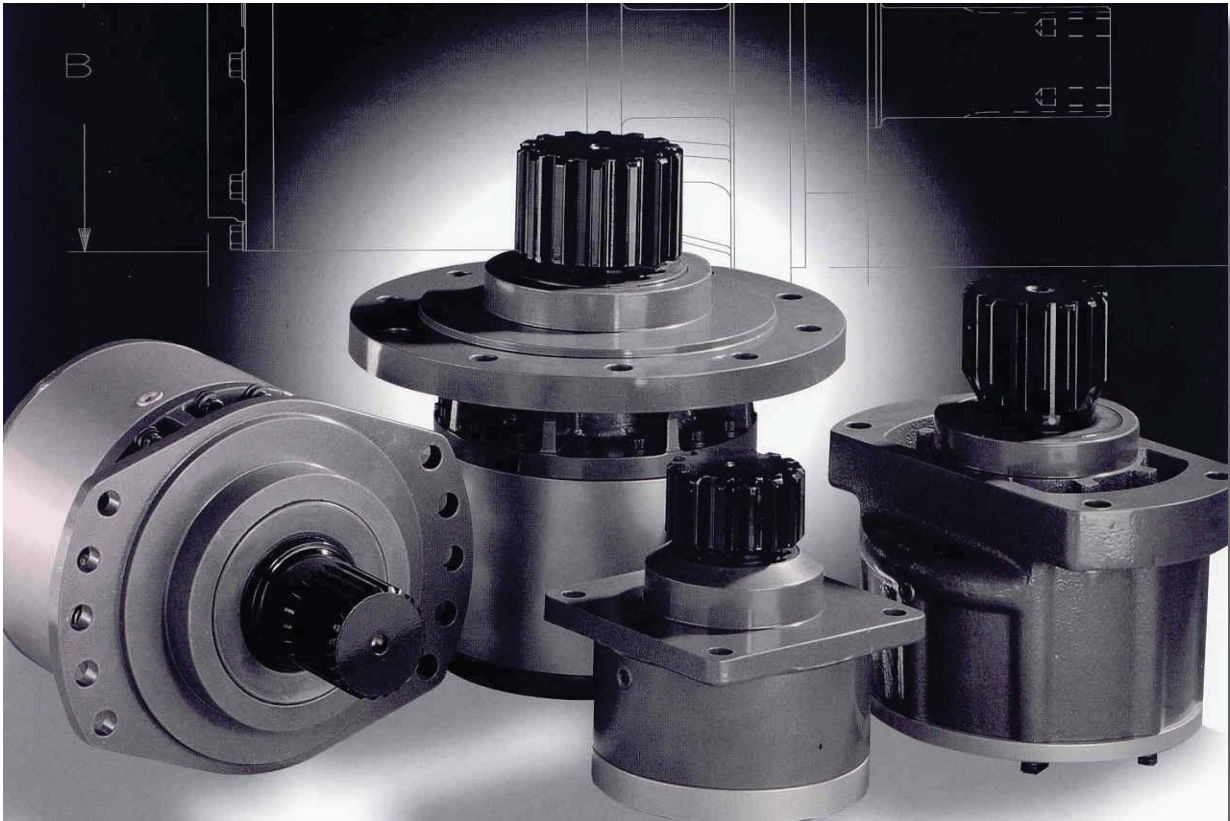




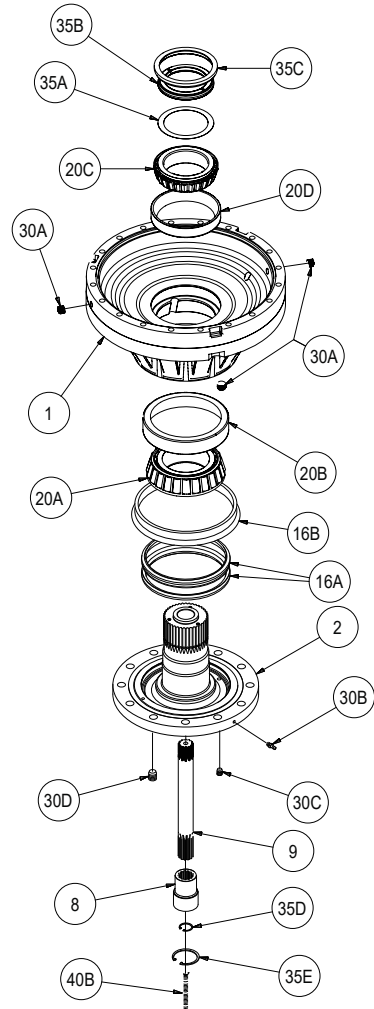
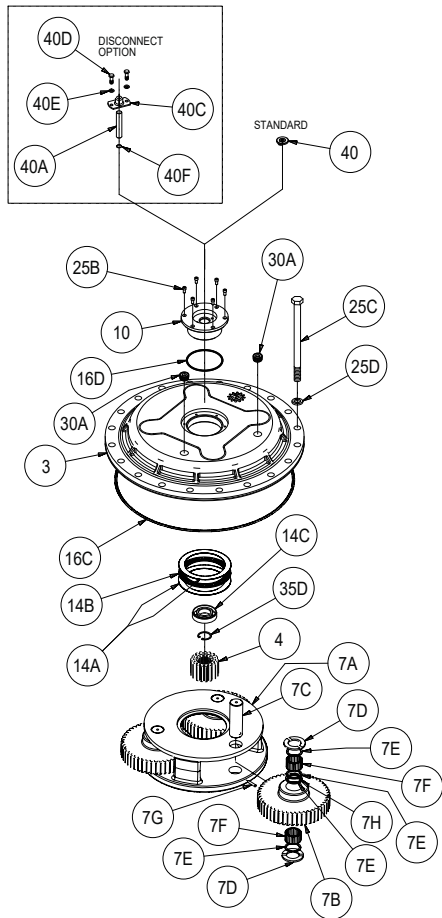
MODEL 1400 TRIPLE PLANETARY WHEEL DRIVE SERVICE MANUAL



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

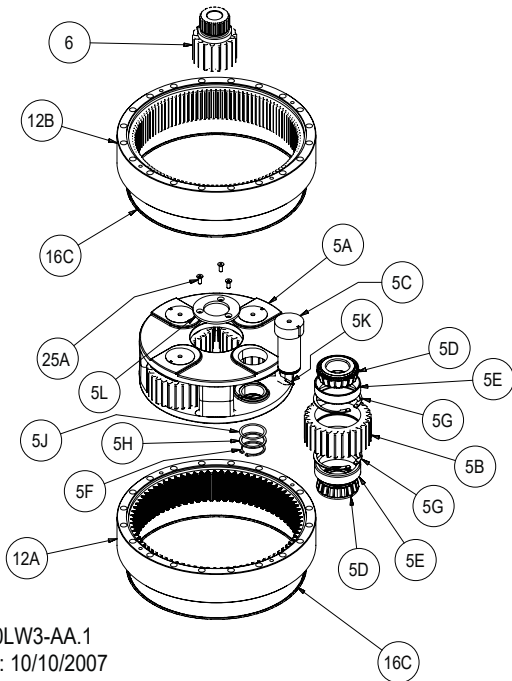
THIS SERVICE MANUAL IS EFFECTIVE:
S/N: 74362 TO CURRENT
DATE: 10/01/2007 TO CURRENT
VERSION: SM1400LW3-AA

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.



VIEWED FROM OUTPUT END OF DRIVE

VIEWED FROM INPUT END OF DRIVE



X1400LW3-AA.1
DATE: 10/10/2007

X1400LW3-AA.1

Page 1 of 3

Effective date 10/01/2007

Effective serial # 74362

			CORE UNIT:	1400LW-25	1400LW-40	2-STAGE+3-STAGE CORE
MODEL 1400 WHEEL DRIVE				25.48:1 4.96:1 5.33:1	40.41:1 7.76:1 5.33:1	EITHER RATIO + 3RD STAGE
Item #	QTY.	Description	Part Number	Part Number	Part Number	
1	1	BASE	CODE A - FLANGED	60-004-3124		SEE 2-STAGE
			CODE F - FLANGELESS	60-004-3138		SEE 2-STAGE
			CODE CA or CF - CUSTOM	(CUSTOM P/N)		SEE 2-STAGE
2	1	SPINDLE	CODE WD1; SAE 'D' MOTOR MOUNT	60-004-4072L		60-004-4202L
			CODE C1 - CUSTOM	(CUSTOM P/N)		SEE 2-STAGE
3	1	COVER; WHEEL DRIVE	60-004-1444			SEE 2-STAGE
4	1	SUN GEAR -PRIMARY	60-004-1802	60-004-1812		SEE 2-STAGE
5	1	SEC CARR ASSY-5.33:1(1400)	60-005-2133			SEE 2-STAGE
5A	1	CARRIER SEC; 4-PLANET	60-004-1774			SEE 2-STAGE
5B	4	PLANET GEAR; SEC	60-004-1232			SEE 2-STAGE
5C	4	PLANET SHAFT; SEC	60-004-1262			SEE 2-STAGE
5D	8	CONE; SEC. PLNT	01-102-0210			SEE 2-STAGE
5E	8	CUP; SEC.PLNT	01-103-0210			SEE 2-STAGE
5F	4	RETAINING RING; PLANET SHAFT	01-160-0490			SEE 2-STAGE
5G	8	RETAINING RING; PLANET BORE	01-160-0500			SEE 2-STAGE
5H	8	WASHER; SEC	60-004-1291			SEE 2-STAGE
5J	8	SHIM; SEC. PLNT	60-004-1321			SEE 2-STAGE
5K	4	ROLL PIN; 1/4 x 1 3/8	01-153-0150			SEE 2-STAGE
5L	1	PLATE; SEC CARRIER RETAINER	60-004-1352			SEE 2-STAGE
6	1	SUN GEAR -SECONDARY	60-004-1792			SEE 2-STAGE
7	1	PRIMARY CARRIER ASSY-1400	60-005-2113	60-005-2123		SEE 2-STAGE
7A	1	CARRIER; PRIMARY	60-004-1372	60-004-1722		SEE 2-STAGE
7B	3	PLANET GEAR; PRIMARY	60-004-1862	60-004-1872		SEE 2-STAGE
7C	3	PLANET SHAFT; PRIMARY	60-004-1272			SEE 2-STAGE
7D	6	THRUST WASHER; PRIMARY PLANET	60-004-1881			SEE 2-STAGE
7E	12	SPACER WASHER; PRI ROLLER; 4 PER SHAFT	60-004-1891			SEE 2-STAGE
7F	168	LOOSE ROLLER; 2 X 28 PER SHAFT	01-106-0050			SEE 2-STAGE
7G	3	ROLL PIN; 1/4 x 1 3/8	01-153-0150			SEE 2-STAGE
7H	3	RETAINING RING; PLANET BORE	01-160-0750			SEE 2-STAGE
8	1	INPUT COUPLING	16T X 13T	60-004-1422		60-004-1422
			13T X 13T	60-004-1692		---
9	1	INPUT SHAFT	60-004-1392			SEE 2-STAGE
10	1	THRUST HUB	60-004-1822			SEE 2-STAGE
12A	1	RING GEAR; SEC.	60-004-1243			SEE 2-STAGE
12B	1	RING GEAR; SIMPLE PRI	60-004-1193			SEE 2-STAGE
14A	2	THRUST RACE; PRI CARR	01-112-0350			SEE 2-STAGE
14B	1	THRUST BRG; PRI CARR	01-112-0340			SEE 2-STAGE
14C	1	BALL BEARING	01-100-0320			SEE 2-STAGE
16A	1	SEAL; METAL FACE	01-406-0010			SEE 2-STAGE
16B	1	SEAL-RUBBER/FACE	01-406-0020			SEE 2-STAGE
16C	3	O-RING; RING GEAR	01-402-0660			SEE 2-STAGE
16D	1	O-RING	01-402-0220			SEE 2-STAGE

X1400LW3-AA

Page 2 of 3

Effective date 10/01/2007

Effective serial # 74362

Model 1400 Wheel Drive Ratio breakdown								
Unit	110	143	160	174	218	227	248	338
Stg I	4.31	5.61	6.30	4.31	8.57	5.61	6.30	8.57
Stg II/Primary	4.96	4.96	4.96	7.76	4.96	7.76	7.76	7.76
Stg III/Secondary	5.33	5.33	5.33	5.33	5.33	5.33	5.33	5.33

20A	1	BRG CONE; OUTER	01-102-0190	SEE 2-STAGE
20B	1	BRG CUP; OUTER	01-103-0190	SEE 2-STAGE
20C	1	BRG CONE; INNER	01-102-0230	SEE 2-STAGE
20D	1	BRG CUP; INNER	01-103-0230	SEE 2-STAGE
25A	3	FLAT HD SOC C.S.; SEC CARR RET. (3/8-24X1 GR-8)	01-150-1590	SEE 2-STAGE
25B	6	SHCS (1/4-20X1/2 GR 8)	01-150-0560	SEE 2-STAGE
25C	20	HHCS (3/4-10 x 10.5 GRD 8)	01-150-1580	SEE 2-STAGE
25D	20	LOCKWASHER; 3/4	01-166-0360	SEE 2-STAGE
30A	6	PIPE PLUG (3/4 NPT MAGNETIC)	01-207-0100	SEE 2-STAGE
30B	1	GR. FIT; STR. 1/8 NPT (O.D. of spindle flange)	01-215-0010	SEE 2-STAGE
30C	1	PIPE PLUG; 1/8 NPT (face of spindle flange)	01-207-0030	---
30D	1	PIPE PLUG; 1/4 NPT (face of spindle shaft)	01-207-0020	---
35A	2	SHIM; OUTPUT SHAFT	60-004-1311	SEE 2-STAGE
35B	1	SPLIT RING (L-SEGMENT)	60-004-1482	SEE 2-STAGE
35C	1	LOCK RING	60-004-1472	SEE 2-STAGE
35D	1	RETAINING RING (input gear OR coupling)	01-160-0580	SEE 2-STAGE
35E	1	RETAINING RING (Input Cplg. in Shaft)	01-160-0060	SEE 2-STAGE
40	1	PLUG; NON-DISCONNECT OPTION	01-208-0080	SEE 2-STAGE
	1	DISCONNECT KIT (OPTION 'D')	60-005-2143	SEE 2-STAGE
40A	1	DOWEL PIN (5/8X3-1/2)	01-152-0130	SEE 2-STAGE
40B	1	SPRING 6.0X.75X.54X23PPI	01-261-0550	SEE 2-STAGE
40C	1	DISCONNECT PLATE - 600/1400 WD	60-004-1832	SEE 2-STAGE
40D	2	HHCS; 5/16-18X1 GR5	01-150-1790	SEE 2-STAGE
40E	2	LOCKWASHER (5/16)	01-166-0110	SEE 2-STAGE
40F	1	O-RING	01-402-0900	SEE 2-STAGE

MODEL 254 THIRD STAGE (RATIOS > 50:1)			CORE UNIT:	1400W-254-4	1400W-254-5	1400W-254-6	1400W-254-8	
			3RD-STAGE RATIO:	4.31	5.61	6.30	8.57	
52	1	SPLINED ADAPTOR SHAFT		60-004-1752				
53	1	MOTOR MOUNT	CODE C - SAE 'C' (2 & 4 BOLT)	25-004-_____ (PNNYA)				
			CODE D - SAE 'D' (4 BOLT)	25-004-1832				
54	1	INPUT GEAR	CODE 4 - 14T 12/24 DP SPLINE	25-004-1732	25-004-1792	25-004-1742	25-004-1812	
			CODE 9 - 13T 8/16 DP SPLINE	25-004-1762	25-004-1802	25-004-1772	25-004-1782	
55	1	CARRIER ASSY - THIRD STAGE		25-005-2201	25-005-2181	25-005-2211	25-005-2171	
55A	1	CARRIER - 3RD STAGE		25-004-1692	25-004-1642	25-004-1702	25-004-1412	
55B	3	PLANET GEAR - 3RD STAGE		25-004-1712	25-004-1652	25-004-1722	25-004-1552	
55C	3	PLANET SHAFT - 3RD STAGE		25-004-1442				
55D	6	THRUST WASHER - 3RD STAGE PLANET		25-004-1582				
55E	12	SPACER WASHER - 3RD STAGE; 4 PER SHAFT		25-004-1592				
55F	36	LOOSE ROLLER; 12 PER SHAFT		01-106-0010				
55G	3	ROLL PIN; 3/16 X 1		01-153-0020				
85	1	RETAINING RING		01-160-0020				
56	2	O-RING - RING GEAR		01-402-0020				
61	1	PLUG: MOTOR MOUNT		01-208-0030				
62	1	RING GEAR-PRI		25-004-1822				
64A	1	THRUST WASHER - INPUT GEAR		25-004-1752				
64B	2	THRUST WASHER - CARRIER		25-004-1132				
75A	12	SOCKET HEAD CAPSCREW; 7/16-20 UNF X 3.5 GR 8		01-150-1940				
75B	12	LOCK WASHER; 7/16 HI-COLLAR		01-166-0440				

X1400LW3-AA

Page 3 of 3

Effective date 10/01/2007

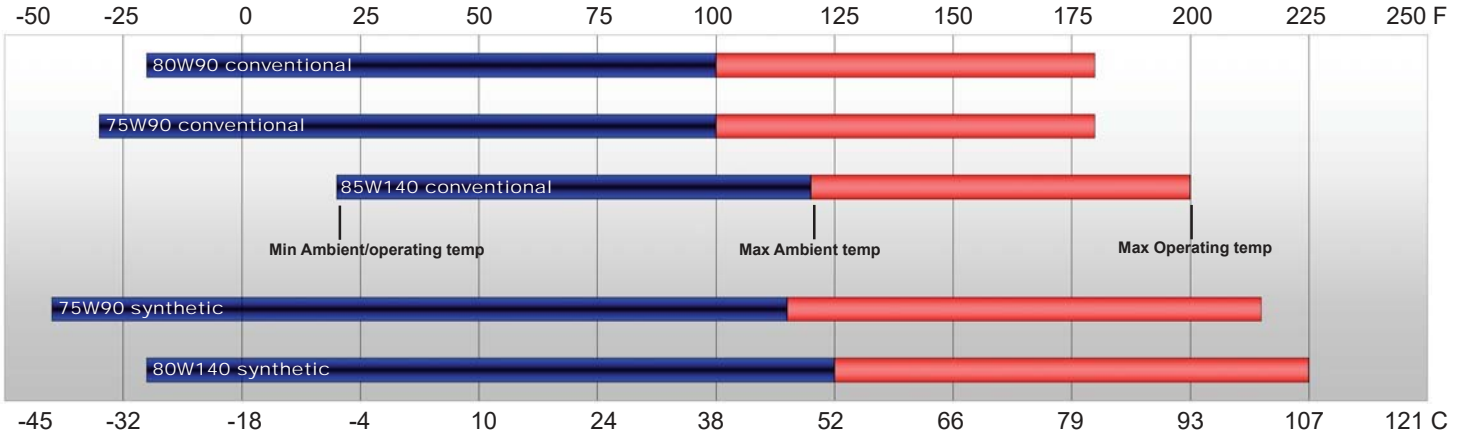
Effective serial # 74362

Model 1400 Wheel Drive Ratio breakdown								
Unit	110	143	160	174	218	227	248	338
Stg I	4.31	5.61	6.30	4.31	8.57	5.61	6.30	8.57
Stg II/Primary	4.96	4.96	4.96	7.76	4.96	7.76	7.76	7.76
Stg III/Secondary	5.33	5.33	5.33	5.33	5.33	5.33	5.33	5.33

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 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.

ESKRIDGE MODEL 1400 WHEEL DRIVE OIL CAPACITIES

Operating Position	Oil Capacity			Oil Level
	Single stage	Double stage	Triple stage	
 Horizontal Shaft	-	-	17 qts / 16 Liters	To horizontal centerline of gear drive 
 Vertical Shaft (Pinion Up)	-	-	N/A	To side port on gear drive base 
 Vertical Shaft (Pinion Down)	-	-	29 qts / 27 Liters	To midway on upper/primary gear set 

ESKRIDGE PART NUMBER INTERPRETATION

Note: All standard 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 main cover (3) to the base (1) before disassembly to aid in the proper positioning of pieces during reassembly.
- 2) Remove drain plugs (30A) and drain oil from unit. The oil will drain out more quickly and completely if warm.
- 3) Remove the twenty 3/4-10 capscrews (25C) and lockwashers (25D) securing the main cover (3).
- 4) Remove the main cover (3), thrust bearing (14C), Stage II sun gear (4) and thrust washers (14A, 14B) from unit. Inspect cover o-ring (16C); discard if damaged or deformed
- 5) Lift the stage II planet carrier assembly (7) from the unit .
- 6) Remove the Stage III sun gear (6) and input shaft (9).
- 7) Remove the three 3/8-24 flat head capscrews (25A) securing the carrier retaining plate (5L) to the output spindle (2).
- 8) Remove remaining ring gears (12B, 12A) and Stage III carrier assembly (5). Inspect gear to gear and gear to base O-ring(s) (16C), discard and replace any damaged or deformed O-rings.
- 9) Invert base assembly, placing input/spindle (2) up.
- 10) Remove the twelve 7/16-20 capscrews (75B) securing the input cover (53) to the unit.
- 11) Remove the input cover (53), input thrust washer(s) (64A, 64B), and Stage I input gear (54). Inspect cover o-ring (56); discard if damaged or deformed.
- 12) Lift the stage I planet carrier assembly (55) including shaft adapter (52) from the unit .
- 13) Remove Stage I ring gear (62), inspect o-ring (56) and replace if damaged or deformed.
- 14) 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 (55B Stg I, 7B Stg II, 5B, Stg III) to check for abnormal noise or roughness in bearings. If further inspection or replacement is required, proceed as follows.

- 1) Drive roll pins (55G Stg I, 7C Stg II) completely into the planet shafts or remove planet shaft retaining rings (5F Stg III)
- 2) Slide planet shafts (55C Stg I, 7C Stg II, 5C Stg III) out of carrier (55A Stg I, 7A Stg II, 5A Stg III).
- 3) Remove planet gears, washers (55D Stg I, 7D Stg II) and bearings (55E Stg I, 7F Stg II, 5D & 5E Stg III) from carrier.
- 4) Inspect the planet gear, bearing bore and planet shaft (55C Stg I, 7C Stg II, 5C Stg III) and bearings. Check for spalling, bruising or other damage and replace components as necessary. *Note: When using loose (uncaged) roller bearings, all rollers in the corresponding planet gear should be replaced if any in the set are found to be defective*

- 5) Remove roll pins (55C Stg I, 7C Stg II) from planet shafts (7C) using a 3/16" (Stg I) or 1/4" (Stg II) pin punch.

Carrier Reassembly

- 1) Loose roller installation; if using bearing assemblies, replace bearings as needed and proceed to step 2:
 - a) Set planet washer (55D Stg I, 7D Stg II) on work table with planet gear (55B Stg I, 7B Stg II) on top of it. Center planet washer to planet gear as closely as possible.
 - b) Center planet shaft (55C Stg I, 7C Stg II) in planet gear bearing bore.
 - c) If used, place spacer washer (55E Stg I, 7E Stg II) onto planet shaft (refer to exploded view to confirm spacer positions).
 - d) Begin placing rollers (55F Stg I, 7F Stg II) around shaft (55C Stg I, 7C Stg II). There should be clearance for last roller to slide in. Be sure to install sixteen (Stg I) or twenty (Stg II) rollers in each bearing row.

(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 (55E Stg I, 7E Stg II) are appropriately positioned.)
 - e) Place a washer (55D Stg I, 7D Stg II) over gear and onto shaft.
 - f) Carefully slide assembly off of table, holding planet washers against planet gear.
 - g) Slide planet shaft out of the assembly and slip assembly into carrier.
 - h) Align planet gear & bearing assembly inside carrier and install planet shaft through entire assembly.
- 2) Planet shafts (55C Stg I, 7C Stg II, 5C Stg III) should be installed with chamfered end of roll pin hole (Stg I, II) or slot (Stg III) towards outside diameter of carrier.
- 3) Drive roll pin into the carrier hole (Stg I & II) and into planet shaft or replace planet shaft retaining rings (Stg III) to retain parts. Repeat for remaining planet gears.

Base Subassembly Teardown

- 1) Remove the output shaft 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 spindle 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 injury. Care should also be taken not to damage it while pressing through base.**
- 2) Place base (1) exterior side down, on a plate or table. Press spindle shaft out bottom of base by applying a load to internal end of spindle (2) until it passes through inner spindle bearing cone (20C).
 - 3) A gear puller may be used to remove the outer bearing cone (20A) from the spindle (2). If reusing old bearing cone, do not pull on or damage roller cage.

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

- 4) Inspect inner and outer bearing cups **(20D & 20B)**. If cups are damaged they must be replaced, 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 magnetic oil plugs located in base **(1)**.
- 2) Place base 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 spindle **(2)** until it seats against the shoulder.
- 5) Wipe the face of each half of the metal face seal **(16A)** using a lint-free wipe. No particles of any kind are permissible on the sealing surfaces. (Even a hair is sufficient to hold the seal surfaces apart and cause a leak.) Apply a thin film of oil on the entire seal face of one or both seals using a clean finger or lint-free applicator. Oil must not contact any surfaces other than the sealing faces. (See Pages 7-9 for seal inspection and service procedures.)
- 6) Place the spindle **(2)** with the outer bearing cone into the base.
- 7) 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 until it seats against inner bearing cup.
- 8) Proper spindle bearing preload will result in a rolling torque which varies between 200 to 300 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™ halves **(35B)** over the shims and into the corresponding spindle groove. Then, 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 buildup of unit.

Unit Reassembly

- 1) Place spindle/base assembly exterior side up on work table.
- 2) Install o-ring on Stage I ring gear **(62)** and install ring gear to spindle **(2)**, aligning mounting holes of ring with those in the spindle **(2)**.
- 3) Install the Stage I carrier assembly with adapter shaft **(52)** into the Stage I ring gear **(62)**.
- 4) Install the input gear **(54)**, carrier thrust washer **(64B)** and input thrust washer **(64A)**. Refer to exploded view for details.
- 5) With lubricated o-ring in place, align and install the input cover

(53).

- 6) Install and torque the twelve 7/16-20 hex head capscrews **(75A)**, w/ lockwashers **(75B)**, retaining the input cover **(53)**. The torque for the cap-screws: 80 ft-lb dry, 60 ft-lb if the fasteners are lubricated.
- 7) Invert base assembly, placing the interior side up.
- 8) Install the Stage III carrier assembly onto the output spindle **(2)**; align the splines of the carrier **(5A)** with the spindle shaft splines and slide the carrier onto the spindle.
- 9) Install carrier retaining plate **(5L)** & secure using provided 3/8-24 Flathead capscrews **(25A)**. If using retaining compound to assist in screw retention, apply only a small amount to internal threads. Use of excess thread retaining compound may cause screws to be irremovable once the compound has cured.
- 10) Lubricate o-rings **(16C)** and install on the ring gear **(12B Stg II/, 12A Stg III)** pilots.

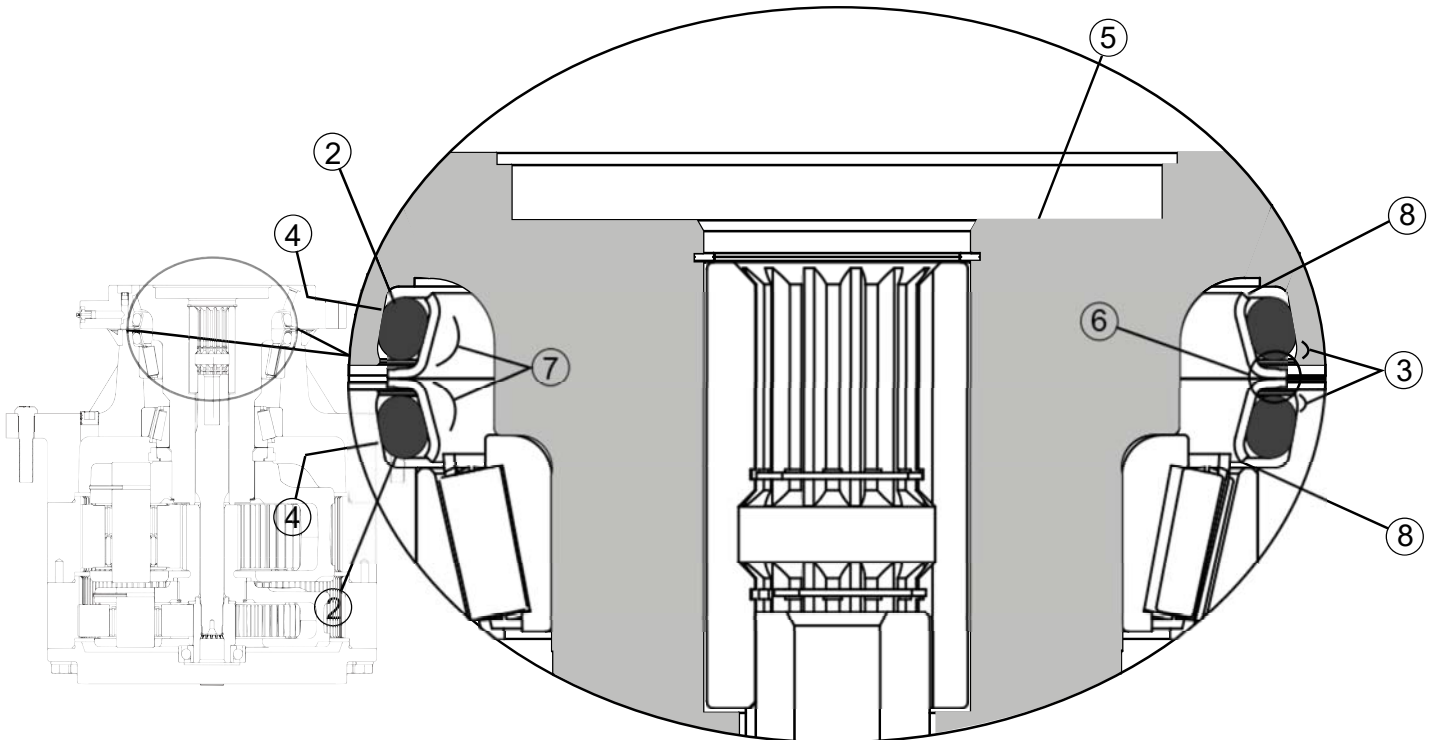
Caution: Use lifting device to prevent injury when handling ring gears and other heavy components.

- 11) Align gear teeth of Stage III ring gear **(12A)** with 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.
- 12) With lubricated o-ring on pilot, place Stage II ring gear **(12)** on base. Align mounting holes of ring gear with holes in base, using the scribed line made during disassembly for reference.
- 13) Install the Stage III sun gear **(6)**, then the Stage II carrier assembly **(7)** aligning gear teeth of ring gear with those of the planet gears
- 14) Install Stage II sun gear **(4)**, and stage II carrier thrust-washers **(14A, 14B)**.
- 15) Install o-ring **(16C)** to main cover **(3)** and install main-cover to Stage II ring gear, aligning mounting holes of cover with those in ring gears. Use the scribed line made during disassembly for reference.
- 16) Install and torque the twenty 3/4-10 capscrews **(25C)** w/ lockwashers **(25D)**. The torque for the capscrews is 380 ft.-lbs. dry or 280 ft.-lbs. lubricated
- 17) Using a splined shaft to drive the input gear **(54)** ensure that the unit spins freely.
- 18) Fill the unit to the proper level, as specified, with recommended gear oil (refer to chart, page 4) after unit is sealed with brake and/or motor.

The gear drive is now ready to use.

Seal Assembly for Duo-Cone Seals

Installation Instructions courtesy Caterpillar, Inc.



Cross Section View of Installed Seal

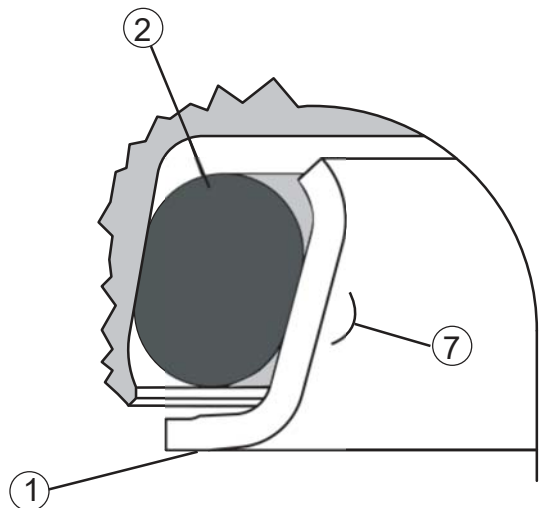
Seal Assembly Contents:

(2) Metal Seal Rings

(2) Rubber Toric Rings

Terminology:

- | | |
|------------------------------------|----------------------------------|
| 1 - Seal Ring | 6 - Seal Ring Face |
| 2 - Rubber Toric | 7 - Seal Ring Ramp |
| 3 - Housing Retainer Lip | 8 - Seal Ring Retaining Lip |
| 4 - Housing Ramp | 9 - Installation Tool (Optional) |
| 5 - Seal Ring Housing (Base/Shaft) | |



Inspection of Worn Seals

Seals wear in an axial, rather than radial, direction (as depicted in Figure Y). The total thickness of the flange is usable wear material on the formed seal rings and good seal performance can generally be expected until the flange is completely worn away. Remaining service life can be estimated by measuring the ring flange thickness, and using the chart below. Minimum flange thickness required for reusability is 0.05" (1.27 mm).

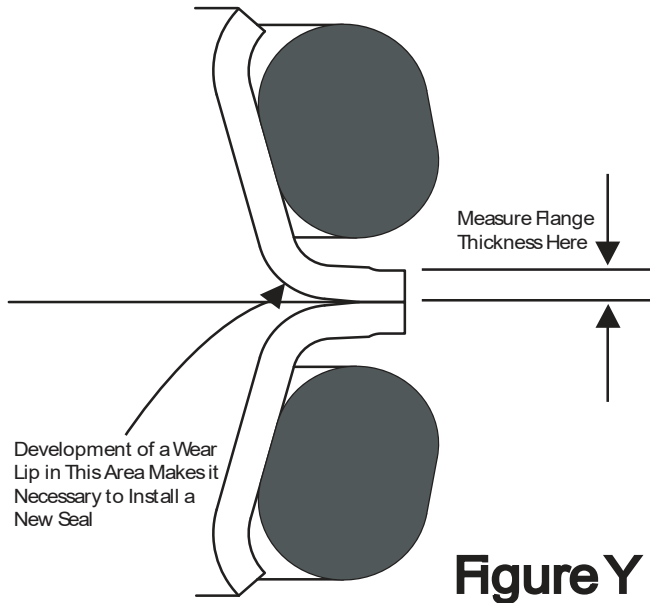


Figure Y

The measured parameter used to check the remaining seal life is flange thickness, at the outer edge (once any wear lip is removed). The measurement must be made carefully because the shoulder is only 0.06" (1.52 mm) from the edge of the flange.

Estimates of expected seal life are difficult, because there are many differences in machine applications, job conditions, maintenance and other factors that affect seal service life.

Formed Seal Wear Chart	
Flange Thickness in (mm)	Seal Wear Percent Worn
0.075 (1.91)	0
0.062 (1.59)	25
0.050 (1.27)	50
0.038 (0.95)	75
0.025 (0.64)	100
0.012 (0.32)	125
0.000 (0.00)	150

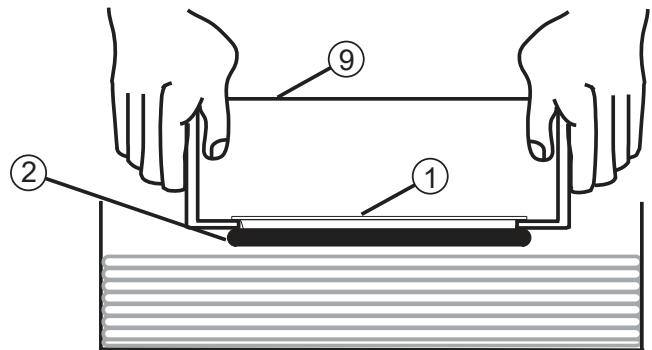
Mishandling Of Seals

Mishandling of seals during assembly can cause immediate leaks or premature failure. Failure can occur due to cutting or tearing of the elastomeric load ring, breakage of the sealing ring, contamination of the sealing face with dirt or lint, etc. When assembling metal face seals, please carefully observe assembly instructions.

Housing Preparation

The housing components (3, 4) that contact the rubber toric rings must be free from foreign material (oil, grease, dirt, metal chips dust or lint particles, etc.) before installing the seal. This should be done with a lint-free wipe and a non-petroleum based solvent.

- 1) Remove any foreign material from the rubber torics (2), ramps (7) and lips (8) of both seal rings. This should also be done with a lint-free wipe and non-petroleum based solvent.
- 2) Dry with a clean wipe.
- 3) Place the rubber toric (2) on the metal seal ring (6) at the bottom of the seal ring ramp (7) and against the retaining lip (8) (see illustration on previous page). Make sure the rubber toric is straight on the seal ring and not twisted. Be careful not to nick or cut the torics during this assembly, as this can cause leaks.
- 4) Put the installation tool (9) onto the metal seal ring (6) and rubber toric (2). Lightly dampen the lower half of the rubber toric with the appropriate assembly lubricant. Techniques to dampen the toric include wiping with a lint-free towel, lubricating using a clean foam brush, or dipping into a container lined with towels saturated in the assembly lubricant (as shown).



Approved Assembly Lubricants*

Isopropyl Alcohol

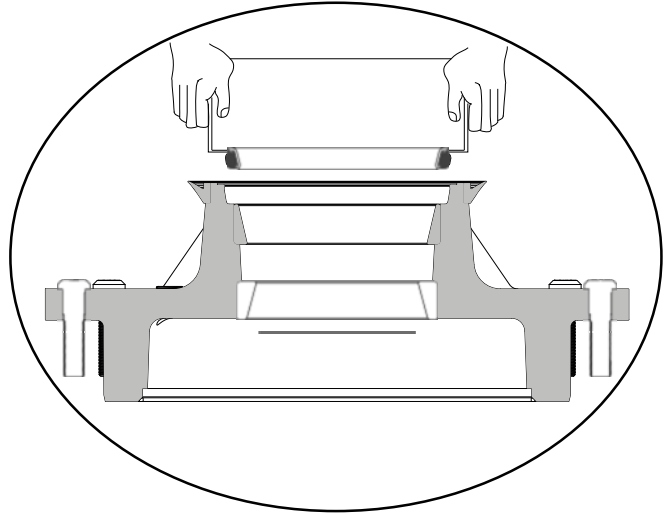
Houghto-Grind 60 CT

Quaker® Solvo Clean 68-RAH

***Do not use Stanosol or any other liquid that leaves an oil film or does not evaporate quickly.**

Installation Process

- 1) With the lower half of the rubber toric still wet, use the installation tool (9) to position the seal ring (1) and the rubber toric (2) squarely against the housing retainer lip (3) (as shown).
- 2) For smaller diameter seals, use sudden and even pressure to push the rubber toric under the retaining lip of the housing. For larger diameter seals, which will not press in with sudden and even pressure, it is acceptable to work the toric past the retaining lip by starting on one side and tapping the opposite side of the installation tool with a rubber mallet until it is engaged past the retaining lip of the housing.
- 3) Check the assembled height (A) (see below) in at least four places, 90° apart, using either a caliper, tool makers' ruler or any other calibrated measuring device. The difference in height around the ring must not be more than 0.04" (1 mm). If small adjustments are necessary, do not push or pull directly on the seal ring. Use the installation tool (9) to push down and your fingers to pull up uniformly on the rubber toric and seal ring.

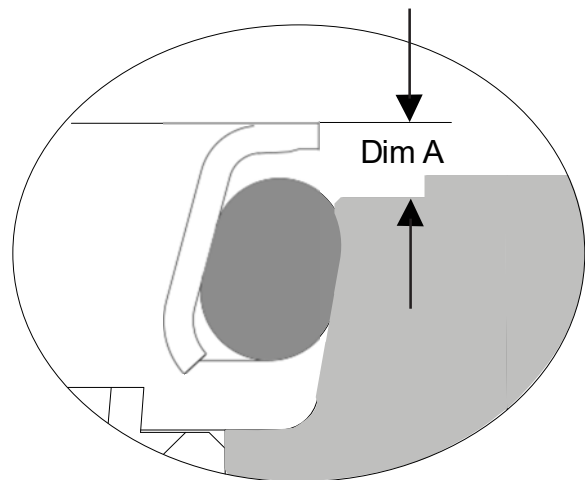


NOTE: The rubber toric can twist if it is not completely wet during installation or if there are burrs or fins on the retaining lip of the housing. Twists, misalignments and bulges of the toric will result in seal failure. If correct installation is not apparent, remove seal from the housing and repeat the process.

The rubber toric must never slip on the ramps of either the seal ring or the housing. To prevent slippage, allow adequate evaporation time for the lubricant before proceeding with further assembly. Once correctly in place, the rubber toric must roll on the ramp only.

- 4) Wipe each seal ring face (6) using a lint-free wipe. No particles of any kind are permissible on the sealing surfaces. (Even a hair is sufficient to hold the seal surfaces apart and cause a leak.)
- 5) Apply a thin film of oil on the entire seal face (6) of one or both seals using a clean finger or lint-free applicator. Oil must not contact surfaces other than the sealing faces.

NOTE: Mishandling of seals during assembly can cause immediate leaks or premature failure. Failure can occur due to curing or tearing of the elastomeric load ring, breakage of the sealing ring, contamination of the sealing face with dirt or lint, etc. When assembling metal face seals, please carefully observe assembly instructions.



Final Assembly

While completing the final assembly of the unit, make sure that both housings are in correct alignment and are concentric. Slowly bring the two housings together. High impact can scratch or break the seal components.

If the rubber toric slips at any location, it will twist, causing the seal rings to cock. Any wobbling motion of the seal is an indication of cocked seals and can cause dirt to enter by pumping mud past the torics.