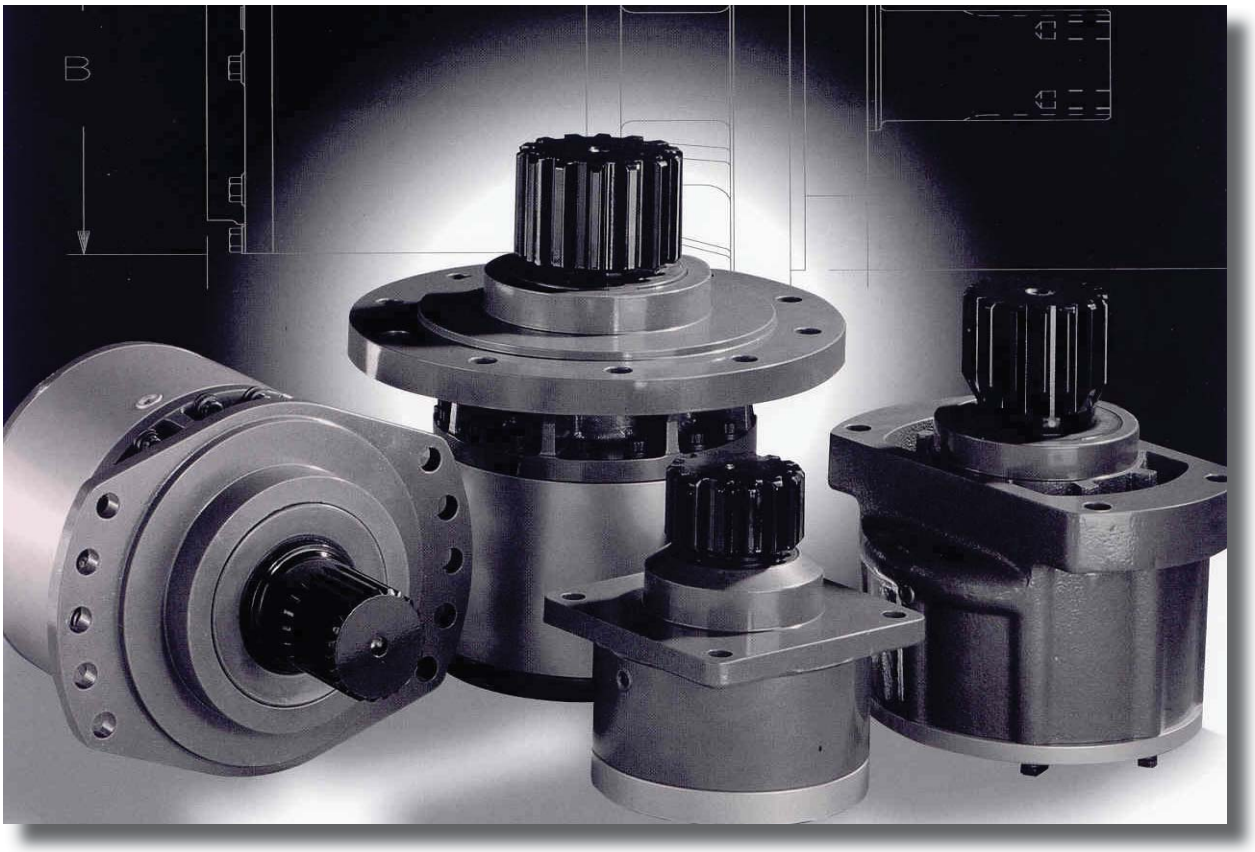
ESKRIDGE

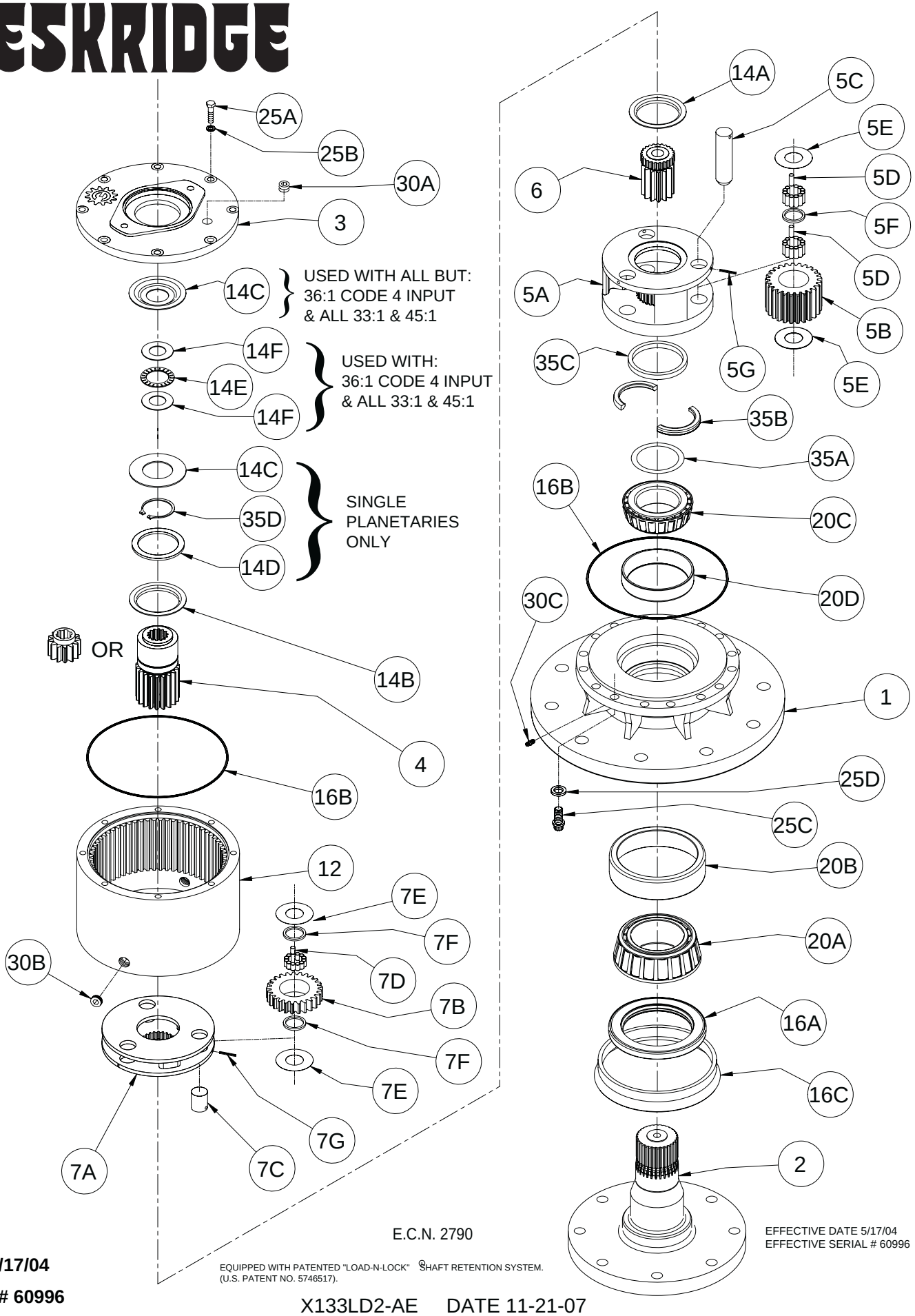
MODEL 133L PLANETARY GEAR DRIVE SERVICE MANUAL



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

THIS SERVICE MANUAL IS EFFECTIVE:
S/N: 60996 TO CURRENT
DATE: 5/17/04 TO CURRENT
VERSION: SM133L-AB

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



X133L-E,

Page 1 of 2

Effective date 5/17/04

Effective serial # 60996

E.C.N. 2790

EFFECTIVE DATE 5/17/04
EFFECTIVE SERIAL # 60996

EQUIPPED WITH PATENTED "LOAD-N-LOCK" SHAFT RETENTION SYSTEM.
(U.S. PATENT NO. 5746517).

X133LD2-AE DATE 11-21-07

MODEL 133L

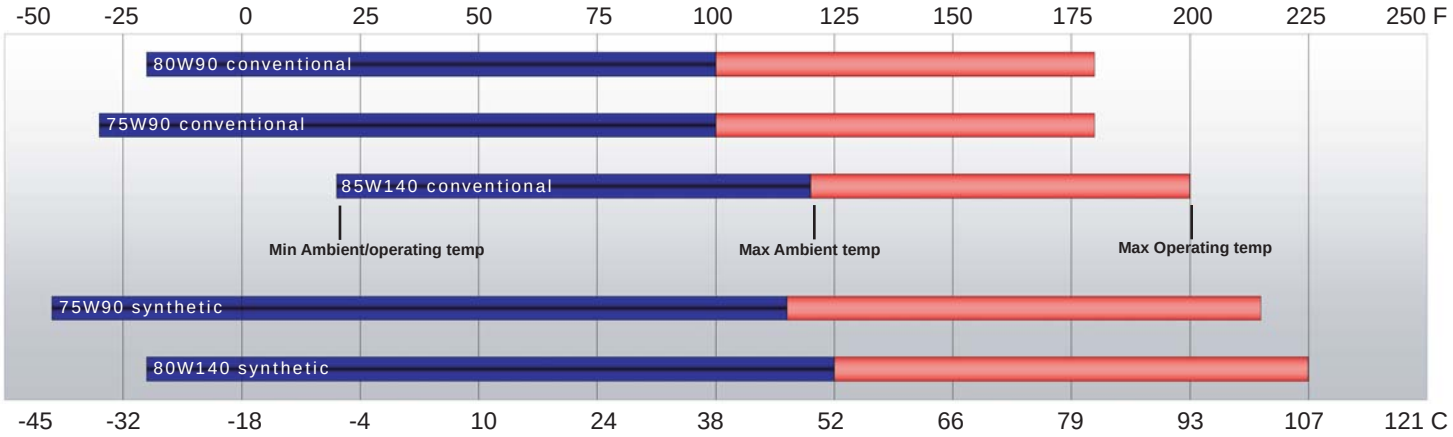
	ITEM	QTY	DESCRIPTION	SINGLE PLANETARY 4:1 (4.42)	SINGLE PLANETARY 6:1 (6.00)	DOUBLE PLANETARY 19.54:1 (4.42 4.42)	DOUBLE PLANETARY 26.52:1 (4.42 6.00)	DOUBLE PLANETARY 33.00:1 (7.50 4.42)	DOUBLE PLANETARY 36.00:1 (6.00 6.00) W/CODE 4	DOUBLE PLANETARY 36.00:1 (6.00 6.00) W/O CODE 4	DOUBLE PLANETARY 45.00:1 (7.50 6.00)
BASE	1	1	A - ROUND FLANGE	13-004-3102							
			A - ROUND FLANGE W/BOOT SEAT	13-004-3042							
			B - SQUARE FLANGE	13-004-3082							
			E - RECTANGULAR FLANGE	13-004-3052							
			F - FLANGELESS	13-004-3152							
			Q - ECCENTRIC	13-004-3112							
			C132/C133 - CUSTOM								
OUTPUT SHAFT	2	1	D1 23 T 8/16 DP SPL 2.25" LG	13-004-4352M							
			D2 3.000" DIA, 5/8" SQ KEY	13-004-4312M							
			D3 23 T 8/16 DP SPL 1.22" LG	13-004-4362M							
			D4 23 T 8/16 DP SPL 2.72" LG	13-004-4372M							
			D5 3.500" DIA, 7/8" SQ KEY	13-004-4382M							
			D6 20T 6/12 DP SPL 4.15" LG	13-004-4342M							
			S1 SPINDLE SHAFT	13-004-4202M							
			C1 CUSTOM								
COVER	3	1	SAE 'A' 2 & MOD. 4 BOLT	----------		13-004-1192	13-004-1192	13-004-1222		13-004-1192	13-004-1222
			SAE 'A' 2 & MOD. 4 BOLT W/ CODE 4	13-004-1252		13-004-1252	13-004-1252	13-004-1222	13-004-1222		13-004-1222
			SAE 'B' 2 BOLT	----------		13-004-1182	13-004-1182	13-004-1232		13-004-1182	13-004-1232
			SAE 'B' 2 & 4 BOLT W/ CODE 4	13-004-1202		13-004-1202	13-004-1202	13-004-1232	13-004-1232		13-004-1232
			SAE 'C' 2 BOLT & 4 BOLT	13-004-1212		13-004-1212	13-004-1212	13-004-1242	13-004-1242	13-004-1212	13-004-1242
			SAE 'D' 4 BOLT W/ CODE 9 **	13-004-1412		----------					
INPUT GEAR	4	1	CODE 2 - INPUT 13 T 16/32 DP	----------		13-004-1292	13-004-1292	13-004-1312		13-004-1302	13-004-1312
			CODE 3 - INPUT SAE 1"-6B	----------		13-004-1322	13-004-1322	13-004-1472		13-004-1332	13-004-1472
			CODE 4 - INPUT 14 T 12/24 DP	13-004-1372	13-004-1382	13-004-1342	13-004-1342	13-004-1362	13-004-1352		13-004-1362
			CODE 5 - INPUT 15 T 16/32 DP	----------		13-004-1452	13-004-1452	13-004-1802		13-004-1442	13-004-1802
			CODE 9 - INPUT 13 T 8/16 DP **	13-004-1402	13-004-1462	----------					
	5	(1)	CARRIER ASSEMBLY-SECONDARY	13-005-2131	13-005-2081	13-005-2131	13-005-2081	13-005-2131	13-005-2081	13-005-2081	13-005-2081
	5A	1	CARRIER (SEC)	13-004-1702	13-004-1522	13-004-1702	13-004-1522	13-004-1702	13-004-1522	13-004-1522	13-004-1522
	5B	3	PLANET GEAR (SEC)	13-004-1712	13-004-1532	13-004-1712	13-004-1532	13-004-1712	13-004-1532	13-004-1532	13-004-1532
	5C	3	PLANET SHAFT (SEC)	13-004-1562							
	5D	72	BEARING - PLANET ROLLER	01-106-0010							
	5E	6	THRUST WASHER - PLANET	13-004-1582							
	5F	3	SPACER WASHER - PLANET	13-004-1592							
	5G	3	ROLL PIN - SEC. PL. 3/16 X 7/8	01-153-0210							
	6	1	SUN GEAR	----------		13-004-1142	13-004-1152	13-004-1142	13-004-1152	13-004-1152	13-004-1152
	7	(1)	CARRIER ASSEMBLY-PRIMARY	----------		13-005-2121	13-005-2121	13-005-2141	13-005-2091	13-005-2091	13-005-2141
	7A	1	CARRIER (PRI)	----------		13-004-1692	13-004-1692	13-004-1732	13-004-1542	13-004-1542	13-004-1732
	7B	3	PLANET GEAR (PRI)	----------		13-004-1722	13-004-1722	13-004-1742	13-004-1552	13-004-1552	13-004-1742
	7C	3	PLANET SHAFT (PRI)	----------		13-004-1572					
	7D	36	BEARING - PRI. PL. ROLLER	----------		01-106-0020					
	7E	6	THRUST WASHER - PLANET	----------		13-004-1582					
	7F	6	SPACER WASHER - PLANET	----------		13-004-1592					
	7G	3	ROLL PIN - PRI. PL. 1/8 X 7/8	----------		01-153-0180					
	12	1	RING GEAR	81-004-2362							
	14	--	THRUST WASHERS & THRUST BRGS			----------					
	14A	1	CARRIER THRUST WASHER	----------		81-004-2711					
	14B	1	CARRIER THRUST WASHER	81-004-2711		----------		81-004-2711	81-004-2711	----------	81-004-2711
	14C	1	INPUT THRUST WASHER	81-004-2883		81-004-2701	81-004-2701	----------		81-004-2701	----------
	14D	1	THRUST WASHER SGL PL	01-112-0030		----------					
	14E	1	BEARING	----------		----------		01-112-0220	01-112-0220	----------	01-112-0220
	14F	2	THRUST RACE	----------		----------		01-112-0230	01-112-0230	----------	01-112-0230
	16	(1)	SEAL KIT	13-016-2051 Contains Items 16A, 16B and 16C: 13-016-2101 SEAL KIT contains only items 16A and 16B							
	16A	1	SHAFT SEAL	01-405-0690							
	16B	2	O-RING	01-402-0420							
	16C	1	SEAL - RUBBER (DIRT BOOT)	01-406-0050 DIRT BOOT IS USED ON THE S1 SPINDLE SHAFT WITH A 13-004-3042 OR 13-004-3052 BASE.							
	20	---	OUTPUT SHAFT BEARINGS	----------							
	20A	1	OUTER CONE	01-102-0260							
	20B	1	OUTER CUP	01-103-0260							
	20C	1	INNER CONE	01-102-0030							
	20D	1	INNER CUP	01-103-0030							
	25	---	HARDWARE	----------							
	25A	8	BOLTS - COVER	01-150-1670 (FOR 13-004-1402 COVER, USE 01-150-1710 SHCS)							
	25B	8	LOCKWASHERS - COVER	01-166-0010 (FOR 13-004-1402 COVER, DO NOT USE LOCKWASHERS)							
	25C	16	BOLTS - RING	01-150-1460							
	25D	16	HARD WASHERS - RING	01-166-0120							
	30	---	PLUGS /GREASE ZERK	----------							
	30A	1	PLUG - COVER	01-207-0070							
	30B	2	PLUG - RING	01-207-0041							
	30C	1	1/4 NPT (SOC. HD.)	01-207-0020							
			GREASE FITTING	01-215-0040							
	35		MISCELLANEOUS	----------							
	35A	*	SHIMS	80-004-1151 (* QUANTITY DETERMINED BY PRELOAD REQUIRED AND PART STACK-UP)							
	35B	1	SPLIT RING	81-004-8101							
	35C	1	LOCK RING	81-004-8111							
	35D	1	RETAINING RING	01-160-0040		----------					

** SAE "D" COVER IS SOLD ONLY WITH A CODE 9, 13 T- 8/16 INPUT GEAR.

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 gear 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 vicintiy 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.

If your unit was specified “shaft up” or with a “-Z” option, a grease zerk was provided in the base housing. For shaft-up operation, the output bearing will not run in oil and must be grease lubricated. Use a lithium based or general purpose bearing grease sparingly every 50 operating hours or at regular maintenance intervals. Over-greasing the output bearing should be avoided as it tends to fill the housing with grease and thicken the oil

ESKRIDGE MODEL 133L OIL CAPACITIES

Operating Position	Oil Capacity		Oil Level
	Single stage	Double stage	
Horizontal Shaft	1.5 qts / 1.4 l	1.5 qts / 1.4 l	To horizontal centerline of gear drive
Vertical Shaft (Pinion Up)	2.5 qts / 2.4 l	2.5 qts / 2.4 l	To side port on gear drive base
Vertical Shaft (Pinion Down)	2.5 qts / 2.4 l	2.5 qts / 2.4 l	To midway on upper/ primary gear set

ESKRIDGE PART NUMBER INTERPRETATION

Note: All non custom Eskridge Geardrives are issued a descriptive part number which includes information regarding the Model, means of shaft retention, base style, shaft style, input mounting, input shaft size, overall ratio and various available options. For a detailed breakdown of this information, please refer to Eskridge product specification sheets found at: http://www.eskridgeinc.com/geardrives/gearprodspecs.html

Unit Teardown

1) Scribe a diagonal line across the outside of the unit from the cover **(3)** to the base **(1)** before disassembly to aid in the proper positioning of pieces during reassembly.

2) Remove drain plugs **(30A &/or 30B)** and drain oil from unit. The oil will drain out more quickly and completely if warm.

3) Remove the 8 3/8-16 capscrews **(25A)** and lockwashers **(25B)**.

4) Remove the cover **(3)**, thrust washer(s)/bearing(s) **(14C OR 14E & 14F OR 14D)**, and input gear **(4)**. Inspect o-ring **(16B)**; discard if damaged or deformed.

5) Lift the planet carrier assembly out of the unit and lift the secondary carrier out of the unit.

6) If the ring gear **(12)** needs to be replaced or serviced, remove the 16 1/2-13 12-point, flange-screws and hard-washers **(25C, 25D)**. If the ring gear **(12)** does not require service, it can be left in place for all other service. Inspect gear to base O-ring **(16B)**; as before, discard if damaged or deformed.

7) The unit is now disassembled into groups of parts. The area(s) requiring repair should be identified by thorough inspection of the individual components after they have been cleaned and dried.

Carrier Assembly Teardown

Rotate planet gears (7B pri/5B sec) to check for abnormal noise or roughness in bearings (7D pri/5D sec). If further inspection or replacement is required, proceed as follows.

1) Drive roll pins **(7G pri/5G sec)** completely into the planet shafts **(7C pri/5C sec)**.

2) Slide planet shafts **(7C pri/5C sec)** out of carrier **(7A pri/5A sec)**.

3) Remove planet gears **(7B pri/5B sec)**, washers **(7E pri/5E sec)** and bearings **(7D pri/5D sec)** from carrier **(7A)**.

4) Inspect the planet gear **(7B pri/5B sec),** bearing bore and planet shaft **(7C pri/5C sec)** and bearings **(7D pri/5D sec)**. Check for spalling, bruising or other damage and replace components as necessary. *Note: When using loose (uncaged individual) rollers, all rollers in the planet gear should be replaced if any are found to be defective*

5) Remove roll pins **(7G pri/5G sec)** from planet shafts **(7C)** using a 1/16 pri/ 3/16 sec inch pin punch.

Carrier Reassembly

1) Loose roller installation:

   a) Set planet washer **(7E pri/5E sec)** on work table with planet gear **(7B pri/5B sec)** on top of it. Center planet washer to planet gear as closely as possible.

   b) Center planet shaft **(7C pri/5C sec)** in planet gear **(7B pri/5B sec)** bearing bore.

   c) If used, place spacer washer **(7F pri/ 5F sec)** onto planet shaft (refer to exploded view to confirm spacer positions).

   d) Begin placing rollers **(7D pri/5D sec)** around shaft **(7C pri/5C sec)**. There should be clearance for last roller to slide in. Be sure to install 12 (pri) or 2 rows of 12 (sec) rollers in each planet gear **(7B pri/5B sec)** on loose roller applications.

   (If using multiple rows of rollers, repeat steps C and D as necessary. Once complete, refer to exploded view to confirm that any spacer washers **(7F pri/ 5F sec)** are appropriately placed.)

   e) Place a washer **(7E pri/5E sec)** over gear **(7B pri/5B sec)** and onto shaft **(7C pri/5C sec)**.

   f) Carefully slide assembly off of table, holding planet washers **(7E pri/5E sec)** against planet gear **(7B pri/5B sec)**.

   g) Slide planet shaft **(7C pri/5C sec)** out of the assembly and slide assembly into carrier.

   h) Align planet gear & bearing assembly inside carrier and install planet shaft through entire assembly.

2) Planet shafts **(7C pri/5C sec)** should be installed with chamfered end of 1/16 pri/ 3/16 sec inch roll pin hole towards outside diameter of carrier **(7A pri/5A sec)**; this will ease alignment of holes while inserting roll pins **(7G pri/5G sec)**.

3) Drive roll pin **(7G pri/5G sec)** into the carrier hole and into planet shaft to retain parts. Repeat for remaining planet gears.

Base Subassembly Teardown

1) Remove the lock ring **(35C)** using a heel bar or puller; if using a heel bar, be sure not to pry against the cage of the inner output shaft bearing **(20C)**. Remove the split ring segments **(35B)** and shims **(35A)**.

   Caution: Since the shaft is no longer positively retained, care should be taken to avoid personal injury. Care should also be taken not to damage it while pressing through base.

Note: Removing the shaft from the base assembly damages the shaft seal and the seal will need to be replaced.

2) Place base **(1)** external side down, on a plate or table. Press output shaft out bottom of base by applying a load to internal end of shaft until it passes through inner shaft bearing cone **(20C)**.

3) A gear puller may be used to remove the outer bearing cone **(20A)** from the shaft **(2)**. If reusing old bearing cone, do not pull on or damage roller cage. Remove the shaft seal **(16A)** for inspection or replacement.

4) Lubricate inner lip of new shaft seal **(16A)** and slide it onto the shaft **(2)** until it fits snugly over the shaft seal diameter with the open side toward the inside of the gear drive.

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) Inspect inner and outer bearing cups **(20D & 20B)**. If cups are damaged, drive them out using a brass drift and utilizing the bearing knock-out notches in the base **(1)**

Base Reassembly

1) Clean all foreign material from any magnetic oil plugs located on base **(1)**.

2) Place base **(1)** exterior side up on work table.

3) Apply a layer of lithium or general purpose bearing grease to the roller contact surface of outer bearing cup **(20B)**.

4) Press outer bearing cone **(20A)** onto the shaft until it seats against the shoulder.

5) Place the shaft **(2)** with the bearing **(20A)** into the base **(1)**.

6) Flip shaft/base assembly, and apply lithium or general purpose bearing grease to roller contact surface of the inner cup **(20D)**., then press inner bearing cone **(20C)** onto shaft **(2)** until it seats against inner bearing cup **(20D)**.

7) Prior to installation of the shaft seal **(16A)**, the pre-load may result in a rolling torque which varies between 100 to 400 in-lb. The bearing preload should be tailored to your application; a low-speed application may require a high pre-load, while high-speed applications usually benefit from low pre-load. Adding shims **(35A)** will increase the pre-load on the bearing set. Determine your pre-load requirement and install shims to obtain this pre-load.

   Install the Load-N-Lock™ segments **(35B)** over the shims **(35A)** and into the groove in the shaft **(2)**. Finally, install the lock ring **(35C)** over the segments **(35B)**.

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

Unit Reassembly

1) Install the secondary carrier assembly onto the output shaft; align the splines of the carrier **(5A)** with the output shaft **(2)** splines and slide the carrier onto the shaft.

2) Lubricate o-ring(s) **(16B)** and install on the base **(1)** pilot (if the ring gear (12) was removed during disassembly).

Caution: Hold ring gear(s) by outside diameter or use lifting device to prevent injury.

3) Align gear teeth of secondary ring gear **(12)** (if it was removed during disassembly) with the gear teeth of the planet gears **(5B)** and place on base., then align mounting holes of ring gear with holes in base. Use the scribed line made during disassembly for reference. Tighten the 16 1/2-13 12-point, flange-screws through the base into the ring gear to a torque of **110 ft-lb dry, 80 ft-lb if the fasteners are lubricated.**

4) Install the primary carrier assembly and sun gear into the secondary carrier.

5) Install the input gear **(4)**.

6) Install the thrust bearing set **(14C OR 14E & 14F OR 14D)** Refer to exploded view for details..

7) Noting the scribed line made during disassembly, (with lubricated o-ring **(16B)** in place) align and install the cover **(3)**.

8) Install and torque the 8 3/8-16 hex-head cap-screws **(25C)** with lockwashers **(25A)**. The torque for the cap-screws: **45 ft-lb dry, 35 ft-lb if the fasteners are lubricated**.

9) Using a splined shaft to drive the input gear **(4)** ensure that the unit spins freely.

10) Fill the unit to the proper level, as specified, with recommended gear oil (refer to chart, page 3) after unit is sealed with brake and/or motor.

The gearbox is now ready to use.