

MS Sheave

Installation & Maintenance Manual

P-5054-TBW
Form 1363



WARNING:

Rotating equipment must be properly guarded.

It is the responsibility of the user to properly guard all rotating equipment to comply with OSHA or any applicable regulations. Failure to properly guard may contribute to severe injury should someone come in contact with the rotating parts or should the rotating part fail.

WARNING:

DO NOT use Wood's products on aircraft propeller or rotor drive systems or on in-flight accessory drives. Wood's products are NOT designed or intended for aircraft use.

FEATURES

Wood's MS-type motion control variable speed sheaves incorporate a unique and proven lubrication system that eliminates the freezing and sticking of movable parts due to fretting corrosion. There are no keys between the flange and its sleeve to establish point contact and obstruct lubrication. Instead, the load is transmitted from the stationary flange to the adjustable flange through a series of torsionally resilient keys, which are located outside the bearing surfaces. These resilient keys assure a continuous, rotational pumping action of the adjustable flange on the sleeve which, along with centrifugal force, results in a constantly renewed and evenly distributed film of oil on the bearing surfaces. Two O-ring seals prevent the oil from escaping from the bearing surfaces.

Because of this positive lubrication, the only maintenance required for the sheave is a periodic check of the oil in the reservoir every 500 hours. Oil is added as needed through the oil fill plug in the end cap or the external Sight-Lube reservoir.

Note that there are two basic designs of MS-type sheaves now in service. Although this has no bearing on installation procedures and operation, it does affect maintenance. **Do not attempt to disassemble an MS sheave without positively identifying its type.** This instruction sheet covers design number 1.

In Design 1, shown in Figure 1, the spring is retained by the spline cap which is secured to the stationary flange by socket head capscrews. **This sheave must be removed from the shaft and placed under a positive-locking arbor press for disassembly.**



FIGURE 1

INSTALLATION OF MS DRIVE (V-FLAT)

Using flat companion and straight mounting the motor.

1. Note instructions furnished with the bushing for installing companion pulley. If an outboard support is used, place belt over pulley or shaft before fastening bearing. Install and secure companion pulley.
2. Place motor base in its approximate position. To find its approximate position, place the belt in position over the companion pulley and hold its other end out at roughly the height of the motor. Place motor on the motor base and secure.
3. Mount MS sheave on motor shaft, leaving approximately 1/8" of usable shaft for final alignment. Secure the sheave to the shaft by: 1) Tightening the two setscrews on the hub or 2) torquing the clamp screw to 50 ft. lb. depending on the model of the sheave.



FLAT COMPANION PULLEY

4. Adjust base by turning handwheel to its furthest forward position, then adjust back approximately 3/4". This is the minimum center distance position. Slide the motor base on the floor to achieve the minimum shaft center distance given in the catalog drive tables for your drive or until the belt is tight when it is in position and the MS is at maximum P.D.
5. Position base by placing a straightedge along the side of the companion pulley and measuring in to the inboard flange of the MS. The straightedge should be 1/8" from the flange of the MS at two points across the flange (See Figure 3). Do this procedure both above shaft center **and** below shaft centers.

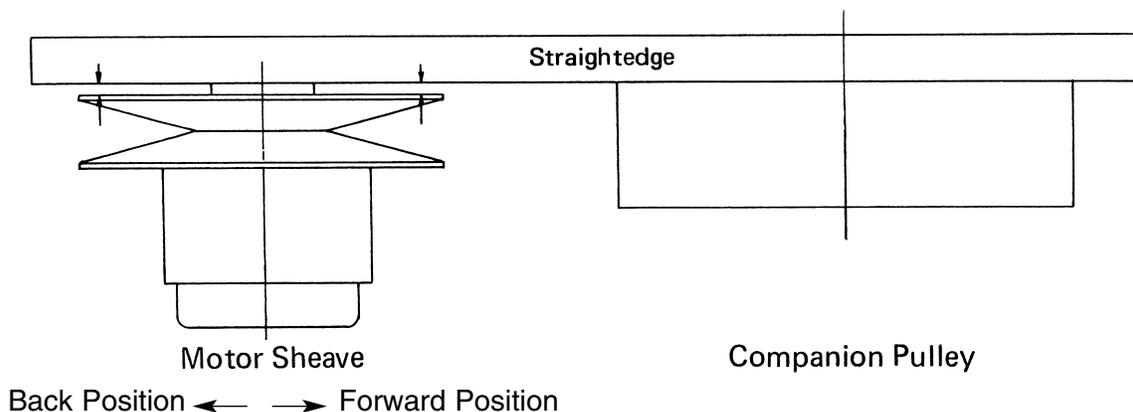


FIGURE 3

6. Secure the motor base to the floor or machine base.
7. Adjust motor base to the extreme forward position and place belt over pulley and in sheave flanges. Rotate the drive by hand to seat the belt while adjusting the motor base to obtain the center distance associated with the maximum speed setting.
8. Check all setscrews and bolts for tightness.
9. Check oil level in sheave's reservoir to ensure that it is full (Refer to page 7).
10. Start drive. Adjust motor back until the MS is at its minimum pitch diameter position. Stop drive and check alignment. The distance from the straightedge to the MS flange should still be 1/8".
11. Start drive and reset to desired speed. Stop drive and install drive guards.

INSTALLATION OF MS DRIVE (V-V)

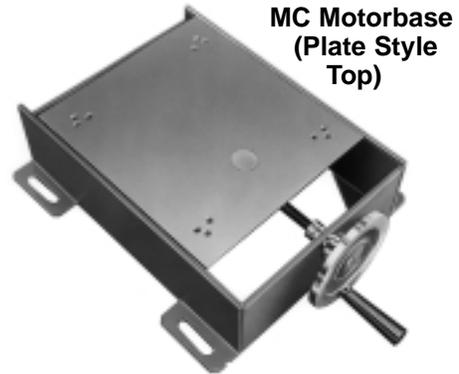
Using grooved companion and angle mounted sliding plate motor base.

Note: The sliding plate of an MC motor base used for this installation must be angle drilled and tapped specifically for your application. Facing the handwheel end, if the motor shaft points to the right, the motor must travel to the left as the center distance is increased; if the shaft points to the left, the motor must travel to the right as the center distance is increased. This movement compensate for flange movement, keeping the belt aligned at all times.

1. Note instructions furnished with the bushing for installing companion pulley. If an outboard support is used, place belt over pulley or shaft before fastening bearing. Install and secure the companion sheave.

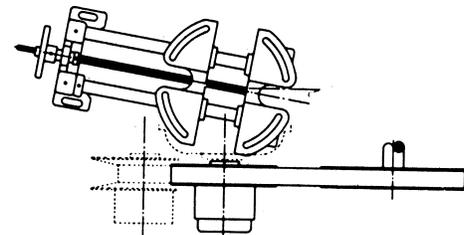
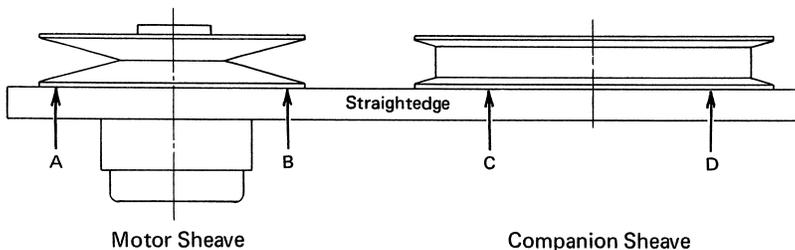


Grooved Companion Sheave



MC Motorbase (Plate Style Top)

2. Place motor base in its approximate position. To find its approximate position, place the belt in position over the companion pulley and hold its other end out at roughly the height of the motor. Place motor on motor base and secure.
3. Mount MS sheave on motor shaft, leaving approximately 1/8" of usable shaft for final alignment. Secure the sheave to the shaft by: 1) Tightening the two setscrews on the hub or 2) torquing the clamp screw to 50 ft. lb. depending on the model of your sheave.
4. Adjust motor base by turning handwheel to its furthest forward position, then adjust back approximately 3/4". This is the minimum center distance position. Slide the motor base on the floor to achieve the minimum shaft center distance given in the catalog drive tables for your drive or until the belt is tight when it is in position and the MS is at maximum P.D.



Back Position ← → Forward Position **FIGURE 4**

5. Position base by placing a straightedge along the flange of the MS. The straightedge must touch the MS and the companion sheave at four points: A, B, C and D. The motor base will be at an angle to the driven shaft, but the motor shaft and the drive shaft will be parallel (see Figure 4).
6. Fasten the motor base to the floor.
7. Adjust motor base to the extreme forward position and place the belt over the sheaves. Rotate the drive by hand and adjust the motor base to seat the belt while adjusting the motor base to obtain the center distance required for the maximum speed setting.
8. Check all bolts and setscrews for tightness.
9. Check sheave's oil level to ensure that it is full (refer to page 7).
10. Start the drive and adjust the motor back until the MS is in its minimum pitch diameter position. Recheck alignment as above and adjust as necessary.
11. Start drive and reset to desired speed. Stop drive and install drive guards.

INSTALLATION OF MS DRIVE (V-V)

Using grooved companion and curve slot motor base.



Grooved
Companion
Sheave



MBA
(Curved
Slot)

1. Mount the companion sheave according to the instructions furnished.
2. Set the motor base in its approximate position and perpendicular to the driveN shaft. To find its approximate position, place the belt in the groove of the companion sheave and hold its other end out at roughly the height of the motor.
3. In order to obtain the correct offset angle, place the motor on the motor base with its shaft parallel to the driveN shaft. Make sure motor is square with adjusting screw and motor base rails. Insert the motor bolts and nuts, and finger-tighten. Turning the handwheel, adjust the base until the motor is as close to the companion sheave as possible, then back it off 3/4 to 1". This is the minimum center distance position.
4. Slide the motor base on the floor to obtain the minimum shaft center distance given in the catalog drive tables for your drive. If you do not have this information, you can find the minimum center distance by placing the belt in position and sliding the motor base until the belt is tight but the MS sheave is at maximum P.D. Record the distance between shafts.
5. Place the MS on the motor shaft, allowing 1/8" of usable shaft for final alignment.
6. Temporarily align the two sheaves, using the four-point method shown in Figure 4. Secure the MS to the motor shaft by 1) tightening the two setscrews on the hub or 2) torquing the clamp screw to 50 ft. lb. depending on the model of your sheave.

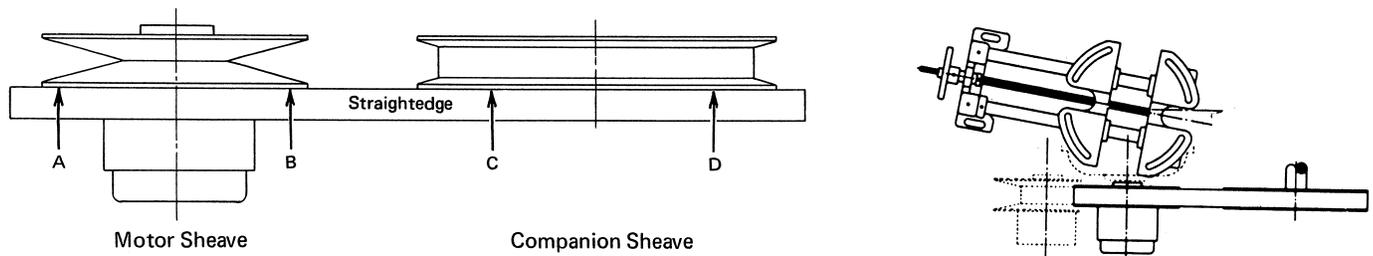


FIGURE 4

7. With a sharp crayon or chalk, draw an arrow on the floor at the points on the motor base's two aluminum index plates marked "O." These plates are located one at each end of the motor base.
8. Determine the correct offset angle for the base from the proper table on page 6. Pivot the motor base on the floor to correct angle. The markings on the index plates are the offset angles in degrees. **Make sure that both ends of the base are rotated correctly.** NOTE: When correctly angled, the motor will move laterally opposite the direction in which the motor shaft points while the position between shafts is being increased.

INSTALLATION OF MS DRIVE (V-V)

Using grooved companion and curved slot motor base (continued).

To Find Offset Angle:

- a. Determine mean center distance from the catalog drive tables by using the formula below:

$$\text{Mean C.D.} = \frac{\text{Max. C.D.} + \text{Min. C.D.}}{2}$$

OR

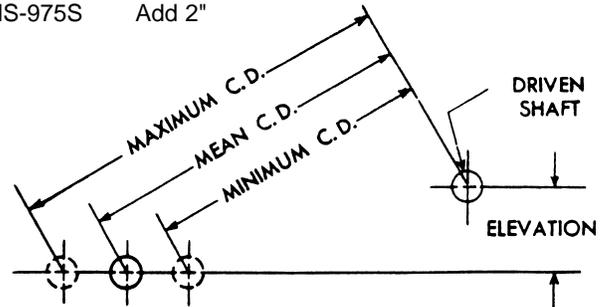
Add to the min. C.D. you found in step 4 according to the following table:

MS-77	Add 2"
MS-97	Add 3-1/4"
MS-100R	Add 2-3/8"
MS-100W	Add 2-1/2"
MS-127	Add 4-1/4"
MS-975S	Add 2"

- b. Measure the vertical heights of the driver and driven shafts. The difference is the centerline elevation.
- c. Using appropriate table below required elevation, read across until mean center is located; then read at bottom of table the offset angle. Interpolate for elevations or center distances not shown.

Example: Sheave MS-100-W

C.D. Min. 18.0, Max. 22.0; mean C.D. = 20
 Height of driver = 11., height of driven = 18
 Elevation 7"
 Offset angle – 9-1/2°



MS-77										
Elevation – Inches	3	Main Center Distance – inches								9*
4	5	Offset angle 7-1/2 for less than 3" elevation; all center distances.								12*
6	7	9	10	11	12	15	21*	9	10	
8	9	10	10	11	12	14	17	24*	11	
10	12	12	13	14	15	17	21	29*	12	
12	14	14	15	16	18	21	25	35*	13	
14	16	17	18	19	21	24	29	41*	14	
16	18	19	20	22	24	27	33	47*	15	
Offset Angle	4	4½	5	5½	6	6½	7	7½		

MS-100R										
Elevation – Inches	3	Main Center Distance – inches								13*
4	5	Offset angle 10 for less than 3" elevation; all center distances.								18*
6	7						11	12	16	
8	9						11	12	16	
10	12	12	13	14	15	16	18	21	26	
12	14	15	16	17	19	21	25	32	38	
14	17	17	18	19	20	22	25	29	37	
16	19	20	21	22	23	26	28	33	42	
Offset Angle	5½	6	6½	7	7½	8	8½	9	9½	

MS-97										
Elevation – Inches	3	Main Center Distance – inches								10*
4	5	Offset angle 9 for less than 3" elevation; all center distances.								13*
6	7						11	13	19*	
8	9						11	13	19*	
10	12	13	14	15	16	18	22	32*	11	
12	15	15	16	18	20	22	27	38*	12	
14	17	18	19	21	23	26	31	44*	13	
16	20	21	22	24	26	30	36	50*	14	
Offset Angle	5½	6	6½	7	7½	8	8½	9		

MS-100W MS-127 MS-110R MS-975-S											
Elevation – Inches	3	Main Center Distance – inches								11	19*
4	5	Offset angle 10 for less than 3" elevation; all center distances.								12	15
6	7						11	13	17		
8	9						11	13	17		
10	12	12	13	14	15	16	18	21	28		
12	14	15	16	17	18	19	22	26	34		
14	17	17	18	19	21	23	25	30	40		
16	19	20	21	22	24	26	29	34	46		
Offset Angle	5½	6	6½	7	7½	8	8½	9	9½		

*Mean center distances and larger.

9. Loosen the motor bolts and swivel the motor on the base until it is parallel with the driven shaft. Place a straightedge across the driven sheave and measure the distance from the straightedge to the MS flange. **Do not** move the MS. Place a chalk mark on the floor this distance from the marks made in Step 7. Shift the entire base laterally until the required offset angle marks on both index plates are over the new points. Check the drive alignment as shown in Figure 4 both with the straight edge above **and** below the sheet centers.
10. Bolt motor base to floor. Realign the sheaves with the straightedge as above. Bolt the motor securely to the motor base and resecure the MS sheave to the shaft if you moved it for this final alignment.
11. Adjust the base forward beyond the minimum center distance position and place the belt in the companion sheave. Place the belt in the MS, and rotate the drive by hand to seat the belt until the top is flush with the edges of the flanges. The sheave is now at its maximum pitch diameter. Secure one of the set collars on the motor base rails to stop the base's travel at this position.
12. Check sheave's oil level to ensure that it is full (see page 7).
13. Start the drive and adjust the motor base back until the MS is in its minimum pitch diameter position. Stop drive and use the four-point alignment system to check the alignment of the drive. Secure the second set collar on the motor base rail at this position. (Set collars can be placed in any position where high-low speed limits are required.) Start drive and set to desired speed. Instead drive guards.

LUBRICATION

When it is necessary to add oil, approved oil should be used. Wood's preferred oil, furnished in the sheaves initially, is SPARTAN EP460, sold by Exxon. Other acceptable commercial brands of oil which are readily available are:

- Amoco Oil Co. – Amogear EP460
- Ashland Oil Co. – Valvoline 831, SAE 80-85-90
- Chevron, USA – Chevron Ultragear SAE 85-140
- Continental Oil Co. – Conoco Gear Oil 460

Damage caused by the use of a non-recommended oil is not covered under Wood's warranty.

To check the oil level and refill the reservoir:

1. Rotate the sheave until the oil fill plug is in its uppermost (12:00) position. Remove the plug.
2. Slowly rotate the sheave until oil appears in the hole. If the reservoir is half full or less, add oil.
3. Rotate the sheave until the oil hole is at 12:00, and fill using a pump-type oil can and pumping slowly. When filled, replace the plug and wipe the end of the sheave.

If the MS is fitted with the optional "Sight-Lube" Oil System, merely check the level in the sight gauge reservoir, refilling it through the top. It is not necessary to shut down the drive if this system is used.

SIGHT-LUBE LUBRICATION SYSTEM



Reservoir Kit

The ADAPTER KIT, shown at right, consisting of the sheave adapter, gasket and three cap screws is available to fit the Wood's oil lubricated variable speed sheaves (listed below).

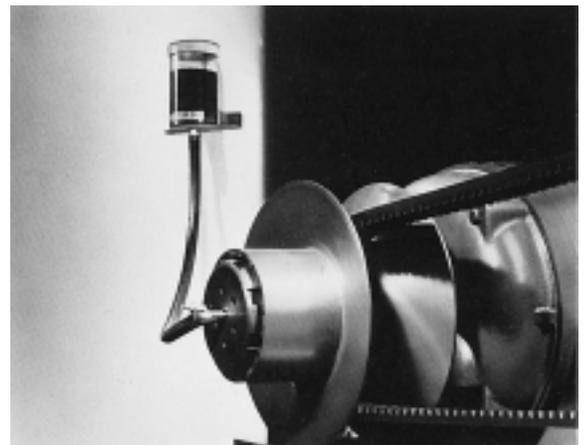
The RESERVOIR KIT, at left, is included with all Sight-Lube systems unless specified otherwise. The reservoir is of clear polycarbonate plastic permanently attached to a durable plastic bracket with holes for mounting to any vertical or horizontal surface. This kit also includes a 36" section of hose with the necessary clamps for connecting to the rotating joint on the sheave.



Sheave Adapter Kit

Kits Available

For Use With Variable Sheave No.	Adapter Kit	Reservoir Kit
	Kit No.	Kit No.
MS-97	SL2K	SR2K
MS-127, MS-100W, MS-975-S	SL3K	SR2K



O-RING REPLACEMENT

The following items are recommended for O-ring replacement.

1. Wood's MS seal replacement kit (MS Kit No. 1), consisting of two O-rings, one plastic gasket, one fill plug washer, and one-2cc tube of Loctite® locking compound (see repair parts).
2. An arbor press.
3. Allen hex wrench.
4. A cup or can to hold drained oil.
5. One pint recommended oil.



DISASSEMBLY

1. With the drive in operation, adjust the center distance so that the belt is in the maximum pitch diameter position of the MS. Stop the drive and further decrease the center distance until the belt can be removed from the sheave. If space or other operating factors do not allow belt removal by this method, use a soft pine block to force the flanges open to remove the belt. If this is fitted with the Sight-Lube oiling system, detach the hose from the sheave and drain the plastic reservoir into a cup. Turn the elbow on the sheave intake up to prevent oil from spilling during handling.
2. Loosen the setscrews in the inboard hub and remove the sheave from the shaft. If the sheave is difficult to remove, remove the setscrews and drip penetrating oil into the holes. When left to penetrate, this should loosen the sheave.

Do not apply force to the flanges other than that which can be applied with the bare hands. Should it be necessary to pry the sheave loose, pry only against the hub of the sheave.

NOTE: To protect the seals and precision parts of the sheave, all service should be performed in a clean, well-lighted area.

3. Use a marking pen or quick-drying paint to reference all parts as shown in Figure 6. **This is important**, as it allows you to reassemble the sheave in its original position and maintain its correct balance.

4. FOR STANDARD MS SHEAVES

Locate the capscrews under the label which hold the spline cap in place. Expose these screws by removing the label covering the screw holes. Leaving two of the screws at 180° in place, remove the others.

4A. FOR MS SHEAVES WITH SIGHT-LUBE

Remove the capscrews which hold the Sight-Lube adapter; remove the adapter and its gasket. Wipe the end of the sheave dry.



FIGURE 6

CAUTION: Do not remove all of the capscrews without placing the MS under an arbor press.

O-RING REPLACEMENT (*continued*)

5. Place the MS under the arbor press as in Figure 7, and remove the remaining capscrews. Allow the MS to open by slowly releasing the arbor press force. Mark the location of the spring in line with the marks applied in Step 3.
6. Remove the spline cap, gasket, spring and resilient keys. Holding the flanges together, pour the oil in the reservoir into a cup. Separate the flanges. Remove the two O-ring seals from the adjustable flange (Figure 8). There is no need to remove the large snap ring over the resilient keys in the adjustable flange. Degrease all parts and flush out the oil reservoir.
7. Using care in handling, completely dry all parts. **Do Not Scratch** the machined surfaces, as this could damage the new O-ring seals.



FIGURE 7

INSPECTION

1. Carefully inspect the machined surfaces of both the adjustable flange and the stationary flange for any signs of wear or pitting. If the MS was operated at any time without oil, there is a possibility that the machined parts will show signs of fretting corrosion. If the flanges are badly corroded or frozen, the entire sheave should be replaced.
2. Check the resilient keys. If they are worn or deformed, **replace the entire set.** (MS-Kit No. 2).



FIGURE 8

BORE PLUG SEAL REPLACEMENT

If any leakage of oil from the bore was observed, replace bore plug seal. (See Replacement Parts List).

A. To remove old seal:

Place the flanged hub on the workbench, flange end up. Using a piece of shafting approximately 1/2" in diameter or a large screwdriver, drive the bore plug from the oil reservoir. **Caution:** MS sheaves with bores 1-3/8" and larger have a snap ring in the bore to protect the plug. Take care not to damage this during this operation.

B. To install new seal:

Turn the flanged hub bore end down. Push the replacement plug into the oil reservoir **with its dished side down.** Using a length of shafting 1/8" smaller than the counterbore, expand the plug into place. The plug is seated correctly when its upper surface is slightly dented.

O-RING REPLACEMENT (continued)

REASSEMBLY

1. With your fingers, spread a light coat of oil around the bore of the adjustable flange. Moisten the two new O-rings with oil and insert them into their grooves in the flange (Figure 9).
2. Place the adjustable flange over the stationary flange, taking care not to pinch the O-rings. **Do not bounce** the adjustable flange on the stationary flange sleeve. Line up location marks.
3. Place the resilient keys in their slots in the adjustable flange.
4. Fill the oil reservoir to within 1/2" of its top. Place spring into its position in the adjustable flange and line up the location marks. (Figure 10.)
5. Insert the new plastic gasket into its seat in the spline cap. Two or three light dabs of grease will help to hold it in position while closing the sheave. Place the spline cap over the spring and line up location marks.
6. Move the entire assembly under the arbor press. Depress the assembly slowly. Before closing the unit, make sure that the resilient keys are lined up with the splines in the spline cap (Figure 11). After checking this, close the unit.



FIGURE 9



FIGURE 10



FIGURE 11

FOR STANDARD MS SHEAVES

7. Spread two or three drops of Loctite® locking compound on the threads of two capscrews. Insert these at 180° and tighten.
8. Remove the sheave from the press. Loctite and insert the remaining capscrews. Tighten all capscrews with a torque wrench to the values given below.
- 9A. Replace the old oil fill plug gasket with the new one furnished with the repair kit.

FOR MS SHEAVES WITH SIGHT-LUBE

- 7A. Spread two or three drops of Loctite® locking compound on the threads of two **short** capscrews. Insert these in such a way that they will not interfere with the Sight-Lube adapter (180° from each other in the MS-77, 120 in the other sizes of MS).
8. Remove the sheave from the press. Loctite and insert the remaining short capscrew if the sheave is other than an MS-77. Tighten all capscrews to the values given below.
- 9A. Place the rubber gasket and the adapter on the sheave. Loctite the long capscrews, insert and tighten them to the values below.

Note: For proper performance of MS sheaves, the capscrews should be tightened as follows:

No. 10-24NC (MS77)	95 to 100 in.-lbs.
1/4 - 20NC (All other MS Sheaves)	170 to 175 in.-lbs.

8. For your preventative maintenance records, scribe or stamp the date of repair on the end cap.
9. Sheave is now ready for installation per the installation instructions.

REPLACEMENT PARTS

TB Wood's will supply **no** rotating cast iron parts for field replacement. Should such a part require replacement, it must be replaced at Wood's factory where your sheave will be dynamically rebalanced before it is returned to you.

All other parts are available in individual or kit form. For the part number of the individual parts contact your Wood's distributor. For the repair kit number refer to the table below.

KIT DESCRIPTION

Seal Kit (Kit #1)

Contains two o-rings, one gasket, one fill plug washer, and one 2cc tube Loctite locking compound.

Resilient Key Kit (Kit #2)

Contains six or eight keys (pads) depending on the number required.

Sheave	Seal Kit	Resilient Key Kit	Bore Plug
MS-77 Design I	MS77K1	MS77K2	M301
MS-97 Design I	MS97K1	MS97K2	M302
MS-100-R	MS100K1	MS100K2	M303
MS-127 Design I	MS100K1	MS100K2	M303

All Customer Service phone numbers shown in bold

Belted Drives and Sheaves	Couplings Cont.	Gearing	Linear Products
<p>TB Wood's <i>Belted Drives</i> Chambersburg, PA - USA 1-888-829-6637 – Press #5 <i>For application assistance:</i> 1-888-829-6637 – Press #7</p>	<p>TB Wood's <i>Elastomeric Couplings</i> Chambersburg, PA - USA 1-888-829-6637 – Press #5 <i>For application assistance:</i> 1-888-829-6637 – Press #7 <i>General Purpose Disc Couplings</i> San Marcos, TX - USA 1-888-449-9439</p>	<p>Bauer Gear Motor <i>Gearred Motors</i> Esslingen, Germany +49 (711) 3518-0 Middlesex, NJ - USA 1-732-469-8770</p> <p>Boston Gear <i>Enclosed and Open Gearing, Electrical and Mechanical P.T. Components</i> Charlotte, NC - USA 1-800-825-6544 <i>For application assistance:</i> 1-800-816-5608</p> <p>Nuttall Gear and Delroyd Worm Gear <i>Worm Gear and Helical Speed Reducers</i> Niagara Falls, NY - USA 1-716-298-4100</p>	<p>Warner Linear <i>Linear Actuators</i> New Hartford, CT - USA 1-800-825-6544 <i>For application assistance:</i> 1-800-825-9050 Saint Barthélemy d'Anjou, France +33 (0)2 41 21 24 24</p>
<p>Couplings</p> <p>Ameridrives <i>Mill Spindles, Ameriflex, Ameridisc</i> Erie, PA - USA 1-814-480-5000 <i>Gear Couplings</i> San Marcos, TX - USA 1-800-458-0887 <i>Universal Joints, Drive Shafts, Mill Gear Couplings</i> Erie, PA - USA 1-920-593-2444</p> <p>Bibby Turboplex <i>Disc, Gear, Grid Couplings, Overload Clutches</i> Dewsbury, England +44 (0) 1924 460801 Boksburg, South Africa +27(0) 11 918 4270</p> <p>Guardian Couplings <i>Engineered Flywheel Couplings, Engine Housings and Pump Mounts, Flexible Shaft Couplings</i> Michigan City, IN - USA 1-219-874-5248</p> <p>Huco <i>Precision Couplings and Air Motors</i> Hertford, England +44 (0) 1992 501900 Chambersburg, PA - USA 1-888-829-6637</p> <p>Lamiflex Couplings <i>Flexible Couplings, Bearing Isolators, and Coupling Guards</i> Cotia, SP - Brasil +55 (11) 4615-6300</p>	<p>Electromagnetic Clutches and Brakes</p> <p>Inertia Dynamics <i>Spring Set Brakes; Power On and Wrap Spring Clutch/Brakes</i> New Hartford, CT - USA 1-800-800-6445</p> <p>Matrix <i>Electromagnetic Clutches and Brakes, Pressure Operated Clutches and Brakes</i> Brechin, Scotland +44 (0) 1356 602000 New Hartford, CT - USA 1-800-825-6544</p> <p>Warner Electric <i>Electromagnetic Clutches and Brakes</i> New Hartford, CT - USA 1-800-825-6544 <i>For application assistance:</i> 1-800-825-9050 Saint Barthélemy d'Anjou, France +33 (0)2 41 21 24 24 <i>Precision Electric Coils and Electromagnetic Clutches and Brakes</i> Columbia City, IN - USA 1-260-244-6183</p>	<p>Heavy Duty Clutches and Brakes</p> <p>Industrial Clutch <i>Pneumatic and Oil Immersed Clutches and Brakes</i> Waukesha, WI - USA 1-262-547-3357</p> <p>Svendborg Brakes <i>Industrial Brakes and Brake Systems</i> Vejrstrup, Denmark +45 63 255 255</p> <p>Twiflex <i>Caliper Brakes and Thrusters</i> Wichita Falls, TX - USA 1-844-723-3483 Twickenham, England +44 (0) 20 8894 1161</p> <p>Wichita Clutch <i>Pneumatic Clutches and Brakes</i> Wichita Falls, TX - USA 1-800-964-3262 Bedford, England +44 (0) 1234 350311</p>	<p>Overrunning Clutches</p> <p>Formsprag Clutch <i>Overrunning Clutches and Holdbacks</i> Warren, MI - USA 1-800-348-0881 – Press #1 <i>For application assistance:</i> 1-800-348-0881 – Press #2</p> <p>Marland Clutch <i>Roller Ramp and Sprag Type Overrunning Clutches and Backstops</i> Warren, MI - USA 1-800-216-3515</p> <p>Stieber Clutch <i>Overrunning Clutches and Holdbacks</i> Heidelberg, Germany +49 (0) 6221-30470</p> <p><i>For information concerning our sales offices in Asia Pacific check our website www.altramotion.com.cn</i></p>



www.tbwoods.com

2000 Clovis Barker Road
San Marcos, TX 78666
512-353-4000