



502-210 SM-001-00

SERVICE MANUAL
AND
REPAIR PARTS
FOR
Size 210 Oil Shear
Shaft Mounted
Posistop Brake



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



FORCE CONTROL INDUSTRIES, INC.

**MANUFACTURERS OF MECHANICAL AND
ELECTRICAL POWER TRANSMISSION EQUIPMENT**

Worldwide Leader In Oil Shear Technology

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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 Size 210 Shaft Mounted *Posistop* Brake is a multiple surface, spring activated, pneumatic release braking device that effectively dissipates the heat generated from frequent starting and stopping.

This 210 *Posistop* Brake has a range of 20 Lb. Ft. to 90 Lb. Ft. of braking torque. This is accomplished with 5 different Brake Stack Configurations, which are described in Section 2.

The brake is mounted and locked to a driven or jack shaft by a Locking Collar that effectively locks the brake hub to the driven shaft. The torque arm is mounted to the back face of the brake.

1-3 FEATURES

(See Figure 1.1)

- **Finned Aluminum Housing** for maximum heat dissipation.
- **Precision Wear Sleeves and Dual-Lip Oil Seals** to eliminate any contamination from any harsh environments.
- **Thru-Shaft Hub with Integral Fluid Pump**, which maintains a positive and continuous oil film between braking surfaces.
- **Multiple Disc Stack** - At the heart of your *Posistop* Brake is a multiple braking disc stack consisting Drive Plates, keyed to the piston housing and Friction Discs, splined to the hub.
- **Heavy-Duty Brake Springs** for maximum torque and long braking life.
- **Rugged Torque Arm** for fast efficient stopping power.
- **Locking Collar** for a positive locking of the brake hub to the driven or jack shaft.
- **Heavy-Duty Cast Iron Housings.**
- **Piston with Teflon Liners** for smooth and consistent actuation of the piston.

1-4 OPERATION

The 210 Shaft Mounted *Posistop* Brake shown in *Figure 1.1* shows the brake in the normally spring-loaded braked position.

Compressed air, controlled by an external valve, enters the piston chamber and moves the piston back to disengage the brake stack, allowing the driven or jack shaft to rotate freely.

When the air pressure is released the piston, which is spring loaded, returns to the normal braked position.

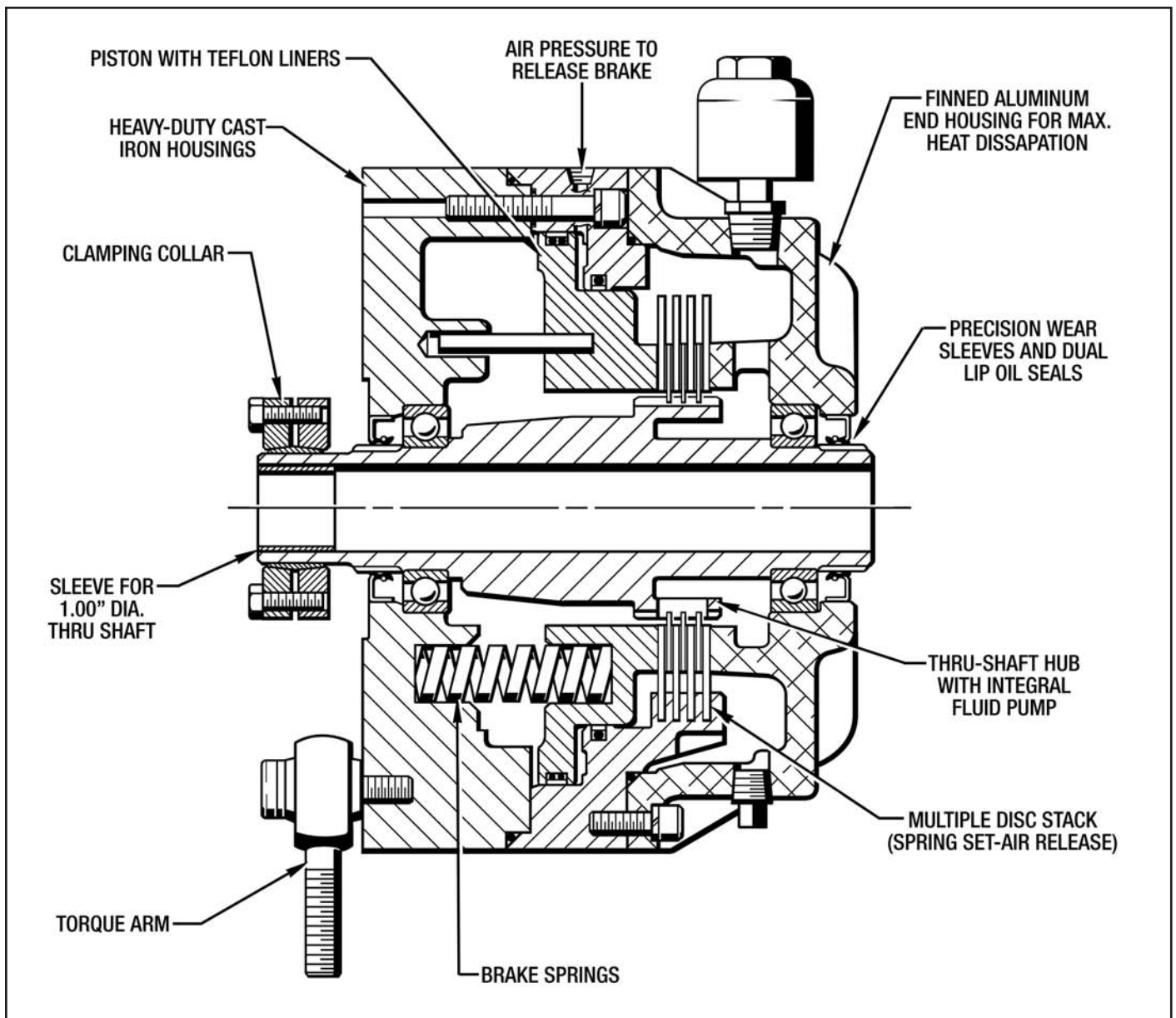
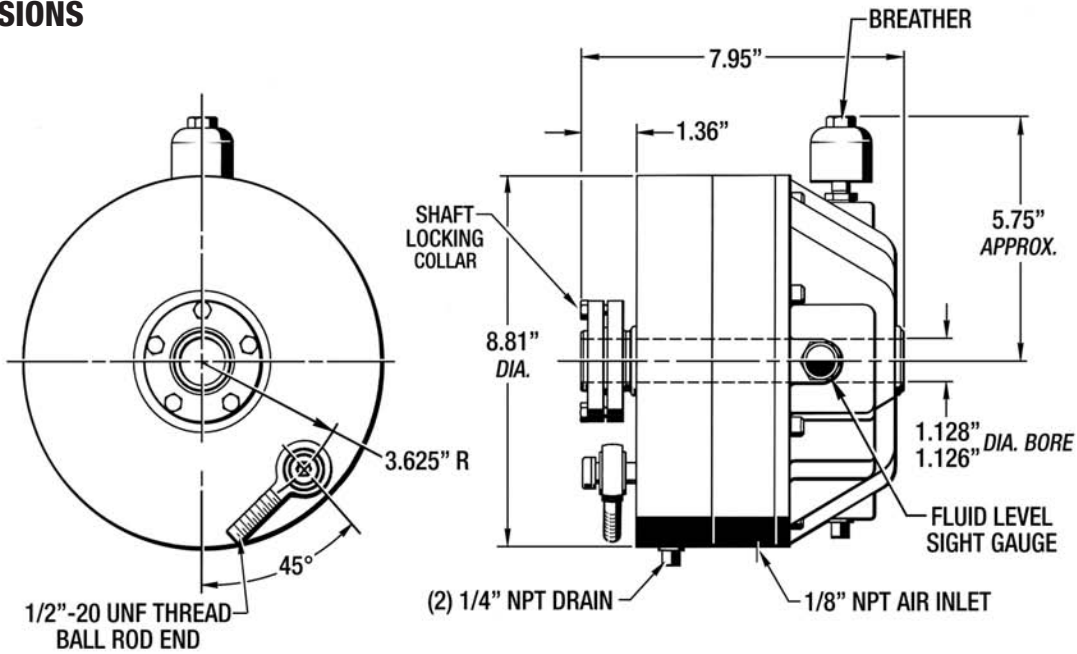


Figure 1.1 - Size 210 Shaft Mounted Posistop Brake

Section 2 - Specifications

2-1 DIMENSIONS



2-2 BRAKE STACK CONFIGURATIONS

A	20 Lb. Ft.	B	30 Lb. Ft.	C	45 Lb. Ft.	D	60 Lb. Ft.	E	90 Lb. Ft.
(6) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)	(4) DRIVE PLATES (#12)
PISTON	PISTON	PISTON	PISTON	PISTON	PISTON	PISTON	PISTON	PISTON	PISTON
(2) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)	(3) FRICTION DISCS (#13)
(2) SPRINGS (#36)	(2) SPRINGS (#36)	(3) SPRINGS (#36)	(3) SPRINGS (#36)	(4) SPRINGS (#36)	(4) SPRINGS (#36)	(4) SPRINGS (#36)	(6) SPRINGS (#36)	(6) SPRINGS (#36)	(6) SPRINGS (#36)

2-3 OPERATING SPECIFICATIONS

BRAKE STACK CONFIGURATION <i>(See Above)</i>	BRAKE TORQUE (Lb. Ft.)		PRESSURE TO RELEASE <i>(PSI)</i>	CYCLIC WK ² <i>(Lb. Ft.²)</i>	MAXIMUM KE per ENGAGEMENT <i>(Ft. Lbs.)</i>	THERMAL RATING <i>(HP Sec./ Min.)</i>	PISTON VOLUME <i>(Cu. In.)</i>
	STATIC	DYNAMIC					
A	20	17	20	.034	6425	25	3
B	30	26	20				
C	45	39	28				
D	60	52	35				
E	90	78	51				

Maximum Speed - 1800 RPM

Section 3 - Installation

IMPORTANT SAFETY PRECAUTIONS

The brake units described in this manual must not be installed in any manner except as specified in this manual. This brake must not be operated at speeds, torque loads or temperatures other than those specified in this manual. Failure to limit operation of the brake to these conditions could damage the brake and may cause malfunction or damage to interconnecting equipment and void the warranty.

WARNING: The following precautions must be taken if the installation of the brake is to be a retrofit for an existing application. Before installing, open the motor disconnect, shut-off the control electrical supply and shut-off the air supply. Lock them out to avoid the possibility of personnel injury.

3-1 INSTALLING BRAKE TO YOUR SHAFT

(See Figure 3.1)

1. Remove the red plastic plug at the top of the brake and install the Reducer Bushing (#76) and the Air Breather (#45).

2. Check the fluid level in the brake as indicated in Section 4 - Lubrication. Add oil if necessary.
3. Place the Locking Collar (#29) on the extended part of the Hub (#2). Finger tighten the (5) screws just enough so it won't slip on the hub.
4. Clean the Jack Shaft completely with a suitable solvent.

WARNING: Open flames or smoking must not be permitted in the area when using flammable solvents.

5. Measure the Jack Shaft to make sure it is the correct diameter for the Locking Collar (#29) to properly lock the brake to the shaft. (See Table Below)

Nominal Shaft Diameter	Shaft Tolerances
1"	1.000" - .999"
1-1/8"	1.125" - 1.124" Dia.

6. Slide the brake on to the shaft in position to attach the Torque Arm.
7. Attach the Torque Arm as shown in Figure 3.1. Adjust the turnbuckle so the Air Breather (#45) is on the vertical center line.

Please Note: The maximum allowable angular misalignment is $\pm 5^\circ$ as shown in Figure 3.1.

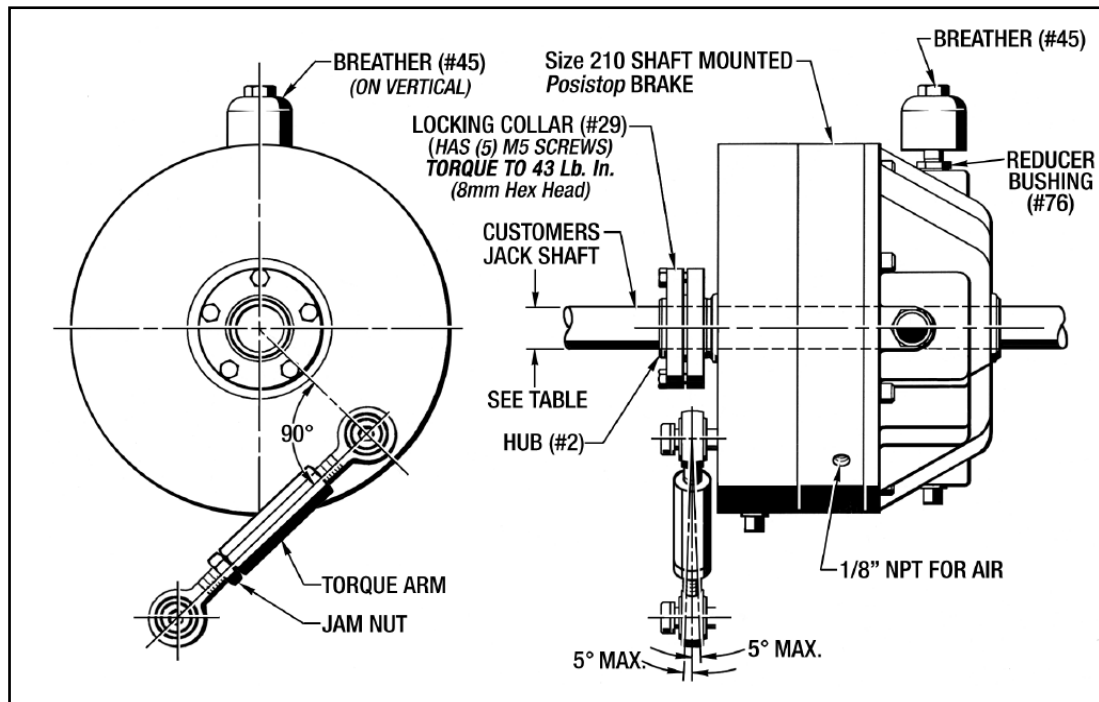


Figure 3.1 - Size 210 Shaft Mounted Brake Installation

- Torque the Locking Collar (#29) to 43 Lb. In. as per manufacturers instructions. (See Installation Sheet in back of this manual.)

3-2 PNEUMATIC HOOK-UP

The following schematic shown in Figure 3.2 illustrates a typical Pneumatic Control Diagram for your size 210 Shaft Mounted *Posistop* Brake.

Valving to be 3/8" NPT minimum and located as close to the brake as possible. See Section 2-3 Operating Specifications for operating pressures to release the brake.

NOTE: Lubrication of the air supply is not recommended because oil will accumulate in the piston chamber and cause the brake to act sluggish.

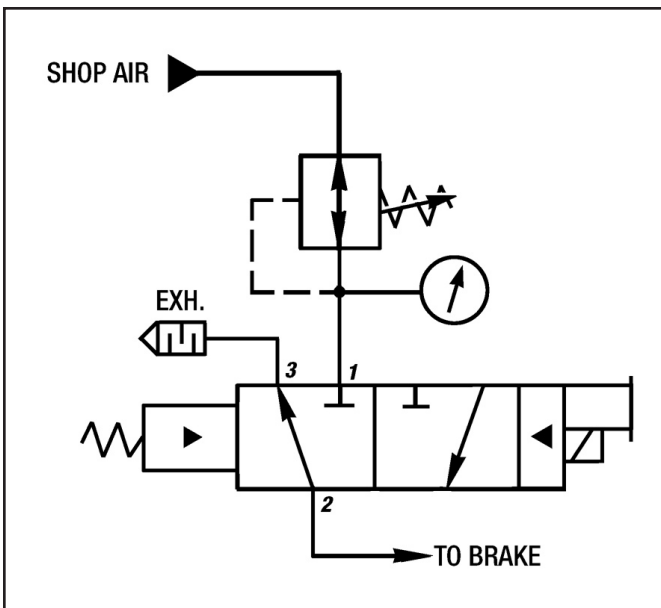


Figure 3.2 - Pneumatic Diagram

Section 4 - Lubrication

4-1 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 Sight Gauge (#46) and Pipe Plug (#75) may be reversed so that level is visible from other side.

4-2 CHANGING THE OIL

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

Remove the (2) Drain Plugs (#74) at the bottom of the end housing and housing. Drain all oil before refilling. Check the Sight Gauge (#46) and Breather (#45) for dirt. Remove them, clean and reinstall if necessary. Replace the (2) Drain Plugs (#74). Remove Plug (#114) and refill unit with clean oil up to the center of the Sight Gauge (#46). Replace the Pipe Plug (#114)

CAUTION

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

3-3 TYPE OF OIL

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

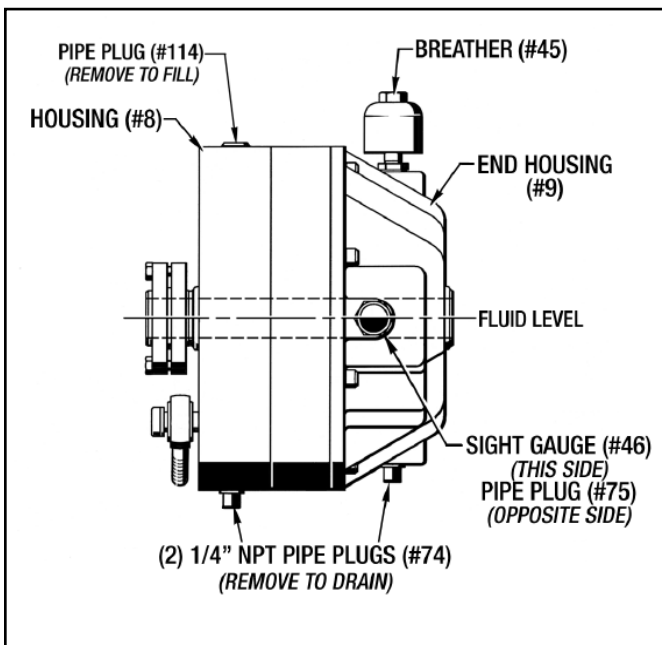


Figure 4.1 - Lubrication

Section 5 - 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.

5-1 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.

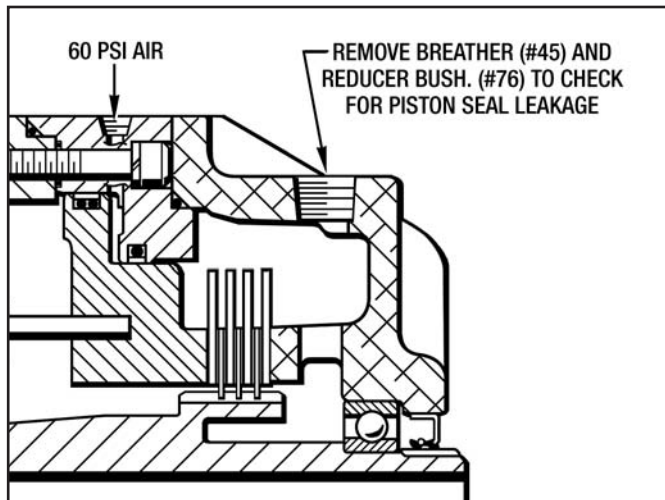


Figure 5.1 - Checking For Air Leaks

5-2 CHECKING BRAKE STACK FOR WEAR

(See Figure 5.2 Below)

1. Remove both Drain Plug (#74) from the End Housing (#9) & Housing (#8) and let oil drain completely from the brake unit.
2. Remove the End Housing (#9) by taking out the (8) Screws (#72) and (8) Lockwashers (#128). Carefully pull the End Housing off the brake.

Be careful not to damage the Oil Seal (#35) lip when pulling the End Housing off.

3. Take the Brake Stack off the spline and put it in an arbor press and measure the Stack Height as shown in Figure 5.2.

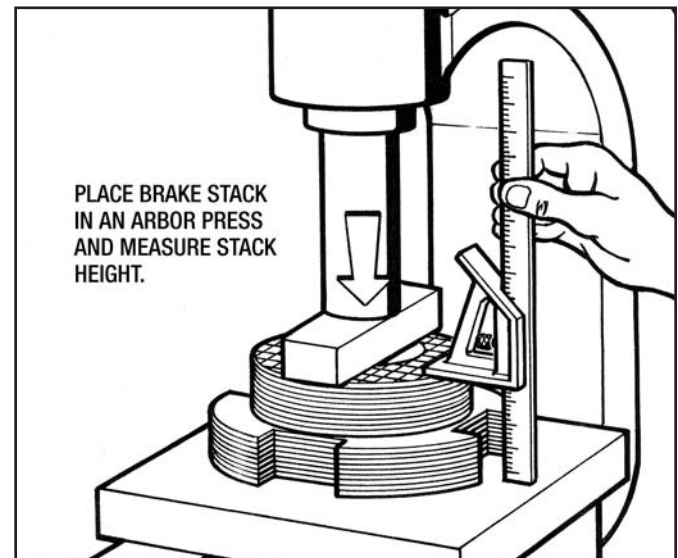


Figure 5.2 - Checking Brake Stack Wear

BRAKE STACK HEIGHT

Minimum Stack Height for both stacks is **.500"** (If it measures under this .500" then the stack needs to be replaced.)

New Stack Height for (2) Friction Discs (#13) and (6) Drive Plates (#12) is **.602"- .560"**

New Stack Height for (3) Friction Discs (#13) and (4) Drive Plates (#12) is **.578"- .540"**

Section 6 - Troubleshooting

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 to 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 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. Piston sticking or binding Air regulator valve not functioning properly.	Increase air pressure. (35 PSI min.) Disassemble to extent necessary to check for damaged parts. Check valve operation and replace if necessary.
E. Unit overheats (Over 225° F)	Brake not engaging or disengaging properly causing excessive slippage. Improper oil level	Refer to Problems A and D. Check oil level & add or drain if necessary.
F. Oil leakage	Oil seal lip damaged. O-Ring seals.	Check for leakage around shaft. Replace oil seal or wear sleeve if necessary. Tighten all external bolts. If leak continues, check for damage.
G. 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 that require precise starting and stopping, operating temperatures are important. Operating temperatures between 116° F and 165° F are recommended.

Section 7 - Disassembly

7-1 REMOVING THE BRAKE FOR REPAIR

1. **Turn-Off and Lock-Out** the electrical power to the Drive Motor, Control Valve and Driven Machinery. Disconnect pneumatic fittings from the brake.
2. Loosen the (5) Screws in the Locking Collar (#29) as per manufacturers instructions. (See Page 18)
3. Loosen and detach the Torque Arm Assembly from the Brake.
4. Slide the brake off of the shaft and move it to a suitable work table.
5. Take the Locking Collar (#29) off of the brake.
6. Drain all the fluid from the brake. Save or discard as condition warrants. Take off the Sight Gauge (#46) and Air Breather (#45) for cleaning.

7-2 BRAKE DISASSEMBLY

Refer to *Figure 10.1* for a visual reference to all parts described in this Disassembly Procedure.

1. Set the brake in a vertical position with the End Housing (#8) in an up position.
2. Remove the (8) Screws (#72) and (8) Lockwashers (#128). Carefully lift the End Housing (#9) up off the brake. (See *Figure 7.1*)

IMPORTANT - If the Oil Seal (#35) is not to be replaced, be very careful not to damage the lip of the Oil Seal (#35) when removing the End Housing (#9).

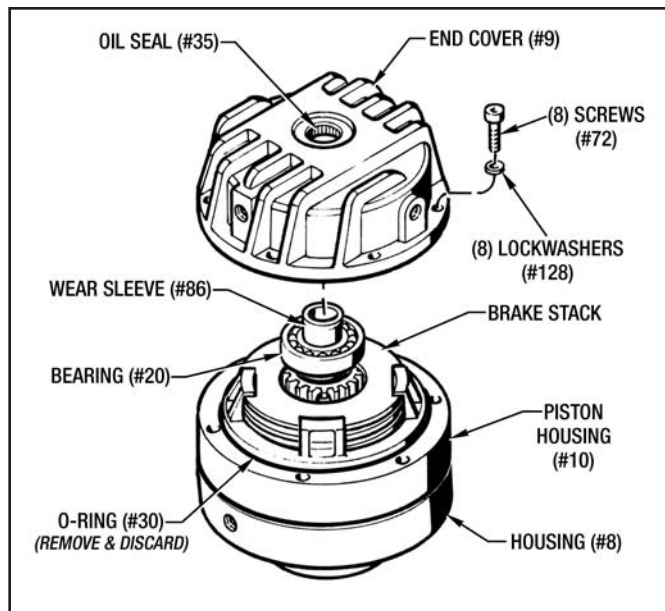


Figure 7.1 - Removing End Housing (#8)

3. If the Oil Seal (#35) is to be replaced, remove it from the End Housing (#9) with an Arbor Press.
4. Take the O-Ring (#30) off the Piston Housing (#10) and discard it.
5. Take the Brake Stack off of the Hub (2) spline.
NOTE - Keep the Drive Plates (#12) and the Friction Discs (#13) in the same order as they were removed.
6. Measure the Stack Height to determine whether or not it needs replaced. (**See Section 5-2 Checking Brake Stack for Wear on page 7 for the procedure.**)
7. In an even manner, back out the (6) Screws (#153) that attaches the Piston Housing (#10) to the Housing (#8). Remove the (6) Screws plus (6) Lockwashers (#127).

CAUTION - This Piston Housing (#10) is under spring pressure so be very careful when backing the (6) Screws (#153) out of the housing.

8. Lift the Piston Housing (#10) and Piston (#3) up and off the Springs (#36).
9. Remove and discard the (6) little O-Rings (#34) on the back face of the Piston Housing (#10). Also remove and discard the large O-Ring (#104) off Housing (#8).
10. Remove the Springs (#36) from the spring pockets.
11. If the Piston Seals are to be replaced, push the Piston (#3) out of the Piston Housing (#10).
12. Remove the Piston Seals and discard them.

They are as follows:

- a. In the Piston Housing there is (1) Teflon Liner (#42) and (1) O-Ring (#39).
 - b. In the Piston there is (1) Teflon Liner (#43) and (2) O-Rings (#40).
13. Carefully pull the Hub (#2) up and out of the Housing (#8).

CAUTION - Be very careful not to damage the lip of the Oil Seal (#35).

14. If the Oil Seal (#35) needs replaced, push it out of the bore with an Arbor Press.

15. To replace the Wear Sleeves (#86) and the Bearings (#20) on the Hub (#2), use the following procedure:

A. Wear Sleeve (#86)

1. Set the Hub on similar V-Block Supports as shown in *Figure 7.2*.
2. With a chisel the same width as the Wear Sleeve (#86), make about 5 or 6 notches in both Wear Sleeves (#86) as shown in *Figure 7.2*

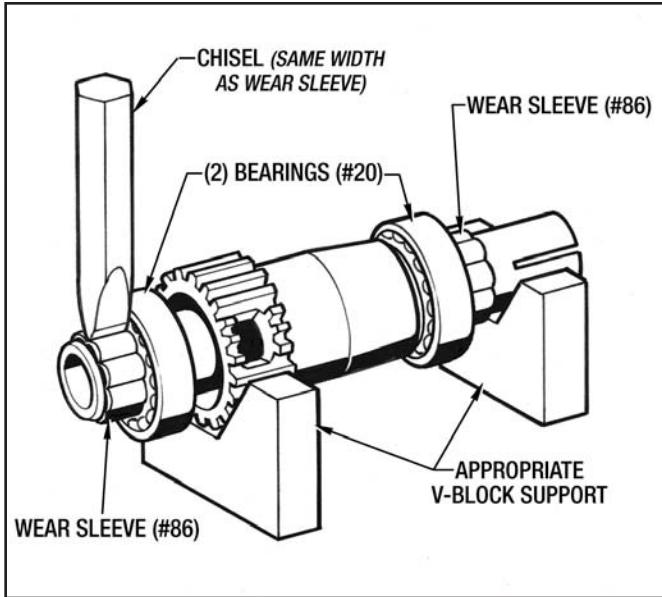


Figure 7.2 - Removing Wear Sleeves (#86)

3. The Wear Sleeves (#86) can now be removed by hand.

B. Bearings (#20)

1. Both Bearings (#20) can be removed from the Hub (#2) with a Standard 3-Jaw Bearing Puller.

Section 8 - Cleaning, Inspection and Repair

8-1 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

8-2 CLEANING AND INSPECTION

Clean metal parts in a suitable solvent and dry with low pressure compressed air. The Drive Plates (#13) can be cleaned in a solvent, but **DO NOT clean the Friction Discs (#12) in solvent.** Use only a lint free rag to clean them. (Solvent will damage the friction material on the Friction Discs (#12). **Keep the Brake Stack in the same order as they were 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.

8-3 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.

Section 9 - Reassembly

9-1 GENERAL REASSEMBLY INSTRUCTIONS

Note the following general reassembly instructions as applicable:

1. Lubricate O-Rings, Liners and the lip of the Oil Seals with a light coating of Vaseline or white grease immediately before reassembly and installation of mating parts.
2. External Teflon Liners will be easier to install if heated in an oven to approx. 200° F. Max.
3. Heat the (2) Bearings (#20) in an oven to 250° F. to install them on the Hub (#2).

CAUTION - Use suitable gloves when handling heated parts.

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

Basically the Reassembly Procedure is just the reverse order as the Disassembly Procedure

9-2 HUB REASSEMBLY

IMPORTANT - The (2) Bearings (#20) have to be installed on the Hub (#2) before the (2) Wear Sleeves (#86).

1. Make sure all mating surfaces on the Hub (#2) are thoroughly cleaned before installation.
2. Lightly coat the mating surfaces of the Hub (#2) with **Red Loctite #271**.
3. Heat the (2) Bearings (#20) to 250° F. and drop them on the Hub (#2). **Make sure each bearing is completely seated against the shoulder.**

CAUTION - Always wear adequate gloves when handling heated parts.

4. Clean off any excess **Loctite**.
5. Install the Front Wear Sleeve (#86) on to the Hub (#2) with the following procedure and as shown in *Figure 9.1*:

Step "A"

(a) Apply **Red Loctite #271** to the mating surface of the Hub (#2).

(b) With an approx. 2" Dia. flat plate and an Arbor Press, push the Wear Sleeve (#86) down until it is flush with the end of the Hub (#2).

Step "B"

(a) With the Assembly Tool #601-02-013 and an Arbor Press, completely seat the Wear Sleeve (#86) on to the Hub (#2). Use End "A" of the Assembly Tool.

(b) Clean off any excess Loctite.

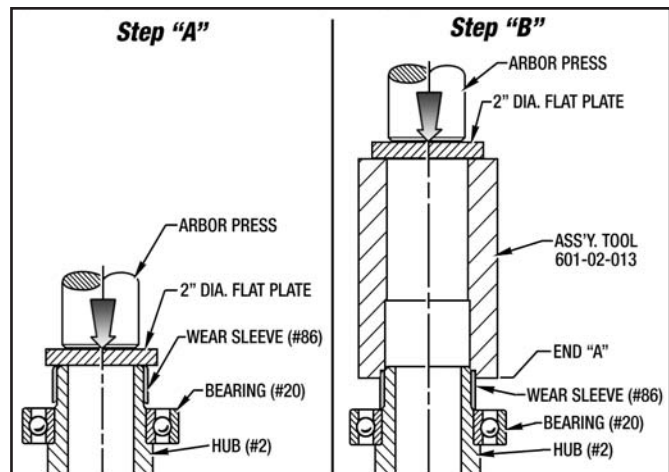


Figure 9.1 - Installing Front Wear Sleeve (#86)

6. Install the Rear Wear Sleeve (#86) on to the Hub (#2) with the following procedure and as shown in *Figure 9.2*:

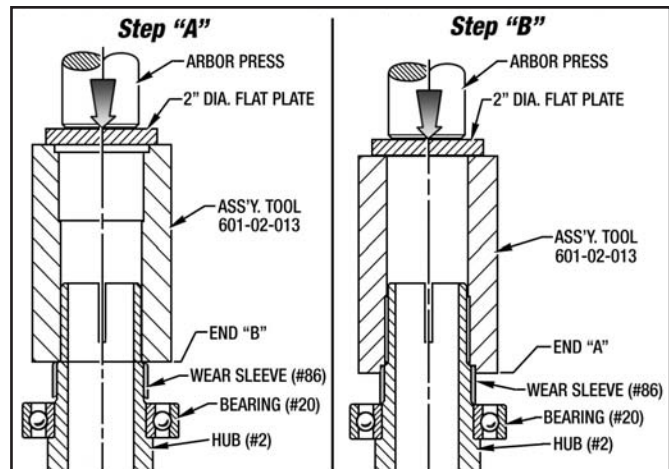


Figure 9.2 - Installing Rear Wear Sleeve (#86)

Step "A"

(a) Apply **Red Loctite #271** to the mating surface of the Hub (#2).

(b) With End "B" of the Assembly Tool #601-02-013, push the Wear Sleeve (#86) on to the Hub (#2).

Step "B"

(a) With the End "A" of Assembly Tool #601-02-013 and an Arbor Press, completely seat the Wear Sleeve (#86) on to the Hub (#2).

(b) Clean off any excess **Loctite**.

See Page 15 for dimensions to make the Wear Sleeve Assembly Tool 601-02-013.

9-3 INSTALLING OIL SEALS (#35)

A. In The End Housing (#9)

1. Clean the bore in the End Housing (#9) of any old sealant. Use solvent or a 3M "Scotch-Brite" (Purple Grade) Cleaning Pad.
2. Coat the bore with a light coating of **Permatex 3D Sealant**.
3. With an Arbor Press and a 2-1/4" Dia. x 1" Thick Plate, press the Oil Seal (#35) in to the Housing (#9) until it is flush with the bottom corner of the chamfer as shown in *Figure 9.3*.

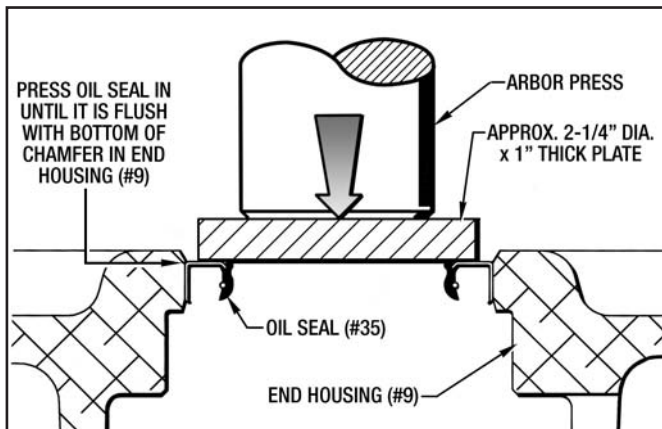


Figure 9.3 - Installing Oil Seal (#35) into the End Housing (#9)

4. Clean off any excess **Permatex**.

B. In The Housing (#8)

1. Clean the bore in the Housing (#8) of any old sealant. Use solvent or a 3M "Scotch-Brite" (Purple Grade) Cleaning Pad.
2. Coat the bore with a light coating of **Permatex 3D Sealant**.
3. With an Arbor Press and a 3-1/4" Dia. x 1" Thick Plate, press the Oil Seal (#35) in to the Housing (#8) until it is flush with the housing surface as shown in *Figure 9.4*.

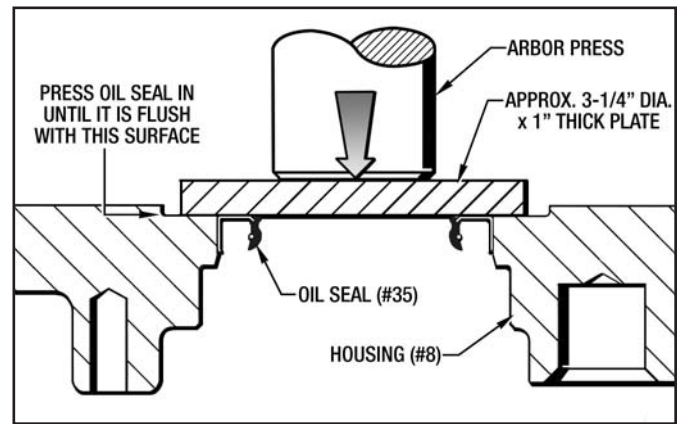


Figure 9.4 - Installing Oil Seal (#35) into the Housing (#8)

4. Clean off any excess **Permatex**.

9-4 INSTALLING NEW PISTON SEALS

(See Figures 9.5 and 10.1)

1. Make sure all grooves and mating surfaces in the Piston (#3) and Piston Housing (#10) are thoroughly cleaned.
2. Coat the (2) O-Rings (#40) and the Teflon Liner (#43) with Vaseline or White Grease and install them into the Piston (#3) groove.
3. Coat the O-Ring (#39) and the Teflon Liner (#42) with Vaseline or White Grease and install them into the Piston Housing (#10) groove.

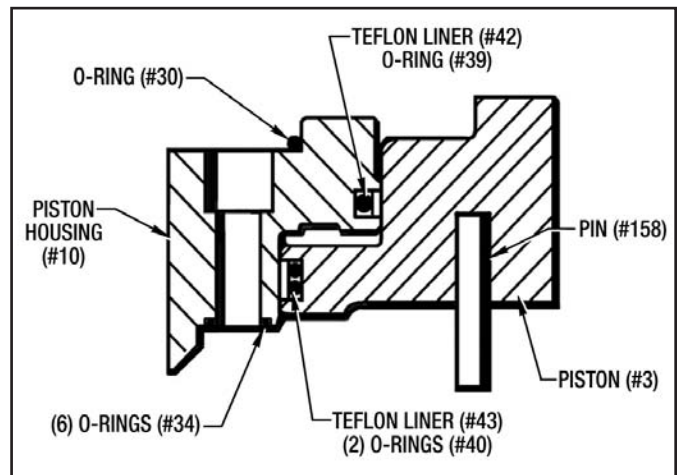


Figure 9.5 - Installing New Piston Seals

4. Push the Piston (#3) into the Piston Housing (#10) and set it aside.

IMPORTANT - Orientate the Pin (#158) in the Piston (#3) to the location of the Actuation Port in the Piston Housing (#10) as shown in *Figure 9.6*, on the next page.

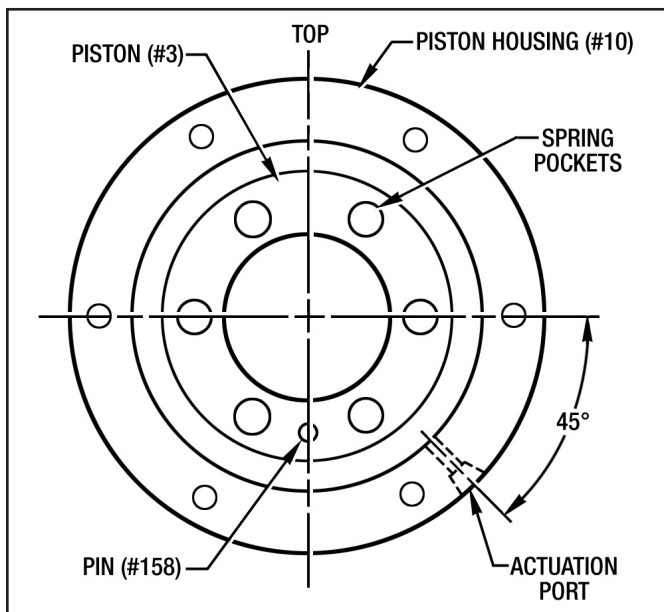


Figure 9.6 - Piston and Piston Housing Orientation

9-5 BRAKE REASSEMBLY

(See Figure 10.1)

1. Place the Housing (#8) in a vertical position with the spring pockets in the up position.
2. Lubricate the O-Ring (#104) and install it on the Housing (#8).
3. Lubricate the lip of the Oil Seal (#35) in the Housing (#8) and the Rear Wear sleeve (#86) on the Hub (#2) with Vaseline or White Grease.

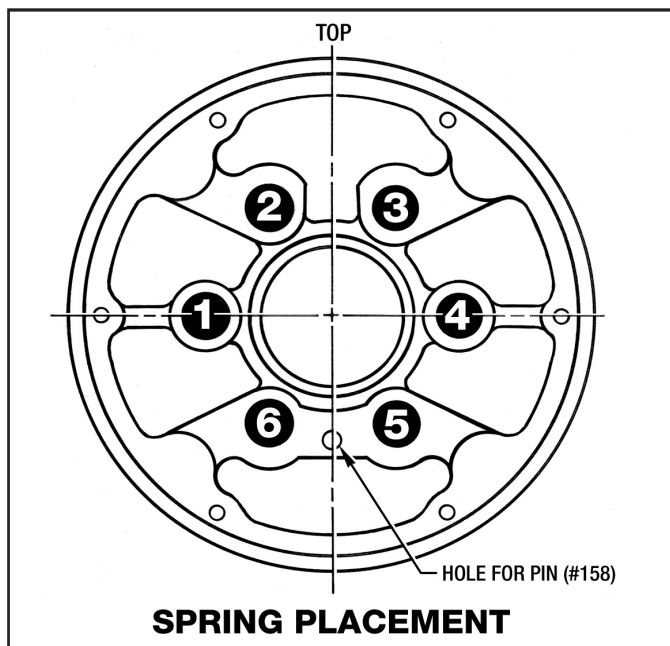


Figure 9.7 - Correct Placement of Springs (#36)

4. Very carefully, insert the Hub (#2) down and into the Housing (#8) until the Bearing (#20) is completely seated in the bearing bore.
5. Place the proper number of Springs (#36) into their prospective spring pockets. (See Figure 9.7)

STATIC TORQUE	SPRING QTY.	POCKET LOCATION
20 & 30 Lb. Ft.	2	1 & 4
45 Lb. Ft.	3	1,3 & 5
60 Lb. Ft.	4	2, 3, 5 & 6
90 Lb. Ft.	6	1, 2, 3, 4, 5 & 6

6. Lubricate the (6) small O-Rings (#34) and install them into the back face of the Piston Housing (#10).
7. Lower the Piston and Piston Housing Assembly down and on the Housing (#8). Make sure the spring pockets in the Piston (#3) align with the Springs (#36). Also the Pin (#158) in the Piston has to be aligned with the small hole at the bottom of the Housing (#8) as shown in Figure 9.7.
8. Attach the Piston Housing (#10) to the Housing (#8) with (6) Screws (#153) and (6) Lockwashers (#127). **Tighten in an even manner to compress the Springs (#36) correctly. Torque to 14 Lb. Ft.**
9. Lubricate and install a new O-Ring (#30) on the Piston Housing (#10).
10. Apply shop air to the brake port to fully retract the Piston (#3).
11. Place the Brake Stack on the Hub (#2) spline and the Piston Housing (#10) keys. Install the Drive Plates (#12) and Friction Discs (#13) as determined by the Brake Stack Configurations shown in Section 2-2 on Page 3.

Assembly Tips:

- (a) One side of the Steel Drive Plates (#12) has a slight radius on all edges. Install this radius side first, tilting each Drive Plate slightly to get them started.
- (b) The Friction Discs (#13) will also go on to the hub spline easier if slightly tilted.
12. Lubricate the lip of the Oil Seal (#35) that is installed in the End Housing (#9). Also lubricate the Front Wear Sleeve (#86) on the Hub (#2).
13. Carefully place the End Housing (#9) on the Piston Housing (#10). Be very careful not to damage the Oil Seal (#35) lip.

Press the End Housing (#9) down firmly so the Bearing (#20) completely seats in the bearing bore.

14. Attach with (8) Screws (#72) and (8) Lockwashers (#128). **Torque to 14 Lb. Ft.**
15. Reinstall the Sight Gauge (#46), Air Breather (#45) and any other pipe plugs or fittings removed for Disassembly.
16. Fill with fresh oil as described in **Section 4 - Lubrication.**
17. Check the operation of the brake as per instructions given in **Section 5 - Operational Checks.**
18. Reinstall the Brake back on the Driven/Jack Shaft with the same procedure given in **Section 3 - Installation.**

9-6 WEAR SLEEVE ASSEMBLY TOOL DIMENSIONS

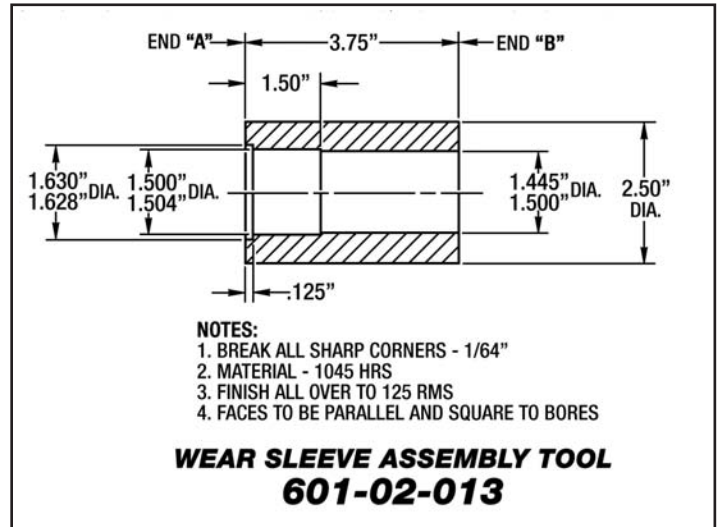


Figure 9.8 - Wear Sleeve Assembly Tool

Dimensions are given for this Wear Sleeve Assembly Tool in case you prefer to make your own. It can also be ordered from Force Control with this part number **601-02-013**

Section 10 - Ordering Repair Parts

10-1 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

10-2 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

Size 210 Shaft Mounted *Posistop* Brake

REF. No.	PART NAME	QTY.	REF. No.	PART NAME	QTY.
2	Hub	1		90 Lb. Ft. Torque	6
2A	Sleeve (1" Dia. Jack Shaft)	1	*39	O-Ring	1
3	Piston.....	1	*40	O-Ring	2
8	Housing	1	*42	Liner, I.D. Sealing.....	1
9	End Housing	1	*43	Liner, O.D. Sealing.....	1
10	Piston Housing	1	*45	Air Breather.....	1
*12	Drive Plate		*46	Sight Gauge.....	1
	20 Lb. Ft. Torque	6	66	90° Street Elbow, 1/8" NPT	1
	30, 45, 60 & 90 Lb. Ft. Torque	4	72	Soc. Hd. Screw, 5/16"-18 x 7/8" Lg.	8
*13	Friction Disc		74	Pipe Plug, Mag. Sq. Hd., 1/4" NPT	2
	20 Lb. Ft. Torque	2	75	Plug Pipe, C'Sunk, 1/2" NPT.....	1
	30, 45, 60 & 90 Lb. Ft. Torque	3	76	Reducer Bushing, 1/2" x 1/4" NPT.....	1
*20	Bearing	2	*86	Wear Sleeve.....	2
29	Locking Ring.....	1	*104	O-Ring	1
*30	O-Ring	1	114	Pipe Plug, C'Sunk, 1/4" NPT.....	1
*34	O-Ring	6	127	Lockwasher, 5/16"	6
*35	Oil Seal	2	128	Lockwasher, 5/16"	8
*36	Spring		*137	Torque Arm Rod End	1
	20 Lb. Ft. Torque	2	138	Shoulder Bolt.....	1
	30 Lb. Ft. Torque	2	153	Soc. Hd. Screw, 5/16"-18 x 2" Lg.	6
	45 Lb. Ft. Torque	3	158	Dowel Pin, 1/4" x 2" Lg.	2
	60 Lb. Ft. Torque	4			

* Indicates parts in Overhaul Kit.
 #2A Sleeve is furnished with the Hub (#2).

Size 210 SHAFT MOUNTED *Posistop* BRAKE

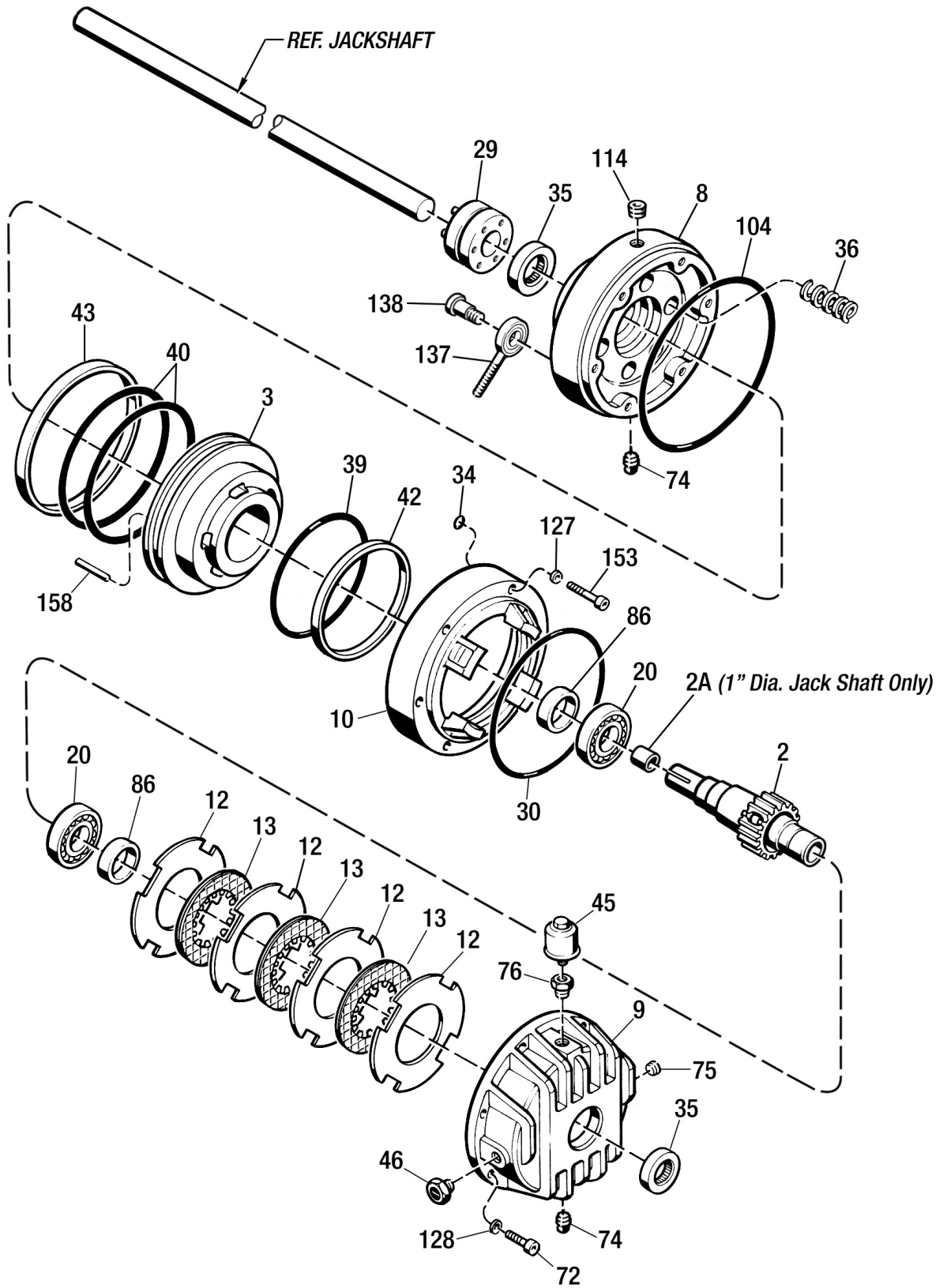


Figure 10.1 - Size 210 Shaft Mounted Posistop Brake

INSTALLATION AND REMOVAL INSTRUCTIONS FOR B-LOC™ SHRINK DISCS

Thank you for purchasing a B-LOC™ Keyless Frictional Locking Device. B-LOC™ keyless connectors provide a high capacity, zero-backlash shaft/hub or coupling connection by means of a mechanical interference fit. Please follow these INSTALLATION AND REMOVAL INSTRUCTIONS carefully to ensure proper performance of this B-LOC™ unit.

ⓘ WARNING ⓘ

When installing or removing B-LOC™ products, always adhere to the following safety standards:

1. Be sure that all power switches are locked out before installing or removing B-LOC™ products.
2. Eye protection is required when installing or removing B-LOC™ products. Please wear safety glasses and protective clothing.

INSTALLATION

(Refer to Figure 1)

B-LOC™ Shrink Discs are supplied ready for installation. However, prior to tightening of locking screws it is necessary to remove wooden spacers that may have been used during shipping.

Important: Never tighten locking screws before shaft installation, as inner ring of Shrink Disc and/or hub can be permanently contracted even at relatively low tightening torques.

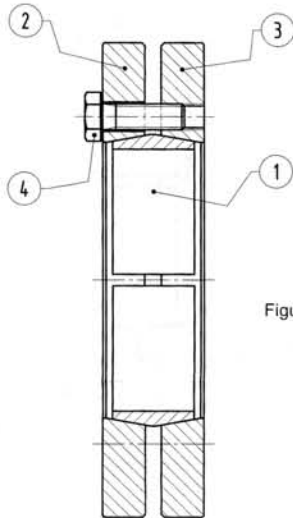


Figure 1

1. Clean hub O.D. and Shrink Disc bore. Lightly lubricate hub O.D. before assembling Shrink Disc on hub.
2. Carefully clean shaft and hub bore of any lubricant prior to mounting hub onto shaft. **This step is critical, as any lubricant on the shaft/hub bore interface will greatly reduce the torque transmitting capacity of a B-LOC™ Shrink Disc connection.**
3. After confirming correct position of hub and Shrink Disc, hand-tighten three (3) or four (4) equally spaced locking screws and make sure that outer collars of Shrink Disc are parallel. Hand-tighten remaining locking screws.
4. Use torque wrench and set it approximately 5% higher than specified tightening torque M_A . Tighten locking screws in either a clockwise or counter clockwise sequence, using approx. 1/4 (i.e., 90°) turns (even if initially some locking screws require a very low tightening torque to achieve 1/4 turns) for several passes until 1/4 turns can no longer be achieved.
5. Continue to apply overtorque for 1 to 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach specified tightening torque.

For technical assistance, please call 1-800-865-7756

6. Reset torque wrench to specified torque (M_A) and check all locking screws. No screw should turn at this point, otherwise repeat Step 5 for 1 or 2 more passes. It is not necessary to re-check tightening torque after equipment has been in operation.

REMOVAL (Refer to Figure 2)

Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Locking Assembly, shaft or any mounted components.

1. Loosen all locking screws in several stages by using approx. 1/2 turns, following either a clockwise or counterclockwise sequence, until Shrink Disc can be moved on hub. The Shrink Disc, hub and shaft will return to their original clearance fits.

ⓘ WARNING ⓘ

DO NOT completely remove locking screws before outer collars are disengaged from inner ring. A sudden release of the outer collars involves high separating forces and could result in permanent injury or death. Be certain that outer collars are disengaged from inner ring before completely removing locking screws.

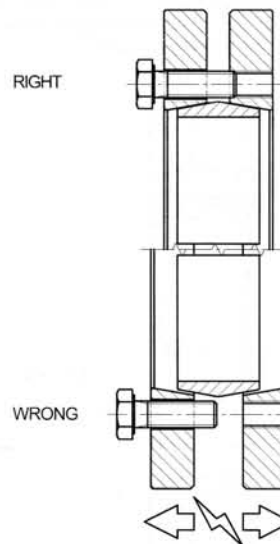


Figure 2

REINSTALLATION OF SHRINK DISCS

In relatively clean operating conditions, Shrink Discs can be re-used without prior cleaning. Shrink Discs used under severe conditions, however, require thorough cleaning and re-lubrication with Dow Corning® Molykote™ G-n Metal Assembly Paste or equivalent.

LOCKING SCREW SIZES AND SPECIFIED TIGHTENING TORQUE M_A									
Screw Size	M5	M6	M8	M10	M12	M16	M20	M24	M27
Tightening Torque M_A (ft-lbs)	3.6	8.7	22	44	74	185	362	620	922
Wrench Size									
Across Flats (mm)	8	10	13	17	19	24	30	36	41

B-LOC Corporation 26 Gilbert Street Monroe, NY 10950

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