



Trabon[®] Electrical/Mechanical Actuated Lube Pump Instructions



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1.1 GENERAL

1.1.1 Standard Components. A wide choice of modular components may be assembled to meet a given application.

1.1.1.1 All LUBEMASTER Systems consist of the following components:

- a. A reservoir or tank for holding the lubricant. Reservoirs are cylindrical units for grease or oil and are equipped with a spring-loaded follower for grease applications. Further information on reservoirs may be found in Section 2.
- b. The standard pump is designed to dispense oil or grease and is adjustable between minimum and maximum limits of 0.010 to 0.050 cubic inches per stroke. It may be driven by an electric motor or a rotating or oscillating machine motion. The high-volume version has a fixed output of 0.135 cubic inches per stroke and is driven by electric motor only. Further information on pumps may be found in Section 3.

1.1.2 LUBEMASTER Options.

1.1.2.1 Options which are available for any system include the following:

- a. Motors in single- or three-phase, 115/230 or 230/460 volt and 1140 or 1725 rpm configurations. Refer to Section 4 for further information.
- b. Floor or wall mounted gear reducers with either a 10:1 or 60:1 reduction plus an oscillating clutch drive for the standard unit that can be activated by a machine motion. Refer to Section 4 for further information.
- c. Low-level switches that mount to the reservoir and provide a low-level fault signal to a customer-designated component. Level switch options are described in Section 5.

- d. High-pressure blowout switches that are installed into the pump outlet circuit and provide an over-pressure signal to external components. Blowout switch options are discussed in Section 6.
- e. Several types of controllers are used which can be adapted to the system. Controller options are discussed in Section 7. Controllers available are as follows:
 1. Timers which may be set to cycle the pump at given intervals. Both AC and DC models are available.
 2. A WMP Maxi-Monitor which provides a dispense signal on either a time or machine cycle basis. The WMP also monitors and displays the status of the lube system it is controlling. The Maxi-Monitor is available in either 115 VAC, 230 VAC, 12 VDC or 24 VDC.
 3. A Flexi-Monitor which is a solid-state control package that monitors the status of several lubrication zones at one time. This Flexi-Monitor is available in either AC or DC Models.

1.2 GENERAL SYSTEM OPERATION

1.2.1 Figure 1-1 shows a functional schematic of a LUBEMASTER Pump and the following steps outline the operating sequence.

- a. Grease or oil in reservoir assembly (1) keeps the pump body (10) full of lubricant during normal operation and maintains a head pressure to accomplish two objectives. These are:
 1. Provide constant lubrication to the pump components.
 2. Force lubricant into the piston chamber in the pump piston sleeve (2) as the piston is retracted prior to the forward power stroke.

NOTE: The LUBEMASTER piston (7) is operated by eccentric (9) connected to drive shaft (8). This drive shaft can be driven by the gear reducer/electric motor drive, the clutch drive option (used with standard pumps), or directly coupled to a rotating shaft or other appropriate machine motion.

- b. As drive shaft (8) is rotated, eccentric (9) rotates and drive yoke (11) moves piston (7) forward in the power stroke, closing off pump inlet (6). The piston continues to move the lubricant forward, unseating check valve (5) and delivering lubricant to the system through the pump outlet. The eccentric (9) continues to rotate and retracts piston (7) to reopen the inlet and return piston to full prime position, ready for the next delivery or power stroke.
- c. The standard pump output can be varied, from 0.010 to 0.050 cubic inches (0.164 to 0.820 cu. cm.) per cycle, by changing the position of the pump adjustment sleeve (2) located below the pressure gauge (3). The high-voltage pump has a fixed output.
- d. Standard or high-pressure blowout switches are options which may be connected to the lube output. A signal from the switch can be used to actuate an alarm or warning light.
- e. Low-level switch options are available for all reservoirs. The switch provides an electrical signal when lubricant level is low.

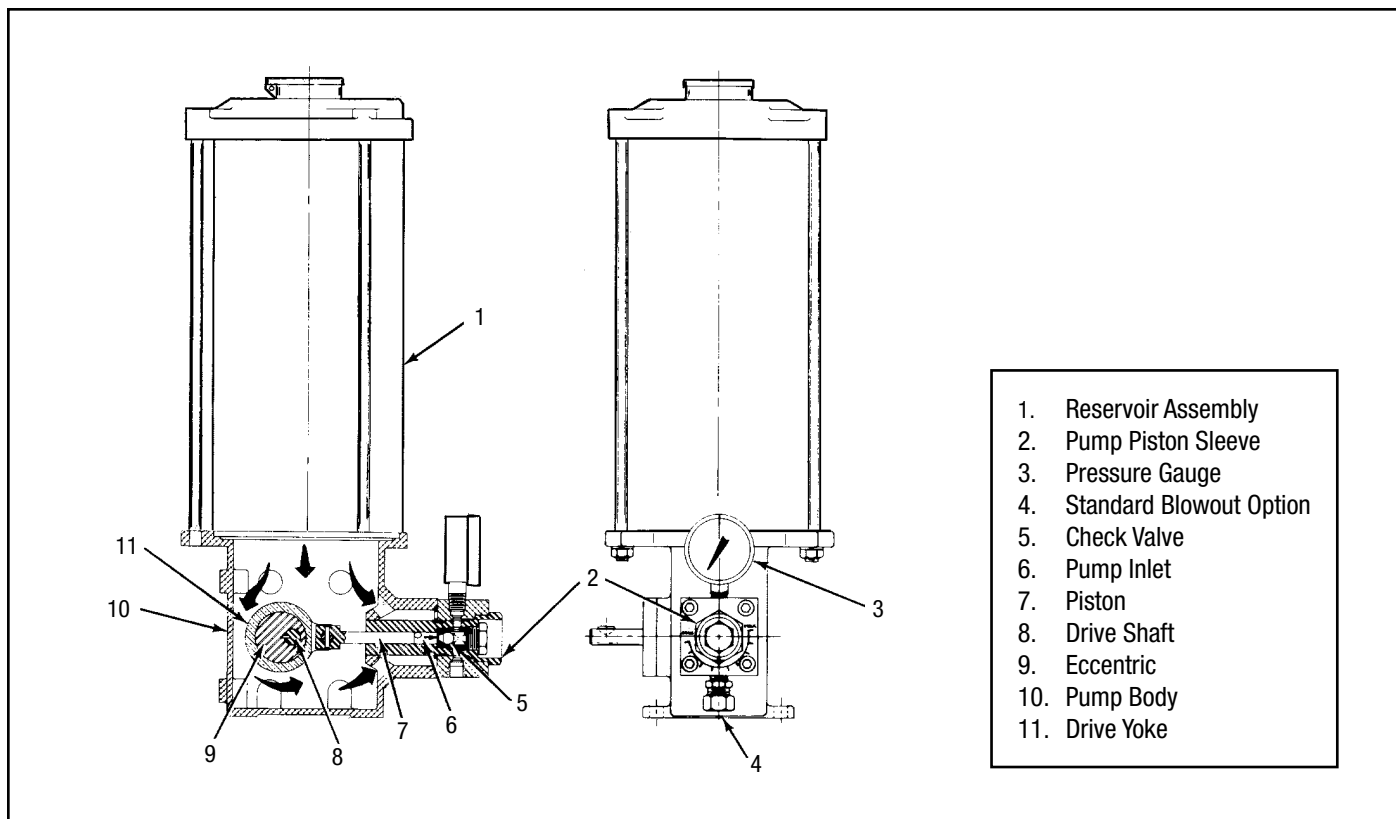


Figure 1-1. LUBEMASTER Pump

OPERATION AND SERVICE INSTRUCTIONS

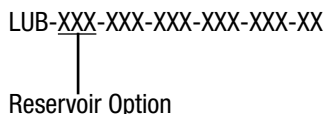
**SECTION 2
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2.1 DESCRIPTION

2.1.1 Reservoir Description. Reservoirs are cylindrical in shape and are used for either grease or oil lubricants. If a reservoir is to be used for grease it will be equipped with a spring-loaded or weighted follower which will apply pressure on the grease to force it into the pump. Reservoirs use cylinders made of metal or plastic. If a metal cylinder is used, the reservoir will be equipped with a level indicator to allow a visual check of lubricant level. Plastic cylinders are clear, allowing personnel to actually see the amount of lubricant present. The reservoirs are designed for direct mounting to LUBEMASTER Pumps.

2.1.2 Reservoirs Available. Table 2-1 lists the optional reservoirs. Listings in the option column are used to identify the reservoir selected when a LUBEMASTER System is ordered. The option used is designated by the entry in the ordering code as shown below:



2.2 PREPARATION FOR USE

2.2.1 Filling Oil Reservoirs. Reservoirs for oil have a fill cup mounted on top. Wipe the area around the fill cup to avoid contamination during filling. Open the fill cup cap and slowly pour the oil into the fill cup. A strainer attached to the fill cup will remove large particles which may be present in the oil. When filling is complete, close fill cup cap and wipe any spillage.

2.2.2 Filling Grease Reservoirs.

WARNING: If a high-pressure, high-volume supply pump is used to fill grease reservoirs, excess pressure could cause the reservoir to fracture, exposing personnel to flying particles and lubricant. Safety glasses must be worn during filling operations.

2.2.2.1 Filling of grease reservoirs requires that an external, air-free supply source be connected to the fill stud located on the side of the pump body. To avoid introducing air into the system, make sure there is enough grease in the supply source to fill the reservoir without being disconnected. Operate the supply source at a steady speed to allow air-free filling of the reservoir. Too fast of a fill speed may result in air pockets. The level of grease is checked by visual means. In reservoirs with plastic cylinders, the grease level may be seen through the cylinder. Reservoirs with metal cylinders have a level-indicator mounted in the cap which will indicate when the fill is complete.

NOTE: Excess grease forced into the reservoir after it has reached full level can be dangerous. (See Warning page 2-1.)

2.2.2.2 When filling is complete, turn off the supply source and disconnect if from the fill stud. A check valve in the fill stud will prevent lubricant from being forced back out. A plastic dust cap is attached to the fill stud and should be installed over the stud to keep dirt from entering the system.

NOTE: For first time grease filling, or if the grease reservoir has been allowed to go empty, loosen the drain plug on the right side of the pump housing. Slowly begin to fill the reservoir, allowing air trapped under follower to exhaust out the open drain plug. When grease free of air flows from the drain, tighten the plug and continue to fill the reservoir until follower is at vent hole in reservoir tube (any remaining air and small amount of grease will exit vent).

Loosen system mainline connection at pump outlet. Operate pump until lubricant free of air flows from outlet port. Tighten mainline connection at pump. Pump is now free of air.

Note, for extreme cases where the pump will not take a prime, it may be helpful to inject several ounces of heavy oil through the grease fill quick disconnect. The pump will then prime on oil pulling the grease behind it. If it becomes necessary to use this method, all injected oil should be discharged at the loosened system supply connection along with any air.

Refer to bulletin L12411 (Portable Filler-Pak) for manual operated fill pump.

2.3 GREASE RESERVOIR MAINTENANCE (OPTIONS GPA, GPB, GMA, GMB, GMC AND GMD)

2.3.1 General. Maintenance tips and disassembly and assembly procedures for grease reservoirs are discussed in Paragraphs 2.3.2, 2.3.3 and 2.3.4. Exploded views of typical grease reservoirs are shown in Figures 2-1 and 2-2 and should be referred to during the discussion

NOTE: 80 and 120 lb reservoirs (Options GMC and GMD) are not discussed in the maintenance paragraphs. These reservoirs are a welded construction that have few serviceable parts. Refer to Figure 2-2 and Table 2-3 for the illustration and parts list for these reservoirs.

2.3.2 Maintenance.

2.3.2.1 Maintenance on the grease reservoir consists of the steps described below:

- a. Visually inspect the reservoir for lubricant leaking between reservoir tube (8, Figure 2-1) and pump. This may indicate a bad gasket (9) or that the hex nuts (5) are not tight. Torque the nuts to 5 ft-lbs. If leakage continues, replace gasket (9). Check for cracks and nicks in tube (8). Replace the tube as required.

- b. Visually inspect the reservoir tube (8) for dents or an out-of-round condition which may restrict the movement of the follower cups (10 and 13). Replace the tube as required.

WARNING: Disconnect and lock out power before opening electrical enclosures or conduit connections. Serious injury may result from electrical shock.

TABLE 2-1 OPTIONAL RESERVOIRS

Description	Part No.	Old Part No.
12 pt Oil Plastic Reservoir, OPA Option	562892	185-100-380
20 pt Oil Plastic Reservoir, OPB Option	562893	185-100-390
12 pt Oil Metal Reservoir, OMA Option	562894	185-100-400
20 pt Oil Metal Reservoir, OMB Option	562895	185-100-410
12 lb Grease Plastic Reservoir, GPA Option	562896	185-100-540
20 lb Grease Plastic Reservoir, GPB Option	562897	185-100-550
12 lb Grease Metal Reservoir, GMA Option	562898	185-100-560
20 lb Grease Metal Reservoir, GMB Option	562899	185-100-570
Adaptor, Overhead Supply, OHS Option	562893	185-100-390

2.3.3 Disassembly of Grease Reservoirs. Figure 2-1 shows a typical grease reservoir but does not include other LUBEMASTER components which may be mounted to the reservoir. Disassembly of the reservoir may require that some of these components be removed. Level and blowout switches may or may not require removal, depending on the level of disassembly required. The electrical connections to the switches probably should be disconnected in order to remove various parts without restriction of movement by the electrical cord. Removal of these components is explained in other sections of the manual. Refer to the table of contents to find where the components are discussed.

2.3.3.1 The disassembly procedure may be performed with the reservoir mounted on the pump. However, some mounting locations may be too restrictive to provide access to all components. If your particular installation requires dismounting of the reservoir, make sure the reservoir is drained of lubricant before removing the attaching hardware. This will reduce the weight of the reservoir and reduce the chance of spillage. The disassembly procedure is as follows:

WARNING: Do not attempt to remove retaining ring (1) or cable assembly (14) (see figure 2-1). Injury could result from sudden expansion of spring (15).

- a. Slowly open reservoir drain and allow lubricant to be forced from the reservoir into a bucket or similar container. Remove fill stud (17) if necessary. Properly dispose of emptied grease.
- b. Remove hex nuts (5) and lockwashers (4) from tie rods (3). Remove tie rods from reservoir cap (16).

- c. Lift reservoir tube (8) from pump keeping reservoir cap (16) in position on top of the tube.
- d. Slide reservoir tube (8) away from reservoir cap (16) until it is free of follower cups (10 and 13).
- e. Remove gasket (9) from pump.
- f. Further disassembly is only possible at the factory. If damage is apparent on the follower cups (10 and 13), cable assembly (14), spring (15) or reservoir cap (16) the unit cannot be serviced and the reservoir assembly must be replaced.

2.3.4 Assembly of Grease Reservoirs.

NOTE: Before assembly, lubricate followers and tube inner diameter with the lubricant used in the system.

2.3.4.1 Assemble the grease reservoir according to the following procedure:

- a. Slide reservoir tube (8, Figure 2-1) over follower cups (10 and 13) being careful not to distort the follower cup lips. Slide reservoir tube up until it contacts reservoir cap (16).
- b. Install new gasket (9) on pump.
- c. Place reservoir tube (8) on gasket (9) and rotate reservoir cap (16) until holes in the cap line up with holes in the pump.
- d. Install tie rods (3) through holes in reservoir cap (16) and pump.
- e. Install lockwashers (4) and hex nuts (5) on tie rods (3) and torque to 5 ft-lbs.
- f. Install fill stud (17) and dust cap (18) in pump.

2.3.4.2 When the assembly steps listed in the above paragraph have been completed, any LUBEMASTER components which were removed to ease disassembly should be reinstalled on the reservoir.

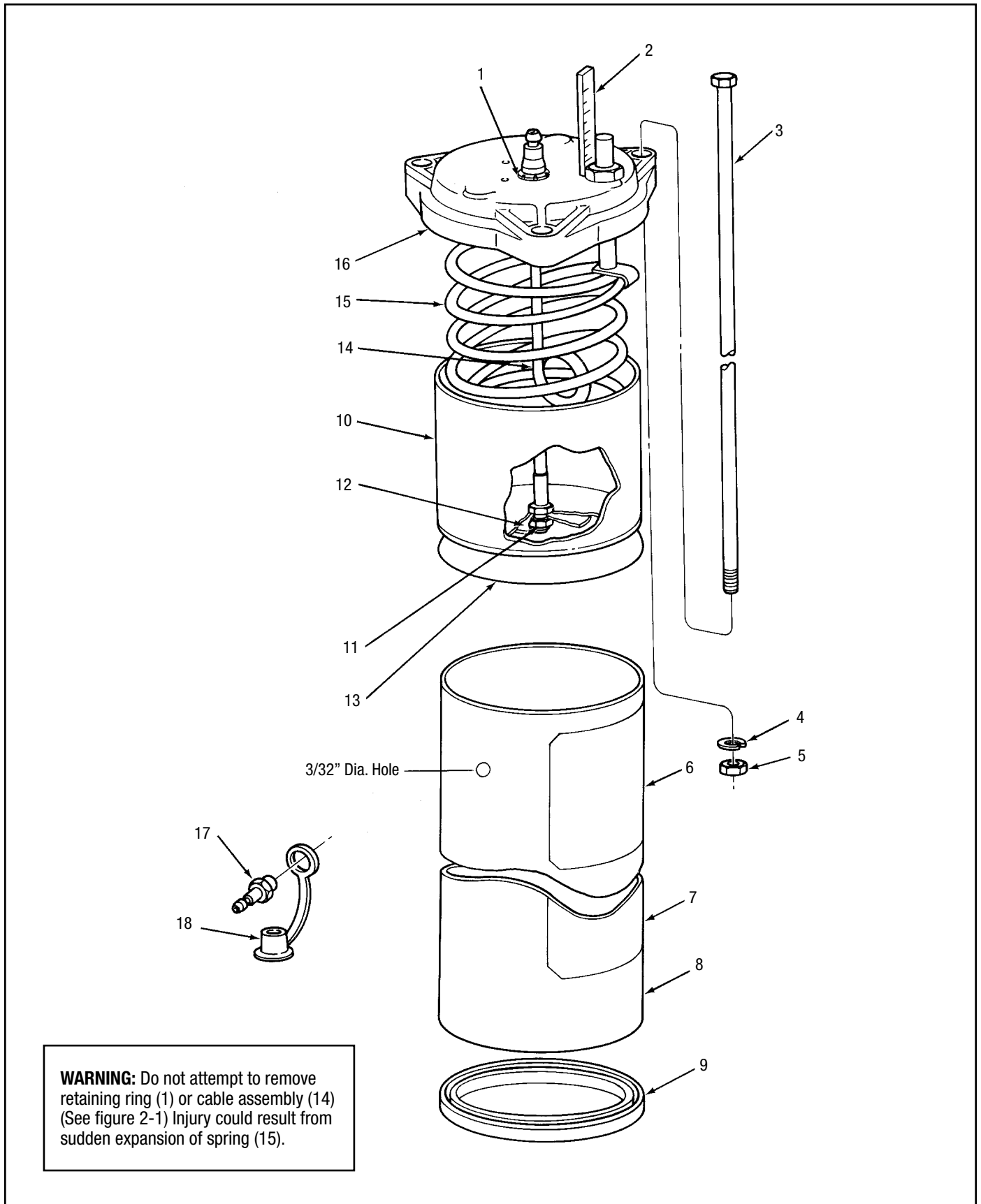
2.3.5 Grease Reservoir Parts Lists. Table 2-2 identifies the parts indexed in Figure 2-1.

TABLE 2.2 GREASE RESERVOIRS GPA, GPB, GMA AND GMB (FIGURE 2-1) PARTS LIST

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
	562896	185-100-540	Reservoir Assembly - Plastic, 12 lb (5.44 kg)	–	GPA
	562897	185-100-550	Reservoir Assembly - Plastic, 20 lb (9.07 kg)	–	GPB
	562898	185-100-560	Reservoir Assembly - Metal, 12 lb (5.44 kg)	–	GMA
	562899	185-100-570	Reservoir Assembly - Metal 20 lb (9.07 kg)	–	GMB
1			Ring, Retaining	1	All
2	–	521-003-630	• Indicator, Level	1	GMA
	–	521-003-640	• Indicator, Level	1	GMB
3	556460	415-700-272	• Tie Bolt, 12 lb Reservoir	3	GPA, GMA
	Dis	415-700-271	• Tie Bolt, 20 lb Reservoir	3	GPB, GMB
4	558676	421-010-020	• Lockwasher, 5/16 in.	3	All
5	–	410-040-020	• Nut, Hex, 5/16-18 in.	3	All
6	556838	457-002-236	• Decal, LUBEMASTER	1	All
7	557554	514-137-002	• Decal, Instruction	1	All
8	557341	501-483-030	• Tube, Reservoir, 12 lb Plastic (6 in. x 13 in.)	1	GPA
	557527	511-175-001	• Tube, Reservoir, 20 lb Plastic (6 in. x 20 in.)	1	GPB
	560503	501-483-000	• Tube, Reservoir, 12 lb Metal (6 in. x 13 in.)	1	GMA
	560651	511-155-000	• Tube, Reservoir, 20 lb Metal (6 in. x 20 in.)	1	GMB
9	557333	501-423-000	• Gasket	1	All
10			• Follower Guide	1	All
11			• Nut, Hex, 5/16-18 in.	1	All
12			• Plate, Backup	1	All
13			• Follower Seal	1	All
14			• Cable Assembly	1	
			• Cable Assembly		
15			• Spring	1	
16			• Cap, Plastic Reservoir	1	
			• Cap, Metal Reservoir	1	GMB
17*	557374	506-189-001	• Stud, Fill	1	All
18	557373	506-165-000	• Cap, Dust	1	All

*Mating Coupler 558906 (506-322-000) Order Separately

Note: Item 1 and 10-16 are not serviceable by the user, replace entire reservoir



WARNING: Do not attempt to remove retaining ring (1) or cable assembly (14) (See figure 2-1) Injury could result from sudden expansion of spring (15).

Figure 2-1. Grease Reservoir Assembly (GPA, GPB, GMA and GMB) - Exploded View

TABLE 2-3 GREASE RESERVOIRS GMC AND GMD (FIGURE 2-2) PARTS LIST

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
			Reservoir Assembly, Metal, 80 lb (36.3 kg)	–	GMC
			Reservoir Assembly, Metal, 120 lb (54.5 kg)	–	GMD
1	–	526-100-380	Cover Gasket	1	Both
2	–	521-702-050	Cover	1	Both
3	–	415-030-110	Screw, 3/8-16 in. x 2-1/4 in.	2	Both
4	555621	421-040-100	Washer, 3/8 in.	2	Both
5	560861	526-100-490	Weight, Follower	1	Both
6	557706	526-100-340	Follower Plate	1	Both
7			Reservoir Weldment	–	–

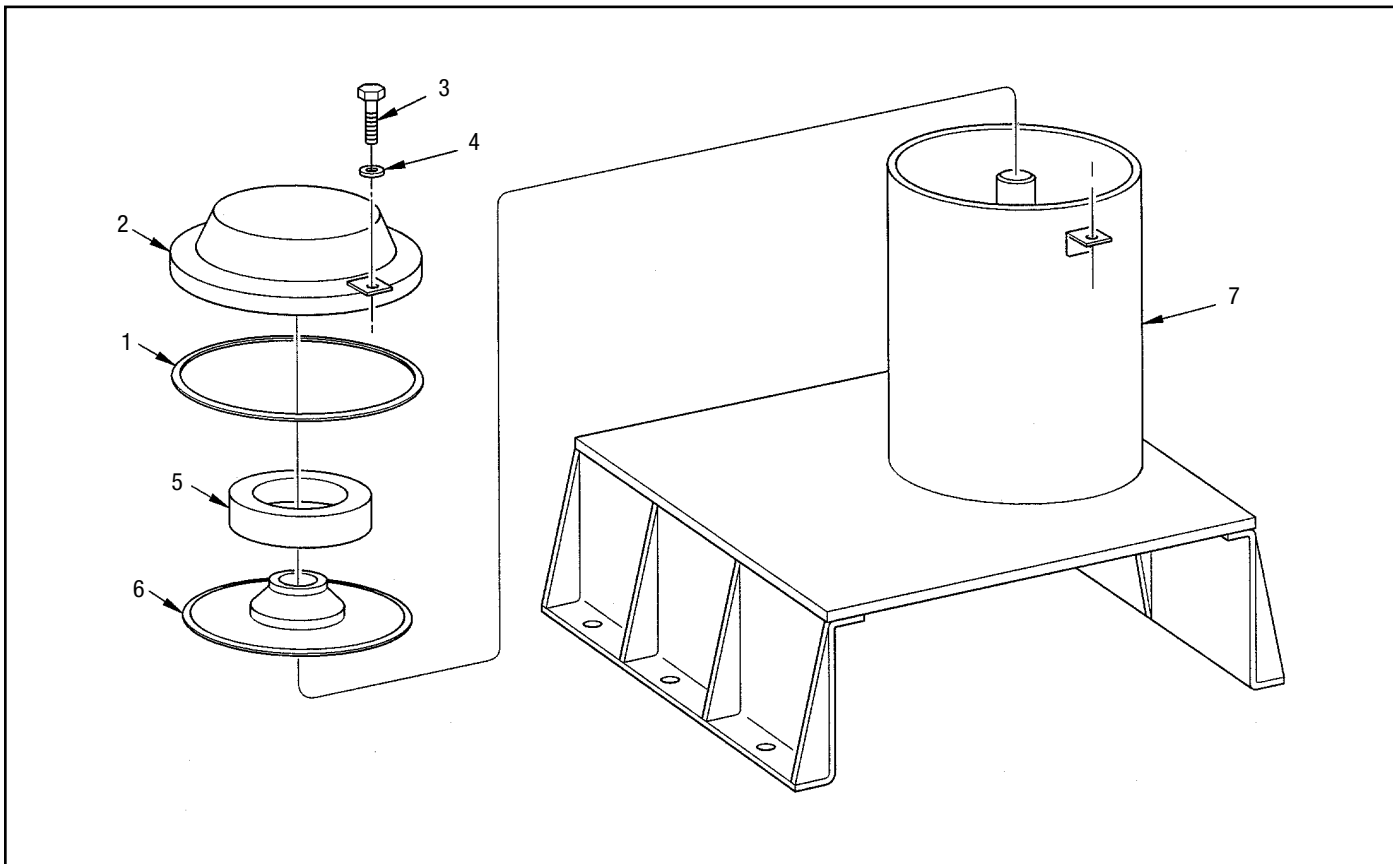


Figure 2-2. Grease Reservoir Assembly (GMC and GMD) - Exploded View

2.4 OIL RESERVOIR MAINTENANCE (OPTIONS OPA, OPB, OMA AND OMB)

2.4.1 General. Maintenance tips and disassembly and assembly procedures for oil reservoirs are discussed in Paragraphs 2.4.2, 2.4.3 and 2.4.4. An exploded view of a typical oil reservoir is shown in Figure 2-3 and should be referred to during the discussion.

2.4.2 Maintenance.

2.4.2.1 Maintenance on the oil reservoir consists of the following:

- a. Visually check for oil leakage between reservoir tube (10, Figure 2-3) and pump. Leakage may indicate that the gasket (7) is defective or that nuts (6) are not tight. Torque nuts to 5 ft-lbs. If leakage continues, replace gasket (7). Check for cracks and nicks on reservoir tube (10). Also, examine reservoir tube (10) for distortions, such as an out-of round condition. Replace the tube as required.
- b. Visually check fill screen (2) in fill cup (1) to make sure it is not clogged. If necessary, remove the screen for cleaning.
- c. Check bottom of reservoir for debris. Clean as required.

WARNING: Disconnect and lock out power before opening electrical enclosures or conduit connections. Serious injury may result from electrical shock.

2.4.3 Disassembly of Oil Reservoir. Figure 2-3 shows a typical oil reservoir but does not include other LUBEMASTER components which may be mounted to the reservoir. Disassembly of the reservoir may require that some of these components be removed. Level and blowout switches may or may not require removal, depending on the level of disassembly required. The electrical connections to the switches should be disconnected in order to remove various parts without restriction of movement by the electrical cord. Removal of these components is explained in other sections of the manual. Refer to the table of contents to find where the components are discussed.

2.4.3.1 The disassembly procedure may be performed with the reservoir mounted on the pump. However, some mounting locations may be too restrictive to provide access to all components. If your particular installation requires dismounting of the reservoir, make sure the reservoir is drained of lubricant before removing the attaching hardware. This will reduce the weight of the reservoir and reduce the chance of spillage. The disassembly procedure is as follows:

- a. Refer to Section 3 for pump draining procedure and allow oil to drain into bucket or similar container. Properly dispose of emptied oil.

- b. Remove three hex nuts (6) and lockwashers (5) from tie rods (4). Remove tie rods from reservoir cap (11).
- c. Remove reservoir cap (11) from reservoir tube (10).
- d. Remove fill screen (2) from fill cup (1) and clean screen.
- e. Remove reservoir tube (10) from pump.
- f. Remove and discard gasket (7) from pump.

2.4.4 Assembly of Oil Reservoir.

NOTE: Before assembly, lubricate followers and tube inner diameter with the lubricant used in the system.

2.4.4.1 Assemble the oil reservoir according to the following procedure:

- a. Install screen (2, Figure 2-3) in fill cup (1).
- b. Install new gasket (7) in pump.
- c. Position reservoir tube (10) on pump and position reservoir cap (11) on tube.
- d. Rotate reservoir cap (11) until tie rods (4) can be installed through holes in cap and pump. Heads of tie rods (4) must fit into the hexagonal depressions on the upper surface of the reservoir cap.
- e. Install lockwashers (5) and hex nuts (6) on tie rods (4). Torque nuts to 5 ft-lbs.

2.4.4.2 When the assembly steps listed in the above paragraph have been completed, any LUBEMASTER components which were removed to ease disassembly should be reinstalled on the reservoir.

2.4.5 Oil Reservoir Parts Lists. Table 2-4 identifies the parts indexed in Figure 2-3.

TABLE 2-4 OIL RESERVOIR (FIGURE 2-3) PARTS LIST

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
	562892	185-100-380	Reservoir Assembly, Plastic, 12 pt (5.68 liter)	1	OPA
	562893	185-100-390	Reservoir Assembly, Plastic, 20 pt (9.46 liter)	1	OPB
	562894	185-100-400	Reservoir Assembly, Metal, 12 pt (5.68 liter)	1	OMA
	562895	185-100-410	Reservoir Assembly, Metal, 20 pt (9.46 liter)	1	OMB
1	557797	534-147-000	• Cup, Fill	1	All
2	557799	534-304-003	• Screen, Fill Cup	1	All
3	557391	508-975-000	• Plug, Pipe, 1/4 in. NPT	1	All
4	556460	415-700-272	• Tie Rod, 12 pt	1	OPA, OMA
	Dis	415-700-271	• Tie Rod, 20 pt	1	OPB, OMB
5	558676	421-010-020	• Lockwasher, 5/16 in.	3	All
6	556370	410-040-020	• Nut, Hex, 5/16-18 in.	3	All
7	557333	501-423-000	• Gasket	1	All
8	557554	514-137-002	• Decal, Instruction	1	All
9	556838	457-002-236	• Decal, LUBEMASTER	1	All
10	557341	501-483-030	• Tube, Plastic Reservoir, 12 pt	1	OPA
	557527	511-175-001	• Tube, Plastic Reservoir, 20 pt	1	OPB
	560503	501-483-000	• Tube, Metal Reservoir, 12 pt	1	OMA
	560651	511-155-000	• Tube, Metal Reservoir, 20 pt	1	OMB
11	557337	501-474-029	• Cap, Reservoir	1	All

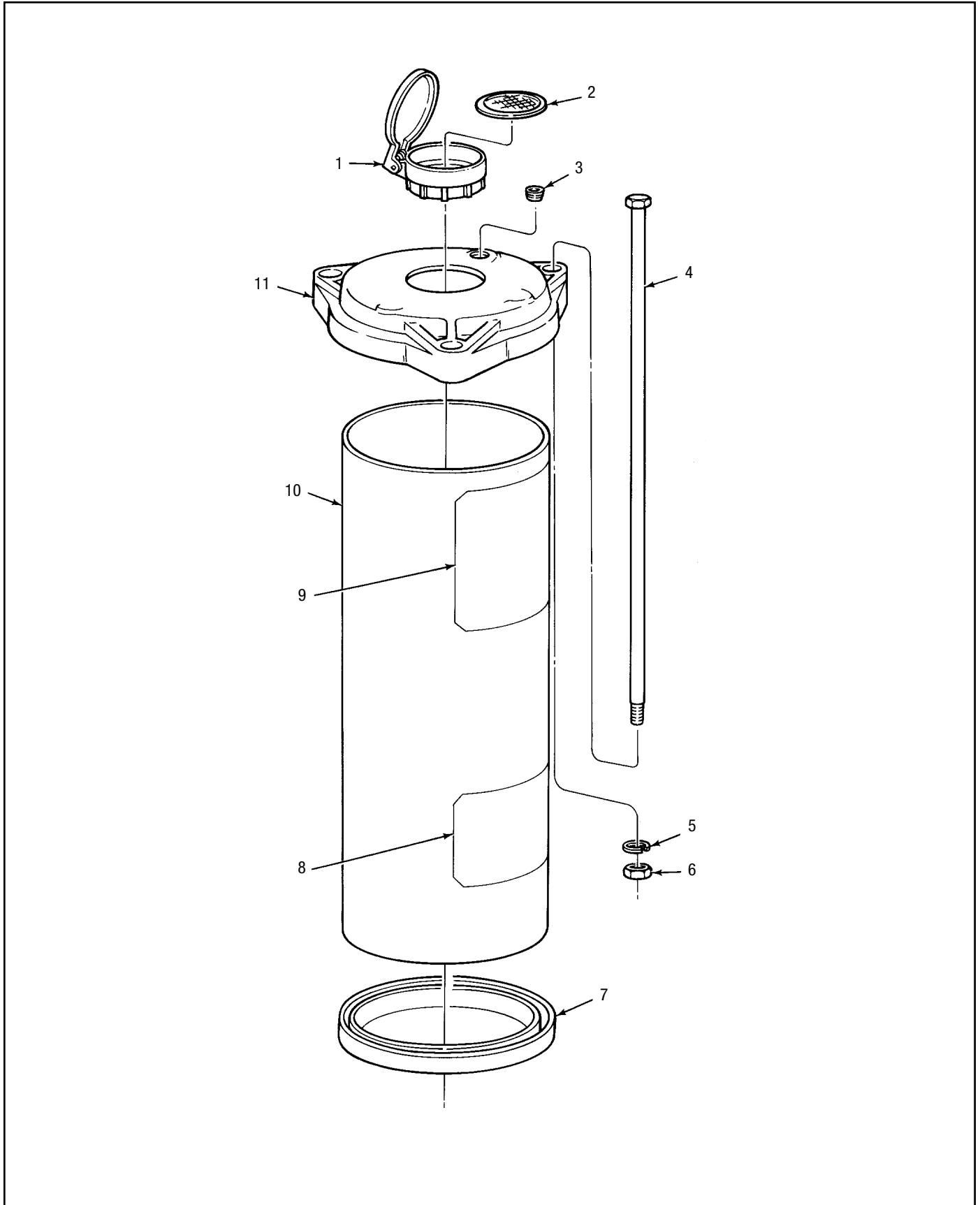


Figure 2-3. Oil Reservoir Assembly - Exploded View

2.5 OVERHEAD SUPPLY ADAPTOR MAINTENANCE (OPTION OHS)

2.5.1 General. Maintenance tips and disassembly and assembly procedures for overhead supply adaptors are discussed in Paragraphs 2.5.2, 2.5.3 and 2.5.4. An exploded view of the adaptor is shown in Figure 2-4 and should be referred to during the discussion.

2.5.2 Maintenance.

2.5.2.1 Maintenance on the adaptor consists of the following:

- a. Visually check for oil-leakage between the adaptor tube (7, Figure 2-4) and the pump. Leakage may indicate that the gasket (6) is defective or that nuts (5) are not tight. Torque nuts to 5 ft-lbs. If leakage continues replace gasket (6). Leakage may also be caused by exceeding recommended inlet pressure of 15 psi.
- b. Check for cracks and nicks on reservoir tube (7). Replace tube as required.

WARNING: Disconnect and lock out power before opening electrical enclosures or conduit connections. Serious injury may result from electrical shock.

2.5.3 Disassembly of Overhead Supply Adaptor. Figure 2-4 illustrates the adaptor but does not include other LUBEMASTER components which may be mounted to the adaptor. Disassembly of the adaptor may require that some of these components be removed. Blowout switches may or may not require removal, depending on the level of disassembly required. The electrical connections to the switches should be disconnected in order to remove various parts without restriction of movement by the electrical cord. Removal of these components is explained in other sections of the manual. Refer to the table of contents to find where the components are discussed.

2.5.3.1 The disassembly procedure may be performed with the adaptor mounted on the pump. However, some mounting locations may be too restrictive to provide access to all components. If your particular installation requires dismounting of the adaptor, make sure the adaptor is drained of lubricant before removing the attaching hardware. This will reduce the weight of the adaptor and reduce the chance of spillage. The disassembly procedure is as follows:

- a. Shut off the lubricant supply to the overhead supply adaptor. Refer to Section 3 for the pump draining procedure and allow any oil to drain into a bucket or similar container. Properly dispose of emptied oil.
- b. Remove three nuts (5) and lockwashers (4) from screws (2). Remove screws from adaptor cap (3).
- c. Remove adaptor cap (3) from adaptor tube (7).

- d. Remove adaptor tube (7) from pump.
- e. Remove and discard gaskets (6).

2.5.4 Assembly of Overhead Supply Adaptor.

2.5.4.1 Assemble the overhead supply adaptor according to the following procedure:

- a. Install new gaskets (6).
- b. Position adaptor tube (7) on pump and position adaptor cap (3) on tube.
- c. Rotate adaptor cap (3) until screws (2) can be installed through holes in cap and pump. Heads of screws (2) must fit into the hexagonal depressions on the upper surface of the adaptor cap (3).
- d. Install lockwashers (4) and nuts (5) on screws (2). Torque nuts to 5 ft-lbs.

2.5.4.2 When the assembly steps listed in the above paragraph have been completed, any LUBEMASTER components which were removed to ease disassembly should be reinstalled on the adaptor.

2.5.5 Overhead Supply Adaptor Parts Lists. Table 2-5 identifies the parts indexed in Figure 2-4.

TABLE 2-5 OVERHEAD SUPPLY ADAPTOR ASSEMBLY (FIGURE 2-4) PARTS LIST

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
	562908	185-100-930	Adaptor Assembly, Overhead Supply	1	OHS
1	557391	508-975-000	• Plug, Pipe, 1/4 in. NPT	1	OHS
2	555475	415-020-090	• Screw, Hex, 5/16-18 in. x 2 in.	3	OHS
3	560272	511-527-001	• Cap, Adaptor	1	OHS
4	100214	421-010-020	• Lockwasher, 5/16 in.	3	OHS
5	556370	410-040-020	• Nut, Hex, 5/16-18 in.	3	OHS
6	557334	501-423-000	• Gasket	2	OHS
7	560780	521-700-740	• Tube, Adaptor	1	OHS

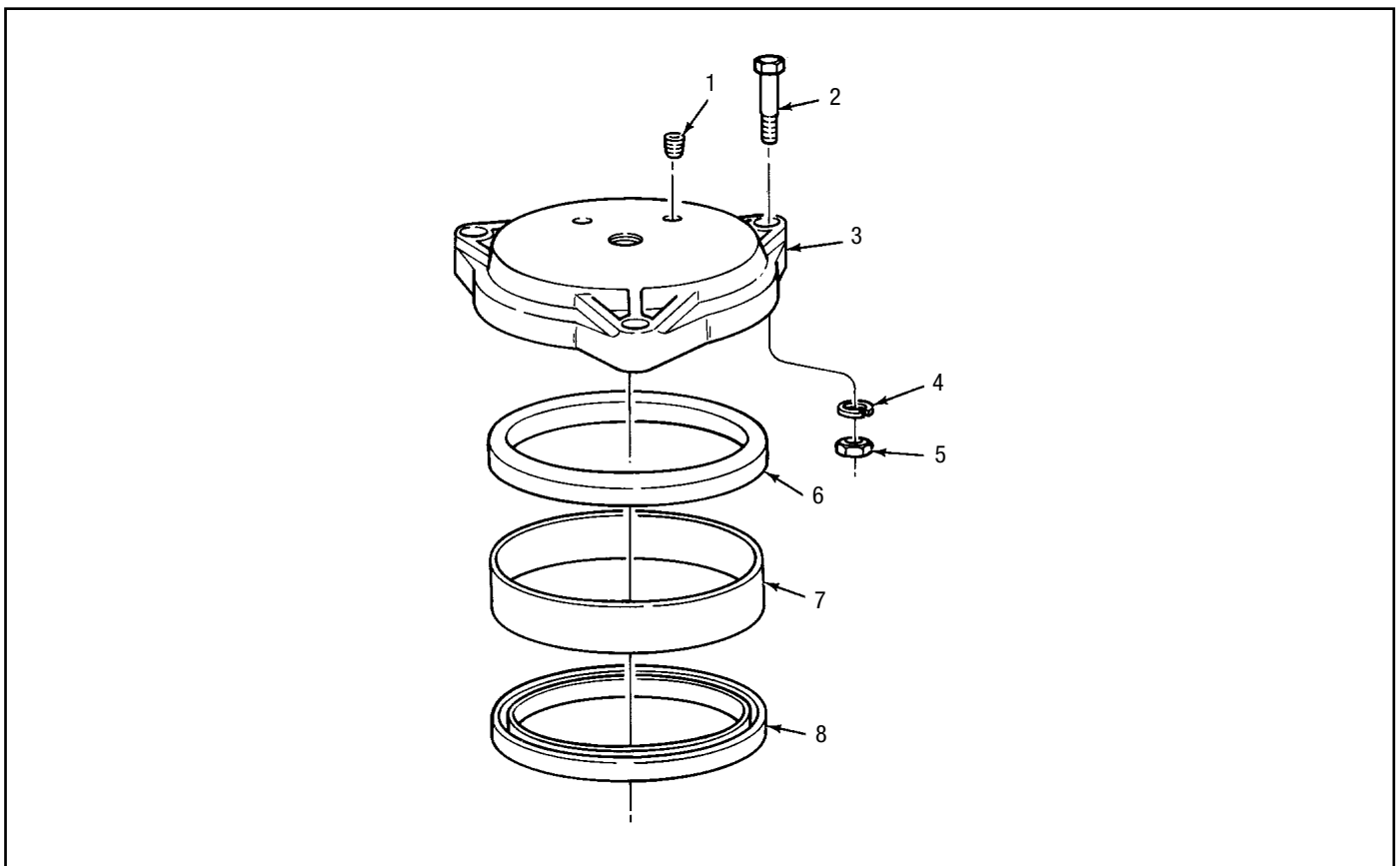


Figure 2-4. Overhead Supply Adaptor Assembly - Exploded View

OPERATION AND SERVICE INSTRUCTIONS

**SECTION 3
PUMPS**

3.1	DESCRIPTION AND OPERATION	3-1	3.3.2	Preparing for Maintenance.....	3-5
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3.1 DESCRIPTION AND OPERATION

3.1.1 Standard Pump Description. The standard LUBEMASTER Pump is a rugged, reliable pump designed to lubricate all types of machinery. It can be driven by an electric motor or by a rotating or oscillating machine motion. The output is readily adjustable.

3.1.1.1 The LUBEMASTER Pump dispenses grease or oil efficiently at a wide range of pump cycle rates and pressures. Anti-friction drive bearings and simplified design improve pump operation and reliability. Its broad output range and interchangeability of drive and mounting selections makes it suitable to many applications. Optional high-pressure and low-level switches are available to allow for protection against excessive system pressure and low reservoir lubricant levels.

3.1.2 Standard Pump Operation.

3.1.2.1 Basic system operation is described in Section 1 which discusses the eccentric motion that drives the pump piston through its power stroke and retracts it to the ready position. A more in-depth discussion of internal functioning is provided here for insight into the volume adjustment feature.

3.1.2.2 Maximum Output (100%). When the piston is in the ready position as shown in Figure 3-1, the supply port is open and allows head pressure in the reservoir to fill the piston bore in the adjusting sleeve forward of the piston. In the maximum (100%) position, the adjusting sleeve is rotated counterclockwise so that the supply port is not aligned with the piston helix (Figure 3-2). As the piston moves forward in the power stroke, the supply port is closed and the piston pressurizes the lubricant to overcome the check valve and dispense 0.050 cubic inches of lubricant for the full power stroke. When the

piston returns to the ready position, the pressure is equalized in the bore as the supply port opens. This allows the check valve to close in preparation for the next power stroke.

3.1.2.3 Minimum Output (20%). When the piston is in the ready position as shown in Figure 3-1, the adjusting sleeve is in the minimum position as shown in Figure 3-3. At this setting, the adjusting sleeve has been rotated 180 degrees clockwise which rotates the supply port to the opposite side of the piston and aligns it with the helix. The purpose of the helix is to keep the supply port open longer and prevent pressure buildup until it is closed. This reduces the effective piston stroke and minimizes the displacement to 0.010 cubic inches of lubricant as shown in Figure 3-2.

NOTE: Percentage displacements between 20% and 100% (0.010 and 0.050 cubic inches) are adjustable as shown in Table 3-1. The adjustment is secured by the setscrew shown in Figure 3-1.

TABLE 3-1 STANDARD LUBEMASTER ADJUSTMENT CHART

% of Output	Output/Stroke cu.in. (cm ³)	Adjustment Mark
100	0.050 (0.820)	Max
90	0.045 (0.736)	*1st
80	0.040 (0.656)	*2nd
70	0.035 (0.574)	*3rd
60	0.030 (0.492)	*4th
50	0.025 (0.410)	*5th
40	0.020 (0.328)	*6th
30	0.015 (0.246)	*7th
20	0.010 (0.164)	Min

*All marks are counting clockwise from max setting

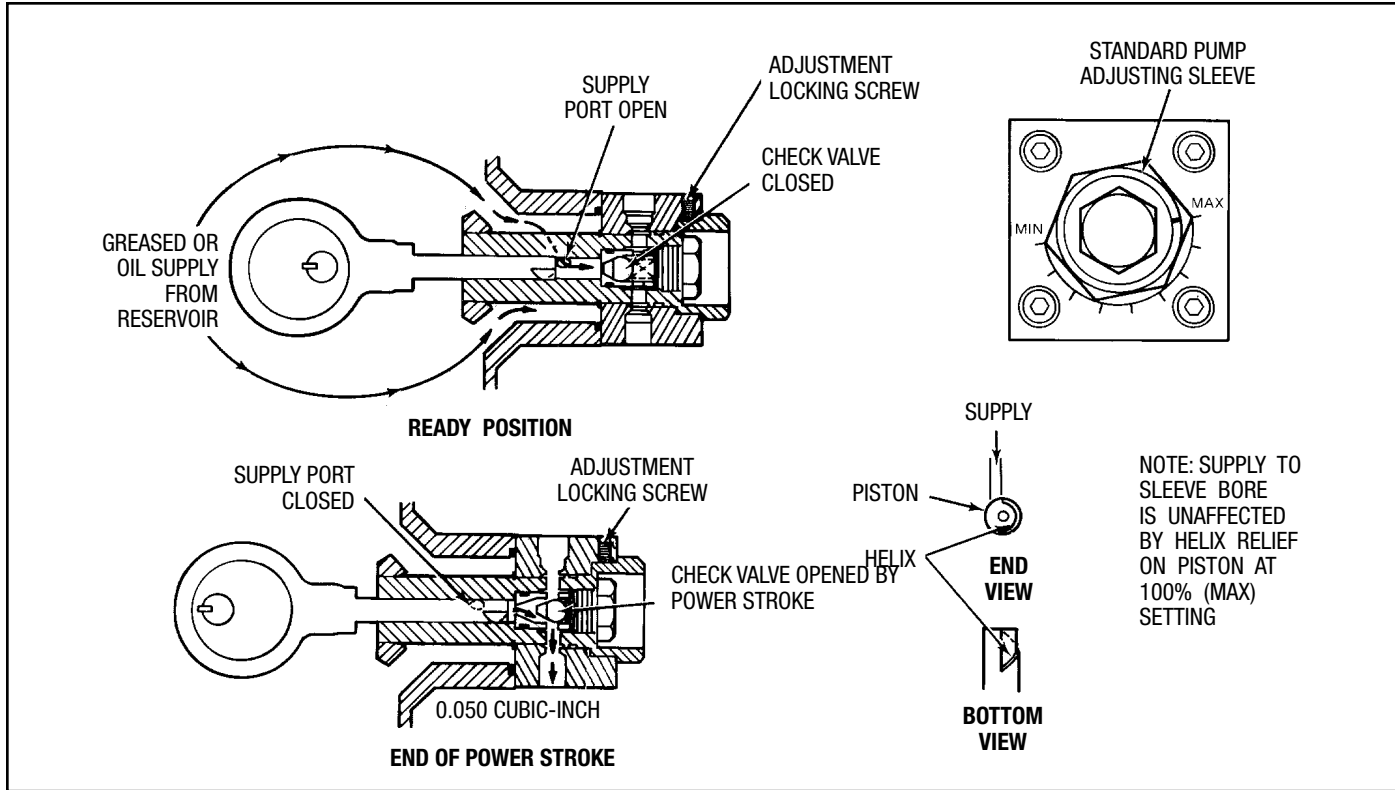


Figure 3-1. Pump Cycle at 100% Rated Output (Max. Setting)

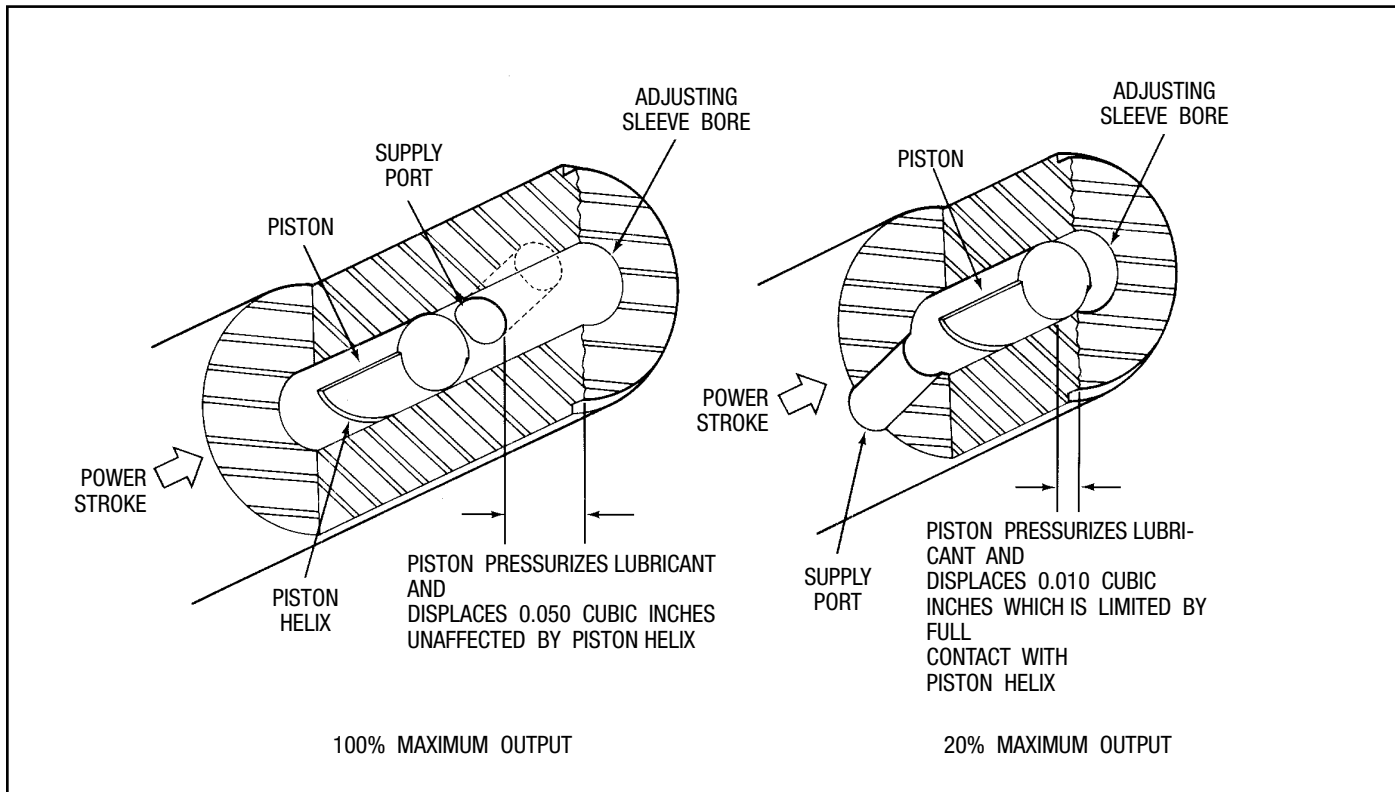


Figure 3-2. Piston Displacement at Maximum and Minimum Settings

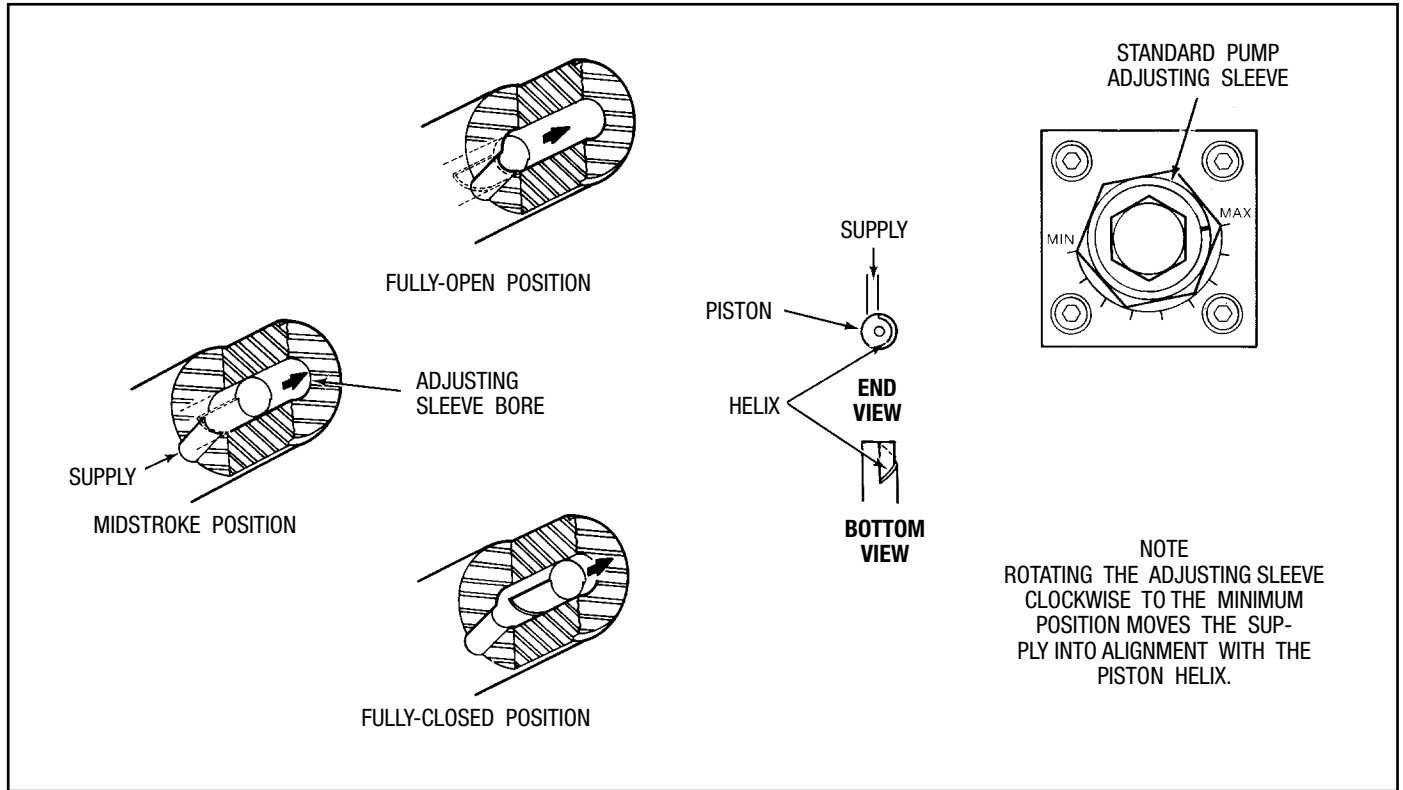


Figure 3-3. Piston Positions During Pump Cycle at 20% Rated Output (Min. Setting)

3.1.3 High-Volume LUBEMASTER. Operation of the high-volume version is similar to the standard pump, except that the output is fixed at 0.135 cubic inches (2.21 cubic centimeters) per stroke.

3.2 PREPARATION FOR USE

3.2.1 Mounting. Dimensions of the basic LUBEMASTER Pump are provided in Figure 3-4. It can be wall-mounted on one of two sides or foot-mounted on a machine or suitable base. Mounting dimensions, thread sizes and through-hole clearance sizes are shown in Figure 3-4. The pump must always be installed with the reservoir in a vertical position to ensure proper operation. If the pump is equipped with one of the drive options (DOA through DOE), refer to Section 4 for mounting dimensions. Also refer to Section 4 if 80 or 120 lb reservoir is used. These large reservoirs are only available with a motor drive.

NOTE: Always use lockwashers with mounting bolts and make certain that the bolts are properly torqued.

3.2.2 After the pump is mounted, continue preparing it for use as follows:

- a. Fill the reservoir with the proper lubricant as shown below:
 - 1. Oil - Options OPA, OPB, OMA or OMB: When pressure filling pump reservoirs with grease,

over-pressurization may cause the reservoir to rupture if the pump is not equipped with a blowout option and cause injury to personnel. Always wear protective eyewear when filling reservoirs.

- 2. Grease - Options GPA, GPB, GMA, GMB, GMC and GMD

- b. If the pump is equipped with an overhead supply (Option OHS), connect supply line to inlet port, being sure not to exceed 15 psi maximum inlet pressure.
- c. Adjust the pump output for the desired displacement as shown in Figure 3-5. (Standard pump only.)
- d. Connect the pump outlet port to the appropriate point to be lubricated.
- e. Initiate pump operation and bleed all air from the line. Refill the reservoir as necessary after bleeding.

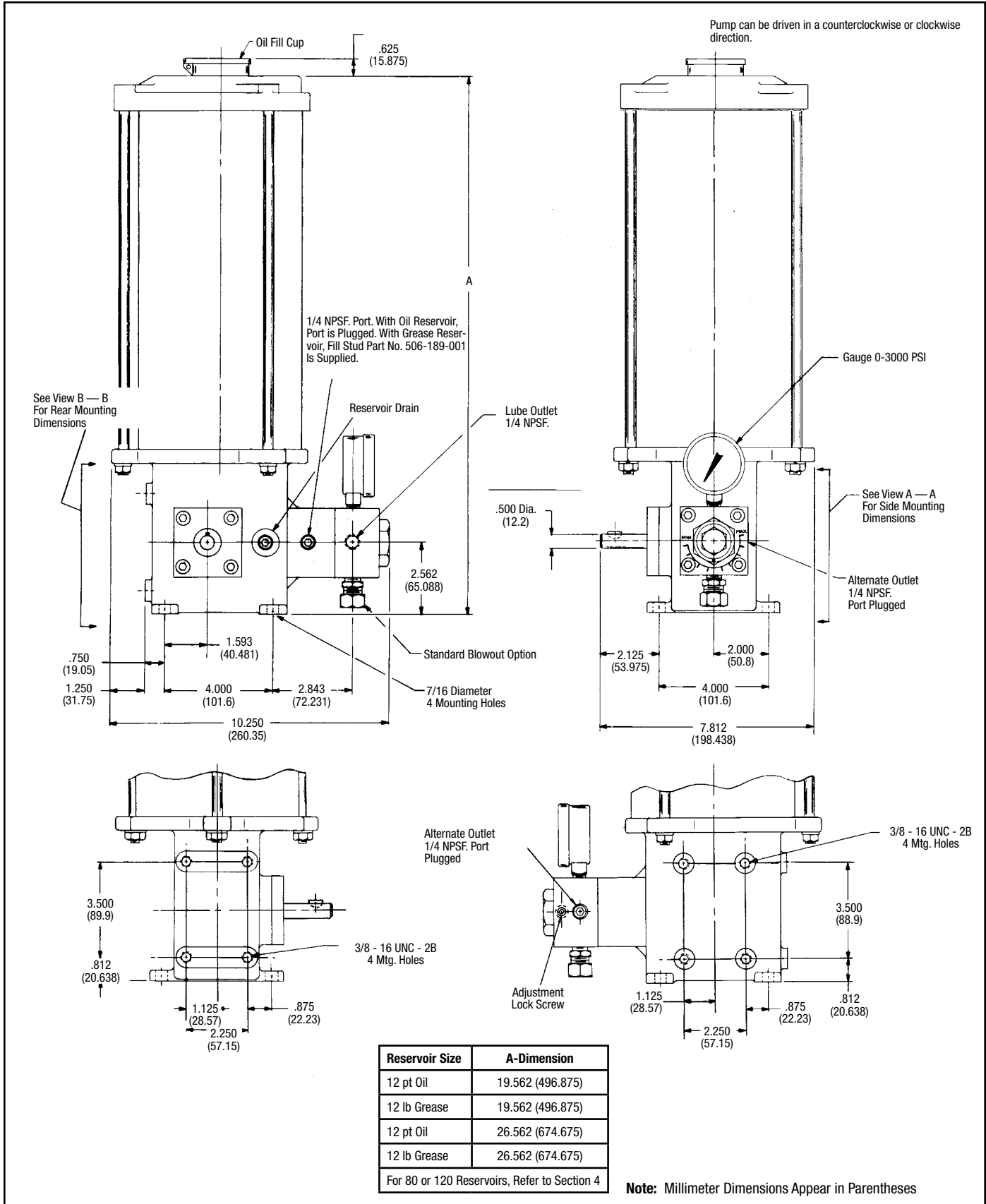


Figure 3-4. LUBEMASTER Pump and Reservoir Dimensions

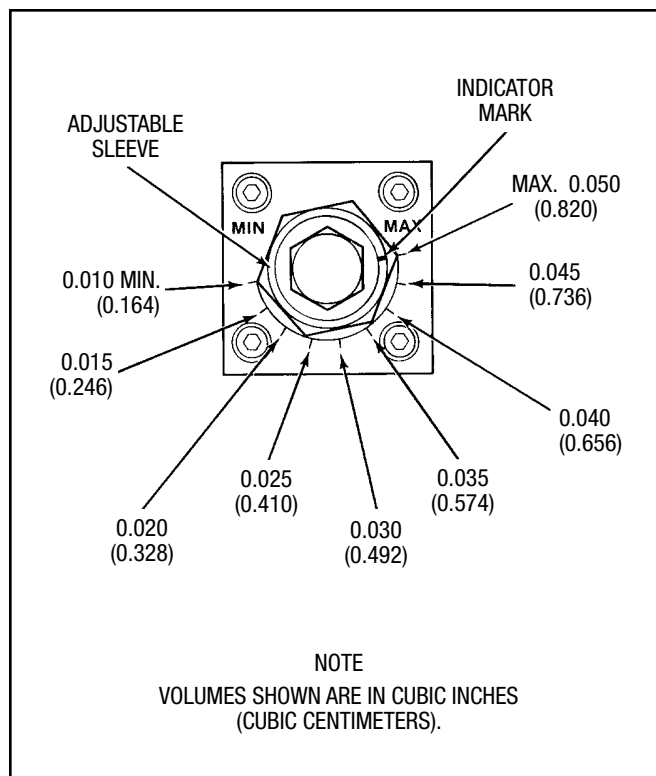


Figure 3-5. Standard Pump Adjustment

3.3 MAINTENANCE

3.3.1 General. Maintenance tips and disassembly/assembly procedures are provided in Paragraphs 3.3.2 through 3.3.3 for the pump body assembly and the manifold block assembly. Exploded views of these assemblies are provided in Figures 3-7 and 3-8. The repair kits listed in Table 3-2 are available and should be utilized in maintenance.

3.3.2 Preparing for Maintenance. Before proceeding with any maintenance, the following procedure must be accomplished:

CAUTION: Failure to electrically disconnect pump could cause serious injury.

- Electrically disconnect pump drive to render pump inoperative.
- For pumps with oil reservoirs, remove pipe plug (17, Figure 3-7) and drain oil into a suitable, clean container. Omit this step for pumps with grease reservoirs. Install plug after draining is complete.
- Remove the reservoir. (Refer to Section 2 for instructions.)
- Remove pump body assembly (Figure 3-7) from its mounting as follows:
 - Remove all guards and mechanical linkages or connections at the pump drive shaft (12).

- Remove all attaching hardware securing pump body (19) in place.
- Remove all grease or oil from the pump body (19).
- Install the appropriate kit listed in Table 3-2 in accordance with the instructions contained in Paragraphs 3.3.3, 3.3.4 or 3.3.6.

3.3.3 Pump Drive Repair Kit (Figure 3-7).

NOTE: Make certain instructions in Paragraph 3.3.2 have been accomplished before proceeding.

- Remove outer drive key (20). On old-style pumps, remove the outer Woodruff key (13).
- Remove roll pin (5) and drive pin (6). Tap lightly to avoid possible damage to piston in output manifold block assembly (8). Remove four retaining rings (3) from drive shaft (12).
- Remove end plate screws (16) and slide end plate (14) off drive shaft (12).
- Remove oil seal (15), wave washer (18), ball bearing (4) and spacer (22). Remove o-ring (11) from pump body (19). Use caution to avoid scratching mating surfaces.

NOTE: If bearing (4) remains on drive shaft (12), carefully remove it using a bearing puller before proceeding to the next step.

- Remove drive shaft (12), drive yoke (2), eccentric (1), spacer (21), and bearing (4) from pump body (19).
- Clean pump body (19) and end plate (14) with a cloth and lightly oil piston in output manifold block assembly (8).

NOTE: Discard all old parts that are being replaced with new parts in the kit (Table 3-2).

- Install bearing (4) in pump body (19).
- Partially insert yoke end of drive shaft (12) into pump body (19). Slide eccentric (1) over the hexagonal part of drive shaft. Install short spacer (21) on yoke end of drive shaft. If reusing old style drive shaft, position Woodruff key (13) in yoke end of drive shaft (12) and partially insert yoke end of shaft into pump body (19). Slide eccentric (1) onto drive shaft over key and install retaining ring (3) in the grooves on either side of the eccentric.

CAUTION: Push piston in output manifold block assembly (8) into the block so that it does not interfere with drive yoke (2) during installation.

TABLE 3-2 REPAIR KITS

Part No.	Old Part No.	Description	Quantity
563915 (Standard and High-Volume Pumps)	560-001-690	Pump Drive* Repair Kit (Refer to Paragraph 3.3.3 for installation instructions)	
		• Eccentric (1, Figure 3-7)	1
		• Drive Yoke (2)	1
		• Short Spacer (21)	1
		• Long Spacer (22)	1
		• Ball Bearings (4)	2
		• Roll Pin (5)	1
		• Drive Pin (6)	1
		• O-Rings (11)	2
		• Drive Shaft (12)	1
		• Square Key (20)	1
		• Oil Seal (15)	1
		• Wave Washer (18)	1
		• Reservoir Gasket (**)	1
563916 (Standard Pumps)	560-001-700	Output Manifold Repair Kit (Standard Pump) (Refer to Paragraph 3.3.4 for installation instructions)	
		563938 (High-Volume Pumps)	560-002-800
563921 (Standard and High-Volume Pumps)	560-001-770	• Roll Pin (5, Figure 3-7)	1
		• Drive Pin (6)	1
		• Output Manifold Block Assembly (8)	1
		• O-Rings (11)	2
		• Reservoir Gasket (**)	1
		Seal Repair Kit (Refer to Paragraph 3.3.6 for installation instructions)	
		• Retaining Rings (3, Figure 3-7)	4
		• Roll Pins (5)	1
		• Drive Pins (6)	1
		• O-Rings (11)	2
		• Woodruff Keys (13)	2
		• Oil Seal (15)	1
		• Wave Washer (18)	1
		• Retaining Ring (1, Figure 3-8)	1
		• Setscrew (4)	1
		• Backup Ring (5, 8, 10)	1
		• O-Ring (6, 7, 11)	1
		• End Plug Gasket (13)	1
		• Spring Washer (14)	1
		• Spring (15)	1
		• Viton Ball (16)	1
		• Poppet (17)	1
		• Reservoir Gasket (**)	1

*This refers to the internal drive mechanism in the pump

**Not shown

- i. Slide drive yoke (2) over eccentric and insert the drive shaft (12) into bearing (4) in pump body (19). It may be necessary to tap the drive shaft into bearing using a mallet.
- j. Install long spacer (22) over drive end of drive shaft (12). If reusing old-style drive shaft, install remaining two retaining rings (3) on drive shaft (12).

- k. Engage drive yoke (2) with piston in output manifold block assembly (8) and carefully install drive pin (6) and roll pin (5).
- l. Install wave washer (18) and bearing (4) in end plate (14).
- m. Install oil seal (15) in end plate (14) and o-ring (11) over bearing housing side of end plate. Lubricate oil seal with a light coating of oil prior to installing end plate.

NOTE: Make sure the letter T stamped on piston is facing up.

NOTE: It may be necessary to pre-install the bearing onto the drive shaft using a hollow pusher if the fit is too tight.

- n. Install end plate (14) and secure with four screws (16). Tighten screws to a torque of 8 ft-lbs.
- o. Refer to Paragraph 3.3.8 for after maintenance procedures.

3.3.4 Output Manifold Repair Kit (Figure 3-7).

NOTE: Make certain instructions contained in Paragraph 3.3.2 have been accomplished before proceeding.

- a. Remove roll pin (5) and drive pin (6) from piston in output manifold block assembly (8). Tap lightly to avoid possible damage to piston.
- b. Remove any gauges, plugs, and fittings from output manifold block assembly (8). Remove manifold screws (7) and output manifold block assembly (8) from pump body (19).

NOTE: Discard any old parts being replaced with new parts in repair kit (Table 3-2).

- c. Install an o-ring (11) on output manifold block assembly (8).
- d. Position output manifold block assembly (8) on pump body (19) and install manifold screws (7). Tighten screws to 8 ft-lbs.
- e. Engage the piston in the output manifold block assembly (8) with drive yoke (2) and install drive pin (6) and roll pin (5).
- f. Refer to Paragraph 3.3.8 for after maintenance procedures.

3.3.5 Pump Body Assembly Parts List. Table 3-3 identifies the parts indexed in Figure 3-7.

3.3.6 Seal Repair Kit.

NOTE: Make certain instructions contained in Paragraph 3.3.2 have been accomplished before proceeding.

- a. Remove roll pin (5, Figure 3-7) and drive pin (6) from piston and sleeve assembly (9, Figure 3-8). Tap lightly to avoid possible damage to piston.
- b. Remove any gauges, plugs and fittings from the output manifold block assembly (8, Figure 3-7). Remove manifold screws (7) and manifold block assembly from pump body (19).
- c. Grip the output manifold block (2, Figure 3-8) in a vise and remove setscrew (4). Remove retaining ring (1) from piston and sleeve assembly (9). Remove piston and sleeve assembly (9) by turning output adjustment hex counterclockwise.
- d. Remove enclosure plug (12) and end plug gasket

(13) from piston and sleeve assembly (9).

- e. Separate piston and sleeve assembly (9) and remove check valve seat (18) from sleeve. Remove o-rings (6 and 7) and backup rings (5 and 8) from sleeve.
- f. Remove curved spring washer (14), spring (15), ball (16) and poppet (17) from check valve seat (18).
- g. Remove o-ring (11) and backup ring (10) from check valve seat (18).

NOTE:

- Discard all old parts that are being replaced with new parts in the kit (Table 3-2).
 - Always lubricate o-rings prior to installation. This will prevent damage and make installation easier.
- h. Install o-ring (11) and backup ring (10) on check valve seat (18).
 - i. Insert poppet (17), ball (16) and spring (15) into check valve seat (18) as shown in Figure 3-6.
 - j. Slide check valve seat (18) with assembled parts into sleeve of piston and sleeve assembly (9).
 - k. Position curved spring washer (14) over end of check valve seat (18) as shown in Figure 3-6.

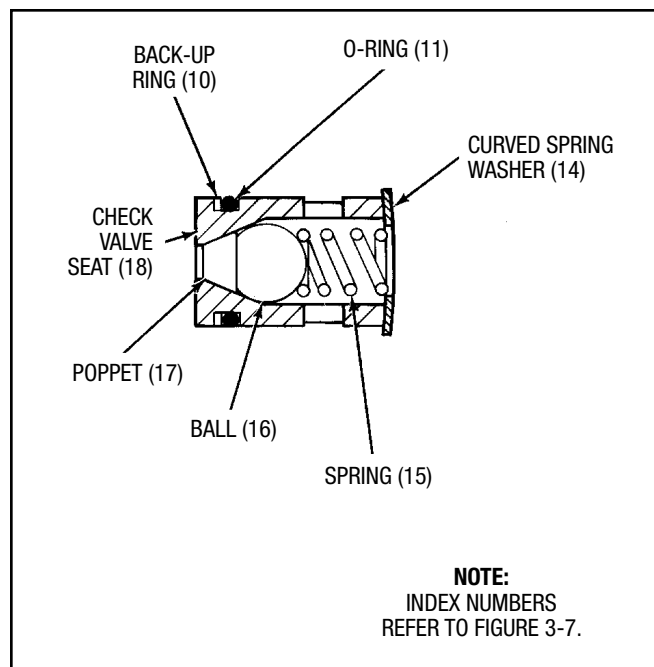


Figure 3-6. Installed Position of Check Valve Components

- l. Install end plug gasket (13, Figure 3-8) on enclosure plug (12) and thread plug into sleeve of piston and sleeve assembly (9). Tighten plug to 18 ft-lbs.

- m. Install o-rings (6 and 7) and backup rings (5 and 8) on piston and sleeve assembly (9) in the sequence shown in Figure 3-8. Lightly lubricate piston and install it in sleeve to form piston and sleeve assembly (9).
- n. Lubricate o-rings (6 and 7) and backup rings (5 and 8) on piston and sleeve assembly (9) and install assembly in output manifold block (2). Install retaining ring (1) on sleeve and pipe plug (3) in block.
- o. Remove outer drive key (20, Figure 3-7). On old-style pumps, remove outer Woodruff key (13).
- p. Remove end plate screws (16) and slide end plate (14) off drive shaft (12).
- q. Remove oil seal (15), wave washer (18), and ball bearing (4). Remove o-ring (11) from pump body (19). Use caution to avoid scratching mating surfaces.
- r. Remove drive shaft (12), drive yoke (2), eccentric (1), and ball bearing (4) from pump body (19).
- s. Clean pump body (19) and end plate (14) with a cloth and lightly oil piston in output manifold block assembly (8).

NOTE: Discard all old parts that are being replaced with new parts in the kit (Table 3-2).

- t. Install ball bearing (4) in pump body (19).
- u. Partially insert yoke end of drive shaft (12) into pump body (19). Slide eccentric (1) over the hexagonal part of drive shaft. Install short spacer (21) on yoke end of drive shaft. On old style drive shaft, position Woodruff key (13) in yoke end of

drive shaft (12) and partially insert yoke end of shaft into pump body (19). Slide eccentric (1) onto drive shaft over key and install retaining ring (3) in the grooves on either side of the eccentric.

- v. Slide drive yoke (2) over eccentric (1) and insert the drive shaft (12) into ball bearing (4) in pump body (19).
- w. Install long spacer (22) over drive end of drive shaft (12). If reusing old style drive shaft, install remaining two retaining rings (3) on drive shaft (12).
- x. Position output manifold block assembly (8) on pump body (19) and secure with four manifold screws (7). Tighten screws to a torque of 8 ft-lbs.

NOTE: Make sure the letter T stamped on piston is facing up.

- y. Engage drive yoke (2) with piston in output manifold block assembly (8) and carefully install drive pin (6) and roll pin (5).
- z. Install wave washer (18) and ball bearing (4) in end plate (14).
- aa. Install oil seal (15) in end plate (14) and o-ring (11) over bearing housing side of end plate. Lubricate oil seal with a light coating of oil prior to installing end plate.
- ab. Install end plate (14) and secure with four end plate screws (16). Tighten screws to a torque of 8 ft-lbs.
- ac. Refer to Paragraph 3.3.8 for after maintenance procedures.
- ad. Install any gauges, plugs, fittings, etc. removed from the output manifold block assembly (8) in step b.

TABLE 3-3 PUMP BODY ASSEMBLY (FIGURE 3-7) PARTS LIST

Item No.	Part No.	Old Part No.	Description	Quantity
(Standard)	563380	521-700-000	Pump Body Assembly	1
(High-Volume)	—	521-702-200		
1	560769	521-700-080	• Eccentric	1
2	560773	521-700-330	• Yoke, Drive	1
3*	555549	418-010-160	• Ring, Retaining	4
4	556361	402-132-039	• Bearing, Ball	1
5	555432	411-200-090	• Pin, Roll	1
6	560770	521-700-090	• Pin, Drive	1
7	555598	419-150-090	• Screw, Manifold	4
8 (Standard)	—	521-700-470	• Manifold Block Assembly, Output	1
8 (High-Volume)	563391	521-702-190	• Manifold Block Assembly, High-Volume	1
9	558636	411-050-070	• Screw, Drive	2
10	556839	457-002-241	• Tag, Caution	1
11	555659	422-011-330	• O-Ring	2

TABLE 3-3 PUMP BODY ASSEMBLY (FIGURE 3-7) PARTS LIST CONTINUED

Item No.	Part No.	Old Part No.	Description	Quantity
12	563392	521-702-348	• Shaft, Drive w/Bearing	1
13*	555377	409-010-090	• Key, Woodruff	2
14	560774	521-700-350	• Plate, End	1
15	556576	423-010-210	• Seal, Oil	1
16		419-150-020	• Screw, End Plate	4
17		508-975-000	• Plug, Pipe	1
18		521-700-340	• Washer, Wave	1
19		521-700-050	• Body, Pump	1
20†		409-020-040	• Key, 1/8 in. Square	1
21†		424-025-828	• Short Spacer, 3/4 in. ID x 11/32 in. Long	1
22†		424-025-829	• Long Spacer, 3/4 in. ID x 31/32 in. Long	1

*Used with old-style round drive shaft

†Used with new style machined hex drive shaft

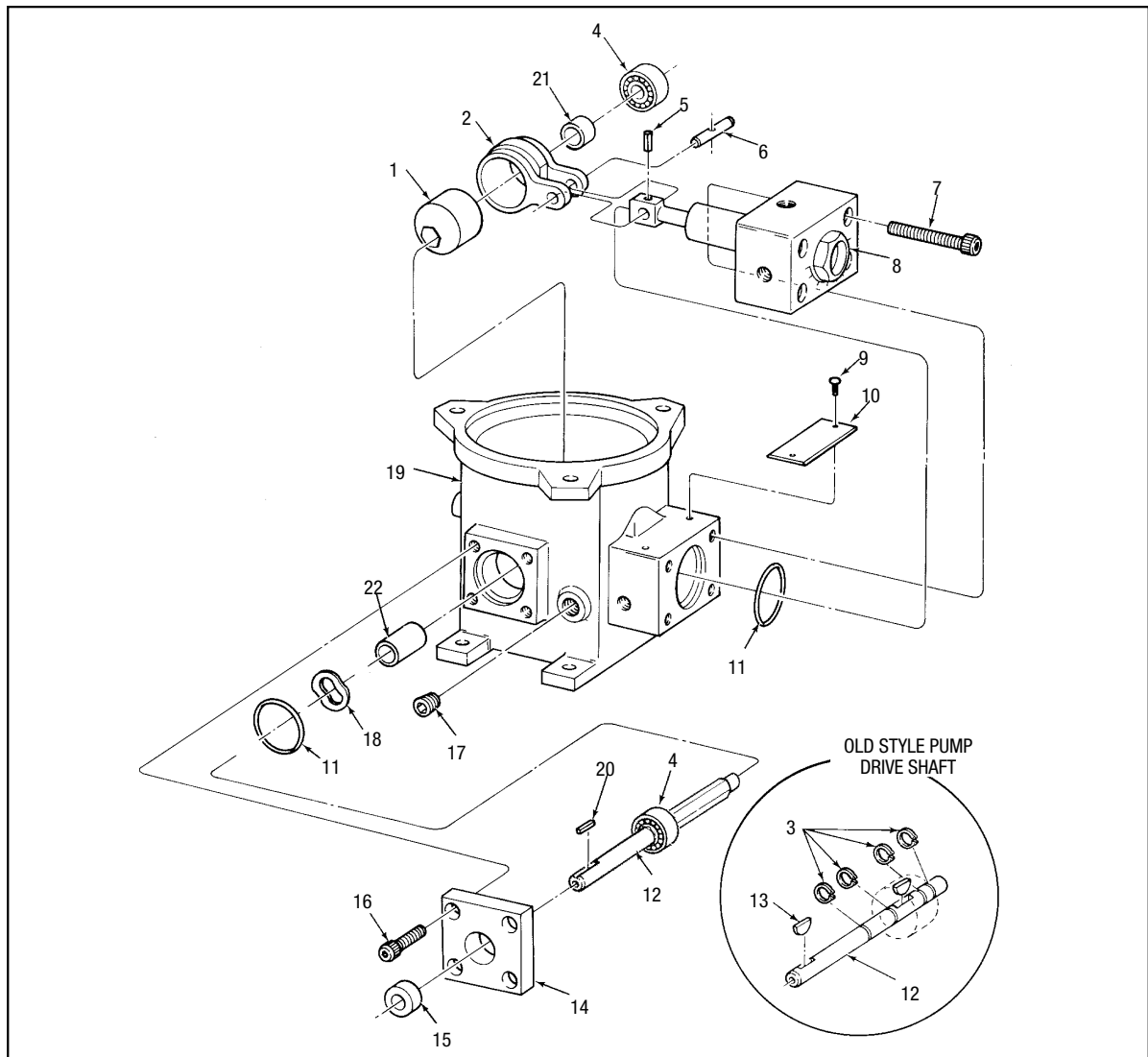


Figure 3-7. Pump Body Assembly - Exploded View

3.3.7 Output Manifold Block Assembly Parts List. Table 3-4 identifies the parts to be indexed in Figure 3-8.

3.3.8 Installation After Maintenance. After pump maintenance (para 3.3.3, 3.3.4 or 3.3.6) has been accomplished, perform the following procedure to return the unit to service.

- a. Locate the pump body (19, Figure 3-7) and assembled parts at the position from which it was removed and secure with attaching hardware. Make certain all fasteners are tightened to the proper torque.

- b. Install all guards and mechanical linkages or connections removed at the pump drive shaft (12).
- c. Install the reservoir. (Refer to Section 2 for instructions.)
- d. Electrically reconnect the pump drive.
- e. Make certain that pipe plug (17), removed to drain oil reservoirs, has been replaced. Perform the procedure outlined in Paragraph 3.3.2.

TABLE 3-4 OUTPUT MANIFOLD BLOCK ASSEMBLY (FIGURE 3-8)

Item No.	Part No.	Old Part No.	Description	Quantity
(Standard Pump)	–	521-700-470	Manifold Block Assembly, Output (Refer to 8, Figure 3-7 for Next Higher Assembly)	
(High-Volume Pump)	563391	521-702-190		
1	555555	418-010-320	• Ring, Retaining	1
2 (Standard)	560776	521-700-370	• Block, Output Manifold	1
2 (High-Volume)	560738	521-702-230	• Block, High Output Manifold	1
3	557391	508-975-000	• Plug, Pipe	1
3 (High-Volume)	556430	412-700-494	• Plug, Pipe, 9/16-18	1
4	555532	417-060-040	• Setscrew	1
5	555791	521-700-030	• Ring, Backup	1
6	555649	422-010-220	• O-Ring	1
7	556549	422-010-240	• O-Ring	1
8	557643	521-700-040	• Ring, Backup	1
9 (Standard)	563381	521-700-150	• Piston and Sleeve Assembly	1
9 (High-Volume)	563390	521-702-170	• Piston and Sleeve Assembly	1
10	557642	521-700-020	• Ring, Backup	1
11	556544	422-010-140	• O-Ring	1
12	560499	500-462-000	• Plug, Enclosure	1
*	569240	412-700-463	• Plug, w/O-Ring	1
13	557323	500-776-000	• Gasket, End Plug	1
14	557657	521-700-620	• Washer, Curved Spring	1
15	557646	521-700-190	• Spring	1
16	556334	401-070-120	• Ball, Viton	1
17	557060	463-920-408	• Poppet	1
18	560775	521-700-360	• Seat, Check Valve	1
19	556503	418-700-524	• Retainer, Spring	1

*Used on late model Pumps

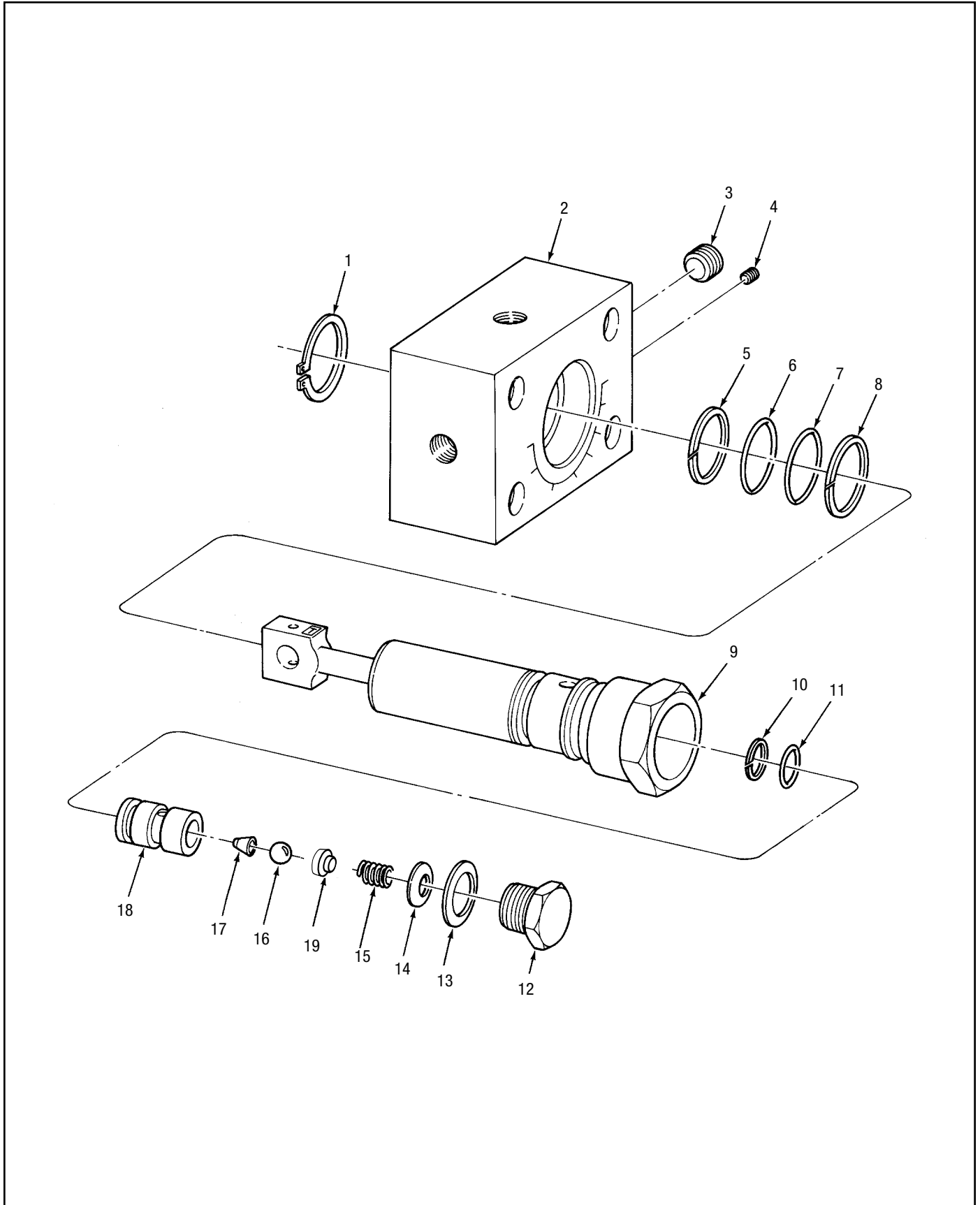


Figure 3-8. Output Manifold Block Assembly - Exploded View

**OPERATION AND
SERVICE INSTRUCTIONS**

**SECTION 4
DRIVES AND MOTORS**

4.1 DESCRIPTION..... 4-1	4.2.1 Mounting Instructions..... 4-2
4.1.1 General..... 4-1	4.2.2 Electrical Installation..... 4-2
4.1.2 Drives and Motors Available..... 4-1	4.2.3 Initial Startup..... 4-2
4.2 PREPARATION FOR USE..... 4-2	4.3 MAINTENANCE..... 4-7

4.1 DESCRIPTION

4.1.1 General. Standard LUBEMASTER Pumps are available with an oscillating clutch drive, 10:1 or 60:1 reduction ratio gear reducers and 1/2 hp motors. Several motors are available to provide optional voltages (115/230 or 230/460 volts), phases (single- or three-phase) and speeds (1140 or 1725 rpm). When the gear reducer option is selected, a mounting base is provided for either floor- or wall-mounting, as desired. Refer to Table 4-1 for a description of these options.

4.1.1.1 LUBEMASTER Pumps furnished with a drive are normally provided with either a clutch drive (Figure 4-1) or with an electric motorized drive (Figure 4-2).

4.1.1.2 High-volume LUBEMASTER pumps are available with a 10:1 ratio reducer, 1-1/2 hp motor and floor-mounted base only.

4.1.2 Drives and Motors Available. Table 4-1 lists the optional, drives and motors available. Listings in the option column are used to identify the selected option when a LUBEMASTER Pump Package is ordered. The option used is designated by the entry in the ordering code as shown below:

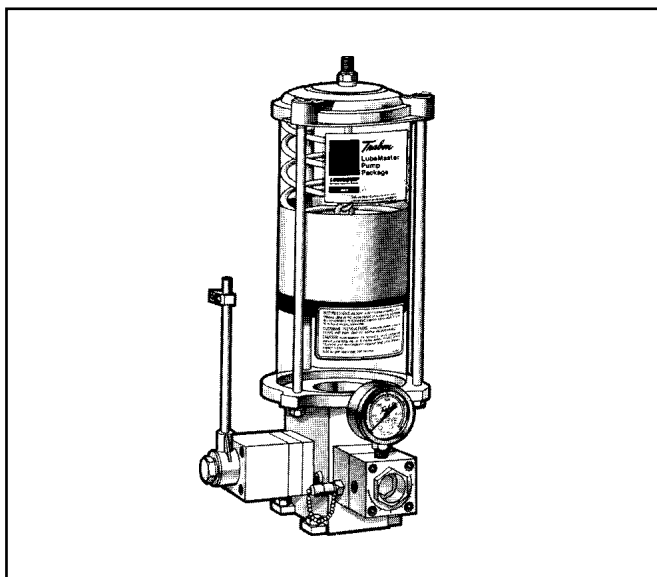
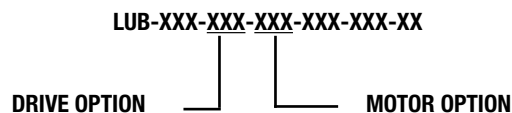


Figure 4-1. LUBEMASTER Pump with Clutch Drive

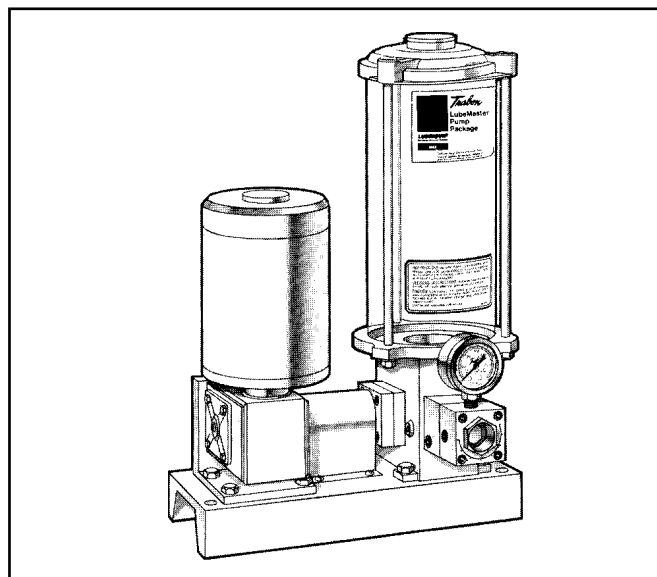


Figure 4-2. LUBEMASTER Pump with Gear Reducer, Motor and Floor-Mounting Base

TABLE 4-1 OPTIONAL DRIVES AND MOTORS

Part No.	Old Part No.	Option	Description	Option
563383	521-700-300	Drive	Clutch Drive w/Arm	DOA
563388	521-700-550	Drive	10:1 Reduction - Floor-Mounting	DOB
563386	521-700-520	Drive	10:1 Reduction - Wall-Mounting	DOC
563389	521-700-560	Drive	60:1 Reduction - Floor-Mounting	DOD
563387	521-700-530	Drive	60:1 Reduction - Wall-Mounting	DOE
557271	492-380-040	Motor	1/2 HP, 115/230 volt, Single-Phase, 1,725 rpm	MOA
557270	492-380-030	Motor	1/2 HP, 230/460 volt, 3-Phase, 1,725 rpm	MOB
557272	492-380-240	Motor	1/2 HP, 115/230 volt, Single-Phase, 1,140 rpm	MOC
557273	492-380-250	Motor	1/2 HP, 230/460 volt, 3-Phase, 1,140 rpm	MOD
-	492-400-050	Motor	1-1/2 HP, 230/460 volt, 3-Phase, 1,725 rpm	-

4.2 PREPARATION FOR USE

4.2.1 Mounting Instructions.

4.2.1.1 Clutch Drive. Mounting dimensions for a LUBEMASTER Pump with the Clutch Drive Option are provided in Figure 4-3. It can be wall-mounted on one of two sides or foot-mounted on a machine or suitable base. Mounting dimensions, thread sizes and through-hole clearance sizes are shown in Figures 4-3 and 3-4. The pump must always be installed with the reservoir in a vertical position to ensure proper operation.

4.2.1.2 The degrees of throw of the clutch lever is adjustable from 12 to 60 degrees. Table 4-2 provides the minimum maximum pump outputs. The actual pump output for your installation may be computed by using the following procedure.

a. Using the clutch lever diagram (Figure 4-4) determine the anticipated clutch lever throw angle.

b. To determine pump output per hour, calculate as follows:

$$1. \frac{360^\circ}{\text{Degrees of Throw}^*} = \text{EFFECTIVE RATIO}$$

*Degrees of Throw can be found by using clutch lever diagram.

$$2. \frac{\text{IMPULSES/HOUR}}{\text{RATIO}} = \text{PUMP STROKE/HOUR}$$

3. Pump strokes per hour x 0.010 = Minimum Pump Output per Hour

4. Pump strokes per hour x 0.050 = Maximum Pump Output per Hour

NOTE: Refer to Section 3 for procedures on adjusting pump output. Minimum and maximum adjustments are shown in steps b (3) and b (4) above.

4.2.1.3 Gear Reducer and Motor. Gear reducers and motors are provided with floor or wall mounting bases. These units are prepackaged as motorized LUBEMASTER Pumps. Mounting dimensions of these units are provided in Figure 4-5.

CAUTION: Gear reducer units are shipped without lubricant. Before operating, always check lubricant level and fill per manufacturer's instructions. Operation without lubricant will damage the gear reducer. Refer to table 5 on page 4-8 for suggested lubricants.

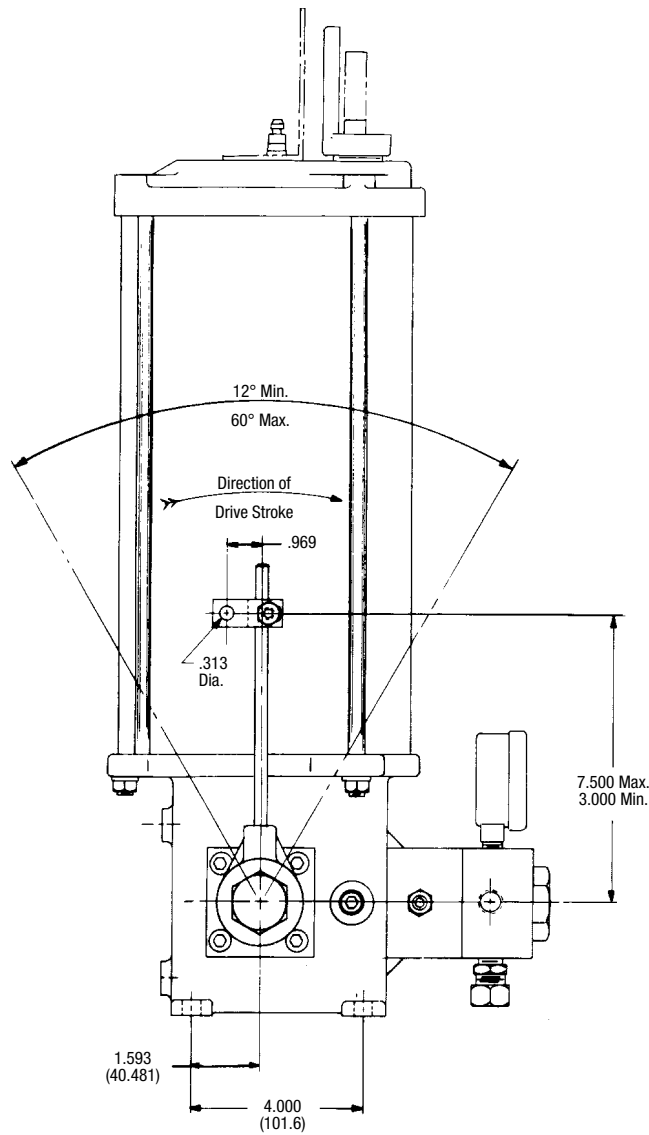
NOTE: See Figure 4-6 for dimensions for LUBEMASTER packages that use 80 and 120 lb reservoir.

4.2.2 Electrical Installation. LUBEMASTER pumping packages that include a drive motor option require a starting device such as a motor starter or contactor. Consideration should be given during installation to any other electrical options, such as low-level switches, blowout switches, and controllers, to make certain these options have been correctly interconnected.

4.2.3 Initial Startup. After the pump has been mounted (para 4.2.1.1 or 4.2.1.3), it should be prepared for operation as described in Paragraph 3.2.2. After these instructions have been accomplished, the pump is ready for use.

TABLE 4-1 OPTIONAL DRIVES AND MOTORS

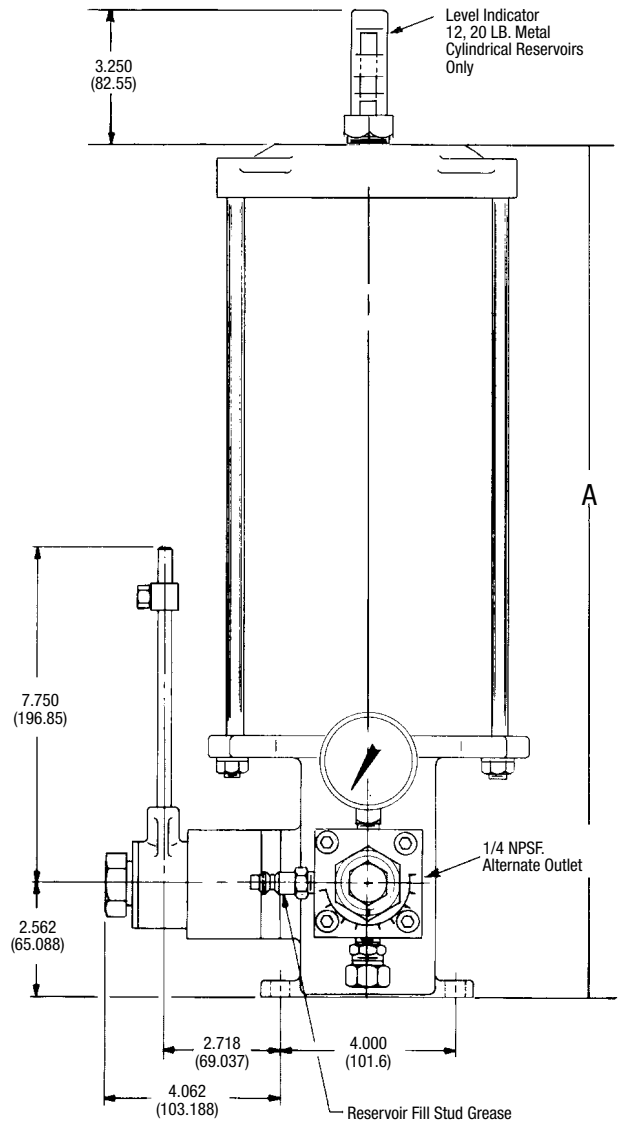
° of Throw	Effective Ratio	Impulses/Minute	Pump Strokes/Hour	Output/Hour cu.in. (cm ³)	
				Min	Max
12	30:1	5 Min	10	0.100 (1.639)	0.500 (8.195)
60	6:1	150 Max	1,500	15.00 (245.85)	75.00 (1229.25)



NOTE:
Millimeter Dimensions Appear in Parentheses

RESERVOIR SIZE	A-DIMENSION
12 PINT OIL	19.562 (496.875)
12 LB. GREASE	19.562 (496.875)
20 PINT OIL	26.562 (674.675)
20 LB. GREASE	26.562 (674.675)

NOTE
ALL DIMENSIONS SHOWN ARE
IN INCHES (MILLIMETERS).



NOTE:
REFER TO FIGURE 3-4 FOR
ALTERNATE MOUNTING LOCATIONS.

Figure 4-3. Clutch Drive Dimensions

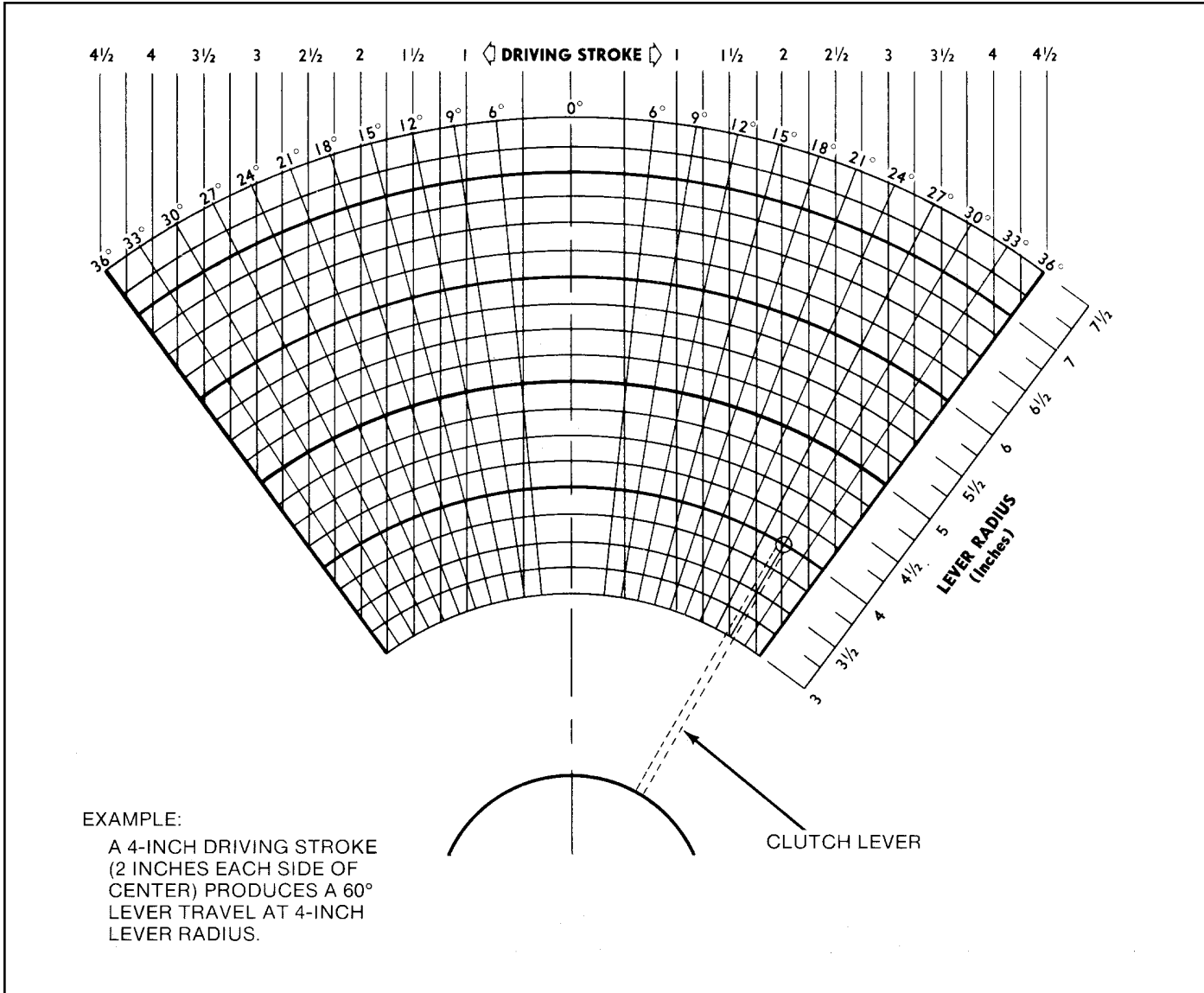


Figure 4-4. Clutch Lever Diagram

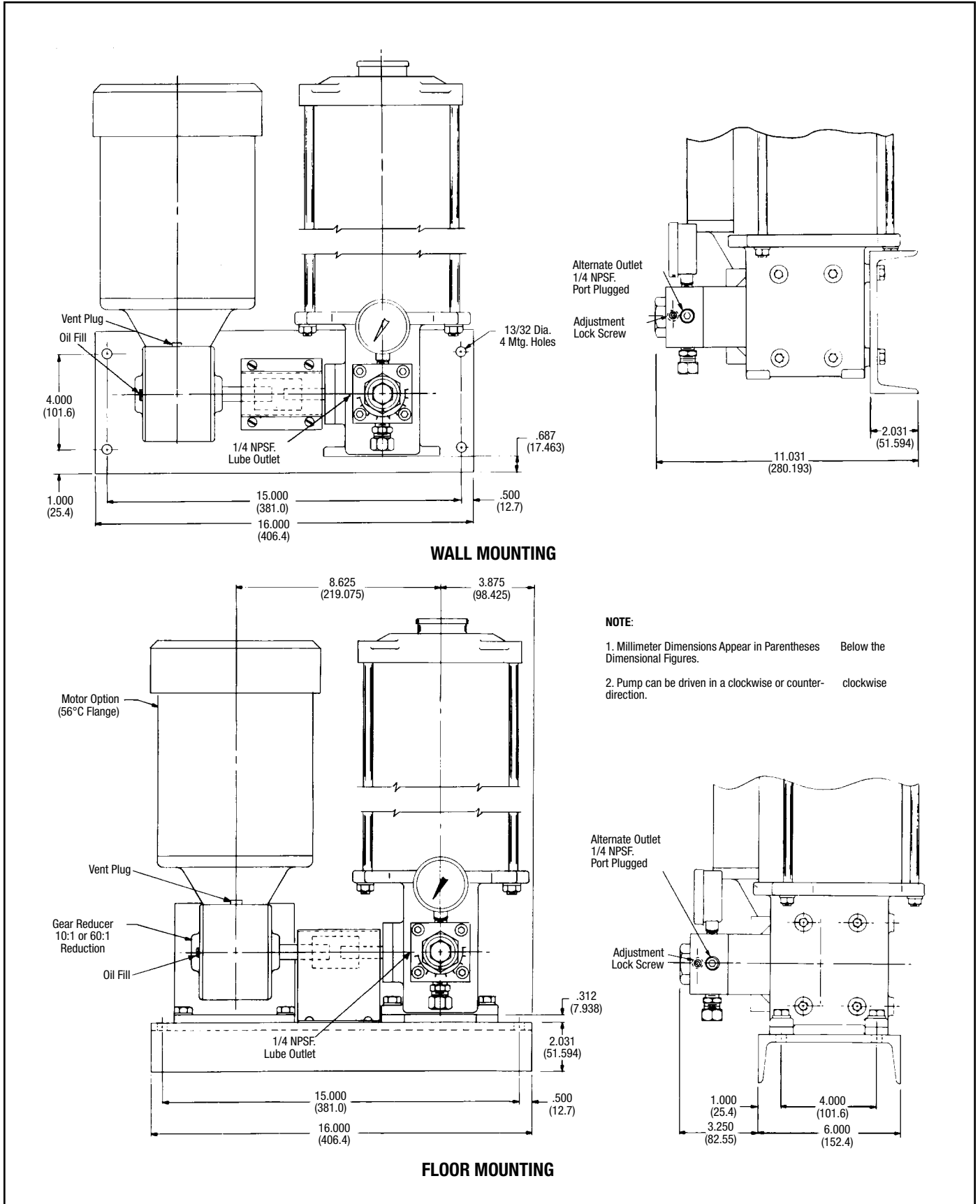


Figure 4-5. Motorized LUBEMASTER Dimensions (Up to 20 Lbs)

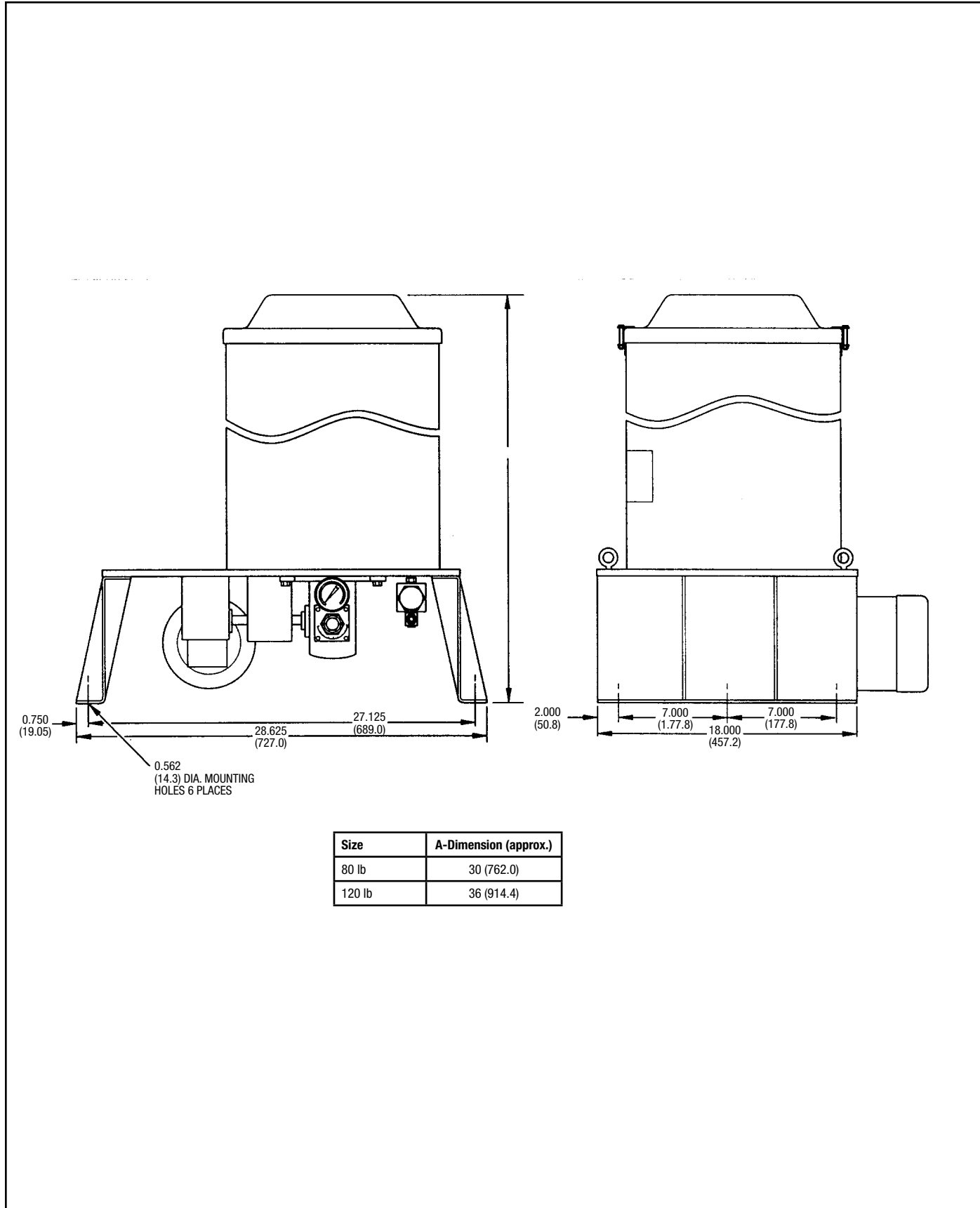


Figure 4-6. LUBEMASTER Dimensions (80 and 120 Lb Reservoir)

4.3 MAINTENANCE

4.3.1 There is little maintenance required on the clutch drive (Figure 4-7) or the motorized LUBEMASTER Pumps (Figure 4-8). Refer to Sections 2 and 3 for maintenance on the reservoirs and pump. If troubleshooting, Section 8, indicates the need for maintenance of the clutch drive, motor or gear reducer, refer to Figures 4-7 and 4-8 and Tables 4-3 and 4-4 for replacement components.

TABLE 4-3 CLUTCH DRIVE ASSEMBLY (FIGURE 4-7)

Item No.	Part No.	Old Part No.	Description	Quantity
	563383	521-700-300	Drive Assembly, Clutch	1
1	555599	419-150-110	• Screw, Clutch Drive	4
2			• Drive, Clutch	NP
3	563554	534-108-000	• Clevis Assembly	1

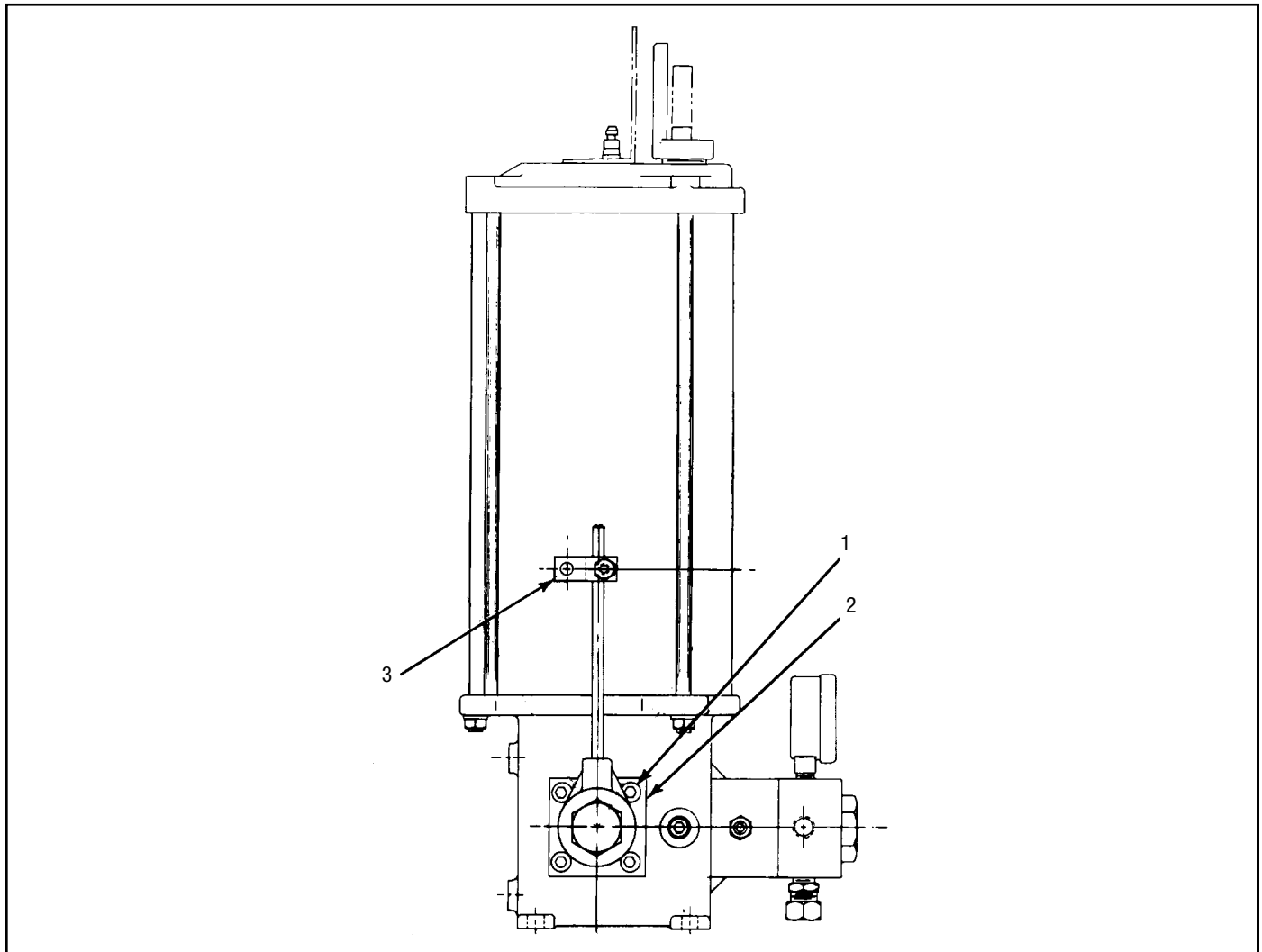


Figure 4-7. Clutch Drive

TABLE 4-4 MOTORIZED LUBEMASTER PUMP, UP TO 20 LBS (FIGURE 4-8)

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
			LUBEMASTER Pump, Motorized	1	
1	557271	492-380-040	• Motor, 115/230 volt, Single-Phase, 1/2 HP, 1,725 rpm	AR	MOA
	557270	492-380-030	• Motor, 230/460 volt, 3-Phase, 1/2 HP, 1,725 rpm	AR	MOB
	557272	492-380-240	• Motor, 115/230 volt, Single-Phase, 1/2 HP, 1,140 rpm	AR	MOC
	557273	492-380-250	• Motor, 230/460 volt, 3-Phase, 1/2 HP, 1,140 rpm	AR	MOD
2	563380	521-700-000	• Pump Assembly	1	All
3	558650	415-030-060	• Screw, Hex-Head, 3/8-16 in. x 1-1/4 in., Floor-Mounting	8	DOB, DOD
	555478	415-030-040	• Screw, Hex-Head, 3/8-16 in. x 7/8 in., Wall-Mounting	4	DOC, DOE
4	558677	421-010-030	• Lockwasher, 3/8 in.	12	DOB, DOD
	558677	421-010-030	• Lockwasher, 3/8 in.	4	DOC, DOE
5	560779	521-700-540	• Spacer, Motor Mount, Floor-Mounting	4	DOB, DOD
	560778	521-700-510	• Spacer, Reducer Mount, Wall-Mounting	4	DOC, DOE
6	557655	521-700-480	• Base, Mounting, Wall or Floor	1	All
7	557654	521-700-450	• Guard, Coupling	1	All
8	555511	416-470-040	• Screw, 10-32	4	All
9	555635	421-070-070	• Lockwasher, No. 10	4	All
10	557160	481-010-223	• Gear Reducer, 10:1, Floor- or Wall-Mounting	1	DOB, DOC
	557161	481-010-224	• Gear Reducer, 60:1, Floor- or Wall-Mounting	1	DOD, DOE
11	557656	521-700-490	• Bracket, Reducer, Floor-Mounting	1	DOB, DOD
12	555471	415-020-030	• Screw, Hex-Head, 5/16-18 in. x 3/4 in., Reducer Mounting	4	DOB, DOD
	–	415-020-060	• Screw, Hex-Head, 5/16-18 in. x 1-1/4 in., Reducer Mounting	4	DOC, DOE
13	558676	421-010-020	• Lockwasher, 3/8 in.	4	All
14	556797	455-045-265	• Coupling	1	All

TABLE 4-5 RECOMMENDED LUBRICANTS FOR ENCLOSED WORM GEAR REDUCERS

Ambient (Room) Temperature	Recommended Oil (or equivalent)	Viscosity Range SUS @ 100°F	Lubricant AGMA No.	ISO Viscosity Grade No. +
-30° to 225°F** (-34° to 107°C)	Mobil SHC 634* Synthetic	1950/2150	–	320/460
40° to 90°F (4.4° to 32.2°C)	Mobil 600W Cylinder Oil	1920/3200	7 or 7C	460
80° to 125°F (26.7° to 51.7°C)	Mobil Extra Hecla Super Cylinder Oil	2850/3600	8 or 8C	680

The gear reducer requires 7.8 ounces of clean lubricant as listed above.

The lubricant must remain free from oxidation and contamination by water or debris, since only a very thin film of oil stands between efficient operation and failure. To assure long service life, the reducer should be periodically drained (preferably while warm) and refilled to the proper level with a recommended gear oil. Under normal environmental conditions oil changes are suggested after the initial 250 hours of operation and thereafter at regular intervals of 2500 hours or every 6 months.

Synthetic lubricants will allow extended lubrication intervals due to its increased resistance to thermal and oxidation degradation. It is suggested that the initial oil change be made at 1500 hours and, thereafter, at 5000 hour intervals.

ALTERNATIVE AGMA LUBRICANTS		
Manufacturer	Lubricant Name	AGMA Rating
Getty Refining Co.	Veedol Asreslube 98	8 EP
	Veedol Asreslube 95	7 EP
	Veedol Asreslube 90	6 EP
Lubrication Engr. Inc.	Almasol 609	8
	Almasol 608	7
Mobil Oil Corp.	Mobilgear 634	8 EP
	Mobil Extra Hecla Super	8
	Mobil Cylinder 600W	7
Shell Oil Co.	Omala 460	7 EP
	Valvala J460	7
	Omala 680	8 EP
	Valvala J680	8
Texaco Inc.	Meropra 680	8 EP
	Meropa 460	7 EP

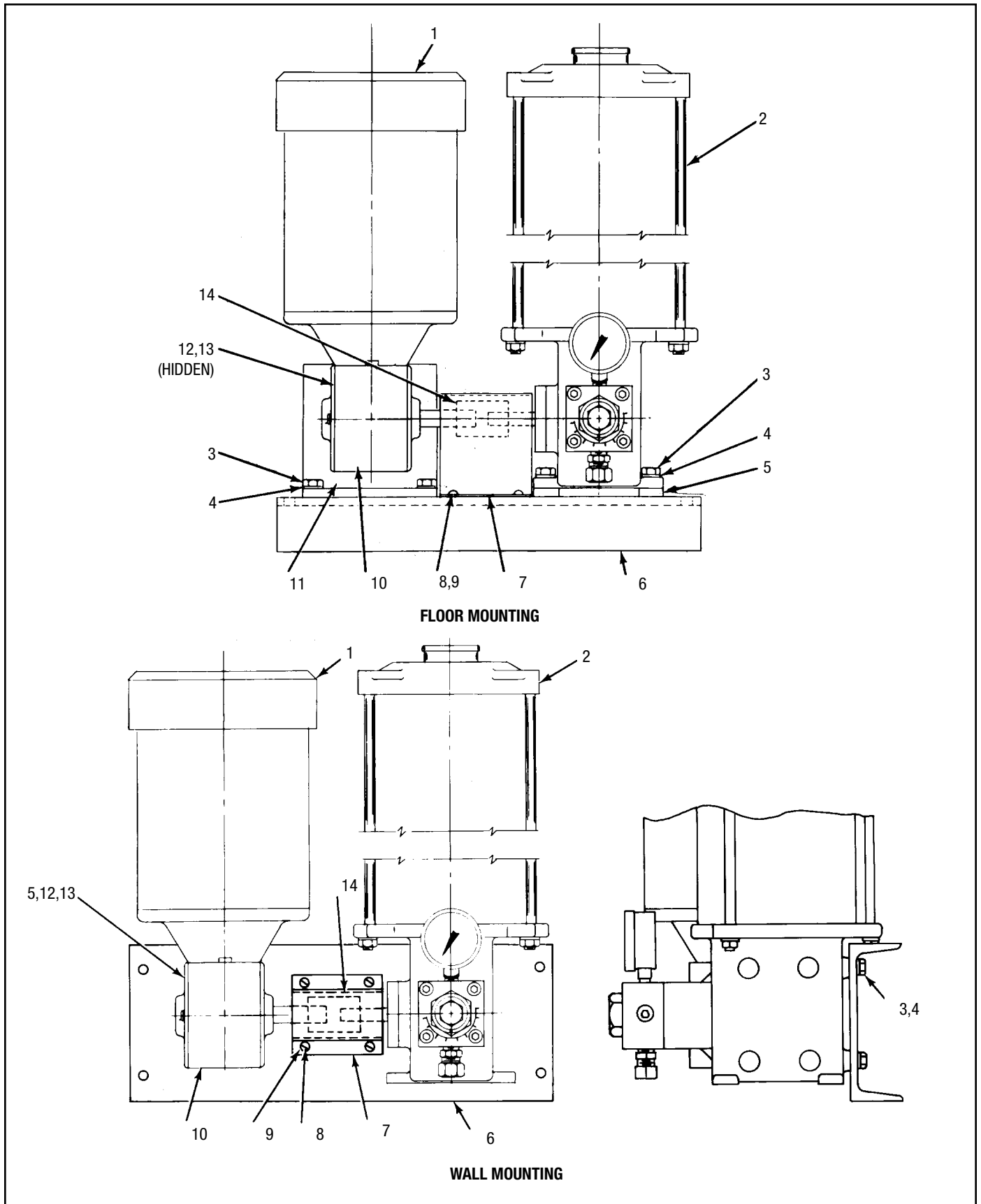


Figure 4-8. Motorized LUBEMASTER Pump with Gear Reducer and Motor (Up to 20 Lbs)

TABLE 4-5 MOTORIZED LUBEMASTER PUMP, 80 OR 120 LBS (FIGURE 4-9)

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
			LUBEMASTER Pump, Motorized, w/80 lb Reservoir	–	GMC
			LUBEMASTER Pump, Motorized, w/120 lb Reservoir	–	GMD
1			Baseplate Weldment (not available)	1	–
2	558649	415-020-050	Screw, 5/16-18 in. x 1 in.	3	Both
3	558676	421-010-020	Lockwasher, 5/16 in.	3	Both
4	557270	492-380-030	Motor	1	Both
5	563507	527-100-380	Strainer	1	Both
6*	563380	521-700-000	LUBEMASTER Pump, Standard	1	Both
	–	521-702-200	LUBEMASTER Pump, High-Volume	1	Both
7	556797	455-045-265	Coupling	1	Both
8	–	467-001-118	Guard, Coupling	1	Both
9	–	481-010-283	Reducer, Gear, 10:1 (Standard Pump)	1	Both
	–	481-010-281	Reducer, Gear, 10:1 (High-Volume Pump)	1	Both

*Standard or High-Volume Pump may be used with either reservoir

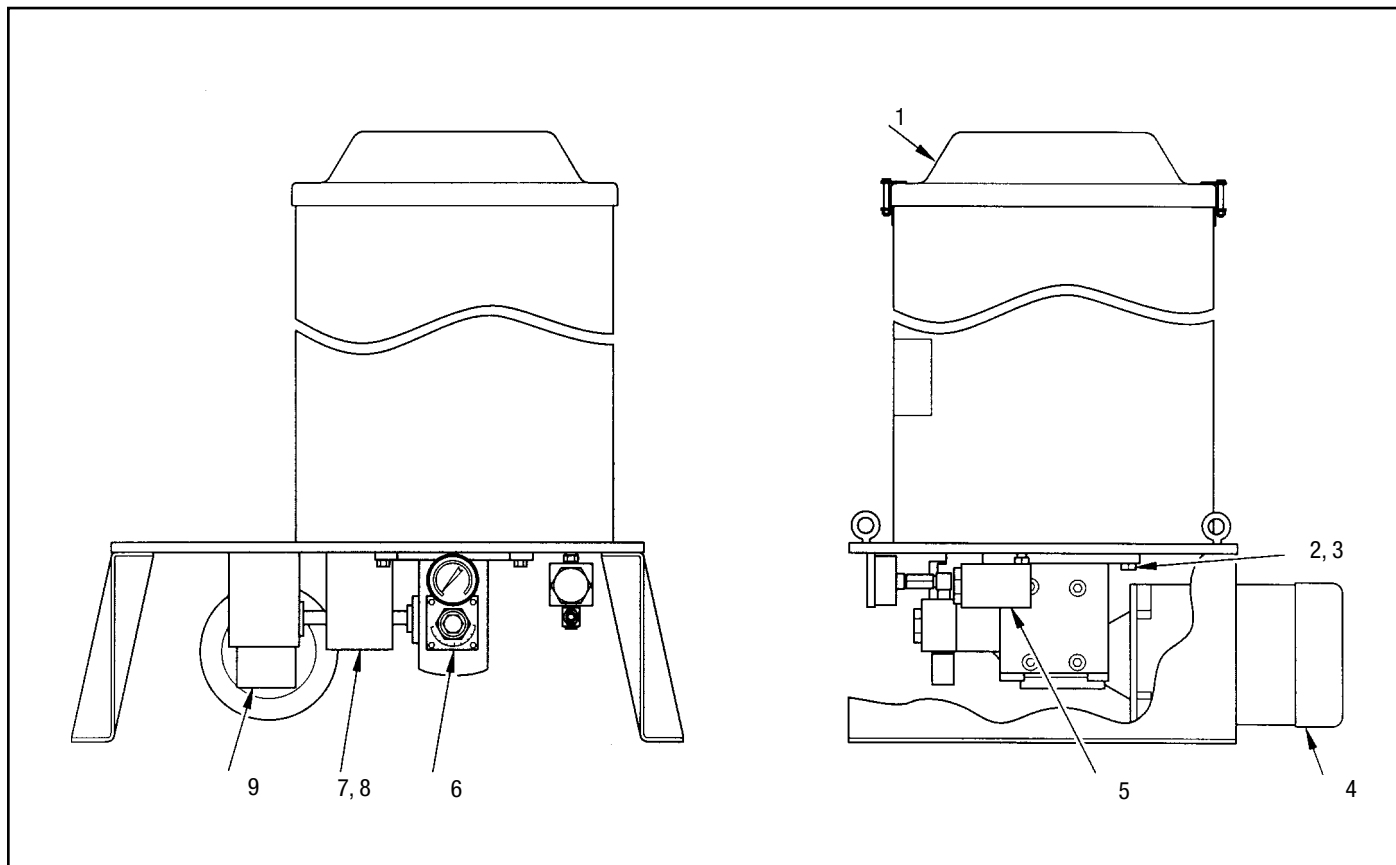


Figure 4-9. Motorized LUBEMASTER Pump with Gear Reducer and Motor (80 or 120 Lbs)

**OPERATION AND
SERVICE INSTRUCTIONS**

**SECTION 5
LOW-LEVEL SWITCHES**

<p>5.1 DESCRIPTION..... 5-1</p> <p> 5.1.1 General..... 5-1</p> <p>5.2. MOUNTING INSTRUCTIONS 5-1</p> <p> 5.2.1 Oil Reservoirs 5-1</p> <p> 5.2.2 Grease Cylinders..... 5-1</p> <p>5.3 OIL RESERVOIR 15 AMP LOW-LEVEL ASSEMBLY MAINTENANCE (OPTIONS LOA AND LOB) 5-2</p> <p> 5.3.1 General..... 5-2</p> <p> 5.3.2 Oil Reservoir 15 Amp Low-Level Assembly Maintenance Tips..... 5-2</p> <p> 5.3.3 Disassembly of Oil Reservoir 15 Amp Low-Level Assemblies 5-2</p> <p> 5.3.4 Assembly of Oil Reservoir 15 Amp Low-Level Assemblies 5-2</p> <p> 5.3.5 Oil Reservoir 15 Amp Low-Level Assemblies Parts List..... 5-3</p> <p>5.4 OIL RESERVOIR 10-WATT LOW-LEVEL ASSEMBLY MAINTENANCE (OPTIONS LOE AND LOF)..... 5-3</p>	<p>5.4.1 General..... 5-3</p> <p>5.4.2 Oil Reservoir 10-Watt Low-Level Assembly Maintenance Tips..... 5-3</p> <p>5.4.3 Disassembly of Oil Reservoir 10-Watt Low-Level Assemblies 5-4</p> <p>5.4.4 Assembly of Oil Reservoir 10-Watt Low-Level Assemblies 5-4</p> <p>5.4.5 Oil Reservoir 10-Watt Low-Level Assemblies Parts List..... 5-4</p> <p>5.5 GREASE RESERVOIR LOW-LEVEL ASSEMBLY MAINTENANCE (OPTION LOC)..... 5-5</p> <p> 5.5.1 General..... 5-5</p> <p> 5.5.2 Grease Reservoir Low-Level Assembly Maintenance Tips..... 5-5</p> <p> 5.5.3 Disassembly of Grease Reservoir Low-Level Assembly 5-5</p> <p> 5.5.4 Assembly of Grease Reservoir Low-Level Assembly 5-5</p> <p> 5.5.5 Grease Reservoir Low-Level Assembly Parts List 5-6</p>
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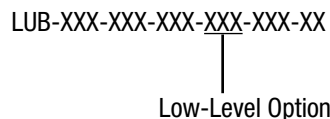
5.1 DESCRIPTION

5.1.1 General. Several varieties of assemblies are available to provide a signal when the lubricant level is low. Low-level switch assemblies used on oil tanks or reservoirs depend on floats that fall with the depletion of lubricant and actuate contacts on the switch. Switch assemblies used on grease reservoirs are actuated when a cable attached to the grease follower is pulled away from the switch as the follower reaches the low position. Switch assemblies used in oil reservoirs are rated at 15 amps. Grease reservoirs use switches rated at 20 amps. Optional 10-watt assemblies are available for oil tanks and reservoirs.

5.1.1.1 The low-level assemblies with a 15 or 20 amp rating are often used to activate a warning device such as a light or alarm. The 10-watt assemblies are used to provide input to controllers which may be programmed to use the input signal as desired.

5.1.1.2 Table 5-1 lists the low-level assemblies available for use. Listings in the option column are used to identify

the assembly selected when a LUBEMASTER Pumping Package is ordered. The option used is designated by the entry in the ordering code as shown below.



5.2. MOUNTING INSTRUCTIONS

5.2.1 Oil Reservoirs. To install any low-level switch in a reservoir requires the removal of the reservoir cap. All caps are equipped with a 1/4 inch NPT tapped hole. The low-level switch has an adapter which threads into the hole. For complete instructions on mounting these units, refer to Paragraphs 5.3.4 and 5.4.4.

5.2.2 Grease Cylinders. The low-level switch for grease cylinders consists of the switch itself mounted to a bracket which is, in turn, attached to the top of the grease cylinder. For complete instructions on mounting these units refer to Paragraph 5.5.4.

TABLE 5-1 LOW-LEVEL SWITCH ASSEMBLIES

Part No.	Old Part No.	Switch Type	Switch Rating AC	Used On	Option
563316	521-001-030	Single-Pole, Double-Throw	15 amps @ 115/230/480 VAC	5, 12 pt Oil Cylindrical Reservoirs	L1
563317	521-001-040	Single-Pole, Double-Throw	12 amps @ 115/230/480 VAC	20 pt Oil Cylindrical Reservoir	L2
563015	456-010-172	Single-Pole, Single-Throw	10 watts @ 115 VAC	5, 12 pt Oil Cylindrical Reservoirs	L5
563016	456-010-173	Single-Pole, Single-Throw	10 watts @ 115 VAC	20 pt Oil Cylindrical Reservoir	L6
563322	521-001-110	Single-Pole, Double-Throw	15 amps @ 115/230/480 VAC 0.5 amps @ 115 VDC 0.25 amps @ 230 VDC	All Grease Cylindrical Reservoirs	L4

5.3 OIL RESERVOIR 15 AMP LOW- LEVEL ASSEMBLY MAINTENANCE (OPTIONS LOA AND LOB)

5.3.1 General. Maintenance tips, disassembly and assembly procedures for low-level options LOA and LOB are discussed in Paragraphs 5.3.2, 5.3.3 and 5.3.4. A typical low-level assembly is shown in Figure 5-1 and should be referred to during this discussion.

5.3.2 Oil Reservoir 15 Amp Low-Level Assembly Maintenance Tips. No maintenance is required on the low-level assemblies used on oil reservoirs. If the oil level runs low and the assembly fails to perform as required, the unit may have to be disassembled to replace a defective switch. Before attempting disassembly, check all electrical connections to make sure they are secure and check for any physical obstruction which might be preventing the float from operating.

5.3.3 Disassembly of Oil Reservoir 15 Amp Low-Level Assemblies.

5.3.3.1 The disassembly procedure is as follows:

WARNING: Disconnect and lock out all power from the assembly before attempting disassembly. Serious injury may result from electrical shock.

- a. Turn off all electrical power and all air supplies to the lube system.
- b. Remove cover from reservoir (Refer to Section 2.).
- c. Unscrew union nut (5, Figure 5-1) from switch adapter (2).
- d. Unscrew switch adapter (2) from switch (1).
- e. Install cover on reservoir (Refer to Section 2.).
- f. Wire switch in accordance with local electrical codes.

5.3.5 Oil Reservoir 15 Amp Low-Level Assemblies Parts List. Table 5-2 identifies the parts indexed in Figure 5-1.

TABLE 5-2 OIL RESERVOIR 15 AMP LOW-LEVEL ASSEMBLIES PARTS LIST

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
		521-001-030	Low-Level Assembly		LOA
		521-001-040	Low-Level Assembly		LOB
1		514-116-001	• Switch	1	Both
2		521-000-710	• Adapter, Switch	1	Both
3		521-000-720	• Adapter, Low-Level	1	Both
4		521-001-420	• Low-Level Lower Assembly	1	LOA
		521-001-430	• Low-Level Lower Assembly	1	LOB
5		509-224-000	• Nut, Union	1	Both

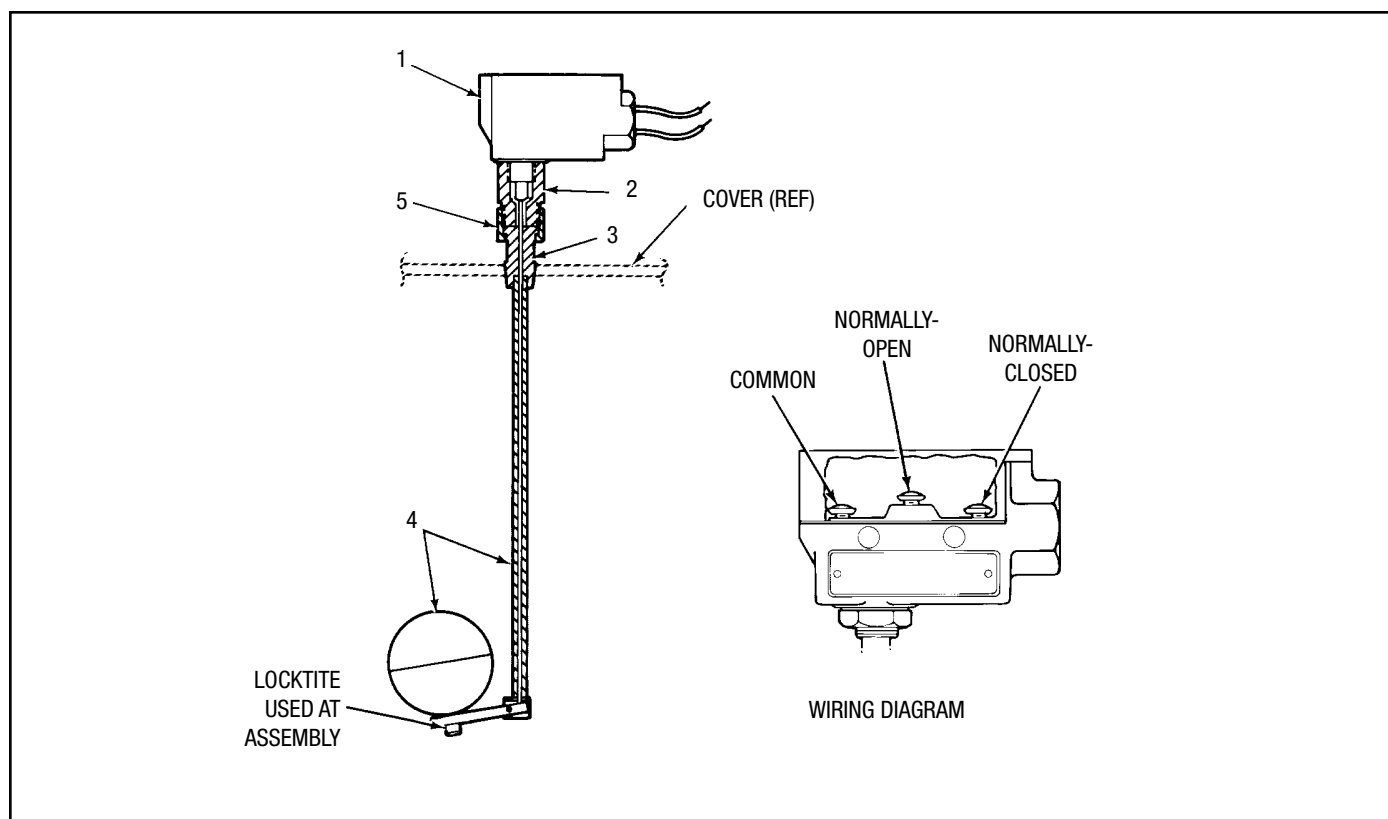


Figure 5-1. Oil Reservoir 15 Amp Low-Level Assembly

5.4 OIL RESERVOIR 10-WATT LOW-LEVEL ASSEMBLY MAINTENANCE (OPTIONS LOE AND LOF)

5.4.1 General. Maintenance tips, disassembly and assembly procedures for low-level options LOE and LOF are discussed in Paragraphs 5.4.2, 5.4.3 and 5.4.4. A sectional view of a low-level assembly is shown in Figure 5-2 and should be referred to during the discussion.

5.4.2 Oil Reservoir 10-Watt Low-Level Assembly Maintenance Tips. No maintenance is required on the 10-watt low-level assemblies used on oil reservoirs. If the oil level runs low and the assembly fails to perform as required the unit may have to be disassembled to replace a defective switch. Before attempting disassembly, check all electrical connections to make sure they are secure and check for any physical obstructions which might be preventing the float from operating.

5.4.3 Disassembly of Oil Reservoir 10-Watt Low-Level Assemblies.

5.4.3.1 The disassembly procedure for oil reservoir 10-watt low-level assemblies is as follows:

WARNING: Disconnect and lock out all power from the assembly before attempting disassembly. Serious injury may result from electrical shock.

- a. Turn off all electrical power and air supplies to the lube system.
- b. Disconnect the two 22 AWG wires from the terminal box. Disconnect adapter (1, Figure 5-2) from the conduit.
- c. Remove the cover from the reservoir. (Refer to Section 2.)
- d. Unscrew nipple (2) from adapter (1). Be careful not to twist the wires too much.
- e. Unscrew nipple (2) from coupling (3).
- f. Unscrew coupling (3) from switch (4).
- g. Unscrew adapter (1) from the reservoir cover.

5.4.4 Assembly of Oil Reservoir 10-Watt Low-Level Assemblies.

5.4.4.1 The assembly procedure is as follows:

NOTE: The procedure listed below is based on installing a new assembly in a reservoir. If your assembly was removed for repairs, steps a and b do not apply.

- a. Remove the cover from the reservoir. (Refer to Section 2.)
- b. Remove the 1/4 inch pipe plug from the cover. Screw adapter (1, Figure 5-2) in and tighten it securely.
- c. Guide the two 22 AWG wires from switch (4) through coupling (3). Screw coupling (3) onto switch (4) and tighten securely.
- d. Guide two 22 AWG wires through nipple (2). Screw nipple into coupling (3).
- e. Guide the two 22 AWG wires through adapter (1). Screw nipple into adapter (1). Be careful not to twist the wires too much. Tighten the connection.
- f. Connect switch (4) in accordance with local electrical codes.

5.4.5 Oil Reservoir 10-Watt Low-Level Assemblies Parts List. Table 5-3 identifies the parts indexed in Figure 5-2.

TABLE 5-3 OIL RESERVOIR 10 WATT LOW-LEVEL ASSEMBLIES PARTS LIST

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
	563015	456-010-172	Low-Level Assembly		LOE
	563016	456-010-173	Low-Level Assembly		LOF
1	557169	484-000-368	• Adapter	1	Both
2	–	412-061-474	• Nipple	1	LOE
	–	412-061-475	• Nipple	1	LOF
3	556396	412-120-010	• Coupling	1	Both
4	557825	541-603-001	• Switch, Reed Type, Single-Pole, Single-Throw, 10 watt, 115 VAC		

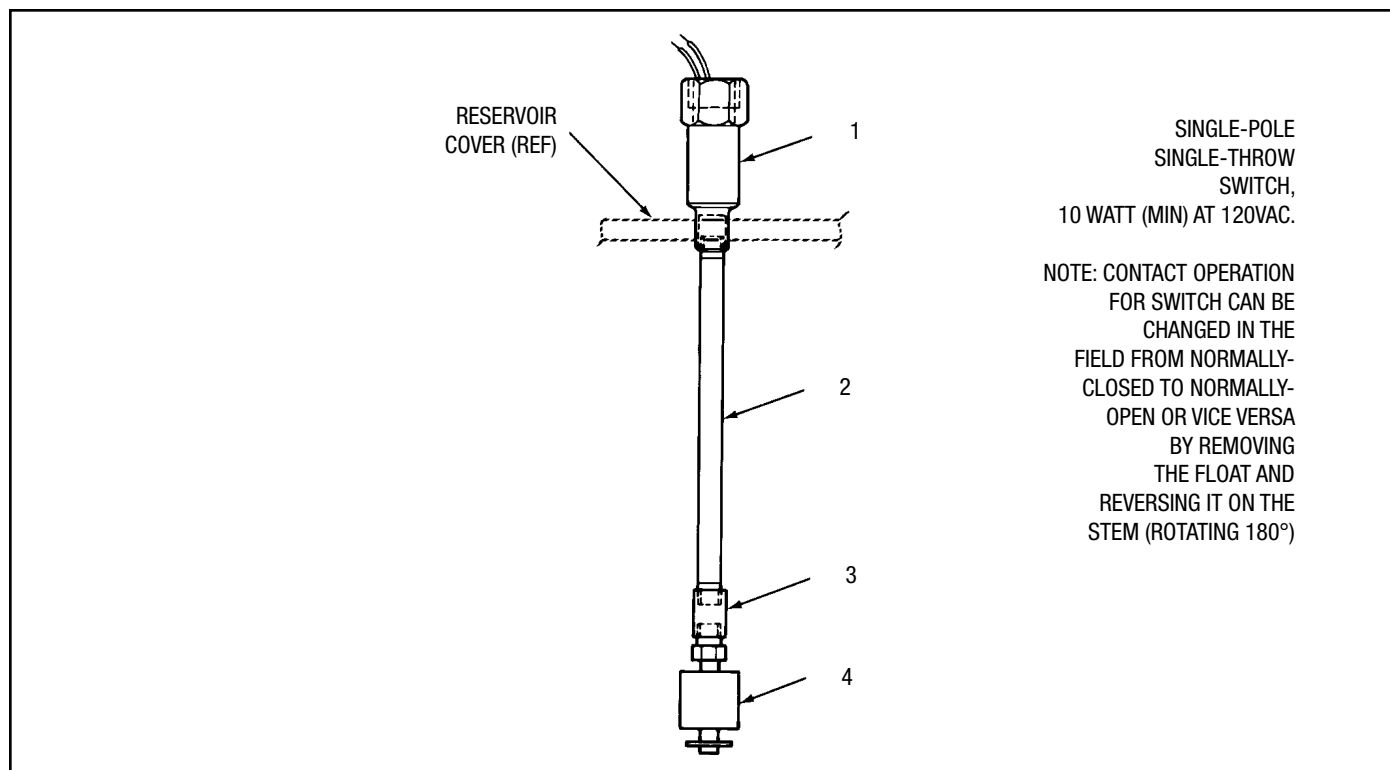


Figure 5-2. Oil Reservoir 10-Watt Low-Level Assembly

5.5 GREASE RESERVOIR LOW-LEVEL ASSEMBLY MAINTENANCE (OPTION LOC)

5.5.1 General. Maintenance tips, disassembly and assembly procedures for low-level assembly option LOC are discussed in Paragraphs 5.5.2, 5.5.3 and 5.5.4. A sectional view of a typical assembly is shown in Figure 5-3 and should be referred to during the discussion.

5.5.2 Grease Reservoir Low-Level Assembly Maintenance

Tips. No maintenance is required on the low-level assemblies used on grease reservoirs. If the grease level runs down and the assembly fails to perform as required, the unit may have to be disassembled to replace a defective switch. Before attempting disassembly, check all electrical connections to make sure they are secure and check for any physical obstruction which might be preventing the switch from operating.

5.5.3 Disassembly of Grease Reservoir Low-Level Assembly.

5.5.3.1 The disassembly procedure for the grease reservoir low-level assembly is as follows:

WARNING: Disconnect and lock out all power from the assembly before attempting disassembly. Serious injury may result from electrical shock.

- Disconnect and lock out all electrical power and air supplies to the lube system.
- Disconnect switch (1, Figure 5-3) from terminal box. Remove switch (1) from bracket (2).
- Remove retainer ring (3) and spring (5).
- Remove three self-tapping screws (4) and bracket (2).

5.5.4 Assembly of Grease Reservoir Low-Level Assembly.

5.5.4.1 The procedure for assembly of the grease reservoir low-level assembly is as follows:

- Attach bracket (2) to grease reservoir cover using three self-tapping screws (4).
- Place spring (5) over tip of level indicator.
- Compress spring (5) and place retainer ring (3) between spring and tip of level indicator.
- Attach switch (1) to bracket (2).
- Wire switch (1) in accordance with local electrical codes.

5.5.5 Grease Reservoir Low-Level Assembly Parts List.

Table 5-4 identifies the parts indexed in Figure 5-3.

TABLE 5-4 GREASE RESERVOIR 15 AMP LOW-LEVEL ASSEMBLIES PARTS LIST

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
	563322	521-001-110	Low-Level Switch Assembly		LOC
1	557781	529-726-001	• Switch	1	
2	557558	514-191-001	• Bracket	1	
3	–	418-700-354	• Ring, Retainer	1	
4	556453	415-210-010	• Screw, Self-Tapping	3	
5	–	458-005-864	• Spring	1	

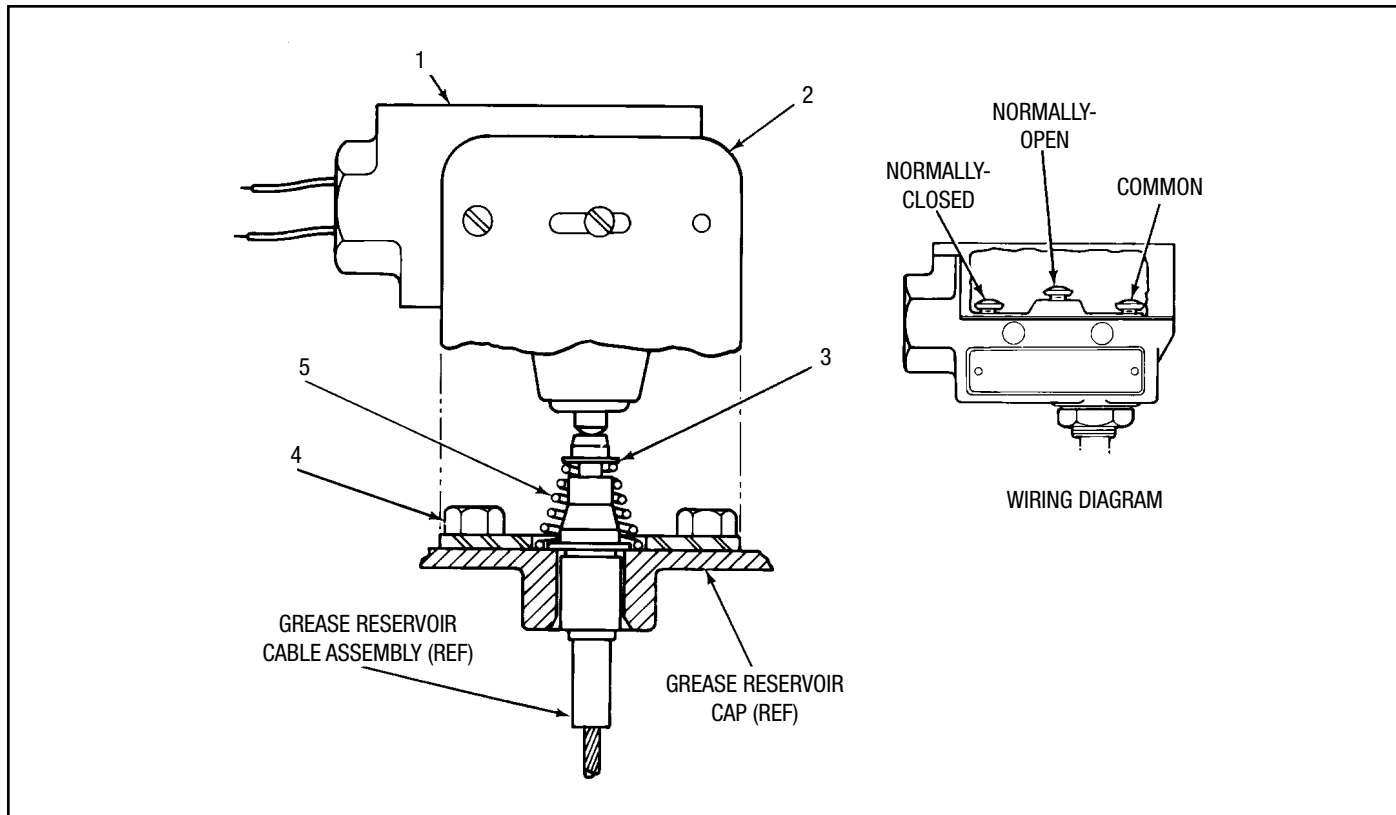


Figure 5-3. Grease Reservoir Low-Level Assembly

OPERATION AND SERVICE INSTRUCTIONS

**SECTION 6
STANDARD BLOWOUT AND HIGH-PRESSURE BLOWOUT SWITCHES**

<p>6.1 DESCRIPTION..... 6-1</p> <p style="padding-left: 20px;">6.1.1 High-Pressure Blowout Switches 6-1</p> <p style="padding-left: 20px;">6.1.2 Blowout Disc 6-1</p> <p style="padding-left: 20px;">6.1.3 Standard Blowout and High-Pressure Blowout Switch Options 6-1</p> <p>6.2 MOUNTING INSTRUCTIONS 6-3</p> <p>6.3 HIGH-PRESSURE BLOWOUT SWITCH MAINTENANCE (OPTIONS POC AND POD) 6-3</p>	<p>6.3.1 General..... 6-3</p> <p style="padding-left: 20px;">6.3.2 High-Pressure Blowout Switch Maintenance Tips..... 6-3</p> <p style="padding-left: 20px;">6.3.3 Assembly/Disassembly of High-pressure Blowout Switch..... 6-3</p> <p style="padding-left: 20px;">6.3.4 High-Pressure Blowout Switch Parts Lists..... 6-3</p>
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6.1 DESCRIPTION

6.1.1 High-Pressure Blowout Switches. High-pressure blowout switch assemblies may be plumbed into the lubricant circuit to provide an electrical signal when the blowout disc has ruptured. On these assemblies, a tubed blowout assembly is used. The tubed blowout allows lubricant to flow from the ruptured blowout disc, through tubing up to an indicator assembly. The indicator assembly has a built-in check valve which will allow the lubricant to reach a pressure sufficient enough to extend a plunger. The extended plunger actuates a switch which will allow a signal to be sent to an alarm or other device. Lubricant from the indicator is directed through tubing and is returned to the inlet port on the reservoir. The indicator will retain the plunger in the extended position even if lubricant pressure is reduced. The plunger must be manually depressed to release the switch and return the indicator to its normal position.

6.1.2 Blowout Disc. The standard blowout disc, rated at 1450 psi (100 bar), may be used on any unit. This assembly does not provide any electrical signal when the blowout pressure has been reached. The blowout disc will rupture at the high pressure and the lubricant escaping

from the blown disc will provide a visual indication of failure. Discs rated at higher pressures than 1450 psi (100 bar) are available separately in kits of six. For identification purposes, discs are color coded. Table 6-1 lists the discs available and the kit number for each.

6.1.2.1 When any pressure or blowout switch is actuated, personnel must determine the cause for the rise in pressure. After the cause has been corrected, any blowout discs which have been ruptured will need to be replaced with an approved disc.

6.1.3 Standard Blowout and High-Pressure Blowout Switch Options. Table 6-2 lists the options available for use. Listings in the option column are used to identify the assembly selected when a Modu-Flo system is ordered. The option used is designated by the entry in the ordering code as shown below:

LUB-XXX-XXX-XXX-XXX-XXX-XX
|
Pressure Indicator Option

TABLE 6-1 BLOWOUT DISCS AND KITS

Disc Part No.	Old Disc Part No.	Color	psi (bar)	*Kit Part No.	Old Kit Part No
557433	509-292-000	Yellow	1,450 (100)	563962	560-900-270
557434	509-293-000	Red	1,750 (121)	563963	560-900-280
557435	509-294-000	Orange	2,050 (141)	563964	560-900-290
557436	509-295-000	Aluminum	2,350 (162)	563965	560-900-300

*Kits contains 6 discs

TABLE 6-2 STANDARD BLOWOUT AND HIGH-PRESSURE BLOWOUT SWITCH ASSEMBLIES

Part No.	Old Part No.	Description	Electrical Rating	Option
563179	509-206-100	Blowout Disc, 1,450 psi	None	POA
563184	509-206-160	Blowout Disc, 2,350 psi	None	POB
563384	521-700-390	High-Pressure Blowout Switch	15 amps @ 115/230/480 VAC 0.5 amps @ 115 VAC 0.25 amps @ 230 VDC	POC
563385	521-700-400	High-Pressure Blowout Switch	15 amps @ 115/230/480 VAC 0.5 amps @ 115 VAC 0.25 amps @ 230 VDC	POD

6.2 MOUNTING INSTRUCTIONS

6.2.1 All high-pressure blowout switch options are connected to the outlet of the pump manifold block and mounted on the reservoir. Refer to assembly Paragraph 6.4.3 for specific assembly instructions.

6.3 HIGH-PRESSURE BLOWOUT SWITCH MAINTENANCE (OPTIONS POC AND POD)

6.3.1 General. Maintenance tips, disassembly, and assembly instructions for reservoir blowout switches are discussed in Paragraphs 6.3.2, and 6.3.3. A typical reservoir with a high-pressure blowout switch is shown in Figure 6-1 and should be referred to during the discussion.

NOTE: The plunger shown in Figure 6-1 must be manually retracted from contact with the switch after a high-pressure situation occurs.

6.3.2 High-Pressure Blowout Switch Maintenance Tips. No maintenance is required on the blowout switch. If the switch assembly is suspected to be defective, check all wiring to the switch before removing any components.

WARNING: Disconnect and lock out all power from the assembly before attempting disassembly. Serious injury may result from electrical shock.

NOTE: Relieve system pressure before removing any components.

6.3.3 Assembly/Disassembly of High-Pressure Blowout Switch. Figure 6-1 shows a typical blowout switch mounted on a reservoir. All components are connected by pipe threads and tubing and are easily assembled or disassembled. The blowout assembly is connected to the IND port on the manifold. The return elbow (5) is piped into the fill port of the reservoir. Normally, the only components which may require removal are the switch (1) and blowout disc. Access to these components is easily achieved after removal of any connective tubing.

6.3.4 High-Pressure Blowout Switch Parts Lists. Table 6-3 identifies the parts indexed on Figure 6-1.

TABLE 6-3 HIGH-PRESSURE BLOWOUT SWITCH PARTS LIST (FIGURE 6-1)

Item No.	Part No.	Old Part No.	Description	Quantity	Used On Option
		521-700-390	High-Pressure Blowout Switch Assembly		POC
		521-700-400	High-Pressure Blowout Switch Assembly		POD
1		511-573-030	• Blowout Switch Assembly	1	Both
2		521-000-770	• Bracket	1	Both
3		417-060-060	• Setscrew, 1/4-20 in. x 1/2 in.	2	Both
4		507-419-001	• Decal	1	Both
5		435-370-020	• Elbow, 1/4 in. Tube x 1/8 in. NPT	3	Both
6		509-220-101	• Blowout Assembly, Oil, 1,450 psi	1	POC
		509-220-161	• Blowout Assembly, Grease, 2,350 psi	1	POD
7		509-113-000	• Elbow, 1/4 in. NPT	1	Both
8		412-380-020	• Tee, 1/4 in. NPT	1	Both
9		509-365-030	• Check Valve Assembly	1	Both
10		435-360-030	• Fitting, Straight, 1/4 in. Tube x 1/4 in. NPT	1	Both
11		400-128-000	• Tubing, Copper, 1/4 in. Outer Diameter	3 ft	Both
12		419-110-020	• Screw, 10-24 x 1/2 in.	2	Both
*		560-900-270	• Blowout Disc, Pack of 6, 1,450 psi	1	Both

*See Table 6-1 for other disc pressure ratings

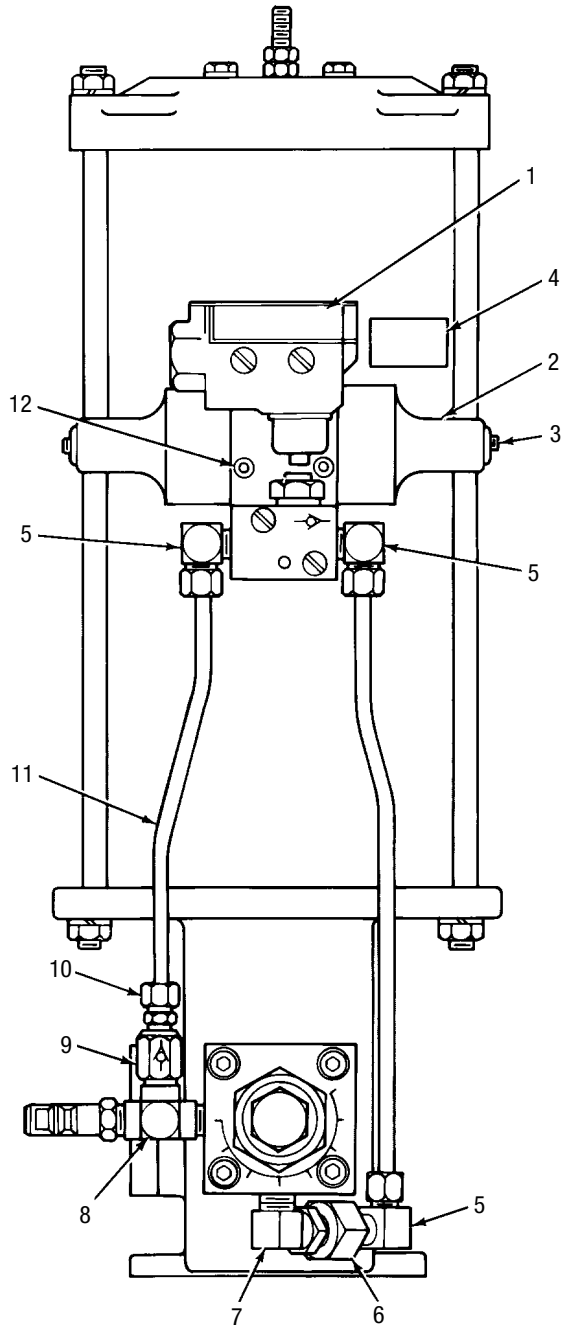


Figure 6-1. High-Pressure Blowout Switch Assembly (Front View)

OPERATION AND SERVICE INSTRUCTIONS

SECTION 7 CONTROLLERS

7.1	DESCRIPTION.....	7-1
7.1.1	AC Timer.....	7-1
7.1.2	WMP Maxi-Monitor.....	7-1
7.2	PREPARATION FOR USE.....	7-1
7.2.1	AC Timer.....	7-1
7.2.2	Maxi-Monitors.....	7-2
7.3	MAINTENANCE.....	7-2

7.1 DESCRIPTION

7.1.1 AC Timer. The AC timer is a solid-state, 115/230 VAC, 50/60 Hz unit that energizes when it is time to start a lubrication cycle. The total cycle time is adjustable from 0.5 minute to 32 hours. The duration of the lubrication pump cycle is adjustable from 12 seconds to 13 minutes. The AC timer has a built-in memory to keep the timer active for 1-1/2 hours during power failures and machine shutdowns. This feature eliminates the prelube cycle when power is reapplied after short shutdowns. A manual run button simplifies startup, testing, and bleeding of lubrication lines and points. When the manual run button is depressed, it resets the system to the beginning of the cycle and signals the pump to run for the duration of the lubrication cycle. Refer to Paragraph 7.2.1 for installation instructions.

7.1.2 WMP Maxi-Monitor. The WMP Maxi-Monitor is designed to control and monitor a lubrication system and its accessories. It can be used to schedule and monitor the operation of lubrication pumps and divider valves in automatic lubrication systems. The WMP is available in 115 VAC, 230 VAC, 12 VDC or 24 VDC power source models.

7.1.2.1 The WMP Maxi-Monitor controls lubrication schedules on either a time or a machine cycle/stroke count basis. It will also continuously monitor and display the status of the lubrication system it is controlling. It is capable of shutting down a machine and lubrication system to protect it from a loss of lubrication.

7.1.2.2 The WMP Maxi-Monitor is easily programmed. No special training or knowledge of computer languages is needed. Programming is done using a built-in keypad to set up the system for operation.

7.2 PREPARATION FOR USE

CAUTION: The AC Timer and WMP Maxi-Monitors are limited in output current and should never be used to directly drive an electric motor or any device which exceeds the output rating of the unit. Electric motors must use a motor starter of proper size or a suitable relay which can then be controlled from the timer or controller.

7.2.1 AC Timer.

7.2.1.1 To install the AC Timer, use the following procedure (See Figure 7-1):

WARNING: Disconnect and lock out all power from the assembly before attempting disassembly. Serious injury may result from electrical shock.

- a. Turn off all input and load electrical power supplies.
- b. Open the timer cover. Remove the timer circuit board.
- c. Install a 1/2 inch conduit in the hole at the bottom of the timer.
- d. Connect load leads in load terminals. Connect input power leads to input terminals. Connect remote manual run contacts (if desired).
- e. Install the timer board. Adjust the total cycle and lubrication "on" time settings. Close and fasten the cover.
- f. Turn on electrical power to input and load power supplies.

7.2.2 Maxi-Monitors. Controllers of this family will have various forms of wiring depending on the type of system application. The wiring terminals are clearly labelled to make wiring an easy operation. Specific controller installation information may be found in bulletin 14737 (WMP).

7.3 MAINTENANCE

7.3.1 The various system controllers do not require maintenance. If a malfunction occurs, replace the controller or contact the manufacturer for assistance.

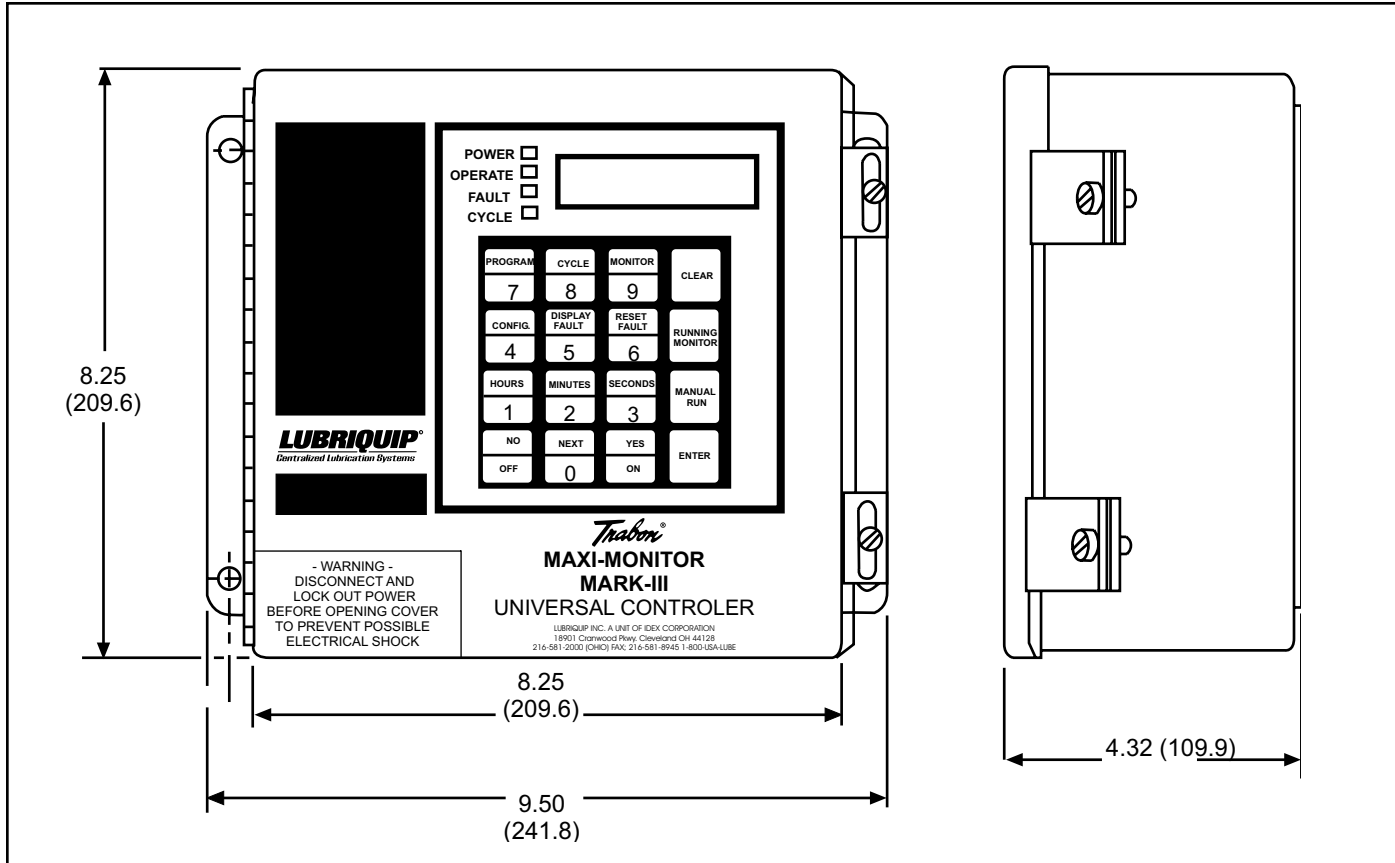


Figure 7-1. AC Timer Wiring Schematic

TABLE 2-1 OPTIONAL RESERVOIRS		
Description	Part No.	Old Part No.
WMP III 115 VAC	556023	163-310-000
WMP III 230 VAC	556024	163-310-010
WMP III 12 VDC	—	163-310-030
WMP III 24 VDC	556025	163-310-020

NOTES: Do not mount controller on surfaces which are subject to heavy mechanical vibration. Excessive vibration may cause component related failures.

While the enclosure is a NEMA 12 rated, the keypad may not survive continuous exposure to some dripping and splashing liquids and chemicals. The controller should be mounted away from such environments, or be placed in a suitable protective enclosure.

See bulletin L14752 for programming instructions.

OPERATION AND SERVICE INSTRUCTIONS

SECTION 8 SYSTEM OPERATION

<p>8.1 GENERAL 8-1</p> <p>8.2 SYSTEM INFORMATION 8-1</p> <p style="padding-left: 20px;">8.2.1 System Setup 8-1</p> <p style="padding-left: 20px;">8.2.2 System Filling 8-1</p> <p style="padding-left: 20px;">8.2.3 System Bleeding 8-1</p> <p style="padding-left: 20px;">8.2.4 System Startup 8-1</p>	<p>8.3 OPERATING TIPS 8-1</p> <p style="padding-left: 20px;">8.3.1 General 8-1</p> <p>8.4 MATERIAL CONSIDERATIONS 8-2</p> <p style="padding-left: 20px;">8.4.1 Material Cleanliness 8-2</p> <p style="padding-left: 20px;">8.4.2 Temperature Effects 8-2</p>
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8.1 GENERAL

8.1.1 This section describes operating procedures for LUBEMASTER Pumping Packages. Detailed descriptions of the system components are covered in Sections 1 through 7.

8.2 SYSTEM INFORMATION

8.2.1 System Setup.

CAUTION: Gear reducer units are shipped without lubricant. Before operating, always check lubricant level and fill per manufacturer's instructions. Operation without lubricant will damage the gear reducer.

8.2.1.1 Before attempting to operate any system, check the following:

- a. Check that the reservoir is securely fastened to the pump. Make sure that the fill cup or grease-fill fitting may be easily reached.
- b. Check that the pump is securely fastened in place.
- c. Check that gear reducer has been filled with proper lubricant.
- d. Check all electrical connections to any controllers, level switches or pressure switches used on the system.
- e. Check that all accessories plumbed into the output manifold block assembly are secure. Make sure all hose or tubing connections are tight.

8.2.2 System Filling. The reservoirs should be filled as described in Section 2 of this manual. To fill the remainder of the system, attach a hand pump to the system fill check valve on the manifold and cycle the hand pump until the system is filled.

8.2.3 System Bleeding. Proper filling of the system will reduce the chance of air entrapment. The pump block manifold assembly still must be bled to remove air which will be trapped inside the pump. Cycle the pump several times until air-free lubricant is dispensed.

8.2.4 System Startup. Before starting any system, make sure that all filling and bleeding steps have been completed. Refer to Bulletin 30103 for filling and bleeding a series progressive system.

8.2.4.1 On the standard pump, check the output of the lubricant pump. Adjust the output as described in Section 3 of this manual. If the pump is equipped with a clutch drive, refer to Section 4 for proper adjustment of the clutch lever angle.

8.2.4.2 The unit is now ready to run. The pump is cycled by an external source, such as a timer, counter, control package, or customer-supplied drive. Once this external source is engaged, the unit will cycle as programmed.

8.3 OPERATING TIPS

8.3.1 General. While the system is operating the following components may be checked:

8.3.1.1 Check that the pump is cycling according to schedule.

8.3.1.2 Visually check the unit for leaks and loose fittings. Make sure that hoses do not become kinked and are not rubbing on anything.

8.3.1.3 If the reservoir is not equipped with a low-level switch, visually check the lubricant level and refill before all lubricant is used. If the reservoir is allowed to run dry, excess air will be introduced into the system, requiring that the system be bled.

8.4 MATERIAL CONSIDERATIONS

8.4.1 Material Cleanliness. System life and consistent operation will both be improved by using only clean lubricant. On all pumps, the lube piston diameter is very close to the diameter of the chamber in the pump body. Contaminants in the lubricant could cause scoring in this area, resulting in erratic pump operation and costly parts replacement. Make sure that lubricant used to fill the system is clean. If there is doubt about cleanliness, lubricant should be filtered before being introduced into the system. After filtering the system, make sure the lubricant supply is protected from debris.

8.4.2 Temperature Effects. Flow characteristics of the lubricant may change if the area the unit is used in goes through drastic temperature changes. Choose a lubricant that will flow properly at all temperatures expected in the system environment.

**OPERATION AND
SERVICE INSTRUCTIONS**

**SECTION 9
TROUBLESHOOTING**

9.1 GENERAL 9-1

9.1 GENERAL

9.1.1 Many system problems may be caused by loose connections or air trapped in the system. Before removing system components, it is a good practice to check all connections to make sure they are tight. Also make sure the system is properly bled. Table 9-1 lists some of the problems which may occur in the LUBEMASTER Pumping Packages along with possible causes and corrective actions. Disassembly and assembly procedures for the system components are contained in other sections of this manual and should be referred to if a component needs servicing.

TABLE 9-1 LUBEMASTER TROUBLESHOOTING

Problem	Problem Cause	Corrective Action
A. No lube is dispensed from pump, but pump is rotating	1. Reservoir is empty	1. Refill as required, refer to Section 2
	2. Check valve is defective	2. Clean and install seal repair kit, refer to Section 3
	3. Adjustment sleeve seals are defective	3. Install seal kit, refer to Section 3
	4. Blowout disc has ruptured	4. Refer to B below
	5. The problem is in the pump	5. Refer to C below
B. Blowout disc has ruptured	1. Blockage exists in the lubrication outlet line	1. Inspect outlet lines and fittings to determine where blockage is. Refer to Bulletin L30101 for how to locate blockage in a series progressive system. Remove blockage and replace disc, refer to Section 6
	2. Wrong disc	2. Install correct disc, refer to Section 6
	3. No disc	3. Install disc
	4. Incorrect torquing altered blowout pressure; too much torque increases pressure, too little torque decreases pressure	4. Replace disc and torque correctly, refer to Section 6
C. Pump needs servicing	1. Yoke, connector pin and piston are defective	1. Install pump drive repair kit, refer to Section 3
	2. Drive motor key is sheared	2. Replace key
	3. Pump drive shaft is broken	3. Install pump drive repair kit, refer to Section 3
	4. Piston in not engaged in sleeve	4. Install output manifold kit, refer to Section 3

TABLE 9-1 LUBEMASTER TROUBLESHOOTING (CONTINUED)

Problem	Problem Cause	Corrective Action
D. No lube is dispensed from pump and drive shaft is not rotating	1. Motor is not running	1. Refer to E below
	2. No gear reducer output	2. Refer to F below
	3. Defective pump input shaft	3. Install pump drive repair kit, refer to Section 3
E. Motor in not running	1. Power is off	1. Turn power on
	2. Electrical connections to motor or timer are defective	2. Check all connections and tighten securely
	3. Timer/controller is set incorrectly or is defective	3. Set timer/controller to correct setting. If unit is still not functioning, consult factory for assistance
F. No gear reducer output	1. Key is sheared or missing at coupling	1. Replace key, refer to Section 4
	2. Gearbox is defective	2. Replace gearbox, refer to Section 4
G. Clutch drive is operating, but there is no flow	1. Reservoir is empty	1. Refill as required, refer to Section 2
	2. Clutch is defective	2. Remove clutch and operate pump manually. If there is output, replace clutch, refer to Section 4. If there is no output, refer to C above
	3. Fluid temperature is below 12°F (-11.1°C)	3. Do not attempt to operate unit until temperature problem is corrected
H. Pump output is erratic	1. System is not bled properly	1. Bleed system
	2. Pump seals, check valves or o-rings are defective	2. Install pump seal repair kit, refer to Section 3
	3. Pump adjustment assembly is leaking or sucking air during return stroke	3. Tighten components of the output manifold block assembly
	4. Piston or bore is worn	4. Install output manifold repair kit, refer to Section 3

All written and visual data contained in this document are based on the latest product information available at the time of publication. Graco reserves the right to make changes at any time without notice.

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