ISO 9001 CERTIFIED

502-GRB-50-001-00

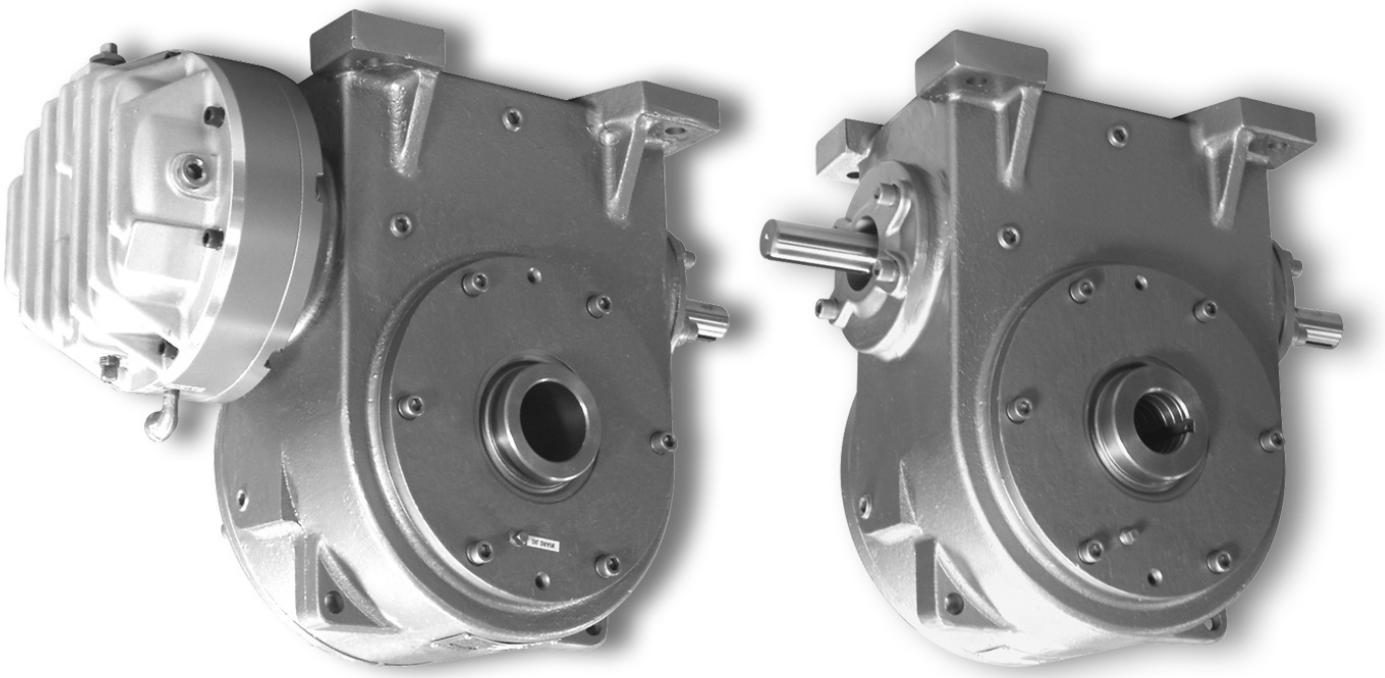
SERVICE MANUAL

AND

REPAIR PARTS

FOR

GRB-50 Posistop BRAKE & WORM GEAR REDUCER (Palletizer Drive System)



WARNING: Read this manual before any installation, maintenance or operation.

FORCE CONTROL®

FORCE CONTROL INDUSTRIES, INC.

MANUFACTURERS OF MECHANICAL AND ELECTRICAL POWER TRANSMISSION EQUIPMENT

Worldwide Leader In Oil Shear Technology

Limited Warranty

Force Control Industries, Inc. (“Force Control”) warrants its products to be free from defects in material and workmanship under normal and proper use for a period of one year from the date of shipment. Any products purchased from Force Control that upon inspection at Force Control’s factory prove to be defective as a result of normal use during the one year period will be repaired or replaced (at Force Controls’ option) without any charge for parts or labor. This limited warranty shall be void in regard to (1) any product or part thereof which has been altered or repaired by a buyer without Force Control’s previous written consent or (2) any product or part thereof that has been subjected to unusual electrical, physical or mechanical stress, or upon which the original identification marks have been removed or altered. Transportation charges for shipping any product or part thereof that the buyer claims is covered by this limited warranty shall be paid by the buyer. If Force Control determines that any product or part thereof should be repaired or replaced under the terms of this limited warranty it will pay for shipping the repaired or replaced product or part thereof back to the buyer. EXCEPT FOR THE EXPRESS WARRANTY SET OUT ABOVE, FORCE CONTROL DOES NOT GRANT ANY WARRANTIES EITHER EXPRESSED OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR USE. The warranty obligation set forth above is in lieu of all obligations or liabilities of Force Control for any damages. Force Control specifically shall not be liable for any costs incurred by the buyer in disconnecting or re-installing any product or part thereof repaired or replace under the limited warranty set out above. FORCE CONTROL EXPRESSLY EXCLUDES ALL LIABILITY FOR ANY INDIRECT OR CONSEQUENTIAL DAMAGES THE BUYER MAY SUSTAIN IN CONNECTION WITH THE DELIVERY, USE, OR PERFORMANCE OF FORCE CONTROL PRODUCTS. Under no circumstances shall any liability for which Force Control is held responsible exceed the selling price to the buyer of the Force Control products that are proven to be defective. This limited warranty may be modified only in writing signed by a duly authorized officer of the company. This limited warranty applies exclusively to Force Control products; warranties for motors and gear reducers and other component parts may be provided by their respective manufactures. Any legal action for breach of any Force Control warranty must be commenced within one year of the date on which the breach is or should have been discovered.

A Return Goods Authorization (RGA) number must be obtained from the factory and clearly marked on the outside of the package before any equipment will be accepted for warranty work. Force Control will pay the shipping costs of returning the owner parts that are covered by warranty.

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Section 1 - Description & Operation

1-1 THE OIL SHEAR PRINCIPLE

Conventional brakes and clutches depend on friction between solid surfaces operating in air to transmit torque. Friction can do the job, but produces a great amount of heat and wear, causing an increase in replacement parts, maintenance, and downtime.

In **Force Control** Oil Shear **Drive Systems** the friction surfaces operate in cooling and lubricating fluid. The oil molecules tend to cling to each other as well as the friction surfaces. As moving and stationary elements are brought together, a thin but positive film of oil is maintained between the friction surfaces, controlled by the clamping pressure and carefully designed grooves in the friction material.

Torque is transmitted from one surface to the other through the viscous shear of the oil film. The friction surfaces are protected by this film and therefore surface wear is greatly reduced. The positive flow of fluid between the discs also effectively transmits heat away from the friction surfaces.

1-2 DESCRIPTION

The **GRB-50** is a machine drive package consisting of a *Posistop* Oil Shear **Brake** integrally mounted to a worm gear reducer. The brake hub and reducer shaft are connected through a collet, which grips the entire diameter of the shaft, and eliminates the need for a key and problems associated with keys. Several other performance features designed into the **GRB-50** are listed on the facing page illustration.

A second worm gear reducer used to drive the opposite palletizer hoist head shaft is also a part of the package. This unit does not require a brake since it is connected to the opposite unit with shafting.

1-3 OPERATION

The **GRB-50** cross section on the facing page shows the Posistop **Brake** and the integrally mounted worm gear reducer. The brake is shown in the normally spring set, brake engaged position.

Compressed air, controlled by external valves, enters the piston housing and moves the piston to disengage the multiple disc brake pack, allowing the connected shafting to rotate freely.

When air pressure is released, the springs return the piston to the normal braking position.

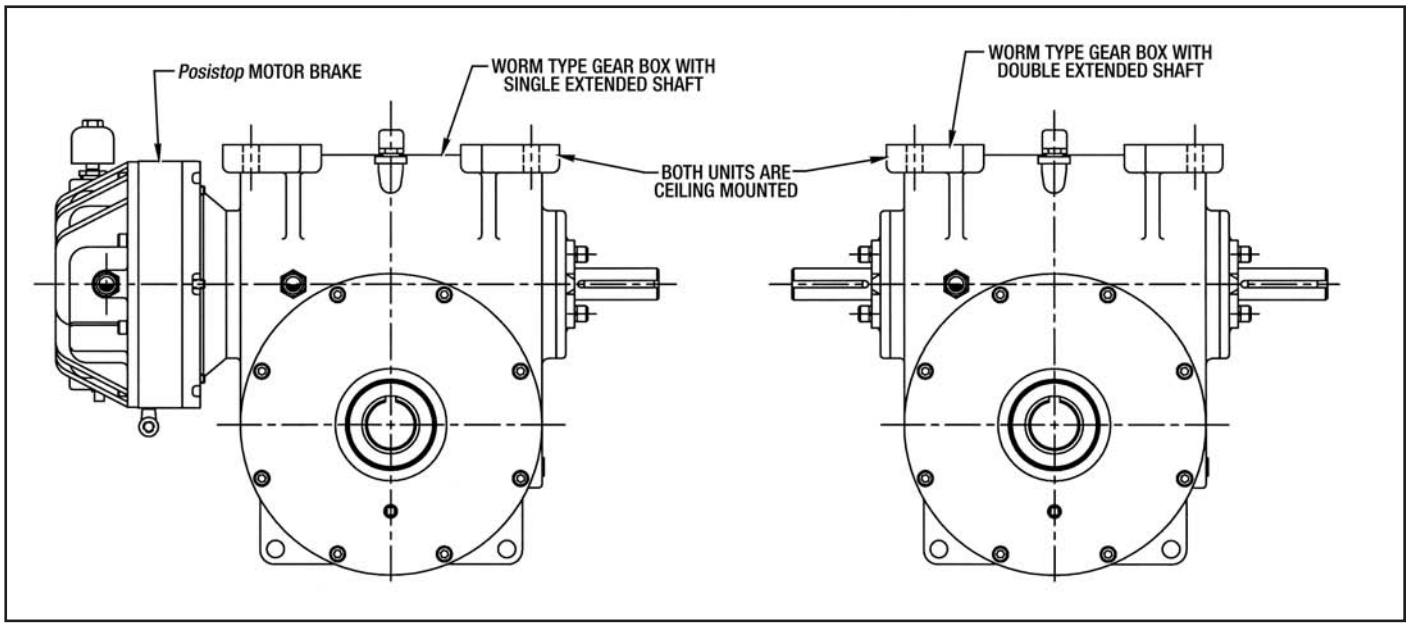

Figure 1.1 - GRB-50 System Components

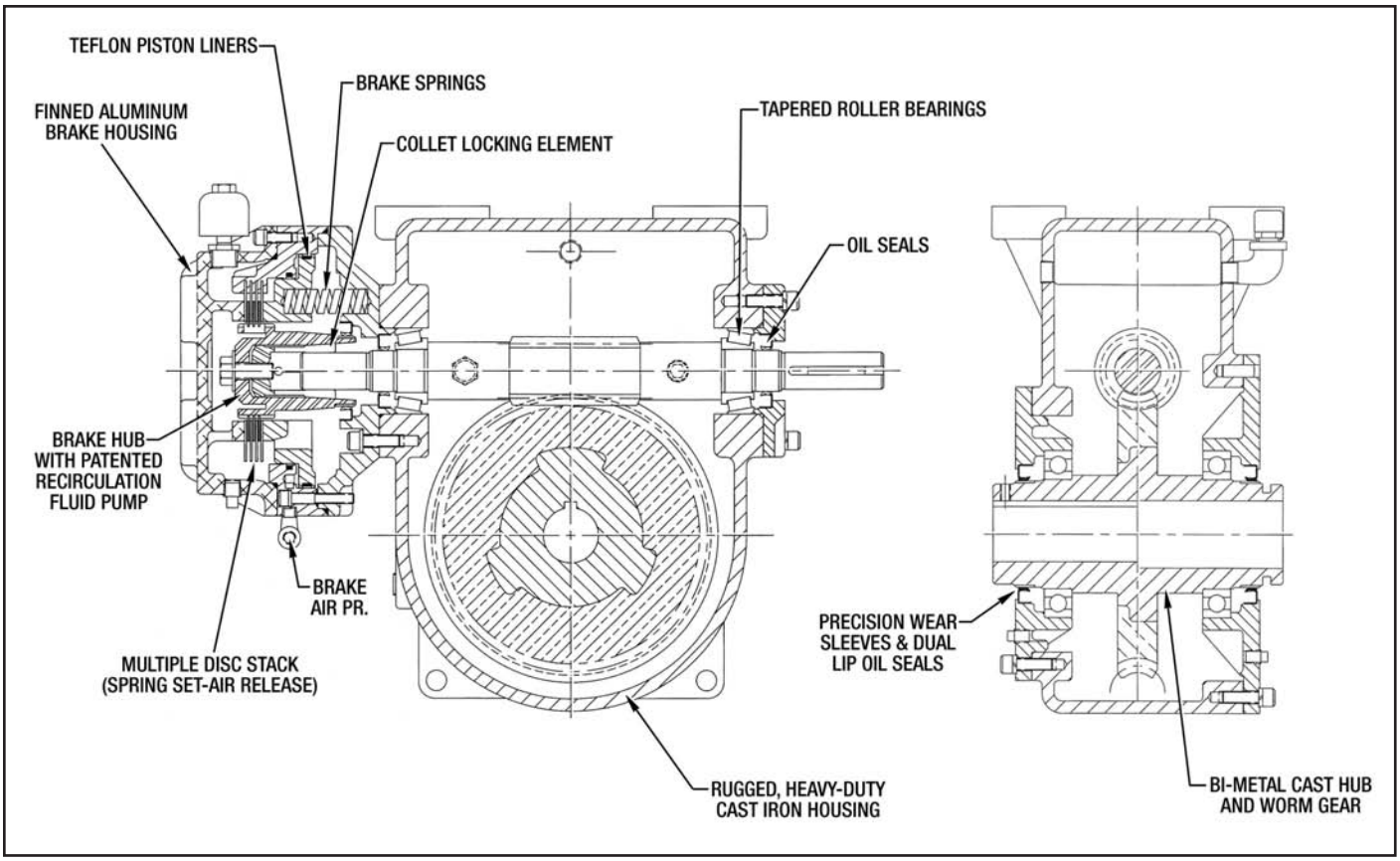

Figure 1.2 - GRB-50 Cross Section

Section 2 - Important Safety Precautions

WARNING:

THE BRAKE AND GEAR REDUCER UNITS DESCRIBED IN THIS MANUAL MUST NOT BE INSTALLED IN ANY MANNER EXCEPT AS SPECIFIED HEREIN, AND MUST NOT BE OPERATED AT SPEEDS, TORQUE LOADS, OR TEMPERATURES OTHER THAN THOSE SPECIFIED IN THIS MANUAL. FAILURE TO LIMIT OPERATIONS OF THE BRAKES TO THE CONDITIONS SPECIFIED COULD DAMAGE THE UNITS, WILL VOID ANY WARRANTIES, AND MAY CAUSE MALFUNCTIONS OR DAMAGE TO INTERCONNECTING EQUIPMENT.

CAUTION: BEFORE PERFORMING ANY WORK ON THE PALLETIZER, TAKE THE FOLLOWING SAFETY PRECAUTIONS.

1. Lower the main hoist to the down position.
2. After the main hoist has been safely positioned, the machine must be made safe to enter.

Push one of the Emergency Stop buttons located at the following: A. Main Electrical Panel, B. Main Hoist Frame, C. Pallet Magazine Remote, D. Remote Control Panel on top of the palletizer.

CAUTION: DO NOT ENTER THE MACHINE YET.

If maintenance must be performed on the machine, the main power must be locked out at the main electrical control panel.

CAUTION: THE HOIST MUST BE IN THE DOWN POSITION.

2-1 MAIN PANEL LOCKOUT PROCEDURE

Turn the Main Power Disconnect switch to the OFF position at the Main Electrical Control Panel.

Insert a lock into the switch, and place an identifier tag at the lock to indicate the machine is being worked on by you and why.

NEVER REMOVE A LOCKOUT UNLESS YOU HAVE PERMISSION TO.

Now try to operate some of the controls. The machine should not operate. If the machine will operate call a qualified maintenance technician or Customer Service.

REMEMBER TO "LOCKOUT & TRY OUT"

CAUTION: THE MAIN HOIST SHOULD BE IN THE DOWN POSITION.

If the palletizer will not operate it is safe to enter the machine.

3. Manually release the existing brake. The main hoist should move downward slightly and come to rest on the lower frame of the palletizer. If not, reset the brake and install cribbing to support the main hoist to prevent it from moving down.
4. The drive shaft connecting the motor and reducer high speed shafts must be removed to access the brake. Match mark the drive shaft couplings so that machine timing can be restored when the brake installation is complete. Remove the drive shaft and set aside.

Section 3 - Lubrication

3-1 CHECKING THE OIL LEVEL

Check the oil level when the drive is installed and weekly thereafter (until experience dictates otherwise). Always check the oil level with the unit stationary (not running). The Gearbox oil level will be at the center of the Sight Gauge (#833). The Brake oil level will be at the center of the Sight Gauge (#46). **NOTE -** The Brake Sight Gauge (#46) and Pipe Plug (#75) may be reversed so that level is visible from other side.

3-2 CHANGING THE OIL

Oil in the *Posistop* brake and Worm Gear Reducer should be changed every twelve (12) months. More frequent oil change may be required for high kinetic energy applications or in extremely dirty environments.

A. Posistop Brake

Remove the Drain Plug (#64) at the bottom of the end housing and housing. Drain all oil before refilling. Check the Sight Gauge (#46) for dirt. Remove and clean if necessary. Replace the drain plugs. Remove Breather (#45) and Plug (#75). Refill unit with clean oil up to the center of the sight gauge. Replace Breather (#45) and the Pipe Plug (#75)

B. Worm Gear Reducer

Remove the Drain Plug (#834) at the bottom of the main housing. Drain all oil before refilling. Replace the drain plugs. Remove Breather (#832) and Oil Level Plug (#837) opposite the Sight Gauge. Refill unit with clean oil until oil comes up to the center of the Sight Gauge (#833). Replace Pipe Plug (#837) and the Breather (#832).

CAUTION

Do not over-fill. Excess oil will cause the unit to overheat.

3-3 TYPE OF OIL

A. Posistop Brake

Use Automatic Transmission Fluid, **Mobil ATF-210 Type F** ONLY (unless otherwise specified on the unit nameplate).

B. Worm Gear Reducer

Use Mobilgear 634 or Mobil 600W Cylinder Oil ONLY (unless otherwise specified on the unit nameplate).

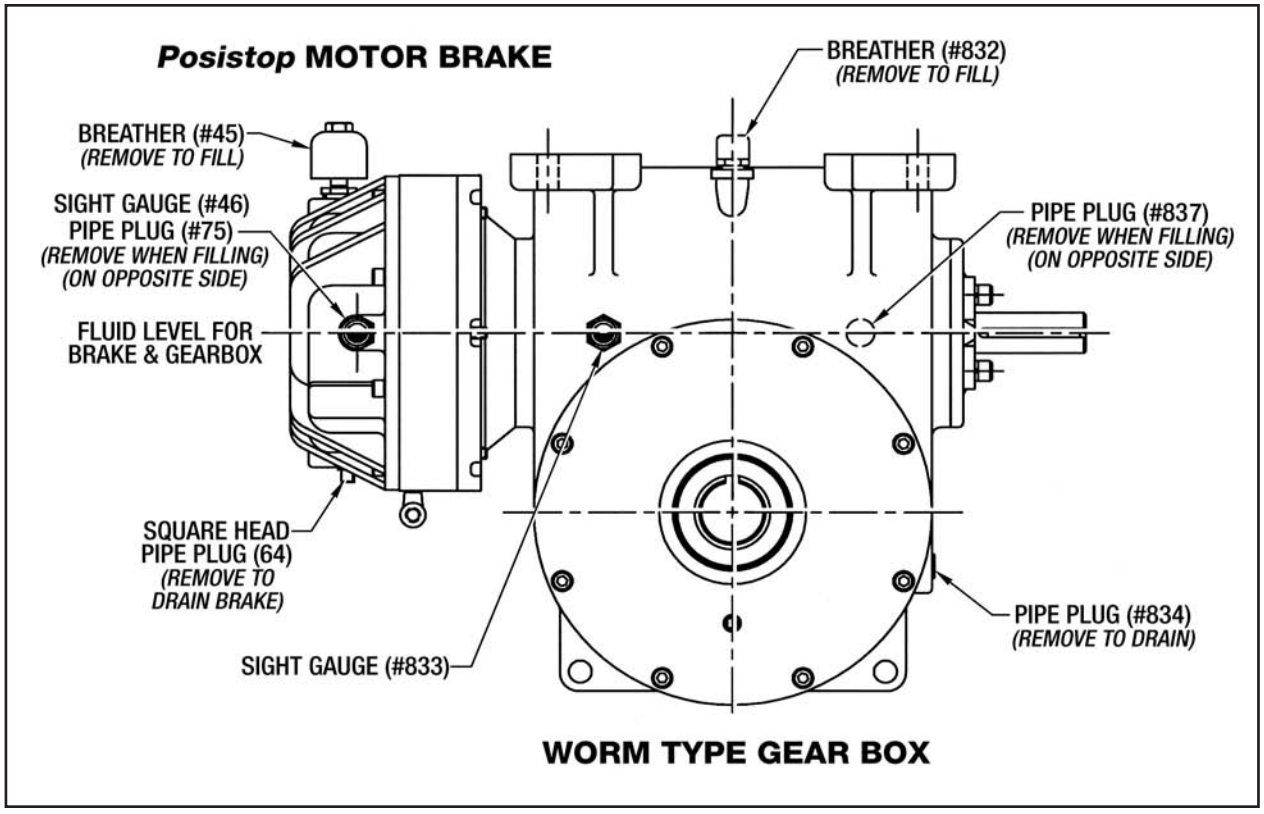

Figure 3.1 - Lubrication

Section 4 - Operational Checks

Warning

Make Operational Checks ONLY when the drive motor and motor brake are NOT IN OPERATION. Open motor disconnect and LOCK IT OUT to avoid personal injury.

See the SAFETY PRECAUTIONS (Section 2) before performing any work on the Palletizer or *Posistop* Brake.

4-1 CHECKING FOR AIR LEAKS & INTERNAL DAMAGE

1. If automatic controls are used, make provisions for manual operation.
2. Remove Air Breather (#45) and Reducer Bushing (#76) from End Housing (#9). Do not remove while motor is operating.
3. Apply 60 P.S.I. air pressure to the brake and observe the action of the piston through the air breather port. If the piston action is irregular, or if it tends to stick or bind, internal damage may be indicated.
4. Listen and look for air bubbles in the oil, which would indicate piston leakage.
5. If the piston moves slowly and leaks are evident, the piston seals may be damaged.
6. Exhaust the air pressure and observe that the piston returns quickly and smoothly back to normal braking position.
7. Re-install the Reducer Bushing (#76) and Air Breather (#45) in the end housing.

4-2 CHECKING BRAKE STACK FOR WEAR

(See Figure 4.1 Below)

1. Remove Drain plug (#64) from the end housing (#9) and let oil drain completely from the brake unit.

Notice that the friction discs and drive plates are compressed between the piston and the end housing thrust surface. Internal springs force the piston against the brake pack to transmit torque. Wear allowance of the brake disc pack can be checked by loosening the bolts that attach the finned end housing to the piston housing and measuring the distance between the two housings.

Follow the sequence below.

2. Loosen Screws and Lockwashers (#72, #128) just enough to relieve the pressure on the housing caused by the internal brake springs.
3. Hold the End Housing (#9) against the disc stack, but do not compress the springs.
4. Use feeler gauge to measure the distance between the End Housing (#9) and the Piston Housing (#10). A Feeler Gauge Dimension for a New Stack will normally range between .070” to .090”. The mean is approximately .075” to .077”. A measurement of .044 or less indicates a worn disc pack.

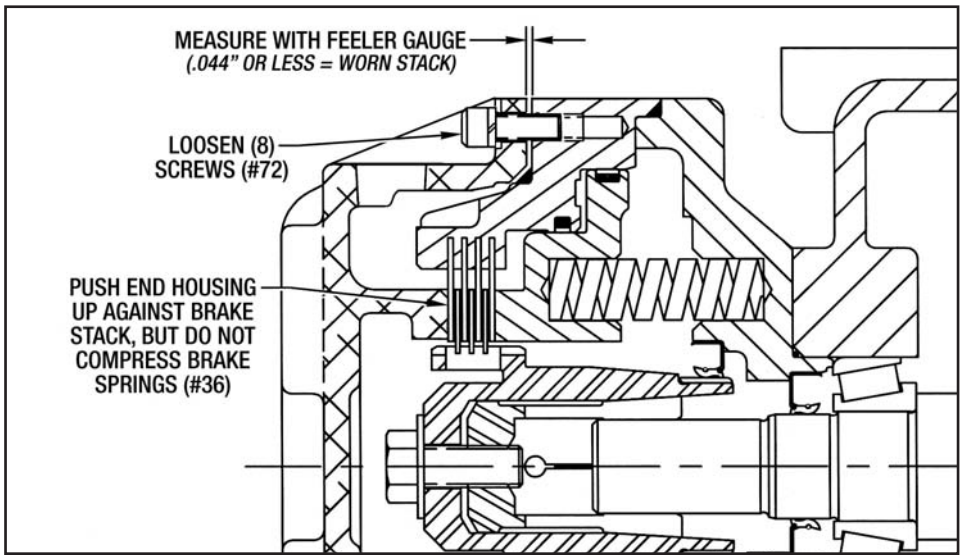

Figure 4.1 - Checking Brake Stack Wear

Section 5 - Troubleshooting

PROBLEM	POSSIBLE CAUSE	CORRECTION
A. Brake fails to engage properly.	Piston Sticking or binding	Disassemble to extent necessary to check for damaged parts.
	Weak or broken springs.	Replace as needed.
	Air pressure not exhausting or slow in exhausting.	Check air regulator valve and replace if necessary.
	Worn friction surfaces.	Check parts for wear and replace if necessary.
B. Brake engages too quickly.	Low oil level.	Check oil level and correct.
C. Noise and vibration.	Improper or loose mounting of brake and gear reducer.	Check mounting and correct if necessary. If partial disassembly is required refer to Section 6-Repair.
D. Brake fails to disengage properly.	Low air pressure.	Increase air pressure. (35 PSI min.)
	Piston sticking or binding	Disassemble to extent necessary to check for damaged parts.
	Air regulator valve not functioning properly.	Check valve operation and replace if necessary.
E. Unit overheats (Over 225° F)	Brake not engaging or disengaging properly causing. excessive slippage.	Refer to Problems A and D.
	Improper oil level	Check oil level & add or drain if necessary.
F. Oil leakage	Oil seal lip damaged.	Check for leakage around shaft. Replace oil seal or wear sleeve if necessary.
	O-Ring seals.	Tighten all external bolts. If leak continues, check for damage.
G. Leakage at breather.	Oil level too high.	Drain excess oil.
	Damaged seal around piston.	Disassemble and replace as necessary.
H. Brake does not repeat.	Air pressure changed.	Check and adjust air pressure.
	*Oil temperature changed.	Check temperature.

* For installations that require precise starting and stopping, operating temperatures are important. Operating temperatures between 116° F and 165° F are recommended.

Section 6 - Repair

6-1 GENERAL INFORMATION

Read and follow the safety precautions in Section 2 before performing any work on the Palletizer or the Posistop Brake or Worm Gear Reducer

Unless the brake is to be completely overhauled, it should be disassembled only to the extent necessary to gain access to the worn or damaged parts

6-2 CLEANING AND INSPECTION

Clean metal parts in a suitable solvent and dry with low pressure compressed air. Clean drive plates and friction discs one at a time, keeping parts in the same order as they were when removed. After cleaning, inspect parts for cracks, distortion, scoring, nicks, burrs or any other damage that would affect the operation of the unit.

Pay particular attention to the following.

1. Check the friction discs wear surfaces for scoring, galling or evidence of uneven wear.
2. Check the brake drive plates for scoring or galling. Make sure they are flat. If a perceptible ridge is worn in the drive plate where it mates with the friction disc, it should be replaced.
3. Carefully check the piston and bore surfaces for nicks, scratches, scoring or other damage, which would affect operation or cause leakage.
4. Pay particular attention to the oil seal and wear sleeves, checking for any nicks, scratches or any damage that would cause leakage.

WARNING: Petroleum based cleaning solvents are extremely flammable. Open flames or smoking by any personnel in the vicinity of these solvents is extremely hazardous and MUST NOT BE PERMITTED.

6-3 REPAIR AND REPLACEMENT

A fine stone or crocus cloth may be used to remove minor surface defects from parts if the operation or sealing action of the part is not affected. The use of coarser abrasives or other machining methods should not be attempted. Otherwise, damaged parts should be replaced.

Replacement is recommended for the following parts when needed.

1. Replace all O-Rings, Liners and Oil Seals removed during disassembly.
2. Replace brake discs and plates as a complete set.

6-4 BRAKE DISASSEMBLY

(See Figure 7.1)

1. Drain all the fluid out of the Brake. Save or discard as conditions warrant.
2. Evenly back out the (8) Screws (#72) and (8) Lockwashers (#128).
3. Remove the End Housing (#9) from the Brake Assembly. Remove and discard O-Ring (#30).
4. The Brake Stack can be removed from the Hub Spline (#2). Keep the Friction Discs (#13) and the Drive Plates (#12) in the same order as they were removed.
5. Remove the (6) Screws (#153) and (6) Lockwashers (#127) from the Piston Housing (#10). **Be very careful when backing these (6) Screws out, because the Housing is under spring pressure.**
6. Pull the Piston Housing (#10) and the Piston (#3) out and away from the remaining Brake Assembly. Remove O-Ring (#104) and the (6) O-Rings (#34). Discard all of them.
7. Remove the (6) Springs (#36) from the spring pockets.
8. Push the Piston (#3) out of the Piston Housing (#10). Remove the Piston Liner (#42) and the O-Ring (#39) from the Piston Housing (#10). Discard the Liner and O-Ring.
9. Remove the Liner (#43) and both O-Rings (#40) from the Piston (#3). Discard them.
10. Remove the Screw (#94) & the Brass Washer (#81) and thread a 5/8”-11 x 1-1/2” Hex Hd. Screw into the Hub. (#2). Tighten to remove Hub (#2) from Worm Shaft (#817). *(See Figure 6.1)*

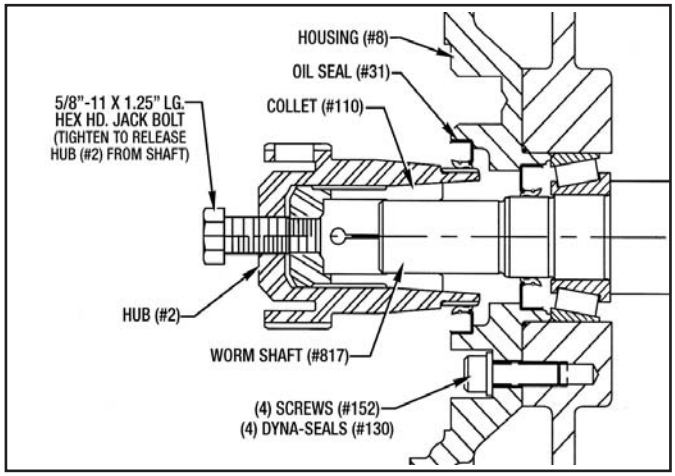

Figure 6.1 - Removing Hub From Worm Shaft

11. Pull the Hub (#2) and Collet (#110) off of the Worm Shaft (#817).

12. Remove the (4) Screws (#152) and the (4) Dyna-Seal Washers (#130). Take the Housing (#8) off of the Main Housing (#800). Discard O-Ring (#872) *(See Figure 6.1)*

    If the Oil Seals (#31) and (#825) do not need to be replaced, be very careful not to damage the lips when removing the Housing (#8)

13. Push the Oil Seals (#31) and (#825) out of the Housing (#8) with an arbor press if they need replaced.

14. Remove the Wear Sleeve (#32) from the Hub (#2) with the following procedure shown in *Figure 6.2*:

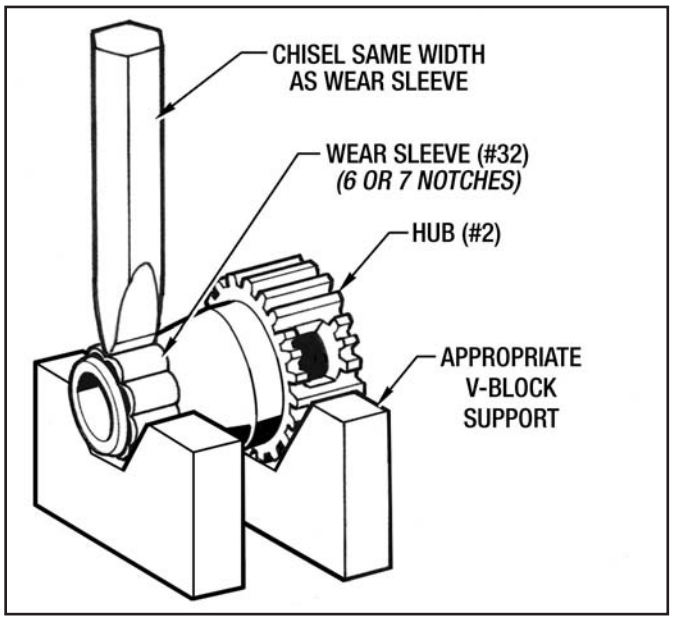

Figure 6.2 - Removing Wear Sleeve (#32)

a. Place the Hub (#2) into appropriate V-Block Supports.

b. Make about 6 or 7 notches in the Wear Sleeve (#32) with a chisel the same width as the Wear Sleeve.

c. The Wear Sleeve (#32) can be pulled off the Hub (#2) by hand.

6-5 GEAR REDUCER REPAIR

If any parts in the Gear Reducer needs replaced, contact Force Control for specific Disassembly and Reassembly Instructions for field repair or to send the unit back to Force Control for our **Factory Rebuild Service.** (See Page 11.)

6-6 BRAKE REASSEMBLY

(See Figures 6.3 and 7.1)

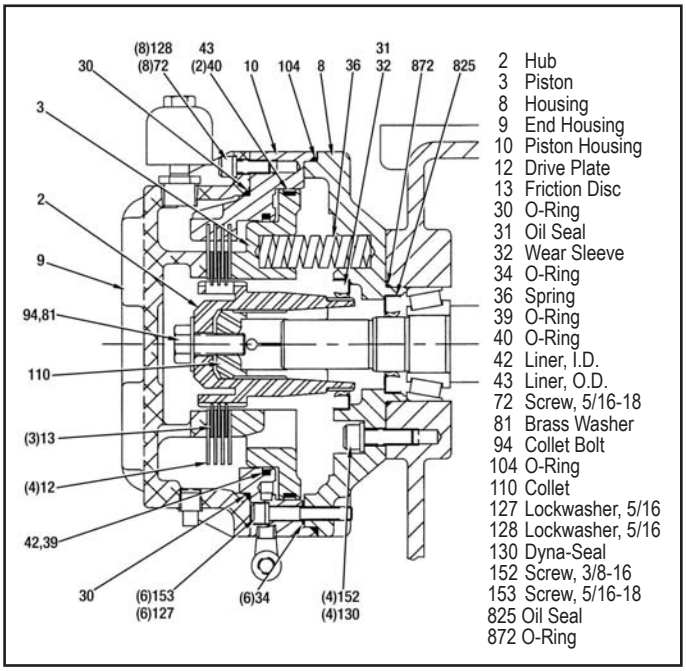

Figure 6.3 - Brake Reassembly

Note the following General Reassembly Instructions.

a. Lubricate O-Rings, Liners and the lip of Oil Seals with a light coating of White Grease or Vaseline just before installation.

b. External Piston Liners will be easier to install if heated to approx. 200° F.

c. The installation of press-fitted parts can also be made easier by heating the outside parts to approx. 250° F.

   CAUTION: Use suitable gloves when handling heated parts.

d. Immediately before assembly, thoroughly clean screw threads with Loctite Safety Solvent. At assembly apply Blue Loctite #242 to all screw threads. Use this sparingly and wipe off any excess.

Basically the Reassembly Procedure is just the reverse order of the Disassembly Procedure.

1. Apply a light coating of Red Loctite #262 to the Hub (#2) and press the Wear Sleeve (#32) on to the Hub with an arbor press and a flat plate.
2. Coat both I.D. surfaces of the Housing (#8) with Permatex #3D and install both Oil Seals (#31) and (#825). Wipe off any excess Permatex.
3. Lubricate the O-Ring (#872) with some white grease and install it on the Housing (#8) lip.

4. Mount the Housing (#8) on to the Main Housing (#800) with (4) Screws (#152) and (4) Dyna-Seals (#130). Torque to 25 Lb. Ft.
5. Assemble the Hub (#2), Collet (#110), Brass Washer (#81) and Screw (#94). Just hand tighten the screw so the collet is snug in the hub.
6. Coat the Wear Sleeve (#32) with a light coating of white grease and carefully position the Collet (#110) and the Hub (#2) on to the worm shaft extension as shown in *Figure 6.4*. Measure 2.584" from the face of Housing (#8) to the outer surface of the Hub (#2).

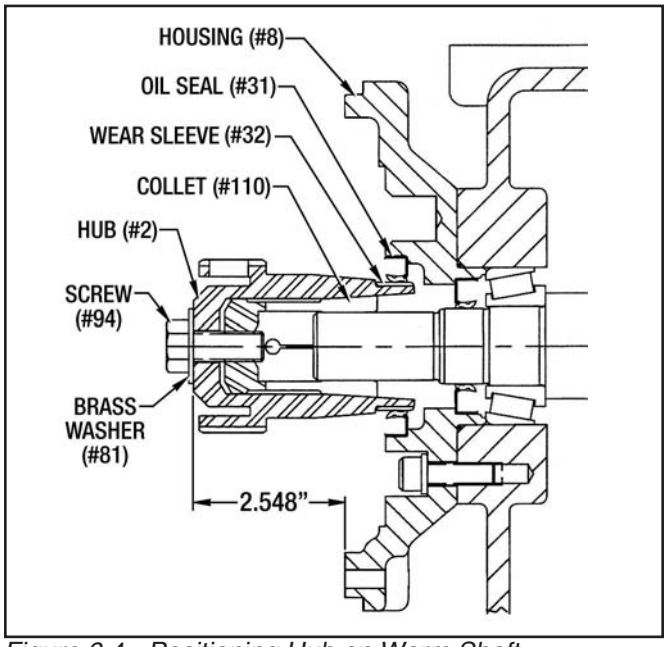

Figure 6.4 - Positioning Hub on Worm Shaft

7. After the Hub (#2) is in position on the worm shaft, retain it from turning and torque the Screw (#94) to 75 Lb. Ft. (Rotate the Hub by hand after the screw is torqued to make sure it is not contacting the housing.
8. Place the (6) Springs (#36) into the spring pockets.
9. Install the (2) O-Rings (#40) and the Liner (#43) into the Piston groove after lubricating them with white grease.
10. Also install the O-Ring (#39) and Liner (#42) into the Piston Housing groove after lubricating them with white grease.
11. Place the Piston (#3) into the Piston Housing (#10) aligning the Dowel Pin (#158) at the bottom as shown in *Figure 6.5*.
12. Place the O-Ring (#104) on the lip of the Housing (#8).
13. Carefully place the Piston Housing/Piston Sub-Assembly on to the mating flange of Housing (#8).

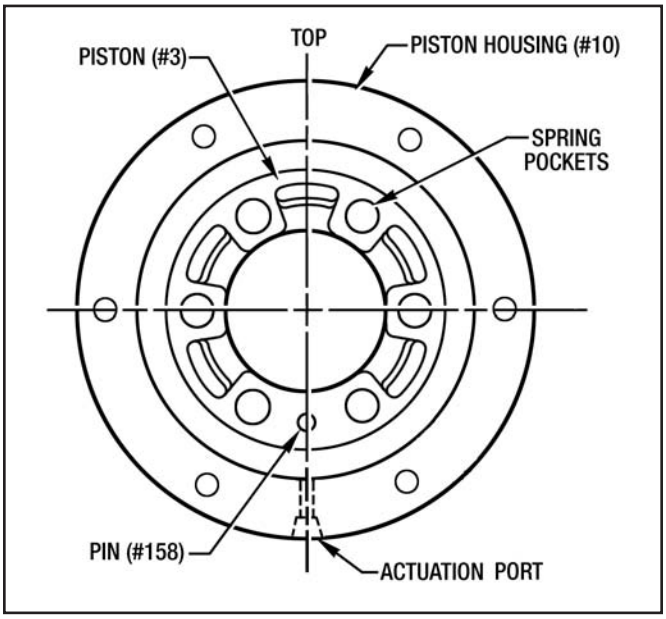

Figure 6.5 - Piston and Piston Housing Orientation

Guide the (6) Springs (#36) into the mating spring pockets in the piston.

14. Attach the Piston Housing with (6) Screws (#153) and (6) Lockwashers (#127). Tighten in an even manner to compress the Springs (#36) correctly. Torque to 14 Lb. Ft.

    Make sure the (6) O-Rings (#34) are in place on the back face of the Piston Housing (#10).
15. Lubricate and install the O-Ring (#30) on to the Piston Housing (#10).
16. Assemble the Brake Stack, which consists of (4) Drive Plates (#12) and (3) Friction Discs (#13), onto the spline of the Hub (#2). Start with a Drive Plate (#12), then a Friction Disc (#13), until completed. *(See Figure 7.1)*

    NOTE- The Drive Plates (#12) are easier to install with the "coined side" or rounded edge is towards the piston. The Friction Discs (#13) are easier to install if they are slightly tilted as they slide on to the spline.
17. Attach the End Housing (#9) to the Piston Housing (#8) with (8) Screws (#72) and (8) Lockwashers (#128). Torque to 14 Lb. Ft.
18. Be sure the Sight Gauge (#46) and all pipe plugs are reinstalled. Fill with fresh fluid as indicated in Section 3 - Lubrication. Reinstall the Air Breather (#45).
19. Connect the air actuation lines to the brake. The solenoid valve should be installed within 5 Ft. of the brake.
20. Reinstall covers and safety equipment. Prepare machine for operation per manufacturers specifications.

NOTES

Section 7 - Ordering Repair Parts

7-1 Ordering Repair Parts

When ordering any repair parts, please specify all of the following information.

1. COMPLETE MODEL NUMBER (On Name Plate)
2. SERIAL NUMBER (On Name Plate)
3. PART REFERENCE NUMBER (From Parts List and Exploded View Drawing)
4. PART NAME (From Parts List)
5. QUANTITY (As Required)
6. COMPLETE SHIPPING INFORMATION

IMPORTANT - Failure to include all of the above information will delay your parts order. Unless another method is specified for shipping information, parts weighing less than 70 lbs. will be shipped United Parcel Service. Parts weighing over 70 lbs. will be shipped motor freight. Airfreight and other transportation services are available, but only if specified on your order

7-2 Factory Rebuild Service

Reconditioning Service is offered by Force Control Industries at the factory. Before returning a unit for this service, be sure to first contact the Service Sales Department at Force Control Industries for authorization and shipping instructions. Force Control cannot be responsible for any units returned to the factory without prior notice and authorization.

Care must be given to the packaging of returned units. Always protect mounting feet and flanges by attaching to a suitable skid. Damaged units always delay repairs. It is usually impossible to recover damage costs from the carrier.

Whenever possible describe the problems you are having with your unit on your shipping papers.

Return to:

Force Control Industries, Inc.
3660 Dixie Highway
Fairfield, Ohio 45014
Telephone: 513-868-0900
Fax: 513-868-2105
E-Mail: info@forcecontrol.com

Repair Parts List

GRB-50 *Posistop* Brake and Worm Gear Reducer

REF. No.	PART NAME	QTY.	REF. No.	PART NAME	QTY.
2	Hub	1	806	Bearing Retainer, Low Speed	2
3	Piston	1	*807	Bearing	4
8	Housing	1	*808	Roller Bearing Cup	4
9	End Housing	1	*809	Roller Bearing Cone	4
10	Piston Housing	1	816	Worm Shaft, L.H.	1
*12	Drive Plate	4	817	Worm Shaft, R.H.	1
*13	Friction Disc	3	818	Hub, L.H.	1
*30	O-Ring	1	819	Hub, R.H.	1
*31	Oil Seal	1	*824	Oil Seal	4
*32	Wear Sleeve	1	*825	Oil Seal	4
*34	O-Ring	6	830	Dowel Pin, 3/8” x 1”	4
*36	Spring	6	*832	Air Breather	2
*39	O-Ring	1	*833	Sight Gauge	2
*40	O-Ring	2	834	Pipe Plug, C’Sunk, 3/8” NPT	2
*42	Liner, I.D. Sealing	1	835	Pipe Plug, Mag. Sq. Hd., 1/8” NPT	4
*43	Liner, O.D. Sealing	1	836	90° Street Elbow, 3/8” NPT	2
*45	Air Breather	1	837	Pipe Plug, C’Sunk, 3/8” NPT	2
*46	Sight Gauge	1	839	Key	
64	Pipe Plug, Mag. Sq. Hd., 1/4” NPT	1		With Brake	1
66	90° Street Elbow, 1/8” NPT	1		Without Brake	2
72	Soc. Hd. Screw, 5/16”-18 x 7/8” Lg.	8	842	Soc. Set Screw, Cone Pt., 5/16”-18 x 1/2”	4
73	Plug Pipe, C’Sunk, 1/8” NPT	2	848	Soc. Hd. Screw, 3/8”-16 x 1-1/4” Lg.	28
75	Plug Pipe, C’Sunk, 1/2” NPT	1	849	Soc. Hd. Screw, 3/8”-16 x 1-1/4” Lg.	
76	Reducer Bushing, 1/2” x 1/4” NPT	1		With Brake	4
81	Brass Washer, 1/2”	1		Without Brake	8
94	Hex Hd. Screw, 1/2”-13 x 1-1/4” Lg.	1	853	Lockwasher	28
*104	O-Ring	1	854	Lockwasher	
110	Collet	1		With Brake	4
127	Lockwasher, 5/16”	6		Without Brake	8
128	Lockwasher, 5/16”	8	*860	Shim (Red .002”)	AR
*130	Dyna-Seal, 3/8”	4	*861	Shim (Blue .005”)	AR
152	Soc. Hd. Screw, 3/8”-16 x 1-1/4” Lg.	4	*862	Shim (Brown .010”)	AR
153	Soc. Hd. Screw, 5/16”-18 x 2” Lg.	6	*865	Shim, Low Speed (Red .002”)	AR
158	Dowel Pin, 1/4” x 2” Lg.	1	*866	Shim, Low Speed (Blue .005”)	AR
800	Main Housing	2	*867	Worm Gear Shim (.002”)	AR
803	Bearing Retainer, Low Speed	2	*868	Worm Gear Shim (.005”)	AR
804	Bearing Retainer	2	*869	Worm Gear Shim (.010”)	AR
805	Bearing Retainer *(Without Brake)*	1	*872	O-Ring	2

* Indicates parts in Overhaul Kit.
Quantities are given for both Gear Reducers.
AR - As Required

GRB-50 *Posistop* Brake and Worm Gear Reducer

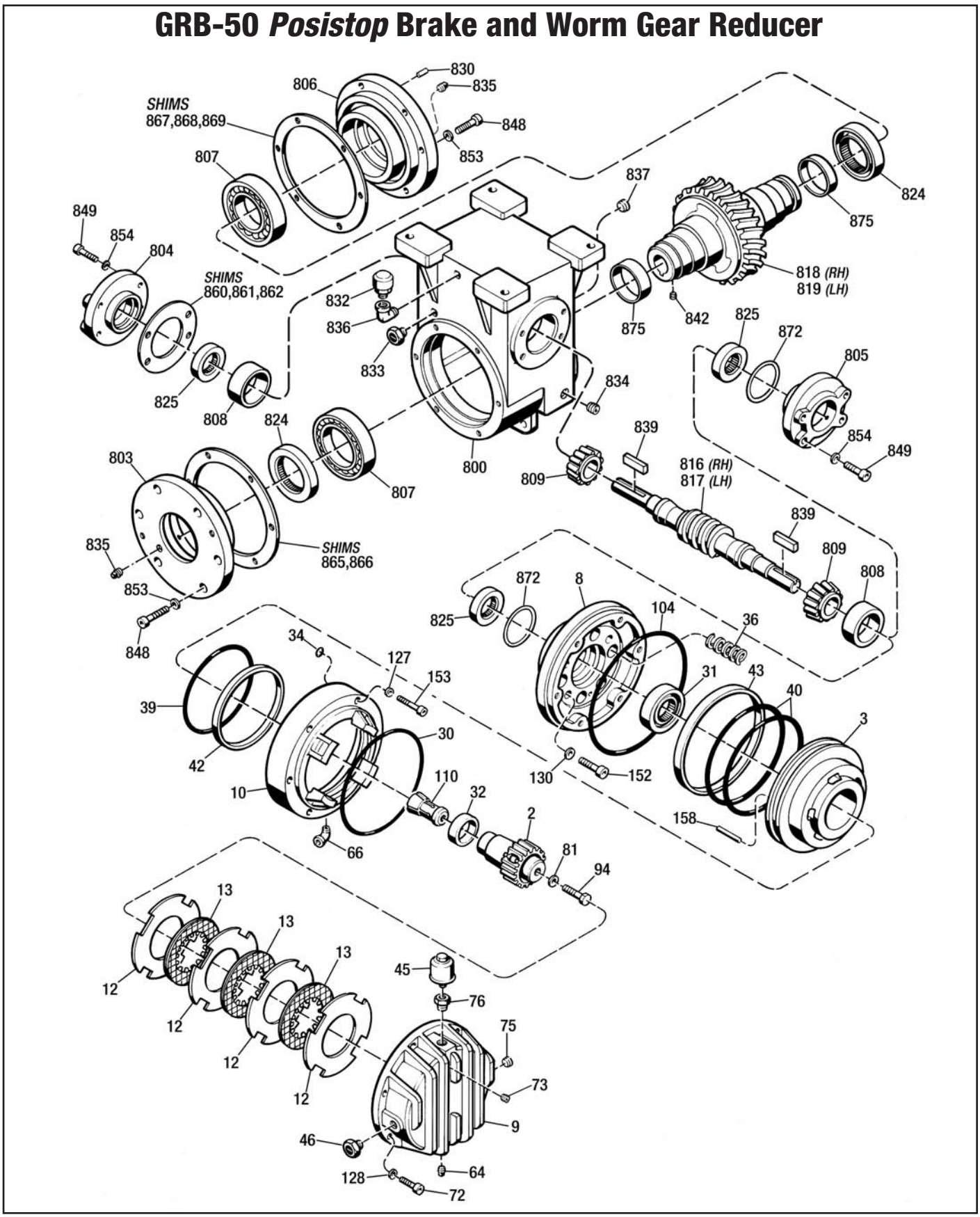

Figure 7.1 - GRB-50 Posistop Brake and Worm Gear Reducer

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