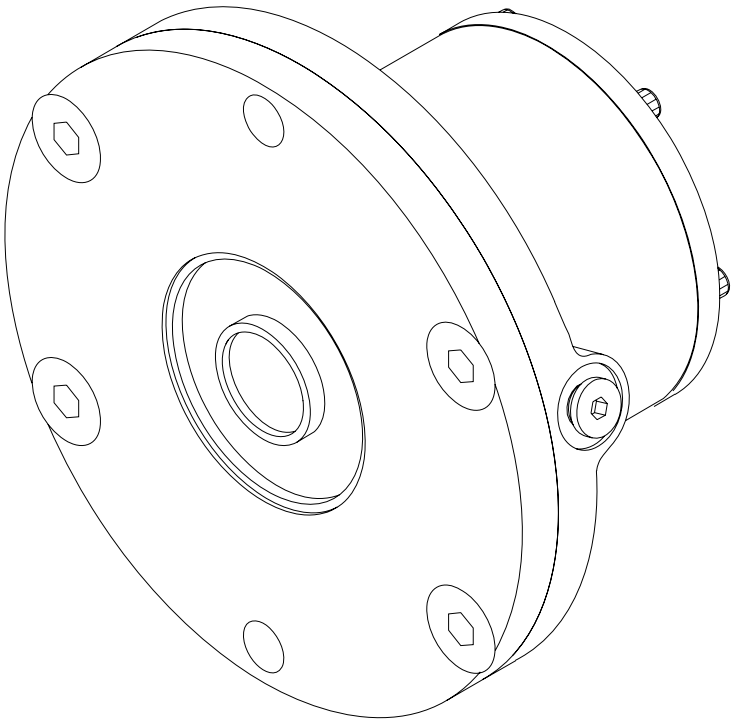
ESKRIDGE

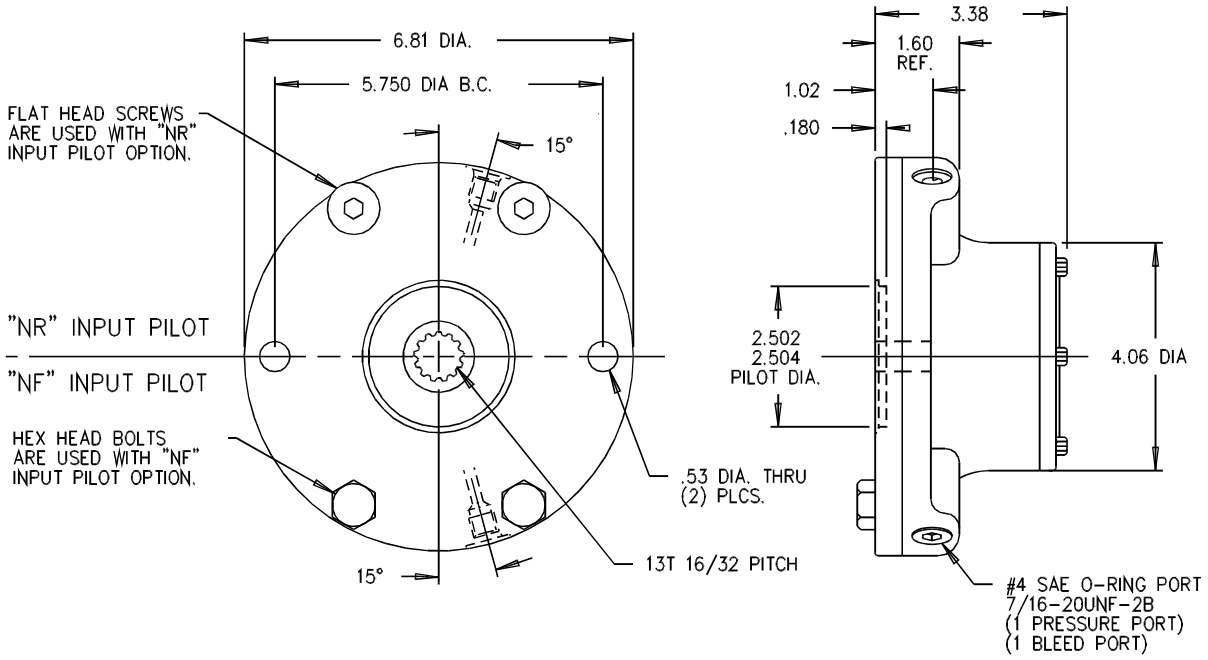


MODEL 93-110

MULTIPLE DISC BRAKE
SERVICE AND REPAIR MANUAL

EFFECTIVE FOR:
S/N: 14926 - UP
DATE: 09/01/89 - UP
REF: SM93110-AD

Part Number & Technical Information



Maximum pressure	3,000 PSI
Maximum continuous pressure	3,000 PSI
Maximum speed	3,900 RPM
Shaft splines	30° involute, flat root side fit per ANSI B92.1-1970 Internal-class 7 External-class 5

Maximum operating temperature	170°F
Volume of oil to release brake	.50 cu. in.
Approximate weight	15 lbs.

Breakaway torque may vary +/- 10% from specified ratings. Use of fluids other than ATF type F must be compatible with internal seals. Wet brake torque based on ATF-F fluid in friction plate cavity. Use only mineral base hydraulic oil to release brake. Bolt brake to motor before pressurizing above 300 PSI.

Part Number Information

Model — **931** [ ] **2** [ ]

Input Pilot

NF Nichols 110/310 Series Motors

NR Nichols 120/130 Series Motors

Input Shaft

2 13T 16/32 Spline

Torque

Torque Code	*Release Pressure (Initial/Full)*
G046 = 1650 lb-ins	110/150 PSI
G056 = 2100 lb-ins	140/185 PSI
G066 = 2500 lb-ins	165/220 PSI
G086 = 3300 lb-ins	220/295 PSI
G106 = 4100 lb-ins	275/370 PSI

Model 93-110 Service Manual

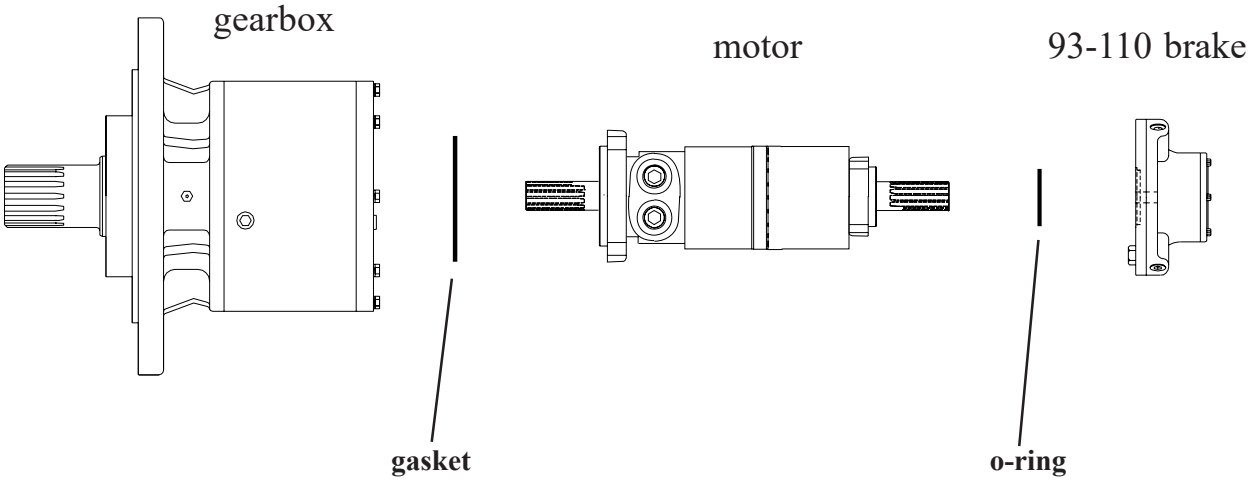
The Model 93-110 Series Eskridge brake is a spring applied, hydraulically released, multiple disc parking brake. The 93-110 is designed with wet organic friction plates for failsafe operations. Dry bronze friction plates are available as an option.

All the brakes are individually tested at the factory for function, leaks, and static breakaway torque. A failsafe brake should be used only when the requirement is a minimum static holding torque.

Temperature, wear, and contamination of the friction surfaces will affect the performance of the brake and should be taken into consideration when specifying a required torque rating. Care should be taken to avoid damaging the splines or mounting surfaces during installation.

The model 93-110 is not intended for use in dynamic applications.

Brake operation should be tested during normal service operation. Brake inspection and service should be part of the normal service and maintenance schedule of the equipment or vehicle in which it is used. Any loss of holding torque requires the removal, inspection and replacement of suspect components.



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

Installation

NOTE: *Before beginning installation procedures, visually inspect brake mounting flanges and shaft splines for damage during shipping.*

1) Position brake and motor for mounting and to orient the bleed and release ports as required. If mounted with shaft horizontal, the bleed port should be at top. It might be necessary to release brake before it can be rotated to align mounting holes. If so, follow instructions in steps 5 and 6 prior to applying release pressure!

2) Use only SAE grade 5 (or better) fasteners for mounting brake and motor.

3) Allow at least one bolt diameter of thread engagement when selecting fastener lengths. Be sure fasteners will not bottom out when fully tightened.

4) See torque chart below for torque values.

5) Remove plastic protective plug from pressure port of brake and attach a hydraulic pressure line with a 7/16-20UNF-2A straight thread o-ring fitting. Use only mineral based hydraulic oil to test and operate the brake.

6) Apply low pressure (20-30 PSI) to brake release port. Loosen hollow hex plug **(ITEM 13)** opposite pressure port just enough to allow air to bleed from between piston o-rings. After air has been bled from brake, remove pressure, tighten plug.

TORQUE IN FT-LBS

THREAD	SAE GRADE 5		SAE GRADE 8	
SIZE	*DRY*	*LUBED*	*DRY*	*LUBED*
3/8-16	30	23	45	35
1/2-13	75	55	110	80
5/8-11	150	110	220	170
3/4-10	260	200	380	280

Disassembly

1) If end cap bearing **(ITEM 9)** or base gasket **(ITEM 8)** need to be replaced, read note and follow step 2. Otherwise, skip to step 3.

NOTE: When inverting brake in step number 2, input end must be capped off with motor or plastic protective closure (used during shipping) to prevent fluid loss. If fluid loss occurs, additional fluid must be added back into brake before operation. To add fluid media*, fully reassemble brake and turn with input facing upward. Remove cover and piston **(DISASSEMBLY steps 4 through 9)** and pour fluid over friction plates until fluid level is even with top friction disc **(ITEM 14)**.

2) To replace the end cap bearing or base gasket, it is not necessary to remove cover. Invert the brake and remove the six capscrews **(ITEM 12)**. Remove the end cap **(ITEM 3)**. Base gasket or bearing may now be removed. When reassembling, torque the capscrews **(ITEM 12)** to 45 in-lbs.

3) Remove any plugs and fittings from the brake pressure and bleed ports. Drain, or blow out, as much hydraulic oil as possible from the brake into a suitable container for proper disposal.

4) Place brake on stable work platform. Support the brake so it won't fall over.

5) Remove the four capscrews **(ITEM 11)** from input end of brake. The capscrews and cover (**ITEM 2**) are under spring load. The capscrews should be loosened gradually and uniformly.

6) Remove cover. This will expose the internal components of the brake. The case seal o-ring **(ITEM 7)** will be attached to the case **(ITEM 1)**. Inspect the o-ring and replace with a new one if worn or damaged.

7) Note the color, number, and spacing of the springs **(ITEM 20)** then remove them from piston **(ITEM 4)**. Inspect springs and replace with new ones if damaged, broken or discolored from heat.

8) Remove thrust race **(ITEM 10)** from top of shaft **(ITEM 5)**.

9) Apply low pressure (20-30 PSI) to the brake release port while holding one hand on top of the piston **(ITEM 4)** and springs. The air will force the piston out of the case. If the friction disks **(ITEM 14)** will be reused, turn the brake upside down so hydraulic oil cannot run into the case and contaminate the friction disks.

10) Note arrangement of friction discs **(ITEM 14)**, separator plates **(ITEM 15)**, and spacers **(ITEM 6)**.

11) Remove friction discs, separator plates and spacers. Any friction discs or separator plates that are damaged, warped, or excessively worn should be replaced with new ones.

12) Inspect brake shaft splines and bearing journals for abnormal wear or damage.

13) Remove o-rings **(ITEMS 18 & 19)** and back-up rings **(ITEMS 16 & 17)** from piston. Replace with new ones if worn or damaged.

Assembly

NOTE: Parts must be clean and dry before assembly. Clean contamination from bronze friction disks using liquid Ether or liquid Freon. If these chemicals are not available replace the friction disks! Cleaning the sintered bronze material with any other media can affect the brakes torque rating! Visually inspect components for damage and abnormal wear. Do not use damaged or worn parts.

1) Place brake case **(ITEM 1)** on a stable work platform, small side down.

2) Install the end cap bearing **(ITEM 9)** and shaft **(ITEM 5)**.

3) If the brake uses spacers **(ITEM 6)**, install them.

4) Install separator plates **(ITEM 15)** and friction discs **(ITEM 14)** in exactly the same order as they were removed. There should be a friction disc on the top and bottom of the stack. Do not place a separator plate next to the piston. *Be careful not to contaminate the friction disc or separator plate surfaces with dirt, grease, or fluid other than the brake was designed to use.*

NOTE: If installing new friction discs, soak all discs in specified fluid media* for approximately 10 minutes before installation.

5) Pour fluid media* over the friction plates or until the fluid level is even with top friction disc.

6) If replacing piston o-rings **(ITEMS 18 & 19)** and piston back-up rings **(ITEMS 16 & 17)**, be sure o-rings are nearest each other with back-up rings to the outside of the piston **(ITEM 4)**. Lightly lubricate piston bores and o-rings. *Take care not to get lubricant onto friction pack.*

7) Gently slide piston into case until larger o-ring touches case. Using a light to medium duty press, push piston completely into bore. This will squeeze the o-rings and back-up rings and set piston against friction pack.8) Place springs **(ITEM 20)** into spring pockets in piston. Arrange springs in a symmetrical pattern.

9) Install the thrust race **(ITEM 10)** on top of shaft **(ITEM 5)**.

10) Install o-ring **(ITEM 7)** around lip on case **(ITEM 1)**.

11) Set cover on top of piston, springs, and shaft.

12) Apply a non-hardening thread-locking compound to each cover capscrew **(ITEM 11)** and start each one into the case by hand. Tighten cover capscrews 1/2 turn at a time in a crisscross pattern until cover is tight against the case. Tighten to the torque shown in the chart on page 3. *A light to medium duty press can be used to push the cover down on to the case so the cover bolts can be installed more easily.*

13) The brake is now ready for testing of fit, function and release pressure. Use only mineral based hydraulic oil to test and operate Eskridge multiple disc brakes. ***Bleed brake before pressurizing.*** To test release pressure, be sure one of the two hollow hex plugs **(ITEM 13)** is installed. Connect a hydraulic power source (either a hand pump or port-a-power) to the other brake port. Bleed air from brake, then pressurize the brake slowly to the advertised release pressure, both initial and full. As you pressurize the brake, rotate the brake shaft. The brake shaft should be able to turn at the advertised initial release pressure (+ or - 25 PSI). There will be drag on the shaft. Increase the pressure slowly until the shaft spins freely, this is the full release pressure. As you pressurize the brake, look for signs of leaks which would indicate that the o-rings or back-up rings may have been damaged during assembly.

***** Unless otherwise specified, series 93 brakes use automatic transmission fluid (ATF type F) as a fluid media. ATF-Dextron will give somewhat different torque characteristic. Some brakes are specifically designed to use hydraulic oil, gear lube, or other fluid media.

Tool list

torque wrench
soft-faced hammer
3/8 inch hex key wrench
5/16 inch hex key wrench
small flat tip screwdriver
o-ring lubricant
non-hardening thread-locking compound
bearing installation tool

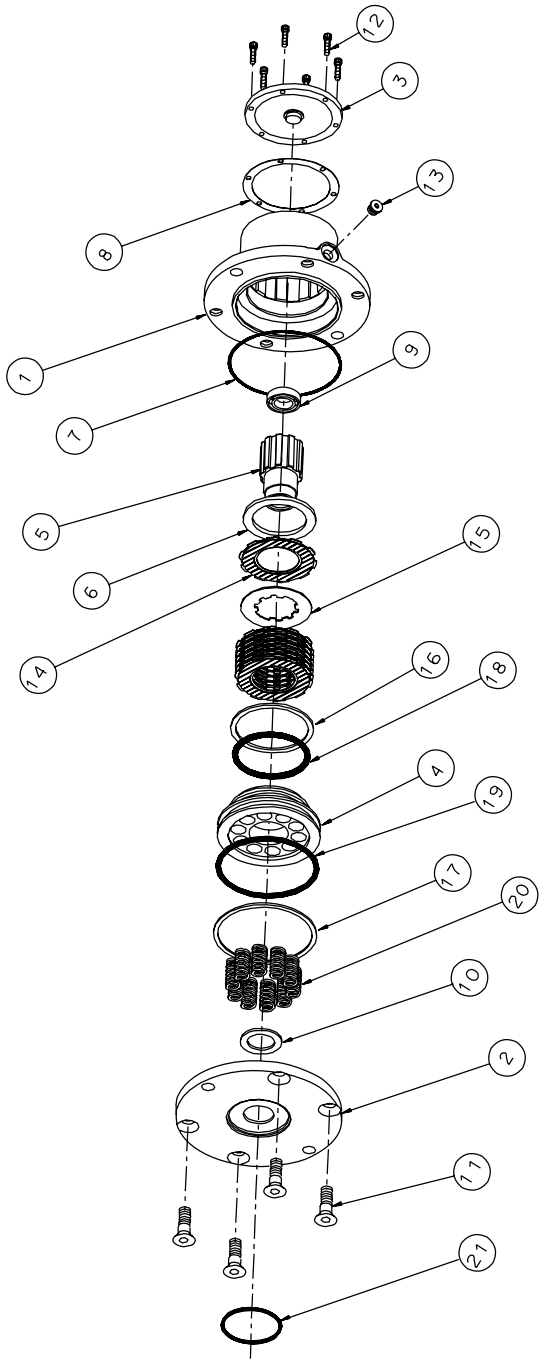
For release pressure testing:

hydraulic hand pump or port-a-power
with a pressure guage and 7/16-20 UNF-2A
straight thread o-ring fitting on the pump hose.

ESKRIDGE

THIS DRAWING IS EFFECTIVE
FROM: S/N 14926, SEPT. 1989
TO: CURRENT
REF: X93-DE

ITEM	MODELS 93-110 QTY 931-NF	MODELS 93-110 QTY 931-NR	MODELS 93-120 QTY 932-NF	MODELS 93-120 QTY 932-NR	PART NO.	DESCRIPTION
1	-	-	1	1	93-004-0894	CASE - 93-120
1	1	1	-	-	93-004-0884	CASE - 93-110
2	1	-	1	-	93-004-1113	COVER - NF
2	-	1	-	1	93-004-1123	COVER - NR
3	1	1	1	1	93-003-1061	END CAP
4	1	1	1	1	90-004-1182	PISTON
5	-	-	1	1	93-004-1103	SHAFT- 13T (93-120)
5	1	1	-	-	93-004-1083	SHAFT- 13T (93-110)
6	*	*	*	*	90-004-1031	SPACER
7	1	1	1	1	01-402-0580	O-RING SEAL
8	1	1	1	1	90-004-1111	BASE GASKET
9	1	1	1	1	01-100-0200	BEARING
10	1	1	1	1	01-112-0290	THRUST BEARING
11	4	-	4	-	01-150-1390	HHCS (1/2-13 X 1)
11	-	4	-	4	01-150-1440	FH SCS (1/2-13 X 1)
12	6	6	6	6	01-150-1030	SHCS (#10-24 X 3/4)
13	1	1	1	1	01-208-0020	HOLLOW HEX PLUG
14	*	*	*	*	01-288-0010	FRICTION DISC
15	*	*	*	*	01-288-0020	SEPARATOR PLATE
16	1	1	1	1	01-400-0120	BACK-UP RING
17	1	1	1	1	01-400-0140	BACK-UP RING
18	1	1	1	1	01-402-0450	O-RING
19	1	1	1	1	01-402-0470	O-RING
20	**	**	**	**	01-261-0290	SPRING
21	1	1	1	1	01-402-0590	O-RING-MOTOR MOUNT



REPAIR KITS FOR SERIES 93 BRAKES

FRICTION DISC KIT 93-016-1211
- 01-288-0010 FRICTION PLATES (8)

SEPARATOR PLATE KIT 93-016-1221
- 01-288-0020 SEPARATOR PLATE (11)

SEAL KIT 93-016-1181
- 01-400-0120 BACK-UP RING, PISTON (1)
- 01-400-0140 BACK-UP RING, PISTON (1)
- 01-402-0450 O-RING, PISTON (1)
- 01-402-0470 O-RING, PISTON (1)
- 01-402-0580 O-RING, CASE SEAL (1)
- 01-402-0590 O-RING, MOTOR PILOT (1)
- 90-004-1101 GASKET, COVER (1)
- 90-004-1111 GASKET, BASE (1)
- 90-004-1171 GASKET, MOTOR (1)

MASTER REBUILD KIT 93-015-1311
- 93-016-1211 FRICTION DISC KIT (1)
- 93-016-1181 SEAL KIT (1)
- 01-100-0120 BEARING (1)

Due to the many combinations of torques and release pressures available for the 93-110, it is impossible to detail each style and supply a repair kit for each individual model. The information listed in this manual is representative of all 93-110 brakes. The repair kits listed below will work with all combinations of torque vs. release pressure, input mountings and friction plates. It is entirely possible to have "extra" parts left over from the repair kits after you have completed the repair or maintenance. If you are not sure about what is required for your brake and its configuration, please contact Eskridge.

* QUANTITIES OF FRICTION DISCS, SEPARATOR PLATES, SPACERS AND SPRINGS MAY VARY DEPENDING ON CUSTOMERS SPECIFIC TORQUE RATING AND RELEASE PRESSURE REQUIREMENTS.
93-120 BRAKES REQUIRING A FULL COMPLEMENT OF FRICTION DISCS (QTY 10) AND SEPARATOR PLATES (QTY 9) WILL NOT INCLUDE ANY SPACERS (ITEM NO.6).
93-110 BRAKES REQUIRING A FULL COMPLEMENT OF FRICTION DISCS (QTY 7) AND SEPARATOR PLATES (QTY 6) WILL NOT INCLUDE ANY SPACERS (ITEM NO. 6).
ONE SPACER TAKES THE PLACE OF ONE FRICTION DISC AND ONE SEPARATOR PLATE.

**QUANTITY OF SPRINGS (10 MAX) DETERMINES BRAKE HOLDING TORQUE AND RELEASE PRESSURE.

ESKRIDGE FINISHED PRODUCT
LIMITED WARRANTY

1.1 **Scope of Warranty Coverage**. Upon the terms and subject to the conditions set forth in this limited warranty:

(a) ESKRIDGE (referred to herein as "**ESKRIDGE**" or the "**Manufacturer**") warrants to each initial end user customer (a "**Purchaser**") of a new finished product together with any accessories manufactured and sold directly from ESKRIDGE (the "**Product**") that the Product shall be free from defects in material and workmanship, under normal working and service conditions, for a period of eighteen (18) months from the date the Product is shipped from ESKRIDGE. (the "**Warranty Term**"). A Purchaser shall be eligible for an additional eighteen (18) months of coverage in addition to the Warranty Term (also referred to as the "**Standard (+) PLUS benefit**") only if the Purchaser (i) complies with Section 1.2(a) and (ii) registers the Product during the Warranty Term at myproduct.eskridgeinc.com.

(b) Notwithstanding the foregoing, this warranty does not cover components damaged by accident, abuse, misuse, neglect, untrained operators, collision, overloading, modification, disassembly, rework, misapplication, improper installation, lack of lubrication or maintenance, or improper service. This warranty does not cover the paint or material finish, removal or reinstallation of the Product, or normal wear and tear and loss of functionality due to aging of the Product (which may include but is not limited to bearings, bushings, seals, O-rings, gaskets, brake material, motor brushes, electrical cables and more).

1.2 **Eligibility of Warranty Coverage**.

(a) A Purchaser shall be eligible for warranty coverage under this Limited Warranty during the Warranty Term only if:

(i) Prior to placing a Product in service, and throughout use of the Product during the Warranty Term, the Purchaser provides (or causes to be provided) proper storage such that foreign objects (e.g. rain or debris) cannot enter any Product through entry ports which are normally closed during operation.; and

(ii) The Purchaser maintains, or causes to be maintained, the Product according to commercially reasonable standards and utilizes the Product for the purposes for which it was created; and

(iii) No repairs or alterations have been made by any party other than ESKRIDGE, including Purchaser, unless otherwise authorized in writing by ESKRIDGE.

1.3 **Transferability of Warranty**.

(a) This warranty is transferable only from the Purchaser to the first subsequent transferee (the "**Transferee**") of the Product from Purchaser upon (i) written notification to ESKRIDGE and (ii) registration of the transfer, both within 30 days of such Product transfer.

(b) Upon satisfaction of transfer requirements set forth in Section 1.3(a), the Transferee shall succeed to all the rights and obligations of the Purchaser set forth in this Limited Warranty.

1.4 **Certain Limitations on Scope of Warranty Service**.

(a) Any obligation of ESKRIDGE under this warranty, statutory or otherwise, is limited to the repair of the Product, at its factory or Authorized Service Centers. Notwithstanding the foregoing, if field service or repair is performed by ESKRIDGE at the request of the Purchaser and no defect is found with material or workmanship of the Product, the Purchaser shall compensate ESKRIDGE for its time and expenses within thirty (30) days of delivery of an invoice relating to the same. If repair is determined by ESKRIDGE in its sole, absolute and uncontrolled discretion to be impossible or impractical, then ESKRIDGE may satisfy this warranty by replacing the Product. ESKRIDGE will not provide any cash payment or credits for defective materials or workmanship.

(b) Purchaser shall be responsible for any and all freight charges for any Product receiving warranty service under this limited warranty. Any travel time, transportation charges, freight charges, or similar costs incurred by ESKRIDGE in connection with the replacement or repair of defective parts, shall, be the responsibility of the Purchaser. If applicable, ESKRIDGE shall invoice Purchaser for the total amount of such charges within sixty (60) days of fulfilling its duties under this warranty, payable within thirty (30) days of delivery of such invoice. In no event shall ESKRIDGE be liable for bills for service, labor or other expenses that have been incurred by the Purchaser without approval or prior authorization by ESKRIDGE for inspection, maintenance, or repair of the Product.

(c) If a Product is found to be operable upon inspection, the Product, at Purchaser's election, may be either (1) returned to the Purchaser with a service charge from ESKRIDGE for inspection, cleaning, and routine replacement of all rubber components and any other parts that show wear; or (2) ESKRIDGE can dispose of the product safely.

1.5 **Limitations of Liability**. ESKRIDGE shall in no event be liable for punitive, special or consequential damages relating to the Product or this Warranty. ESKRIDGE makes no warranty in respect to third-party accessories, upgrades, or additions to the Product.

1.6 **Improving Product**. ESKRIDGE reserves the right to improve the Product through changes in design or materials as it may deem desirable or necessary without being obligated to incorporate, upgrade, or otherwise modify previously manufactured products.

1.7 **Limitations of Warranty**.

(a) THE WARRANTY SET FORTH ABOVE IS THE ONLY EXPRESS WARRANTY. ESKRIDGE HEREBY DISCLAIMS AND EXCLUDES ANY OTHER EXPRESS, IMPLIED, OR STATUTORY WARRANTIES, ARISING BY OPERATION OF LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE, OF TRADE, OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY.

(b) ANY IMPLIED WARRANTY WHICH BY LAW MAY NOT BE EXCLUDED IS LIMITED IN DURATION TO ONE (1) YEAR FROM THE DATE OF ORIGINAL RETAIL PURCHASE OF THE PRODUCT.

(c) This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

(d) This warranty is valid only in the U.S.A. and Canada. For warranty outside the U.S.A. and Canada contact your nearest Eskridge Distributor.

1.8 **No Modifications to Warranty**. No ESKRIDGE dealer, distributor, agent or employee is authorized to make any modification, extension or addition to this warranty.

1.9 **How to Apply for Warranty Coverage**.

All claims are handled by contacting your nearest Eskridge Distributor. For questions, please contact customer support: eskcustomersupport@ramseyindustries.com.

Visit Dealer Locator - Eskridge for Eskridge Distributor locations and contact information.

Additional warranty, service support, product information, and parts information can be found on www.eskridgeinc.com.