107-407TR Shaft Mounted Gear Drives and 107-407TL Screw Conveyor Drives

Installation, Lubrication and Maintenance Instructions

WARNING: Failure to comply with these instructions or disassembly of gear drive will void the gear drive warranty.

Assembly of Backstop

When an optional backstop is to be used with the shaft mounted gear drive and has not been factory installed, it should be assembled to the unit prior to mounting the unit on the driven shaft. See Figure 1.

Remove bolts (1), cupped cap (2), shim gasket (3) and spacer ring (4) from the gear housing (5). If the backstop housing (6) contains two snap rings, remove the snap ring (7) only.

CAUTION: Note direction of rotation indicated by the arrow on the backstop to allow shaft rotation in that direction.

Install the backstop (8), key not shown, and the snap ring (7) if the snap ring was previously removed, into the backstop housing (6). Place the previously removed shim gasket(s) (3) on the face of the gear drive housing (5). Slide the assembled housing (6) onto the backstop shaft extension. While sliding the backstop housing onto the backstop shaft extension, rotate the backstop housing opposite the direction of the arrow, to allow for ease of installation. Do NOT use excessive force. Bolt the installed housing (6), shim gasket (3), cap gasket (9) and flat cap (10) with bolts (11) treated with a locking adhesive to the gear drive housing (5).

CAUTION: Do not reinstall bolts (1), cupped cap (2) or spacer ring (4).

Turn the input shaft by hand to ensure that it locks in the desired direction and rotates freely in the opposite direction without excessive end play. Torque bolts (11) to 25 ft-lbs.

WARNING: Never use an EP additive oil with a backstop because the enhanced lubrication properties of EP oils may cause the backstop to slip.

WARNING: Backstops may not be used for people moving, and have a maximum overrunning speed of 1800 rpm. Indexing, jogging or ratcheting is not permitted.

WARNING: Do not attempt to disassemble or service the backstop when it is under power or under load. Remove or block the load so it will not move prior to servicing the unit. Always follow lockout procedures to prevent activation of the prime mover when servicing the unit.

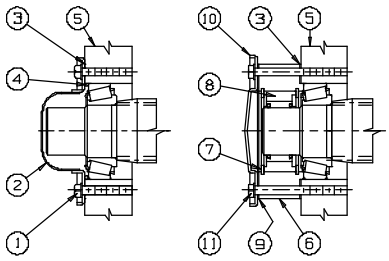

Figure 1 - Backstop Assembly

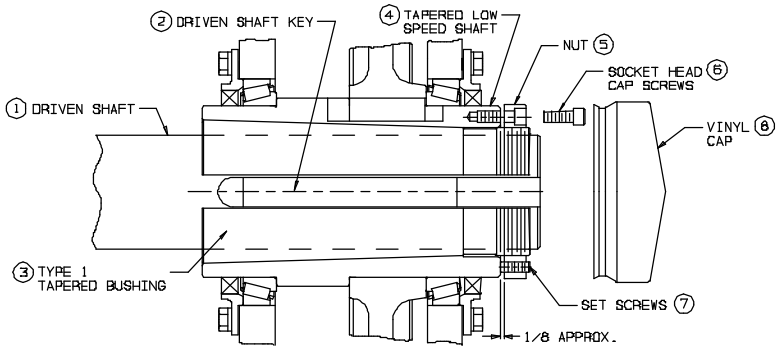

Figure 2 - Type 1 Tapered Bushing Assembly

Installation & Removal Instructions

All Dorris tapered bushing kits include the bushing, nut, key(s) and fasteners required for installation. See Figure 2.

Installation Instructions - Type 1 Bushing

Type 1 tapered bushings are used when the driven shaft diameter is the nominal diameter for that gear drive model. (For example, a 215TR unit has a nominal bore diameter of 2 15/16").

Type 1 tapered bushings have only one key and one keyway. The keyway is designed to be 1/8" wider than the key to allow for compression of the tapered bushing.

De-burr and clean the driven shaft (1) and orient with the keyway up.

Fit and install the key (2) in driven shaft. Stake the keyway to prevent the key from moving. Position the key such that it will be centered lengthwise once the bushing is installed. Note that the key may be square, rectangular or stepped and orient it properly.

Align the bushing slot with the shaft key. Slide the tapered bushing (3) onto the driven shaft, threaded end of the bushing out. It is recommended that the tapered bushing be completely supported by the driven shaft. Apply a coat of lithim-based grease or anti-seize compound to the outside of the tapered bushing.

After aligning the key in the bore of the low speed shaft of the gear drive (4), slide the gear drive onto the tapered bushing. Do not lift the gear drive by the high speed shaft; lifting holes are provided in the torque plates.

Thread the nut (5) onto the bushing and snug it up against the low speed shaft of the gear drive hand tight. Back off the nut 1/8" and align the three clearance holes in the nut with the three tapped holes in the low speed shaft.

For alignment only, **LOOSELY** install the three socket head cap screws (6). (Note: These screws must **NOT** be torqued, as they would then prevent the tapered bushing from seating.)

Install the three set screws (7) into the threaded holes in the nut until they contact the gear drive low speed shaft, and torque them evenly to the value shown in Table 1.

Make sure the 1/8" gap is still present. If there is no gap, remove the three socket head cap screws, loosen the set screws, and back off the nut another 1/8". Continue this process until you can torque down the set screws while maintaining the 1/8" gap.

Now snug up the three socket head cap screws--handtight only--to prevent them from backing out of the nut. Do not overtighten, and be sure that the set screws (7) are torqued first.

After coating the nut (5) and screws (6 & 7) thoroughly with a lithium based grease, install vinyl cap (8).

Installation Instructions - Type 2 Bushing

Type 2 tapered bushings are normally used when the driven shaft diameter is smaller than nominal for that gear drive model. Type 2 tapered bushings have two keys.

The installation procedure for a type 2 bushing is the same as for a type 1 bushing, except that one key is required between the driven shaft and the bushing, while another key is required between the bushing and the gear drive low speed shaft. Fit and install the key in the driven shaft. Stake the keyway to prevent the key from moving. Position the driven shaft key so that it will be centered lengthwise once the bushing is installed. Install the low speed shaft/bushing key until it is seated.

Removal Instructions

To remove the gear drive from the tapered bushing (3), remove the vinyl cap (8) and back the three set screws (7) off the gear drive low speed shaft (4) and into the nut (5). Making sure that at least a 1/8" clearance exists between the nut face and the end of the gear drive low speed shaft, alternately tighten the three socket head cap screws (6), that have been installed through the clearance holes in the nut and threaded into the gear drive low speed shaft, until the gear drive releases from the tapered bushing. Then remove the socket head cap screws and the nut from the bushing to allow removal of the gear drive.

Table 1 - Bushing Screw Torque

MODEL	SET SCREW THREAD	MAXIMUM TIGHTENING TORQUE (IN.-LBS.)
107, 115, 203	1/4 - 20	75
207, 215	5/16 - 24	150
307, 315	3/8 - 24	275
407	1/2 - 20	450

Rev. S - March 2003

Assembly of Torque Arm

Keep the torque plates in the factory installed position, away from the driven shaft. Assemble the torque rods and turnbuckle to the torque plates and base angles. Position and secure the base angles so that the torque arm assembly forms a right angle to a line through the point of attachment and the center line of the output shaft. Ensure that the torque arm is in tension when the unit is operating.

When connecting the rod ends to the base angles or to the torque plate, allow the rod ends some degree of freedom on the connecting bolts. All other connections should be tightened securely.

The base angles must be attached to a sturdy and rigid member of the machinery frame. In locating the base angles, allow for adjustment of the torque arm.

407TR only--Attach the rod ends to the torque plates and base angles with the 1 1/4 diameter pin, two 1 1/4 flat washers and two 7/32 cotter pins.

WARNING: Do not disassemble or service torque arm while unit is in operation, under power or under load. Make certain that unit is securely anchored by some other means (to prevent rotation) prior to servicing torque arm.

Assembly of Motor Mount

Note that the two motor mount support brackets are adjustable up and down the housing flange to the low, intermediate or high (low or high for 407TR) mounting positions and that they may be mounted along either the long sides (6 o'clock orientation) or the short sides (3 o'clock orientation) of the housing. The motor mounts may also be mounted above the gear drive in the 12 o'clock or 9 o'clock orientation. Contact the Dorris Company for v-belt center distances for these positions.

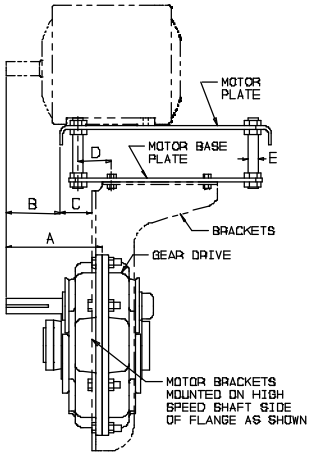

Figure 3 - Motor Mount Dimensions (3 o'clock orientation shown above)

MODEL	A	B	C	D	E
107	5 1/2	3 19/32	1 9/32	2 1/32	5/8
115	5 13/16	3 17/32	1 21/32	2 13/32	5/8
203	6 15/16	4 1/16	2 1/8	2 3/16	3/4
207	7 9/16	4 1/4	2 9/16	2 5/8	3/4
215	8 1/2	4 1/4	3 1/2	3 9/16	3/4
307	10	5	4 3/16	4	3/4
315	10 5/8	5	4 13/16	4 5/8	3/4
407	12 13/16	6 13/16	4 15/16	4 7/8	1

Bolt the support brackets to the housing using either four or six housing flange bolts (sizes 107 through 215 and 407) or six or eight housing flange bolts (sizes 307 and 315). Place the support brackets on the high speed shaft extension side of the housing flange. See Figure 3.

Bolt the motor base plate to the brackets using the four nuts, bolts and lockwashers that are provided.

Assemble the four jack screws to the motor base plate with one nut on the bottom and one nut on the top side of the plate.

After threading one more nut on each jack screw, assemble the motor plate to the four jack screws, with the holes in the motor plate forming an arrowhead pointing toward the input shaft extension. The remaining nuts are then threaded on to the jack screws.

After assembly of the motor mount is complete, ensure that all nuts and bolts are securely attached and properly torqued. Tightening of the bolts prior to completing the assembly may make it difficult to align and install the bolts.

Motor mount support brackets are designed to be universal. In some orientations, they will be longer than necessary. The brackets can be cut to remove the excess length.

Assembly of Motor & V-belt to Motor Mount

Ensure that the electrical service to the motor is disconnected or locked out prior to proceeding with the installation.

Match the motor mounting holes with the holes in the motor plate. Securely attach the motor to the plate using the proper type and grade of fastener.

Before mounting the sheave on the input shaft extension, apply a thin coat of lithium-based grease or anti-seize compound to the shaft. To minimize the overhung load, mount the sheave as close as possible to the gear drive housing.

Before installing the sheave, check that the pitch diameter is greater than the minimum shown in the catalog.

Install the v-belts. Avoid excessive tensioning. V-belts must have a slight bow on the slack side when operating. After v-belts are properly adjusted by the jack screws on the motor mount, tighten the jack screw nuts.

Install the proper guards or other safety devices as specified in all applicable safety codes and regulations. Guards and other safety devices are neither supplied by nor are they the responsibility of the Dorris Company.

TL Screw Conveyor Drives

Conversion of Shaft Mount to Screw Conveyor Drive (107 - 315)

After removing the tapered bushing, remove the screws from the low speed cap on the opposite side of the gear drive housing from the high speed shaft extension. Remove the shim gasket (4) from the back of the cap and apply it to the face of the gear drive housing. In addition to providing a seal, the shim gaskets establish the bearing preload and are therefore important to the operation of the unit. See Figure 4.

Grease the oil seal lips and install the new oil seal (1) in the gear drive adaptor (2). Position the gear drive adaptor on the gear drive housing (3), making sure that the shim gasket (4) is in place on the gear drive housing. Using the long hex head screws provided, treat them with a locking adhesive and securely attach the gear drive adaptor to the gear drive housing.

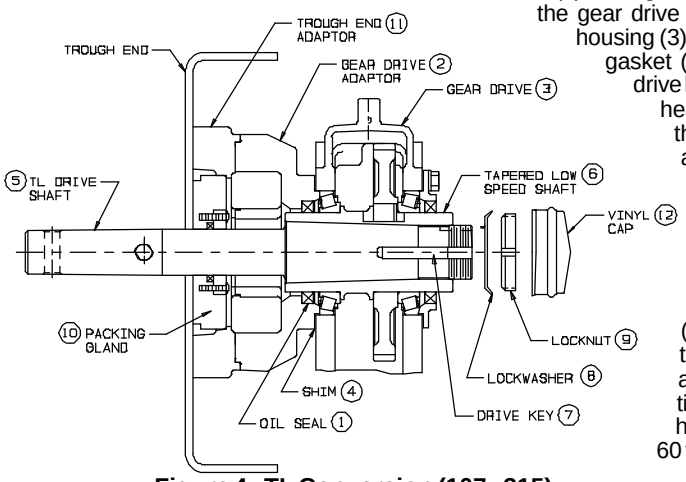

Figure 4 - TL Conversion (107 - 315)

Attach the proper trough end adaptor (11) to the gear drive adaptor, by applying locking adhesive (i.e., red loctite) to cleaned threads in the gear drive adaptor and securely tightening the eight socket head cap screws provided to 60 ft.-lbs.

After coating it with lithium-based grease or anti-seize compound, insert the TL drive shaft (5) into the hollow low speed shaft (6) of the gear drive with the drive shaft key (7) in place. Position the lockwasher (8) on the TL drive shaft with the inner tab placed in the short, narrow keyway as shown and secure it tightly with the locknut (9), using a spanner wrench. Then bend the outer tab on the lockwasher into the groove in the locknut.

After coating the locknut (9) and lockwasher (8) with a lithium based grease, install vinyl cap (12).

To remove the TL drive shaft, it is recommended to use the TR nut (part of item E1 on the TR Series Parts List in the catalog) and its mounting screws. Follow the same removal procedure as for the TR tapered bushing.

Conversion of Shaft Mount to Screw Conveyor Drive (407)

No disassembly of the gear drive is required. Treat the included hex head screws (note the two lengths) with a thread locking adhesive. Mount the screw conveyor adaptor to the gear drive housing over the low speed cap on the side opposite the high speed shaft extension (the longer screws go into the holes located furthest from the high speed and intermediate bearing caps) and tighten the screws to 300 ft.-lbs. Assemble the TL drive shaft as specified above.

Installation to Trough End

Before assembling the gear drive to the trough end, insert the packing gland assembly (10) into the trough end adaptor (11) with the anti-rotation lug aligned with the notch in the adaptor. See Figure 4.

Bolt the trough end to the end flange of the trough. See Figure 5.

Bolt the fully assembled screw conveyor drive to the trough end. Torque the supplied bolts to 100 ft.-lbs. (107 - 315) or 500 ft.-lbs. (407).

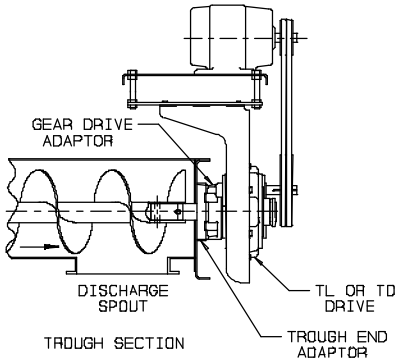

Figure 5 - Trough Assembly

Trough End Adaptor Options

Dorris screw conveyor drives (107 - 315) can be used on all Dorris trough ends and also on all standard CEMA trough ends, when the proper trough end adaptor is used. The trough end adaptor is bolted to the gear drive adaptor. There is one gear drive adaptor for each screw conveyor gear drive model. Any Dorris or CEMA trough end adaptor will attach to any gear drive adaptor. If a different trough end becomes necessary, simply remove the existing trough end adaptor and replace it with one that mates with the trough end to be used.

The Dorris trough end adaptor (D624) is shown in Figure 6a, while the CEMA trough end adaptor (C69 for 1 1/2 inch shaft or C924 for 2 through 3 7/16 inch shaft) is shown in Figure 6b.

407TL gear drives are supplied with only one adaptor in the configuration listed in the catalog. Consult Dorris Company for trough end options.

Packing Gland Options

There are two different types of packing glands available (sizes 107 - 315) and they can be used with any trough end adaptor. The standard packing gland is made of plastic with a single, non-adjustable Kevlar fiber, Teflon impregnated seal. This can be used in the food processing industry. The standard packing gland is shown in Figure 7a.

The optional high performance packing gland (standard for 407) has several advantages over the standard gland. It has two Kevlar fiber, Teflon impregnated seals which can be adjusted to compensate for normal wear. The gland is made of high strength cast iron with a steel pressure plate. The high performance packing gland is shown in Figure 7b.

ASSEMBLY OF MOTOR MOUNT
See TR Instructions.

ASSEMBLY OF MOTOR & V-BELT TO MOTOR MOUNT
See TR Instructions.

LUBRICATION

CAUTION: All Dorris gear drives are shipped without oil. Do not assume that this unit has been properly lubricated. Prior to start-up, be sure that the proper type, grade and amount of oil has been installed into the gear drive.

Table 2 - Oil Selection

AMBIENT TEMP RANGE (°F)	R & O (RUST & OXIDATION INHIBITED) GEAR OIL FOR UNITS WITH OR WITHOUT A BACKSTOP		VISCOSITY RANGE	
	AGMA R & O LUBE NUMBER	ISO VG R & O GRADE	cSt (mm2/s) @ 40°C (104°F)	SUS @ 100°F
15 - 75	3	100	90 - 110	417 - 510
32 - 100	4	150	135 - 165	626 - 765
50 - 125	5	220	198 - 242	918 - 1122

Lubricate the gear drive by filling the unit to the proper level, per these instructions. Select the proper type and grade of oil based on the ambient air temperature range around the gear drive. Choose an oil that meets the requirements of Table 2. Table 4 lists some oil brand names that meet the requirements in Table 2. Other oil companies may have equivalent oils to those listed.

Make sure that the coolest ambient temperature is at least 10°F greater than the pour point of the oil chosen.

Industrial petroleum-based rust and oxidation inhibited (R&O) gear oils are recommended for most applications. Automotive motor oils are not recommended.

Extreme pressure (EP) additive oils are not recommended and are never to be used if the gear drive has an optional backstop installed.

Synthetic,hydrocarbon-type (polyalpha-olefin base) gear oils without EP additives are recommended for ambient temperatures as low as -20°F or as high as 170°F. However, consult Dorris for proper oil selection for applications where the ambient temperature is greater than 100°F.

When the gear drive is used in the food processing industry, ensure that the lubrication is approved for the application. The oil capacity of the unit is dependent on its mounting position. See Table 3 and Figure 8. The oil capacities are based upon the mounting position shown , assume a double reduction (10:1 through 40:1) ratio and an output speed of the gear drive being 40 rpm or more. For speeds less than 40 rpm, oil capacity for the single reduction (5:1) ratio units, inclined or vertical mounting, or other arrangements not shown, consult the Dorris Company.

Table 3 - Oil Capacity for Double Reduction Ratios (Quarts)

Note: TL oil capacities are the same as the TR.

UNIT SERIES	6 O'CLOCK MOUNT	3 O'CLOCK OUNT	12 O'CLOCK MOUNT	9 O'CLOCK MOUNT	VERTICAL MOUNT
107TR	1 1/4	1 1/4	1 1/2	1	2
115TR	2 1/2	2 1/4	3	2 3/4	3 1/2
203TR	3	2 3/4	3 3/4	3 1/4	4 1/2
207TR	3 3/4	3 1/2	4 1/4	3 3/4	5 1/2
215TR	5	4 1/2	7	6	7 1/2
307TR	10	7	12 1/4	11 1/4	15
315TR	10	8 1/4	15 1/2	11 1/2	16 1/2
407TR	10 3/4	14	18 1/2	15 3/4	22

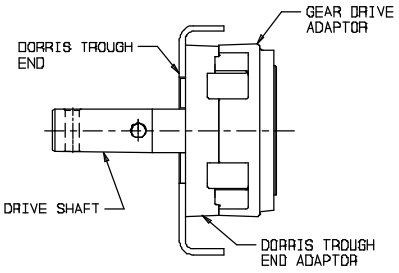

Figure 6a - Dorris Trough End Adaptor for Dorris Trough Ends

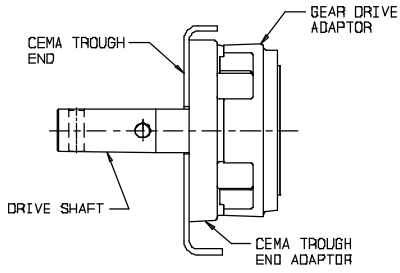

Figure 6b - CEMA Trough End Adaptor for CEMA Trough Ends

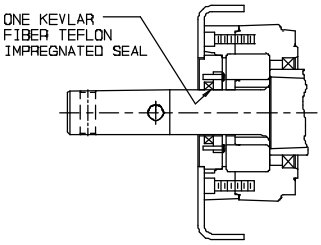

Figure 7a - Standard Packing Gland

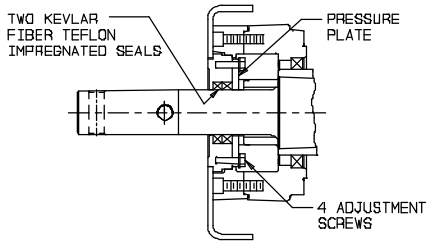

Figure 7b - High Performance Packing Gland

® Kevlar and Teflon are registered trademarks of DuPont deNemours, E.I., & Co. Inc.

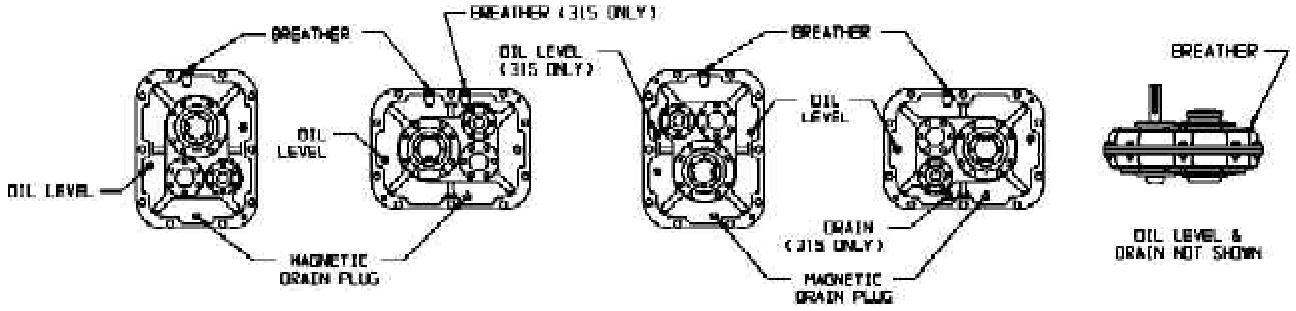

Figure 8 - Gear Drive Orientations, Double Reduction (10:1 thru 40:1) Ratios

Maintenance

Change the oil after an initial period of 500 hours of operation or one month, whichever occurs first.

Thereafter, for a petroleum-based gear oil, change the oil every 2500 hours of operation or every six months, whichever occurs first. If a synthetic, hydrocarbon-type gear oil is used, the recommended oil change interval is doubled to 5000 hours or 12 months, whichever occurs first.

In cases of severe service applications, such as extreme exposure to water, high humidity, dirty or dusty environment or chemicals in the air, which react with lubrication oil, the oil change interval must be shortened depending on the severity of the conditions.

For better drainage, drain the oil when the unit is warm. Remove and examine the magnetic drain plug for metal chips and fines. An excessive amount of metal fines signals internal problems. Consult the Dorris Company if you think the amount is excessive. Small amounts of metal fines are normal and should simply be cleaned off prior to reinstallation. After draining, thoroughly flush the inside of the unit with clean oil. Remove and clean the breather plug to ensure that the air passage is clear. Reinstall the drain plug and breather plug after using a thread sealant.

For units that see a significant seasonal swing in ambient temperature, you should change the grade of oil as needed (lighter oil in the winter, heavier oil in the summer).

Do not allow the gear drive to become covered with dirt, dust or other debris. The insulating properties of these coverings could cause the unit to overheat. This will lead to a breakdown of the lubrication, causing premature failure of the gear drive components.

In environments where a buildup of unwanted surface coverings is expected, clean the outer surfaces of the gear drive often. Ensure that the breather is clear after cleaning.

Check the unit for oil leakage and the source of that leakage. The most common leak points are pipe plugs and oil seals. Operation of the unit when full of oil causes overheating and leakage through the oil seals and the breather plug. Rather than waiting for parts during unscheduled down time, you may wish to order replacement parts when the leaks are minor. Occasionally, the breather plug is not properly located at the highest point on the unit. Relocate the breather plug, if required, especially if the lubricant is foaming out of the breather. Many leaks are caused by overfilling the unit with oil. Check for the proper level. Do not let any leak go unattended as the loss of oil will eventually cause a failure.

Storage

If the unit is not going to be operated for an extended period of time (greater than two months), you have two options. Either fill the unit completely with the proper oil for long term storage or fill it to the operating level and run it for a minimum of half an hour per week to coat the internal parts with oil. Either procedure will help prevent internal oxidation of the critical parts. Before resuming use, ensure that the oil is of the proper type and at the proper level. Operation of the unit when full of oil causes overheating and leakage through the oil seals and the breather plug.

Store the gear drive in a dry location where the temperature remains relatively constant, not passing through the dew point. Do not store the unit outdoors. If the temperature passes through the dew point, moisture will condense on the inside of the unit, reducing the life of the gear drive.

Table 4 - Selective Oil Brand Names

R & O Gear Oils

	ISO VISCOSITY GRADE		
COMPANY	**100 (AGMA 3)**	**150 (AGMA 4)**	**220 (AGMA 5)**
AMOCO	American Ind'l Oil 100	American Ind'l Oil 150	American Ind'l Oil 220
CHEVRON	Machine Oil R&O ISO 100	Machine Oil R&O ISO 150	RPM Gear Oil SAE 90 (ISO 220)
CITGO	Pacemaker Oil 100	Pacemaker Oil 150	Pacemaker Oil 220
CONOCO	Dectol R&O Oil 100	Dectol R&O Oil 150	Dectol R&O Oil 220
EXXON	Teresstic 100	Teresstic 150	Teresstic 220
MOBIL	DTE Heavy	DTE Extra Heavy	DTE BB
PHILLIPS	Magnus Oil ISO VG 100	Magnus Oil ISO VG 150	Magnus Oil ISO VG 220
SHELL	Morlina Oil 100	Morlina Oil 150	Morlina Oil 220
SUN	Sunvis 9100	Sunvis 9150	Sunvis 9220
TEXACO	Regal Oil R&O 100	Regal Oil R&O 150	Regal Oil R&O 220

Synthetic Hydrocarbon Type Gear Oils

COMPANY	**LOW TEMP (0° TO 60°F) ***	**NORMAL TEMP (50° TO 125°F)**	**HIGH TEMP (100° TO 170°F)**
MOBIL	SHC 626	SHC 630	Consult Factory
TEXACO	Pinnacle 68	Pinnacle 220	Consult Factory
AMSOIL	RCJ 68	RCM 220	Consult Factory

*** -20°F possible if no backstop installed.**

Dorris Company, Inc.
8610 Page Avenue, St. Louis, MO 63114-6183
Phone 314-423-7300 ~ Fax 314-423-8083
info@dorrisco.com