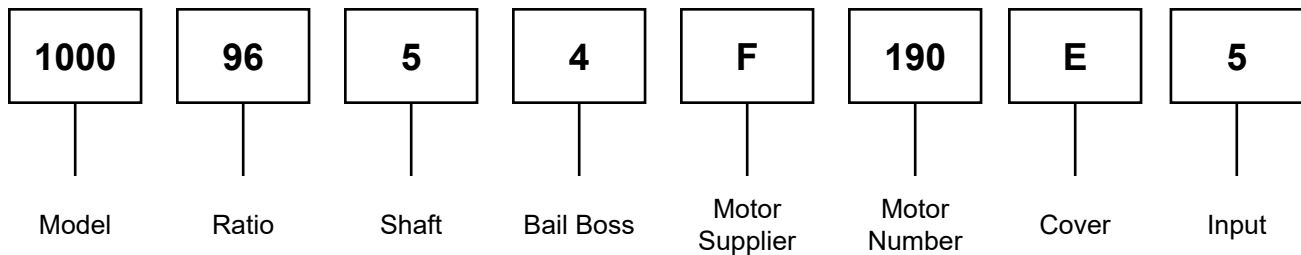




## SERVICE MANUAL 1000 SERIES DIGGER MODELS



### Example Part Number



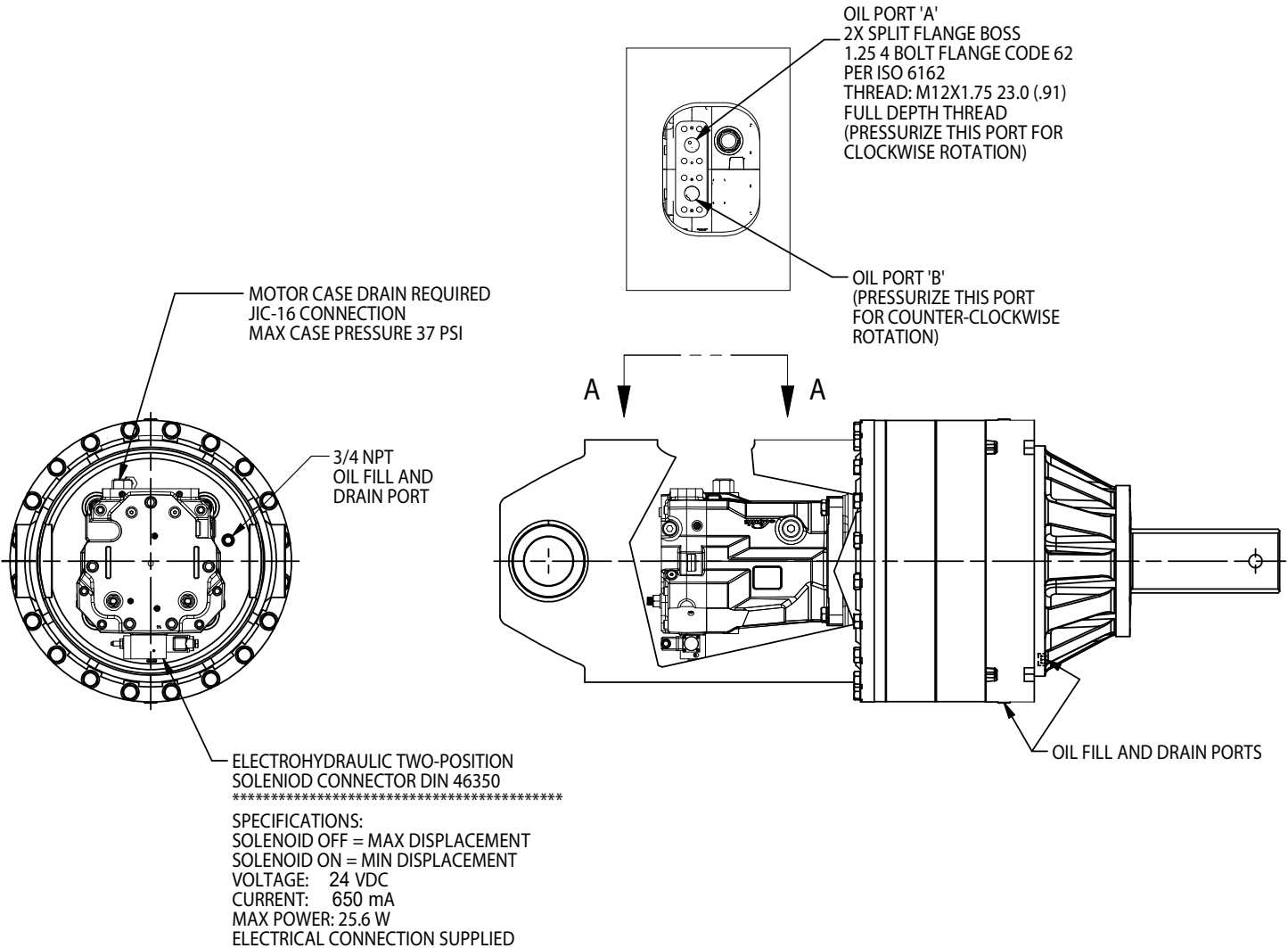
**THIS SERVICE MANUAL IS EFFECTIVE:**  
**S/N: 237505 TO CURRENT**  
**DATE: 1-2022 TO CURRENT**  
**VERSION: SMD100096-54F190E5\_AB**

**NOTE:** Individual customer specifications (spindle mounting, sprocket pilot, brake assembly, etc.) may vary from exploded drawing and standard part numbers shown. If applicable, refer to customer drawing for details.

# INSTALLATION INFORMATION

The D1000 drive head is designed for anchor setting and digger applications. This drive head uses a high efficiency, solenoid actuated, two speed axial piston motor of optimum performance. These drives require a customer supplied mounting apparatus for connection to the customers mechanized equipment.

The maximum allowable motor pressure is 5000 psi and the maximum flow is 100 GPM. The motor requires a case drain and the maximum allowable case drain return line pressure is 37 PSI. Fill motor with hydraulic oil to the bottom of the case drain port before startup. For two speed operation the electrohydraulic switch requires a 24V excitation voltage. The voltage shifts the motor from 238cc maximum displacement to 126cc minimum displacement. The motor is fixed at maximum displacement if an electrical signal is not applied. Refer to drawing below for electrical and hydraulic information and locations.

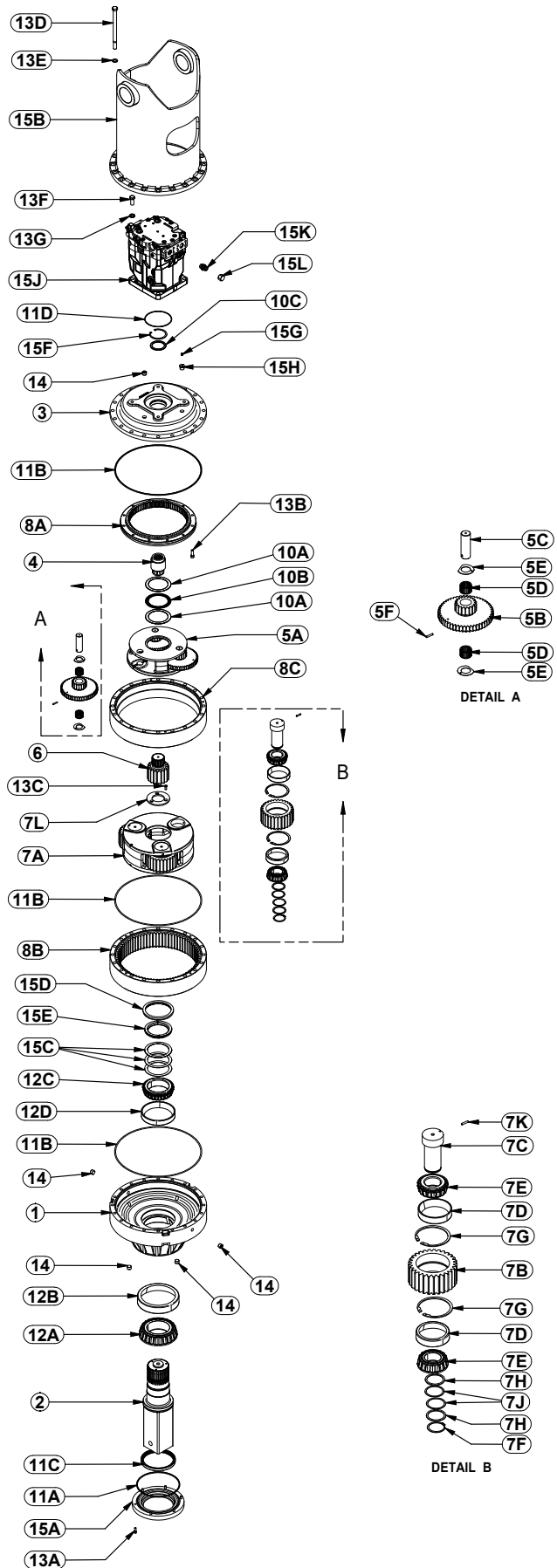




**100096-54F190E5 DIGGER ASSEMBLY**  
EFFECTIVE FROM SN: 237505 1-1-2022 TO PRESENT  
12-02-2021 EG

100096-54F121E5 PARTS LIST				
GROUP	ITEM	QTY	PART NUMBER	DESCRIPTION
	1	1	60-004-3014	BASE-FLANGELESS
	2	1	60-004-4222L	SHAFT
	3	1	60-004-1564	COVER-SAE 'E'
	4	1	60-004-1462	INPUT GEAR
5	-	1	60-005-2043	CARRIER ASSEMBLY - PRI
	5A	1	60-004-6109	CARR.-PRI
	5B	3	60-004-1182	CLUSTER GEAR
	5C	3	60-004-1272	PLANET SHAFT - PRI
	5D	6	01-105-0510	BEARING
	5E	6	60-004-6110	WASHER - THRUST- PRI
	5F	3	01-153-0150	ROLL PIN
	6	1	60-004-1222	SUN GEAR (5.33:1)
7	-	1	60-005-2083	CARRIER ASSEMBLY - SEC
	7A	1	60-004-1044	CARRIER SEC
	7B	3	60-004-1232	PLANET GEAR SEC
	7C	3	60-004-1262	PLANET SHAFT - SEC.
	7D	6	01-103-0210	TAPERED BEARING CUP
	7E	6	01-102-0210	TAPERED BEARING CONE
	7F	3	01-160-0490	RETAINING RING; EXTERNAL
	7G	6	01-160-0500	RETAINING RING
	7H	6	60-004-1291	WASHER - SEC. PLANET
	7J	*	60-004-1321	SHIM-SECONDARY PLANET
	7K	3	01-153-0150	ROLL PIN
	7L	1	60-004-1352	SEC CARRIER RETAINER
8	-	-	-	RING GEARS AND SPACERS
	8A	1	60-004-1213	RING GEAR - COMPOUND PRI
	8B	1	60-004-1243	RING GEAR - SEC
	8C	1	60-004-1253	RING SPACER - CMPD PRI
10	-	-	-	THRUST WASHERS & BEARINGS
	10A	2	01-112-0350	THRUST RACE
	10B	1	01-112-0340	THRUST BEARING
	10C	1	01-112-0060	THRUST WASHER
11	-	-	-	SEALS & O-RINGS
	11A	1	01-402-0670	O-RING
	11B	3	01-402-0660	O-RING
	11C	1	01-405-0810	SEAL
	11D	1	01-402-1021	O-RING
12	-	-	-	OUTPUT SHAFT BEARINGS
	12A	1	01-102-0190	TIMKEN#99550
	12B	1	01-103-0190	CUP
	12C	1	01-102-0220	BRG CONE
	12D	1	01-103-0220	BEARING CUP
13	-	-	-	HARDWARE
	13A	6	01-150-1110	Hex Socket Head Cap Screw
	13B	12	01-150-0570	SOC HD CAP SCREW
	13C	3	01-150-1590	FLAT HD SOC C.S.
	13D	20	01-150-1720	HHCS (3/4-10 x 11.5 GRD 8)
	13E	20	01-166-0350	HARDWASHER - 3/4; 1.25 O.D.
	13F	4	01-150-2112	HHCS (3/4-10 UNC 2.25" GR8)
	13G	4	01-166-0360	LOCKWASHER 3/4" MED.
	14	5	01-207-0100	PIPE PLUG 3/4 NPT MAGNETIC
15	-	-	-	MISCELLANEOUS
	15A	1	60-004-1922	SEAL CARRIER
	15B	1	60-005-1622	BAIL ASSY
	15C	*	60-004-1311	SHIM - SHAFT
	15D	1	60-004-1472	LOCKING RING
	15E	1	60-004-1482	SPLIT RING
	15F	1	01-160-0510	RETAINING RING; INTERNAL
	15G	1	01-216-0080	RELIEF VALVE
	15H	1	01-201-0530	ADAPTER
	15J	1	01-304-1900	MOTOR
	15K	1	01-201-0823	ADAPTER-STR
	15L	1	01-201-0795	CAP

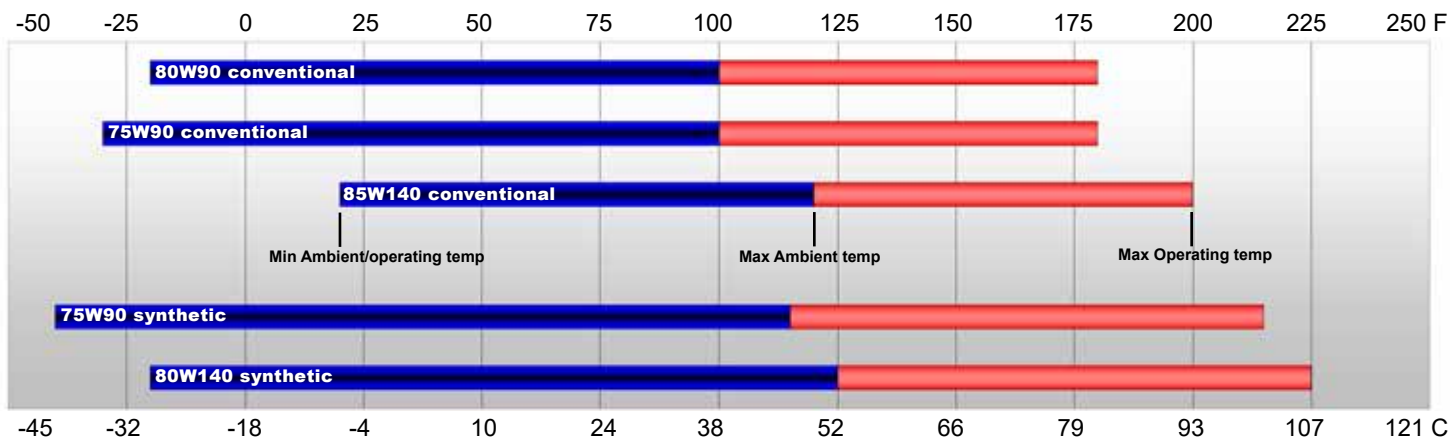
\*QUANTITY DETERMINED BY BEARING PRELOAD



# LUBRICATION & MAINTENANCE

Using the chart below, determine an appropriate lubricant viscosity. Use only EP (extreme pressure) or API GL-5 designated lubricants. Change the lubricant after the first 50 hours of operation and at 500 hour intervals thereafter. The auger drive should be partially disassembled to inspect gears and bearings at 1000 hour intervals.

## Recommended ambient and operating temperatures for conventional and synthetic gear lubricants



**Note:** Ambient temperature is the air temperature measured in the immediate vicinity of the gearbox. A gearbox exposed to the direct rays of the sun or other radiant heat sources will operate at higher temperatures and therefore must be given special consideration. The max operating temp must not be exceeded under any circumstances, regardless of ambient temperature.

<u>Operating Position</u>	<u>Oil Capacity</u>	<u>Oil Level</u>
Vertical Shaft (Shaft Down)	9.5 gal	To midway on upper/primary gear set

## HYDRAULIC MOTOR OIL REQUIREMENTS

The maximum motor service life is obtained by using a fluid that meets or exceeds ISO 4406 cleanliness specifications code 18/16/13. Recommended motor filtration of 10um (absolute) is recommended. Hydraulic main circuit oil temperatures should not exceed 176°F/80°C and drain fluid should not exceed 212°F/100°C. When hydraulic system has reached full operating temperature the minimum oil viscosity from the motor drain should be above 8 mm<sup>2</sup>/s (cSt). At motor startup the hydraulic fluid viscosity should not exceed 1000 mm<sup>2</sup>/s (cSt). The ideal operating range for the hydraulic fluid viscosity is 15 to 30 mm<sup>2</sup>/s (cSt). For working temperatures approximately between 140°F/60°C and 176°F/80°C a viscosity class oil of 46 or 68 should be used.



**WARNING:** While working on this equipment, use safe lifting procedures, wear adequate clothing and wear hearing, eye and respiratory protection.

# Unit Disassembly Procedure

- 1) Scribe a diagonal line across the outside of the unit from the bail (15B) to the base (1) before disassembly to aid in the proper positioning of pieces during reassembly.
- 2) Remove magnetic drain plugs (14) and drain oil from unit. The oil will drain out faster and more completely if warm.
- 3) Remove the twenty hex-head capscrews (13D) and flat washers (13E).
- 4) Separate bail (15B) from gearbox and remove from digger assembly.
- 5) Install two hex-head capscrews (13D) into cover (3) to retain gearbox assembly together while removing motor fasteners.
- 6) Remove motor (16J) from cover (3) and remove temporary fasteners (13D).
- 7) Remove cover (3), thrust bearings (10A, 10B & 10C), remove input gear (4). Inspect o-ring (11B); discard if damaged or deformed.
- 8) Lift Stage I planet carrier assembly (5) out of the unit. Remove ring gear spacer (8C) and inspect o-ring (11B); discard if damaged or deformed.
- 9) Remove Stage II sun gear (6) from secondary carrier assembly (7).
- 10) Remove the three 3/8-24 flat head capscrews (13C) securing the carrier retaining plate (7L) to the output shaft (2).
- 11) Remove remaining ring gear (8B) and Stage II carrier assembly (7). Inspect o-ring(s) (11B), discard and replace any damaged or deformed o-rings.
- 12) The unit is now separated into sub-assemblies. The area(s) requiring repair should be identified by thorough inspection of the individual components after they have been cleaned and dried.

## Disassembly

- 1) Rotate planet gears (5B) to check for abnormal noise or roughness in bearings (5D) or planet shafts (5C). If further inspection or replacement is required, proceed as follows.
- 2) Drive roll pins (5F) completely into the planet shafts (5C).
- 3) Press or drive planet shafts (5C) out of carrier (5A).
- 4) Remove planet gears (5B) and thrust washers (5E) from the carrier (5A).
- 5) Inspect the planet gear (5B) bearing bore, planet shaft (5C) and rollers (5D). Check for spalling, bruising or other damage.
- 6) Replace any parts where abnormal wear is found.
- 7) Use 3/16 inch pin punch to remove roll pins (5F) from planet shafts (5C).

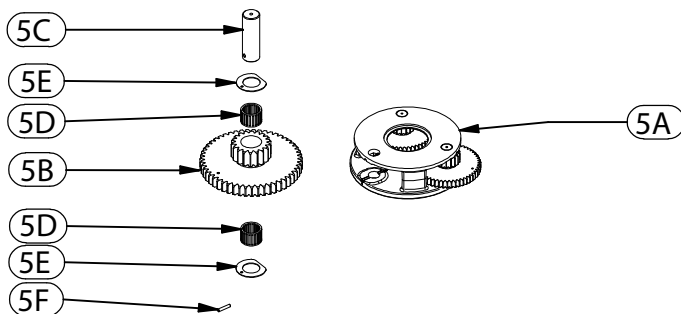
**NOTE: If either the bearings or the planet shafts (pins) are damaged, both components should be replaced.**

## Reassembly

- 1) To install rollers in planet gear bore:
  - a) Set planet washer (5E) on work table, place planet gear (5B) onto washer and insert bearings (5D) into planet bore.
  - b) Place planet washer (5E) onto top of planet gear then slide the gear into carrier (5A). (Oriented as shown. Position tabs on washers towards outside of carrier.)
- 2) Planet shafts (5C) should be installed with chamfered end of 3/16 inch hole toward outside diameter of the carrier (5A). This will aid in alignment of holes while inserting roll pins (5F).
- 3) Drive a roll pin (5F) through the carrier hole and into the planet shaft to retain the parts. Repeat for other planet gears.

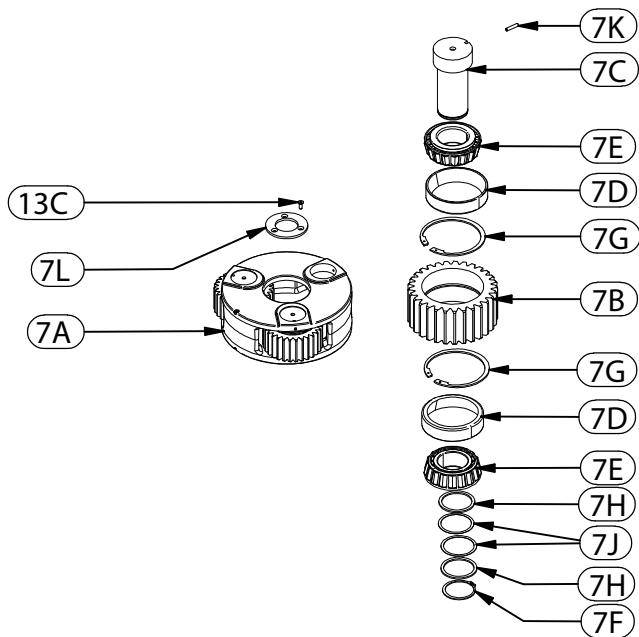
## Stage I Carrier Subassembly

(Items 5A, 5B, 5C, 5D, 5E, & 5F)



## Stage II Carrier Subassembly

(Items 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7J, 7K 7L & 13C)



### Disassembly

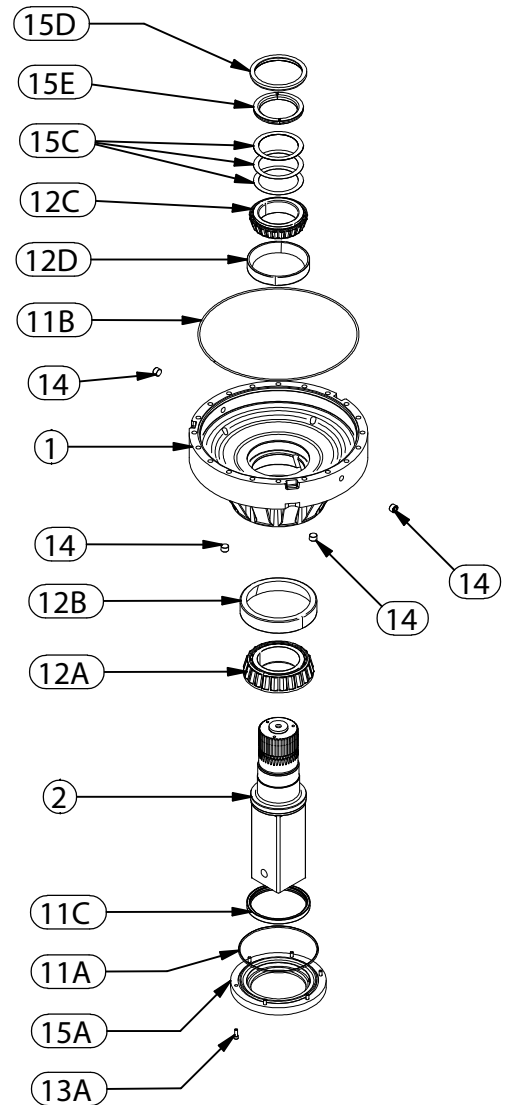
- 1) Rotate planet gears (7B) to check for abnormal noise or roughness in bearings (7D, 7E). If further inspection or replacement is required, proceed as follows.
- 2) Removing retaining ring (7F), washer (7H) and shims (7J) from planet shaft (7D).
- 3) Press planet shafts (7C) out of carrier (7A).
- 4) Remove planet gears (7B) and washer (7H) from carrier.
- 5) Inspect the planet gear (7B), bearing cone (7D), bearing cup (7E) and planet shaft (7C). Check for spalling, bruising or other damage. Replace components as necessary; bearing need to be replaced as a cup and cone set.
- 6) Replace any parts where abnormal wear is found.

### Reassembly

- 1) Rebuild Stage II planet carrier assembly in reverse order using any needed new parts. The carrier retainer plate (7L) needs to be installed in the carrier before planet gears are replaced.
- 2) Install bearing cones (7D) into planet gear bearing cups (7E). Place washer (7H) onto interior carrier spot faced surface.
- 3) Insert planet gear assembly into carrier (7A). Slide planet shaft (7C) into carrier planet assembly and align planet pin notch with roll pin in carrier.
- 4) Place shims (7J) and washer (7H) onto planet shaft. Install retaining ring (7F). Rotate planet gears by hand to test bearing preload. Correct bearing preload on the planet gears requires 50-75 in-lbs rotating torque. If gear doesn't rotate remove a shim and test again until a smooth loaded rotation is developed.

## Base Subassembly

(Items 1, 2, 11A, 11B, 11C, 12A, 12B, 12C, 12D, 13A, 14, 15A, 15C, 15D, & 15E)



### Disassembly

- 1) Remove the seal carrier retaining screws (13A) and seal carrier (15A) from unit. Inspect seal (11C) and o-ring (11A) for signs of wear or damage and replace as necessary.
- 2) Remove the lock ring (15D) using a heel bar or puller, be sure not to pry against the cage of the inner output shaft bearing (12C). Remove the split ring segments (15E) and shims (15C).

**Caution: Since the output shaft is no longer retained, care should be taken to avoid personal injury. Care should also be taken not to damage it when it is pressed through base.**

- 3) Base (1) should be set pinion side down, as shown, on a plate or table. Press output shaft through the bottom of base by applying a load to top end (internal end) of shaft until it passes through inner shaft bearing cone (12C).
- 4) A gear puller may be used to remove the outer bearing cone (12A) from the shaft (2). If reusing old bearing cone, do not pull on or damage roller cage.

- 5) Inspect inner and outer bearing cups (**12A, 12B, 12C & 12D**). If cups are damaged, drive them out using a brass drift and utilizing the bearing knock-out notches in the base (**1**)

### Reassembly

- 1) Clean all foreign material from magnetic oil plug (**14**) located on the side of the base (**1**).
- 2) Place base (**1**) (output side up, opposite shown) on the table.
- 3) Apply a layer of lithium or general purpose bearing grease to the roller contact surface of outer bearing cup (**12B**).
- 4) Press outer bearing cone (**12A**) (large end down as shown) onto the shaft until it seats against the shoulder.

**Note: Press bearing cone onto output shaft by pressing on inner race only. DO NOT press on roller cage, as it may damage bearing.**

- 5) Place the shaft (**2**) with the bearing (**12A**) into the base (**1**).
- 6) Flip this assembly, resting the base (**1**) on the end of the output shaft (**2**).
- 7) Apply a layer of lithium or general purpose bearing grease to the roller contact surface of the inner cup (**12D**). Press the inner bearing cone (**12C**) (large end up as shown) onto the shaft (**2**) until it is seated against inner bearing cup (**12D**).
- 8) Without the shaft seal (**11C**) installed, the preload may result in a rolling torque that varies between 50 to 300 in-lb. The bearing preload should be tailored to your application; a low-speed application may require a high preload, high-speed applications usually benefit from low preload. Adding shims (**15C**) will increase the preload on the bearing set. Determine your preload requirement and install shims to obtain this preload. Install the Load-N-Lock™ segments (**15E**) over the shims (**15C**) and into the groove in the shaft (**2**). Finally, install the lock ring (**15D**) over the segments (**15E**).

- 9) Install o-ring (**11A**) onto seal carrier (**15A**). Lubricate inner lip of new shaft seal (**11B**) and slide seal carrier assembly onto the shaft (**2**). Install seal carrier fasteners (**13A**). **Torque to 30 ft-lbs.**

**All subassembly service or repairs should be complete at this time. Continue to Unit Assembly to complete unit buildup.**

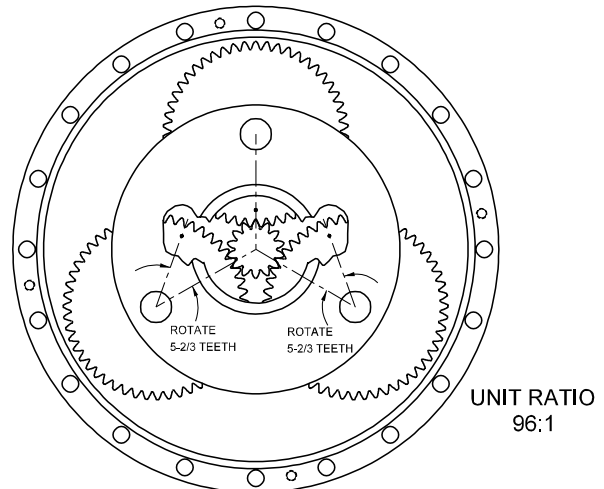
## Unit Assembly

- 1) When all subassemblies are complete, the unit is ready to be assembled.
- 2) Install the Stage II carrier assembly onto the output shaft; align the splines of the carrier (**7A**) with the splines of the shaft (**2**) and slide the carrier onto the shaft. The holes in the top of the shaft (**2**) need to be orientated between the planet gears when the carrier is installed.
- 3) Secure the carrier retaining plate (**7L**) using 3/8-24 flathead capscrews (**13C**). **Torque fasteners to 30 ft-lbs.**
- 4) Lubricate o-ring (**11B**) and install on the pilot of the Stage II ring gear (**8B**).

**Caution: Hold ring gear by outside or use lifting device to prevent injury.**

- 5) Install Stage II sun gear (**6**) into Stage II carrier assembly.
- 6) Align gear teeth of ring gear (**8B**) with the gear teeth of the planet gears (**7B**) and place on base. Align mounting holes of ring gear with holes in base. Using the scribed line made during disassembly for reference.
- 7) Place Stage I carrier (**5A**) onto Stage II sun gear (**6**).
- 8) Lubricate o-ring (**11B**) and install on the pilot of the Stage I ring gear spacer (**8B**). Install spacer.

### PRIMARY CARRIER TIMING DIAGRAM



- 9) Compound primary timing instructions:
  - a) The planet gears will now need to be timed. Refer to the diagram. The planet gears each have a timing mark, on the large diameter gear. Locate the timing marks on planet gears (**5B**).
  - b) As seen from above, start with the top planet gear and position it's timing mark pointing straight down. Next, rotate the lower left planet gear counterclockwise as indicated in the timing diagram. Then rotate the lower right planet gear clockwise as indicated.
  - c) Set the input gear (**4**) and the input thrust race (**10C**) into the center of the primary planet carrier assembly.
  - d) If compound primary ring gear (**8A**) was not removed during disassembly, then skip to step 10. Otherwise, bolt to the inside of the cover (**3**) with twelve bolts (**13B**). Use a removable thread locking compound on the threads of the bolts. Tighten to 110 ft.-lbs. dry or 80 ft.-lbs. lubricated.
- 10) Install thrust washer (**10A**) onto Stage I carrier then install thrust bearing (**10B**) and thrust washer (**10A**).
- 11) Lubricate o-ring (**11B**) and install on the pilot of the cover (**3**).
- 12) Noting the scribed line made during disassembly, install the cover (**3**). Install 2 fasteners (**13D**) to retain unit together.
- 13) Ensure the unit spins freely by using a splined shaft to drive the input gear (**4**). If unit does not rotate freely for one revolution of the output shaft remove cover and verify primary planet gearing is timed correctly.

- 14) Install motor **(15J)** onto cover **(3)** and align motor ports with bail relief hole. Install motor fasteners **(13F)** and washers **(13G)**. **Torque to 380 ft-lbs dry, 280 ft-lbs if fasteners are lubricated.**
- 15) Remove two temporarily fasteners installed in step 11. Place bail **(15B)** onto assembly and aligning holes in bail and cover using scribed line made during disassembly as a reference. Install and torque the 20 3/4-10 hex head capscrews **(13D)** with flat washers **(13E)**. **The torque for the capscrews is 380 ft-lbs dry, 280 ft-lbs if fasteners are lubricated.**
- 16) Fill the unit to the proper level, as specified, with GL5 EP 80/90 gear oil after it is sealed with the motor.

**The digger is now ready to use.**