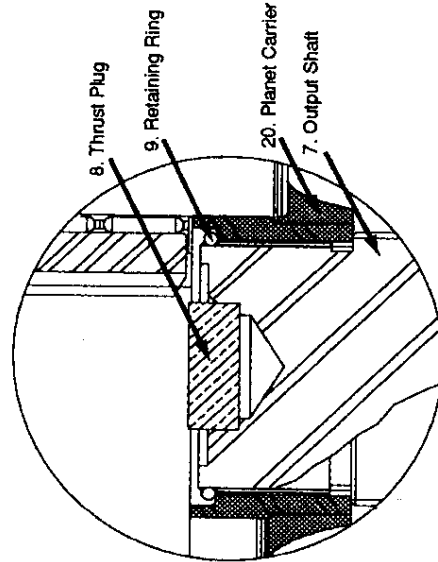


Fig. 2

Model 20 & 20D Disassembly Instructions, Continued

- Instructions 7-12 are for Model 20D only. To continue, refer to number 13.
- Remove small internal gear (28) from transition plate (22).
 - Remove 'O' rings (29) from small internal gear (28).
 - Remove sungear (33) from small planet gears (37).
 - Remove small planet carrier assembly (27) from large planet gears.
 - Remove eight bolts (23) from transition plate (22).
 - Remove transition plate (22) from large internal gear (21).
 - Remove internal gear (21) from housing (12). Remove 'O' rings (14) from internal gear (21).

The following instruction applies only to the Model 20. To continue, refer to number 15.

- Remove sungear (24) from planet gears (28).
- 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)
- Lift planet carrier assembly (20) from shaft (7).
- Bend tab on lock washer (18) away from lock nut (19).
- Using a spanner wrench or HECO tool #29150, unscrew lock nut (19) and remove lock washer (18) and keyed washer (17). (Fig. 4)

(continued)

Model 20 & 20D Assembly Instructions, Continued

- Lubricate spline on intermediate gear (24), seat retaining ring (26) in groove between spline and gear. Stand intermediate gear on gear end, lay other retaining ring (26) on splined end, slide small planet carrier assembly spline onto splined end of intermediate gear (24). With appropriate tool, seat retaining ring (26) into groove at end of intermediate gear (24).
- Lubricate planet bearings (41) and press into planet gear (42). (Fig. 9)
- Lubricate planet pin (44) and insert into planet pin hole in planet carrier (20) from splined side of carrier. (Fig. 9)
- Lubricate thrust washers (43), place one washer on each side of planet gear (42). Place planet gear and thrust washer in planet carrier (20). Drive planet pin (44) through thrust washers and planet gear, into opposite planet pin hole in carrier housing. (Fig. 9 & 5)
- Secure planet pin (44) with retaining rings (40) on each end of planet pin. (Fig. 9)
- Repeat steps 7-10 for installation of two remaining planet gears. At this point, carrier assembly is complete.
- Stand output shaft in vice or press and press thrust plug (8) into shaft (7). (Fig. 2)
- Using an appropriate tool, press bearing cups (11) and (15) into the housing. Note: Insure cups are square with counterbore before seating.
- 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 26, 27 & 28 for assembly detail)

(continued)

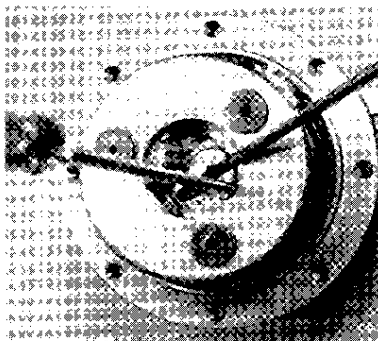


Fig. 3

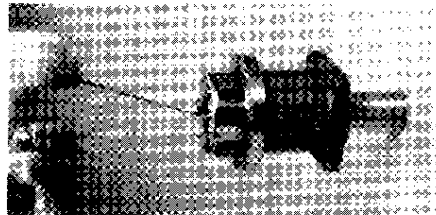


Fig. 5

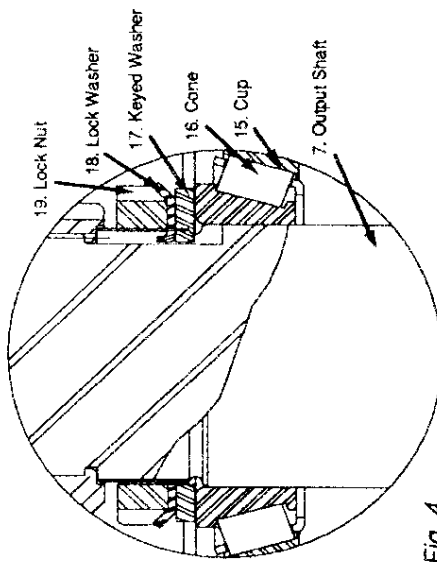


Fig. 4

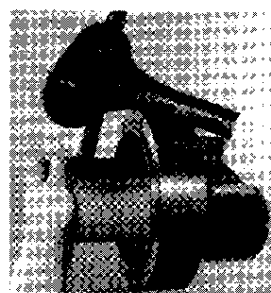


Fig. 6

Model 20 & 20D Disassembly Instructions, Continued

Model 20 & 20D Assembly Instructions, Continued

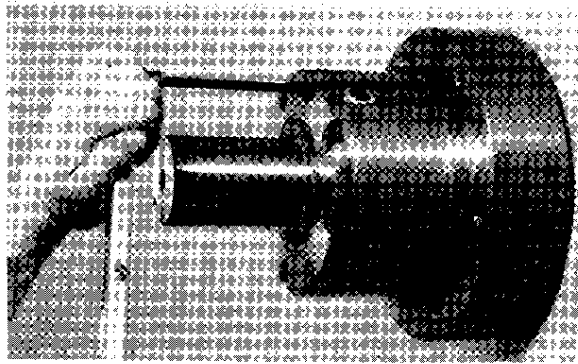


Fig. 7

19. Take unit out of vice and turn it over. Remove eight cap screws (1) from seal carrier (3). (Fig. 7)
20. Remove seal carrier (3) from housing (12).
21. Remove 'O' ring (6), quad and backup rings (5 & 4) and shaft seal (2) from seal carrier (3) and discard. (Fig. 8)
22. 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 (10) attached. Remove bearing cone carefully to avoid damage to shaft.
23. Carefully drive bearing cups (11 & 15) out of housing (12).

Instructions 24-29 are for Model 20D only. To continue, skip to number 29.

24. Remove retaining rings (35) from ends of planet pins (39). (Fig. 9)
25. Support small planet carrier (27) spline side down and drive planet pins (39) out of planet carrier (27), from input side of carrier. (Fig. 9 & 5)
26. Remove small planet gears (37) and thrust washers (38) from small planet carrier (27). (Fig. 9)
27. Remove planet bearings (36) from small planet gears (37).
28. Remove retaining ring (26) from intermediate gear (24).
29. Remove intermediate gear (24) from small planet carrier (27). (Fig. 12)
30. Remove retaining rings (40) from ends of planet pins (44). (Fig. 9)
31. Support planet carrier (20) spline side down and drive planet pins (44) out of planet carrier (20). (Fig. 9 & 5)
32. Remove planet gears (42) and thrust washers (43) from planet carrier (20). (Fig. 9)

(continued)

15. Stand output shaft (7) and assembled cone securely in vice with input spline of shaft up.
16. Stand housing (12) on shaft. Seat bearing cone (10) against bearing cup (11) in housing.
17. 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.
18. 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 till housing resists rotation and end play is minimal. (Fig. 4 & 6)
19. 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)
20. Lubricate spline end of shaft (7), lay retaining ring (9) on end of shaft. Slide planet carrier assembly spline onto shaft spline. [Model 20D— Slide large planet carrier assembly] 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)
21. Lubricate 'O' rings (14). Place one 'O' ring (14) around pilot on bearing housing. Note: Check for sharp edges or burrs on housing pilot.
22. Place internal gear (21) into mesh with planet gears (42) of planet carrier assembly. Line up holes in internal gear (21) with holes in housing (12).

(continued)

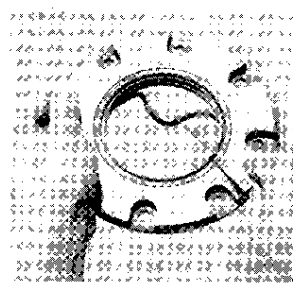
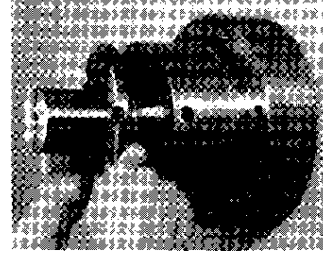
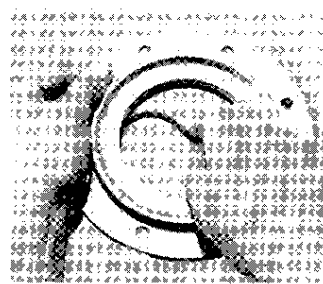


Fig. 8



Model 20 & 20D Disassembly Instructions, Continued

Model 20 & 20D Assembly Instructions, Continued

33. Remove planet bearings (41) from planet gears (42).
34. 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.
35. Clean and examine all parts for wear or failure. Replace planet gears as a "set", replace all 'O' rings, seals and quad rings. *(disassembly complete)*

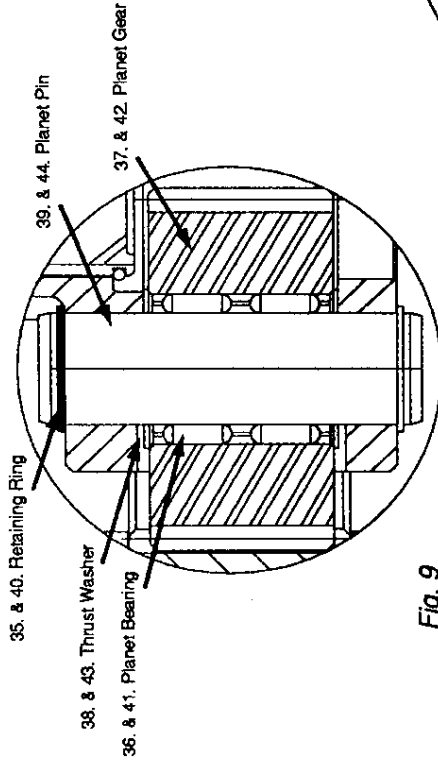


Fig. 9

23. [Model 20— Place other 'O' ring (14) on pilot of motor adapter (30).]
[Model 20D— Place 'O' ring (14) on pilot of transition plate (22).]
Note: Check for sharp edges or burrs on housing pilot.
24. [Model 20— 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 8 cap screws (23) with lock washers, in holes. Tighten to 60-75 ft. lbs. torque.]

[Model 20D— Place transition plate (22) pilot into counterbore of large internal gear (21). Line up holes in transition plate with matching holes in internal gear and housing. Insert eight cap screws (23) with lock washers, in holes. Tighten to 60-70 ft. lbs. torque.] (Fig. 1)

25. Turn unit over and stand on motor adapter end.
26. 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)
27. Note: Check for sharp edges or burrs on housing pilot.
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.

(continued)

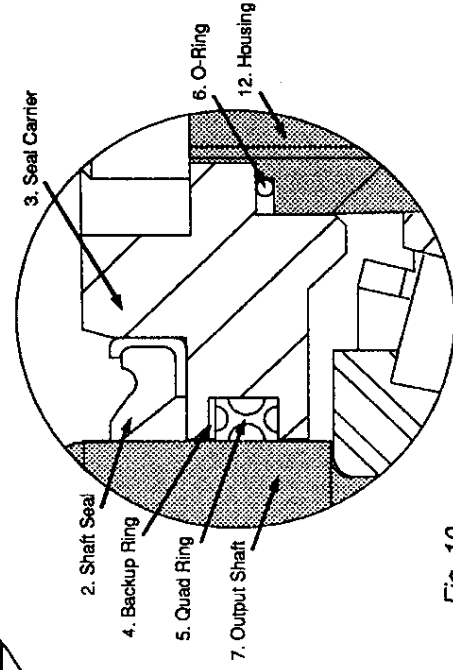


Fig. 10

STANDARD SEAL

Model 20 & 20D Assembly Instructions, Continued

28. 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 eight socket head cap screws (1) in holes and tighten to 20-25 ft. lbs. torque. (Fig. 7)
- Instructions 29-33 are for Model 20D only. To continue, refer to number 34.**
29. Turn unit over and support, shaft down. Lubricate intermediate gear and small planet carrier assembly, place gear in mesh with large planet gears. (Fig. 12)
 30. Lubricate 'O' rings (29). Place one 'O' ring onto pilot of transition plate (22). Note: Check for sharp edges or burrs on pilot.

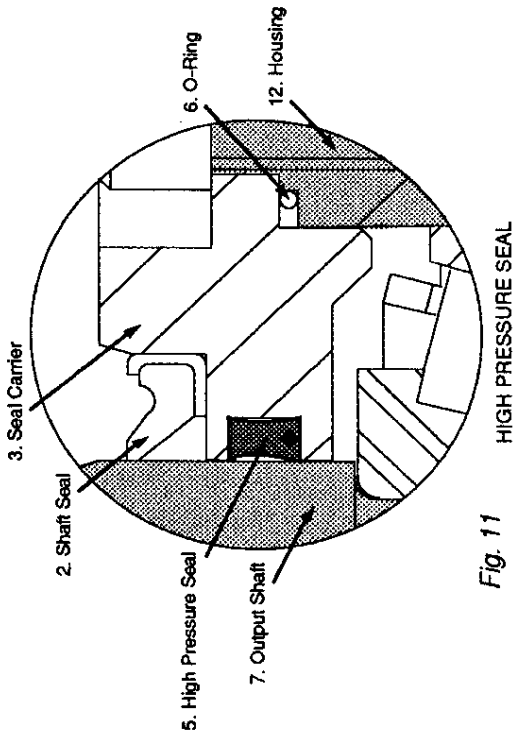


Fig. 11

31. Place small internal gear (28) into mesh with planet gears (37) of small planet carrier assembly. Line up holes in small internal gear with holes in transition plate (22).
32. Place other 'O' ring (29) on pilot of motor adapter (30). Note: Check for sharp edges or burrs on pilot.
33. Place motor adapter pilot into counter-bore of internal gear, line up holes in motor adapter with holes in internal gear. Insert eight cap screws (32) with lock washers, in holes. Tighten to 60-75 ft. lbs. torque. (Fig. 1)
34. Tighten pipe plugs (13) into holes in housing (12) and motor adapter (30) using a thread sealing compound. At this point unit assembly is complete. 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)

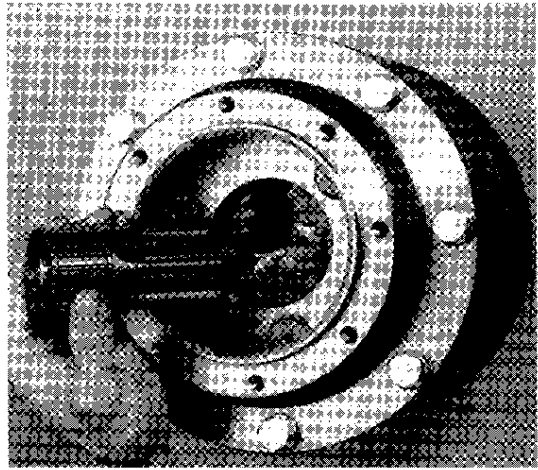


Fig. 12