

# High Speed Backstop Clutches Models HSB 400 thru 1027

Service & Installation Instructions

P-222-7-FC  
Bulletin 2214



 **Formsprag**<sup>®</sup>  
Clutch

An **Altra Industrial Motion** Company

# Introduction

Formsprag HSB – High Speed Backstops consist of a Formsprag FSO Clutch and an attached oil reservoir for increased oil capacity and cooler operation. With the Formsprag exclusive Formchrome® PCE sprags, HSB units are designed to give high performance under continuous operation at high over-running speeds.

Follow carefully the step by step instructions for installation and maintenance to assure that the high performance built into the clutch will be realized in service.

**⚠ WARNING** Failure to follow these instructions may result in product damage, equipment damage, and serious or fatal injury to personnel.

## Pre-installation Check

Before installing, check:

1. The oil reservoir kit may be packaged separate from the over-running clutch.
2. **Shaft to Bore Fit:**

Clutch Bore	Recommended Fit*
0 to 2 inches dia.	Line fit to .002" loose
2 to 4 inches dia.	Line fit to .0025" loose
4 to 6 inches dia.	Line fit to .003" loose

\*If a press fit is necessary under special circumstances, do not exceed .001 inches tight.

## 3. Key and Keyseat

A hardened key, from 30 to 40 Rockwell 'C' Scale, is recommended. The key must be as long as backstop inner race for proper support. The key should be installed with a push fit and must seat squarely. Do not use a driving force fit. Keys are not furnished by Formsprag on Models HSB-400 through HSB-700. Keys are furnished by Formsprag on size HSB-750 and larger. For key stock material use SAE 1141, 1045 or 4130.

## 4. Rotation

Check the shaft to determine the desired direction of rotation. Orient the clutch such that the inner race overruns (rotates) in the same direction as the shaft. Determine the outboard side or reservoir side of the clutch where the clutch inner race overrunning direction matches the shaft rotation direction.

5. HSB model clutches can only be used in installations where the outer race remains stationary with the use of a torque arm (purchased separately), as in a backstopping application.

For TORQUE ARM DESIGNS (see Figure 5) AND FSO TORQUE ARMS LISTED IN CATALOG P-956.

## Installation

1. Clutches are shipped with oil seals, in both ends, and half full of oil (see Figure 1). After the proper direction of rotation of the clutch has been determined, remove the oil seal on the reservoir side with a screw driver, (or similar instrument), being careful not to damage the clutch. On HSB Models 400, 600 and 700, the snap ring needs to be installed next to the bearing (see Figure 2). On HSB Models 750 and larger, a spacer (provided in the kit) needs to be installed next to the bearing, then restrained by reutilizing the snap ring (see Figure 2).

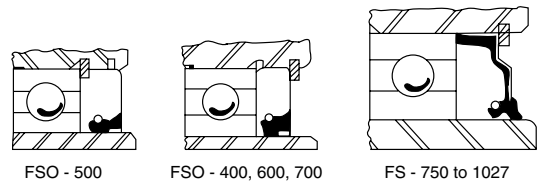


Figure 1, As Received

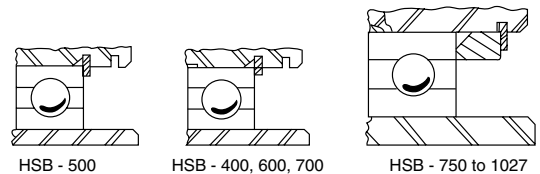


Figure 2, As Modified

- Mount torque arm (purchased separately) to seal end of backstop. The torque arm is required to hold the backstop outer race when backstopping torque is applied in service. Secure torque arm to outer race with machine or cap screws. Use screws in all tapped holes (see Figure 5).

Model No.	No. of Tapped Holes	Thread Size	Tapped Useable Thread Depth	Hole Circle Diameter
HSB-400	4	5/16-24	1/2	2-7/8
HSB-500	4	5/16-24	5/8	3-5/8
HSB-600	6	5/16-24	5/8	4-3/4
HSB-700*	8	3/8-24	3/4	6-1/4
HSB-750**	8	1/2-20	1	7
HSB-800	8	1/2-20	1	8-15/16
HSB-900	10	5/8-18	1-1/4	9-3/4
HSB-1027	12	5/8-18	1-1/4	11-3/4

\* Model 700 – Six equally spaced mounting holes plus two extra holes at 180. Six mounting screws are adequate for torque loads up to 3,000 lb. ft. For loads up to 4,000 lb. ft., use all eight mounting holes.

\*\* Model 750 – Six equally spaced mounting holes are provided plus two extra holes at 180. Six mounting screws are adequate for torque loads up to 5,100 lb. ft. For loads up to 6,800 lb. ft. use all eight mounting holes.

**Note:** Mount torque arm so that when backstop is installed an oil drain port will be at the bottom of backstop and breather will be at top.

- Mount backstop with torque arm attached on shaft with oil seal end toward reducer. (Shaft must be horizontal.) Secure inner race to shaft by holding inner race against a shoulder or collar with a flat

washer and securing screw, a snap or retaining ring etc., as shown (see Figure 3). Use a gasket with RTV sealant under flat washer to prevent oil leakage. With snap ring, apply RTV sealant around shaft and along keyway to prevent oil leakage.

**Note:** When mounting the backstop, apply pressure to end face of backstop inner race only to avoid damage to internal bearings.

- Install oil reservoir. Apply RTV sealant to both sides of gasket (O-Ring furnished to Models HSB 750 through HSB 1027). Install breather at top. Install oil recirculating tube on Models HSB 750 through HSB 1027. Connect tube from bottom oil hole on clutch race to bottom hole on reservoir. Tighten fittings securely.
- Install torque arm stops.
- All fasteners are recommended to be grade 8 bolts.

**Important:** The torque arm MUST NOT BE RIGIDLY SECURED to a fixed member. The torque arm must be free to float in both axial and angular directions. Allow 1/8 inch clearance between torque arm and stops.

- Locate the lubrication tag in the oil reservoir kit and adhere to clutch outer race in line with the breather. Note the tag arrows “inner race free” and orient the tag with the arrows in the direction of shaft rotation.
- Lubricate backstop according to OIL LUBRICATION before operating.
- After backstop has been operating for a short time, check oil hole fittings and cap screws for tightness. Tighten if necessary.

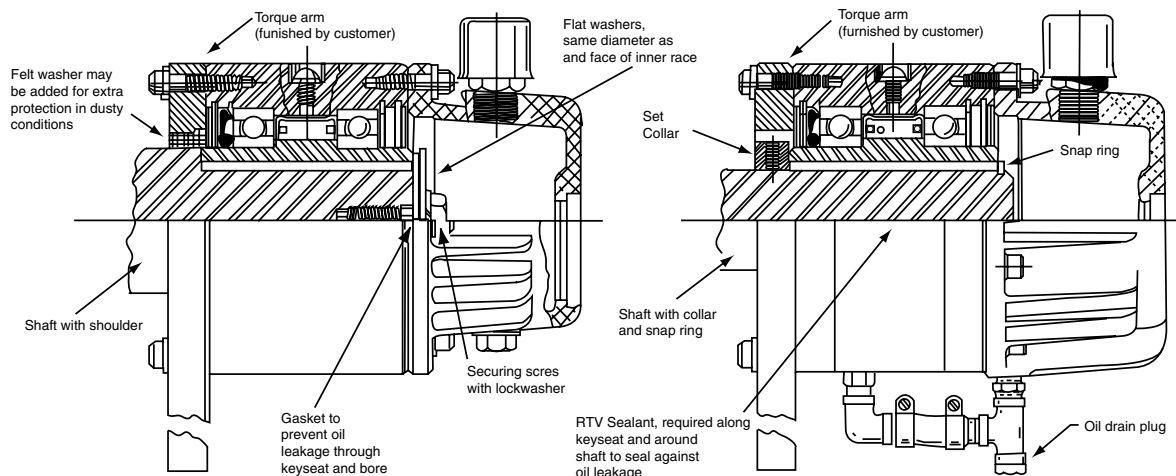
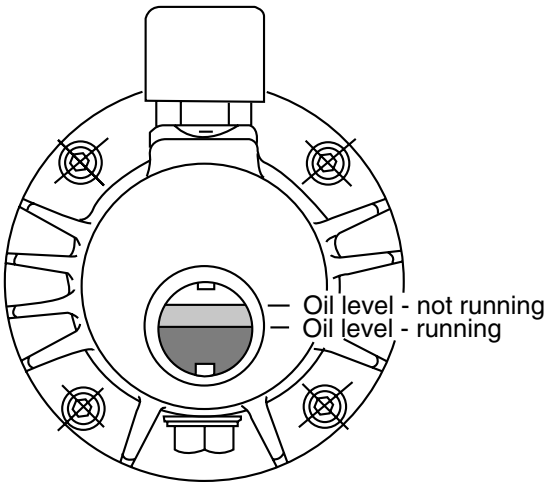


Figure 3

**Note:** For dusty atmosphere conditions such as coal, cement, or dust), it is suggested that an auxiliary seal be employed to protect the oil seal installed in the clutch. Dust acts as an abrasive which can wear the oil seal at an accelerated rate. The auxiliary seal may be purchased from Formsprag-Warren, for models 750 through 1027. (The user's torque arm may also be adapted to incorporate some type of seal or wiper which will prevent dust from entering the oil seal area.)



Backstop should be half full of oil.

**Figure 4**

## Oil Lubrication

1. Use oil selected from the table according to the ambient temperatures existing at the Holdback.
2. Remove breather – and add oil through hole in reservoir to level shown (see Figure 4), “Oil level – not running”.
3. When backstop is operating, oil level in reservoir will fall to “Oil level – running”.

Temperature Range	Recommended Lubricant
+20°F to +150°F (-7°C to +65°C) (Max. permissible ambient temperature)	Mobil DTE Heavy Medium Automatic Transmission Fluid (high grade only) Texaco Regal R&O No. 68 Shell Turbo Oil 68 Gulf Harmony 68 Amoco Industrial Oil 68 Exxon Teresstic Oil 68 Sunoco Sunvis 931
-10°F to +20°F (-23°C to -7°C)	Chevron Oil 46 Chevron GST Oil 931 Mobil Gargoyle Arctic C Heavy Texaco Regal R&O Oil 46 Sunoco Sunvis 921 Automatic Transmission Fluid (high grade only)
-40°F to +150°F (-40°C to +65°C) (Max. permissible ambient temperature)	Mobil Jet Oil 2 Shell Turbine Oil 500 Exxon Turbo Oil 2389 Standard Esso Turbo Oil 2389 Military Oils MIL-L-7808 or MIL-L-23699

**CAUTION** Do not use lubricants of the E.P. type (extreme pressure characteristics), or those containing slippery additives.

**WARNING** The use of lubricants in clutch assemblies, other than those shown, can result in improper sprag engagement. Improper sprag engagement may cause personal injury or property damage.

Formsprag Clutch is not responsible for any changes made by the manufacturers in their lubricants.

The use of any lubricants, other than those listed in this bulletin, will automatically void any warranty.

## Maintenance

Lubrication is the most important backstop maintenance factor.

1. Check oil level every two weeks. Add oil if necessary to keep oil at proper level.
2. To assure continued efficiency of operation, flush clutch with mineral spirits at intervals as follows:

Up to 12 hours per day operation: Flush backstop and change oil every six (6) months.

12 to 24 hours per day operation: Flush backstop and change oil every three (3) months.

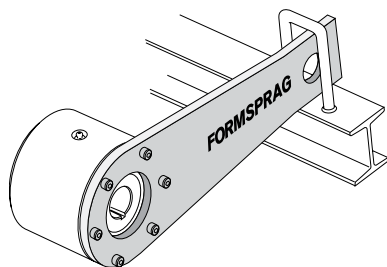
Under extremely dusty or dirty operating conditions: Flush backstop and change oil as often as necessary to keep clean.

## Flushing procedure

1. Drain oil from backstop.
2. Install drain plug. Remove breather. Add mineral spirits through breather hole in top of reservoir until level reaches top of sight gage glass.
3. Operate backstop for several minutes (10 maximum) to break up and dissolve any oil residue which may have formed.
4. Drain backstop. Open drains in bottom of reservoir and in bottom of backstop outer race.
5. Install drain plugs.
6. Add new oil to level shown above (see Figure 4).
7. Inspect breather before installing.

**Note:** Breathers are supplied with Formsprag HSB High Speed Backstops.

- a. Check filter element. If plugged with dust or dirt, discard and install new breather.
- b. Keep sufficient supply of breathers on hand to permit immediate replacement when required.



**Figure 5**  
**Torque Arm Designs**

## Replacement Breathers

Order spare Breathers,  
Manufacturers Part Number 569022 directly from:  
Fluid Systems Engineering Company  
22940 Greater Mack Avenue  
St. Clair Shores, Michigan 48080  
Telephone (313) 772-3000

Spare breathers can also be purchased from:  
Formsprag – Part Number – CL-30702.

## Packaging

Your high Speed Backstop, carefully wrapped in VPI type activated paper for corrosion protection and packed in shipping box conforming to the requirements of Rule 41, Uniform Freight Classification, may be stored for up to two (2) years and reshipped without added packaging. Models 400 through 600 are packed in corrugated board shipping boxes and Models 700 through 1027 in wooden style 4 shipping boxes with integral skids. To store in unprotected area or if original package is opened, wrap with waterproof covering.

## Backstop Rebuilding Service

Disassembly and repair of Formsprag backstops in the field is not recommended.

Formsprag clutch and backstops are mechanical devices designed to protect mechanical equipment from rotation in the opposite direction and should generally not be considered Safety Devices. Formsprag clutches and backstops have surfaces which wear with use over time and as a result will need to be replaced. The clutches and backstops do not offer a feature for determining the time of their replacement. As a result the decision for the time of replacement must be made by the operator of the equipment based upon the specific application and performance of the clutch or backstops.

Formsprag clutches are precision devices manufactured and tested under careful controls to meet exacting standards. When reconditioning is required, Backstops should be returned directly to Formsprag Clutch. (Purchase Orders must go through the Warner Electric Distributor or the Original Equipment Manufacturer.)

For additional technical and dimensional information refer to Formsprag Overrunning Clutch Catalog P-956.

## Selection

Size	Kit No.
300	TA300
400	TA400
500	TA500
550	TA550
600	TA600
650	TA650
700	TA700
750	TA750
800	TA800
900	TA900
1027	TA1027

## Warranty

Formsprag LLC warrants that it will repair or replace (whichever in its sole discretion it deems advisable) any product it manufactured and sold which proves to be defective in material or workmanship within a period of one (1) year from date of original purchase for consumer, commercial or industrial use. This warranty extends only to the original purchaser and is not transferable or assignable without Formsprag LLC's prior consent.

This warranty covers normal use and does not cover damage or defect which results from alterations, accident, neglect, disassembly or improper installation, operation or maintenance.

Formsprag LLC's obligation under this warranty is limited to the repair or replacement of the defective product. In no event shall Formsprag LLC be liable for consequential, indirect or incidental damages of any kind incurred by reason of manufacture, sale or use of any defective product. Formsprag LLC neither assumes nor authorizes any other person to give any other warranty or to assume any other obligation or liability on its behalf.

These instructions cannot cover all details or variations in equipment and applications nor provide for every possible contingency which may be met in installation, operation or maintenance. Should further information be needed, contact Formsprag Clutch at 1-800-927-3262.



[www.formsprag.com](http://www.formsprag.com)

23601 Hoover Road  
Warren, MI 48089  
586-758-5000  
Fax: 586-758-5204

An **Altra Industrial Motion** Company

