

Air Motor

Description and Operation

“RAM” air motor model 339413 series power a variety of fluid and material reciprocating pumps.

The pump tube assembly is secured to the motor with the nuts and bolts equipped with the motor. This hardware utilizes keepers (part of the pump) that hold the body of the pump tube to the motor. See **Figure 3**.

Models 339413 and 339413-A1

The difference between these models is the standard of thread for the air inlet. Refer to **Figure 1**.

Installation Operation

IMPORTANT: A moisture separator/filter should be used to prevent contamination and the washout of lubricant.

The motor is packed with Teflon lubricant and requires no additional lubrication except during service.

Lubricator

Alemite Corporation recommends to operate the motor without an air line lubricator.

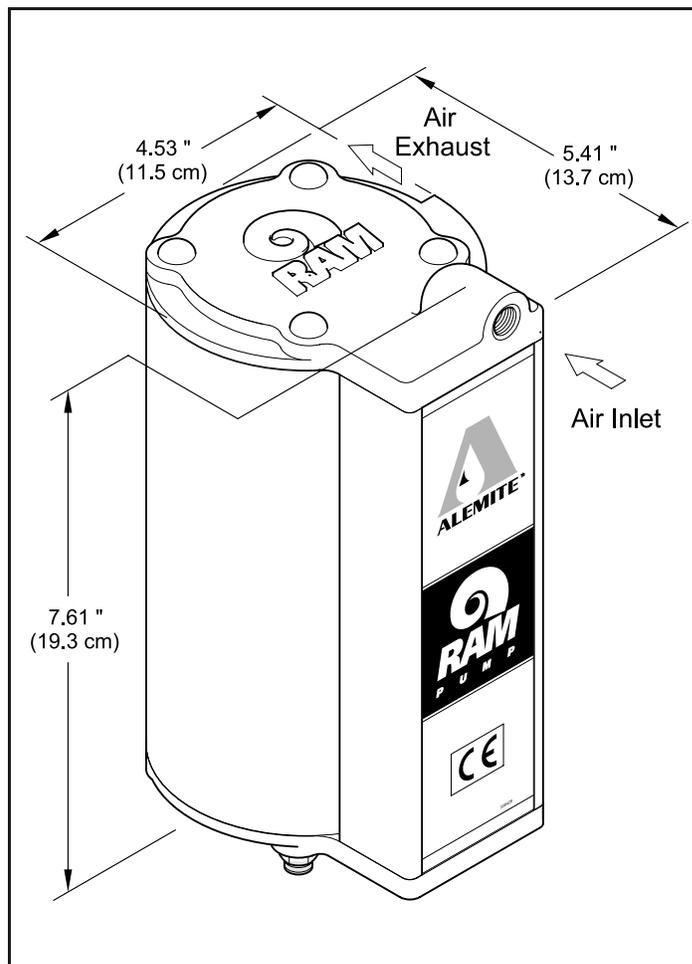
CAUTION

Should an air line lubricator be installed, never allow the motor to operate without lubrication (minimum 10W oil) or the warranty will be void.

Motor Operation

Pneumatically actuated pilot valves (one set at each end of a directional spool) cause the directional spool to shift. The directional spool directs air pressure to one side of the motor’s piston and allows air to exhaust from the opposite side.

Pilot ports in the cylinder control the pilot valves as the ports are uncovered by the piston.



Air Motor Model	Piston Diameter x Stroke		Air Inlet	Maximum Air Pressure
	Inches	Centimeters		
339413	3 x 3-5/16	7.6 x 8.4	1/4 " NPTF (f)	*
339413-A1			1/4 " BSPT (f)	

* For information on the maximum air pressure for the air motor, please refer to the pump’s Service Guide.

Figure 1 Air Motor Model 339413 Series

NOTE: These air motors are not available to be purchased separately. However, a kit can be purchased that includes the entire motor. See **Figure 3**.

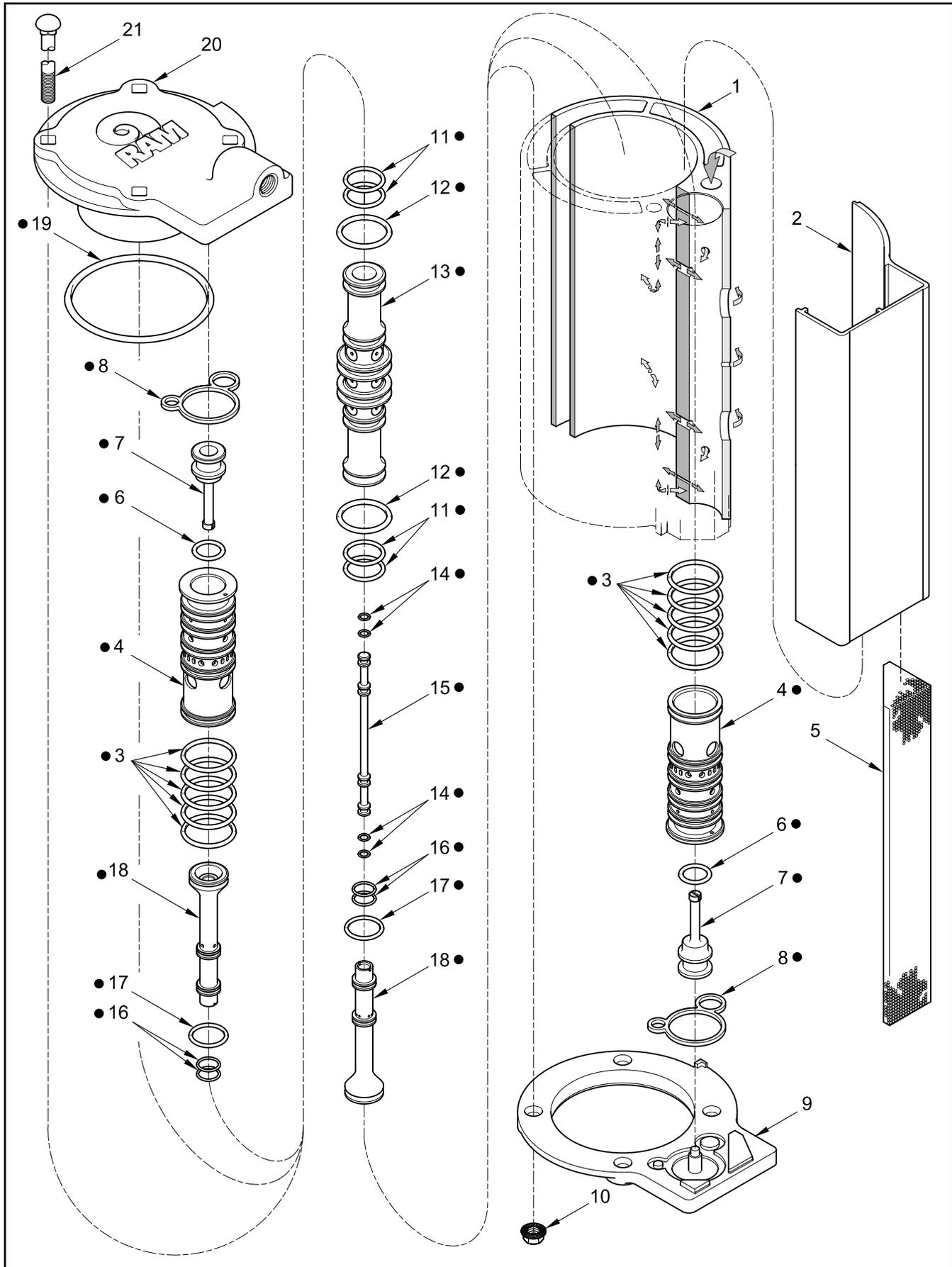


Figure 2 Air Motor Model 339413 Series - Exploded View

Item No.	Part No.	Description	Qty	Notes	Numeric Order Part # (Item #)
1	339414	Body	1		X171000-1 (14)
2	339418	Cover, Muffler	1	w/o Decals	X171000-7 (16)
3	X171009-10	O-Ring, 1 " ID x 1-1/8 " OD	10	● Pack of Ten (10)	X171000-10 (6)
4		Adapter, Exhaust	2	●	X171000-17 (12)
5	339427	Muffler (Open-Celled Foam)	1		X171009-5 (17)
6	X171000-10	O-Ring, 1/2 " ID x 11/16 " OD	2	● Pack of Ten (10)	X171009-10 (3)
7		Piston, Pilot	2	●	X171009-52 (19)
8		Gasket	2	●	339375 (10)
9	339416	Cap, End, Bottom	1		339414 (1)
10		Nut, Serrated Flange, 1/4 " -20	4		339416 (9)
11		O-Ring, 11/16 " ID x 7/8 " OD	4	● Tan in Color	339418 (2)
12	X171000-17	O-Ring, 7/8 " ID x 1-1/8 " OD	2	● Pack of Ten (10)	339419 (15)
13		Spool, Directional	1	●	339420 (7)
14	X171000-1	O-Ring, 1/8 " ID x 1/4 " OD	4	● Pack of Ten (10)	339421 (18)
15		Shaft	1	●	339422 (13)
16	X171000-7	O-Ring, 3/8 " ID x 1/2 " OD	4	●	339423 (8)
17	X171009-5	O-Ring, 11/16 " ID x 13/16 " OD	2	●	339424 (4)
18		Adapter, Pilot	2	●	339425 (21)
19	X171009-52	O-Ring, 3 " ID x 3-3/16 " OD	1	● Pack of Ten (10)	339426 (20)
20	339426	Cap, End, Top (w/ 1/4 " NPTF inlet)	1		339426-1 (20)
	339426-1	Cap, End, Top (w/ 1/4 " BSPT inlet)	1		339427 (5)
21		Bolt, Carriage, 1/4 " -20 x 7-1/2 "	4		339512 (11)

Legend:

Part numbers left blank (or in italics) are not serviced separately

● designates a repair kit item

Repair Kits

Part No.	Kit Symbol	Description
393706	●	Kit, Valve Replacement * (Includes tube of 393590 Magnalube-G Teflon lubricant)

* The kit components shown within this illustration are assembled and the O-Rings are lubricated. Includes items on **Figure 2** and **Figure 3**

NOTE: An **Upgrade Kit** to replace an exiting PML Motor is illustrated on the following page.

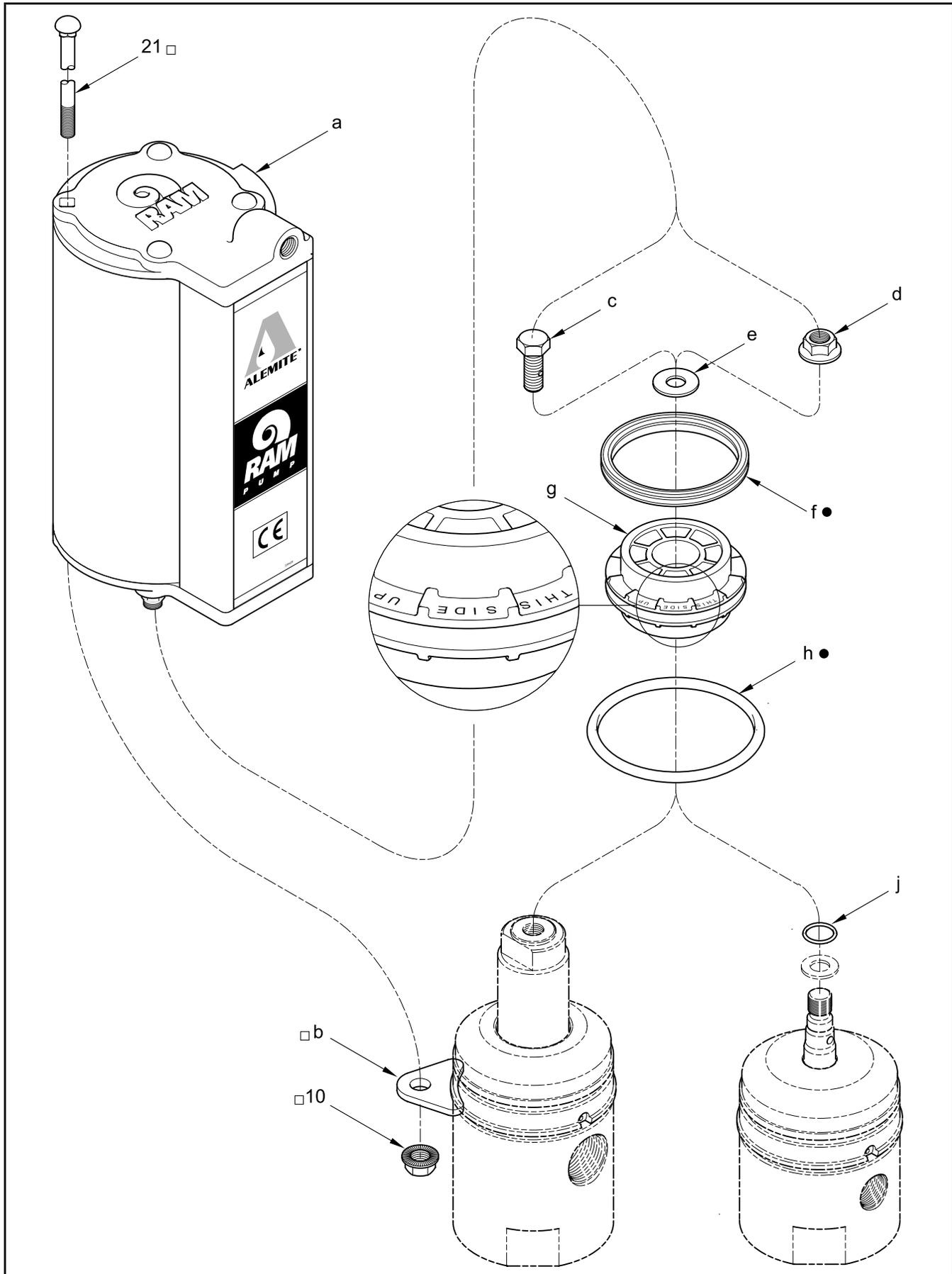


Figure 3 Upgrade Kits Model 393705 and 393705-A (Replace Existing PML Motor)

Upgrade Kits

The upgrade kits (illustrated in **Figure 3**) are used to replace the existing PML air motor on any pump.

This kit includes a complete air motor and the changeover components for both a fluid and grease pump.

Part No.	Description	Air Motor Model	Notes
393705	Kit, Upgrade	393413	Includes a 0.75 oz (21.8 gm) tube of 393590 Magnalube-G Teflon lubricant
393705-A		393413-A1	

Item	Part No.	Description	Qty	Notes	Numeric Order Part # (Item #)	
a		Motor Assembly, Air (w NPTF Inlet)	1		Includes items 10 & 21	<i>14536</i> (e)
		Motor Assembly, Air (w BSPT Inlet)	1			X171000-7 (j)
10		Nut, Serrated Flange, 1/4 " -20	4	<input type="checkbox"/>		X171003-10 (h)
21		Bolt, Carriage, 1/4 " -20 x 7-1/2 "	4	<input type="checkbox"/>		X171008-37 (f)
b	339412	Keeper	4	<input type="checkbox"/>		<i>172409</i> (c)
c		Screw (w/ Nyloc Insert) 3/8 " -24 x 3/4 "	1			<i>339375</i> (10)
d	339513	Nut, Flange, 3/8 " -24	1			339412 (b)
e		Washer, 3/8 "	1			<i>339413</i> (a)
f	X171008-37	Quad-Ring, 2-5/8 " ID x 3 " OD	1	●	Pack of Ten (10)	<i>339413-A1</i> (a)
g	339429	Piston, Air	1			<i>339425</i> (21)
h	X171003-10	O-Ring, 2-3/4 " ID x 3 " OD	1	●	Pack of Ten (10)	339429 (g)
j	X171000-7	O-Ring, 3/8 " ID x 1/2 " OD	1			<i>339513</i> (d)
Legend: Part numbers left blank (or in italics) are not serviced separately <input type="checkbox"/> designates a repair kit item						

Repair Kit

Part No.	Kit Symbol	Description
393706	●	Kit, Valve Replacement * (Includes tube of 393590 Magnalube-G Teflon lubricant)
393708	<input type="checkbox"/>	Kit, Keeper

* The kit components shown within this illustration are packed loose.
Includes items on **Figure 3** and **Figure 2**

IMPORTANT: Prior to performing any maintenance procedure, the following safety precautions must be observed. Personal injury may occur.

WARNING



Do not use halogenated hydrocarbon solvents such as methylene chloride or 1,1,1 trichloroethane in this motor. An explosion can result within an enclosed device capable of containing pressure when aluminum and/or zinc-plated parts come in contact with halogenated hydrocarbon solvents.

Release all pressure within the system prior to performing any overhaul procedure.

- Disconnect the air supply line from the motor.
- Into an appropriate container, operate the control valve to discharge remaining pressure within the system.

Never point a control valve at any portion of your body or another person. Accidental discharge of pressure and/or material can result in personal injury.

Read each step of the instructions carefully. Make sure a proper understanding is achieved before proceeding.

Overhaul

NOTE: Refer to **Figures 2** and **3** for component identification on all overhaul procedures.

Disassembly

Separate Air Motor from Pump Tube

Refer to the Pump **SER Service Guide** for details.

Air Motor

1. Remove Bolts (21) from Top End Cap (20) as required.
2. Remove the Top End Cap from Body (1).
3. Slide Cover (2) upward from the Body.
4. Remove Muffler (5) from the Cover.

5. Remove O-Ring (19) and Gasket (8) from the Top End Cap.
6. Remove Gasket (8) from the Bottom End Cap.

Logic Components

CAUTION

Do not pry any logic component from the Body. Damage to components can occur.

NOTE: The following procedural step requires a blunt rod as a tool. If available, use the end of Carriage Bolt (21).

7. Push on Pilot Piston (7) with the tool.
 - Remove the logic components from the Body.
8. Push remaining Exhaust Adapter (4) from the inside of the Body.
 - Use the blunt tool.
9. Remove Directional Spool (13) [with attached components], Pilot Pistons (7), Pilot Adapters (18), and Shaft (15) from the Exhaust Adapter.
10. Remove O-Rings (11) and (12) from the Directional Spool.
11. Remove O-Rings (3) from both Exhaust Adapters.
12. Remove O-Rings (16) and (17) from both Pilot Adapters.
13. Remove O-Ring (6) from both Pilot Pistons.

Clean and Inspect

1. Clean all metal parts in a cleaning solvent. The solvent should be environmentally safe.
2. Inspect all parts for wear and/or damage.
 - Replace as necessary.
3. Inspect the bores of Body (1) closely for score marks.
 - Replace as necessary.

Assembly

NOTE: Refer to **Figures 2** and **4** for component identification on all assembly procedures.

Air Motor

IMPORTANT: Always use Magnalube-G Teflon grease in this air motor.

Valve Replacement

NOTE: Procedural steps **1 - 4** are applicable to the Valve Replacement Kit.

1. Remove the Exhaust Adapter and O-Ring assembly (with Pilot Piston assembly) from one end of the valve kit.

IMPORTANT: Use care during the assembly of the logic components. Prevent possible damage to O-Rings.

2. Install and seat the remainder of the valve kit assembly into one end of Body (1).
3. Install and seat the Exhaust Adapter assembly into the Body and logic components.
4. Install the Pilot Piston assembly into the Body.

Body

5. Install Muffler (5) into Cover (2).
6. Slide the Cover assembly onto the Body assembly.

HINT: Fill the Gasket groove and the O-Ring groove in Top End Cap (20) with Teflon grease.

Fill the Gasket groove in Bottom End Cap (9) with Teflon grease.

7. Install Gaskets (8) into Top End Cap (20) and Bottom End Cap (9).
 - Make sure the Gaskets seat properly.
8. Install O-Ring (19) into the Top End Cap.
9. Position the Top End Cap and the Bottom End Cap assembly onto the Body.
10. Install each Carriage Bolt (21) into the Top End Cap.

Attach Air Motor to Pump Tube

Refer to the Pump **SER Service Guide** for details.

Bench Test and Operation

Refer to the Pump **SER Service Guide** for details.

Check the motor for air leakage.

If the motor leaks, refer to the **Troubleshooting Chart** for details.

Installation

General

Additional items that should be incorporated into the air piping system are listed in **Table 1**.

Part Number	Description
338860	Regulator, Gauge, Separator Combination (w/ Auto Dump)
7604-B	Regulator and Gauge (Included with 338860)
5604-2	Moisture Separator (Included with 338860)
5904-2	Lubricator *
* Not recommended, use only as required.	

Table 1 Air Line Components

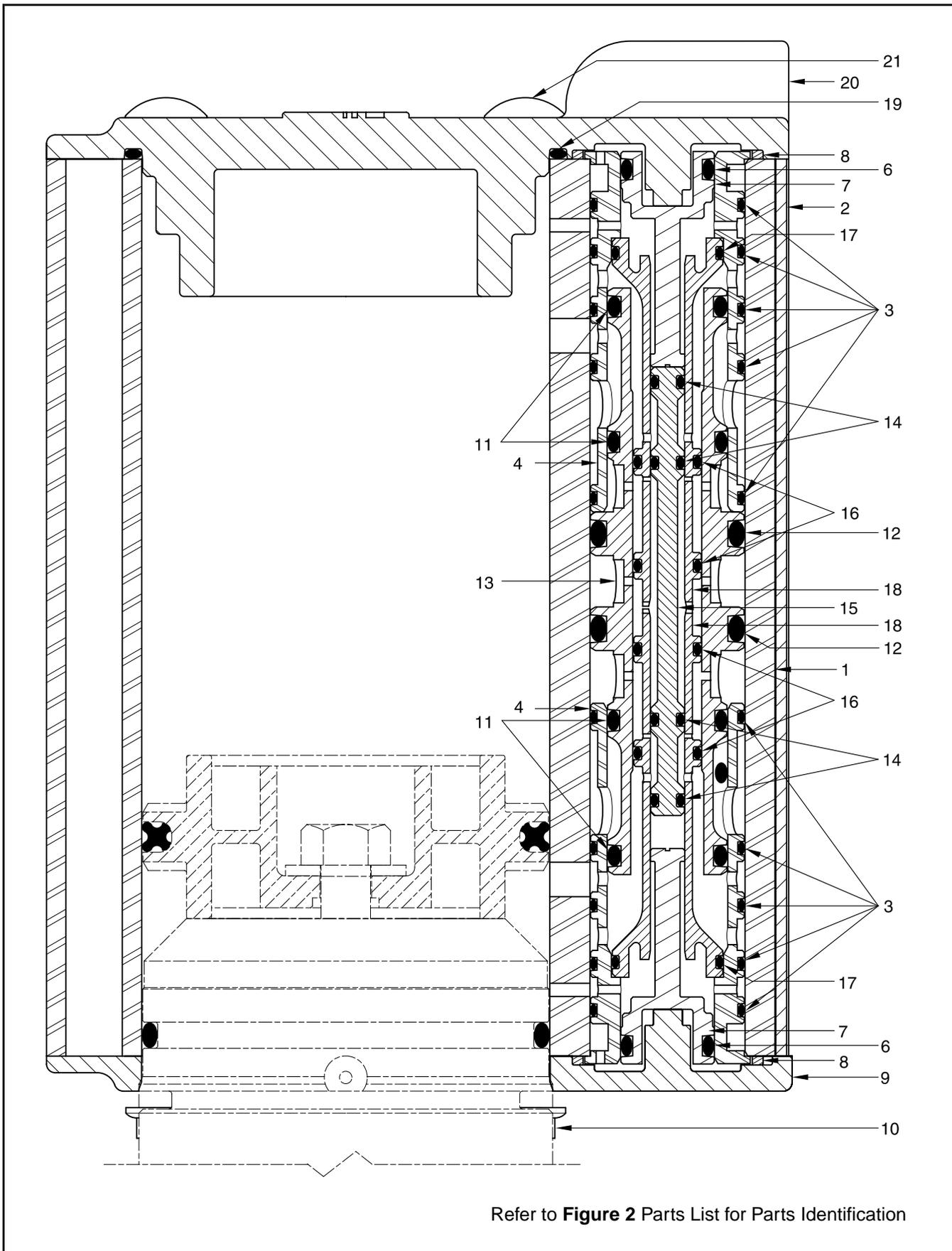
Upgrade Kit (Conversion)

IMPORTANT: Do not disassemble the RAM motor when installing the upgrade kit to an existing pump with a PML motor.

1. Remove the PML motor from the pump.
2. Remove the air motor piston from the rod.
 - Discard the piston and o-ring assembly.
3. Remove the o-ring from the body of the pump and discard.
4. Install lubricated O-Ring (h) onto the pump body.
5. Install and secure Piston (g) onto the rod.
6. Install lubricated Quad-Ring (f) onto the Piston.
7. Lubricate the bore of Body (1) with Magnalube-G Teflon grease.

CAUTION

Install the RAM Air Motor Assembly with care. Damage to Quad-Ring (f) and/or O-Ring (h) can occur.



Refer to **Figure 2** Parts List for Parts Identification

Figure 4 Air Motor Model 339413 Series- Section View

8. Install and seat the air motor assembly onto the body of the pump.

IMPORTANT: Perform procedural steps 9 through 13 one Keeper at a time. This prevents the motor assembly from loosening.

9. Remove Nut (10) from Carriage Bolt (21).
 • Use care not to lose Keeper (b).
10. Slide the Carriage Bolt from Top End Cap (20) until it clears Bottom End Cap (9).

11. Install the Keeper into the groove of the pump body.
 • Make sure the hole aligns with the Carriage Bolt.
12. Drop the Carriage Bolt through the Keeper.
13. Secure the air motor to the pump with the Nut.
 • Torque the Nut from 60 to 70 inch-pounds (6.8 - 7.9 Nm).
14. Repeat procedural steps 9 - 13 for the additional Keepers.

Troubleshooting Chart

Indications	Possible Problems	Solution
Air motor does not cycle	1. Insufficient air pressure 2. Jammed air valve assembly 3. Pump tube jammed and/or contains loose components	1. Increase air pressure * 2. Rebuild or replace air valve assembly 3. Rebuild pump tube
Air motor blows air at exhaust	Missing O-Ring(s)	Disassemble air motor, clean, inspect, and install O-Ring(s). Lubricate with Magnalube-G Teflon grease.
Air motor cycles and slight air leakage at exhaust	Worn or damaged O-Ring(s)	Disassemble air motor, clean, inspect, and replace worn or damaged O-Ring(s). Lubricate with Magnalube-G Teflon grease.
Slight air leakage at top and/or bottom of Body (1)	1. Gasket (8) installed incorrectly 2. Damaged Gasket (8) 3. Initial tightening of Nuts (10) not sufficient	1. Reinstall Gasket (8) 2. Replace Gasket (8) 3. Tighten Nuts (10)
Slight air leakage at top of Body (1)	1. Damaged O-Ring (19) 2. Initial tightening of Nuts (10) not sufficient	1. Replace O-Ring (19) 2. Tighten Nuts (10)
* To "jump start" a virgin motor, disconnect the air line and apply a maximum of 100 psi (6.9 Bars) to the motor's connector in a quick "install and release" motion.		

Changes Since Last Printing

Changed O-Ring 171000-103 to Quad-Ring 171008-37

