

# von Gal® Palletizers

Oil Shear Drive Systems  
for

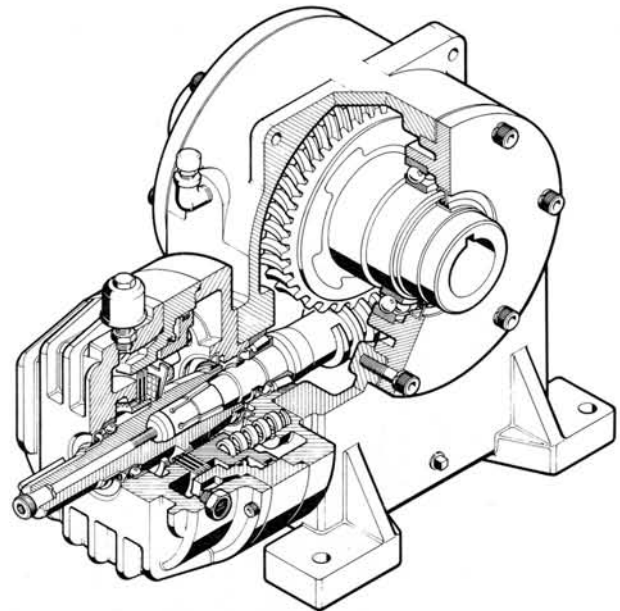
Litton von Gal® Palletizers

502-60-215-00

## SERVICE MANUAL & REPAIR PARTS

FOR

## GRB-40 Posistop Brake and Worm Gear Reducer



Manufactured by:



*Force Control Industries, Inc.*  
Oil Shear Drive Systems

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

**Litton**

Process & Packaging Systems

von Gal® Palletizers

# 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.

Force Control oil shear drive systems are oil shear with friction surfaces that 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 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 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-40 is a machine drive package consisting of a *Posistop*® oil shear brake and integrally mounted 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-40 are listed on the facing page illustration.

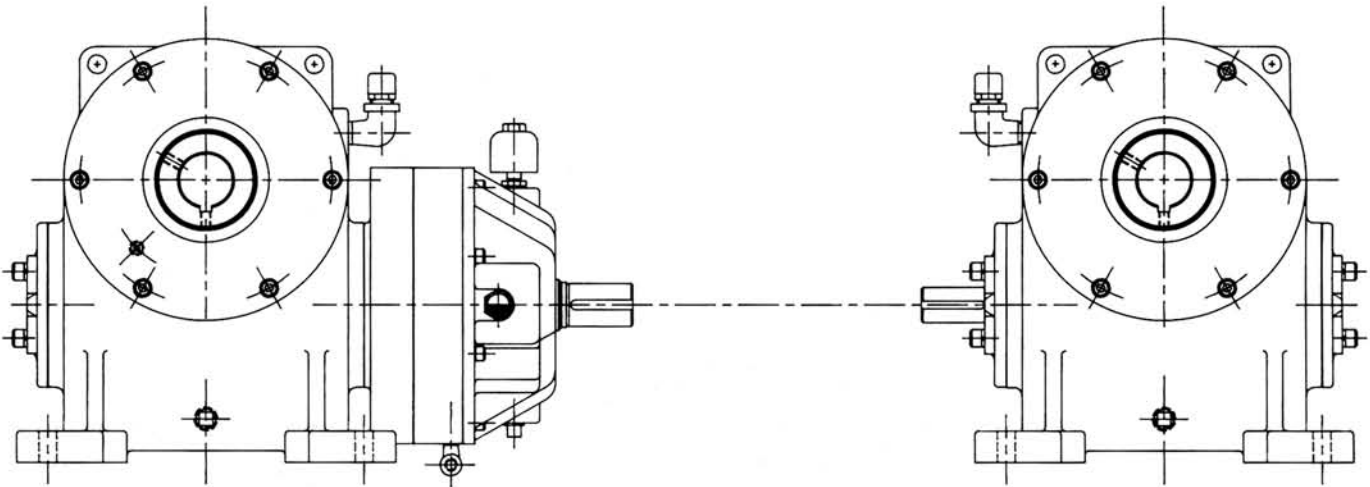
A second worm gear reducer used to drive the opposite palletizer hoist head shaft is also a part of the package. This unit does not require a brake since it is connected to the opposite unit with shafting.

## 1-3 Operation

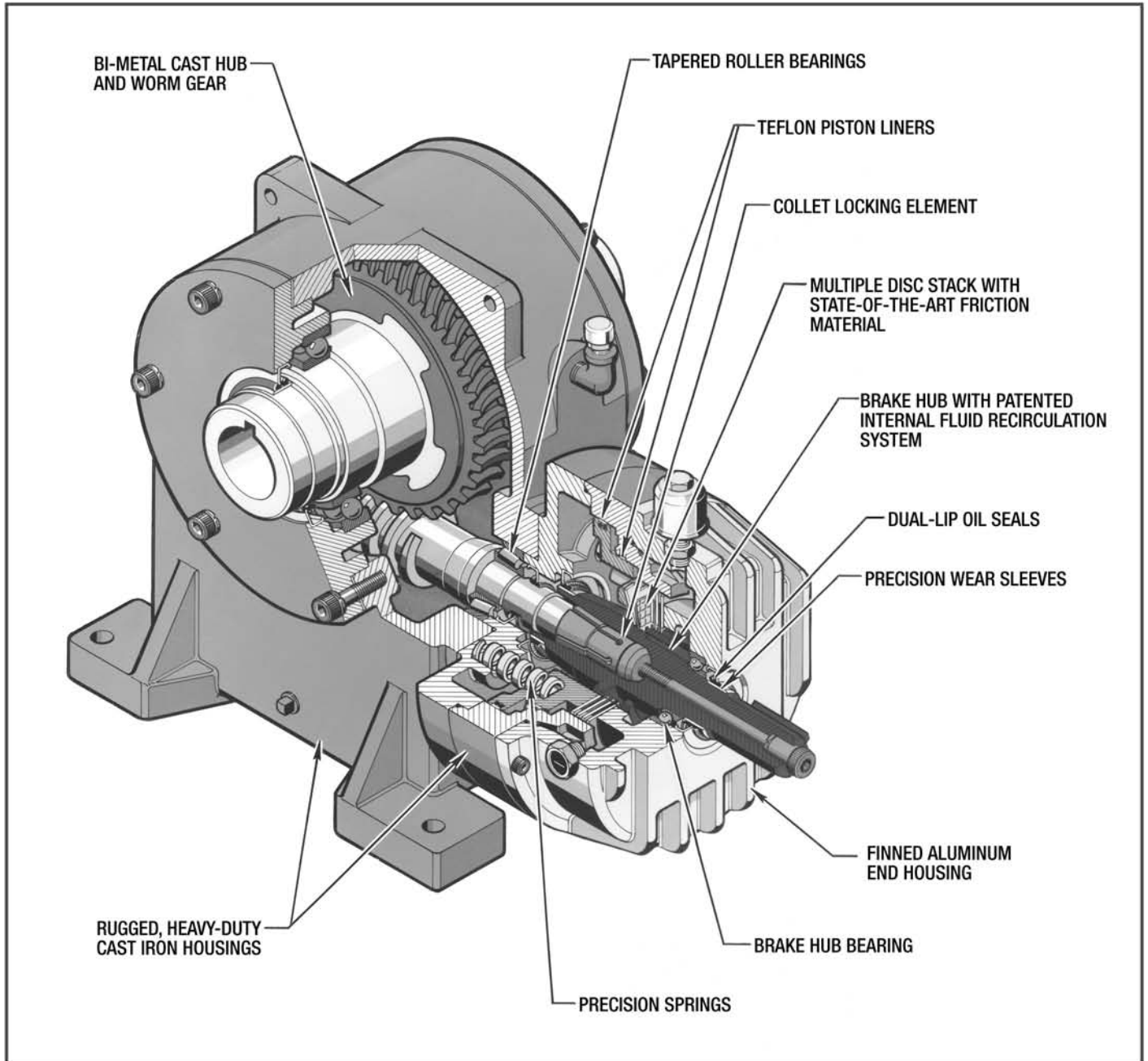
The GRB-40 cross section on the facing page shows the *Posistop*® brake and the integrally mounted worm gear reducer. The brake is shown in the normally spring set, brake engaged position.

Compressed air, controlled by external valving, 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.



# GRB-40 *Posistop*<sup>®</sup> Brake and Worm Gear Reducer



## 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.

#### **DO NOT ENTER THE MACHINE.**

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

#### **THE HOIST MUST BE IN THE DOWN POSITION.**

#### **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 do so.

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

### **!!!! REMEMBER TO LOCKOUT AND 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.

# 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). NOTE - The brake oil 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.

### **Posistop**® Brake

Remove the drain plug #74 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. Refill unit with clean oil up to the center of the sight gauge. Approximate capacities are listed on page 3 of the 502-180-006 manual

### **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 #835. Refill unit with clean oil until oil comes up to the oil level hole and replace pipe plug #835.

### **CAUTION**

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

## 3-3 Type of Oil

### **Posistop**® Brake

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

### **Worm Gear Reducer**

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

# 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.**

### **To check for air leaks or 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 (#45,76) in the end housing.

### **To check wear allowance of the brake disc pack:**

1. Remove Drain plug (#64) from the end housing (#9) and let oil drain completely from the brake unit.  
*Refer to the cut-a-way illustration on page 3 of this manual. 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 pack, 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 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.

# 5 TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	CORRECTION
A) Brake fails to engage properly.	Piston sticking or binding.  Weak or broken springs.  Air pressure not exhausting or slow in exhausting.  Worn friction surfaces.	Disassemble to extent necessary and check for damaged parts.  Replace as needed.  Check air regulator valve and replace if necessary.  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.	Check mounting & correct. If partial disassembly is required, refer to the Installation Section.
D) Brake fails to disengage properly.	Low air pressure.  Piston sticking or binding.  Air regulator valve not functioning properly.	Increase pressure. 35 PSI min.  Disassemble to extent necessary and inspect for damaged parts.  Check valve operation and replace if necessary.
E) Unit overheats (Temperature over 225°F)	Brake not engaging or disengaging properly, causing excessive slippage.  Improper oil level.	Refer to PROBLEMS A & D.  Check level and add or drain as necessary.
F) Oil leakage	Lip seal damaged.  O-ring seals.	Check for oil leaking around shaft. Replace if necessary.  Tighten all external bolts. If leak continues, check for damage.
G) Oil leakage at breather	Oil level too high.  Damaged seal around piston	Drain excess oil.  Disassemble and replace as necessary.
H) Brake does not repeat	Air pressure changed.  *Oil temperature changed.	Check and adjust air pressure.  Check temperature.

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

# 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 or Replacement

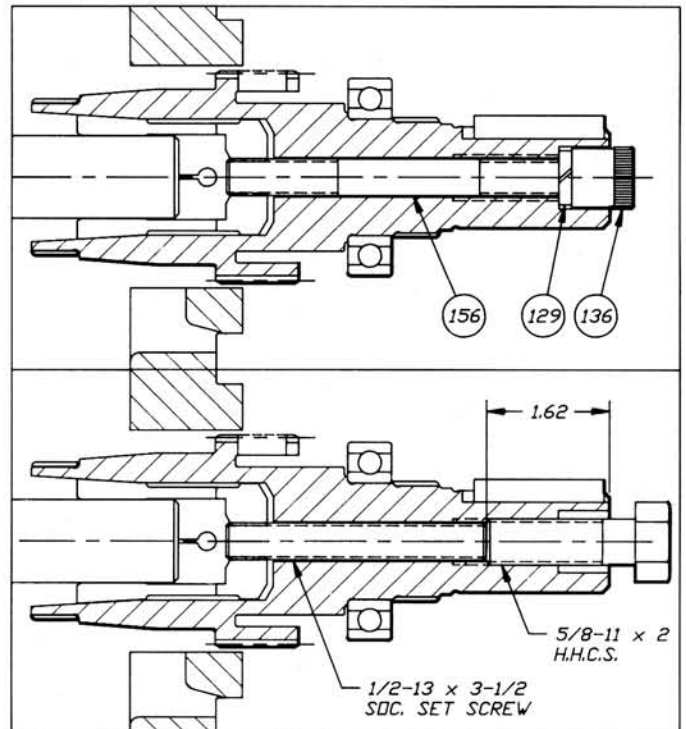
A fine stone or crocus cloth may be used to remove minor surface defects from parts if the operation or sealing action of the part is not affected. The use of coarser abrasives or other machining methods should not be attempted. Otherwise, damaged parts should be replaced.

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 Disassembly of Brake

- 1) Remove end housing sub-assembly (items #9, #35) by removing screws & lockwashers (items #72, #128).
- 2) Remove the stack of friction discs and drive plates (items #13 #12).
- 3) Remove the hub assembly (item #2, #110, #86, #32) as follows.
  - a) Remove allen nut and lockwasher (#136, #129).
  - b) Use a screwdriver to remove threaded rod (#156).
  - c) Insert a 1/2"-13 x 3-1/2" long socket set screw into the threaded hole in the end of the collet (#110).
  - d) Run the set screw in until it's end is 1 5/8" from the shaft end of the hub.
  - e) Insert a 5/8"-11 bolt into the threads in the hub/shaft end and screw the bolt in until the collet (#110) loosens its' grip on the gear reducer shaft.
  - f) The hub assembly can now be removed.



**CAUTION:** Care must be taken not to damage the oil seal (#825) and wear sleeves items (#32, #86).

- 4) Remove piston housing sub-assembly (items #10, #30, #34, #36, #39, #40, #42, #43,) by removing screws and lockwashers (items #127, #153).
- 5) Remove housing sub-assembly (items #8, #31, #104, #105, #825) by removing screws and lockwashers (items #130, #152).

## 6-5 Disassembly of Reducer

Use the reference numbers in sequence shown below to disassemble the worm gear reducer.

REF. NO.	PART NAME	QTY.
849	S.H.C.S.	12
804	BEARING RETAINER	2
805	BEARING RETAINER	1
860	SHIM	AS REQ.
825	OIL SEAL	1
848	S.H.C.S.	24
803	BEARING RETAINER	2
865	SHIM	AS REQ.
824	OIL SEAL	4
807	BEARING	4
818,819	GEAR (L.H. R.H.)	1,1
800	MAIN HOUSING	2
832	BREATHER	2
836	90 ST. ELBOW	2
808	BEARING CUP	4
809	BEARING CONE	4
816,817	WORM (L.H. R.H.)	1,1

## 6-6 Re-Assembly

Note the following general re-assembly instruction.

1. Lubricate o-rings, liners and the lip of the oil seal with a light coating of Vaseline or equivalent immediately before assembly and installation of mating parts.
2. External o-ring liners will be easier to install if heated in an oven to approximately 200 degrees F max.
3. The installation of press-fitted parts can also be made easier by heating the outside part in an oven.

**CAUTION:** Use suitable gloves when handling

4. Immediately before assembly, thoroughly clean screw threads with Loctite Safety Solvent. At assembly apply Loctite 242 (or equivalent) to all screw threads. Use this adhesive sparingly and wipe off any excess.

**After repair/overhaul the reducer can be assembled in reverse order of index numbers.**

### Re-assembly of brake on gear reducer

1. Mount housing sub-assembly (items #8, #31,#104, #105, #825) to gearbox with S.H.C.S. ( #130,#152).
  2. Re-assemble the collet/hub assembly (#2,#110,#156, #136, #129). Apply a small amount of Loctite threadlocker #271 or equivalent on the threads of threaded rod (#156). Coat wear sleeve (item #32) with petroleum jelly or grease.
- CAUTION:** Do not use molybdenum disulfate "Molycoat" or any other type of lubricant on the reducer shaft. The collet locking element is keyless and depends on friction to transmit torque from the brake hub to the reducer shaft.
3. Slide the hub onto the gear reducer shaft until 1/8" of

the wear sleeve (#32) wear surface protrudes beyond the lip of the oil seal (#31).

4. After the hub is properly positioned, retain it from turning and tighten the allen nut (#136) to 75 ft.lb.. This will cause the hub to move in toward the oil seal (#31) approximately 1/32". Rotate the hub to make sure it is not in contact with the housing.

5. Place correct number of springs (#36) into spring pockets in housing (#8).

Spring Qty	Brake Torque	Max. Hoist Load
2	30 ft.lbs.	2000 lbs.
3	45 ft.lbs.	3000 lbs.
4	60 ft.lbs.	4000 lbs.

6. Align the dowel pin in the piston with the air port located at the bottom of the piston housing (#10). Make sure that the o-ring (#104) is in place around the housing (#8). Carefully place the piston housing assembly onto the mating flange of housing (#8), guiding the springs (#36) into the mating pockets of the piston (#3). Attach piston housing to end housing using 6 SHCS and lockwashers (#153, #127).

7. Assemble stack (consisting of plates #13, and discs #12) onto the spline of the hub (#2). The plates and discs must be placed in the following order: First plate then discs until completed.

**NOTE:** The plates are easier to assemble when the "coined side", or rounded edge, is assemble toward the piston. The discs are easier to assemble if they are tilted slightly so they are not parallel with the face of the piston as they slide onto the hub spline.

8. Coat wear sleeve (item #86) with petroleum jelly or grease. Slide the end housing sub-assembly (#9,#35) over spline and hub, making sure o-ring (#30) is in place. Care should be taken not to damage the oil seal as it slides over the hub. Bolt the end housing (#9) to the piston housing with S.H.C.S. (#72) and lockwasher (#128). Tighten the screws to 15 ft. lbs.

9. Be certain the oil level gauge is visible and the breather is located above oil level. Oil level gauge may be moved to the opposite side for ease of viewing.

10. Fill the brake to the center of the oil level gauge with ATF 210 or type "F". Re-install the breather (#45).

11. Connect the air actuation line to the brake.  
**NOTE:** The solenoid valve should be installed within 5 feet of the *Posistop*® brake for best response time.

12. Reinstall covers & safety equipment. Prepare machine for operation per manufacture's specifications.



# 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](mailto:info@forcecontrol.com)**

# GRB-40 Posistop Brake and Worm Gear Reducer

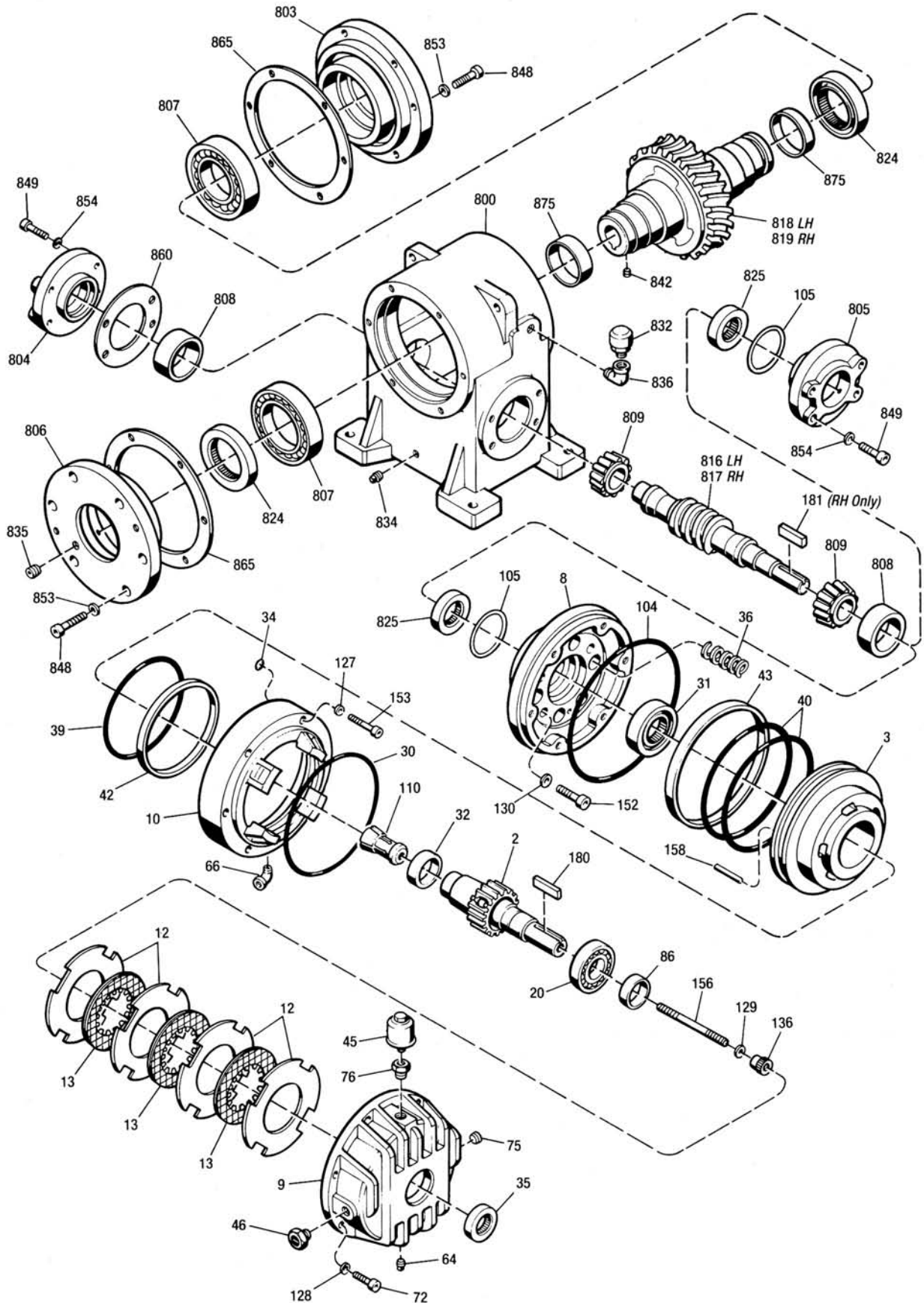
REF. No.	PART NAME	QTY.	REF. No.	PART NAME	QTY.
2	Hub .....	1	136	Allen Nut .....	1
3	Piston .....	1	152	Soc. Hd. Cap Screw .....	4
8	Housing .....	1	153	Soc. Hd. Cap Screw .....	6
9	End Housing .....	1	156	Stud .....	1
10	Piston Housing .....	1	158	Dowel Pin .....	1
*12	Drive Plate .....	4	180	Key .....	1
*13	Friction Disc .....	3	181	Key (R.H. Gear Box Only) .....	1
*20	Bearing .....	1	800	Main Housing .....	2
*30	O-Ring .....	1	803	Bearing Retainer, Lo-Speed .....	2
*31	Oil Seal .....	1	804	Bearing Retainer, Hi-Speed .....	2
*32	Wear Sleeve .....	1	805	Bearing Retainer (R.H. Gear Box) ...	1
*34	O-Ring .....	6	806	Bearing Retainer, Lo-Speed .....	2
*35	Oil Seal .....	1	*807	Bearing .....	4
*36	Spring .....	AR**	*808	Bearing Cup .....	4
*39	O-Ring .....	1	*809	Bearing Cone .....	4
*40	O-Ring .....	2	816	Worm (L.H.) .....	1
*42	Liner, ID Sealing .....	1	817	Worm (R.H.) .....	1
*43	Liner, OD Sealing .....	1	818	Gear (L.H.) .....	1
*45	Breather .....	1	819	Gear (R.H.) .....	1
*46	Sight Gauge .....	1	*824	Oil Seal .....	4
64	Pipe Plug, Mag. Sq. Hd. ....	1	*825	Oil Seal .....	2
66	90° Deg. Street Elbow .....	1	*832	Air Breather .....	2
72	Soc. Hd. Cap Screw .....	8	834	Pipe Plug, Mag. Sq. Hd. ....	4
75	Pipe Plug, C'Sunk .....	1	835	Pipe Plug .....	2
76	Reducer Bushing .....	1	836	90° Deg. Street Elbow .....	2
*86	Wear Sleeve .....	1	842	Soc. Set Screw .....	4
*104	O-Ring .....	1	848	Soc. Hd. Cap Screw .....	24
*105	O-Ring .....	2	849	Soc. Hd. Cap Screw .....	12
110	Collet .....	1	853	Lockwasher, Hi-Collar .....	24
127	Lockwasher, Hi-Collar .....	6	854	Lockwasher, Hi-Collar .....	12
128	Lockwasher, Hi-Collar .....	8	*860	Shim, Hi-Speed .....	AR
129	Lockwasher, Hi-Collar .....	1	*865	Shim, Lo-Speed .....	AR
*130	Dyna-Seal .....	4	*875	Wear Sleeve .....	4

\* - Indicates parts in Overhaul Kit

AR - As Required

\*\* - See chart in Section 6-4, Item 5

# GRB-40 Posistop Brake and Worm Gear Reducer

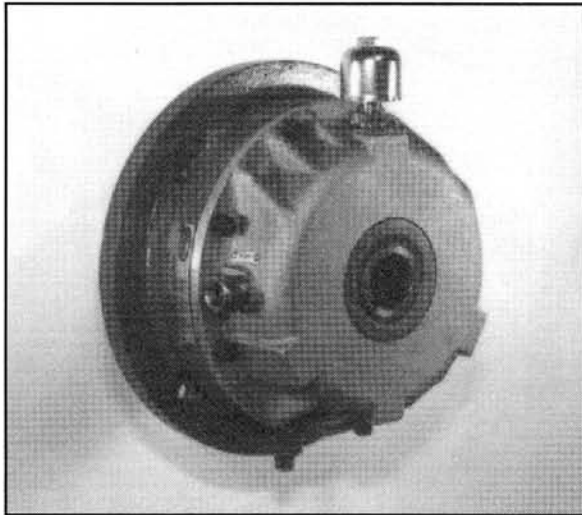


# **Posistop® Oil Shear Braking Systems for Litton von Gal Palletizer Main Hoist Drives**

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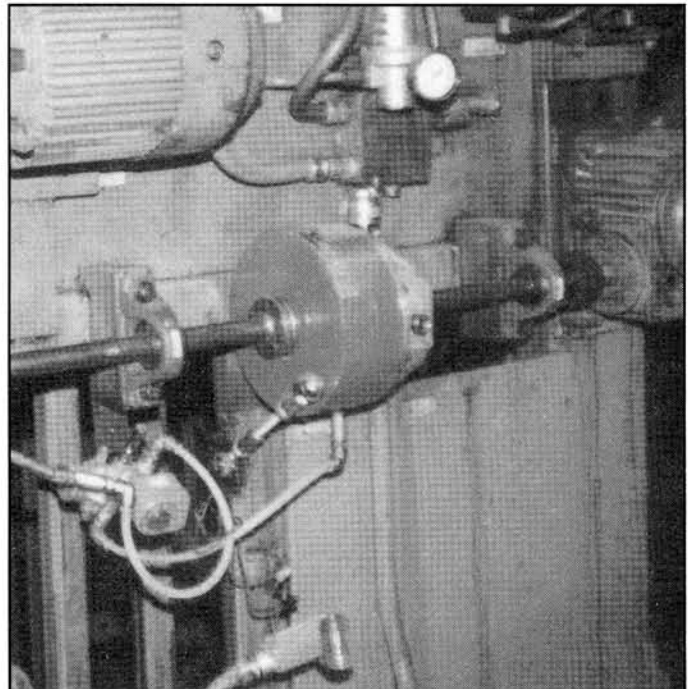
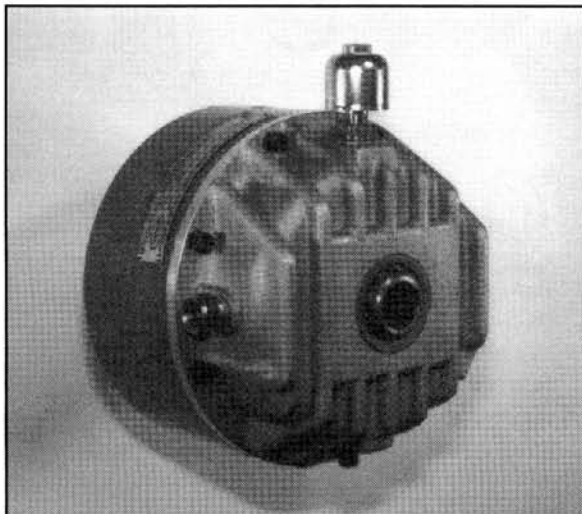
**Posistop® Brake Models: MB 210-424,  
MB 210-440, MB 210-441**

**Retrofit for von Gal Palletizers  
manufactured from 1985 through mid-1990**



**Posistop® Brake Model: MB 210-432**

**Retrofit for von Gal Palletizers  
manufactured prior to 1985**



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**Litton**

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