EXPEDITIONARY DEPLOYABLE OXYGEN CONCENTRATION SYSTEM 120 LITERS PER MINUTE

MODEL E-DOCS-120

PART NUMBER 792641-001

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Maintenance Information

Section 1. VSA Maintenance

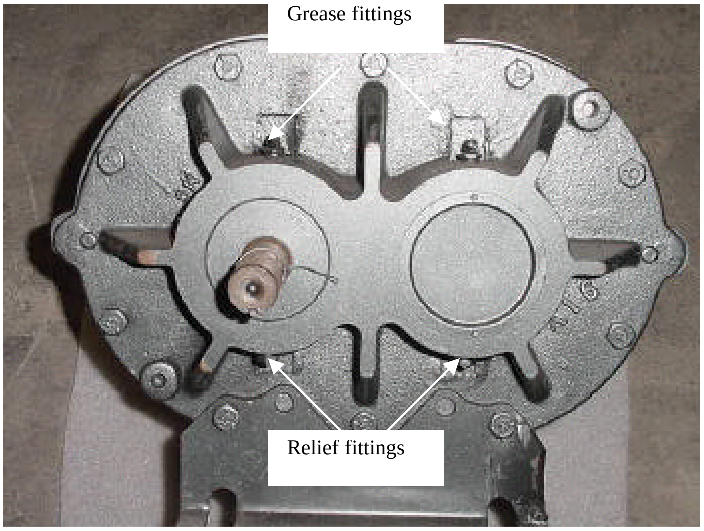
Roots Type Blower (B-100)
The blower is a double lobe type. Drive shaft (sheave side) end bearings are grease lubricated using two zirk type fittings with two hydraulic pressure relief fittings. The relief fittings vent any excess grease preventing grease induced seal failure. It is normal to have grease vent from relief fittings during lubrication and during blower startup after lubrication. The timing gear and bearing side is splash lubricated using an oil slinger. Periodic greasing along with lubricating oil change and belt inspection is the extent of maintenance required to maximize blower life. Drive belt inspection, change-out and troubleshooting should be performed per drive belt vendor information found at the end of this section.

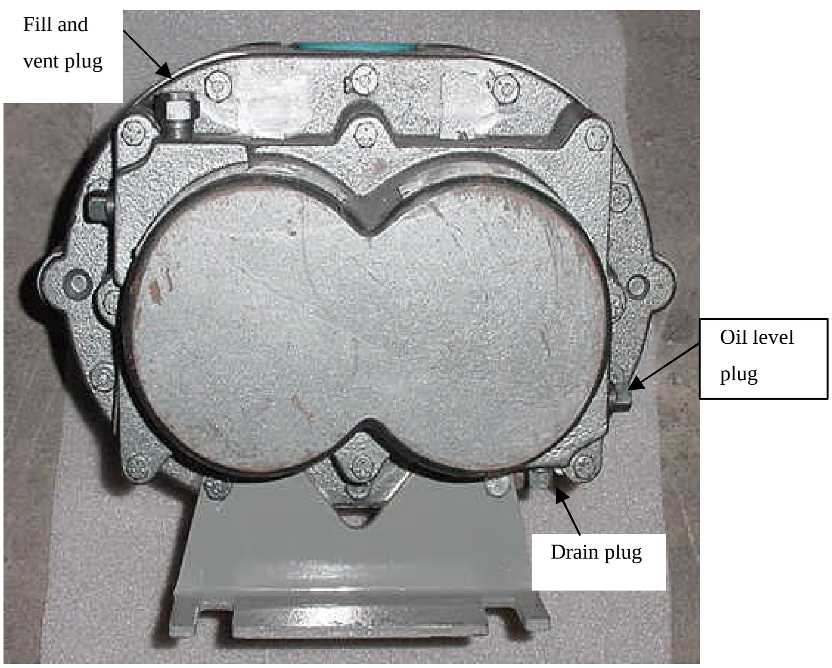
> **Note:** Observing a liquid oil film around the roots blower base is an indication of oil leakage. If leak source cannot easily be found, increased monitoring of blower oil level will be required until repairs or replacement blower is installed. *A common leak source is the blower oil drain plug not tightened correctly from previous oil change.* Operating blower without oil or grease will lead to total failure of blower.

Blower Lubrication
Grease: Any NLGI#2 premium grade grease, high temperature (300°F) petroleum grease.
Oil: Preferred: Roots high temperature synthetic lubricating oil or equivalent. Alternates: Mobil SHC 630, Mobil DTB BB, Texaco R&O 220, Amoco 220 or equivalent.

> **Note:** For grease fitting locations, oil capacities & maintenance intervals see literature at the end of this section.
> **Caution -** Blower and fan operation is through a thermostat. When power is applied to oxygen generator, the thermostat will start fans automatically. When working on or near fans, the power must be shut off at disconnect.

Section 1 V.SA Maintenance continued:





Section 1. VSA Maintenance continued:

Motorized Valve

Position of V-1 is controlled by the PLC monitoring two cam-following position switches mounted on the gear reducer end opposite valve V-1. Each switch rides on a cam with two cams machined at 180°. The cam sets are machined offset at 90° to each other. When a position switch roller drops into a cam depression, the switch closes creating a PLC input state change. The PLC will then determine length of time at valve position based on an internal setting.

A correct operating valve requires the following:
1) Correct wiring of valve position limit switches and ensuring jumper installed
2) Secure mounting of limit switches and cam
3) V-1 valve port switches at 90° intervals (Damaged or bent limit switches will affect operation)
4) Limit switch operation indicates on PLC as switch roller rolls over the cam depression (Input Slot#0 input s#0 & 1 light on PLC)
5) Valve in vacuum position (Input #0 light lit on PLC) at startup or valve moves to light #0 at startup

During testing, before shipment to customer, the above items were checked to ensure proper operation of V-1. Damage during shipment to cams, position switches or wiring may affect valve operation at startup. Position limit switches and cam mounted on gear reducer R-200 opposite valve V-1

Jogging V-3 Motorized Valve 90°

With the unit power switch in the OFF position, and power supply energized to unit (through disconnect), jog V-1 by opening enclosure E-100/200 and momentarily sliding tab on CR-145 to the left. This will operate valve motor M-200. Let the motor turn valve V-1 until the first of both position switch rollers drops into a cam depression. This should be less than a 90° jog (Input #0 light lit on PLC).

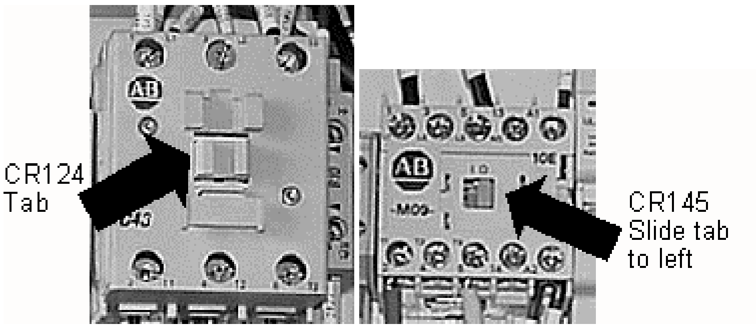
> **Note:** If a limit switch problem is suspected, gently lifting each switch out of the low point in the cam depression and hearing an audible "click" will check for correct operation. The click should occur at about the mid-way point in the cam depression. Limit switches can be adjusted for the mid-way click by gently bending the arm up or down**.**

NOTICE!

Limit switch rollers must continue riding flat on cam surface. Twisting or excessive bending of a limit switch arm will not resolve operational problems!

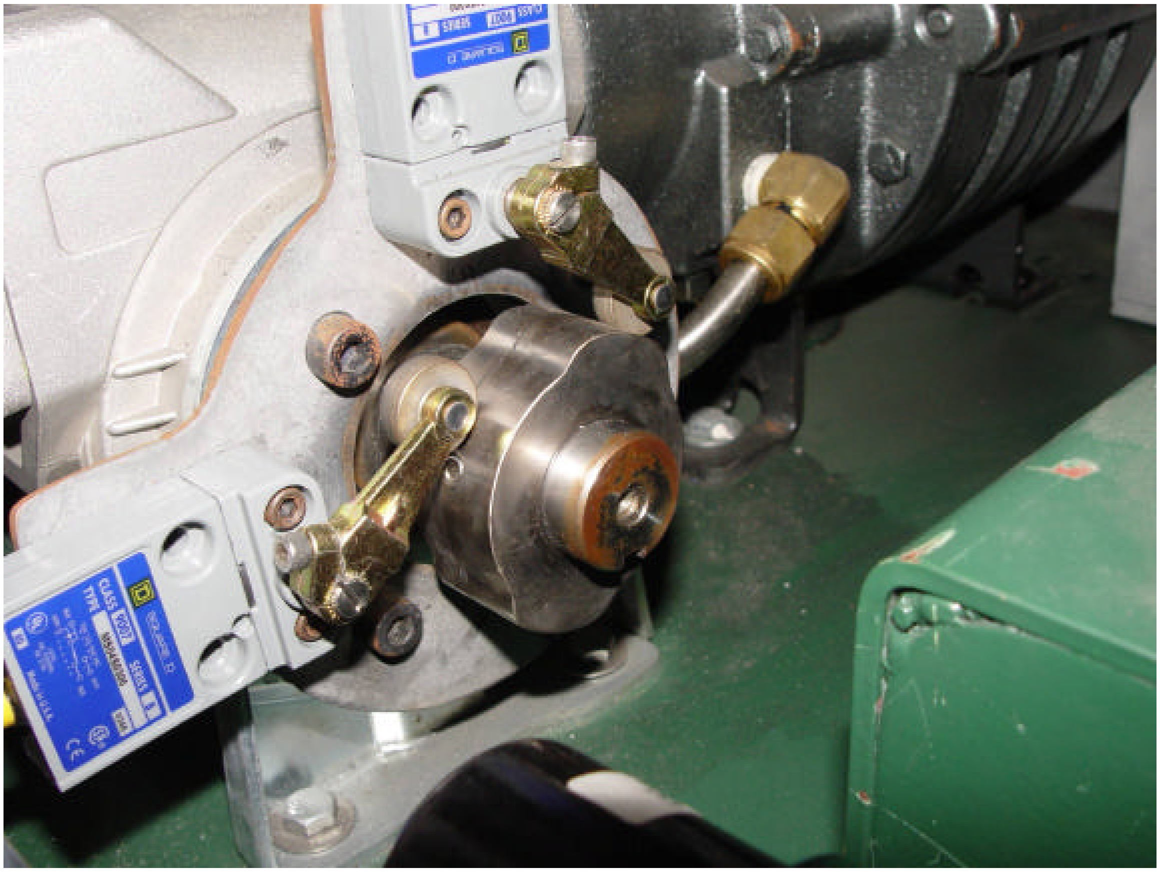
Section 1. VSA Maintenance continued:

Slide tab to left to jog V-3



Turn power switch to on position, unit should now startup in evacuation mode. Oxygen generator should be operational. If unit does not startup when power switch is turned to ON position refer to troubleshooting in Section 4.

Section 1. VSA Maintenance continued:



Section 1. VSA Maintenance continued:

Frequency	Task
Daily	Visual inspection for any unusual noises or vibrations.
250 hours 10 days	**Check blower and valve drive units for any oil leakage.** Any evidence of oil leakage from the blower or valve drive reducer may mean that a seal has failed, in which case, the unit should be repaired or replaced as soon as possible. **Grease the two-blower end bearing Zirk fittings.** For grease, any NLGI#2 premium grade, high temperature (300°F, 115°C) grease. Using a pressure gun, force new grease into each bearing until traces of clean grease come out of the relief fitting.
First 100 hours and every 1000 hours following	**Change blower oil.** High temperature synthetic lubricating oil such as Valvoline Full Synthetic 75W-90; Mobil SHC 630; Mobil DTB BB; Texaco R&O 220; Amoco 220 or equivalent. If the oil appears to have broken down, increase the oil change frequency. Oil capacity of the 4005 blower is **6.8 oz (200 ml).** Always fill the gear housing until oil drips out of the oil level hole. Replace plugs in their respective holes. Following this procedure will ensure proper oil level. **Inspect belt tension.** The proper belt tension will give approximately 1/2 inch of deflection when moderate force is applied to the center of the belts. If either of the belts are worn both belts should be replaced as a set. The belts are model **5Vx530.** **Inspect inlet filter.** (Should not need replacement in normal environment.) **Inspect valve limit or proximity switches depending on model for mounting tightness.** Any movement of the limit or proximity switches will cause the valve to stop in a different position causing leakage from the blower discharge to the blower inlet and loss of performance. If loose, the limit switches will need to be adjusted to ensure that when the valve stops it is aligned with the piping.

First 100 hours and every 1000 hours following	**Check piping to ensure all connections are tight.** **Check for proper valve alignment; Adjusting cam & limit switches for proper valve alignment. Adjusting Proximity limit switches & split ring for proper valve alignment.** (Misalignment of the 4-way ball valve can lead to insufficient pressure and vacuum levels causing poor performance.)

! For trouble shooting on the MD Blower refer to the MD Manual!

Section 2. Rix booster Compressor Maintenance

See Rix Manual for detailed information

2-1 INTRODUCTION

The purpose of this chapter is to provide the operator with the scheduled maintenance required to insure a long service life of the RIX Compressor, Model 2PS2B-.85. This chapter covers the procedures for performing examinations, tests, replacements, preventive maintenance tasks, and overhauls. Material and test equipment requirements are covered in the following paragraphs for each specific task. The chart is arranged with the most frequently performed tasks covered first, the less frequent tasks later. Where maintenance tasks require significant disassembly, they are referenced here for scheduling and explained in the Rix Manual Chapter 6 - Corrective Maintenance. Also, any corrective maintenance required as a result of any preventative maintenance inspections is covered in Chapter 6. On a daily basis, visually inspect the operating compressor. Check gas pressures, gas, temperatures, and for any leaks or unusual noises.

WARNING

The compressor may start at any time when in automatic mode. Before attempting any repairs or adjustments, de-energize the Machine by putting the selector switch to OFF, disconnect power to the system (to avoid shock hazard), vent pressure by opening hand valves and give the discharge piping time to cool down (discharge air lines are hot and can cause burns)

Section 2. Rix booster Compressor Maintenance continued:

Table 2-1. Preventive Maintenance

Time Intervals in Hours

Para.	Operation		2000	3000	4000
4-2	Filter Cleaning		X		
4-3	Compressor Valves Inspection and Reconditioning				X
4-4	Pressure Relief Valves				X
4-5	Belt Adjustment			X	
4-6	Gas System Piping			X	
4-7	Bearing Inspection			X	
4-8	Piston Ring Replacement:	1st Stage		X	
		2nd Stage	X		

WARNING

Before performing any of the scheduled maintenance tasks in Chapter 4, the compressor should be shut off and tagged **Out of Service**. This is to prevent an inadvertent start which could cause injury to personnel or damage to the equipment. After completing the maintenance action, the compressor should be restored to full operation and the tags removed.

Section 2. Rix booster Compressor Maintenance continued:

WARNING

To prevent **FIRE, SERIOUS INJURY, and/or DEATH**, it is the User's responsibility to ensure all parts used in the compression assembly, gas plumbing of this RIX Oxygen compressor and any other existing portions of the gas stream that may be exposed during the installation of new or replacement parts are cleaned for Oxygen Service prior to installation. Any work to be done on the compressor where the gas stream may be exposed must be done in accordance with **safe Oxygen Equipment handling procedures.** No attempt should be made to work on the machine without full knowledge of Oxygen equipment handling and the potential hazards of contamination. Factory Oxygen cleaned parts are denoted by an "X" prefix at the beginning of the part number. It is the User' s responsibility to maintain the cleanliness of factory cleaned parts and any other existing portions of the gas stream that may be exposed during the initial installation, start up, or during installation of replacement parts

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RIX Industries recommends the customer establish a procedure for working with oxygen machinery. Refer to Compressed Gas Association, Inc. publication number CGA G-4.1, Cleaning Equipment for Oxygen Service.

4-2 FILTER CLEANING

4-2.1 FREQUENCY. Every 2000 hours of running time the external interstage filter should be cleaned. Failing to clean the filter as scheduled may result in improper operation of the compressor valves.

4-2.2 PROCEDURE.

a. Remove external filter shown on Figure 1-1b or Figure 3-2.

b. Clean and thoroughly dry filter.

c. Reinstall the filter with the flow in the proper direction.

Section 2. Rix booster Compressor Maintenance continued:

4-3 COMPRESSION VALVES INSPECTION AND RECONDITIONING.

4-3.1 FREQUENCY. Every 4000 hours the compressor valves should be removed and reconditioned. Step by step procedures for removing and servicing the valves are given in the Rix Manual Paragraph 6-4. As a minimum during the 4000 hour maintenance action, the O-rings should be replaced with new parts and the valve seat resurfaced to remove any and all defects. It is recommended to maintain a stock of spare valves so that servicing can be as simple as possible. This allows the service man to change out the valves and reduce the down time during this maintenance action. The used valves may then be reconditioned as time permits so that they are ready for the next change out.

4-4 PRESSURE RELIEF VALVES.

4-4.1 FREQUENCY. The pressure relief valves should be removed from the compressor and tested for correct set-point every 4000 hours. If a valve fails to lift at its rated pressure, it must be readjusted and if necessary, serviced per Paragraph 6-13.

4-5 BELT ADJUSTMENT.

4-5.1 Belt tension should be checked every 2000 hours of operation or if slipping occurs.

4-5.2 PROCEDURE.

a. Shutdown compressor, disconnect power and bleed off pressure.

b. Remove belt guard.

c. Loosen motor bolts.

d. Push down on motor sheave and tighten motor bolts. Belt should deflect 1/2 - 3/4" at mid span with approximately 10 lb.force.

NOTE: Alignment is critical to ensure proper belt life.

e. Replace belt guard.

Section 2. Rix booster Compressor Maintenance continued:

4-6 GAS SYSTEM PIPING.

4-6.1 FREQUENCY. Every 2000 hours of running time or any time the piping system is disturbed, such as during a corrective maintenance action, the piping should be examined for leaks. Any obvious leaks should be dealt with as they are detected. Leak testing the piping requires that the compressor is pressurized, and therefore running.

NOTE

The test is simplified if the compressor is allowed to cool, then restarted, immediately prior to running the leak test, since the hot discharge pipes can boil away the leak test soap solution, making detection of leaks difficult or impossible.

WARNING

Hot discharge lines can produce painful burns. Be careful to avoid making contact with hot pipes while performing tests and repairs. If a leak is detected, it should be noted or conspicuously marked so that it can be repaired at the next convenient shutdown period.

4-6.2 MATERIALS. A soapy solution in a squirt bottle works best for locating leaks in a gas system. The gaskets and O-rings needed for the specific repair should be on hand prior to attempting to fix a leak.

4-6.3 PROCEDURE.

a. Restart compressor after it has been allowed to cool down. See Rix Manual Chapter 2 - Operation.

b. Systematically move from joint to joint and fitting to fitting in the gas system piping, spraying the leak test solution.

Section 2. Rix booster Compressor Maintenance continued:

c. Observe for the formation of bubbles. Mark the location of any detected leaks. Large leaks may blow the soap solution away as quickly as it is applied. These may be detected by feel, again being careful of hot discharge lines.

d. Test relief valves by forming a bubble across the outlet opening and observing if the bubble grows.

e. Leaks at fitting joints may, in some cases, be corrected by tightening the joint.

CAUTION

Avoid over-tightening as this can produce distortion and make the problem more severe. If the joint is tight and still leaks, the gasket must be replaced.

f. O-ring joints cannot be corrected by additional tightening. In most every case, the leaking o-ring must be discarded and a new one installed. Always inspect the surfaces that seal against the O-ring for defects and correct them as required.

4-7 BEARING INSPECTION.

4-7.1 FREQUENCY. Every 2000 hours inspect the main ball bearings, connecting rod ball bearing, and connecting rod needle bearing to verify adequate lubrication and smooth rotation. If replacement is necessary, follow the procedures given in the Rix Manual Paragraphs 6-8 and 6-9. Failure to replace the bearings could result in a bearing failure which would cause further damage to the compressor.

4-8 PISTON RING REPLACEMENT.

4-8.1 FREQUENCY. Every 2000 hours, the 2nd stage floating piston, including new compression rings, rider rings, and O-rings, should be replaced following the procedures given in the Rix Manual Paragraph 6-7. Every 3000 hours the 1st stage rings should be checked and replaced as necessary. If the piston rings are allowed to wear beyond their service life, the compressor output will be reduced, causing more frequent compressor operation and unnecessary wear on other components. There is also the risk of damaging the cylinder walls if the rings wear out completely.

! For trouble shooting on the Rix Booster Compressor refer to the Rix Manual!

Section 3. Scroll Compressor Maintenance

See Powerex Manual for detailed information

Maintenance Schedule

		Operating Hours				
Item	**Action required**	**2500**	**5000**	**10,000**	**15,000**	**20,000**
Blow Fan	**Clean**		?	?	?	?
Fan Duct	**Clean**		?	?	?	?
Compressor Fins	**Clean**	?	Every 2,500 hours			
Bearings	**Grease**			?		?
Tip seal	**Replace**			?		?
Dust seal	**Replace**			?		?
Drive belt	**Inspect/replace**	?	Every 2,500 hours			

! For trouble shooting and maintenance detail on the Scroll Compressor refer to the Powerex Manual!