

Compressor Maintenance (Continued)

Step 7 Separate the cylinder sleeve from the valve plate and discard the sleeve and O-ring.

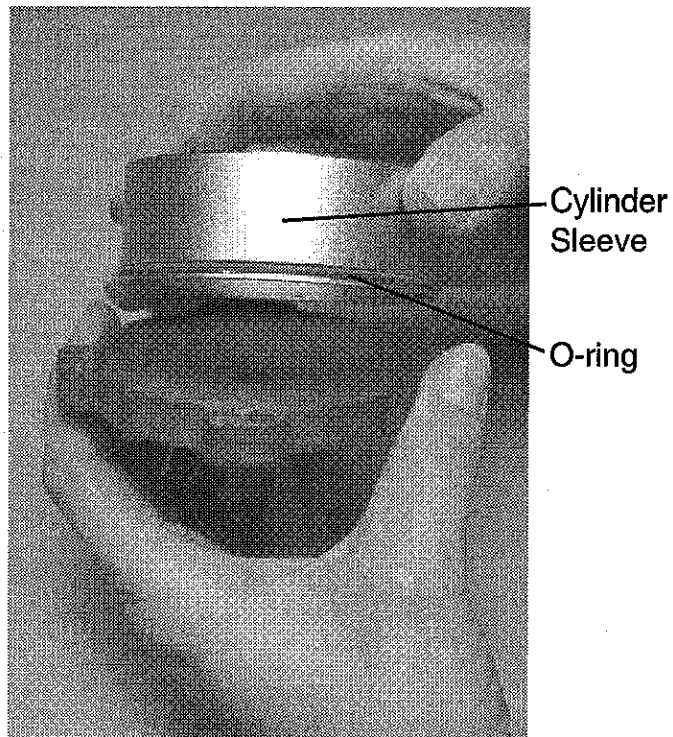


Figure 6-16
Separating the Cylinder Sleeve and Valve Plate

Step 8 Remove the screw and replace the flapper valve on the valve plate using a T-15 or 3/32 Torx bit.

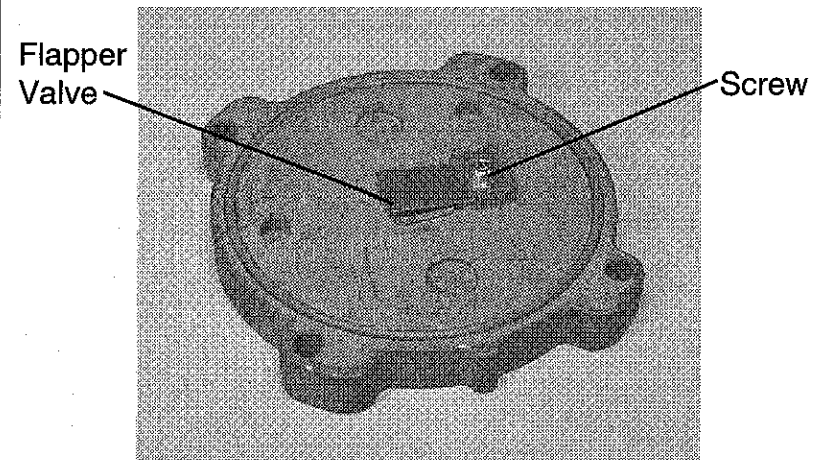


Figure 6-17
Flapper Valve Renewal

Compressor Maintenance (Continued)

Step 9 Using a Phillips screwdriver, remove and discard the four screws from the piston cup retainer. (The piston should be at the bottom of travel.)

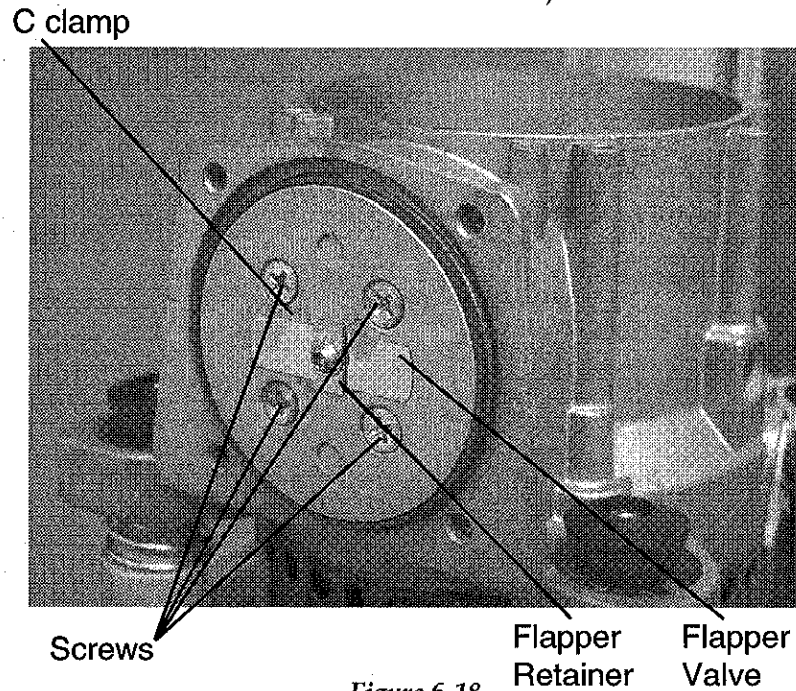


Figure 6-18
Location of the Piston Cup Retainer Screws

NOTE: Before removing the flapper, place the "C" clamp at the point indicated in Figure 6-18, this will keep the new flapper in place while you are tightening it.

Step 10 Remove and discard the cup seal and cork from the back side of the piston cup retainer.

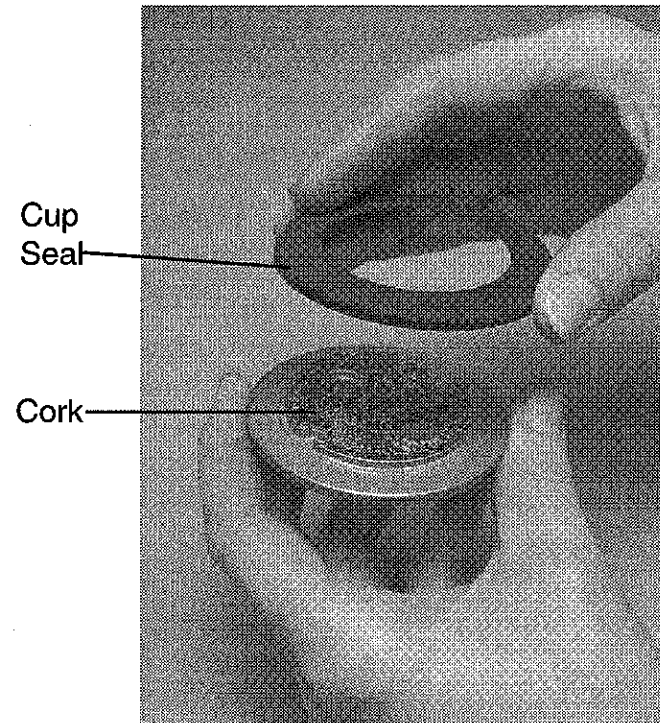


Figure 6-19
Removing the Cup Seal and Cork



Compressor Maintenance (Continued)

- Step 11** Remove and replace the flapper valve from the front side of the piston cup retainer using a T-15 or 3/32 Torx bit.
- Step 12** Move the piston to the top of travel.
- Step 13** Set the new sleeve in place with the O-ring away from the piston.
- Step 14** Place the cork and the cup seal on the piston cup retainer. Make sure the two holes in the cork line up with the two holes in the piston cup retainer and the cup seal is in the groove on the piston cup retainer. Place the four screws into the piston cup retainer and through the screw holes in the cork.
- Step 15** Holding the cup seal and piston cup retainer, place it on top of the sleeve. Start the four screws and tighten in an "X" pattern, one turn each, until the piston cup retainer is seated to the piston. Tighten each screw to 30 in.-lbs.
- Step 16** Align the marks made in step 4 then install the valve plate.
- Step 17** Place the O-ring on the valve plate.
- Step 18** Reattach the compressor head and, using the a T-25 or 1/8 Torx bit, tighten the four screws.

- Step 19** Place the new felt filter and the O-ring on the intake muffler.
- Step 20** Secure the intake muffler using a T-20 or 7/64 Torx bit to tighten the four screws.



6.7 Millennium Oxygen Concentrator Maintenance Record¹

Model: _____ Serial No. _____ Date Purchased _____

Date	Hours	Lpm	FILTERS				COMPRESSOR		9 V Battery ³	Oxygen Concent. ³	OPI	Other Data
			Air Inlet ²	Pre-Filter ³	Inlet ³	Bacteria	Cup Seals	Rebuild				
Record at each check			Clean and replace as needed		Check and replace as needed		Check and perform maintenance as needed		Check and replace as needed	Check level ³	Check lights at start up	

(See Notes on next page.)



Millennium Oxygen Concentrator Maintenance Record (Continued)

- Note 1:** All checks and maintenance should be performed as specified in the Respironics Millennium Oxygen Concentrator Service Manual.
- Note 2:** Patients should be instructed to position the unit so that proper ventilation for the unit is maintained, and to clean the air inlet filter weekly.
- Note 3:** Respironics requires that routine maintenance be performed annually.



Chapter 7: Troubleshooting and Diagnostics

7.1 Overview	7-3
7.2 Troubleshooting Table	7-4
7.3 System Pressure Test Table	7-16



Chapter 7: Troubleshooting and Diagnostics

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Chapter 7: Troubleshooting and Diagnostics

7.1 Overview

This troubleshooting section is provided as a guide to help the technician determine what is wrong with the Millennium Oxygen Concentrator System (Millennium). It should also be used to determine what parts, if any, need to be replaced.

NOTE: To determine if the thermal switch located inside the compressor has closed, simply power up the concentrator. If the compressor starts, the switch has closed.



7.2 Troubleshooting Table

Symptom	Cause	Verification	Corrective Action
<ul style="list-style-type: none"> • Pressure relief valve activating • Low pressure alarm 	Canister to compressor tubing failure <ul style="list-style-type: none"> • Tubing disconnected, kinked, or hole in tubing 	<ul style="list-style-type: none"> • Verify the tubing between the canister and compressor is connected • Verify the tubing is not kinked or pinched • Verify there are no holes in the tubing 	<ul style="list-style-type: none"> • Reconnect the tubing • Reposition the tubing • Replace the tubing
<ul style="list-style-type: none"> • Audible and visual alarm • Pressure relief valve activating 	Fuse fails <ul style="list-style-type: none"> • Open fuse 	<ul style="list-style-type: none"> • Verify the audible and visual alarm due to battery 	<ul style="list-style-type: none"> • Replace the fuse
<ul style="list-style-type: none"> • Fluctuations in oxygen pressure • Fluctuation in flow ball 	Pressure regulator failure <ul style="list-style-type: none"> • Component failure 	<ul style="list-style-type: none"> • Verify the flow from regulator is correct • Perform Oxygen Outlet / Regulated Pressure Test 	<ul style="list-style-type: none"> • Replace the regulator



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
Unit will not turn on <ul style="list-style-type: none">• Audible alert (Steady)• Red LED on (Steady)	<ul style="list-style-type: none">• No power to the unit	<ul style="list-style-type: none">• Verify the power cord is connected to the wall outlet• Verify there is power in the wall outlet• Verify if the outlet is connected to a light switch and the switch is in the on position	<ul style="list-style-type: none">• Connect the power cord to the wall outlet• Check the household fuse or circuit breaker• Move the power switch to the ON position



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
Unit will not alarm (Red LED) <ul style="list-style-type: none">• Power cord is connected• Power switch in the ON position• No Audible Alert• No Red LED	<ul style="list-style-type: none">• No power to the alarm	<ul style="list-style-type: none">• Verify the battery voltage is 5 volts or higher• Verify the battery connector is correctly seated on the battery• Verify the wiring harness is connected to the power switch• Verify the wiring harness is connected to the PCB	<ul style="list-style-type: none">• Replace the 9 volt battery• Connect the wiring harness• Connect the wiring harness• Connect the wiring harness• Replace the PCB



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
LED failure (Models 600 and 605) <ul style="list-style-type: none">• Red LED inoperable• Green LED inoperable• Yellow LED inoperable	<ul style="list-style-type: none">• No power to LED's	<ul style="list-style-type: none">• Verify the power cord is plugged in• Verify the battery voltage is greater than 5 volts• Verify that all wiring harnesses are connected• Verify the PCB is not damaged• Verify the OPI board is not damaged (Model 605 Only)	<ul style="list-style-type: none">• Connect the power cord to AC power source• Replace the 9 volt battery• Connect all wiring harnesses• Replace the PCB• Replace the OPI board



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
<ul style="list-style-type: none"> Unit is inoperable 	PCB failure <ul style="list-style-type: none"> Intermittent power up High / Low pressure alarm No power 	<ul style="list-style-type: none"> Verify the wiring harnesses are connected Verify the wiring harness is not damaged Verify the condition of the fuse on PCB Verify the solder joints are not faulty on PCB Verify there are no component failures on PCB 	<ul style="list-style-type: none"> Connect the wiring harnesses Check the wiring harnesses for continuity Test the fuse for open Replace the PCB Replace the PCB
<ul style="list-style-type: none"> Start-up alarms inoperable 	Piezoelectric speaker failure <ul style="list-style-type: none"> No audible alarm 	<ul style="list-style-type: none"> Verify the wiring harnesses are connected Verify the solder joints are not faulty on the PCB Verify there are no component failures on the PCB 	<ul style="list-style-type: none"> Reconnect the wiring harnesses Replace the PCB Replace the PCB



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
<ul style="list-style-type: none"> No audible or visual alarm while turning power switch on with the power cord unplugged 	Battery failure <ul style="list-style-type: none"> No audible or visual alarm during power-off 	<ul style="list-style-type: none"> Verify the battery is connected Verify the battery voltage is greater than 5 VDC Verify the wiring harness has continuity 	<ul style="list-style-type: none"> Connect the battery Replace the 9 volt battery Replace the wiring harness
<ul style="list-style-type: none"> Low pressure alarm 	Compressor failure <ul style="list-style-type: none"> Fluctuating or no oxygen production 	<ul style="list-style-type: none"> Verify the thermal switch is not open (See Note 1) Verify if the compressor needs to be rebuilt 	<ul style="list-style-type: none"> Replace the thermal switch Rebuild the compressor Replace the compressor
<ul style="list-style-type: none"> High pressure alarm 	Pressure relief valve <ul style="list-style-type: none"> Relief valve activated 	<ul style="list-style-type: none"> Verify the tubing is not kinked or pinched Verify the tubing is not damaged 	<ul style="list-style-type: none"> Reposition the tubing Replace the damaged tubing Replace the pressure relief valve (See Note 2)



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
<ul style="list-style-type: none"> • Low oxygen output • Oxygen percentage indicator alarm (Model 605) 	<p>Sieve bed contaminated</p> <ul style="list-style-type: none"> • Low or no oxygen production 	<ul style="list-style-type: none"> • Verify the oxygen output with an oxygen analyzer • Verify the compressor is working properly 	<ul style="list-style-type: none"> • Replace the sieve cannister (See Note 3) • Rebuild or replace the compressor
<ul style="list-style-type: none"> • Oxygen percentage indicator not functioning 	<p>OPI power control board failure</p> <ul style="list-style-type: none"> • Oxygen output readings out of calibration 	<ul style="list-style-type: none"> • Verify all wiring harnesses are connected • Verify there are no faulty solder joints on OPI • Verify the OPI voltage outputs and compare with OPI Voltage Verification Chart (See Page 5-10) 	<ul style="list-style-type: none"> • Connect all wiring harnesses • Replace the OPI board • Replace the OPI board



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
<ul style="list-style-type: none"> • High pressure alarm • Low pressure alarm • Oxygen percentage indicator • Pressure relief valve activated 	<p>Valve / solenoid failure</p> <ul style="list-style-type: none"> • Low oxygen production • No oxygen production • Supply pressure too high 	<ul style="list-style-type: none"> • Verify the solenoid is working • Verify the pilot valve is working • Verify the main valve is working • Verify all wiring harnesses are connected • Verify the compressor is working correctly 	<ul style="list-style-type: none"> • Replace the solenoid • Replace the pilot valve • Replace the main valve • Reconnect the wiring harnesses • Rebuild the compressor • Replace the compressor
<ul style="list-style-type: none"> • Low pressure alarm 	<p>Sieve canister leaking</p> <ul style="list-style-type: none"> • Reduced or no oxygen production 	<ul style="list-style-type: none"> • Verify there are no loose screws on the sieve canister assembly • Verify there are no blown gaskets on the sieve canister assembly 	<ul style="list-style-type: none"> • Tighten the hardware • Replace the sieve canister



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
Cooling fan failure <ul style="list-style-type: none"> • Warm cabinet temperature 	<ul style="list-style-type: none"> • Thermal switch open 	<ul style="list-style-type: none"> • Verify the cooling fan electrical connectors are seated • Verify there is continuity on electrical fan wiring harness • Verify there is power to the cooling fan • Verify the cooling fan bearings are not worn • Verify the cooling fan is not obstructed 	<ul style="list-style-type: none"> • Reseat the connectors • Replace the wiring harness • Reseat the connectors • Replace the cooling fan • Remove the obstructions from cooling fan
<ul style="list-style-type: none"> • False alarms 	Oxygen pressure transducer failure <ul style="list-style-type: none"> • Inaccurate or no pressure readings 	<ul style="list-style-type: none"> • Verify the pressure tubing is not damaged • Verify there are no faulty solder joints on PCB • Verify there are no component failures on PCB 	<ul style="list-style-type: none"> • Replace the damaged tubing • Replace the Control PCB • Replace the Control PCB



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
<ul style="list-style-type: none">• Pressure relief valve activated• Intermittent audible alarm• Red LED blinking• Low pressure	Cycle failure <ul style="list-style-type: none">• Unit will cycle then activate the pressure relief valve• Unit will not complete the cycle	<ul style="list-style-type: none">• Verify both wiring harnesses to the solenoid are attached• Verify both wiring harnesses have continuity• Verify there are no faulty solder joints on PCB• Verify there are no component failures on PCB	<ul style="list-style-type: none">• Reconnect the wiring harnesses• Replace the wiring harnesses• Replace the PCB• Replace the PCB



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
<ul style="list-style-type: none"> Inaccurate oxygen readings 	<p>Oxygen percentage indicator (OPI) board failure (Model 605)</p> <ul style="list-style-type: none"> Oxygen percentage inaccurate 	<ul style="list-style-type: none"> Verify the OPI board wiring harness is connected Verify the solder joints are not faulty on OPI board Verify there are no component failures on OPI board Verify the output with a calibrated oxygen analyzer Measure the DC output voltage on PCB 	<ul style="list-style-type: none"> Reconnect the wiring harness Replace the OPI board Replace the OPI board Replace the OPI board Replace the PCB
<p>Flow meter failure</p> <ul style="list-style-type: none"> Inaccurate oxygen flow 	<ul style="list-style-type: none"> Flow meter miscalibrated Flow ball stuck 	<ul style="list-style-type: none"> Verify the flow meter can be adjusted properly (See Note 4) 	<ul style="list-style-type: none"> Replace the flow meter



Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
<ul style="list-style-type: none"> • Loss of power • Low pressure alarm 	<p>Compressor compartment thermal switch failure</p> <ul style="list-style-type: none"> • Compartment temperature allowed to exceed 70 +/- 5 degrees C or 158 +/- 5 degrees F 	<ul style="list-style-type: none"> • Verify that air flow around concentrator is not blocked • Verify that all filters are clean • Verify that the thermal switch is closing after cooling 	<ul style="list-style-type: none"> • Reposition the concentrator to an open area • Replace all dirty filters • Replace the thermal switch
<ul style="list-style-type: none"> • Loss of power • Low pressure alarm 	<p>Compressor thermal switch failure</p> <ul style="list-style-type: none"> • Compressor temperature allowed to exceed 145 +/- 5 degrees C or 293 +/- 5 degrees F 	<ul style="list-style-type: none"> • Verify that thermal switch is closing after cooling (See Note 1) 	<ul style="list-style-type: none"> • Replace the compressor



7.3 System Pressure Test Table

Symptom	Cause	Verification	Corrective Action
System Pressure Test <ul style="list-style-type: none"> Abnormal readings 	<ul style="list-style-type: none"> High pressure reading above 29 psig. 	<ul style="list-style-type: none"> Check oxygen percentage at 5 lpm. If Low? 	<ul style="list-style-type: none"> Check for proper valve cycling Replace sieve canister
<ul style="list-style-type: none"> Fluctuating pressure 	<ul style="list-style-type: none"> Difference in Peak pressure is > 1 psig. 	<ul style="list-style-type: none"> Check oxygen percentage at 5 lpm. If Low? 	<ul style="list-style-type: none"> Check for leaks Replace sieve canister
<ul style="list-style-type: none"> Low pressure reading 	<ul style="list-style-type: none"> Low pressure reading below 25 psig. 	<ul style="list-style-type: none"> Check for leaks Check for dirty filters Check for compressor cup seal wear 	<ul style="list-style-type: none"> Replace tubing Replace fittings Replace filters Perform compressor maintenance



Chapter 8: Repair & Replacement

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8.2	Millennium Oxygen Concentrator Repair Kits	8-6
8.3	Warnings and Cautions	8-16
8.4	Replacement Instructions	8-17



Chapter 8: Repair & Replacement

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Chapter 8: Repair & Replacement

8.1 Overview

Figures 8-1 through 8-3 list the names and identify the locations of the major replaceable components in the Millennium Oxygen Concentrator System (Millennium), Models 600 and 605. These figures provide a quick reference and overview of the unit. Within each replacement section, more detailed support graphics are provided to illustrate the exact component location and replacement procedure(s).

Refer to Chapter 9 for testing that is required after components are replaced.

For additional information or technical support, contact:

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Chapter 8: Repair & Replacement

Overview (Continued)

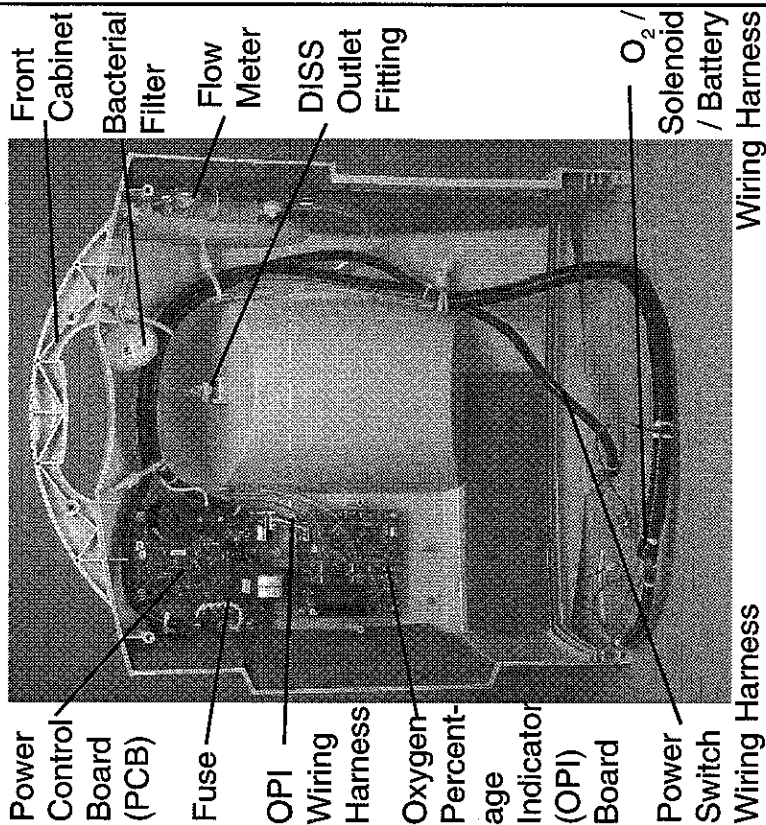


Figure 8-1
Millennium Oxygen Concentrator Components – View 1
(Component Location and Identification)

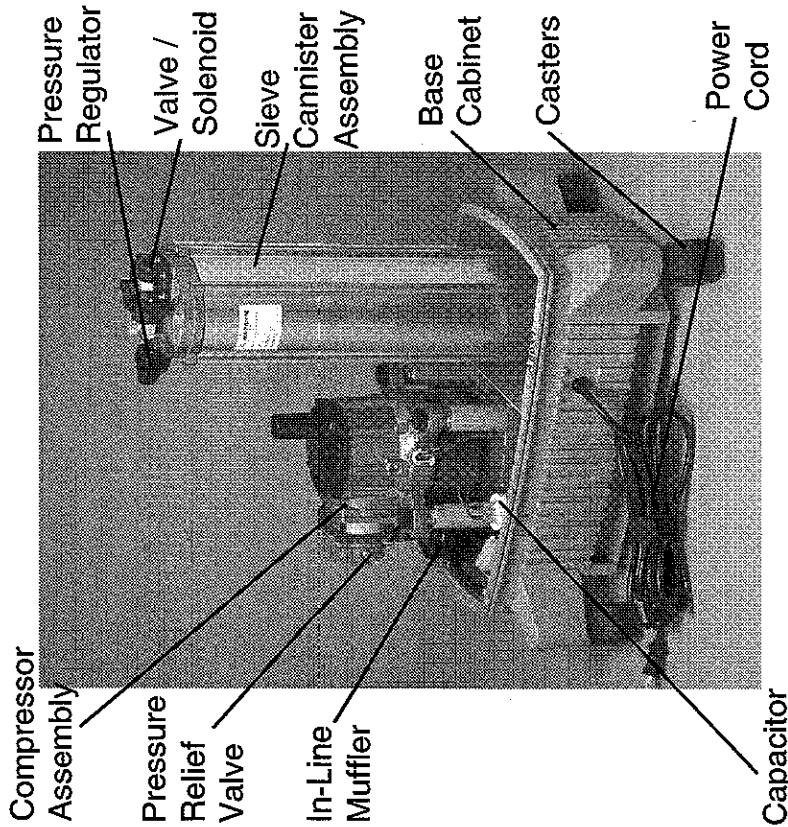


Figure 8-2
Millennium Oxygen Concentrator Components – View 2
(Component Location and Identification)



Overview (Continued)

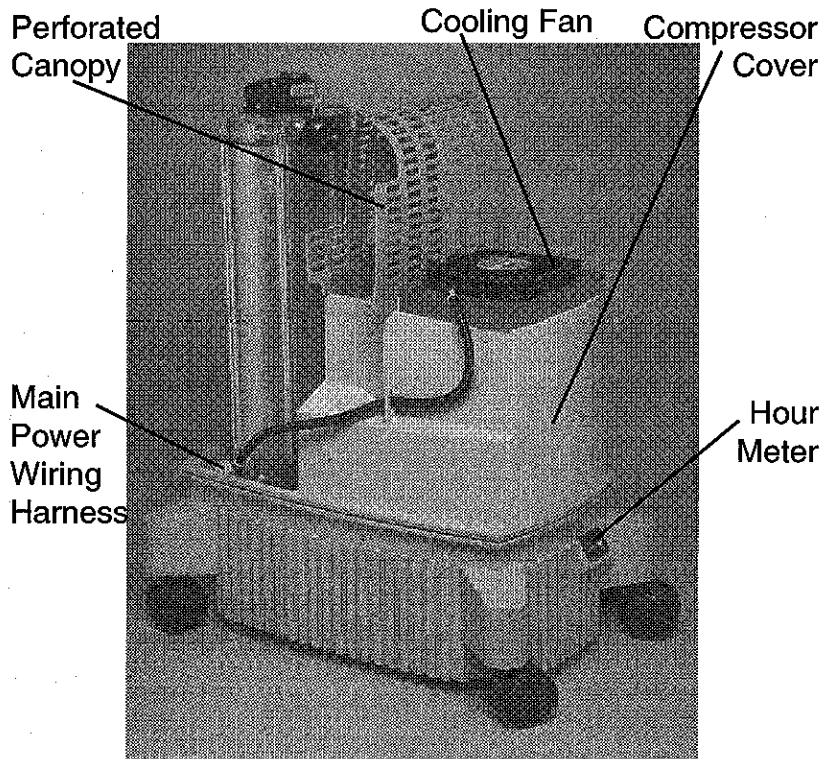


Figure 8-3
Millennium Oxygen Concentrator Components – View 3
(Component Location and Identification)



8.2 Millennium Oxygen Concentrator Repair Kits

Replacement Part	Replacement Part No.	Page No.
Alarm Battery (9-volt)	130-0009-00	6-10
Base Cabinet Includes: <ul style="list-style-type: none"> • Base cabinet • Base cabinet foam assembly • Base cabinet foam, compressor • Base cabinet foam, hose port • Base cabinet pan • Base cabinet pan foam • Caster (×4) • 4-20 × .50" large pan head screw (plastite) • Cable tie (×3) 	H636	8-97
Base Cabinet Pan	H642	8-25
Blow Down Muffler	260-0805-10	8-93
Cable Tie Kit – Screw Down (×10)	H641	N. A.
Capacitor (15 Micro Farad – 400 volt)	180-1502-20	8-72
Caster (×4)	H624	8-22
Compressor – 120 V Includes: <ul style="list-style-type: none"> • Compressor assembly (120V / 60 Hz) • One-eared clamp 	H611	8-76



Millennium Oxygen Concentrator Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Compressor – 230 V Includes: <ul style="list-style-type: none">• Compressor assembly (230V / 50 Hz)• One-eared clamp	H612	8-76
Compressor Cover / Perforated Canopy Includes: <ul style="list-style-type: none">• Compressor cover• Compressor foam• Compressor foam• Perforated canopy• Label (battery)• Label (caution)	H637	8-67



Millennium Oxygen Concentrator Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Compressor Maintenance Includes: <ul style="list-style-type: none">• Piston cup• Valve keeper / restraint (exhaust)• Valve keeper (intake)• Cylinder sleeve• Valve flapper (exhaust)• Valve flapper (intake)• O-ring (head & sleeve) (x2)• O-ring (intake filter cover)• Gasket (intake)• Filter (felt)• 6-32 x .188" screw (valve x2)• 10-24 x .625" screw (retainer x4)	H610	6-13
Compressor Mount Includes: <ul style="list-style-type: none">• Compressor bumper (x4)• Spring, helical (x4)• 10-24 x 1.00" hex shoulder screw (x4)	H616	8-76



Millennium Oxygen Concentrator Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Cooling Fan	360-9100-15	8-62
DISS Outlet Fitting Includes: <ul style="list-style-type: none">• DISS outlet fitting• 1/2" lock washer• 1/2"-13 jam nut (nylon)	H628	8-38
Filter – Air Inlet (×6)	H619	6-5
Filter – Bacteria Includes: <ul style="list-style-type: none">• Bacteria filter (×6)• Cable ties (×12)	H621	6-7
Filter – Inlet (single lumen ×6)	H620	6-5
Filter – Pre-Inlet (×6)	H618	6-5
Flow Meter – Standard Includes: <ul style="list-style-type: none">• Flow meter (5 lpm)• Washer / nut (×2)• Cable tie (×2)	H627	8-35
Flow Meter – Pediatric Includes: <ul style="list-style-type: none">• Pediatric flow meter (1 lpm)• Cable tie (×2)	H644	8-35



Millennium Oxygen Concentrator Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Foam Includes: <ul style="list-style-type: none"> • Front cabinet foam (.50" and .75") • Rear cabinet foam (.50") • Compressor housing foam (.50" and .75") • Base foam assembly • Base foam, compressor • Base foam, hose port • Base bottom pan foam 	H623	8-99
Front Cabinet Includes: <ul style="list-style-type: none"> • Front cabinet • Control Overlay (Model #600) • Control Overlay (Model #605) • Front cabinet foam (.50" and .75") • 10-32 x .50" low torque screw (x5) • Cable tie (x5) 	H634	8-59 8-31 (Partial)
Fuse – 50 HZ Power Control Board (PCB) (63 mA @ 250 V, 50 Hz) (2 / PACK)	H639	8-44
Fuse – 60 HZ Power Control Board (PCB) (125 mA @ 120 V, 60 Hz) (2 / PACK)	H638	8-44



Millennium Oxygen Concentrator Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Hour Meter Includes: • Hour meter • Locking frame	199-0600-60	8-83
Millennium Screw Driver	H646	N. A.
Millennium Tool Kit Includes: • Millennium screw driver • Millennium / Alliance one-eared clamp pliers • Millennium / Alliance pressure test gauge assembly kit	H647	N. A.
Millennium / Alliance One-eared Clamp Pliers	H645	N. A.
Millennium / Alliance Pressure Test Gauge Assembly Kit	513-1	N. A.
Muffler – In-line Includes: • In-line filter • Pressure hose (3/8" I. D. × 2") • One-eared clamp (×3)	H622	8-80
One-eared Clamp Kit (×10)	H640	N. A.
Overlay – Control Model #600	340-0600-00	8-20
Overlay – Control Model #605	340-0605-00	8-20
Overlay – Instructions	320-0650-00	8-20



Millennium Oxygen Concentrator Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Oxygen Percentage Indicator (OPI) Board Includes: • OPI board • 6-19 × .31" low torque screw (×4)	H633	8-50
Oxygen Percentage Indicator (OPI) Wiring Harness	610-0625-00	8-48
Perforated Canopy	260-0671-00	8-65
Power Control Board (PCB) - No OPI Includes: • PCB assembly (120 V) • 6-19 × .31" low torque screw (×4)	H629	8-45
Power Control Board (PCB) - No OPI Includes: • PCB assembly (230 V) • 6-19 × .31" low torque screw (×4)	H631	8-45
Power Control Board (PCB) - With OPI Includes: • PCB assembly (230 V) • 6-19 × .31" low torque screw (×4)	H632	8-45
Power Control Board (PCB) - With OPI Includes: • PCB assembly (120 V) • 6-19 × .31" low torque screw (×4)	H630	8-45
Power Cord Includes: • AC power cord • Strain relief grommet	H617	8-95
Power Switch	441-0600-00	8-41
Pressure Regulator	365-0001-00	8-88



Millennium Oxygen Concentrator Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Pressure Relief Valve	365-0600-10	8-74
Rear Access Door w/ Rear Foam	H643	N.A.
Rear Cabinet Includes: • Rear cabinet • Access door • Instruction label • Rear cabinet foam • 10-32 x .50" pan head screw (x6)	H635 See Note ¹	8-28
Return Unit Shipping Carton Includes: • Shipping carton • Insert, bottom • Insert, top • Bag (plastic)	H615	N.A.
Technical Service Manual	1002074	N. A.
Sieve Canister – 60 Hz Includes: • Sieve canister module assembly (60 Hz) • Foam (canister bottom) • One-eared clamp	H614	8-90



Millennium Oxygen Concentrator Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Sieve Canister – 50 Hz Includes: • Sieve canister module assembly (50 Hz) • Foam (canister bottom) • One-eared clamp	H613	8-90
User's Manual	577-0615-00	N. A.
Valve / Solenoid • Air valve / solenoid assembly (SMC) • 6-32 x .50" hex screw (x5) • #6 flat washer (x5)	H625	8-85
Wiring Harness, Main Power Includes: • Wiring harness, main • Tubing, convoluted (with crimped ends)	610-00620-00	8-69
Wiring Harness, O ₂ / Solenoid / Battery – No OPI Includes: • Wiring harness, O ₂ / solenoid / battery • Tubing, convoluted (with crimped ends)	610-00600-00	8-56