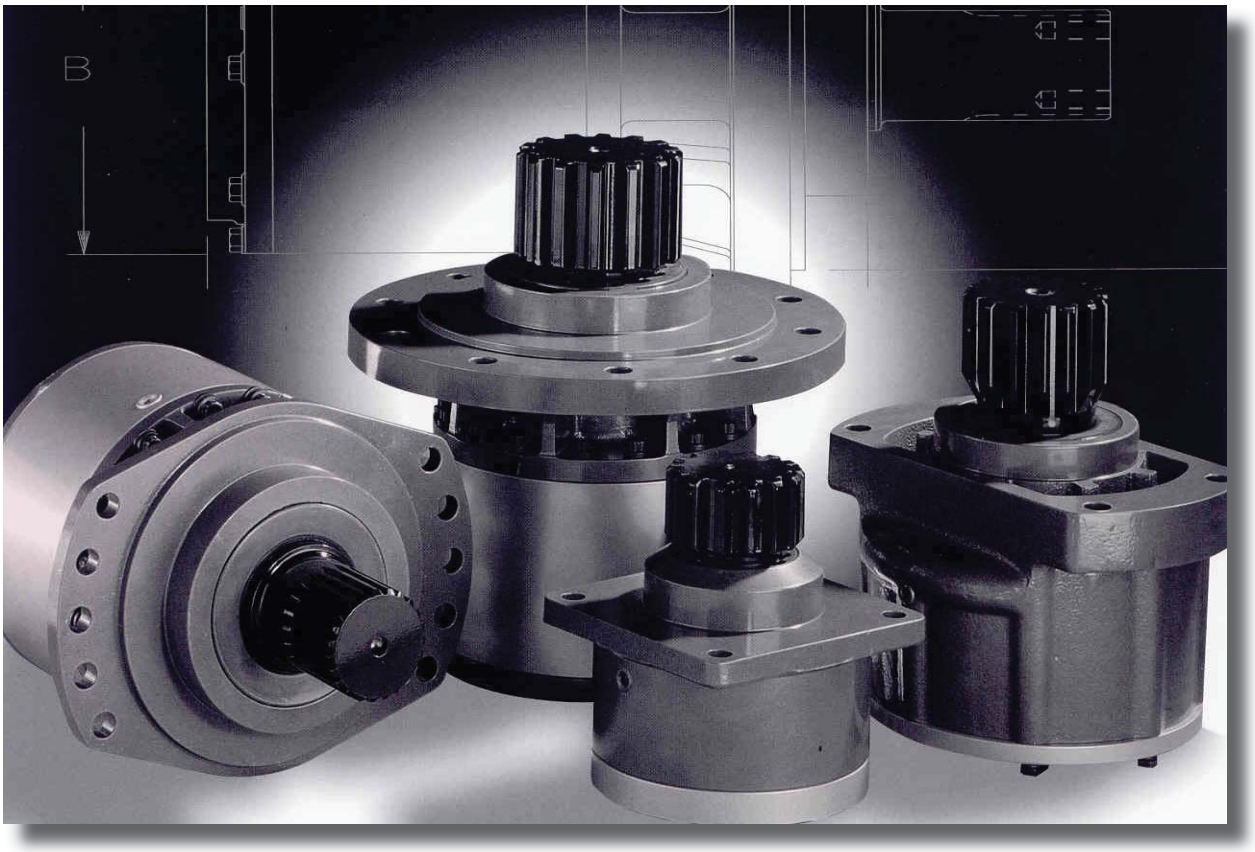
ESKRIDGE

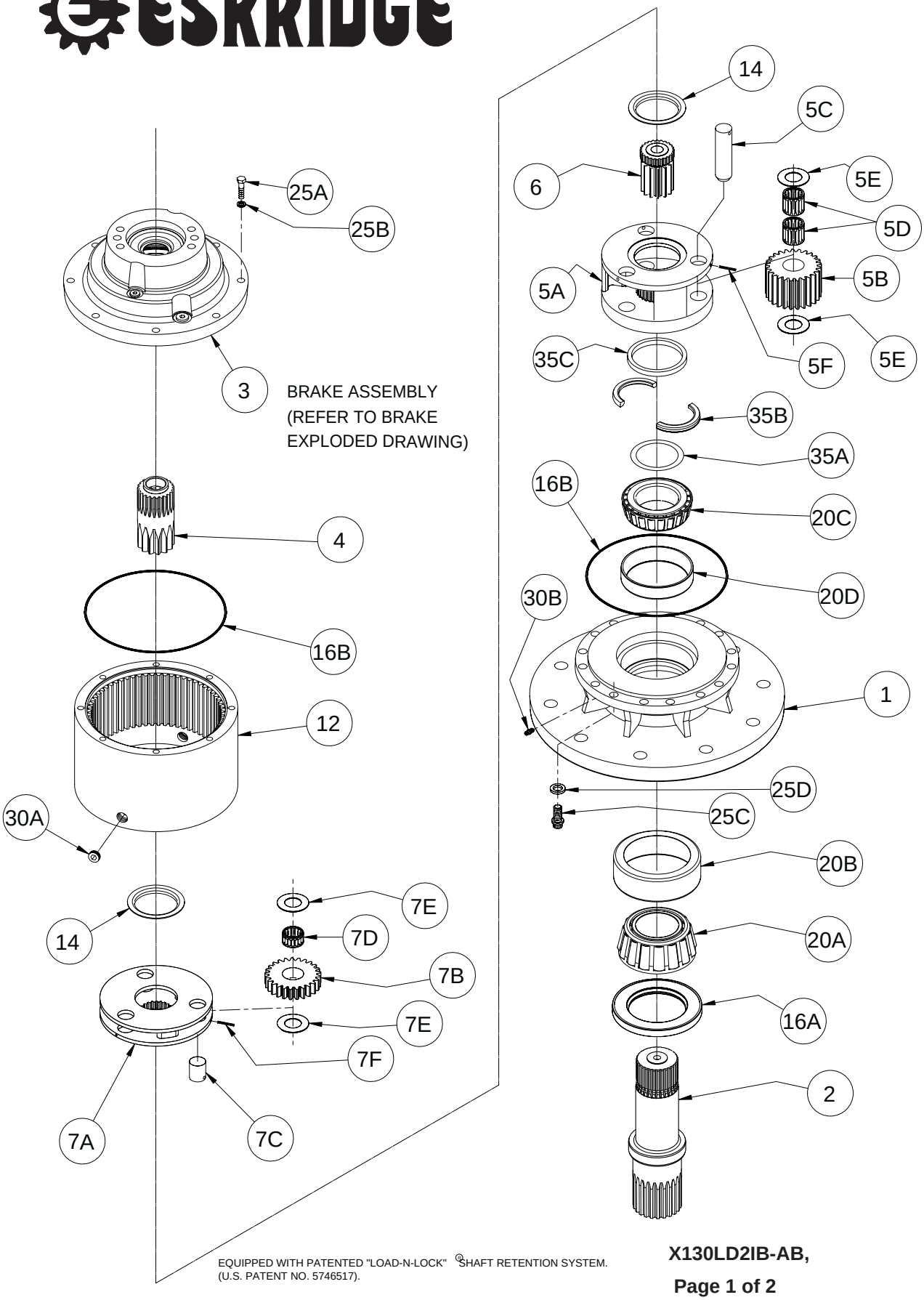
MODEL 130L PLANETARY GEAR DRIVE WITH INTEGRAL BRAKE SERVICE MANUAL



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: 56079 TO CURRENT
DATE: 10/01/02 TO CURRENT
VERSION: SM130LD2IB-AD

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.



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

X130LD2IB-AB,

Page 1 of 2

Effective date 10/01/02

Effective serial # 56079

MODEL 130L WITH INTEGRAL BRAKE

	ITEM	QTY	DESCRIPTION (RATIO'S →)	DOUBLE PLANETARY			
				26.52:1 (6.00 / 4.42)	33.15:1 (7.50 / 4.42)	36.00:1 (6.00 / 6.00)	45.00:1 (7.50 / 6.00)
BASE	1	1	A130 - ROUND FLANGE	81-004-0342			
			B130 - SQUARE FLANGE	81-004-0592			
			E130 - RECTANGULAR	81-004-3072			
			F130 - FLANGELESS	81-004-1142			
			C130 - CUSTOM				
OUTPUT SHAFT	2	1	D1 23 T 8/16 DP SPL 2.25" LG	81-004-1392L			
			D2 3.000" DIA, 5/8" SQ KEY	81-004-0992L			
			D3 23 T 8/16 DP SPL 1.22" LG	81-004-1412L			
			D4 23 T 8/16 DP SPL 2.72" LG	81-004-0942L			
			D5 3.500" DIA, 7/8" SQ KEY	81-004-1152L			
			C1 CUSTOM				
	3	1	INTEGRAL BRAKE	(SEE BRAKE EXPLODED DRAWING)			
	4	1	INPUT SHAFT 1-6B	13-004-9022	13-004-9062	13-004-9022	13-004-9062
	5	(1)	CARRIER ASSEMBLY-SECONDARY	13-005-2001	13-005-2001	13-005-2011	13-005-2011
	5A	1	CARRIER (SEC)	13-004-1062	13-004-1062	13-004-1072	13-004-1072
	5B	3	PLANET GEAR (SEC)	13-004-1082	13-004-1082	13-004-1092	13-004-1092
	5C	3	PLANET SHAFT (SEC)	81-004-0061			
	5D	6	BRG - SEC. PL.	01-105-0500			
	5E	6	THRUST WASHER - PLANET	81-004-1561			
	5F	3	ROLL PIN - SEC. PL. 3/16 X 7/8	01-153-0210			
	6	1	SUN GEAR	13-004-1152	13-004-1142	13-004-1152	13-004-1152
		(1)	CARRIER ASSEMBLY-PRIMARY	13-005-2031	13-005-2041	13-005-2031	13-005-2041
	7A	1	CARRIER (PRI)	13-004-1042	13-004-1052	13-004-1042	13-004-1052
	7B	3	PLANET GEAR (PRI)	13-004-1112	13-004-1122	13-004-1112	13-004-1122
	7C	3	PLANET SHAFT (PRI)	13-004-1021			
	7D	3	BRG - PRI. PL.	01-105-0590			
	7E	6	THRUST WASHER - PLANET	81-004-1561			
	7F	3	ROLL PIN - PRI. PL. 1/8 X 7/8	01-153-0180			
	12	1	RING GEAR	81-004-2362			
	14	2	CARRIER THRUST WASHER	81-004-2711			
	16	(1)	SEAL KIT	81-016-2941			
	16A	1	SHAFT SEAL -	01-405-0270			
	16B	2	O-RING	01-402-0420			
	20	---	OUTPUT SHAFT BEARINGS	----------			
	20A	1	OUTER CONE	01-102-0020			
	20B	1	OUTER CUP	01-103-0020			
	20C	1	INNER CONE	01-102-0030			
	20D	1	INNER CUP	01-103-0030			
	25	---	HARDWARE	----------			
	25A	8	BOLTS - COVER	01-150-1670			
	25B	8	LOCKWASHERS - COVER	01-166-0010			
	25C	16	BOLTS - RING	01-150-1460			
	25D	16	HARD WASHERS - RING	01-166-0120			
	30	---	PLUGS /GREASE ZERK	----------			
	30A	2	PLUG - RING	01-207-0041			
	30B	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			

ESKRIDGE

EFFECTIVE FOR:

FROM S/N: 73000 10-01-02

TO: CURRENT

Model 10 Integral Brake

ITEM	QTY	PART NO.	DESCRIPTION
1	1	13-004-9012	CASE - SAE 'A' 2 & 4-BOLT
2	1	(VARIES)	SHAFT (SEE GEARBOX EXPLODED DRAWING)
3	1	13-004-9032	PISTON
4	1	13-004-9042	BACKING PLATE
5	*	01-261-0501	SPRING (3/4 X 1 BLUE)
6	**	01-288-0072	FRICTION DISC (ROTOR)
7	**	01-288-0082	SEPARATOR PLATE (STATOR)
8	1	01-160-0670	RETAINING RING
9	1	01-112-0230	THRUST WASHER
10	1	01-400-0220	BACKUP RING
11	1	01-400-0260	BACKUP RING
12	1	01-402-0690	O-RING
13	1	01-402-0830	O-RING
14	2	01-208-0020	PLUG (SAE #4)
15	1	01-208-0070	PLUG (SAE #6)

NOTES:

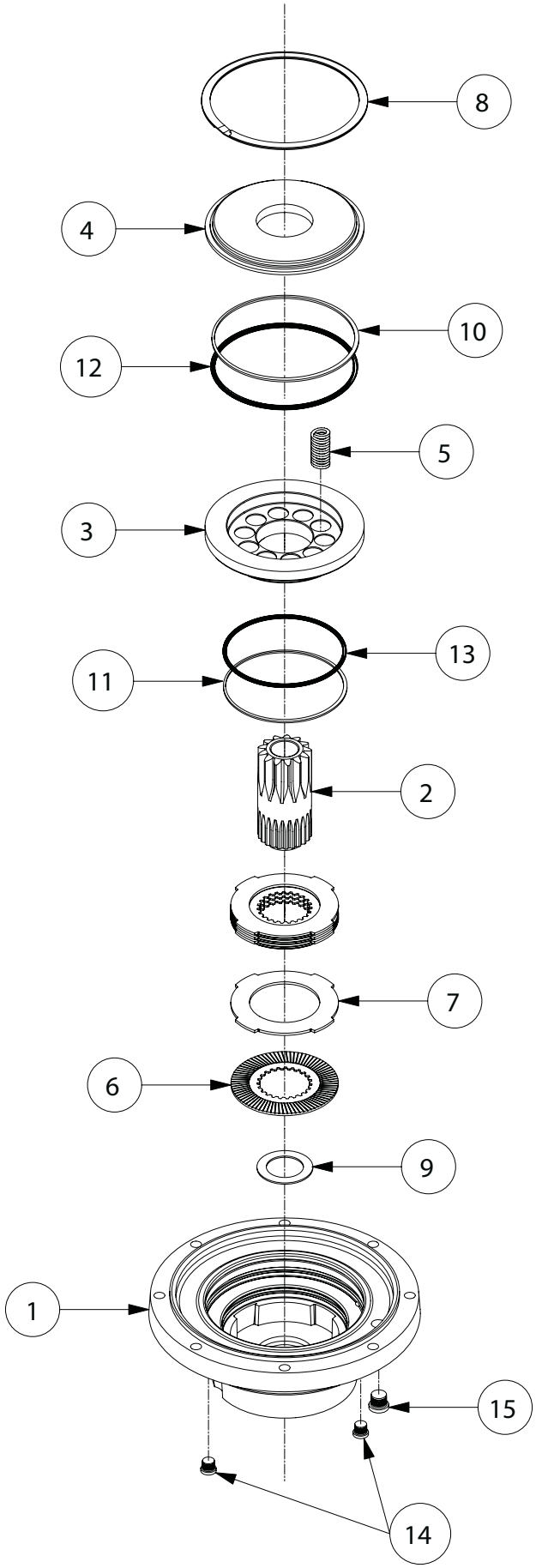
* 1. QTY OF SPRINGS MUST BE 2,4,5,6,8 OR 10 AS DETERMINED BY SPECIFIC BRAKE REQUIREMENTS.

** 2. TOTAL QTY OF FRICTION DISCS (ITEM 6) AND SEPARATORS (ITEM 7) MUST EQUAL 8. FULL COMPLEMENT BRAKE INCLUDES 4 FRICTION DISCS (ITEM 6) AND 4 SEPARATORS (ITEM 7).

OPTIONS:

1. SEAL KIT, P/N 95-016-2541 (INCLUDES 1 EACH, ITEMS 10,11,12,13)
2. FRICTION DISC KIT 95-016-2551 (INCLUDES 4 EACH ITEM 6)
3. SEPARATOR PLATE KIT 95-016-2561 (INCLUDES 4 EACH ITEM 7)

>>> NOTE THAT BRAKE IS SHOWN INVERTED (UPSIDE-DOWN) RELATIVE TO EXPLODED DRAWING OF PLANETARY GEARDRIVE.

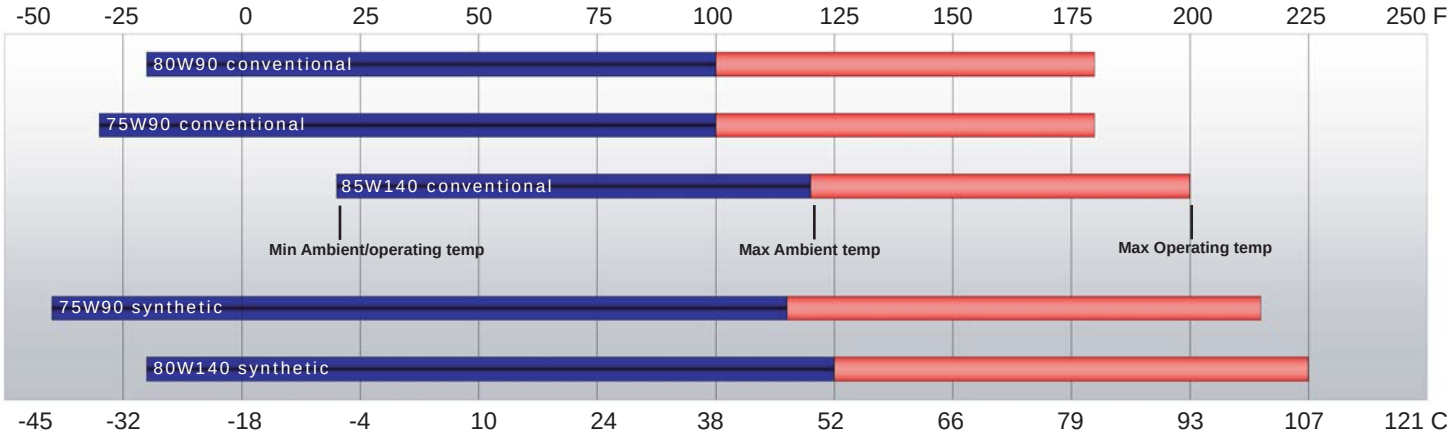


X10IB-AA ECN ----- 12-13-02

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 130L OIL CAPACITIES

Operating Position	Oil Capacity Single/Double stage	Oil Level
Horizontal Shaft	3.0 pints / 1.4 l	To horizontal centerline of gear drive
Vertical Shaft (Pinion Up)	5.0 pints / 2.4 l	To side port on gear drive base
Vertical Shaft (Pinion Down)	5.0 pints / 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/brake **(3)** to the base **(1)** before disassembly to aid in the proper positioning of pieces during reassembly.

2) Remove drain plugs **(30B & 15 of brake exploded drawing)** and drain oil from unit. The oil will drain out more quickly and completely if warm.

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

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

5) Lift the planet carrier assembly out of the unit .

6) Remove secondary carrier assembly. Remove ring gear (**12**), if necessary by removing the 16 1/2-13 12-point cap-screws (**25C & 25D**). Inspect the 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 **(7F pri/5F 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 pri/5A sec)**.

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.

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

Carrier Reassembly

1) Insert the bearings (**7D pri/5D sec**) into the planet gears (**7B pri/5B sec**). Place a planet washer (**7E pri/5E sec**) on top and bottom of planet gear and slide into carrier (**7A pri/5A sec**).

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 out-side diameter of carrier **(7A pri/5A sec)**; this will ease alignment of holes while inserting roll pins **(7F pri/5F sec)**.

3) Drive roll pin **(7F pri/5F 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 preload may result in a rolling torque which varies between 50 to 350 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 preload.

8) 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)**.

Brake Subassembly Teardown

The 10" integral brake is spring loaded (normally applied) and requires hydraulic pressure to release. All brakes are individually tested at the factory for function, leaks and static breakaway torque and are tested to be within +/-20% of the rated torque. Because the brake is integral with the gear drive it is designed to run "wet." Brake holding torque will be affected by the actual lubricant used but it is intended for operation with EP 80/90 gear oil. Orientation of the gearbox also affects the performance of the brake. With the gearbox mounted horizontally or vertically, pinion-up, the clutch plates will be bathed in oil and the holding torque will be in the -20% range. With the gearbox mounted in the vertical, output-down orientation, the brakes plates will not run in oil and the holding torque should be in the +20% range.

	Continuous	Intermittent
MaxOperating release pressure (psi)	**1500 psi**	**3000 psi**
max Operating Speed (rpm)	**2000 rpm**	**3000 rpm**
Max Operating Temperature (deg F)	**170° F**	**200° F**
Oil Volume Required to Release Brake	**0.62 in^3**	
Seal Compatibility	**Mineral Based Hydraulic Oil**	

Note: Item numbers in this section refer to the exploded drawing of the integral brake found on page 3.

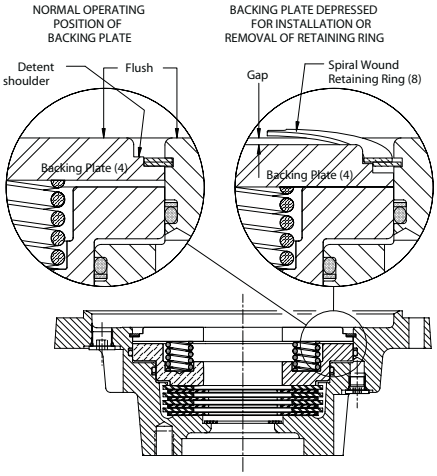
1) Remove the retaining ring **(8)** as follows:

   a) With brake assembly oriented large end up as shown in exploded view, apply downward force on backing plate **(4)** to compress springs **(5)**. Each spring exerts about 300 pounds of force.

   b) Press the plate as far as it will go (about 1/16 inch of travel). This can be done with a hydraulic press or a piece of (at least 1/2-13) all-thread, washers and hex nuts through the middle of the brake.

   c) With backing plate **(4)** pressed away from the retaining ring **(8)**, start the retaining ring out of the groove by prying the end of it with a screw driver.

   d) Grab the end of the retaining ring with your hands and with a circular motion, work the retaining ring the rest of the way out of the groove.



NOTE: The retaining ring (8) is normally under very high spring load. DO NOT attempt to remove it without first releasing spring load by depressing the backing plate (4) as described above. Personal injury and/or damage to the brake will result if this step is not followed.

2) Remove springs **(5)**.

8) Remove piston **(3)** as follows: Apply low air pressure (20-30 psi) to the brake release port while holding one hand on top of the piston **(3)**. It is a good idea to first place a shop rag over the piston. The air will force the piston **(3)** out of the case **(1)**.

4) Remove the friction discs **(6)**, separator plates **(7)**, O-rings **(12, 13)** and back-up rings **(10,11)** and thrust washer **(9)** from case **(1)**.

Brake Inspection

1) Clean all parts prior to inspection.

2) Case **(1)**: grooves for O-rings and retaining ring should be clean and free of nicks and dings. Inspect retaining ring groove for any yielding. Replace housing **(1)** if yielding has occured.

3) Shaft **(2)**: Should be free of heavy wear. Gear teeth should show no signs of pitting or surface spalling. Spline on inside and outside of shaft should not show any fretting wear beyond surface discoloration.

4) Piston **(3)**: Should be free of all scratches, nicks and dings on the two diameters that seal against O-rings in the case. Only very minor scratches may be dressed with 600 grit and finer emory paper to a 32 micro-inch finish or better.

5) Backing plate **(4)**: Shoulder that bears against retaining ring **(3)** should be square and free of nicks and dings.

6) Springs **(5)**: May be reused if no signs of cracks or rust. Springs do eventually fatigue and fail after many cycles so it is always recommended that they be replaced during non-routine servicing.

7) Friction & separator plates **(6 & 7)**: May be reused if not excessively worn. There should be 8 parts total in the friction pack, 1-4 friction discs and 4-7 separator plates. Replace friction discs if the full stack measures less than .775 inches height. This height represents a 10% reduction in holding torque versus "new".

8) Retaining ring **(8)**: Should lay relatively flat and round in

the free state. Replace if height measures more than .25" when checked on a flat surface or if the 2 spiral coils do not lay one on top of the other.

9) Back-up & O-rings **(10, 11, 12 & 13)**: It is recommended that they be replaced during non-routine servicing. They may be reused if replacements are not available only if they are free of cuts and wear. Be sure to check all surfaces.

Brake Reassembly

Note: Item numbers in this section refer to the gearbox exploded drawing found on page 1 and 2.

1) Install thrust washer **(9)** in case **(1)**.

2) Friction discs **(6)** may be installed dry or they may be pre-wetted with gear oil. A friction disc **(6)** should be placed in the cased **(1)** followed by a separator plate **(7)**. Alternate with friction discs **(6)** and separator plates **(7)** in exactly the same order as they were removed. There must always be a separator plate **(7)** on the exposed (piston) end of the stack and a friction disc **(6)** on bottom end of stack.

3) With the friction pack in place, align the splines of the friction discs **(6)** using the shaft **(item 12 from gearbox exploded drawing)**. The shaft must be able to slip all the way through the friction pack to the thrust washer **(9)**.

4) Install O-rings **(12 & 13)** such that they are nearest each other with the back-up rings **(10 & 11)** to the outside.

5) Lubricate the O-rings **(12 & 13)** and piston **(3)** with gear or hydraulic oil. Gently slide piston **(3)** into case **(1)** using heel of both hands as far as it will go. Recheck spline alignment of friction discs with the shaft **(item 12 from gearbox exploded drawing)**. Using a mallet or light force, press the piston into the case **(1)** till it drops below the retaining ring groove.

6) Install springs **(5)** into the piston **(3)**. They must be evenly spaced such that spring force is always balanced side-to-side.

7) Set backing plate **(4)** with stepped side up, on top of springs **(5)** in case **(1)**. Set the retaining ring **(8)** on stepped lip on backing plate **(4)**. Using hydraulic press or suitable apparatus (mentioned above), press and hold the backing plate **(4)** as far as it will go below retaining ring groove. Refer to detail view in Disassembly instructions.

8) Using your hands, install the retaining ring **(8)** in its groove in the case **(1)**. Start one end into the groove and work the rest of it into the groove with a circular motion. A flat-blade screwdriver or awl may help in the installation but no other tools should be needed. If the retaining ring doesn't go in freely then the backing plate is not pressed far enough into the case **(1)**.

9) When installed, release the load against the backing plate **(4)**. Check that the ring is properly seated in the groove and below the detent shoulder in backing plate **(4)**. Refer to detail view in disassembly instructions.

10) Reinstall shaft **(12, gear drive drawing or 2, brake drawing)** and verify that it will insert through the brake to the thrust washer **(9)**. If not, apply pressure to the release ports to disengage the brake. Shaft must insert all the way through to the thrust washer **(9)** in order for the brake unit to install properly on the gear drive

.

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 and cover **(3)** pilot.

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

3) Align gear teeth of secondary ring gear **(12)** 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.

4) Install and torque the 16 1/2-13 12-point-head cap-screws **(25C)** with hard washers **(25B)**. The torque for the cap-screws: **110 ft-lb dry, 90 ft-lb** if the fasteners are lubricated.

5) Install the primary carrier assembly and sun gear **(6)** into the secondary carrier.

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

7) Install the thrust bearing **(14)** Refer to exploded view for details.

8) Noting the scribed line made during disassembly, (with lubricated o-ring in place) align and install the cover/brake **(3)**. Install the 8 3/8-16 hex-head cap-screws and lockwashers **(25A and 25B)**. Tighten to a torque of **45 ft-lb dry, 35 ft-lb** if the fasteners are lubricated.

9) Release the brake with hydraulic pressure on one of the release ports and, 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 rec-