Pressure Regulator Replacement (Continued)

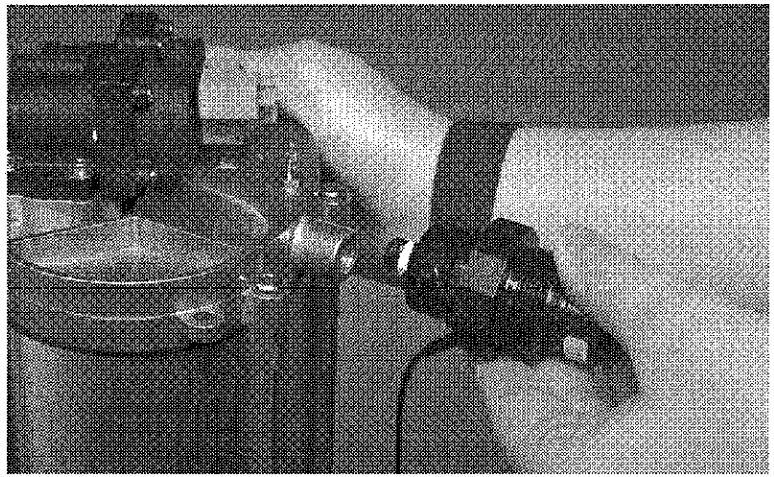

Figure 8-81
Removing the Pressure Regulator

Step 2 Installing the Pressure Regulator

a. Apply a layer of Teflon thread tape to the threads of the pressure regulator.

b. Align the pressure regulator with the pressure regulator port in the sieve canister assembly. Screw the pressure regulator into the sieve canister assembly until strong resistance is felt and the pressure regulator outlet port is oriented in the correct position.

c. Install the pressure tubing on the pressure regulator outlet port.

d. Connect the unit to a power source and turn on the unit. Apply snoop leak detector to the area where the pressure regulator mounts to the sieve canister assembly and where the O_2 tubing connects to the outlet barb to check for leaks.

8.4.27 Sieve Canister Assembly Replacement

Replacement Part Number H613 - 50 Hz
H614 - 60 Hz

Included in Kit:	Tools & Supplies Required:
Sieve canister assembly	Phillips screwdriver (medium w/ long shaft)
Foam, canister	Phillips screwdriver (large)
One-eared clamp (×1)	Crimping clamp tool or diagonals
	Channel locks (medium)
	Hog ring or slip joint pliers (medium)
	Teflon® thread tape

Procedure

Removed / Installed During Process:

- Rear cabinet (See Section 8.4.4 for more detailed instructions.)
- Front cabinet assembly (separated from unit) (See Section 8.4.5 for more detailed instructions.)
- Compressor cover / perforated canopy (See Section 8.4.18 for more detailed instructions.)
- Valve / solenoid assembly (See Section 8.4.25 for more detailed instructions.)
- Pressure regulator (See Section 8.4.26 for more detailed instructions.)
- Sieve canister assembly
- Blow down muffler (See Section 8.4.28 for more detailed instructions.)

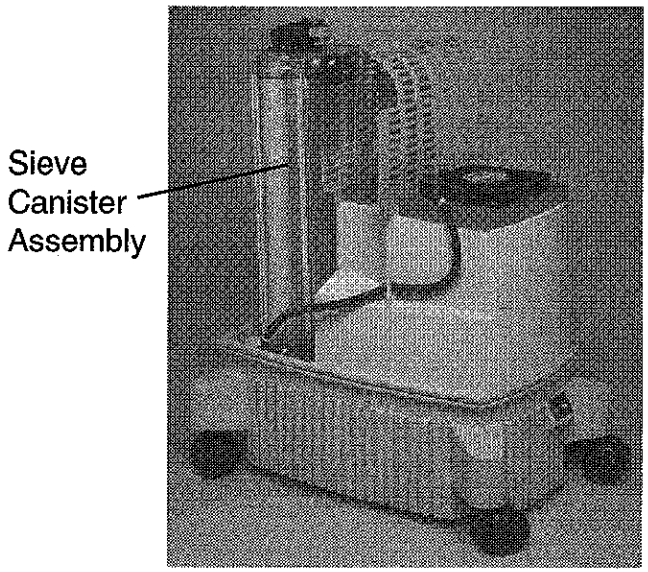

Figure 8-82
Location of the Sieve Canister Assembly

Step 1 Removing the Sieve Canister Assembly

a. Using a Phillips screwdriver, remove the four screws securing the sieve canister assembly to the base cabinet.

Sieve Cannister Assembly Replacement (Continued)

b. Using a crimping clamp tool or diagonals, cut the one-eared clamp securing the 12" pressure tubing to the inlet port of the sieve canister assembly.

c. Remove the 12" pressure tubing from the inlet port of the sieve canister.

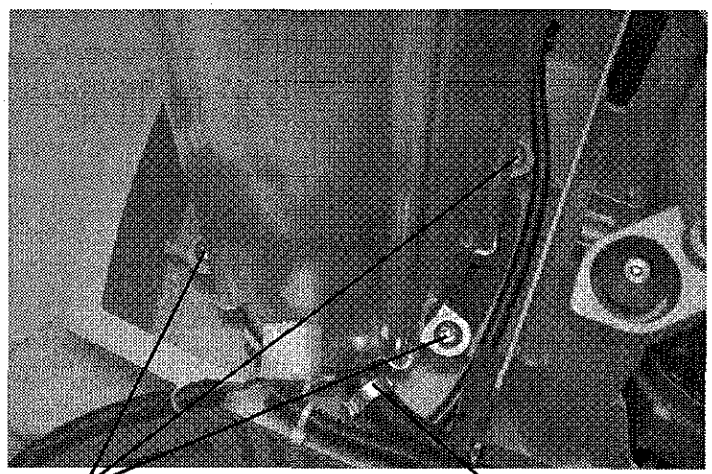

Figure 8-83
Location of the One-eared Clamp and Sieve Canister Assembly Mounting Screws

d. Lift the sieve canister assembly up and out of the base cabinet.

Figure 8-84
Removing the Sieve Canister assembly

e. Remove the blow down muffler from the sieve canister module. (See Section 8.4.28 for more detailed instructions on removing the blow down muffler.)

f. Remove the brass fitting from the top of the sieve canister module.

Sieve Cannister Assembly Replacement (Continued)

Step 2 Installing the Sieve Canister Assembly

a. Install the supplied canister foam on the bottom of the sieve canister assembly.

b. Install the brass fitting in the top of the sieve canister module.

c. Install the blow down muffler onto the sieve canister module. (See Section 8.4.28 for more detailed instructions on installing the blow down muffler.)

d. Set the sieve canister assembly in place in the base cabinet.

NOTE: Insure that the AC power cord is clear of the sieve canister assembly.

e. Slide the one-eared clamp provided onto the 12" pressure tubing.

f. Install the 12" pressure tubing provided on the inlet port of the sieve canister.

g. Using a crimping clamp tool or diagonals, "pinch" the one-eared clamp securing the pressure tubing to the inlet port of the sieve canister assembly.

h. Using a Phillips screwdriver, insert then tighten the four screws that secure the sieve canister assembly to the molded base.

i. Install the valve / solenoid on the top of the sieve canister. (See Section 8.4.25 for more detailed instructions.)

j. Install the wire connectors on the terminals of the valve / solenoid.

k. Connect the yellow pressure tubing to the brass fitting on the top of the sieve canister.

l. Connect the clear pressure tubing to the port on the pressure regulator.

8.4.28 Blow Down Muffler Replacement

Replacement Part Number 260-0805-10

Included in Kit:	Tools Required:
Blow down muffler	Phillips screwdriver (medium w/ long shaft) Phillips screwdriver (large) Channel locks (medium) Hog ring or slip joint pliers (medium)

Procedure

Removed / Installed During Process:

- Rear cabinet (See Section 8.4.4 for more detailed instructions.)
- Front cabinet assembly (separated from unit) (See Section 8.4.5 for more detailed instructions.)
- Compressor cover / perforated canopy (See Section 8.4.18 for more detailed instructions.)
- Valve / solenoid assembly (See Section 8.4.25 for more detailed instructions.)
- Pressure regulator (See Section 8.4.26 for more detailed instructions.)
- Sieve canister assembly (See Section 8.4.27 for more detailed instructions.)
- Blow down muffler

NOTE: If care is taken during the following procedures, the valve / solenoid assembly and the pressure regulator do not have to be removed. However, if these components are damaged during the procedure, they must be replaced.

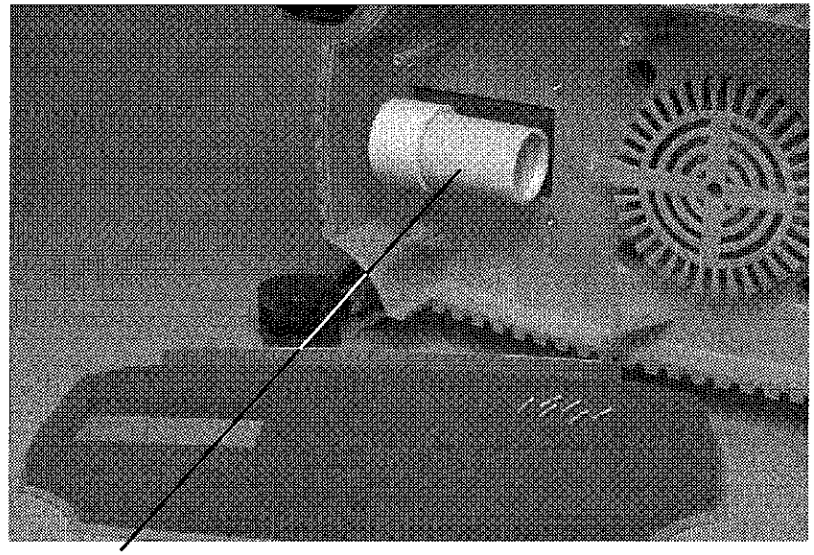

Figure 8-85
Location of the Blow Down Muffler

Blow Down Muffler Replacement (Continued)

Step 1 Removing the Blow Down Muffler

a. Note the orientation of the blow down muffler in relation to the sieve canister assembly.

b. Using channel locks, turn the blow down muffler counter-clockwise until it is free of the sieve canister assembly.

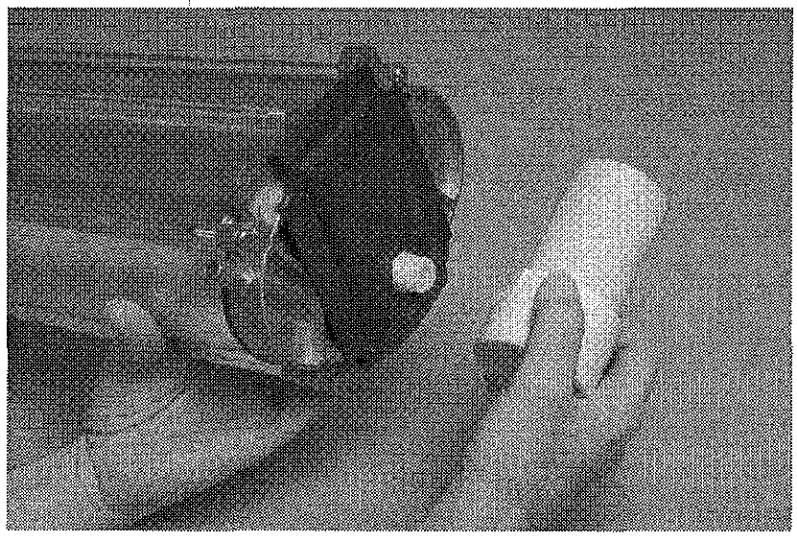

Figure 8-86
Removing the Blow Down Muffler

Step 2 Installing the Blow Down Muffler

a. Align the blow down muffler with the sieve canister assembly's threaded fitting. Screw the blow down muffler onto the fitting until it comes in contact with the sieve canister foam and the blow down muffler is positioned in its original orientation.

8.4.29 Power Cord Replacement

Replacement Part Number H617

Included in Kit:	Tools Required:
AC power cord (w/ strain relief grommet)	Phillips screwdriver (medium w/ long shaft) Hico tool Amp terminal retractor tool

Procedure

Removed / Installed During Process:

- Rear cabinet (See Section 8.4.4 for more detailed instructions.)
- Front cabinet assembly (separated from unit) (See Section 8.4.5 for more detailed instructions.)
- Compressor cover / perforated canopy (See Section 8.4.18 for more detailed instructions.)
- Power cord

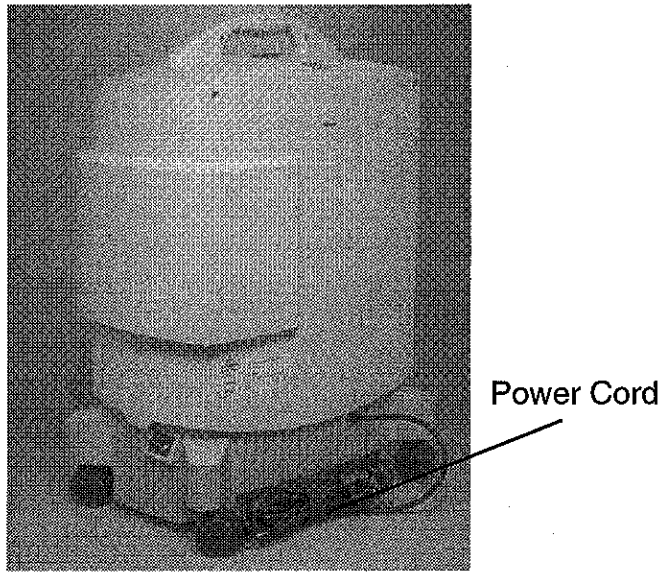

Figure 7-87
Location of the Blow Down Muffler

Step 1 Removing the Power Cord

a. Disconnect the main power wiring harness connector from its receptacle on the power switch wiring harness. Note the orientation of both the black and white power cord wires in the main power wiring harness connector.

b. Using an Amp terminal retractor tool, remove the female connectors of both the black and white power cord wires from the main power wiring harness connector.

Power Cord Replacement (Continued)

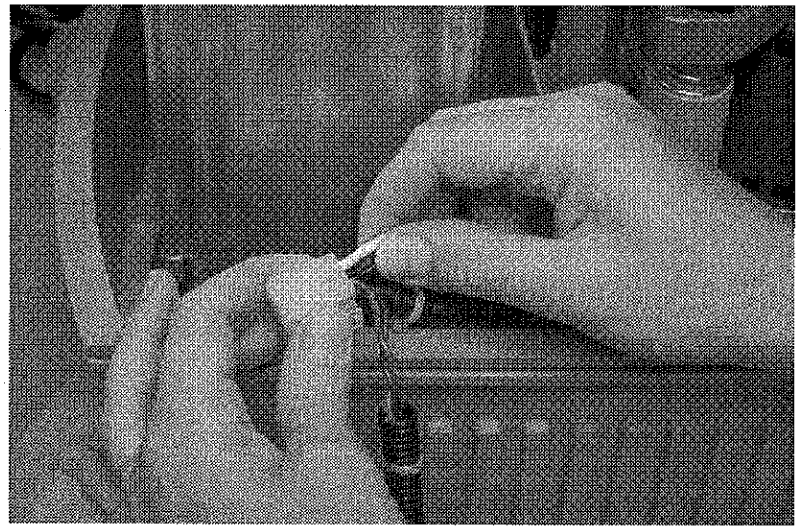

Figure 8-88
Removing the Power Cord Wires from the Main Power Wiring Harness Connector

c. Using a Hico tool, depress the locking tabs on the AC power cord strain relief grommet installed in the base cabinet.

d. Once the grommet is free of the base cabinet, remove the power cord.

Step 2 Installing the AC Power Cord

a. Insert the power cord wires into the hole in the base cabinet.

b. Route the power cord wires to the main power wiring harness connector.

c. Align the female connectors on the end of the black and white power cord wires with their receptacles in the main power wiring harness connector.

d. Press each power cord wire female connector into the main power wiring harness connector until completely seated.

CAUTION: The black and white power cord wires MUST be inserted in the main power wiring harness connector in their original configuration. If they are reversed, damage to the unit will occur.

e. Align the power cord strain relief grommet with the cutout in the base cabinet. Press the grommet into the base cabinet until completely seated.

f. Plug the main power wiring harness connector into its receptacle on the power switch wiring harness.

8.4.30 Base Cabinet Replacement

Replacement Part Number H636

Included in Kit:	Tools Required:
Base cabinet (w/ foam insulation)	Phillips screwdriver (medium w/ long shaft)
Base cabinet pan (w/ foam insulation)	Phillips screwdriver (large)
Caster (×4)	Phillips screwdriver (small)
#6-196 × .31" low torque screw (×6)	Rubber mallet
Cable tie (×3)	Needle-nose pliers (insulated)
	Crimping clamp tool or diagonals
	1/8" hex key wrench or socket
	Hog ring or slip joint pliers (medium)
	Hico tool
	Amp terminal retractor tool

Procedure

Removed / Installed During Process:

- Rear cabinet (See Section 8.4.4 for more detailed instructions.)
- Front cabinet assembly (separated from unit) (See Section 8.4.5 for more detailed instructions.)
- Compressor cover / perforated canopy (See Section 8.4.18 for more detailed instructions.)
- Capacitor (See Section 8.4.20 for more detailed instructions.)
- Compressor / motor assembly (See Section 8.4.22 for more detailed instructions.)
- In-line muffler (See Section 8.4.23 for more detailed instructions.)
- Hour meter (See Section 8.4.24 for more detailed instructions.)
- Sieve canister assembly (See Section 8.4.27 for more detailed instructions.)
- Power cord (See Section 8.4.29 for more detailed instructions.)
- Base cabinet and bottom pan

NOTE: If care is taken during the following procedures, the air valve / solenoid assembly and the pressure regulator do not have to be removed. However, if these components are damaged during the procedure, they must be replaced.

Base Cabinet Replacement (Continued)

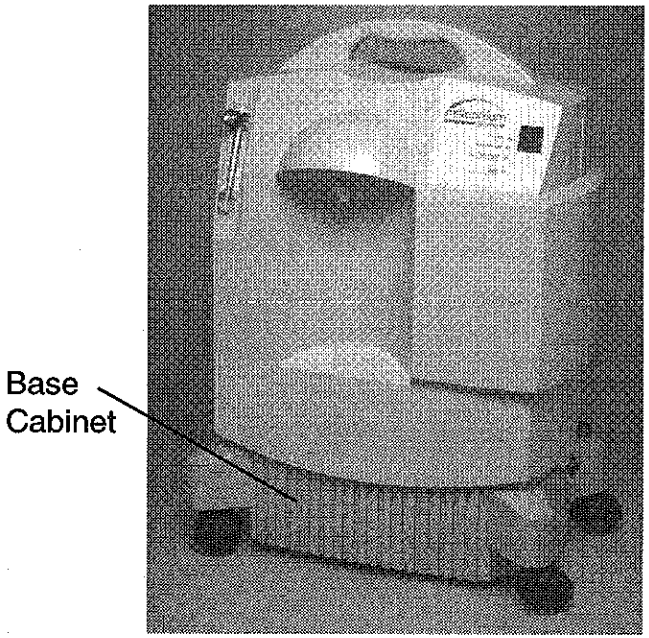

Figure 8-89
Location of the Base Cabinet

Step 1 Installing the Base Cabinet

a. All components have now been removed from the original base cabinet. To begin reassembly, place the base cabinet on a protected work surface. Follow the disassembly process in reverse order to reassemble the unit.

8.4.31 Foam Replacement

Replacement Part Number H623

Included in Kit:	Tools & Supplies Required:
Front cabinet foam	Phillips screwdriver (medium w/ long shaft)
Rear cabinet foam	Phillips screwdriver (large)
Compressor housing foam	Hog ring or slip-joint pliers (medium)
Base foam assembly	Flat-blade screwdriver (medium)
Base foam, compressor	Phillips screwdriver (small)
Base foam, hose port	Needle-nose pliers (insulated)
Base bottom pan foam	Crimping clamp tool or diagonals
	Hico tool
	Amp terminal retractor tool
	1/8" hex key wrench or socket
	Isopropyl alcohol
	Cleaning cloth

Procedure

Removed / Installed During Process:

- Rear cabinet (See Section 8.4.4 for more detailed instructions.)
- Front cabinet assembly (separated from unit) (See Section 8.4.5 for more detailed instructions.)
- Compressor cover / perforated canopy (See Section 8.4.18 for more detailed instructions.)
- Capacitor (See Section 8.4.20 for more detailed instructions.)
- Compressor / motor assembly (See Section 8.4.22 for more detailed instructions.)
- In-line muffler (See Section 8.4.23 for more detailed instructions.)
- Hour meter (See Section 8.4.24 for more detailed instructions.)
- Sieve canister assembly (See Section 8.4.27 for more detailed instructions.)
- Power cord (See Section 8.4.29 for more detailed instructions.)

NOTE: If care is taken during the following procedures, the air valve / solenoid assembly and the pressure regulator do not have to be removed. However, if these components are damaged during the procedure, they must be replaced.

Foam Replacement (Continued)

Step 1 Removing and Installing the Foam

NOTE: Throughout this process a small amount of isopropyl alcohol on a cleaning cloth may be necessary to remove the adhesive residue from the mounting surfaces.

a. Remove the six screws securing the base bottom pan to the base cabinet.

b. Remove the base bottom pan foam and any adhesive remaining on the base bottom pan.

c. Remove the protective backing from the new base bottom pan foam, align the foam correctly with the base bottom pan, then set the foam in place.

d. Install the base bottom pan onto the base cabinet. Secure the base bottom pan using the six original screws.

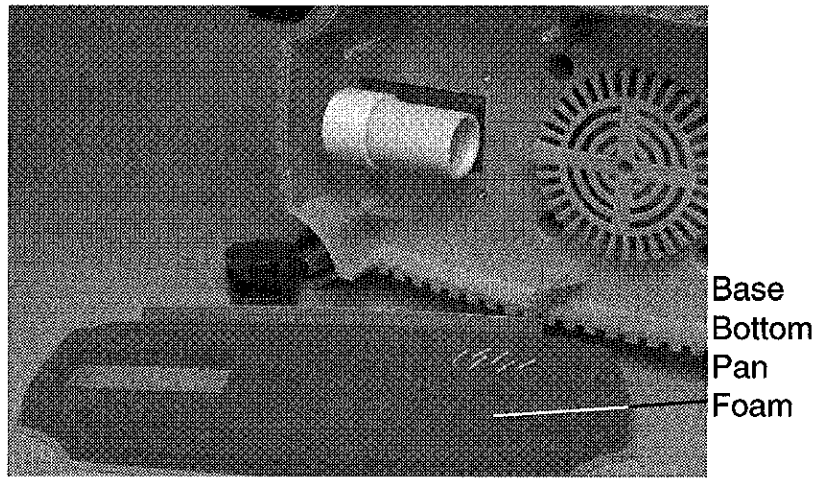

Figure 8-90
Installing the Base Bottom Pan Foam

e. Remove the base foam assembly, compressor foam, and hose foam, as well as any remaining adhesive from the base cabinet.

f. One by one, remove the protective backing from the new foams to be installed on the base cabinet. Align each correctly, then set each in place.

g. Remove the rear cabinet foam and any adhesive remaining on the rear cabinet.

Foam Replacement (Continued)

h. Remove the protective backing from the rear cabinet foam, align the foam correctly with the rear cabinet, then set the foam in place.

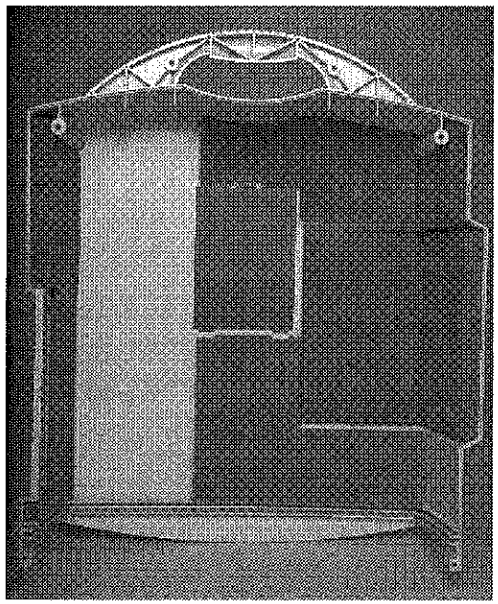

Figure 8-91
Location of the Rear Cabinet Foams

i. Remove the front cabinet foams and any remaining adhesive from the front cabinet.

j. One by one, remove the protective backing from the new foams to be installed on the front cabinet. Align each correctly, then set each in place.

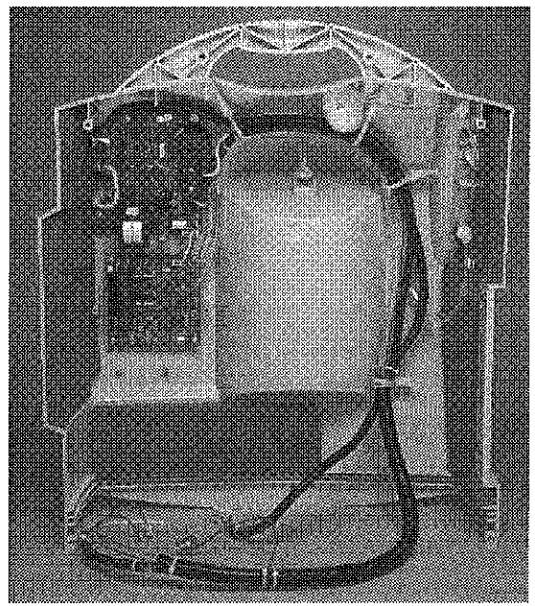

Figure 8-92
Location of the Front Cabinet Foams

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Chapter 9: Testing

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Chapter 9: Testing

9.1 Millennium System Final Test

The following test must be performed after any repairs to the Millennium Oxygen Concentrator System (Millennium). The results of the test must be entered on the Testing Data Sheet provided and then signed, in ink, and dated by the technician performing the test.

This test may also be used as a screening procedure on the unit between patient usages.

NOTE:	The results of this test must be recorded in the space provided on the Testing Data Sheet.
NOTE:	All testing on the unit must be performed at the proper voltage and frequency applicable for the country where the unit is being used.
NOTE:	Before starting the System Final Test, the unit must be turned on and run for a minimum of one hour with the front and back cabinets in place.

Equipment & Tools

Digital Multi-Meter (See Appendix A)

Calibrated Oxygen Analyzer (See Appendix A)

Millennium Tool Kit

9.1.1 Testing Procedure

Step 1 Insure that the unit has been run-in for a minimum of one hour.

Step 2 Record the serial number, located on the rear of the unit, in the space provided on the Testing Data Sheet (See Section 9.2).

Step 3 Record the voltage and frequency at which the unit is being tested.

Step 4 Record the hours from the hour meter located on the lower right hand side of the unit.

Step 5 Remove the front and rear cabinets (See section 8.4.4 and 8.4.5). Disconnect the yellow pressure tubing from the fitting on top of the sieve canister. Using the pressure gauge, "T" fitting, and the short yellow tubing supplied with the tool kit, connect the pressure gauge to the long yellow tubing and the sieve canister. Turn the unit on and set the flow meter to 5 lpm. Allow the unit to cycle for at least two minutes to stabilize. Hold the gauge in a vertical position then read and record the peak pressure for four cycles.

Testing Procedure (Continued)

NOTE: After completing Step 7, the pressure gauge, "T" connector, and short yellow tubing can be removed from the sieve cannister.

Step 6 Connect the pressure gauge to the DISS outlet fitting to test the "No Flow" alarms. The yellow LED (Low Oxygen) should illuminate and an intermittent alarm should sound within 60 seconds. Record the results.

Step 7 With the pressure gauge still connected and held in a vertical position, measure the oxygen outlet pressure. The oxygen outlet pressure should be within 5.0 - 7.0 psi. If the oxygen outlet pressure needs adjusted, refer to Section 5.4. Record the results.

NOTE: The oxygen analyzer used in the following steps must be calibrated to meet the manufacturer's specifications.

Step 8 Connect the Black ground lead from the digital multi-meter to Pin 19 and the Red positive lead to Pin 16 on the power control board (PCB). Set the multi-meter to VDC. Set the flow meter to 5 lpm and connect a calibrated oxygen analyzer to the DISS outlet. Observe the oxygen analyzer for three cycles and record the oxygen reading for each cycle. Measure and record the voltage between pins 16 and 19. Add the three oxygen readings and then divide by three to find the average oxygen outlet purity. Locate the average oxygen purity on the chart provided (see Section 5.5). Compare the voltage reading from the DMM to the voltage listed on the chart.

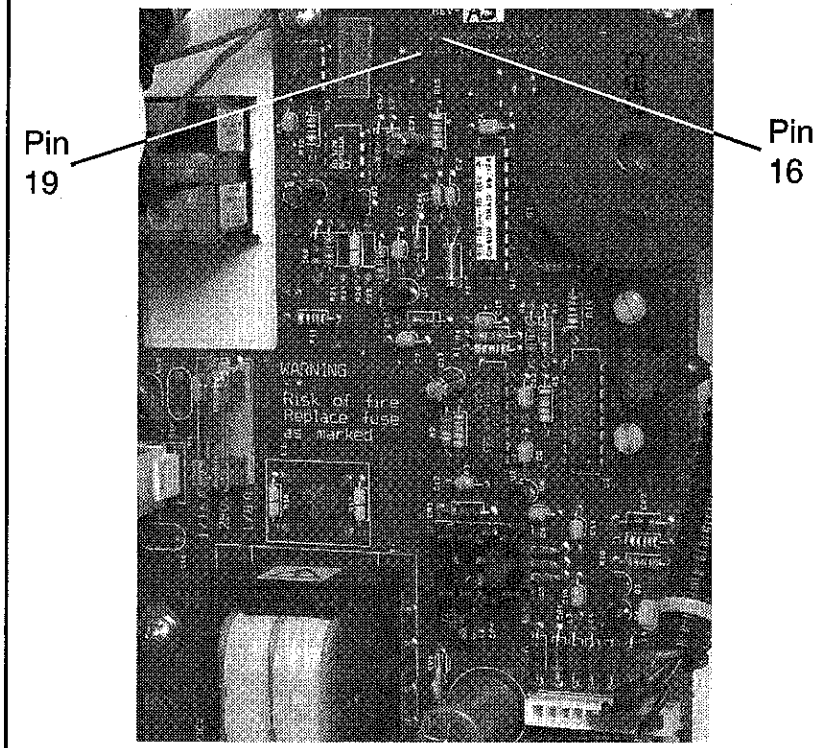

Figure 9-1
Location of Pins 16 and 19

Testing Procedure (Continued)

Step 9 Set the flow meter to 5 lpm. With the oxygen analyzer still connected to the DISS outlet, measure and record the oxygen concentration. Remove the oxygen analyzer and set the flow meter to 2 lpm. Reconnect the oxygen analyzer. Measure and record the oxygen concentration.

NOTE: After completing Step 10, the oxygen analyzer and tubing can be removed from the DISS outlet. The multi-meter and the test leads can be removed from the PCB.

Step 10 Reinstall the front and rear cabinets (see Sections 8.4.4 and 8.4.5).

Step 11 In ink, sign and date the Testing Data Sheet after all tests have been completed. The notification number is optional (in-house only). If the unit has failed any of the tests performed, the unit must be repaired and retested according to this service manual.

OPI Voltage Verification Chart

Oxygen Concentration Percentage Average	Average Acceptable Voltage Output (VDC)
96 %	3.96 to 3.72 VDC
95 %	3.92 to 3.68 VDC
94 %	3.88 to 3.64 VDC
93 %	3.84 to 3.60 VDC
92 %	3.80 to 3.56 VDC
91 %	3.76 to 3.52 VDC
90 %	3.72 to 3.48 VDC
89 %	3.68 to 3.44 VDC
88 %	3.64 to 3.40 VDC
87 %	3.60 to 3.36 VDC
86 %	3.56 to 3.32 VDC
85 %	3.52 to 3.28 VDC

9.2 Testing Data Sheet

NOTE: All information on this data sheet should be entered in the box provided for the test completed. The data sheet must then be signed in ink and dated by the technician performing the tests.

Line Voltage _____ VAC Hz _____ Serial No. _____ Hour Meter _____

Oxygen Outlet Pressure 5.0 - 7.0 psig	**PRESSURE GAUGE READING**

Peak Pressures Within 1 psig of each other at 25 to 29 psig	**1ST PEAK**	**2ND PEAK**
	3RD PEAK	**4TH PEAK**

No Flow Alarms < / = 60 sec.	**PASS**	**FAIL**

Oxygen Analyzer Reading	**1ST CYCLE**	**2ND CYCLE**	**3RD CYCLE**
Average (of three cycles)			
PCB Voltage Reading			
PASS		**FAIL**	

Flow Meter Oxygen Concentration	**60 Hz**		**50 Hz**	
	88 – 96% @ 5 lpm 92 – 96% @ 0.5 to 4 lpm		88 – 96% @ 4 lpm 92 – 96% @ 0.5 to 3 lpm	
	2 lpm	5 lpm	2 lpm	5 lpm

Signature _____ Date _____ Notification No. _____
(RI internal use only)

Appendix A: Tools and Equipment

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Appendix A: Tools and Equipment

A.1 Service Tools and Equipment

You should have the following hand tools, supplies, and equipment available for troubleshooting, testing, and repairing the Millennium Oxygen Concentrator System.

- Common hand tools:
  - Antistatic work station – minimum requirement is a grounded mat and wrist strap
  - Flat-blade screwdriver (small)
  - Flat-blade screwdriver (medium)
  - Phillips screwdriver (small)
  - Phillips screwdriver (small w/ thin shaft)
  - Phillips screwdriver (medium w/ long shaft)
  - Phillips screwdriver (large)
  - 1/8" hex key wrench or socket
  - 7/64" hex key wrench or socket
  - 9/16" wrench or deep well socket
  - 11/16" wrench
  - Torque wrench (in. – lbs.)
  - Hog ring or slip-joint pliers (medium)
  - Needle-nose pliers (insulated)
  - Channel locks (medium)
  - Diagonals (wire cutters)
  - Fuse extractor
  - Crimping clamp tool
  - Rubber mallet
  - Amp terminal retractor tool
  - Hico tool
- Supplies:
  - Cleaning cloth
  - Cleaner (i.e., Fantastik®, 409®)
  - Isopropyl alcohol
  - Mild detergent
  - Disinfectant
  - Teflon® thread tape

Service Tools and Equipment (Continued)

- Equipment:

  Digital multi-meter

  Calibrated oxygen analyzer

  Stop watch

  Millennium tool kit

A.2 Acceptable Test Equipment

A.2.1 Digital Multi-meter

Specification:

3 1/2 digit readout

Acceptable Options:

- Fluke 87 or better model, Oil% basic DC accuracy
- Any commercially available digital multi-meter that meets the above specifications

A.2.2 Oxygen Analyzer

NOTE: The oxygen analyzer used must be calibrated to meet the manufacturer's specifications

Specifications:

Range: 0.0% to 100.0% O_2

Accuracy: $\pm$ 2.0% O_2

Acceptable Options:

- Respironics Oxygen Analyzer with Alarm (RI P/N 28001)
- Respironics Oxygen Analyzer with no Alarm (RI P/N 28005)
- MSA MiniOXI Oxygen Analyzer (RI P/N 27009)
- Any commercially available Oxygen Analyzer that meets the above specifications

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Appendix B: Schematic

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Appendix B: Schematic

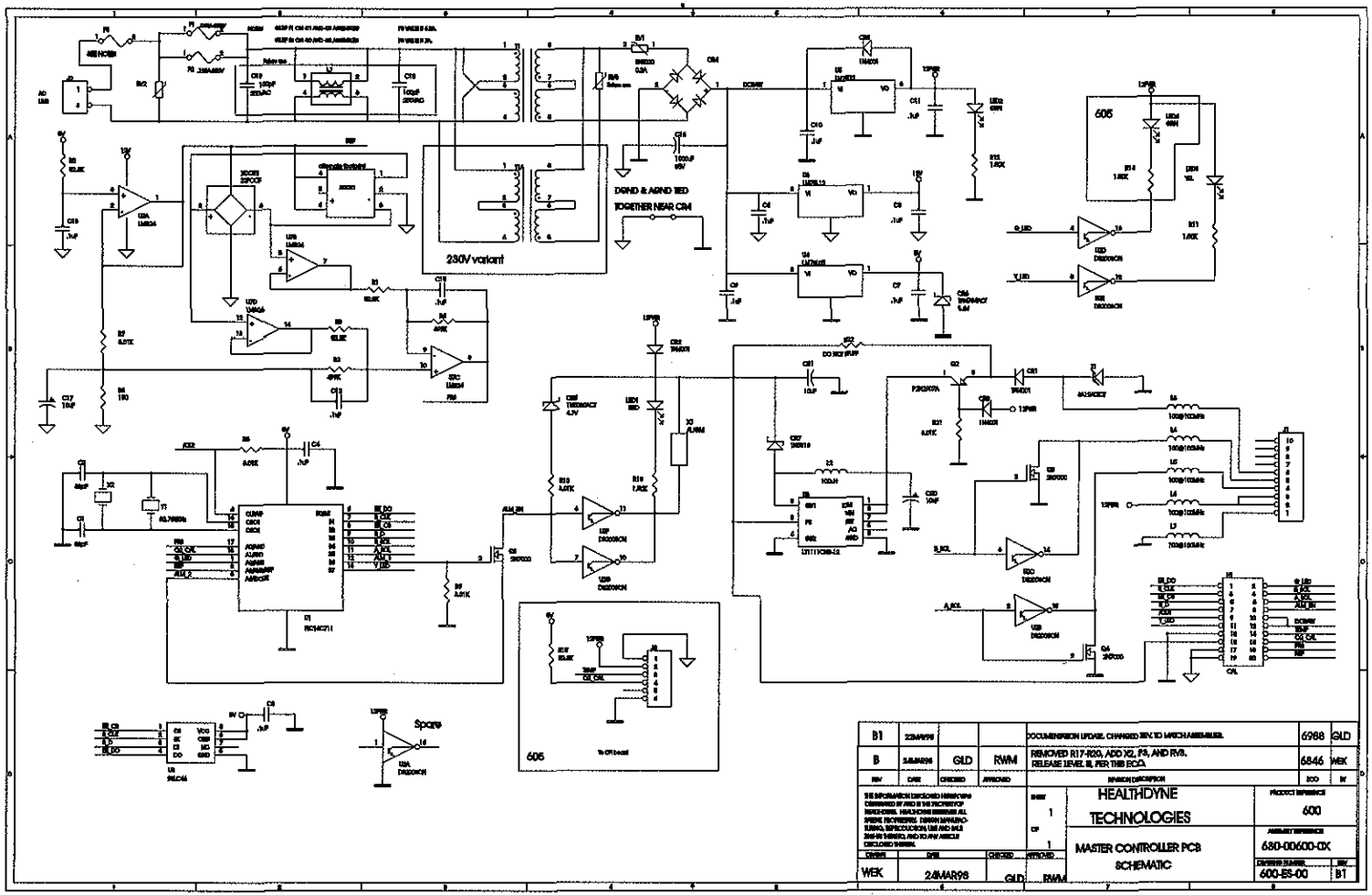
B.1 Schematic Statement

This schematic is supplied with this manual in direct support of the sale and purchase of this product.

The schematic is proprietary and confidential. Do not copy the schematic or disclose it to third parties beyond the purpose for which it is intended. Patents are pending.

The schematic is intended to satisfy administrative requirements only. It is not intended to be used for component level testing and repair. Any changes of components could affect the reliability of the device, prohibit lot tracking of electronic components, and void warranties. Repairs and testing are supported only at the complete board level.

The schematic is of the revision level in effect at the time that this manual was last revised. New revisions may or may not be distributed in the future.



Master Controller PCB

Appendix C: Receiving Inspection Checks

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C.1 Receiving Inspection Checks Chart

After removing the Millennium Oxygen Concentrator System from the carton, check for any damage to the cabinet and power cord. If shipping damage is found, contact your freight carrier immediately.

Record the following data:

Date Received: _____ Millennium Oxygen Concentrator Model: _____

Unit Serial Number: _____ Hour Meter Reading: _____

Remove the rear door and check to see that the filters are clean and in place and that the battery is in place and connected.	**Check when completed**
Pre-Inlet Filter	
Air Inlet Filter	
Inlet Filter	
9-volt Battery	

Before connecting the unit to a power source, perform the following to check the 9-volt battery and alarm function.	**Check when completed**
a. Move the power switch to the ON (I) position. The alarm should sound and the red LED alarm should illuminate.	
b. Move the power switch to the OFF (O) position. The alarm and the red LED alarm should go off.	

Receiving Inspection Checks Chart (Continued)

Connect the unit to the proper power source. Move the power switch to the ON (I) position and verify the following.	**Check when verified**
a. All LED's illuminate and audible alarm sounds for two seconds.	
b. The unit starts running.	
c. The red LED goes off and the alarm stops after the first cycle.	
d. If you have Model 605, which is equipped with the OPI, all three of the LED's (green, yellow, red) will illuminate momentarily. Then after approximately a ten minute delay, one of the LED's will illuminate according to the operating status.	

Adjust the flowmeter to 5 lpm: clockwise decreases flow; counter-clockwise increases flow. Check for the following.	**Check when verified**
a. Is there good flow coming out of the oxygen port?	
b. Verify that a flow of warm air is emitted through the exhaust opening at the bottom of the unit.	

NOTE: When the flow setting is changed, run the unit for 20 minutes to allow the oxygen concentration to stabilize. The oxygen concentration must fall within the specified tolerances for each flow setting.

	Yes	**No**
c. Is the normal O_2 indicator (OPI green LED) illuminated?		

Receiving Inspection Checks Chart (Continued)

Attach a calibrated Oxygen Analyzer to the DISS outlet fitting. Let the unit run for 20 minutes. Record the oxygen concentration in the space provided. Readings should be 92 ± 4% @ 5.0 lpm, 94 ± -2% @ 0.5 to 4.0 lpm (92 ± 4% @ 4.0 lpm, 94 ± 2% @ 0.5 to 3.0 lpm – international).	**Enter Recorded Data**
Oxygen Reading	

WARNING: Oxygen vigorously accelerates combustion. Avoid violent ignitions by never using any equipment, valves, gauges, or tools that have been exposed to any petroleum based products.

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Y

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15221-4401 USA

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