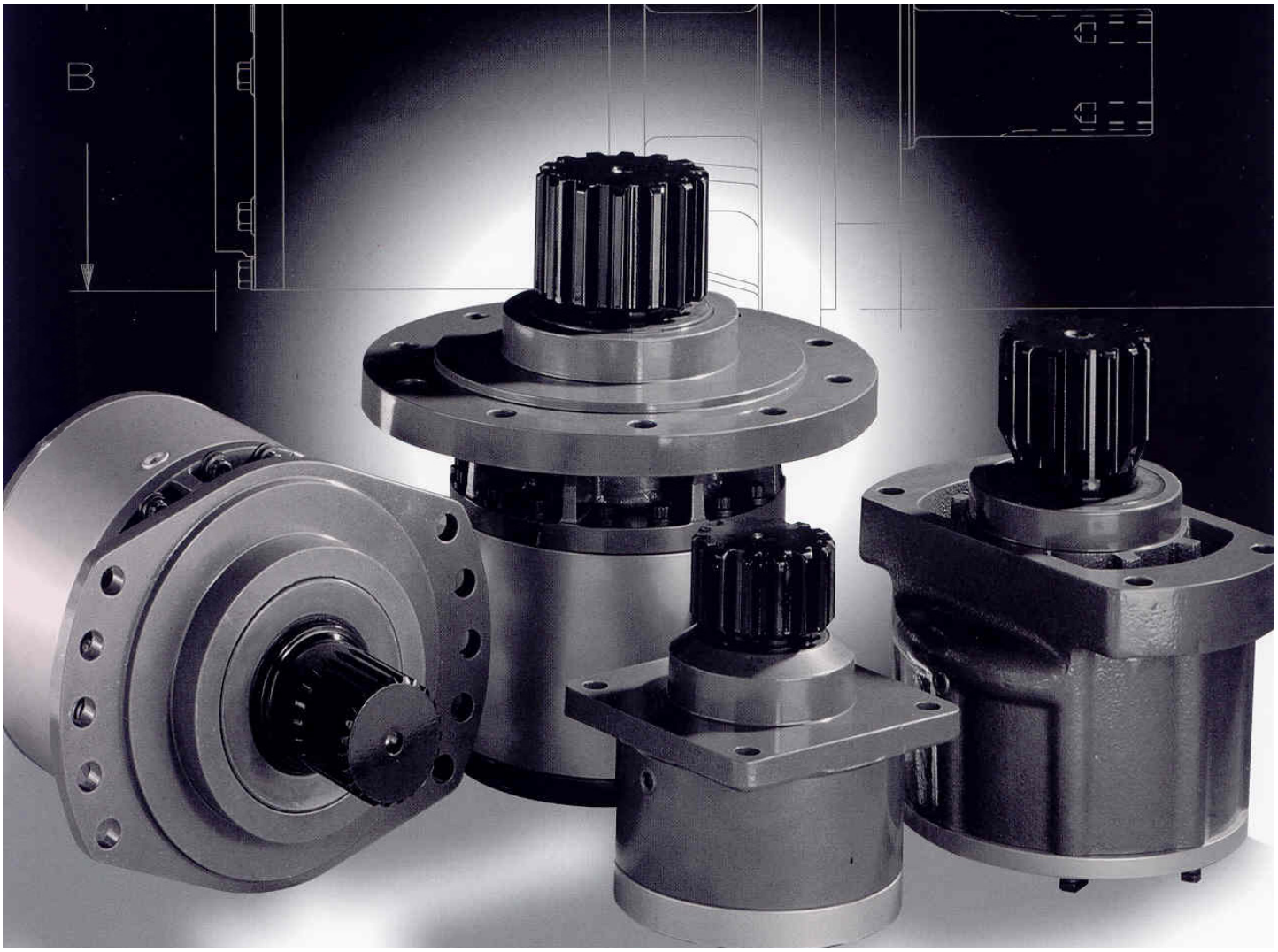
ESKRIDGE

65E PLANETARY GEAR DRIVE
SERVICE AND REPAIR MANUAL

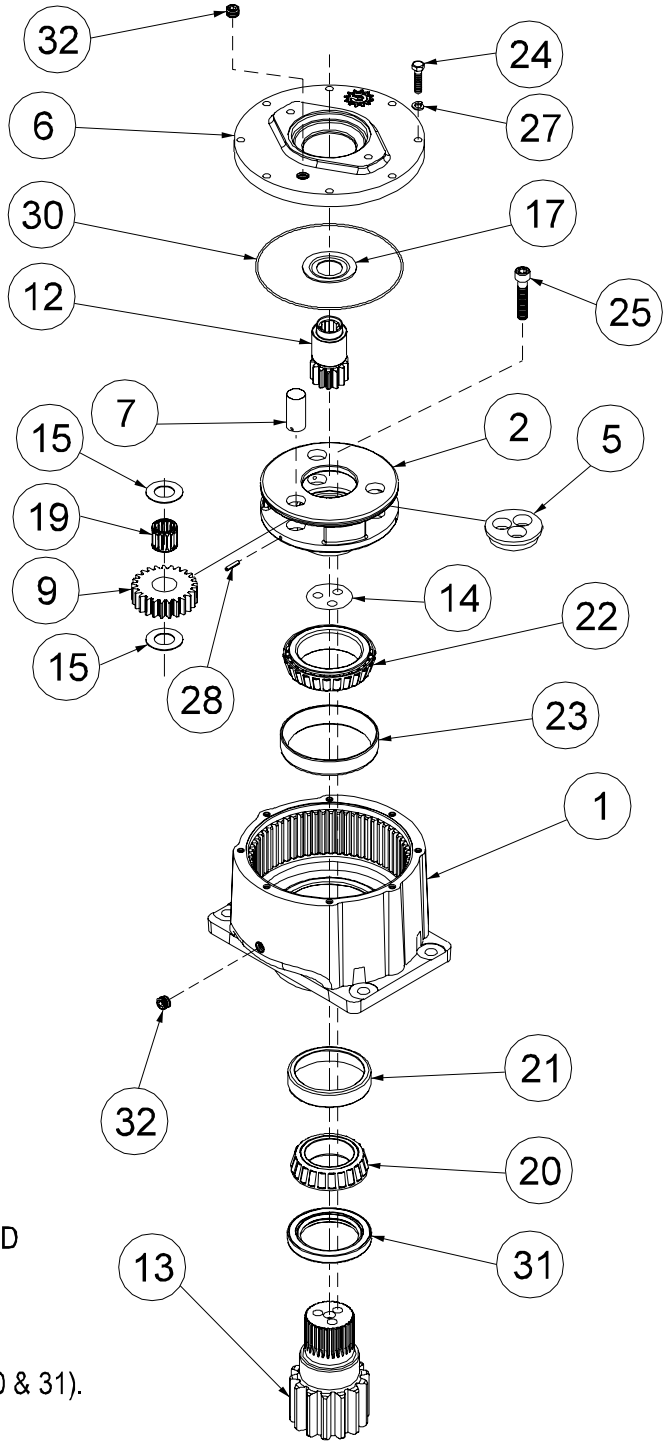


WARNING: While working on this equipment, use safe lifting procedures, wear adequate clothing and wear hearing, eye and respiratory protection.

THIS SERVICE MANUAL IS EFFECTIVE
FROM: ..... S/N 55013, JUNE 2002
TO: ..... CURRENT
REF: SM65ED2-AD

65E Single Stage Exploded View Drawing

MODEL E 65 RATIO →			SINGLE PLANETARY	
EFFECTIVE FOR: FROM S/N 55013, 6/3/02 TO CURRENT			4.42:1	6.00:1
ITEM	QTY	DESCRIPTION	PART NO.	PART NO.
1	1	CASE-E60 (STD)	83-004-3012	83-004-3012
2	1	CARRIER (SEC)	83-004-1262	83-004-1232
5	1	PLATE- BEARING RETAINER	86-004-1002	86-004-1002
COVER 6	1	SAE 'A' 2 AND MOD 4 BOLT	13-004-1192	13-0041192
		SAE 'B' 2 BOLT	13-004-1182	13-004-1182
		SAE 'B' 2 & 4 BOLT	13-004-1202	13-004-1202
		SAE 'C' 2 AND 4 BOLT	13-004-1212	13-004-1212
7	3	PLANET SHAFT (SEC)	83-004-1031	83-004-1031
9	3	PLANET GEAR (SEC)	83-004-1272	83-004-1242
12	1	CODE 3 - INPUT - SAE 1"- 6B	-	83-004-1302
13	1	SHAFT- PER CUSTOMER SPEC	-	-
14	*	SHIMS	83-004-1101	83-004-1101
15	6	THRUST WASHER- PLANET	81-004-1561	81-004-1561
17	1	THRUST WASHER-INPUT	81-004-2701	81-004-2701
19	3	BEARING - SEC. PL.	01-105-0500	01-105-0500
20	1	BEARING CONE	01-102-0090	01-102-0090
21	1	BEARING CUP	01-103-0080	01-103-0080
22		BEARING CONE	01-102-0100	01-102-0100
23	1	BEARING CUP	01-103-0090	01-103-0090
24	8	H.H.C.S. 3/8-16-1 1/2 GR8	01-150-1670	01-150-1670
25	3	S.H.C.S. 1/2-20 2 1/2 GR8	01-150-1480	01-150-1480
27	8	LOCKWASHER 3/8 MED	01-166-0010	01-166-0010
28	3	ROLL PIN - SEC. PL. 3/16 X 7/8	01-153-0210	01-153-0210
30	1	O-RING	01-402-0420	01-402-0420
31	1	SHAFT SEAL	01-405-0380	01-405-0380
32	2	PIPE PLUG 3/8 NPT MAGNETIC	01-207-0070	01-207-0070
38	**	GREASE FITTING 1/8 NPT 65°	01-215-0070	01-215-0070



* QUANTITY OF SHIMS DETERMINED BY PRELOAD DESIRED AND PART STACK-UP

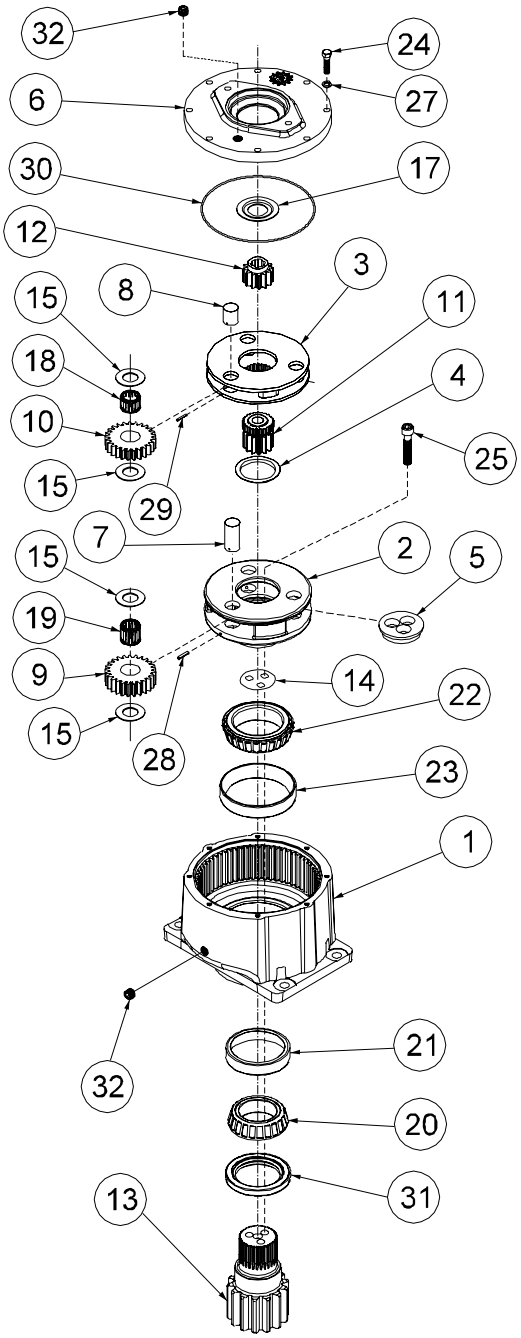
** OPTION FOR PINION UP CONFIGURATION.

SEAL KIT P/N 83-016-5011 (INCLUDES 1 EACH OF ITEMS 30 & 31).

FILENAME X65ED1-AA

65E Double Stage Exploded View Drawing

MODEL E 65 RATIO → EFFECTIVE FOR: FROM S/N 55013, 6/3/02 TO CURRENT			DOUBLE PLANETARY					
			19.54:1 (4.42 / 4.42)	26.52:1 (4.42 / 6.00)	33.16:1 (7.50 / 4.42)	36.00:1 (6.00 / 6.00) W/CODE 4	36.00:1 (6.00 / 6.00) W/O CODE 4	45.00:1 (7.50 / 6.00)
ITEM	QTY	DESCRIPTION	PART NO.	PART NO.	PART NO.	PART NO.	PART NO.	PART NO.
1	1	CASE-E60 (STD)	83-004-3012	83-004-3012	83-004-3012	83-004-3012	83-004-3012	83-004-3012
2	1	CARRIER (SEC)	83-004-1262	83-004-1232	83-004-1262	83-004-1232	83-004-1232	83-004-1232
3	1	CARRIER (PRI)	13-004-1032	13-004-1032	13-004-1032	13-004-1032	13-004-1032	13-004-1032
4	1	THRUST WASHER- SECONDARY	81-004-2711	81-004-2711	-	-	81-004-2711	-
	2	THRUST WASHER- SECONDARY	-	-	81-004-2711	81-004-2711	-	81-004-2711
5	1	PLATE- BEARING RETAINER	86-004-1002	86-004-1002	86-004-1002	86-004-1002	86-004-1002	86-004-1002
COVER 6	1	SAE 'A' 2 AND MOD 4 BOLT	13-004-1192	13-0041192	13-0040-1222		13-004-1192	13-004-1222
		SAE 'A' 2 AND MOD 4 BOLT W/ CODE 4	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 BOLT W/ CODE 4	13-004-1202	13-004-1202	13-004-1232	13-004-1232		13-004-1232
		SAE 'C' 2 AND 4 BOLT	13-004-1212	13-004-1212	13-004-1242		13-004-1242	13-004-1242
		SAE 'C' 2 AND 4 BOLT W/ CODE 4	13-004-1212	13-004-1212	13-004-1242	13-004-1242		13-004-1242
7	3	PLANET SHAFT (SEC)	83-004-1031	83-004-1031	83-004-1031	83-004-1031	83-004-1031	83-004-1031
8	3	PLANET SHAFT (PRI)	13-004-1021	13-004-1021	13-004-1021	13-004-1021	13-004-1021	13-004-1021
9	3	PLANET GEAR (SEC)	83-004-1272	83-004-1242	83-004-1272	83-004-1242	83-004-1242	83-004-1242
10	3	PLANET GEAR (PRI)	13-004-1102	13-004-1102	13-004-1122	13-004-1112	13-004-1112	13-004-1122
11	1	SUN GEAR	83-004-1282	83-004-1252	83-004-1282	83-004-1252	83-004-1252	83-004-1252
INPUT GEAR 12	1	CODE 2 - INPUT - 13T 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 14T 12/24 DP	13-004-1342	13-004-1342	13-004-1362	13-004-1352		13-004-1362
		CODE 5 - INPUT -15T 16/32 DP	13-004-1452	13-004-1452			13-004-1442	
13	1	SHAFT- PER CUSTOMER SPEC	-	-	-	-	-	-
14	*	SHIMS	83-004-1101	83-004-1101	83-004-1101	83-004-1101	83-004-1101	83-004-1101
15	12	THRUST WASHER- PLANET	81-004-1561	81-004-1561	81-004-1561	81-004-1561	81-004-1561	81-004-1561
17	1	THRUST WASHER-INPUT	81-004-2701	81-004-2701	-	-	81-004-2701	-
18	3	BEARING - PRI. PL.	01-105-0590	01-105-0590	01-105-0590	01-105-0590	01-105-0590	01-105-0590
19	3	BEARING - SEC. PL.	01-105-0500	01-105-0500	01-105-0500	01-105-0500	01-105-0500	01-105-0500
20	1	BEARING CONE	01-102-0090	01-102-0090	01-102-0090	01-102-0090	01-102-0090	01-102-0090
21	1	BEARING CUP	01-103-0080	01-103-0080	01-103-0080	01-103-0080	01-103-0080	01-103-0080
22		BEARING CONE	01-102-0100	01-102-0100	01-102-0100	01-102-0100	01-102-0100	01-102-0100
23	1	BEARING CUP	01-103-0090	01-103-0090	01-103-0090	01-103-0090	01-103-0090	01-103-0090
24	8	H.H.C.S. 3/8-16-1 1/2 GR8	01-150-1670	01-150-1670	01-150-1670	01-150-1670	01-150-1670	01-150-1670
25	3	S.H.C.S. 1/2-20 2 1/2 GR8	01-150-1480	01-150-1480	01-150-1480	01-150-1480	01-150-1480	01-150-1480
27	8	LOCKWASHER 3/8 MED	01-166-0010	01-166-0010	01-166-0010	01-166-0010	01-166-0010	01-166-0010
28	3	ROLL PIN - SEC. PL. 3/16 X 7/8	01-153-0210	01-153-0210	01-153-0210	01-153-0210	01-153-0210	01-153-0210
29	3	ROLL PIN - PRI. PL. 1/8 X 7/8	01-153-0180	01-153-0180	01-153-0180	01-153-0180	01-153-0180	01-153-0180
30	1	O-RING	01-402-0420	01-402-0420	01-402-0420	01-402-0420	01-402-0420	01-402-0420
31	1	SHAFT SEAL	01-405-0380	01-405-0380	01-405-0380	01-405-0380	01-405-0380	01-405-0380
32	2	PIPE PLUG 3/8 NPT MAGNETIC	01-207-0070	01-207-0070	01-207-0070	01-207-0070	01-207-0070	01-207-0070
36	1	BEARING	-	-	01-112-0220	01-112-0220	-	01-112-0220
37	1	THRUST RACE-USED WITH "BLIND SPLINE" INPUTS	-	-	01-112-0230	01-112-0230	-	01-112-0230
38	**	GREASE FITTING 1/8 NPT 65°	01-215-0070	01-215-0070	01-215-0070	01-215-0070	01-215-0070	01-215-0070



* QUANTITY OF SHIMS DETERMINED BY PRELOAD DESIRED AND PART STACK-UP

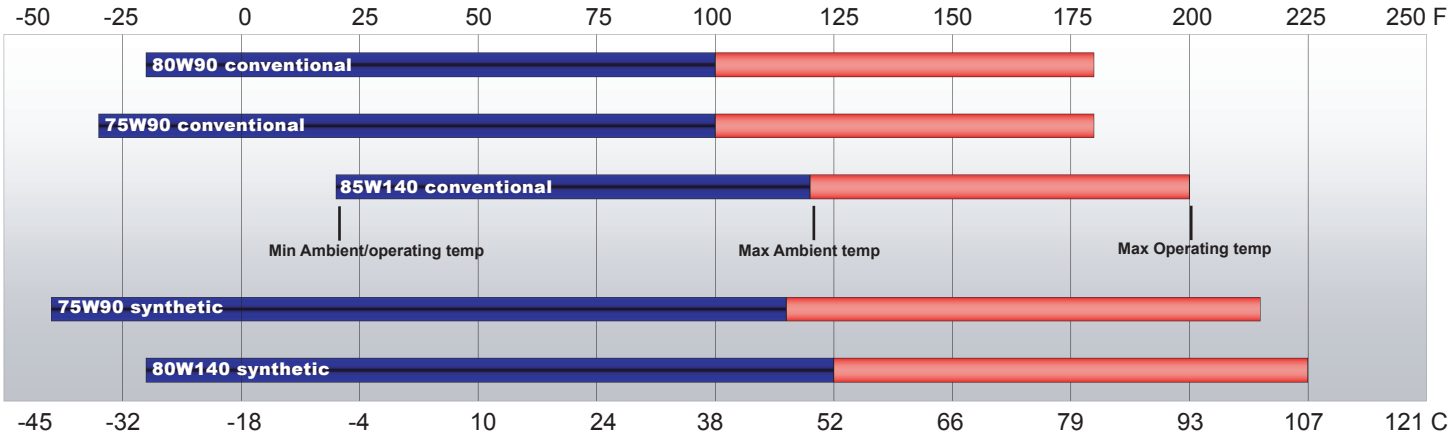
SEAL KIT P/N 83-016-5011 (INCLUDES 1 EACH OF ITEMS 30 & 31).

FILENAME X65ED2-AA

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 65E OIL CAPACITIES

Operating Position	Oil Capacity		Oil Level	
	Single stage	Double stage		
Horizontal Shaft	2.25 pints / 1.1 liters	2.25 pints / 1.1 liters	To horizontal centerline of gear drive	
Vertical Shaft (Pinion Up)	2.5 pints / 1.2 liters	2.5 pints / 1.2 liters	To side port on gear drive base	
Vertical Shaft (Pinion Down)	2.5 pints / 1.2 liters	2.5 pints / 1.2 liters	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 Disassembly Procedure

1) Scribe a diagonal line across the outside of the unit from cover **(6)** to case **(1)** before disassembly to assure proper positioning of pieces during reassembly.

2) Remove magnetic pipe plug **(32)** and drain oil from unit. Maximum drainage occurs when oil is warm.

3) Remove eight cover bolts **(24)** and lockwashers **(27)**.

4) Lift off cover **(6)**. The input shaft**(12)** and carrier thrust washer **(17)** may be lifted out of carrier assembly.

5) Lift primary planet carrier assembly **(3,8,10,15,18, & 29)** out of case.

6) The output shaft **(13)** and secondary planet carrier assembly may now be removed as follows:

   a) The secondary planet carrier **(2)** spline is a press fit onto output shaft **(13)** spline. Case **(1)** should be set on a plate or table with output shaft protruding downward through hole in table.

   b) Loosen but do not remove shaft retaining cap screws **(25)**.

NOTE: Care should be taken not to damage output shaft or injure your feet when shaft falls out of case.

   c) Press output shaft out bottom of case by applying press load to top end of capscrews **(25)**. Remove capscrews to allow shaft to pass through case.

   d) Remove shim(s) **(14)** from top end of shaft **(13)**.

7) Secondary planet carrier assembly **(2,5,7,9,15,19, 22 & 28)** may now be lifted out of case.

Output Shaft Subassembly

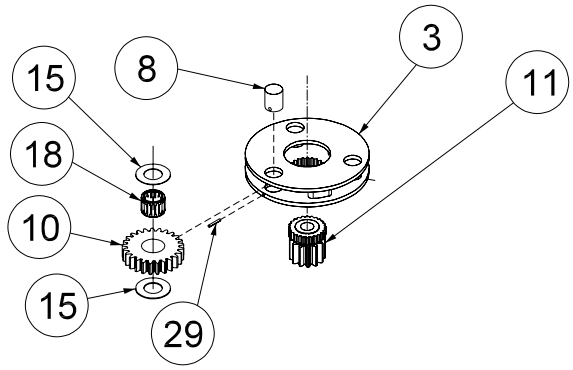
(Items 13, 20, 31)

1) Outer tapered bearing cone **(20)** may be removed using a gear puller. If reusing old bearing cone, do not damage roller cage by pulling on it.

2) To replace shaft seal **(31)** lubricate inner lip of new seal and turn so that open side is facing upward. Slide seal down output shaft **(13)** all the way to gear teeth or until it fits snug over seal diameter.

Primary Planet Carrier Subassembly

(Items 3, 8, 10, 11, 15, 18 & 29)



1) Rotate the planet gears **(10)** to check for abnormal noise or roughness in bearings **(18)** or planet shafts **(8).** If further inspection or replacement is required, proceed as follows.

2) Drive roll pins **(29)** into planet shafts **(8)**.

3) Press or drive planet shafts out of carrier **(3)**.

4) Slide planet gears **(10)** along with planet washers **(15)** out of primary carrier **(3)**.

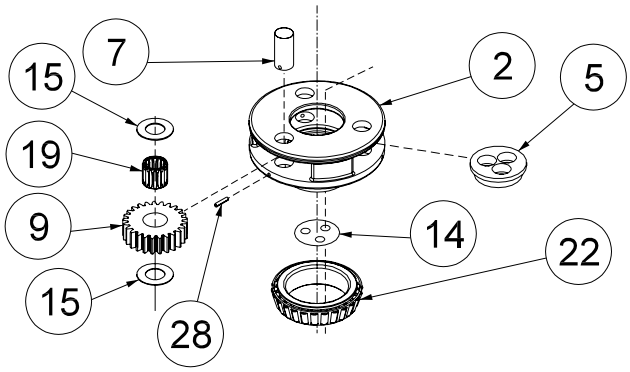
5) If planet bearings **(18)** must be replaced, they may now be removed from primary planet gears **(10)**.

6) Use 1/8 inch pin punch to remove roll pins **(27)** from planet shafts.

7) Rebuild primary planet carrier assembly in reverse order using any needed new parts. Planet shafts **(8)** should be installed with chamfered end of 1/8 inch hole toward outside diameter of carrier. This will aid in alignment of holes while inserting roll pins.

Secondary Planet Carrier Subassembly

(Items 2, 5, 7, 9, 14, 15, 19, 22 & 28)



1) Disassembly procedure is the same as previous section on primary planet carrier subassembly (steps 1-4) except substitute these parts: secondary carrier **(2)**, secondary planet gears **(9)**, planet bearings **(19)**, secondary planet shafts **(7)** and roll pins **(28).**

Reassembly

1) Place carrier **(2)** with hub down as shown above. Place bearing retainer plate **(5)** in bottom of carrier. Insert secondary planet gears **(9)**.

2) Turn carrier **(2)** over while using the planet gears **(9)** to hold retainer plate **(5)** in place.

3) Remove one planet gear **(9)** and insert a bearing **(19)**. Install two washers **(15)** (one on either side of the planet gear). Place in carrier and install planet shaft **(7)** and roll pin **(26)**. Repeat for two remaining gears.

NOTE: Press bearing onto hub by pressing on inner race only. DON'T press on roller cage or it may damage bearing.

4) If tapered inner bearing cone **(22)** on hub of secondary carrier **(2)** must be replaced, it may be removed using a gear puller. Then, press a new bearing cone onto hub making sure bearing shoulder is tight against hub shoulder.

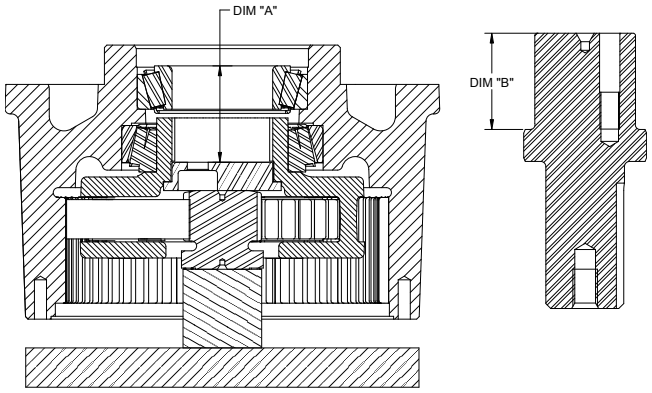
Case Subassembly

1) Inspect inner and outer bearing cups **(21 & 23)** and replace if necessary.

2) Clean all foreign material from magnetic drain and fill plug **(32)**.

Unit Reassembly

Bearing Pre-Load Measurement and Setting:



1) Install the secondary carrier assembly with the bearing **(22)** installed, into the base **(1)** with cups **(21 & 23)** installed. Turn this assembly upside down (outer bearing pointing up). Support the retainer plate **(5)** on a suitable support so the entire assembly is free to rotate on the inner bearing on the support. See the illustration above. Place the outer cone **(20)** into the outer cup **(21)** and carefully spin this assembly 1-3 revolutions to allow the bearings to seat. Using a depth micrometer, measure down from the outer bearing cone mounting surface to the bottom surface of the retainer plate **(5)**. Record this measurement as **A**. Next, measure from the inner end of the shaft **(13)**, where the three threaded holes are located, to the bearing seat. Record this measurement as **B**. Subtract **A-B**. This number is the un-preloaded gap in the bearing stack. The correct amount of pre-load is generally between 0.005 inch and 0.020 inch compression of the bearings. Add or remove shims to achieve the desired gap which will compress or pre-load the beairngs. Each shim is 0.005 inch thick. The lower gap will produce rolling torque of 50-150 in-lb, the higher gap will produce rolling torques of 150-250 in-lb. Fewer shims = tigheter bearing pre-load, more shims = looser bearing pre-load.

2) Place the shaft seal **(31)** onto the seal-diameter of the shaft **(13)**. Press the outer bearing cone **(20)** onto the shaft; press only on the race, not on the cage.

3) Turn case pinion side up. Apply a layer of lithium grease to outer bearing cup **(21)**. Place the shaft **(13)** into case **(1)** so that the shaft's outer tapered bearing cone **(20)** is seated in case's outer bearing cup **(21)**. Tap shaft seal **(31)** into place.

CAUTION: Shaft is not retained at this time.

4) Turn case pinion side down.

5) Apply a layer of lithium grease to inner bearing cup **(23)**.

6) Install the correct number of shims (14), determined in step 1 onto the end of the shaft (13) with the holes lined up correctly.

7) Rotate bearing retainer plate **(5)** inside secondary carrier assembly so that counter-bored holes are centered between planet gears **(9)**.

NOTE: It is important that the holes in the retainer plate remain centered between planet gears. A certain amount of tool clearance will be necessary in order to install and torque the capscrews (25).

8) Install secondary carrier assembly **(2)** into case **(1)** as follows: Rotate secondary carrier assembly back and forth until planet gear teeth **(9)** mesh with gear teeth in case **(1)**. Let carrier assembly down until carrier spline touches output shaft **(13)** spline. Rotate carrier by hand until you are certain carrier spline has started cleanly and squarely onto shaft spline. View down through top of secondary carrier assembly through counter-bored holes in retainer plate **(5).** If needed, align holes in retainer plate directly over holes in the shaft and shim(s) **(14)**.

9) Counter-bored holes should be centered between planet gears **(9)**. Slowly press secondary carrier assembly down tightly against output shaft **(13).**

NOTE 1: Rolling torque at proper bearing preload will vary according to the application. At output speeds of greater than 25 RPM, preload torque (including seal drag) should be in the range of 50 to 150 in-lbs. At less than 25 RPM, rolling torque should be 150 to 250 in-lbs.

10) Tighten the socket-head capscrews **(25)** to a torque of 90 ft-lb. Spin the gearbox case **(1)** on the shaft 2 to 3 revolutions. Now re-tighten the capscrews **(25)** to a torque of 90 ft-lb. This step allows the bearings to seat into their running position and ensures the correct torque on the fasteners.

11) Place secondary thrust washer **(4)** onto center of secondary planet carrier assembly.

12) Install sun gear **(11)** into center of secondary planet carrier.

13) To install primary planet carrier assembly hold inside diameter of carrier **(3)** and rotate until planet gears line up with case gear teeth and sun gear. Assembly will drop into place.

NOTE: A simple planetary such as this does not require a gear timing procedure.

14) Insert input gear **(12)** into unit so that teeth mesh with primary planet gears **(10)**.

15) Place input thrust washer **(17)** over input gear.

16) Place a new o-ring **(30)** on bottom of cover **(6).**

17) Set cover **(6)** on top of unit and refer to scribed line for proper orientation. Install and torque eight cover bolts **(24)** with lockwashers **(27)** to 32 ft-lbs.

17) Check to be sure magnetic plug **(32)** is securely installed into side of case **(1)**.

18) Add gear oil as specified on page 2. Correct oil level will measure to middle of primary planet gears **(10)** when in the vertical operating position.

19) Put pipe sealant on magnetic plug **(32)** and install into oil fill hole in cover **(6).**

20) Insert a shaft, such as an output shaft from a hydraulic motor, into input gear **(12)** and rotate by hand to be sure unit turns smoothly and easily.

THE GEARBOX IS NOW READY FOR USE.