

# OPERATOR'S MANUAL

# 650002-X-B

**INCLUDING: OPERATION, INSTALLATION & MAINTENANCE**

RELEASED: 7-1-87  
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(REV. C) IPP

INCLUDE 6641X-X AIR MOTOR MANUAL

**PUMP**  
**15:1 RATIO 3" AIR MOTOR**  
**2 1/4" STROKE**

**650002-1-B LEATHER**  
**650002-3-B PTFE**  
**650002-9-B LEATHER/PTFE**

**IMPORTANT: READ THIS MANUAL CAREFULLY BEFORE INSTALLING,  
OPERATING OR SERVICING THIS EQUIPMENT.**

## SERVICE KITS

- 637066-B Service Kit for Air Motor Repair
- 637154-X Service Kit for Lower Pump End Repair (See Fig. 3)

## OPERATING PRECAUTIONS

- Use ARO® replacement parts to assure compatible pressure rating.
- HEED ALL WARNINGS AND CAUTIONS.
- CAUTION: The pump should not be used for the structural support of the piping system. Be certain system components are properly supported to prevent stress on the pump parts.
- Suction and discharge connections should be flexible connections (such as hose), not rigid piped.
- Be sure material hoses and other components are able to withstand fluid pressures developed by this pump.
- Disconnect air line from pump when system sits idle for long periods of time.
- DO NOT EXCEED MAXIMUM WORKING PRESSURE OF 2,250 P.S.I. (55 bar) at 150 P.S.I. (10.3) air inlet pressure.

**WARNING: HIGH PRESSURE DEVICE. IMPROPER USAGE OF EQUIPMENT COULD RESULT IN SERIOUS INJURY. THE POSSIBILITY OF INJECTION INTO THE FLESH IS A POTENTIAL HAZARD. NEVER ALLOW ANY PART OF THE HUMAN BODY TO COME IN DIRECT CONTACT WITH THE MATERIAL OUTLET.**

**AN INJECTION INJURY CAN BE SERIOUS! IF INJECTION SHOULD OCCUR, CONTACT A QUALIFIED PHYSICIAN FOR IMMEDIATE TREATMENT OF SUCH INJURIES.**

**WARNING:** When using pump in a location where surrounding atmosphere is conducive to spontaneous combustion or when pumping, flushing or recirculating inflammable substances (e.g., paints, solvents, lacquers, etc.), failure to safeguard against static spark, open flame, heat and improper ventilation could result in explosion and/or fire causing severe personal injury or death and/or property damage.

- Safety precautions should include:
  - Use of static wire hoses.
  - Proper grounding of pump, dispensing valve or device, hoses, any object to which substance is being transferred, and containers. After grounding, periodically check to verify continuity of electrical path to ground. Test with ohmmeter from each component (i.e., hoses, pump, clamp, container, spray gun, etc.) to ground to insure continuity. Ohmmeter reading shown should be 10 ohms or less. Consult local electric codes for specific grounding requirements.
  - Submersion of outlet hose end, dispensing valve or device within substance being dispensed whenever possible. (Avoid free streaming of substance being dispensed.)
  - Proper ventilation of area where pump and containers are located.
  - Keeping inflammables away from heat, open flames and sparks.

## PUMP DATA

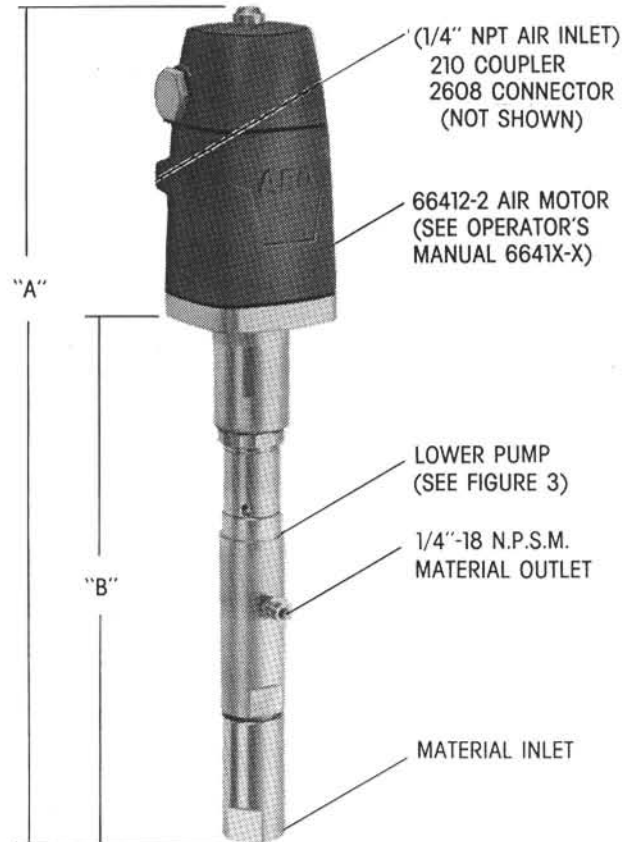


FIGURE 1

MODEL	LOWER PUMP	"A"	"B"
650002-1-B	61931-1	21.750	13.375
650002-3-B	61931-3	(553 mm)	(340 mm)
650002-9-B	61931-9		

- Keeping containers closed when not in use.
- Secure pump, connections and all contact points to avoid vibration and generation of contact or static spark.
- CAUTION: The chemical compatibility of the materials of which the wetted parts of the pump are constructed and the substance being pumped, flushed or recirculated with the pump must be verified. Chemical compatibility may change with temperature and concentration of chemical(s) within substance being pumped, flushed or recirculated. Consult ARO Form 8677-P, Fluid Compatibility Guide, for information on chemical compatibility, which Form 8677-P is available from ARO upon request.

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# ARO

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- **WARNING: DO NOT SERVICE OR CLEAN PUMP, OR REMOVE OUTLET HOSE AND/OR DISPENSING VALVE OR DEVICE, WHILE UNDER PRESSURE AS SERIOUS PERSONAL INJURY COULD RESULT.** First disconnect air line, then relieve pressure from system by opening dispensing valve or device and/or carefully and slowly loosening and removing outlet hose or piping from pump.
- **CAUTION:** Do not allow pump to operate for long periods of time when out of material. This may cause unnecessary wear or damage to the pump.

## AIR AND LUBE REQUIREMENTS

- **WARNING: DO NOT EXCEED MAXIMUM INLET AIR PRESSURE OF 150 PSI (6.9 BAR). OPERATING PUMP AT HIGHER PRESSURE MAY CAUSE PUMP DAMAGE AND/OR PERSONAL INJURY AND/OR PROPERTY DAMAGE.**
- A filter capable of filtering out particles larger than 50 microns should be used on the air supply. In most applications there is no lubrication required other than the "O" Ring lubricant which is applied during assembly or repair. When lubricated air is necessary, supply air lubricator with a good grade of SAE 90 wt. non-detergent oil and set lubricator to a rate not to exceed one drop per minute.

## INSTALLATION

### FLUSH PUMP

- \_\_\_ Connect fluid hose to pump outlet. Be sure all fittings are tight.
- \_\_\_ Turn air regulator knob counter-clockwise until it turns free.
- \_\_\_ Pump has been tested in oil and a small amount remains for protection against rusting. Immerse lower pump end in compatible solvent.
- \_\_\_ Connect air hose coupler to connector on FRL.
- \_\_\_ Turn air regulator knob clockwise until air motor starts.
- \_\_\_ Flush pump until oil is removed.
- \_\_\_ Disconnect air supply to air motor.

- **CAUTION: Solvent used for flushing may not be compatible with material to be pumped. If this is the case, flush again with a compatible solvent.**
- If pump is to be inoperative for an unspecified period of time, disconnect air and relieve all pressure.
- If pump does not function properly, disconnect air and relieve all pressure. Refer to Trouble Shooting.

## OPERATING INSTRUCTIONS

- \_\_\_ Turn air regulator knob clockwise until air motor starts to cycle.
- \_\_\_ Allow pump to cycle slowly until it is primed and all air is purged from the fluid hose or dispersive valve.
- \_\_\_ Turn off dispensing valve and allow pump to stall – check all fittings for leakage.
- \_\_\_ Change air regulator setting until desired pressure and flow is obtained.
- \_\_\_ Inspect airline filter, open petcock, to flush moisture or residue from bowl.
- \_\_\_ Pump is recommended to operate between 30 PSI and 150 PSI (not to exceed 75 cycles per minute).

## MAINTENANCE

The basic pump consists of two major components: 1. Air Motor, 2. Lower Pump End. The air motor is connected to the lower pump end. The air motor is removable and is to be serviced separately. Refer to air motor manual for service and parts.

- Periodically flush entire pump system with a solvent that is compatible with the material being pumped.

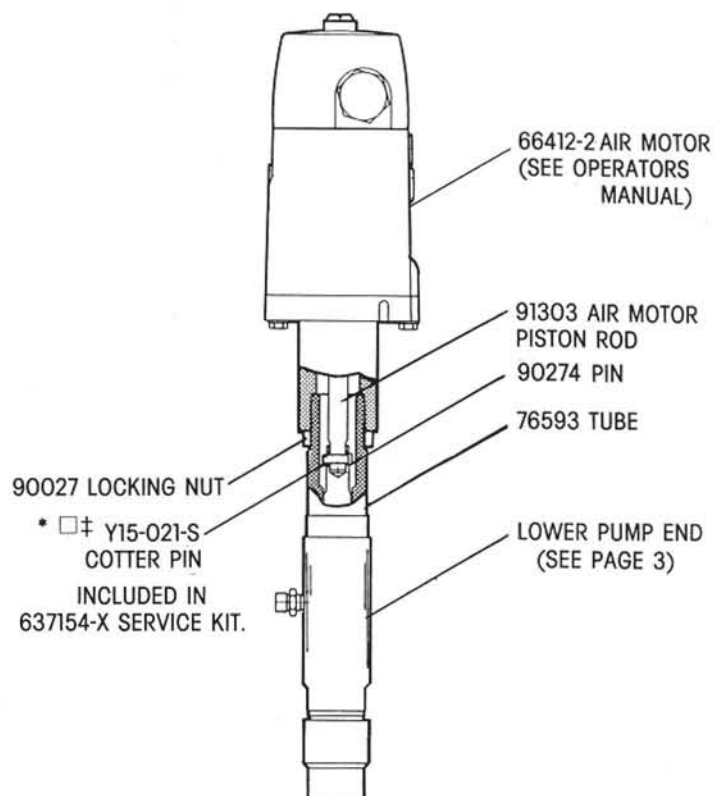


FIGURE 2

- Refer to Disassembly Procedures of air motor for correct breakdown.
- Disassembly should be done on a clean work bench with clean cloths to keep parts clean.
- If replacement parts are necessary, consult drawing containing parts for identification.
- Before assembling, lubricate parts where required. When assembling "O" rings or parts adjacent to "O" rings, care must be exercised to prevent damage to "O" rings and "O" ring groove surfaces.

## PUMP DISASSEMBLY

Refer to Figure 2

- \_\_\_ Secure air motor with clamp.
- \_\_\_ Loosen 90027 Nut.
- \_\_\_ Place strap wrench around 76593 Tube and loosen by turning counterclockwise. If the wrench slips on the tube, wrap a piece of 400 sand paper around tube and under strap wrench. (NOTE: Pipe wrench will damage the finish of the tube.)
- \_\_\_ After the tube has been pulled down to expose the 91303 Piston Rod and 90274 Pin, remove Y145-2 Cotter Pin, 90746 Pin, and lower pump end will separate from air motor.

## PUMP ASSEMBLY

NOTE: Clean all parts thoroughly before assembly.

For assembly of pump, reverse the disassembly instructions.

## 61931-X Lower Pump Parts List

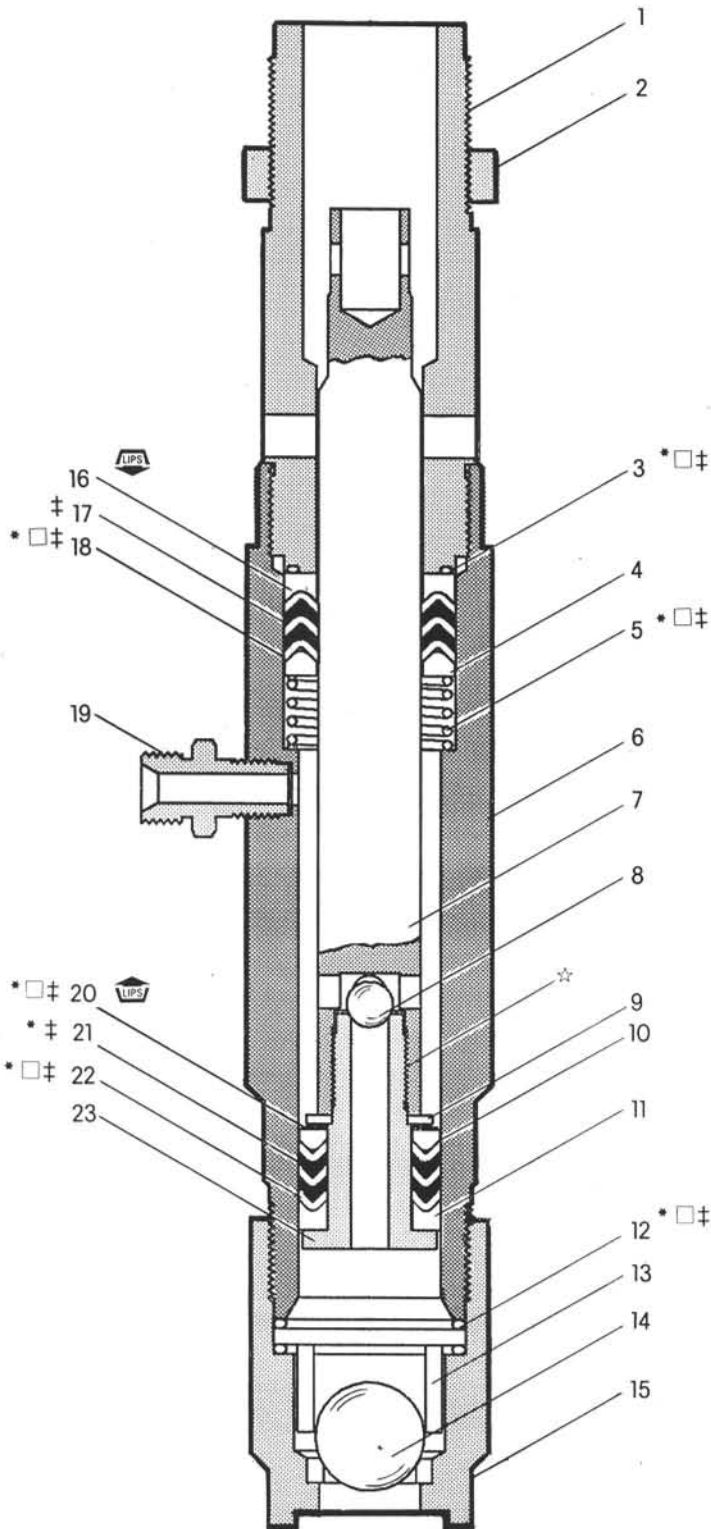


FIGURE 3

☆ APPLY PTFE TAPE TO THREADS UPON REASSEMBLY.

REF.	DESCRIPTION	(SIZE)	(MAT'L)	(QTY)	PART NO.
1	Tube		(C)		76593
2	Locking Nut		(S)		90027
3	"O" Ring (1 1/4" O.D.)		(B)		Y325-024 *□‡
4	Male Washer		(S)		91100
5	Spring		(S)		91107 *□‡
6	Tube		(S)		76616
7	Plunger Rod		(S)		76595
8	Ball (11/32 Dia.)		(S)		Y16-111
9	Washer		(S)		91567
10	Male Washer		(S)		91593
11	Female Washer		(S)		91592
12	Gasket		(S)	(2 req'd.)	92840 *□‡
13	Ball Stop				65019
14	Ball (13/16 Dia.)		(S)		Y16-126
15	Foot Valve				66289
16	Female Washer		(S)		91101
17	"V" Packing				
17A	Model 61931-9		(L)	(2 req'd.)	91106 ‡
18	"V" Packing				
18A	Model 61931-1		(L)	(5 req'd.)	91106 *
18B	Model 61931-3		(T)	(Set of 5)	90671-15 □
18C	Model 61931-9		(T)	(3 req'd.)	92355 ‡
19	Nipple		(S)		93212
20	Washer		(S)		91568 *□‡
21	"V" Packing				
21A	Model 61931-1		(L)	(Set of 2)	90908-25 *
21B	Model 61931-9		(L)	(Set of 2)	90908-25 ‡
22	"V" Packing				
22A	Model 61931-1		(L)	(Set of 3)	90908-3 *
22B	Model 61931-3		(T)	(Set of 5)	90671-17 □
22C	Model 61931-9		(T)	(Set of 3)	90671-16 ‡
23	Valve Seat		(S)		76633

\* Service Kit includes items 3, 5, 12 (2 req'd.), 18A (5 req'd.), 20, 21A (Set of 2) and 22A (Set of 3)..... 637154-1

□ Service Kit includes items 3, 5, 12 (2 req'd.), 18B (Set of 5), 20, and 22B (Set of 5) .... 637154-3

‡ Service Kit includes items 3, 5, 12 (2 req'd.), 17A (2 req'd.), 18C (3 req'd.), 20, 21B (Set of 2), and 22C (Set of 3)..... 637154-9

### MATERIAL CODE

(C) = Carbon Steel                      (L) = Leather  
 (S) = Stainless Steel                  (T) = PTFE  
 (B) = Buna "N"

## LOWER PUMP END DISASSEMBLY

NOTE: All threads are right hand.

- \_\_Vise the 61931-X Lower Pump Assembly on (6) Tube.
- \_\_Unscrew (2) Locking Nut from (1) Tube.
- \_\_Remove (16) Female Washer, (17) "V" Packings, (18) "V" Packings, (4) Male Washer and (5) Spring from (6) Tube.
- \_\_Unscrew (15) Foot Valve from (6) Tube.
- \_\_Remove (12) two Gaskets, (13) Ball Stop and (14) Ball from (15) Foot Valve.
- \_\_Push (7) Plunger Rod down and out bottom of (6) Tube using caution not to mar or damage the finish on (7) Plunger Rod.
- \_\_Vise the (7) Plunger Rod on the flats. (Do not vise on finished surfaces.)
- \_\_Place a wrench on (23) Valve Seat and unscrew from (7) Plunger.
- \_\_Remove (9) Washer, (20) Washer, (10) Male Washer, (21) "V" Packing, (22) "V" Packing and (11) Female Washer from (7) Plun-

## LOWER PUMP END ASSEMBLY

NOTE: All packings and rubber goods should be lubricated with a compatible lubricant prior to assembly.

- \_\_Place (5) Spring, (4) Male Washer, (18) "V" Packing, (17) "V" Packing, and (16) Female Packing Washer in (6) Tube.
- \_\_Screw (1) Tube with (3) "O" Ring into (6) Tube. Screw (2) Nut onto (1) Tube.
- \_\_Insert (8) Ball into (7) Plunger Rod.
- \_\_Place (11) Female Washer, (22) "V" Packing, (21) "V" Packing, (10) Male Packing Washer, (20) Washer, and (9) Washer onto (23) Valve Seat.

**CAUTION:** When assembling packings and washers, be sure they are assembled correctly as shown in Figure 3.

- \_\_Grease (7) Plunger Rod and carefully slide (7) Plunger Rod into (6) Tube.
- \_\_Assemble (14) Ball, (13) Ball Stop, and two (12) Gaskets into (15) Foot Valve.
- \_\_Screw (15) Foot Valve into (6) Tube.

## TROUBLE SHOOTING

- No material (pump continually cycles)  
PROBLEM  
Empty material supply.  
CAUSE  
Disconnect the air. Replenish material supply. Connect the air.  
REMEDY  
CAUSE  
Damaged (19) Suction Tube.  
REMEDY  
Replace Suction Tube.

- Material on one stroke only (fast downstroke).  
PROBLEM  
(21) Ball in (22) Foot Valve assembly not seating.  
CAUSE  
REMEDY  
Remove the Foot Valve Assembly. Remove the Ball from the Foot Valve Assembly. Clean and inspect Ball and Foot Valve Assembly. If either Ball or Foot Valve Assembly is damaged, replace. (See lower pump end instructions).

- Material on one stroke only (fast upstroke).  
PROBLEM  
CAUSE  
Worn or damaged (13) Packings.  
REMEDY  
Replace with new Packings. (See lower pump end instructions.)

- Air leakage out of the main exhaust.  
PROBLEM  
CAUSE  
Worn 90796 Valve Insert. (See air motor instructions.)  
REMEDY  
Replace the Valve Insert. (See air motor instructions.)  
CAUSE  
Loose 65027 Piston Assembly.  
REMEDY  
Tighten Piston Assembly (See air motor instructions.)  
CAUSE  
Damaged 65027 Piston Assembly.  
REMEDY  
Replace Piston Assembly. (See air motor instructions.)  
CAUSE  
Warped or worn 65028 Valve Plate and Pin Assembly.  
REMEDY  
Replace Valve Plate and Pin Assembly (See air motor instructions.)

- Continual leakage out of the bleeder hole in the Head Assembly.  
PROBLEM  
CAUSE  
Worn 91207 "O" ring or 91007 Seal.  
REMEDY  
Replace the "O" ring and Seal

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