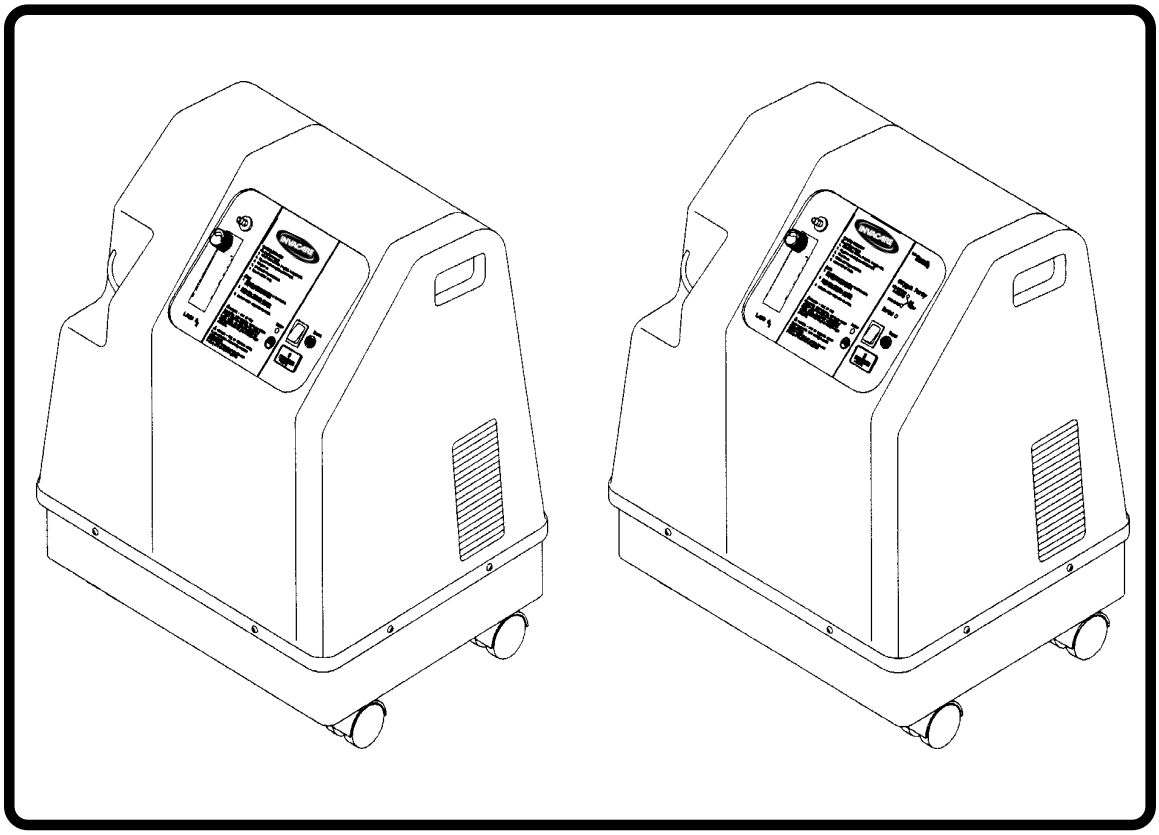
INVACARE
OXYGEN CONCENTRATORS



INVACARE 3 & 5
Model 3LX
Model 5LX

INVACARE 5 & 6
Model 5LXO2 *with Sens*O_2
Model 5LXO2T *with Sens*O_2
Model 6LXO2 *with Sens*O_2
Model 6LXO2T *with Sens*O_2
Model 6LXO2H *with Sens*O_2
Model 6LXO2HT *with Sens*O_2

SERVICE MANUAL

DEALER: KEEP THIS MANUAL. THE PROCEDURES IN THIS MANUAL MUST BE PERFORMED BY AN AUTHORIZED DEALER ONLY.

SPECIAL NOTES

WARNING/CAUTION notices used in this manual apply to hazards or unsafe practices which could result in personal injury or property damage.

NOTICE

THE INFORMATION CONTAINED IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.

WARNING

DO NOT OPERATE THIS EQUIPMENT WITHOUT FIRST READING AND UNDERSTANDING THIS MANUAL. IF YOU ARE UNABLE TO UNDERSTAND THE WARNINGS AND INSTRUCTIONS, CONTACT A HEALTHCARE PROFESSIONAL (DOCTOR - THERAPIST) BEFORE ATTEMPTING TO USE THIS EQUIPMENT - OTHERWISE INJURY OR DAMAGE MAY RESULT.

SAVE THESE INSTRUCTIONS

TABLE OF CONTENTS

SAFETY SUMMARY

READ THE FOLLOWING INFORMATION BEFORE OPERATING THIS PRODUCT.

WARNING

The use of oxygen therapy requires that special care be taken to reduce the risk of fire. Any materials that will burn in air, and some that will not, are easily ignited and burn rapidly in high concentrations of oxygen. For safety concerns, it is necessary that all sources of ignition be kept away from the product and preferably out of the room in which it is being used. NO SMOKING signs should be prominently displayed.

A spontaneous and violent ignition may occur if oil, grease or greasy substances come in contact with oxygen under pressure. These substances MUST be kept away from the oxygen concentrator, tubing and connections, and all other oxygen equipment. DO NOT use any lubricants unless recommended by Invacare.

For optimum performance, Invacare recommends that each concentrator be on and running for a minimum of 30 minutes at a time. Shorter periods of operation may be harmful for maximum product life.

If it has a damaged cord or plug, if it is not working properly, if it has been dropped or damaged, or dropped into water, call Qualified Service Personnel for examination and repair.

Keep the cord away from HEATED or HOT surfaces.

NEVER drop or insert any object into any opening.

NEVER block the air openings of the product or place it on a soft surface, such as a bed or couch, where the air opening may be blocked. Keep the openings free from lint, hair and the like.

Fill humidifier with water to the level shown by the manufacturer. DO NOT overfill.

Invacare recommends that Crush-Proof oxygen tubing (supplied by Invacare) be used with this product and NOT exceed 50 ft. (15.2m) in length.

MAINTENANCE

The Invacare Oxygen Concentrator was specifically designed to minimize routine preventative maintenance at intervals of once per year. Only professionals of the healthcare field or persons fully conversant with this process such as authorized or factory trained personnel should perform preventative maintenance or performance adjustments on the oxygen concentrator.

RADIO FREQUENCY INTERFERENCE

Most electronic equipment is influenced by Radio Frequency Interference (RFI). CAUTION should be exercised with regard to the use of portable communications equipment in the area around such equipment.

SAFETY SUMMARY (Continued)

TO REDUCE THE RISK OF ELECTROCUTION.

WARNING

ALWAYS unplug this product IMMEDIATELY after using.

Avoid using while bathing. If continuous usage is required by the physicians prescription:

- **The concentrator must be located in another room at least seven (7) feet from the bath.**
- **DO NOT come in contact with the concentrator while wet.**
- **DO NOT place or store product where it can drop into water or other liquid.**
- **DO NOT reach for product that has fallen into water. UNPLUG IMMEDIATELY.**

TO REDUCE THE RISK OF BURNS, ELECTROCUTION, FIRE OR INJURY TO PERSONS.

WARNING

This device is to be used only in accordance with the prescription of a physician and this Owners Manual. If at any time the patient or attendant conclude that the patient is receiving an insufficient amount of oxygen, the supplier and/or physician should be contacted immediately. No adjustments should be made to the flowrate unless prescribed by a physician.

A product should NEVER be left unattended when plugged in.

Close supervision is necessary when this product is used by, on or near children or bed confined individuals.

Use this product for only intended use as described in this manual.

DO NOT use unauthorized parts, accessories or adapters other than those authorized by Invacare.

SAFETY SUMMARY (Continued)

GROUNDING INSTRUCTIONS

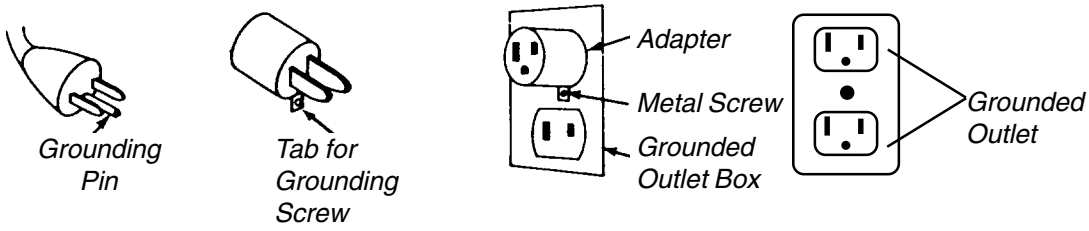
A. This product should be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electrical current. This product is equipped with a cord having a grounding wire with a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded.

DANGER

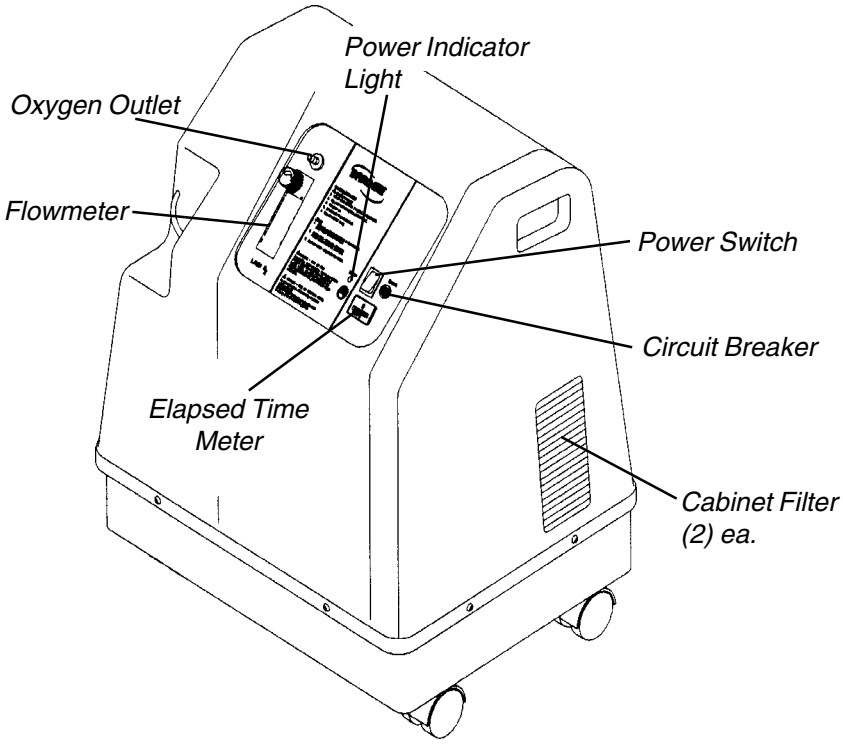
IMPROPER USE OF THE GROUNDING PLUG CAN RESULT IN A RISK OF ELECTRICAL SHOCK.

If repair or replacement of the cord or plug is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation having an outer surface that is green with or without yellow stripes is the grounding wire. Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if doubt exists as to whether the product is properly grounded.

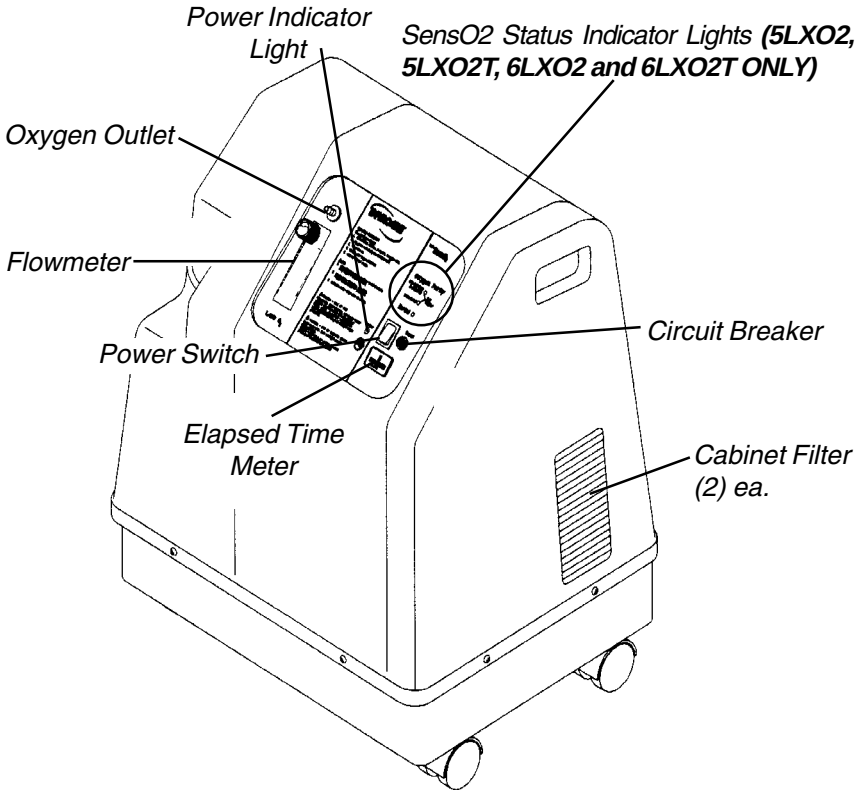
B. This product is for use on a normal 120 V circuit and has a grounding plug that looks like the plug illustrated in sketch A shown at the bottom of the page. A temporary adapter, which looks like the adaptor illustrated in sketches B and C, may be used to connect this plug to a 2-pole outlet as shown in sketch C if a properly grounded outlet is not available. The temporary adaptor should be used only until a properly grounded outlet (sketch D) can be installed by a qualified electrician. The green colored rigid ear, lug and the like extending from the adapter must be connected to a permanent ground such as properly grounded outlet box cover. Whenever the adapter is used, it must be held in place by the screw.



FEATURES



FEATURES - 3LX, 5LX



FEATURES - 5LXO2, 5LXO2T, 6LXO2, 6LXO2T

SPECIFICATIONS

STANDARD SPECIFICATIONS

Electrical Requirements: 120 VAC ±10% (132 VAC/108 VAC), 60 Hz

Rated Current Input: 4.0 A **(ALL Models)**

Sound Level:
52 dB Average **(3LX)**
53 dB Average **(5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)**

Operating Altitude: Up to 6,000 ft. (1828 meters) above sea level without degradation of performance. From 6,000 ft. (1828 meters) to 13,129 ft. (4000 meters) below 90% efficiency.

Ambient Temperature Range: 50°F - 95°F (10° - 35°C)

***Oxygen Output Concentration Levels:**

ALL MODELS
95.6% to 87% at all flowrates.

*** Stated performance maximum achieved after 30 min. of run time.**

Maximum Outlet Pressure:

(5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)	**(3LX)**
5 psi ± 0.5 psi. (34.5 kPa ± 3.45 kPa.)	5 psi ± 0.5 psi. (34.5 kPa ± 3.45 kPa.)

***Sens*O2 Alarm Thresholds:**

If no internal selector switch, 73% operation ONLY.

	Indicators	
O2 Purity	**Internal Switch *Set at 73%**	**Internal Switch Set at 85%**
Over 85% (± 2%)	**GREEN** Indicator Light	**GREEN** Indicator Light
73% (± 3%) to 85% (±2%)	**YELLOW** Indicator Light	**RED** Indicator Light - Continuous Audible Alarm Sieve GARD™ Compressor Shutdown
Below 73% (± 3%)	**RED** Indicator Light - Continuous Audible Alarm Sieve GARD™ Compressor Shutdown	**N/A**

***** Factory Preset at 73%

Flow Range: 1/2 - 5 L/min. **(5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)** 1/2 - 3 L/min. **3LX)**

For flow rates less than 1/2 L/min., use the Invacare Pediatric Flowmeter PF16.

Power Consumption: 460W **(6LXO2, 6LXO2T)** 350W/400W **(3LX)**
400W **(5LX, 5LXO2, 5LXO2T)**

Pressure Relief Mechanism Operational at: 35 psi ± 3.5 psi (241 kPa ± 24.1 kPa)

SPECIFICATIONS, CONTINUED

Filters:	Cabinet Compressor Inlet Bacteria
Safety Systems:	Current overload or line surge shutdown. High temperature compressor shutdown. High pressure alarm w/compressor shutdown. Low pressure alarm w/compressor shutdown. Battery Free™ Power Loss Alarm. *Sens*O2 Oxygen System **(5LXO2, 5LXO2T, 6LXO2, 6LXO2T ONLY)**.
Width: **Height:** **Depth:**	18-inches (45.7 cm) 23.75-inches (60.3 cm) 14-inches (35.6 cm)
Weight: **Shipping Weight:**	54 lbs. (24.5 kg) **(All 5LX and 6LX Models)** 53 lbs. (23.9 kg.) **(3LX)** 59 lbs. (27 kg) **(All 5LX and 6LX Models)** 58 lbs. (26.1 kg.) **(3LX)**
Operating Temperature **Exhaust:** **Oxygen Output:**	 Less than Ambient + 35^{O} F (+16^{O} C) Less than Ambient + 4^{O} F (+2^{O} C)
Cabinet:	Impact Resistant flame-retardant plastic cabinet.
Regulatory Listing:	ETL certified complying with applicable portions of UL 1431
RECOMMENDED END-USER GUIDELINES FOR OPTIMUM PERFORMANCE:	
Temperature:	50^{O} - 95^{O}F (10^{O} - 35^{O}C)
Electrical:	No extension cords.
Placement:	No closer than 3-inches from any wall.
Tubing:	Crush-Proof Tubing - 50 feet (15.2 m.) maximum **(do NOT pinch)**.
Room Characteristics:	Smoke and soot-free No confined spaces (closet).
Relative Humidity:	20 to 60%
Time of Operation:	Up to 24 hours per day.

SHIPPING AND HANDLING INSTRUCTIONS

This Service Manual describes, in detail, the Invacare 3, 5 and 6 Oxygen Concentrators. It has been carefully written to explain concentrator operation, service and preventative maintenance. Before you install and operate the concentrator, please refer to OWNER'S MANUAL.

The Invacare concentrator should always be kept in the upright position to prevent cabinet damage while being transported. The shipping container has been designed to assure maximum protection of the concentrator.

If the concentrator is to be reshipped by common carrier, it should be packed in a new carton. Additional cartons are available from Invacare.

The air compressor suspension system has been engineered to withstand severe motion and orientation.

UNPACKING (FIGURE 1)

1. Check for any obvious damage to the carton or its contents. If damage is evident, notify the carrier, or Invacare.
2. Remove all loose packing from the carton.
3. Carefully remove all the components from the carton.

NOTE: After inspection, unless the Invacare Oxygen Concentrator is to be used immediately, retain carton and packing materials for use in storing until use of the concentrator is required.

INSPECTION

1. Examine exterior of the Invacare Oxygen Concentrator for nicks, dents, scratches or other damages. Inspect all components.

STORAGE

1. Store the repackaged Invacare Oxygen Concentrator in a dry area.
2. **DO NOT** place other objects on top of the repackaged concentrator.

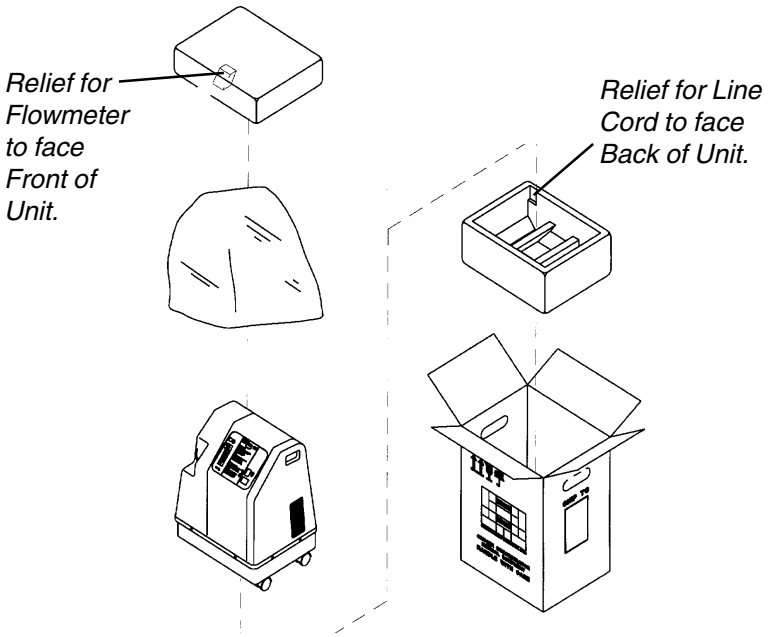


FIGURE 1 - UNPACKING

INSTALLATION / SEQUENCE OF OPERATION

MODEL 3LX and MODELS 5LX,5LXO2, 5LXO2T, 6LXO2, 6LXO2T

INSTALLATION / VERIFICATION OF BATTERY FREE™ POWER LOSS ALARM

When your new Invacare concentrator arrives, it should be checked for proper operating conditions.

1. If the unit has been in below-freezing temperatures, allow it to warm up to room temperature **(approximately 30 minutes)** before operating.
2. The **concentrator** will need to be turned on for **4 to 5 seconds** to charge the Battery Free™ Power Loss Alarm. Connect power cord to outlet and turn the concentrator on. Turn flow control knob counterclockwise and flow will begin immediately. Set flow rate of the Invacare 3 to 3 L/min., Invacare 5 to 5 L/min. and the Invacare 6 to 6 L/min. Turn unit off.
3. Unplug the power cord and press On/Off switch to the **ON** position. An intermittent audible alarm will sound. This confirms proper operation of the Battery Free™ Power Loss Alarm. Turn On/Off switch **OFF**.
4. Connect cord to outlet and turn on concentrator. Unit will sound **3 BEEPS** on startup.
5. Check the oxygen concentration per specifications after 30-40 minutes running time.

SEQUENCE OF OPERATION

Applying 120 VAC via the power switch energizes the compressor motor, hour meter, cooling fan and the printed circuit (P.C.) board.

Room air enters the compressor via the cabinet filter, compressor inlet filter, and sound muffler. The air is compressed by the wobble pistons in the compressor to a pressure of 20 PSI (137.72 kPa) BEFORE Serial No. "97K" or 21 PSI (144.79 kPa) AFTER Serial No. "97K".

As increased pressure creates increased temperature, a heat exchanger is utilized to lower the temperature by 20^{O} F (6.7^{O} C) before the air enters the 4-way valve. It is then channeled to a sieve bed containing the adsorption material. A restrictor downstream of the sieve bed causes pressure to build up inside the sieve bed which is necessary for the adsorption process. A small amount of relatively pure oxygen enters the top of the second bed with the balance entering a storage tank. The nitrogen removed is exhausted back from the bed through the four-way valve into room air. A muffler is located at the exhaust end of the valve to muffle the sound of the exhaust as it exits the concentrator.

The oxygen not being used to exhaust is channeled into the storage tank. The pressurized oxygen is regulated down to 5 PSI (34.4 kPa), enters an accurate flow-measuring device, flows through a bacterial filter, a check valve and out to the patient.

The electrical activation of the 4-way valve is accomplished every 8 to 21 seconds by the pressure sensor and P.C. board electronics when the pressure set point of 20 $\pm$ 3 PSI (137.72 $\pm$ 51.32 kPa) BEFORE Serial No. "97K" or 21 $\pm$ 3 PSI (144.79 $\pm$ 51.32 kPa) AFTER Serial No. "97K" is reached. The time between cycles is dependent on altitude, flow rate and internal environmental factors.

On the **5LX/5LXO2/5LXO2T/6LXO2/6LXO2T**, a P.E. or Pressure Equalization valve opens just prior to the shift of the 4-way valve. This allows highly concentrated oxygen to enter the just exhausted bed from the top. This additional pressure allows the bed to start its cycle at a higher pressure. The P.E. valve will close just after the shift of the 4-way valve.

INSTALLATION / SEQUENCE OF OPERATION, CONTINUED

If main power is lost, the Battery Free™ Power Loss Alarm will sound a short **"beep"**, with a long pause, intermittently. All units are equipped with a diagnostic alarm system that signals if the pneumatic pressure or electrical systems malfunction. The Troubleshooting Guide explains the alarm system signals and reasons in detail for your convenience.

SENSO2 OXGYEN SENSOR TECHNOLOGY CERAMIC ZIRCONIA SENSOR

Technical Description

The oxygen being produced by the concentrator flows out of the product tank and into the flowmeter. In-line between these components is a tee fitting that directs a small flow of oxygen through a precision orifice to the oxygen sensor mounted on a printed circuit board.

As the oxygen enters the sensor, it passes through a screen and contacts the sensing disk.

Electric current flowing through a metal film resistor heats the disk in excess of 300°C. Oxygen molecules contact the electrode of the disk and pick-up extra electrons to become oxygen ions. These oxygen ions are attracted to the electrode on the bottom of the zirconia disk. Because of the crystal structure of the zirconia, only oxygen ions can pass through. When the oxygen ions reach the bottom electrode, the extra electrons are released from the oxygen ions and oxygen molecules return to the air. The number of electrons is directly related to the oxygen concentration. The electrons travel to the PC board where they are "counted" and the oxygen concentration "reading" is calculated.

A microprocessor on the P.C. board contains software that interprets the signal being received from the sensor. It compares the signal to clinically acceptable limits that have been selected with the indicator switch mounted on the PC board. Signals outside of the clinically acceptable limits generate responses in the form of lighted **LEDs**, audible indicators, and/or system shut-down.

Operating Sequence

Once the power switch has been turned **ON**, the SensO_2 circuit will wait 5 minutes for the concentrator to begin producing clinically acceptable oxygen before activating. No **LEDs** will illuminate for at least 5 minutes.

After 5 minutes, if the oxygen purity exceeds 85% $\pm$ 2% the **GREEN LED** will illuminate.

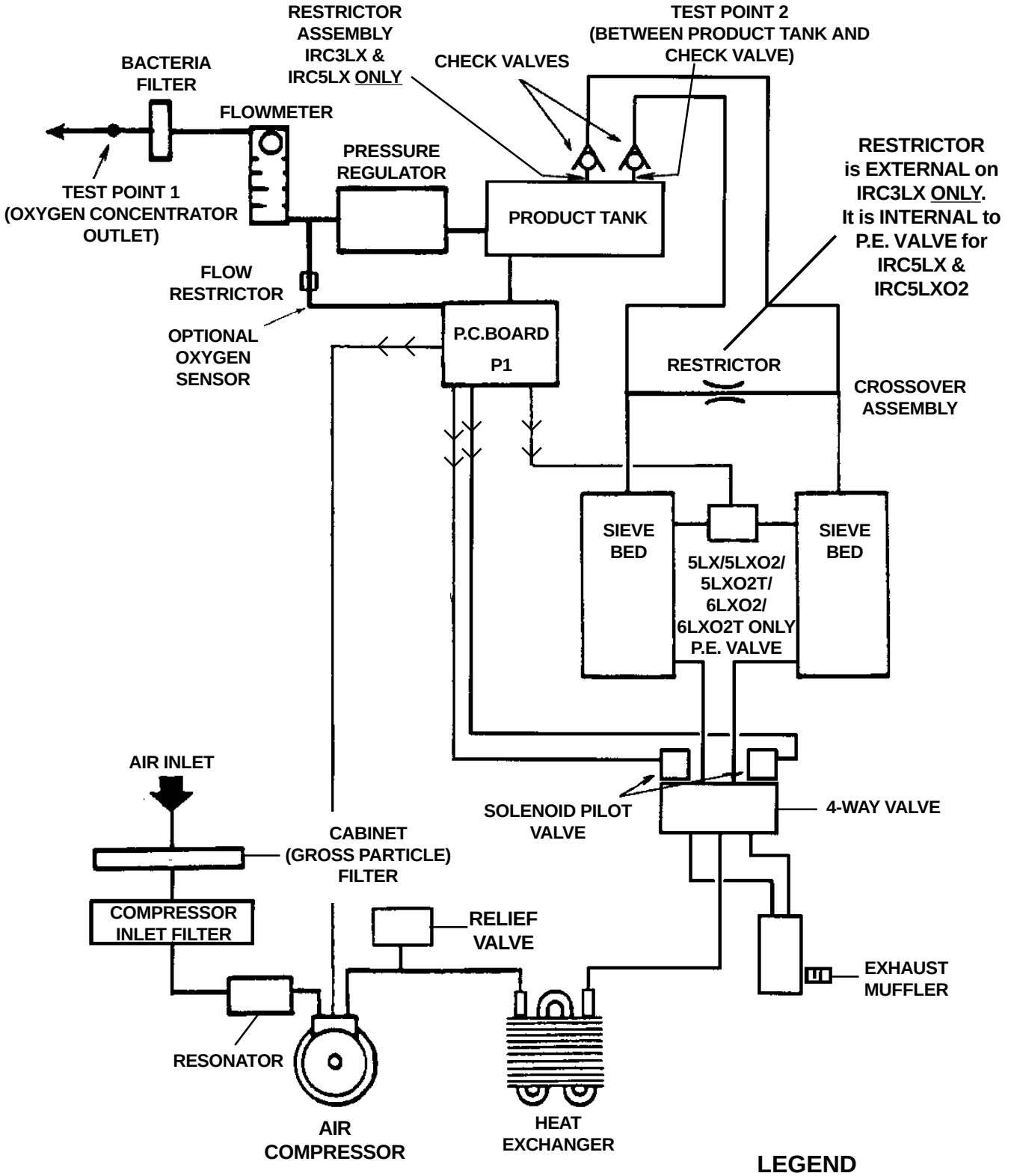
If the oxygen level is not above 85% $\pm$ 2% after the first 5 minutes, **LEDs** will remain off. The system will wait for a maximum of 30 minutes from start-up to reach 85% $\pm$ 2% before activating an alarm. Environmental factors such as low voltage, high altitude, or age of the machine will affect the time required to reach 85% $\pm$ 2%.

If the oxygen level is not above 85% $\pm$ 2% within the first 30 minutes, the oxygen concentration alarm sequence will activate, depending upon the position of the indicator switch. All units are preset at the factory at 73% $\pm$ 3%.

When oxygen concentration is above 85% $\pm$ 2%, the sensor measures oxygen purity every 10 minutes. If a reading falls below 85% $\pm$ 2% and the alarm indicator is in the 73% mode or no switch is present, the oxygen sensor measures purity continuously and a yellow **LED** will illuminate. If the oxygen purity falls below 73% $\pm$ 3% the **RED LED/Alarm/Shut-Down** mode will activate. If the selector switch is present and it is set at 85%, the **RED LED/Alarm/Shut-Down** mode will activate if the oxygen purity falls below 85% $\pm$ 2%.

PNEUMATIC DIAGRAM

INVACARE 3 & 5 OXYGEN CONCENTRATORS
MODELS IRC3LX, IRC5LX, IRC5LXO2



LEGEND

and = ELECTRICAL CONNECTIONS

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
NORMAL OPERATION: **Internal Status Indicators:** **RED: Off GREEN: Off** Unit plugged in, power switch on. 3 "beeps" on start up.	No problems.	System O.K.
POWER LOSS: **Internal Status Indicators:** **RED: Off GREEN: Off** Unit unplugged, power switch on, alarm off.	No problems.	"Battery Free™" Circuit drained. Plug in cord and turn power switch **ON** to recharge.
POWER LOSS: **Internal Status Indicators:** **RED: Off GREEN: Off** Unit plugged in, power switch on, alarm off. "Battery Free™" circuit drained.	1. No Power at outlet. 2. Power Cord. a. Frayed. b. Broken or damaged spade. c. Spade connector from Power Cord loose or disconnected **(inside back of unit)**. 3. On/Off switch. a. Disconnected wire. b. Faulty switch.	1. Check electrical outlet with a table lamp or voltmeter set on 150-200 VAC scale. If outlet isn't working, check protective device in home's electrical panel or consult an electrician. Also ensure that unit is properly plugged in. DO NOT use extension cords. Move to another outlet or circuit. 2a. Replace cord. 2b. Replace power cord connectors on plug. 2c. Reattach connector. 3a. Check all electrical connections to the On/Off switch for any disconnected wires. 3b. If the concentrator does not come on at all and wiring is intact, color code and remove wires one at a time and clean the On/Off switch with contact cleaner while turning the switch on and off. Reinstall switch and turn power on. If switch still doesn't work, replace switch. Transfer wires from old switch to new switch one at a time to the matching contact.

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
POWER LOSS, Continued:	4. Circuit breaker. Tripped.	4. Reset breaker. **NOTE: Breaker may trip to safeguard concentrator during a power surge. If breaker trips immediately, there is a probable short in the unit. Check for pinched or charred wires. If the breaker does not trip, run unit for approximately 2 hours. If breaker trips again, there is an internal problem. Contact INVACARE TECHNICAL SERVICE.**
	5. P.C. Board. a. Damaged. b. Loose or damaged connector.	5a.Replace **(PROCEDURE 11).** 5b.Repair or replace connector.
INTERNAL POWER LOSS SENSO2: **Internal Status Indicators:** **RED: Off GREEN: Off** Alarm may or may not be on. **Control Panel Indicators:** **RED: Off YELLOW: Off GREEN: Off** Fan operates, power light on, compressor not operating.	1. Transformer Assembly. a. Faulty. b. Connector loose or disconnected. c. Faulty wiring.	1a.Replace **(PROCEDURE 12).** 1b.Reattach connector. 1c.Replace Transformer Assembly **(PROCEDURE 12).**
	2. P.C. Board. Faulty.	2. Replace P.C. Board **(PROCEDURE 11).** For **5LX or 6LX** - Unit may require retiming after P.C. Board replacement **(PROCEDURE 18).**
HIGH PRESSURE: **Internal Status Indicators:** **RED: On GREEN: Off** (*LX Control Board*) **RED: One (1) Flash** **GREEN : Two (2) Flashes** *(Integrated Sensor Board)* *(LX SMT Board)* **Control Panel Indicators:** **RED: On YELLOW: Off GREEN: Off** Unit plugged in, power switch on, continuous alarm. Compressor shut down.	1. P.C. Board. a. Malfunction.	1a.Set flow to max l/min. for concentrator. Check voltage across Pilot Valve 1 on 200 volt scale. If meter reads 0 volts when unit is turned on, replace P.C. Board **(PROCEDURE 11).**
	b. Disconnected Wire.	1b.Check spade connectors on pilot valves 1 and 2 and connectors on P.C. Board.
	c. Shifting Valve at Pressures greater than 25 p.s.i.	1c.Replace P.C. Board **(PROCEDURE 11).** For **5LX or 6LX** - Unit may require retiming after P.C. Board replacement **(PROCEDURE 18).**
	2. 4-way Valve a. Not Shifting.	2a.If voltage rises to approximately 24 volts D.C. when unit shuts down, P.C. Board is functioning properly. Replace 4-way Valve **(PROCEDURE 16).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
HIGH PRESSURE, Continued	2. b. Bad Coil. 3. Sieve Beds. Contaminated.	2b.Replace 4-way Valve **(PROCEDURE 16).** 3. Replace Sieve Beds **(PROCEDURE 4).**
LOW PRESSURE: **Internal Status Indicators:** **RED: On GREEN: On** (*LX Control Board*) **RED: One (1) Flash** **GREEN : One (1) Flash** *(Integrated Sensor Board)* *(LX SMT Board)* Unit plugged in, power switch on, continuous audible alarm. Compressor shut down (Failure to cycle due to low pressure).	1. Inlet Filter Dirty or Plugged. 2. Compressor. a. Leaks at fittings or tubing. b. Leaking or defective relief valve. c. Insufficient voltage at outlet. d. Worn Cup Seals or Gaskets. 3. Heat Exchanger a. Leak at tubing or body chamber. b. Inspect tubing and heat exchanger. 4. Regulator cracked or leaking. 5. P.E. Valve leaking.	1. Replace Inlet Filter **(PROCEDURE 2).** 2a.Replace or repair. 2b.Repair leak or replace. 2c.**DO NOT** use extension cords. Use another outlet. 2d.Rebuild Top End of Compressor **(PROCEDURE 2).** 3a.Replace or retighten. 3b.Replace or retighten tubing. Replace Heat Exchanger **(PROCEDURE 8).** 4. Replace **(PROCEDURE 6).** 5. Replace P.E. valve. Check voltage at P.E. valve connector on 24 volt D.C. scale. The P.E. valve activates or energizes approximately 1 second prior to the activation of the 4-way Valve with approximately 24 volts. If voltage is in excess of 24 volts consistently, replace the P.C. Board. If the P.C. Board voltage acts normally, replace the P.E.valve **(PROCEDURE 3).** **NOTE: Check for leaks starting at the compressor output through all the pneumatic connections. Major leaks will cause system pressures to remain below adequate shift (exhaust) pressures and will cause compressor shut down.**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
LOW CONCENTRATION: **NOTE: Check for O2 purity using a calibrated Oxygen Analyzer at Test Point 1 (OXYGEN OUTLET) of the concentrator.** **Internal Status Indicators:** **RED: On GREEN: Off** (*LX Control Board*) **RED: Two (2) Flash** **GREEN : One (1) Flash** **73% Shutdown** *(Integrated Sensor Board)* **RED: Two (2) Flash** **GREEN : Two (2) Flashes** **85% Shutdown** *(Integrated Sensor Board)* **Control Panel Indicators:** **SensO2 ONLY:** **RED: On** **YELLOW: Off** **GREEN: Off** For SensO2 units, the Red indicator will signal extremely low purity and will be accompanied by a continuous audible alarm and a system shutdown. Repairs are required.	1. Cabinet Filters Dirty.	1. Clean or Replace **(PROCEDURE 2).**
	2. Inlet Filter Dirty.	2. Replace **(PROCEDURE 2).**
	3. Compressor. a. Defective.	3a.Replace Compressor **(PROCEDURE 7).**
	b. Faulty Capacitor.	3b.Replace Capacitor **(PROCEDURE 7).**
	c. Bad Motor Windings.	3c.Replace Compressor **(PROCEDURE 7).**
	d. Worn Seals.	3d.Rebuild Top End of Compressor **(PROCEDURE 2).**
	e. Bad Bearings.	3e.Replace Compressor **(PROCEDURE 7).**
	f. Leak at fittings or tubing.	3f. Replace Fittings or Tubing.
	g. Leaky or Defective Relief Valve.	3g.Replace Relief Valve.
	h. Insufficient voltage **(outlet)**.	3h.**DO NOT** use extension cords.
	4. Heat Exchanger. a. Leak at tubing or body chamber.	4a.Replace or Retighten.
	b. Inspect tubing and Heat Exchanger.	4b.Replace or retighten tubing. Replace Heat Exchanger **(PROCEDURE 8).**
	5. Regulator Cracked or Leaking.	5. Replace **(PROCEDURE 6).**
	6. Exhaust Muffler dirty or plugged.	6. Replace **(PROCEDURE 2).**
Internal Status Indicators: **RED: Off GREEN: Off** (*LX Control or Integrated Sensor* Board) **Control Panel Indicators:** **SensO2 ONLY:** **RED: Off** **YELLOW: On** **GREEN: Off** A Yellow indicator signals low purity, but within specification for the user. Repairs are required.	7. Fan a. Not Operating. Unit overheating.	7a.Leads to fan Disconnected. Reconnect **(PROCEDURE 10).**
	b. Faulty Fan.	7b.Replace **(PROCEDURE 10).**
	8. Sieve Beds defective	8. Replace **(PROCEDURE 4).**
	9. Tubing kinked or blocked.	9. Repair or replace.
	10.P.C. Board a. Shifts at wrong pressures.	10a.Check pressure at product tank. Pressure should rise to 20 p.s.i. at shift point. If not, replace P.C. Board **(PROCEDURE 21).**
	b. Pressure transducer tubing leaks.	10b.Inspect tubing at transducer and at product tank. Replace tubing **ONLY** if damage is evident. **(PROCEDURE 9).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
LOW CONCENTRATION, Continued:	11.Flowmeter. a. Flowmeter opened beyond maximum flow rate. b. Cracked or broken Fitting. c. Input tubing leaking or loose.	 11a.Return flow to maximum setting. 11b.Replace fitting. 11c. Repair or replace.
	12.Timing.	12. To accommodate for varying tolerances when replacing components, an adjustable timer is used to control the shifting of the Invacare 5 Pressure Equalization **(P.E.)** Valve **(PROCEDURE 18).**
	13. P.E. Valve. a.Bad Coil. b.Restrictor Blockage.	 13a. Replace P.E. Valve **(PROCEDURE 3).** 13b. Replace P.E. Valve **(PROCEDURE 3).**
	14. Inspect P.C. Board Restrictor tubing for kinks or tears.	14. Replace P.C. Board. Unit may need retiming after board replacement **(PROCEDURE 11).**
FLUCTUATING FLOW:	1. Regulator/Flowmeter. a. Incorrectly set regulator. b. Flowmeter malfunction.	 1a.Check pressure at oxygen outlet. Adjust Regulator **(PROCEDURE 6).** 1b.If flow is still unstable, check for leaks starting at the compressor outlet fitting through all pneumatic connections. If no leaks are found and flow is still fluctuating, replace the regulator **(PROCEDURE 6).** If pressure at test point is within spec (5 p.s.i. $\pm$ 0.2 max. [34.4 kPa $\pm$ 6.89]), replace flowmeter **(PROCEDURE 14).**
	2. Bacteria Filter a. Dirty or Plugged	2a. If low flow conditions persists, replace bacteria filter.
UNIT EXCESSIVELY LOUD:	1. Pneumatic Exhaust. a. Muffler cracked, damaged or missing. b. Muffler tubing disconnected or damaged.	 1a.Replace. **(PROCEDURE 2).** 1b.Reconnect or replace tubing.
	2. Intake Resonator. a. Damaged or missing. b. Tubing disconnected or damaged.	 2a.Install new resonator. 2b.Reconnect tubing or replace.
	3. Inlet Filter missing. 4. Compressor.	3. Replace inlet filter. 4. Replace Compressor. Internal damage **(PROCEDURE 7).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
UNIT OVERHEATS:	1. Base Exhaust Vent Plugged or restricted.	1. Place unit at least 3-inches from any wall. DO NOT place unit on pile or shag carpeting that may restrict air flow.
	2. Cabinet Filters Dirty or blocked.	2. Clean or replace **(PROCEDURE 2).**
	3. Fan. a. Leads to fan disconnected. b. Defective Fan. c. Fan installed upside down.	 3a. Reconnect leads. 3b. Replace fan **(PROCEDURE 10).** 3c. Install fan with air flow arrow pointing down **(PROCEDURE 10).**
	4. Heat Exchanger. a. Fins dirty or plugged. b. Fins damaged.	 4a. Clean heat exchanger **(PROCEDURE 2).** 4b. Replace heat exchanger **(PROCEDURE 8).**
	5. Compressor. a. Defective. b. Faulty capacitor. c. Bad motor windings. d. Worn seals. e. Bad bearings.	 5a. Replace compressor **(PROCEDURE 7).** 5b. Replace capacitor **(PROCEDURE 7).** 5c. Replace compressor **(PROCEDURE 7).** 5d. Replace compressor **(PROCEDURE 7).** 5e. Replace compressor **(PROCEDURE 7).**
	6. Line Voltage excessive **(surge).**	6. Have line voltage inspected by certified electrician. A voltage regulator may be required and is obtainable from your local electric company.
OXYGEN PURITY: GOOD **Internal Status Indicators:** **RED: Off GREEN: Off** **Control Panel Indicators:** **RED: Off YELLOW: Off** **GREEN: Off** Purity Switch setting at 73% or 85%: After 30 minutes of run time, unit operates normally, oxygen purity within normal range. Green or Yellow panel indicator should illuminate.	1. P.C. Board defective.	1. Replace P.C. Board **(PROCEDURE 11).** Unit may need retiming after P.B. Board replacement **(PROCEDURE 18).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
UNIT NOT OPERATING **ALARM: OFF** **Internal Status Indicators:** **RED: Off** **GREEN: Off** **CONTROL PANEL INDICATORS:** **RED: Off** **YELLOW: Off** **GREEN: Off** Purity Switch setting at 73% or 85%.	1. Purity Switch. Defective. 2. Horn. Disconnected.	1. Replace P.C. Board. **(PROCEDURE 11).** Unit may need retiming after board replacement. **(PROCEDURE 18).** 2. Reattach horn connector to harness.
UNIT NOT OPERATING, **Internal Status Indicators:** **RED: Off** **GREEN: Off** **Control Panel Indicators:** **RED: Off** **YELLOW: Off** **GREEN: Off** Power Switch ON. Continuous audible alarm.	1. Transformer Assembly. a. Molex connector disconnected from P.C. Board. b. Faulty transformer assembly.	1a. Reattach connector. 1b. Replace transformer assembly **(PROCEDURE 12).**
UNIT NOT OPERATING, **Internal Status Indicators:** **RED: Three (3) Flashes** **GREEN: One (1) Flash** (Integrated Circuit Board) **Control Panel Indicators:** **RED: Off** **YELLOW: Flashing** **GREEN: On**	1. Internal repairs required.	1. Replace SensO2 circuit board **(PROCEDURE 11).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

REPAIR / REPLACEMENT GUIDE

INVACARE 3LX, INVACARE - 5LX/5LXO2/5LXO2T AND INVACARE - 6LXO2/6LXO2T

PROCEDURE 1 - REMOVING CABINET (FIGURE 1)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove the eight (8) mounting screws that secure cabinet assembly to the base assembly.
3. Lift the cabinet straight up.

NOTE: When required, vacuum inside of the cabinet and exposed foam insulation.

4. To re-install cabinet, reverse **STEPS 2-3**.

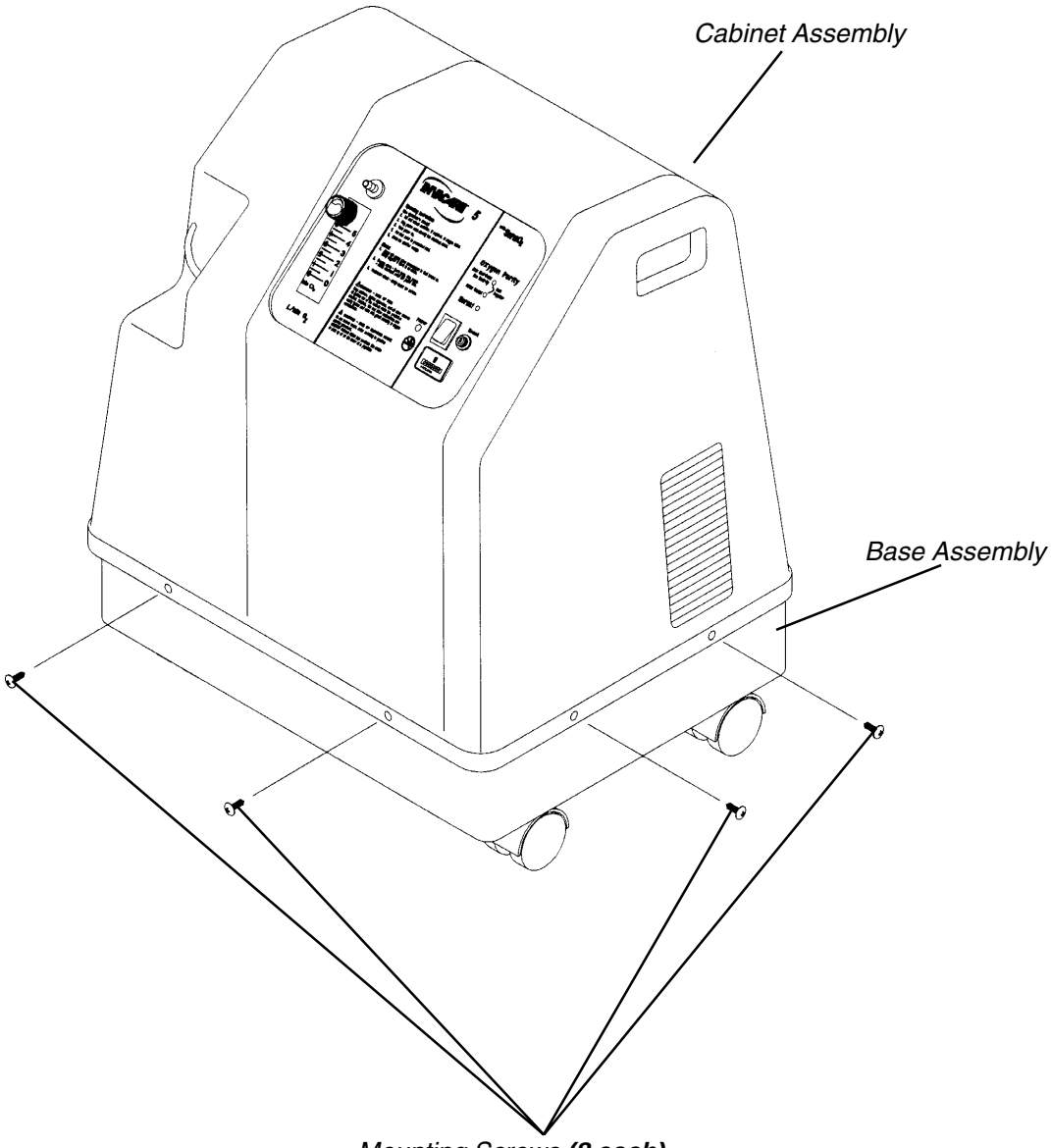


FIGURE 1 - REMOVING CABINET

PROCEDURE 2 - PREVENTIVE MAINTENANCE

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

NOTE: The Invacare Concentrators are specifically designed to minimize routine preventive maintenance at intervals of once per year. In places with high dust or soot levels, maintenance may need to be performed more often. The following must be performed at a minimum of one (1) year in service to assure years of additional reliability (Refer to TROUBLESHOOTING GUIDE for plugged filter symptoms). Only authorized or factory-trained personnel should perform preventive maintenance on the concentrator. Power should be disconnected before beginning preventive maintenance on the Invacare concentrator.

Cabinet Filters (FIGURE 1)

1. Clean or replace gross particle **(cabinet)** filters on both side of the cabinet.

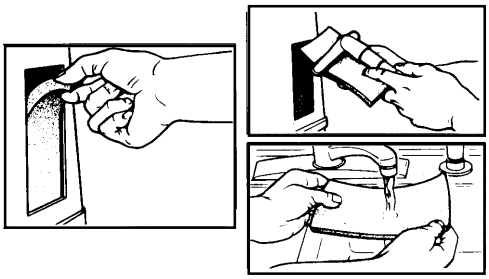


FIGURE 1 - CABINET FILTERS

Inlet Filter (FIGURE 2)

NOTE: Perform this procedure as needed depending upon the environment the concentrator is used in.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Unscrew the inlet filter located on the top left of the sound box **(counterclockwise)**.
4. Discard existing inlet filter and replace with a **NEW** inlet filter.
5. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

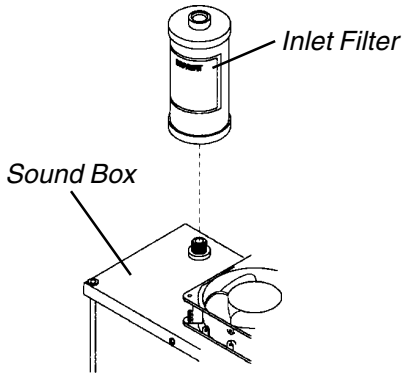


FIGURE 2 - INLET FILTER

Bacteria Filter (FIGURE 3)

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

NOTE: The bacteria filter is accessible without removing the control panel but, if it becomes necessary to loosen the control panel to access the bacteria filter, refer to PROCEDURE 9 - REMOVING CONTROL PANEL.

3. Remove **FRONT** of bacteria filter from the tygon tubing extending to the top fitting of the flowmeter.
4. Remove **REAR** of bacteria filter from the tygon tubing extending to back of in-line check valve.
5. Install **NEW** bacteria filter by reversing **STEPS 3-4**.
6. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

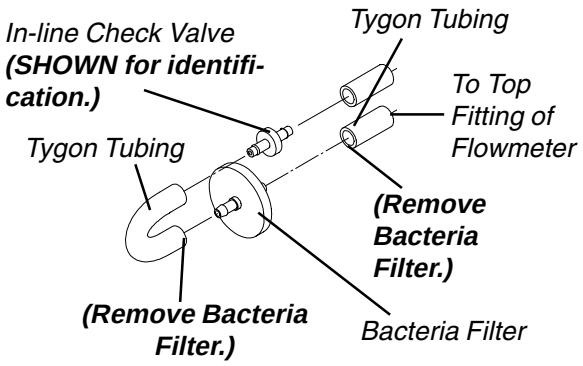


FIGURE 3 - BACTERIA FILTER

PROCEDURE 2 (continued) - PREVENTIVE MAINTENANCE

Exhaust Muffler Canister/Exhaust Muffler (FIGURE 4)

NOTE: The following should be performed at 20,000 hr. intervals although these procedures can be performed as needed depending upon the environment the concentrator is exposed to.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove the ty-wraps that secure 4-way Valve manifold exhaust tubing to top fittings of muffler canister **(canister)**.
4. Disconnect the exhaust hoses from fittings on top of canister.
5. Remove mounting screw(s) from rear of sound box and remove muffler canister.
6. Unscrew **(counterclockwise)** the exhaust muffler located on the muffler canister.
7. Inspect muffler canister for restriction of the internal filtration and do one of the following:
   a). Replace muffler canister and muffler if plugged or restricted.
   b). Install **NEW** exhaust muffler if canister is in good condition.
8. Install **NEW**/re-install existing muffler canister by reversing **STEPS 3-5.**
9. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

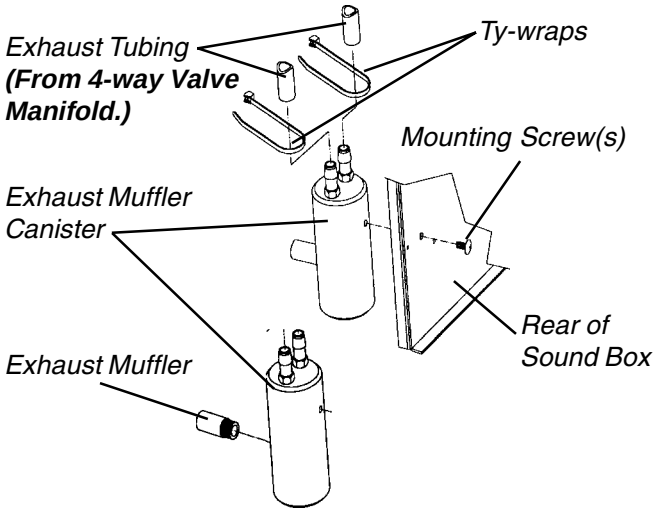


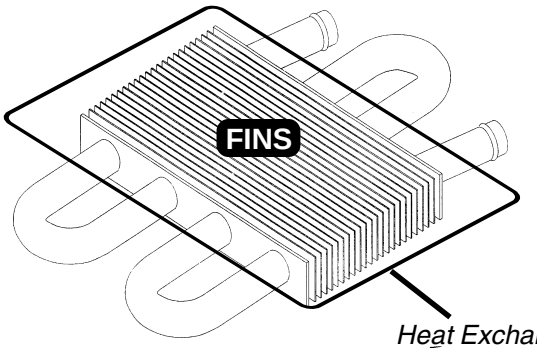
FIGURE 4 - EXHAUST MUFFLER CANISTER/ EXHAUST MUFFLER

Cleaning Finned Heat Exchanger (FIGURE 5)

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

CAUTION
DO NOT damage fins of heat exchanger when removing, cleaning, or reinstalling.

3. Remove heat exchanger **(Refer to PROCEDURE 8 - REPLACING HEAT EXCHANGER)**.
4. Remove excessive dirt build-up on heat exchanger fins using compressed air.
5. Reinstall heat exchanger **(Refer to PROCEDURE 8 - REPLACING HEAT EXCHANGER)**.
6. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**



*Heat Exchanger Fins **(Use Compressed Air to Clean Dirt Buildup).***

FIGURE 5 - CLEANING FINNED HEAT EXCHANGER

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

NOTE: This kit is designed for rebuilding the Thomas Model 2638 or 2618. These compressors use this rebuild kit. The serial number is located on the front of the compressor. If the serial number does not begin in this way, this kit will not work.

The 3-Liter Thomas 2638 or 2618 Compressor Rebuild Kit contains the following:

1. Two (2) Connecting (**Piston**) Rod Assemblies.
2. Two (2) Connecting Rod Screws.
3. Two (2) Aluminum Piston Sleeves.
4. Four (4) Valves.
5. Two (2) Valve Restraints.
6. Two (2) Head Gaskets.
7. Two (2) Valve Plate Gasket.
8. Two (2) Connecting Rod Screw.
9. Twelve (12) Head Mounting Screws.
10. Four (4) Valve Screws.
11. Four (4) Connector (**Crossover**) Tube "O" Rings.
12. Hernon # 846 Lubricant.
13. Hernon # 423 Threadlocker.

Tools Required:

One (1) 1/8 and 5/32-inch Allen Wrench attachment.
Inch Pound Scale Torque Wrench.
One (1) Common (**Flathead**) Screwdriver.
One (1) Small Common (**Flathead**) Screwdriver.
One (1) Phillips Head Screwdriver.

Removing and Marking the Compressor Heads and Replacing Crossover Tube "O" Rings (FIGURE 6)

1. Unplug concentrator.
2. Carefully remove compressor from concentrator. **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
3. Use the Phillips screwdriver to remove the twelve (12) screws that secure the head assembly and valve plates to the compressor.
4. Mark the heads and valve plates to ensure proper reinstallation and set valve plates aside.
5. Grasp both head assemblies and gently pull them apart.
6. Remove the crossover tubes from the head assembly.

NOTE: Replace all four (4) "O" rings.

7. Use a small flat screwdriver to get between the edge of the "O" rings and grooves in the crossover tubes or roll the "O" rings out of the grooves and remove from crossover tubes.
8. Slide NEW "O" rings into the grooves at each end of the crossover tubes.
9. Gently reinstall the crossover tubes into the end of one (1) compressor head.
10. Reinstall the remaining head onto the ends of the crossover tubes.

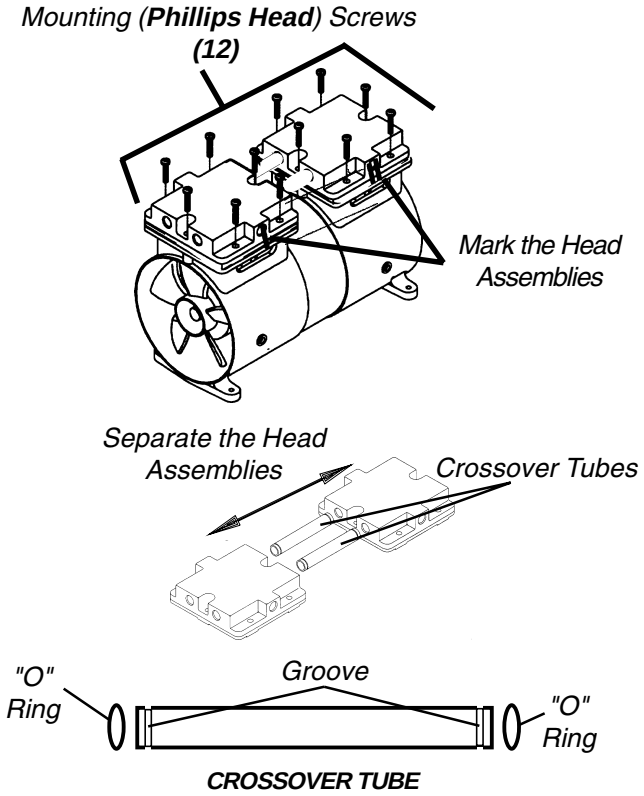


FIGURE 6 - REMOVING AND MARKING THE COMPRESSOR HEADS AND REPLACING CROSSOVER TUBE "O" RINGS

NOTE: After removing the head assembly, reinstall Valve Plate onto the side opposite the piston being rebuilt. This restricts movement of the other piston and prevents possible damage to the components.

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Removing the Piston - 3 Liter Compressor (FIGURE 7)

1. Place the screw driver blade between the fan and the eccentric bearing and remove the fan blade from the side of the compressor being rebuilt by gradually prying it off.
2. Locate and align the eccentric set screw with the eccentric set screw access hole on the opposite side of the compressor body.
3. Use the 1/8-inch Allen wrench to loosen the set screw.

NOTE: DO NOT remove the eccentric set screw; loosen it ONLY.

4. Situate compressor so the piston being rebuilt is to your right and locate the connecting rod set screw access hole located on the lower portion of the compressor.
5. Use the 5/32-inch Allen wrench to remove the set screw located at the base of the connecting rod.

NOTE: It may be necessary to pry the spread point of the connecting rod to loosen it from the bearing of the eccentric.

6. Carefully slide the eccentric out of the compressor housing and set aside.
7. Remove the aluminum sleeve from the piston.
8. Tilt the piston slightly and with the other hand, slide the lower portion of the piston around the camshaft and out through the side of the compressor.

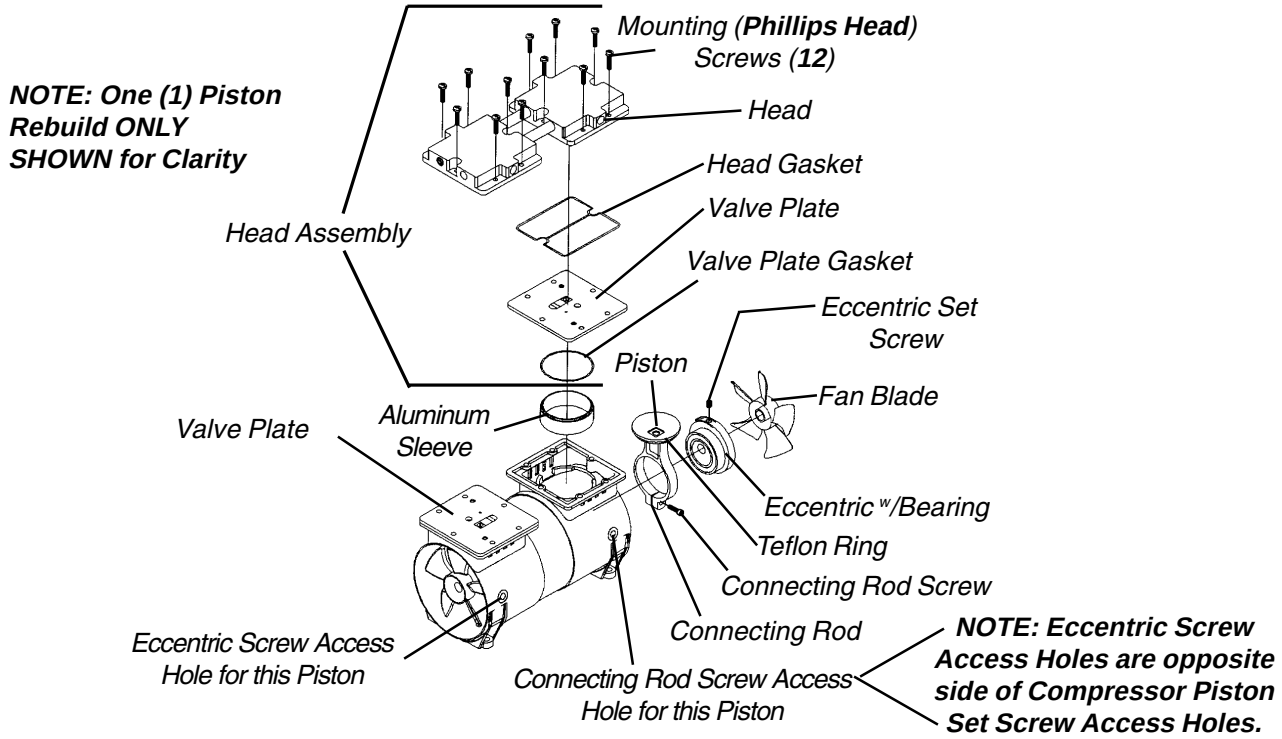


FIGURE 7 - REMOVING THE PISTON - 3 LITER COMPRESSOR

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Installing the New Piston (FIGURE 8)

WARNING
DO NOT lubricate or use oil on any moving parts. The compressor eccentric uses a precision sealed bearing.

1. Place a bead of Hernon # 846 on your finger and apply around the inside of the bearing bore of the new connecting rod.
2. Install the new piston by inserting the piston head through the side of the compressor body.
3. Continue moving piston up into the upper compressor housing with the connecting rod situated around the eccentric nib (camshaft).

CAUTION
The eccentric set screw MUST face the flat spot on the eccentric nib (shaft). Failure to do so may cause damage to the compressor.

4. Reinstall the eccentric ensuring that the bearing on the eccentric sits inside the piston connecting rod.
5. Align the front face of the connecting rod with the front face of the bearing leaving a clearance of .032 (1/16-inch).
6. Apply a small amount of Hernon #423 to threads of connecting rod screw.
7. Install connecting rod screw and torque to 15 in. lbs. **DO NOT OVERTIGHTEN**.

CAUTION
DO NOT force aluminum sleeve onto piston. The Teflon ring may become damaged and make the piston unusable.

8. Turn the eccentric until piston is in the full up position.
9. Place the aluminum sleeve partially over the piston head at a 45^{O} angle with the tooled edge up.
10. Hold the piston in place and gently rotate the sleeve onto the piston head and down until it rests on the locator ribs of the compressor housing and over the piston.

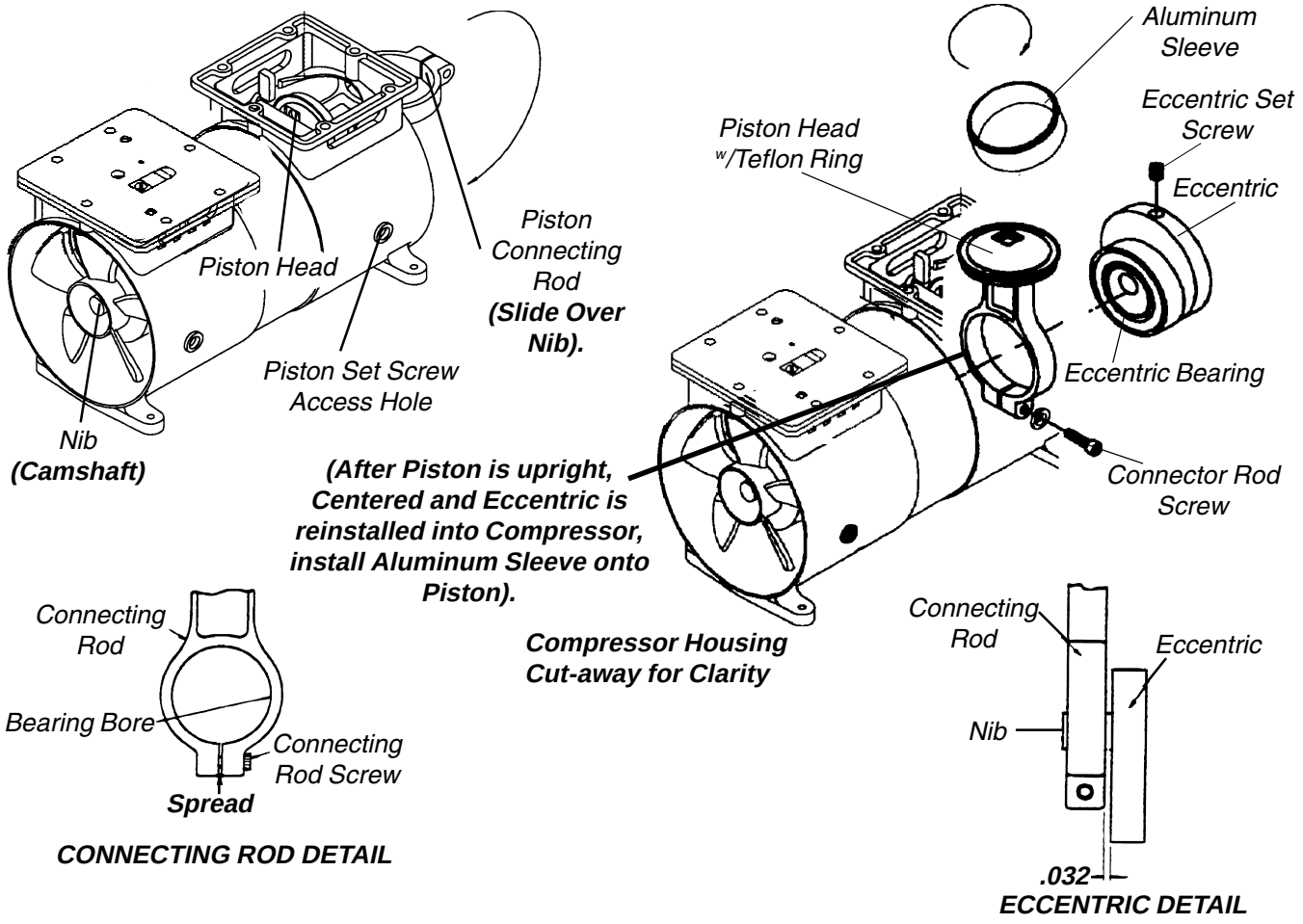


FIGURE 8 - INSTALLING NEW PISTON

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Alignment of the Piston (FIGURE 8)

1. Hold sleeve down with one hand and slowly turn eccentric with the other.
2. As the piston travels up and down, the connecting rod will rock from front to back in normal operation.
3. If connecting rod rocks side to side, the rod is misaligned on the eccentric bearing.
4. If this is evident, loosen set screw and repeat **STEPS 3-8** for **INSTALLING THE PISTON**.
5. If connecting rod cannot be properly aligned, contact **Invacare Technical Service**.
6. Twist the aluminum sleeve back up onto the piston until sleeve is approximately centered on the teflon ring of the piston.
7. With the aluminum sleeve firmly seated onto locator ribs, set the individual valve plate from that side of the compressor onto the aluminum sleeve and position it until the six (6) holes in the valve plate line up with the six (6) holes in the top of the compressor housing. This aligns the piston assembly**.**
8. Securely tighten the connecting rod screw against the flat spot on the nib **(camshaft) (FIGURE 3)**.

CAUTION

Ensure that eccentric set screw is aligned with the flat spot on the cam shaft. Failure to do so may result in damage to compressor or possible injury.

9. Reinstall the fan blade securely over the nib in front of the eccentric **(FIGURE 3)**.
10. Temporarily reinstall the valve plate for the piston just replaced to simplify installation of the other piston.
11. Begin at **FIGURE 2** for installation of the new piston on the opposite side of the compressor.

Replacing the Top and Bottom Valves and Gaskets (FIGURE 9)

NOTE: Ensure that when installing the new valves, they are facing in the same direction that the old ones were in when removed from each plate and that they completely cover the compression opening in the valve plate. Ensure that no dirt or grease contacts them as this may inhibit their ability to open and close properly and severely reduce the compressor's ability to adequately compress air.

CAUTION

Because of tooling of the valve keepers, ensure that the word "UP" on the valve keeper is facing you when installing the valve keepers.

1. Replace the top and bottom valves by doing one side of the valve plate at a time.
2. Use the small common **(flathead)** screwdriver to remove the valve screws securing the valve, valve keeper, and valve restraint to the valve plate.
3. Remove the valve keeper, and valve from the top of the valve plate.
4. Remove the bottom valve screw, valve keeper strip and valve from the bottom of the valve plate.
5. Remove the old gasket from the valve plate.
6. Reverse **STEPS 1-5** to install the **NEW** valves and gasket onto the valve plate.
7. Remove the old gasket in the head assembly and install the new gasket in the compressor head and the valve plate gasket into the underside of the valve plate.

*NOTE: **DO NOT** attempt to reinstall the head assembly at this time.*

8. After the other piston and valves have been replaced, install the valve plates over the aluminum sleeves ensuring that the valve keeper strip fits into the cut-out in the top of the piston.

NOTE: Ensure that the gaskets are not pinched or out of position when reinstalling the valve plates and the head assembly. Doing this will prevent leaks and lowsystem pressures.

9. Reinstall the head assembly onto the valve plates noting the markings made when the head assembly and valve plates were removed.
10. Tighten the screws in a criss-cross manner and torque to 45 in. lbs.
11. Reinstall the compressor.
12. Run unit and check for leaks around compressor hoses and crossover tubes.
13. If crossover tube(s) leak, gently rotate the tube(s) approximately 1/4-turn. Once "O" ring(s) seat themselves, leaks should stop. If not, contact Invacare Technical Service at the number on back page of this instruction sheet.

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

14. Take pressure readings to ensure proper system pressures **(Refer to PROCEDURE 21 - SIEVE BED PRESSURE TAP-IN KIT INSTALLATION AND BED PRESSURE CHECK in the IRC3LX/ IRC5LX/IRC5LXO2 SERVICE MANUAL).**

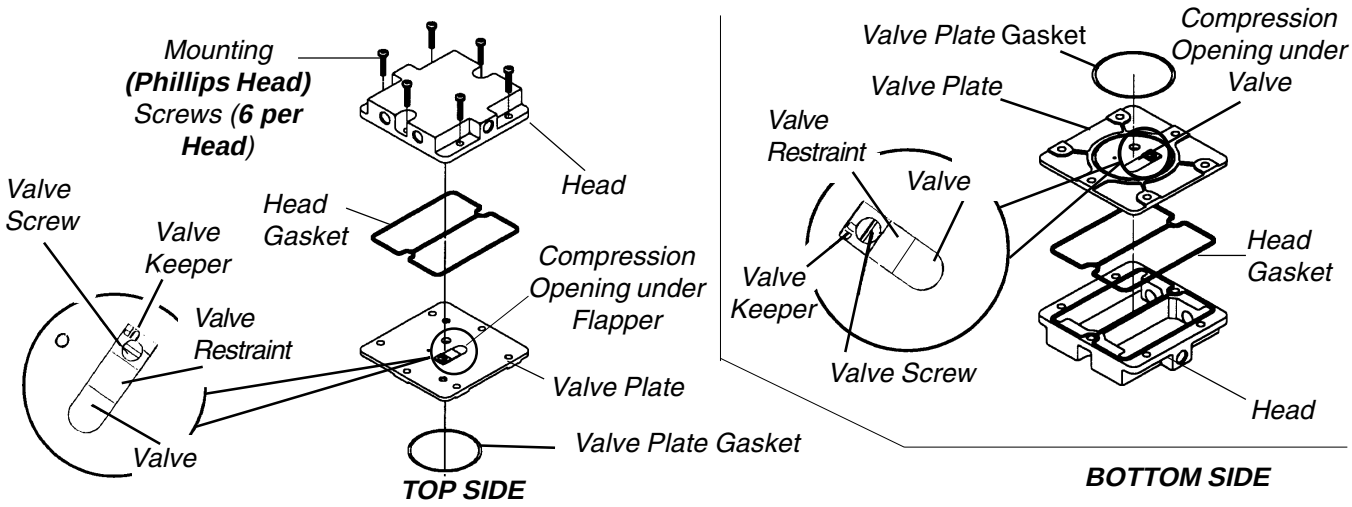


FIGURE 9 - INSTALLING THE TOP AND BOTTOM FLAPPERS AND GASKETS

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

Compressor Top End Rebuild - 5 Liter

NOTE: This kit is designed for rebuilding the Thomas Model 2639 or 2619. These compressors use this rebuild kit. The serial number is located on the front of the compressor. If the serial number does not begin in this way, this kit will not work.

The 5-Liter Thomas 2639 or 2619 Compressor Rebuild Kit contains the following:

1. Two (2) Teflon Piston Rings
2. Two (2) Aluminum Piston Sleeves
3. Four (4) Valves
4. Four (4) Valve Restraints
5. Two (2) Head Gaskets
6. Two (2) Valve Plate Gaskets
7. Eight (8) Head Mounting Screws
8. Four (4) Valve Screws
9. Four (4) Connector (**Crossover**) Tube "O" Rings

Tools Required:

One (1) Phillips Head **TORX T-25** Driver.
One (1) Phillips #2 Screwdriver Attachment for Torque Wrench (**for Retainer Screws**).
One (1) 1/8-inch Allen Wrench attachment for Torque Wrench (**for Eccentric Set Screw**).
One (1) 5/32-inch Allen Wrench attachment for Torque Wrench (**for Rod Clamping Screw**).
One (1) Common (**Flathead**) Screwdriver attachment (**for Valve Screw**).

Removing and Marking the Compressor Heads and Replacing Crossover Tube "O" Rings (FIGURE 10)

1. Unplug concentrator.
2. Carefully remove compressor from concentrator. **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
3. Use the **TORX T-25** torque wrench to remove the eight (8) screws that secure the head assembly and valve plates to the compressor.
4. Mark the heads and valve plates to ensure proper reinstallation and set valve plates aside.
5. Grasp both head assemblies and gently pull them apart.
6. Remove the crossover tubes from the head assembly.

NOTE: Replace all four (4) "O" rings.

7. Use a small flat screwdriver to get between the edge of the "O" rings and grooves in the crossover tubes and remove "O" rings from crossover tubes.
8. Slide NEW "O" rings into the grooves at each end of the crossover tubes.
9. Gently reinstall the crossover tubes into the end of one (1) compressor head.
10. Reinstall the remaining head onto the ends of the crossover tubes.

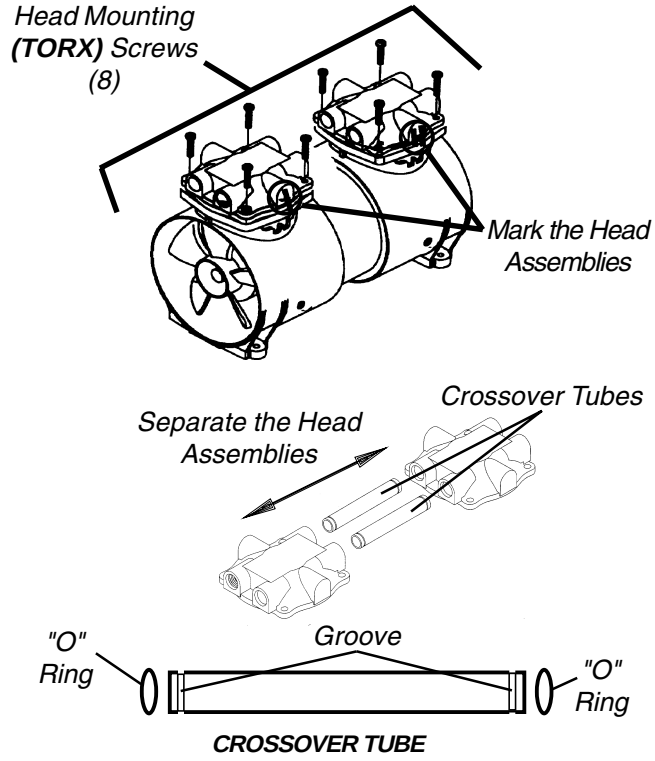


FIGURE 10 - REMOVING AND MARKING THE COMPRESSOR HEADS AND REPLACING CROSSOVER TUBE "O" RINGS

NOTE: After removing the head assembly, reinstall Flapper Plate onto the side opposite the piston being rebuilt. This restricts movement of the other piston and possible damage to the components.

WARNING
DO NOT lubricate or use oil on any moving parts. The compressor eccentric uses a precision sealed bearing.

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Removing the Piston Head and Teflon Ring (FIGURE 11)

NOTE: An Allen wrench may be inserted into the connecting screw to keep to keep it from moving.

1. Remove the aluminum sleeve from the piston to be rebuilt.
2. Remove the four (4) phillips screws on the top of the piston and remove the piston head and Teflon ring.
3. Discard the old teflon ring.
4. Remove any debris from top of piston.
5. Repeat **STEPS 1-4** for other piston.

One (1) Piston Rebuild ONLY SHOWN for Clarity

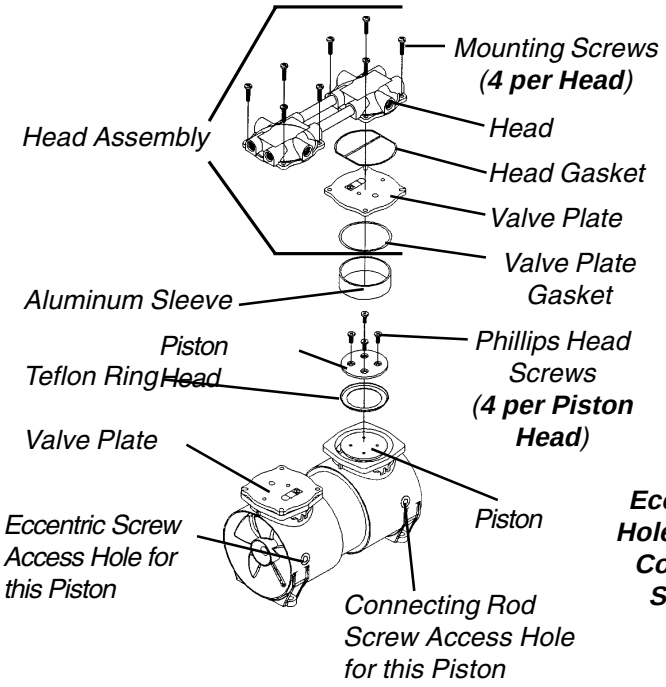


FIGURE 11 - REMOVING THE PISTON HEAD AND TEFLON RING

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Installing the New Teflon Rings and Piston Heads (FIGURE 12)

CAUTION
Piston head MUST be rotated 90° when reinstalling. This ensures proper wear on the piston head and will prolong it's life.

1. Place the aluminum sleeve onto its mounting position on the compressor housing.
2. Rest the new Teflon ring on the aluminum sleeve and center the ring with the piston head.
3. Install the piston head over the piston ring and into the aluminum sleeve.
4. Install and tighten the phillips head screws until snug to align the Teflon ring with the aluminum sleeve.
5. Once the Teflon ring is centered properly with the piston head and aluminum sleeve, torque the screws to 30 in. lbs.

CAUTION
DO NOT force aluminum sleeve onto piston. The Teflon ring may become damaged and render the piston unusable.

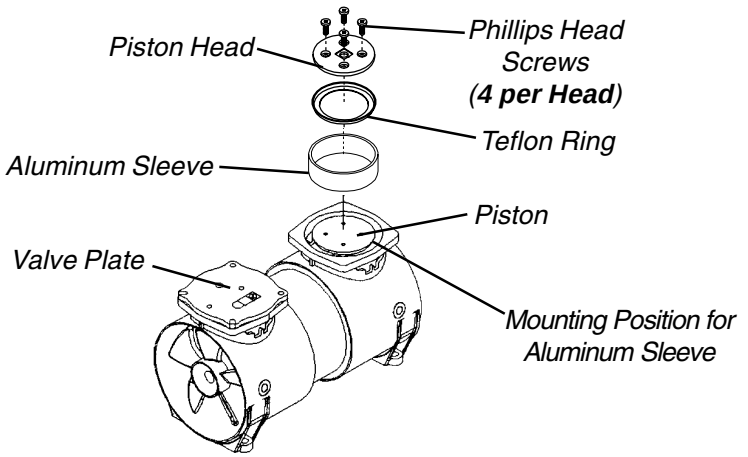


FIGURE 12 - INSTALLING THE NEW TEFLON RINGS AND PISTON HEADS

Installing Top and Bottom Flappers (FIGURE 13)

NOTE: Ensure that new valves are facing in the same direction that the old ones when installing and that they completely cover the compression opening in the valve plate. Make sure that no dirt or grease contacts the valves or valve plates as this may inhibit their ability to open and close properly and severely reduce the compressor's ability to adequately compress the air. Replace the top and bottom valves by doing one side of the valve plate at a time.

CAUTION
Because of tooling of the valve keepers, ensure that the word "UP" on the valve keeper is facing you when installing the valve keepers.

1. Use the small common **(flathead)** screwdriver to remove the valve screw securing the valve restraint, valve keeper, and valve to the top of the valve plate.
2. Remove the valve screw, valve keeper, and valve from the bottom side of the valve plate.
3. Reverse **STEPS 1-2** to install the **NEW** top and bottom valves onto the valve plate.
4. Torque valve screws to 12 in. lbs.
5. Install the head gasket in the compressor head and the valve plate gasket into the underside of the valve plate.
6. After the other piston has been rebuilt, install the valve plates over the aluminum sleeves and reinstall the head assembly onto the valve plates noting the markings made when the head assembly and valve plates were removed.

NOTE: Ensure that the gaskets are not pinched or out of position when reinstalling the valve plates and the head assembly. Doing this will prevent leaks and low system pressures.

7. Tighten the screws on the heads in a criss-cross manner until snug. **DO NOT** tighten completely.
8. Use a torque wrench with the **TORX T-25** drive and torque each head screw to 40 in. lbs. in a criss-cross manner.
9. Reinstall the compressor **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
10. Run unit and check for leaks around compressor hoses **(Refer to PROCEDURE 19 - LEAK TEST)**.
11. If crossover tube(s) leak, gently rotate the tube(s) approximately 1/4-turn. Once "O" ring(s) seat themselves, leaks should stop. If not, contact Invacare Technical Service at the number on back page of this Owner's Manual.
12. Take pressure readings to ensure proper system pressures (Refer to **PROCEDURE 21 - SIEVE BED PRESSURE TAP-IN KIT INSTALLATION AND BED PRESSURE CHECK** in the **IRC3LX / IRC5LX/IRC5LXO2 SERVICE MANUAL)**.

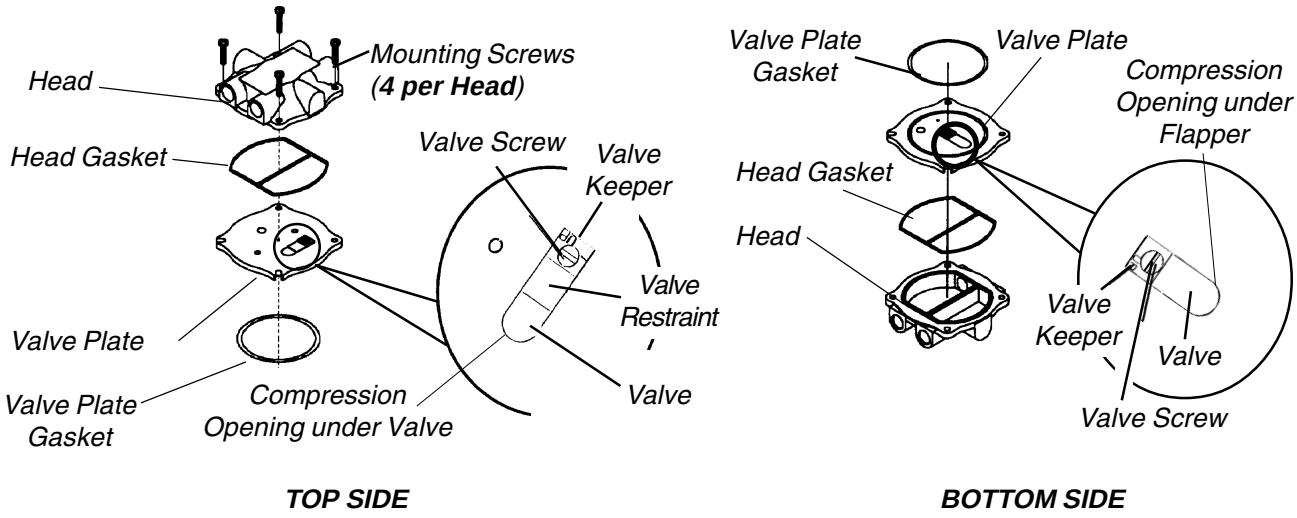


FIGURE 13 - INSTALLING THE TOP AND BOTTOM FLAPPERS AND GASKETS

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Compressor Top End Rebuild - 5/6 Liter (For S/N after 98XXXXX)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

NOTE: This kit is designed for rebuilding the Thomas Model 2650 Series. This compressor uses this rebuild kit. The serial number is located on the front of the compressor. If the serial number does not begin in this way, this kit will not work.

The 5/6-Liter Thomas 2650 Series Compressor Rebuild Kit contains the following:

1. Two (2) Teflon Piston Cups
2. Two (2) Aluminum Piston Sleeves
3. Four (4) Flapper Valves - Intake and Exhaust
4. Four (4) Valve Keepers
5. Two (2) O-Ring - Sleeve
6. Two (2) Valve Plate Gaskets
7. Eight (8) Head Mounting Screws
8. Four (4) Valve Screws
9. Two (2) Valve Restraints
10. Two (2) Piston Cup Retainer Screws

Tools Required:

1. Torque wrench that has an inch-pound scale (for head screws, set screws, flapper valve screw, and pipe plugs)
2. Torx® T-25 drive for torque wrench (for head screws or flat blade)
3. 5/32-inch Allen wrench attachment for torque wrench (for eccentric set screw)
4. Flat blade screwdriver attachment or 1/2-inch hex socket for torque wrench (for flapper valve screw)
5. Torx® T-27 screwdriver attachment for torque wrench (for retainer screws)

WARNING

DO NOT lubricate or use oil on any moving parts. The compressor eccentric uses a precision sealed bearing.

REMOVING COMPRESSOR AND COMPRESSOR HEADS (REFER TO FIGURE 15).

Compressor

1. Unplug concentrator.
2. Carefully remove compressor from concentrator. **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**

Compressor Heads

3. Clean loose dirt from the outside of the compressor.
4. Use the **TORX T-25** torque wrench and loosen the eight (8) head screws.
5. Remove the compressor heads.

Valve Plate

6. Lift off the valve plate.

NOTE: Note the position of the tab on valve plate for reassembly (FIGURE 14).

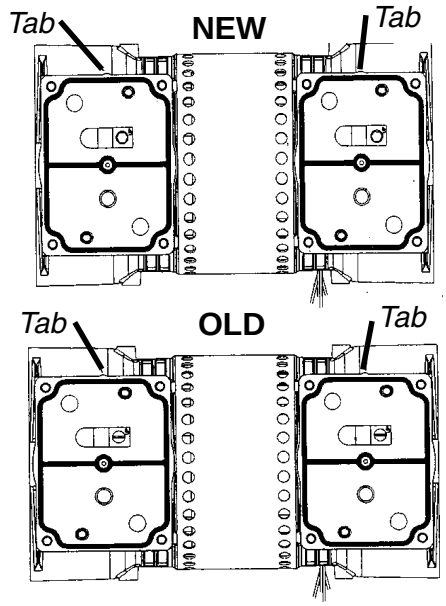


FIGURE 14 - TAB POSITIONS

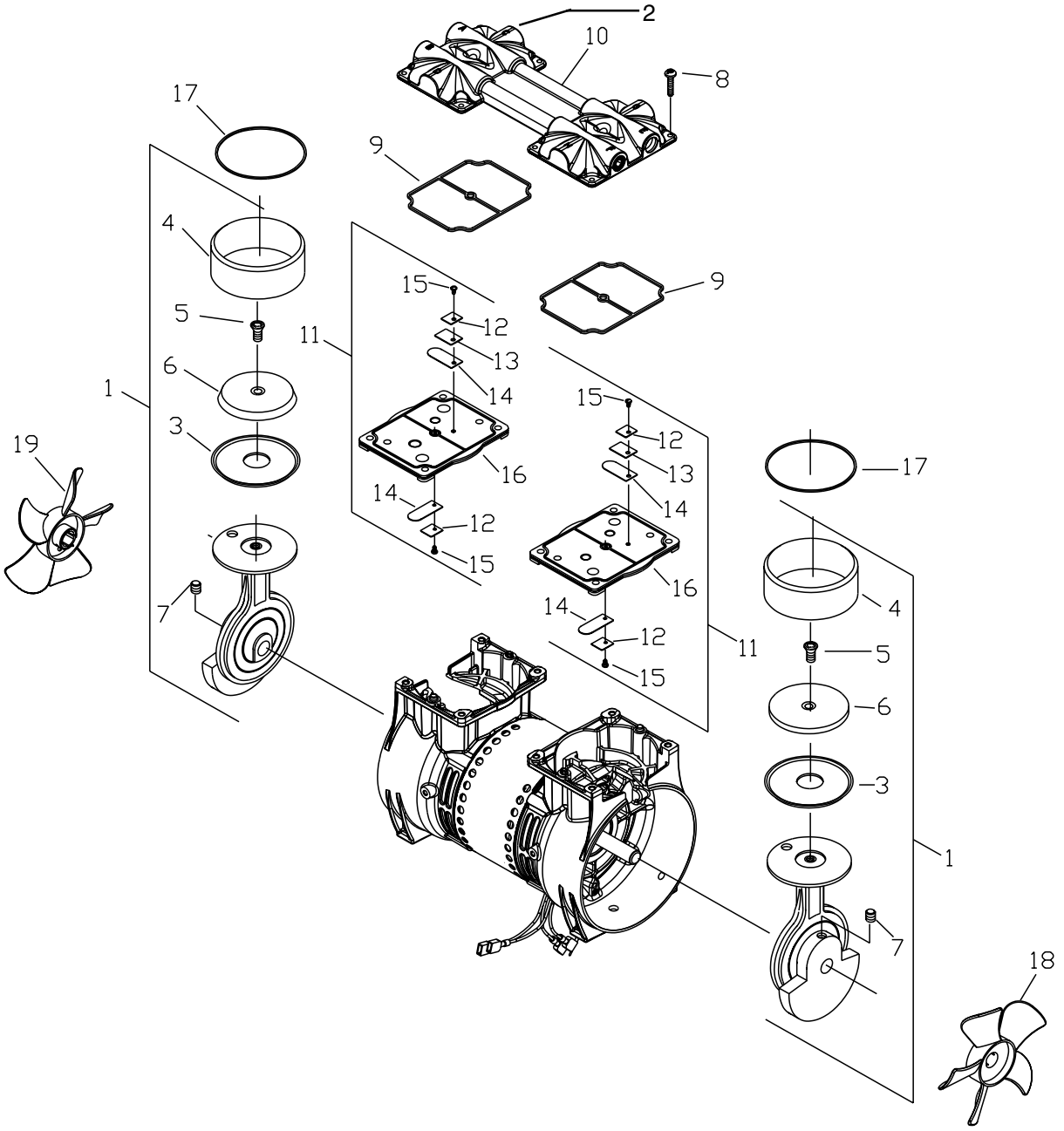
NOTE: To avoid confusion, ONLY service one (1) end of the compressor at a time.

Fan

7. Remove the fan by releasing the pressure from the clip holding it to the shaft.

NOTE: Note position of fan/orientation for reassembly.

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)



Item	Description
1	Connecting Rod, Eccentric & Bearing Assembly
2	Valve - Pressure Relief
3	Teflon Piston Cup
4	Piston Sleeve
5	Screw - Piston Cup Retainer
6	Piston Cup Retainer
7	Set Screw - Eccentric
8	Screw - Head Mounting
9	O-Ring - Head Gasket
10	Piston Head

11	Valve Plate Assembly
12	Valve Keeper
13	Valve Restraint
14	Valve Flapper - Intake & Exhaust
15	Screw - Valve Flapper
16	Valve Plate
17	O-Ring Sleeve
18	Fan - Gray
19	Fan - Black

FIGURE 15 - COMPRESSOR EXPLODED VIEW

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Connecting Rod/Eccentric Assembly

8. Rotate shaft to align the eccentric's set screw with the access hole in the bottom of the compressor housing.
9. Insert the 5/32-inch allen wrench into the access hole in the bottom of the compressor housing.
10. Loosen the setscrew 1/4 turn.
11. Rotate connecting rod to top dead center (180^0) and slide the connecting rod/eccentric assembly off the shaft.
12. Secure the rod assembly in a fixture.
13. Remove the sleeve from the connecting rod and discard.

Piston Cup

14. Remove the screw (discard) from the cup retainer (retain for reassembly).
15. Remove the piston cup (discard) and wipe debris from the top of the connecting rod with a clean damp cloth.

O-ring, Intake Valve and Valve Keeper

16. Remove the O-ring, intake valve and valve keeper from the bottom of the valve plate. Discard all.
17. Clean the bottom of the valve plate with a clean, soft cloth.

Exhaust Flapper Valve, Valve Restraint and Valve Keeper

18. Remove the exhaust flapper valve, valve restraint and valve keeper from the top of the valve plate. Discard all.
19. Clean the top of the plate with a clean, soft cloth.

Gasket

20. Remove the OLD gasket from the top of the valve plate and discard.
21. Clean the valve plate with a clean, soft cloth.

REBUILDING COMPRESSOR (REFER TO FIGURE 15).
NOTE: Before reassembly, wipe any residue from all components with a clean soft cloth.

Gasket

1. Install NEW gasket; seating the gasket firmly in the groove at the top of the valve plate with your finger or blunt object.

CAUTION
Make sure that the O-ring is NOT twisted when seated in the groove of the top of the valve plate.

Exhaust Flapper Valve, Valve Restraint and Valve Keeper

2. Install the NEW exhaust flapper valve, valve restraint and valve keeper to the top of the valve plate (**FIGURE 16**).

NOTE: Torque flapper screws to 18 inch-lbs.

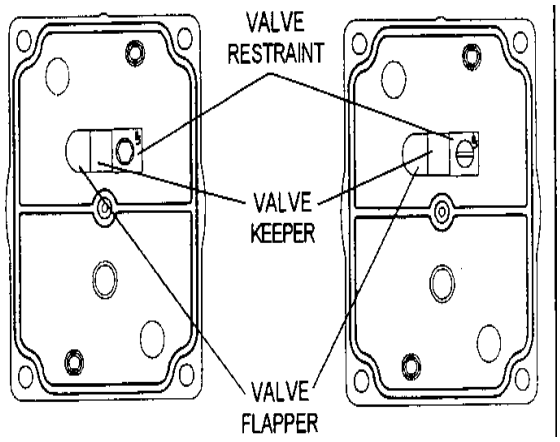


FIGURE 16 - INSTALL THE NEW EXHAUST FLAPPER VALVE, VALVE RESTRAINT AND VALVE KEEPER

O-ring, Intake Valve and Valve Keeper

3. Install the NEW valve keeper on top of the NEW intake flapper so that the word "UP" is visible (**FIGURE 17**).

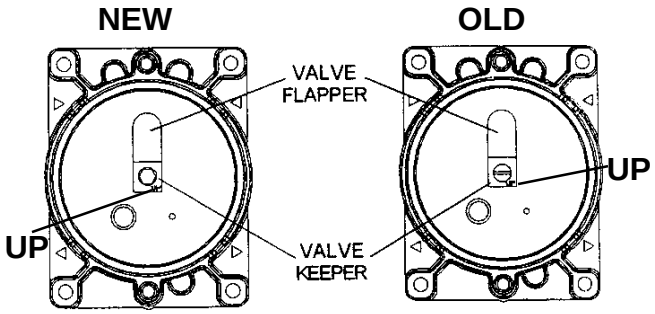


FIGURE 17 - INSTALL O-RING, INTAKE VALVE AND VALVE KEEPER

4. Install the NEW O-ring, seating it firmly into the grove with your finger or blunt object.

NOTE: Torque flapper screws to 18 inch-lbs.

Piston Cup

5. Place cylinder sleeve over rod top with smooth edge facing up.
6. Place piston cup on rod top making sure it is CENTERED.
7. Place retainer on top of piston cup and seat retainer in rod top pocket, making sure the retainer and cup lineup properly along with screw holes.
8. Insert new screw into rod top and torque to 65 inch-lbs.

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Connecting Rod/Eccentric Assembly

9. With gloved-hand or clean cloth, pre-form piston cup if necessary.
10. Gently slide cylinder sleeve up and over cup to fully form it.

WARNING

DO NOT lubricate or use oil on any moving parts. The compressor eccentric uses a precision sealed bearing.

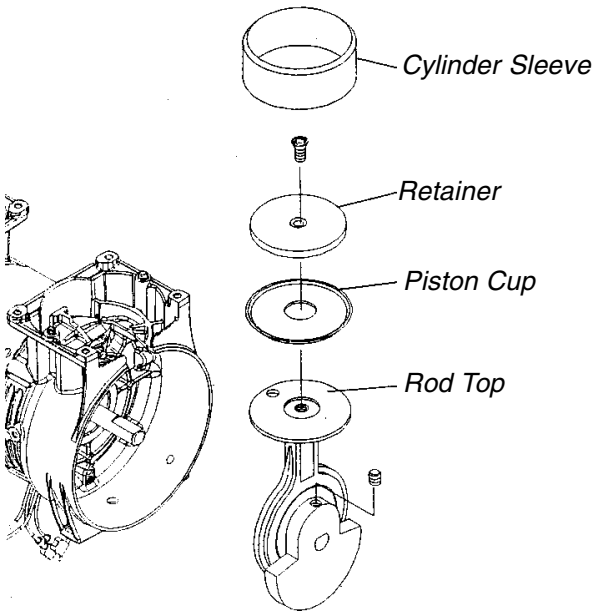
CAUTION

DO NOT crimp the piston cup when you replace the sleeve. If the cup is crimped, it MUST be replaced.

11. With bearing side (**FIGURE 18**) of connecting rod/eccentric assembly facing the center (motor) of the compressor, slide the assembly onto the shaft bringing it flush to the motor bearing.

NOTE: Make sure the eccentric setscrew is positioned over the flat of the shaft.

12. Tighten setscrew to 100 inch-lbs.
13. Hold the sleeve down by the housing with one (1) hand and slowly rotate the eccentric with the other hand to ensure all the components are lined-up properly.



NOTE: As the piston travels up and down it will also rock from side-to-side. This is a feature of the WOB-L Piston.

FIGURE 18 - CONNECTING ROD/ECCENTRIC ASSEMBLY

Fan

14. Reinstall the fan onto the shaft in original orientation.

Valve Plate

15. With the sleeve located and firmly seated on the housing, replace the valve plate in the same manner as it was (**FIGURE 18**).

NOTE: Make sure the top edge of the sleeve locates in the O-ring groove in the bottom of the valve plate.

CAUTION

Make sure that the O-ring is NOT twisted when seated in the groove of the bottom of the valve plate.

Compressor Heads

16. Place the heads on top of the valve plates.
17. Tighten the head screws in a criss-cross pattern to 40 inch-lbs.

Compressor

WARNING

To avoid personal injury or property damage, rotate the fan by hand prior to connecting the unit to a power source. Check for suction at the air inlet by placing your finger over the port as you rotate the fan. You should feel a slight suction with each rotation of the fan. If you don't feel a suction but you feel or hear a thump as you turn the fan, DO NOT connect the unit to a power source. Review the assembly procedure for possible error.

18. Reinstall compressor **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
19. Run unit and check for leaks around compressor hoses and compressor tubes **(Refer to PROCEDURE 19 - LEAK TEST)**.
20. Take pressure readings to ensure proper system pressures (Refer to **PROCEDURE 21 - SIEVE BED PRESSURE TAP-IN KIT INSTALLATION AND BED PRESSURE CHECK** in the **IRC3LX/IRC5LX/ IRC5LXO2 SERVICE MANUAL)**.

PREVENTIVE MAINTENANCE RECORD

INVACARE OXYGEN CONCENTRATOR

MODEL NO. IRC _____ **SERIAL NO.** _____

ON EACH INSPECTION

Record Date of Service																	
Record Elapsed Hours On Hour Meter																	
Clean Cabinet Filter(s)																	
Check Prescribed L/min. Flow Rate																	

EVERY 90 DAYS

Check Oxygen Concentration **(UNITS WITHOUT *SENSO*2)**																	

ANNUALLY or DURING PREVENTIVE MAINTENANCE SCHEDULE

Clean/Replace Cabinet Filter(s)																	
Replace Bacteria Filter																	
Check/Replace Compressor Inlet Filter																	
Check Oxygen Concentration **(*SENSO*2 MODELS)**																	
Check Power Loss Alarm																	

AS REQUIRED

Clean Heat Exchanger																	
Replace Exhaust Muffler																	
Rebuild Top End of Compressor																	

EVERY 20,000 HOURS

Replace In-line Filter - **(ALL MODELS <u>EXCEPT</u> 3LX,5LX,5LXO2, 5LXO2T, 6LXO2, 6LXO2T)**																	

PROCEDURE 3 - REPLACING P.E. VALVE - 5LX/5LXO2/5LXO2T/6LXO2/6LXO2T ONLY (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Remove spade connectors from P.E. Valve assembly.
4. Remove ty-wraps from P.E. Valve tubing.
5. Remove P.E. valve assembly from tubing.

CAUTION

If P.E. Valve is not to be installed immediately, plug the P.E. Valve tubing to prevent sieve bed contamination.

6. Install new P.E. valve assembly immediately, by reversing **STEPS 3-5.**

NOTE: After replacing P.E. valve, retiming may be necessary. Refer to PROCEDURE 18 - TIMING OF THE INVACARE 5 CONCENTRATOR.

7. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST)**.
8. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

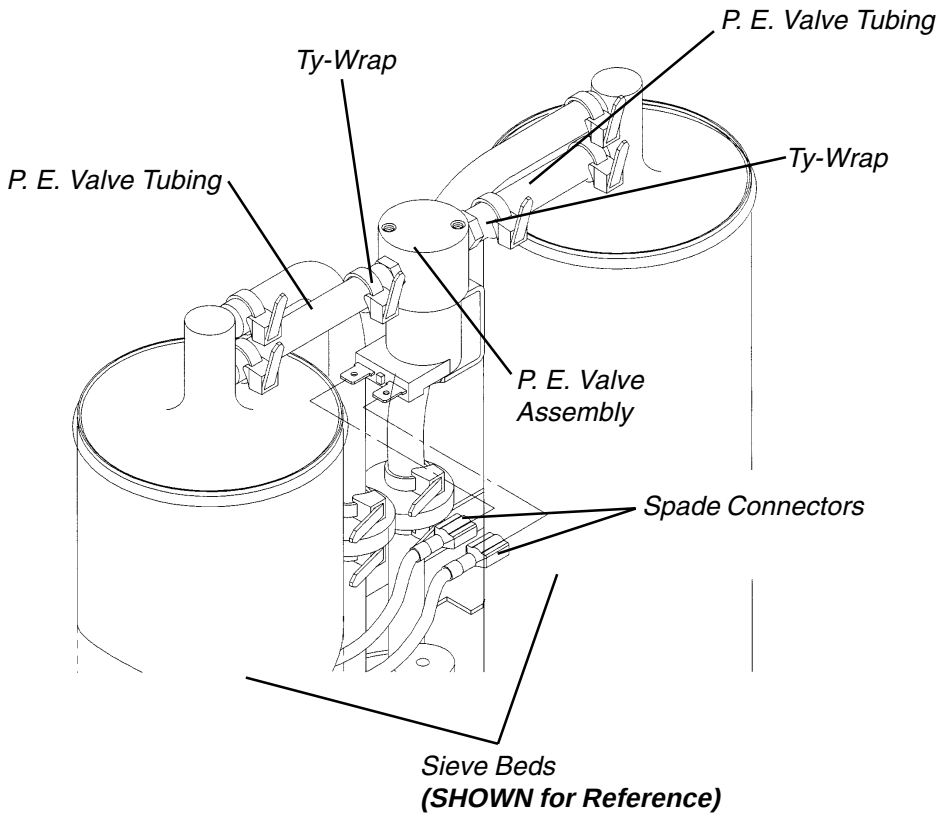


FIGURE 1 - REPLACING P.E. VALVE (5LX/5LXO2/5LXO2T/6LXO2/6LXO2T ONLY)

PROCEDURE 4 - REPLACING SIEVE BEDS (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

NOTE: Always replace Sieve Beds in pairs to ensure that both beds are in optimum condition.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove ty-wraps and disconnect P.E Valve and sieve bed tubing from top of sieve beds.
4. Remove P.E. Valve assembly **(Refer to PROCEDURE 3 - REPLACING P.E. VALVE (5LX/5LXO2/ 5LXO2T/6LXO2/6LXO2T ONLY)**.
5. Loosen adjustable clamps on sieve beds and slide clamps down below the adjustable clamp hangers.
6. Lift sieve beds up and rest sieve beds on top rear of base.
7. Remove plastic clamps and reinforced tubing from bottom of both sieve beds and remove sieve beds.

CAUTION

DO NOT remove plastic caps from NEW sieve bed fittings until ready to install NEW beds. Severe sieve contamination can occur if uncapped beds are exposed to air.

8. Remove plastic caps from the top and bottom fittings of the **NEW** sieve beds.
9. Install **NEW** sieve beds reversing **STEPS 3-7.**

NOTE: After replacing sieve beds, retiming may be necessary. (Refer to PROCEDURE 18 - TIMING OF THE INVACARE 5 CONCENTRATOR).

10. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST)**.
11. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

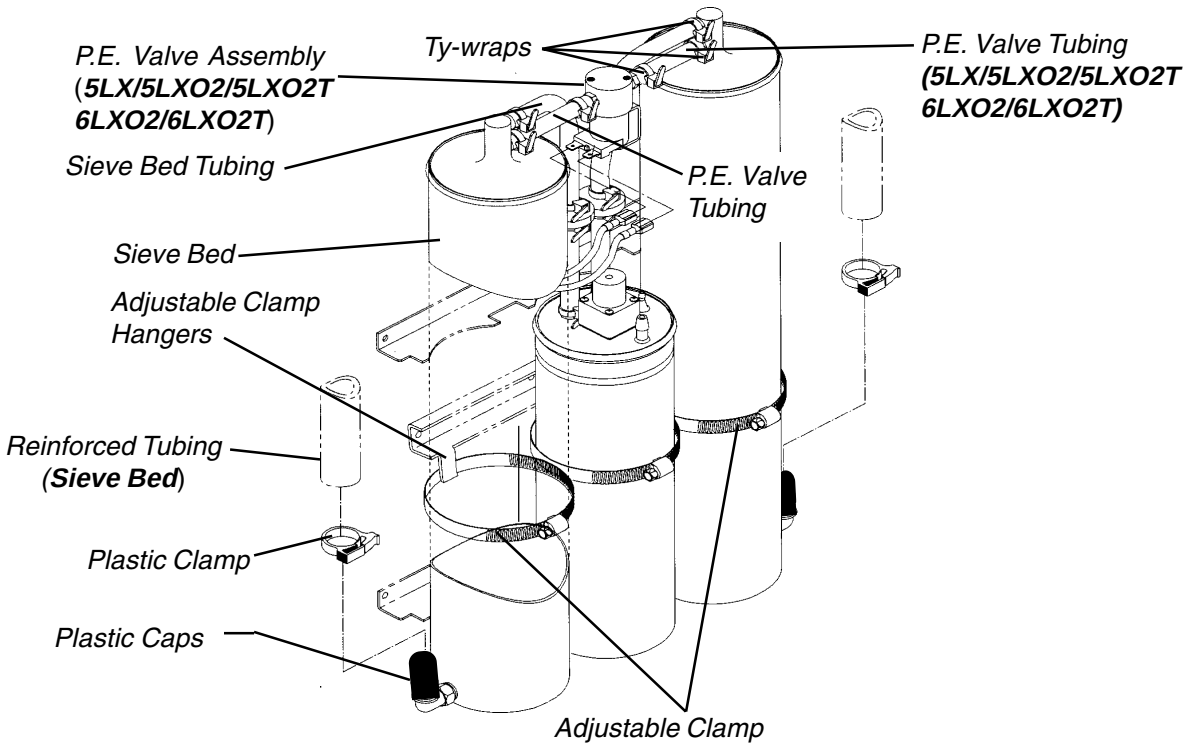


FIGURE 1 - REPLACING SIEVE BEDS

PROCEDURE 5 - REPLACING CHECK VALVES (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**

NOTE: Replace one or both check valves when performing this procedure. The check valves are one-way directional and can be checked by passing air through them. Air should flow in one direction ONLY.

3. Loosen adjustable clamp on product tank and slide clamp down below the adjustable clamp hanger to access check valve(s).
4. Remove ty-wraps from top and bottom of the check valve(s) and disconnect check valve(s) from tygon tubing.

CAUTION

The check valves are one-way directional and MUST be installed correctly. The letters VAC are printed on the bottom half of the check valves and should be installed with VAC to the underside of the check valve. Low system pressures and eventual bed contamination will result if not properly installed.

5. Install the **NEW** check valve(s) into the tygon tubing.

NOTE: Ensure proper orientation of check valves when installing.

6. Secure the check valve(s) by installing new ty-wraps to the tygon tubing where previously removed.

NOTE: If tygon tubing is damaged in any way, replace the section of tygon tubing before installing check valve(s).

7. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST).**
8. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

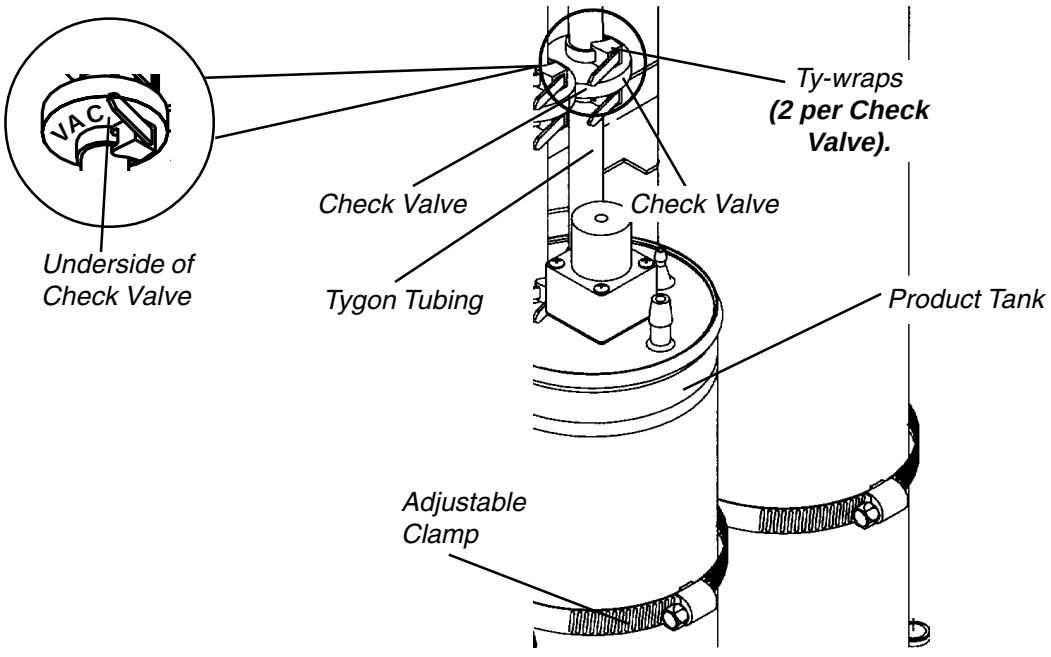


FIGURE 1 - REPLACING CHECK VALVES

PROCEDURE 6 - REPLACING / ADJUSTING REGULATOR

Replacing Regulator (FIGURE 1)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Loosen adjustable clamp on product tank and slide clamp down below the adjustable clamp hanger.
4. Pull product tank back and up to access regulator.
5. Remove the four (4) mounting screws that secure regulator to product tank cap.
6. Remove regulator from product tank cap ensuring that the "O" rings are removed.

NOTE: Clean mounting surface of product tank lid. Ensure that the two (2) "O" rings for the NEW regulator are installed onto the ports (underside) of the NEW regulator before installation.

CAUTION
Ensure proper installation of regulator. Note flow arrow on regulator. This MUST face toward the front of unit or flow will be interupted causing system shutdown.

7. Install new regulator onto product tank by reversing **STEP 5**.
8. Torque mounting screws to 5 $\pm$ 1 inch lbs.
9. Re-install product tank and secure with the adjustable clamp.
10. Adjust regulator pressure if necessary **(Refer to ADJUSTING REGULATOR (FIGURE 2) in this PROCEDURE)**.
11. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST)**.
12. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

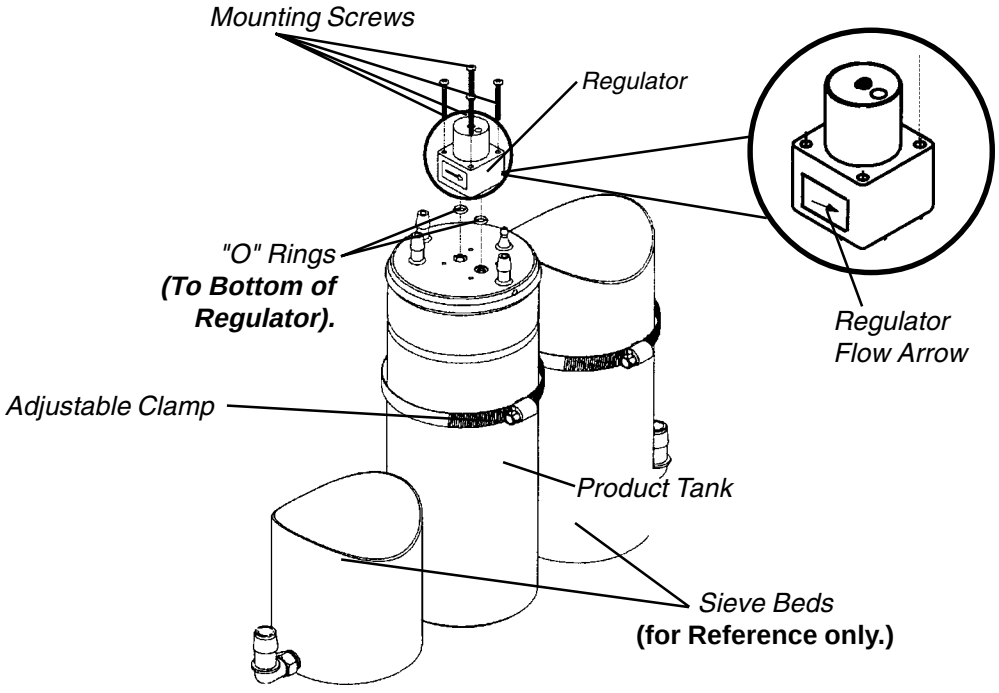


FIGURE 1 - REPLACING REGULATOR

PROCEDURE 6 - REPLACING / ADJUSTING REGULATOR

Adjusting Regulator (FIGURE 2)

1. Turn unit **ON**.
2. Install pressure gauge onto oxygen outlet.

NOTE: Check O2 pressure at oxygen outlet. It should read a steady 5 p.s.i. ± 0.5 p.s.i. If pressure is not in specification, proceed to STEP 3. If difficulty is encountered in adjusting or maintaining 5 p.s.i. ± 0.5 p.s.i., refer to the TROUBLESHOOTING GUIDE in this manual for assistance. If pressure does fall within specification, operate normally.

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

3. Unplug unit.
4. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
5. Move product tank back to access regulator **(Refer to PROCEDURE 6 - REPLACING/ADJUSTING REGULATOR - Replacing Regulator [FIGURE 1])**.
6. Plug unit in and turn power switch **ON**.
7. Locate the pressure adjustment screw in center of regulator.
8. Insert a 3/32-inch Allen wrench into the pressure adjustment screw.
9. While reading pressure gauge, turn pressure adjustment screw:
   a) Clockwise to **increase** output pressure or;
   b) Counterclockwise to **decrease** output pressure.
10. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

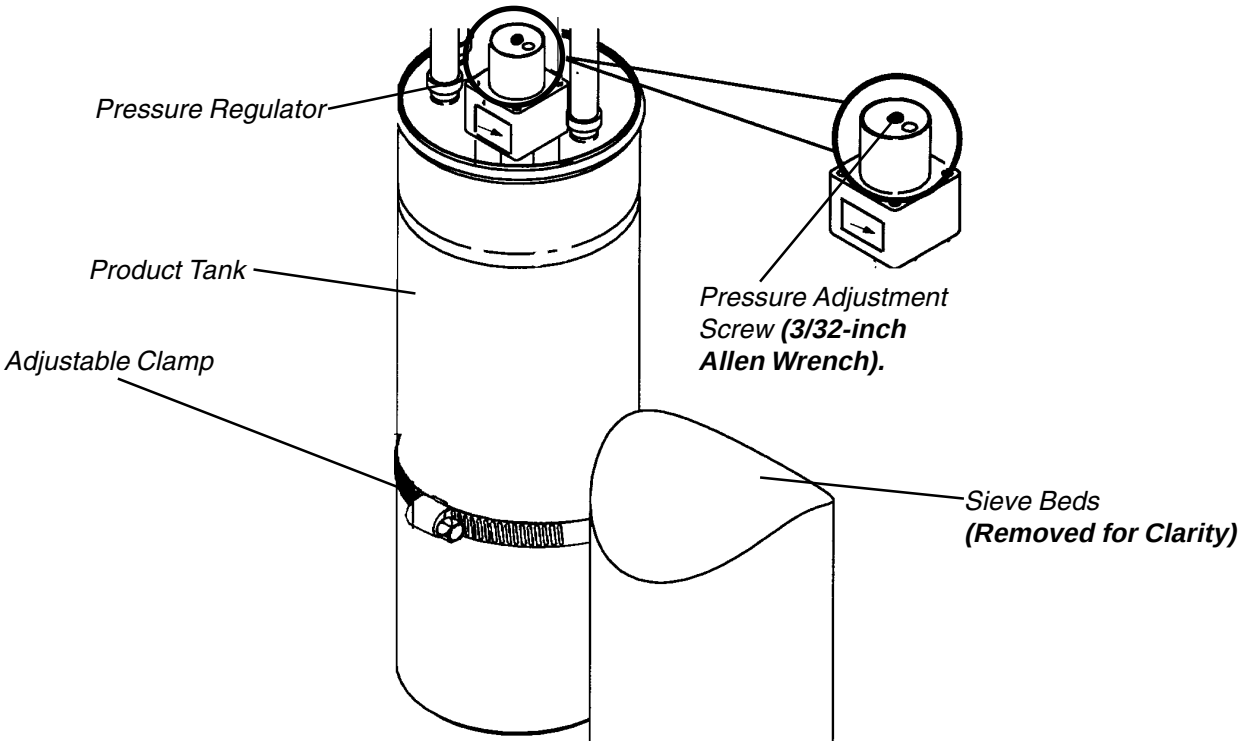


FIGURE 2 - ADJUSTING REGULATOR

PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

Replacing Compressor Assembly (FIGURE 1)

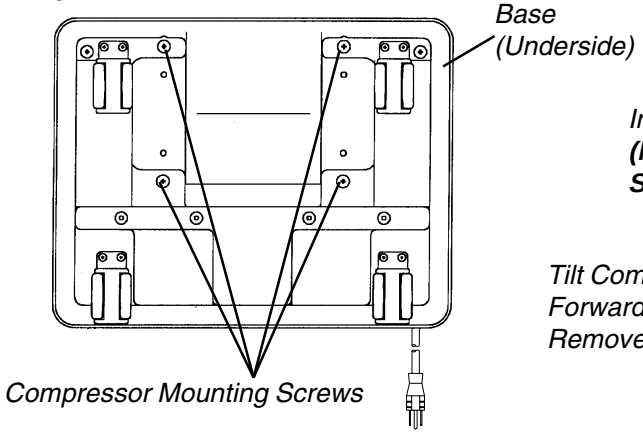
1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Disconnect intake and exhaust hoses from compressor assembly.

NOTE: If resonator is aluminum can design, leave it intact on compressor assembly until compressor has been removed from concentrator.

4. Disconnect molex connector from compressor assembly.
5. Disconnect ground **(green)** wire **(NOT SHOWN)** from back of sound box and pull wire through grommet.
6. Cut and remove ty-wraps.
7. Remove the four (4) mounting screws securing compressor brackets to base.
8. Tilt compressor assembly toward front of unit and lift out.

NOTE: If replacing capacitor only, proceed to Replacing Capacitor (FIGURE 2).

9. If resonator is aluminum can design, remove it from existing compressor and install on NEW compressor.
10. Reverse **STEPS 3-8** to install new compressor assembly.
11. Run unit and inspect for leaks **(Refer to PROCEDURE 19 - LEAK TEST)**.
12. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.



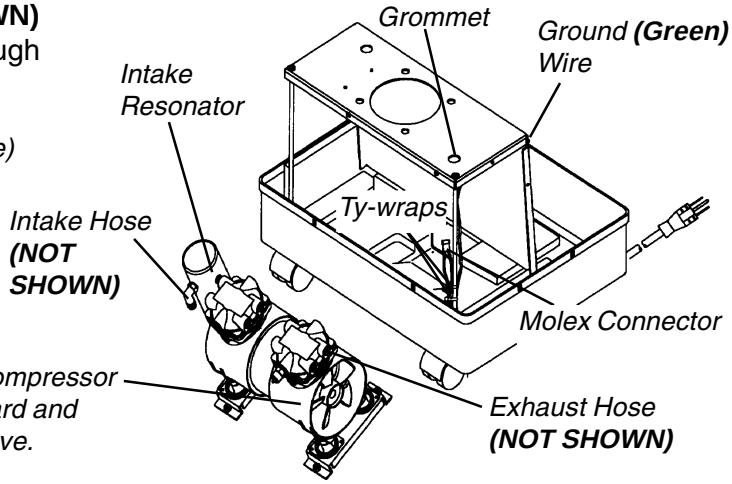


FIGURE 1 - REPLACING COMPRESSOR ASSEMBLY

Replacing Capacitor (FIGURE 2)

1. Remove compressor. **(Refer to Replacing Compressor Assembly (FIGURE 1).**
2. Remove terminal boot on wires (if present).
3. Disconnect the wires to the capacitor.
4. Remove ty-wraps and capacitor from bottom of Compressor Mounting Bracket.
5. Install **NEW** capacitor by reversing **STEPS 2-4.**
6. If applicable, transfer the unterminated terminals from the OLD capacitor to the NEW capacitor.
7. Reconnect spade connectors from compressor to connectors on capacitor.
8. Reinstall compressor assembly. **(Refer to Replacing Compressor Assembly) (FIGURE 1).**

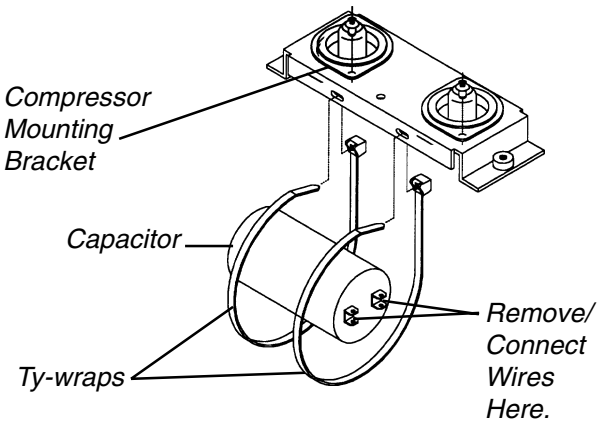


FIGURE 2 - REPLACING CAPACITOR

PROCEDURE 8 - REPLACING HEAT EXCHANGER (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Remove compressor assembly **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR)**.

NOTE: Concentrator can be laid down to more easily access heat exchanger.

4. Cut the four (4) ty-wraps that secure the heat exchanger to the four (4) ty-wrap mounts under the top of the sound box.

CAUTION

If applicable, use care not to damage fins of heat exchanger when installing, removing or cleaning.

5. Loosen the adjustable clamps on the compressor output and valve manifold input hoses at the front and rear of the heat exchanger.
6. Move the heat exchanger out to access the hoses and remove them from the heat exchanger.
7. Remove heat exchanger.
8. Ensure that protective **(paper)** cover is installed onto the front of finned heat exchanger. If NEW heat exchanger is being installed, discard protective paper cover.
9. Reverse **STEPS 4-6** to install new heat exchanger.
10. Torque adjustable clamps to heat exchanger to 6.5 $\pm$ 1 inch lbs.
11. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST)**.
12. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

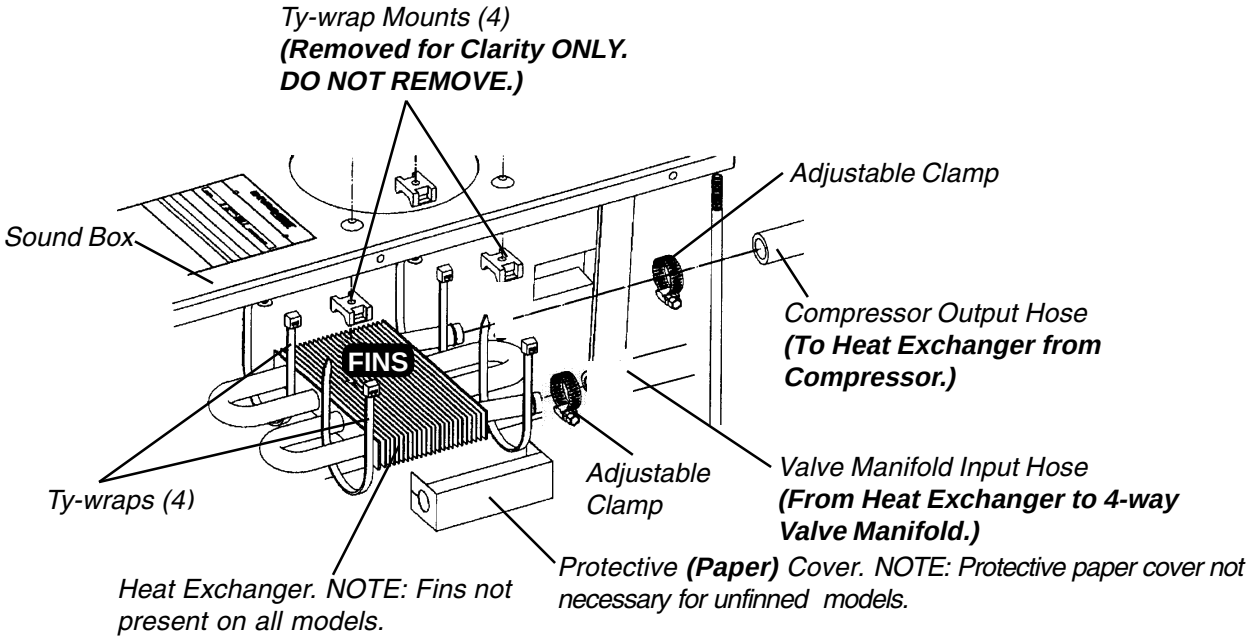


FIGURE 1 - REPLACING HEAT EXCHANGER

PROCEDURE 9 - REMOVING CONTROL PANEL (FIGURE 1)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove the two (2) upper mounting screws that secure the control panel.
4. Loosen the two (2) lower mounting screws that secure the control panel.
5. Cut the ty-wraps that secures the 1/8-inch I.D. transducer tubing to the product tank and remove tubing from the top of the product tank.
6. Remove the 1/4-inch I.D. pressure regulator tubing from the tee fitting behind the control panel.
7. Disconnect the 9-pin molex connector from P.C. Board.
8. Disconnect the 8-pin molex connector from P.C. Board.
9. Disconnect the 4-pin connector to interface cable from P.C. Board (Telemetry Unit ONLY).
10. Remove and code connectors from circuit breaker, hour meter and On/Off switch. **(Jumper wire harness from On/Off switch to circuit breaker does not have to be removed)**.
11. Remove control panel.
12. Reverse **STEPS 3-10** to re-install control panel.
13. Run unit and check for leaks at transducer tubing on product tank cap **(Refer to PROCEDURE 19 - LEAK TEST).**
14. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

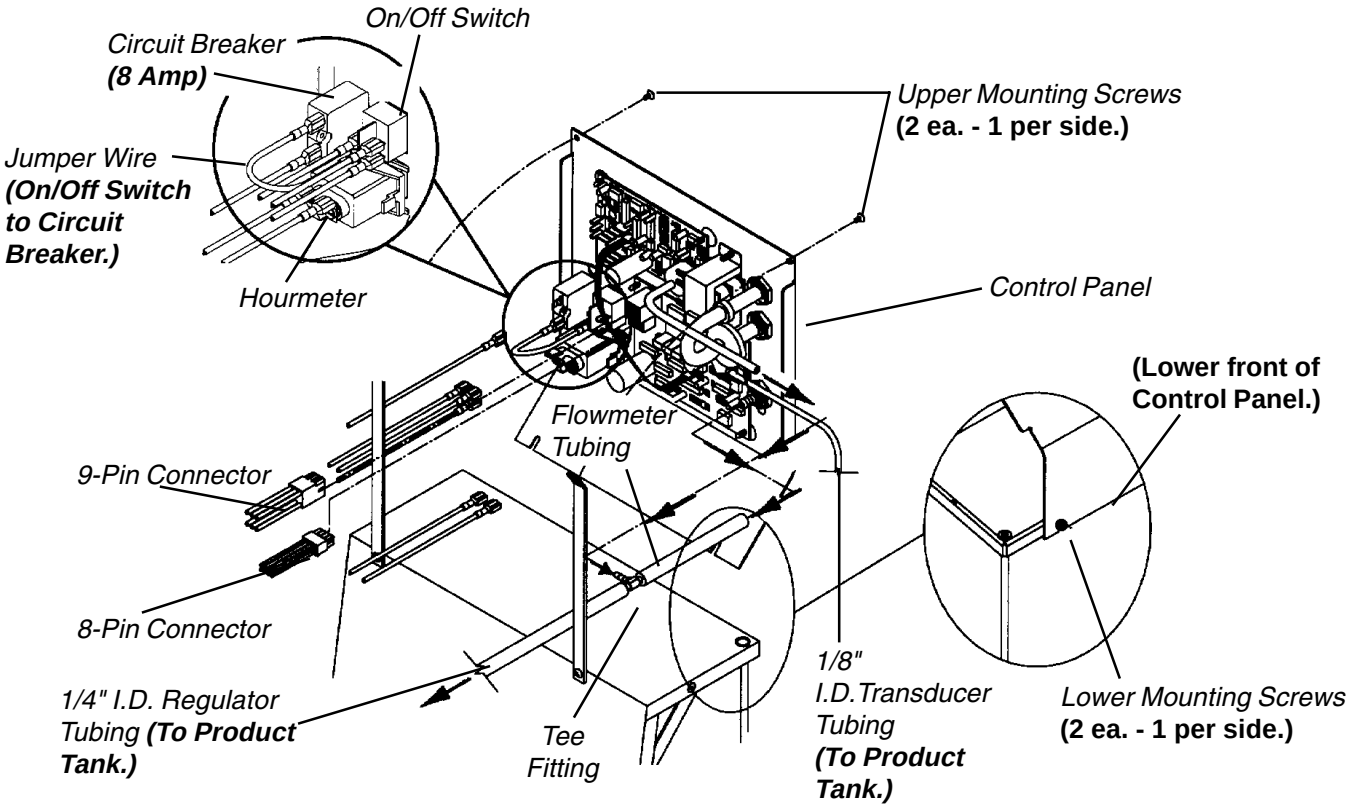


FIGURE 1 - REMOVING CONTROL PANEL

PROCEDURE 10 - REPLACING COOLING FAN (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Remove control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
4. Remove compressor assembly **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
5. Remove heat exchanger **(Refer to PROCEDURE 8 - REPLACING HEAT EXCHANGER).**

NOTE: Before removing the four (4) mounting clips, note their position. These clips must be properly reinstalled to secure heat exchanger.

6. Remove the four (4) mounting screws located under sound box and remove mounting clips.
7. Move fan to access the wires connected to fan.
8. Disconnect wires from spade connectors on back side of fan.
9. Remove **GREEN** ground wire from rear of fan by removing self-tapping screw on fan assembly.
10. Remove existing fan.

WARNING

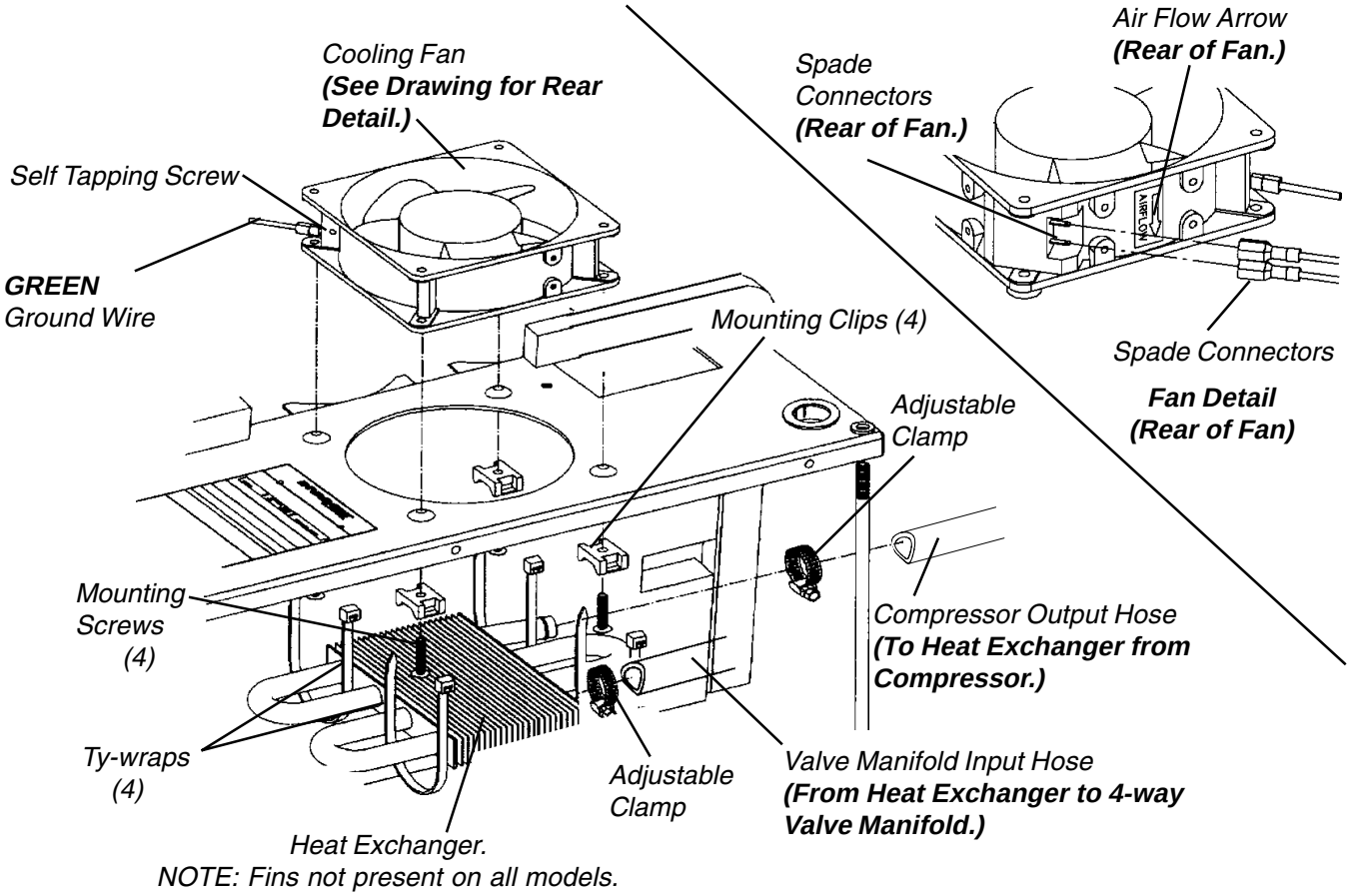
Fan must be positioned properly so air from the fan blows DOWN onto the compressor (see air flow arrow on back of fan) or damage to the unit will occur.

11. Reverse **STEPS 6-9** to install **NEW** fan.
12. Reinstall heat exchanger **(Refer to PROCEDURE 8 - REPLACING HEAT EXCHANGER).**
13. Reinstall compressor **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
14. Reinstall control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL).**
15. Plug unit in and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST).**

NOTE: Run unit for at least 1/2 hour. If unit runs properly, replace cover. If not, call Invacare Technical Service.

16. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

PROCEDURE 10 (continued) - REPLACING COOLING FAN (FIGURE 1)



NOTE: Fins not present on all models.

FIGURE 1 - REPLACING COOLING FAN

PROCEDURE 11 - REPLACING P.C. BOARD(S) (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Remove control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.

WARNING

ONLY QUALIFIED SERVICE TECHNICIANS SHOULD MAKE ANY CHANGES TO THIS EQUIPMENT.

These are precautions that should be followed to prevent damage to the P. C. boards: Before handling any P. C. boards, you need to be properly grounded to prevent static damage to the components of the board. A Static Cuff must be worn and properly grounded using an alligator clip. Electrical conduit or a water pipe is normally sufficient when a known good ground is not available. Care should be taken to ensure that alligator clip contact with bare metal surface.

When removing quick disconnects, DO NOT pull on wire itself as damage to the connector or solder joint may occur. Hold down the P. C. board with one hand and use an upward force with a slight rocking motion to remove the terminals.

Before installing any P. C. boards, ensure that all insulators are in place.

4. Remove Sensor Wiring Harness Jumper **(P2)** from P.C. board(s) to be replaced.
5. **Disconnect the following:**

CAUTION

DO NOT remove sensor tubing from P.C. Board. Remove from tee fitting ONLY. Damage to sensor assembly could occur.

3LX, 5LX and 5LXO2 before S/N97JXXXX

***Sens*O2 (Top) P.C. Board (5LXO2 ONLY):**

a) Sensor tubing from "T" fitting behind control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.

Control (Bottom) P.C. Board (3LX, 5LX, 5LXO2):

a) Wiring Harness from 9-Pin Wiring Harness Connector **(P1)**.
b) Wiring Harness from 8-Pin Wiring Harness Connector **(P5)**.
c) Transformer connector **(P3)**.
d) Pressure transducer tubing from product tank.

Integrated Board (5LXO2/5LXO2T/6LXO2/6LXO2T) After *S/N97JXXXX*

a) Wiring Harness from 9-Pin Wiring Harness Connector **(P1)**.
b) Wiring Harness from 8-Pin Wiring Harness Connector **(P5)**.
c) Transformer connector **(P3)**.
d) Pressure transducer tubing from product tank.
e) Oxygen Sensor tubing from "T" fitting behind control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
f) Wiring Harness from 4-pin wiring harness connector (P6) [5LXO2T, 6LXO2T Telemetry Unit ONLY].

Remote Display Board

a) Sensor wiring harness if not disconnected in **STEP 1**.

6. Pinch end of each stand-off with needle-nose pliers and remove the P.C. Board(s).

PROCEDURE 11 (continued)- REPLACING P.C. BOARD(S) (FIGURE 1)

7. Position **NEW** P.C. board(s).
8. Snap P.C. Board(s) into place.
9. **3LX, 5LX and 5LXO2 after S/N 97JXXXX. Connect the following:**

   ***Sens*O2 or Integrated (Top) P.C. Board (5LXO2 ONLY):**

   a) Sensor tubing to "T" fitting behind control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.

   Control (Bottom) P.C. Board (IRC3LX, IRC5LX, IRC5LXO2):

   a) Wiring Harness to 9-Pin Wiring Harness Connector **(P1)**.
   b) Wiring Harness to 8-Pin Wiring Harness Connector **(P5)**.
   c) Transformer connector **(P3)**.

10. Reinstall Sensor Wiring Harness Jumper **(P2)** to P.C. board(s).
11. Reconnect P6 (4-pin connector) on wiring harness on Telemetry Units ONLY.
12. Set timing switch to position **"F"** for **3LX**.
13. Run unit and ensure that concentrator operates to specification.

NOTE: After replacing P.C. Board(s), retiming may be necessary. (Refer to PROCEDURE 18 - TIMING THE INVACARE OXYGEN CONCENTRATOR.

14. Check for leaks at transducer tubing on product tank cap **(Refer to PROCEDURE 19 - LEAK TEST in this manual.**
15. Reinstall control panel **(Refer to PROCEDURE 9- REMOVING CONTROL PANEL)**.
16. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

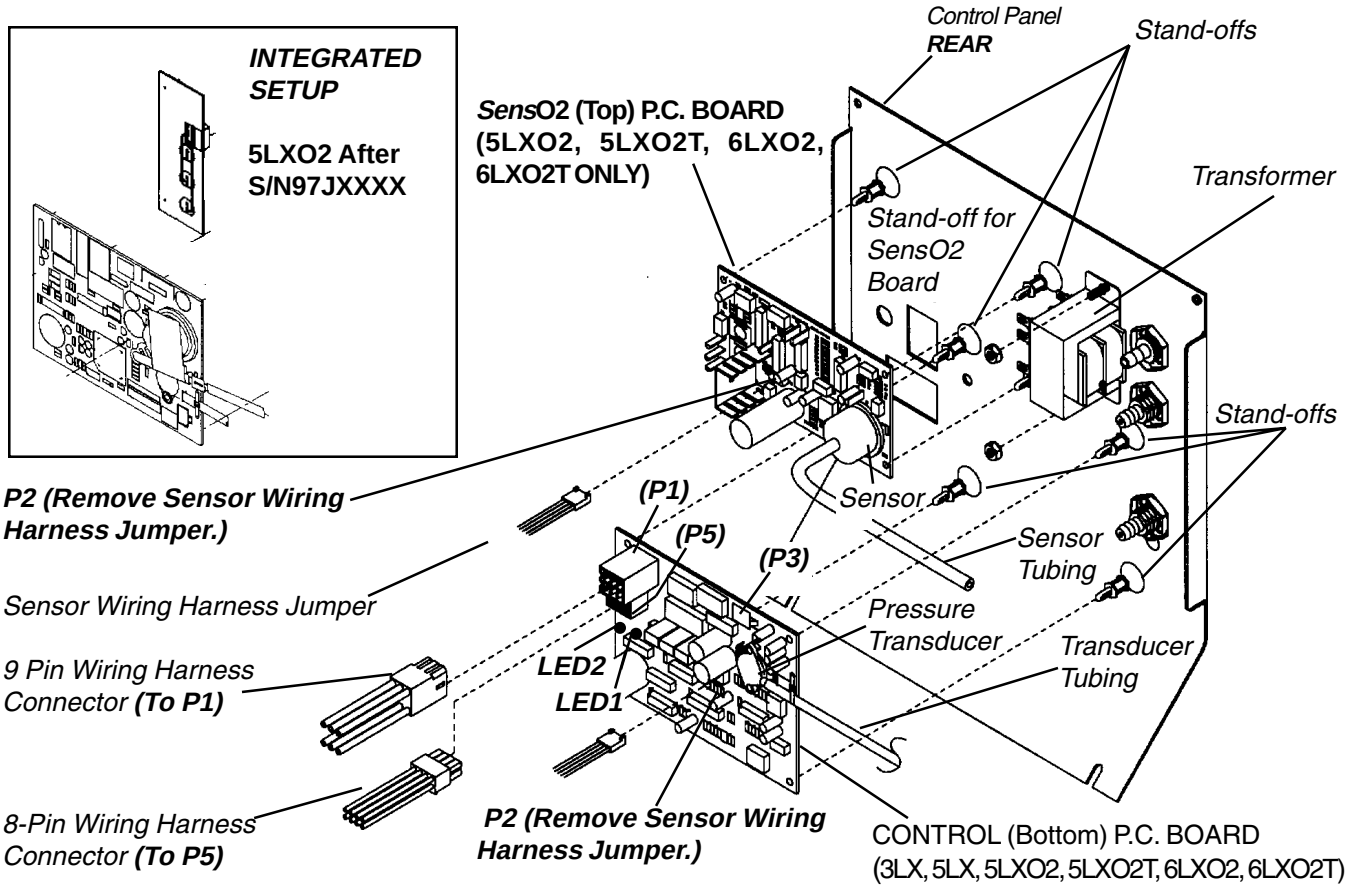


FIGURE 1 - REPLACING P. C. BOARD(S)

PROCEDURE 12 - REPLACING TRANSFORMER ASSEMBLY (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
4. Locate the transformer assembly in the upper right corner on the back of control panel.
5. Unplug the transformer connector from the Control **(bottom)** P.C. Board.
6. Remove the two (2) keps nuts that secure transformer to the back of the control panel.
7. Reverse **STEPS 5-6** to install **NEW** transformer.
8. Torque keps nuts to 13.5 $\pm$ 1 in. lbs.
9. Reinstall control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
10. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

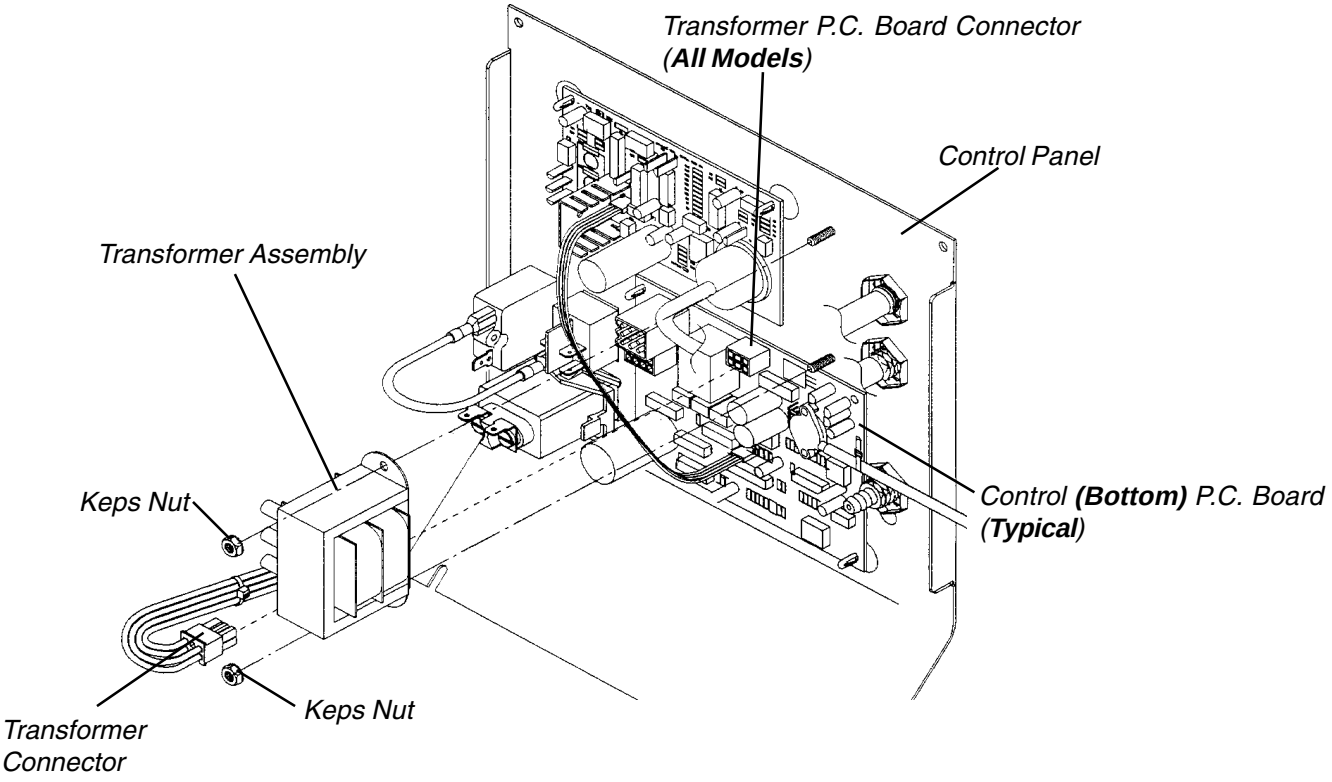


FIGURE 1 - REPLACING TRANSFORMER ASSEMBLY

PROCEDURE 13 - REPLACING ON/OFF SWITCH (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
4. Remove and code the four (4) wires from back of existing On/Off switch.
5. Compress retaining grips on back of existing On/Off switch and push switch out through front of panel.

CAUTION

DO NOT install the On/Off switch upside down. Universal OFF symbol should be at bottom and Universal ON symbol should be at the top. Possible damage to the concentrator may result if not properly installed.

NOTE: Ensure proper orientation of the On/Off switch and wiring connections before installation. See Detail A and Detail B below.

6. Reverse **STEPS 4-5** to secure **NEW** On/Off switch.
7. Reinstall control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
8. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

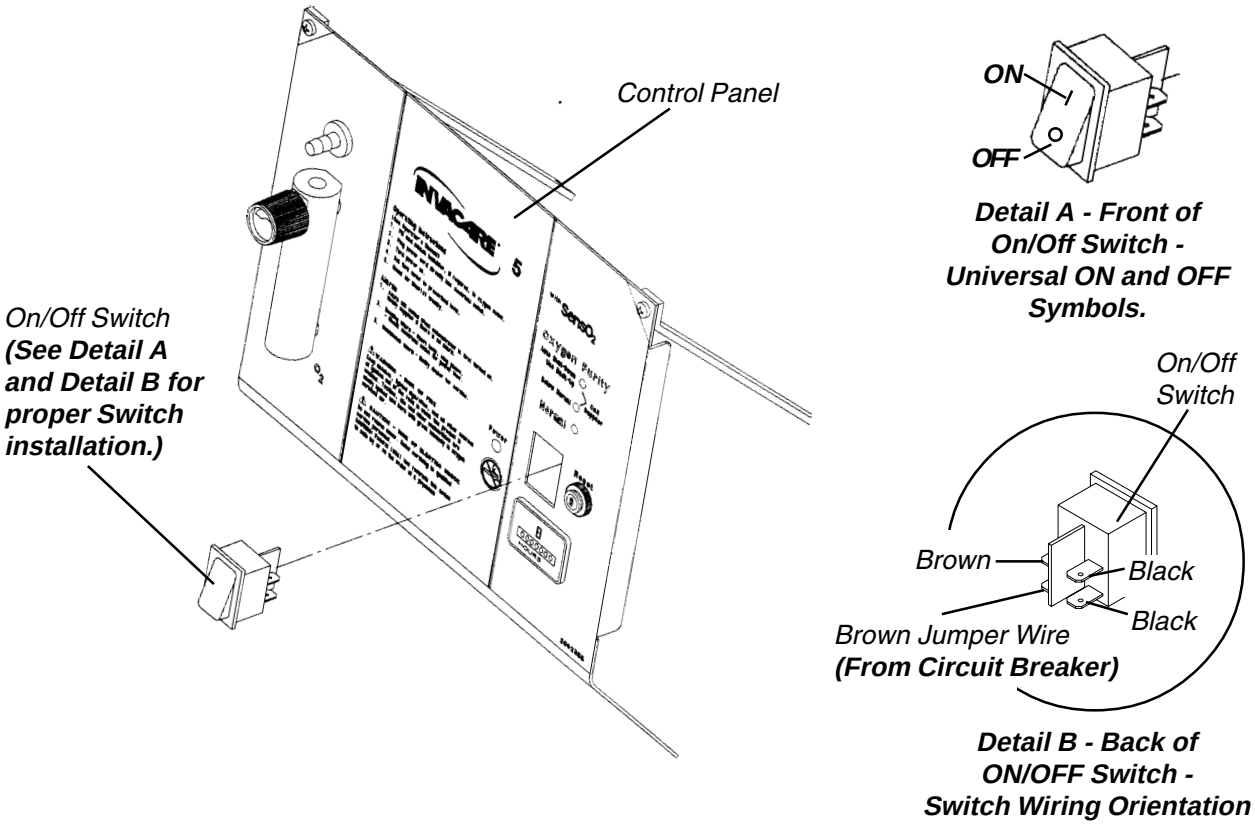


FIGURE 1 - REPLACING ON / OFF SWITCH

PROCEDURE 14 - REPLACING FLOWMETER (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Remove control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
4. Remove tygon tubing from the top and bottom fittings on back of flowmeter.
5. Remove palnuts from rear of flowmeter.
6. Remove flowmeter from front of control panel.
7. Install new flowmeter reversing **STEPS 4-5.**
8. Reinstall control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
9. Run unit and check for leaks where tygon tubing engages flowmeter fittings **(Refer to PROCEDURE 19 - LEAK TEST).**
10. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

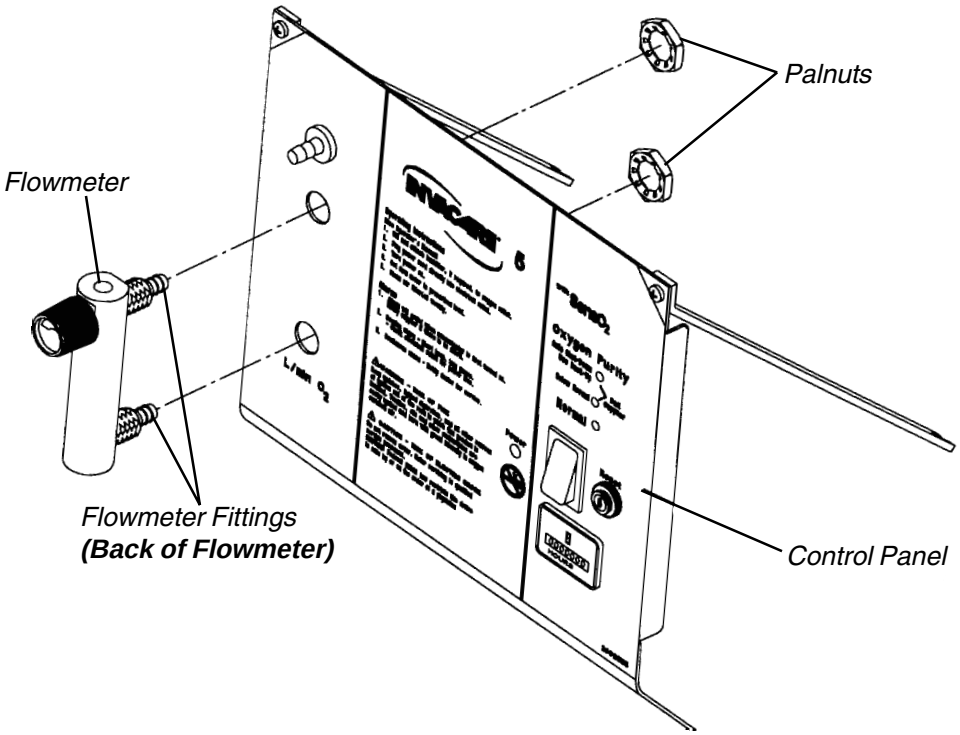


FIGURE 1 - REPLACING FLOWMETER

PROCEDURE 15 - REPLACING HOUR METER (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
4. Remove and code the two (2) wires connected to back of hour meter.
5. Spread retaining clips on hour meter housing that secure hour meter to control panel.
6. Remove hour meter by pushing meter through front of control panel.
7. Install new hour meter reversing **STEPS 4-6.**
8. Reinstall control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
9. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

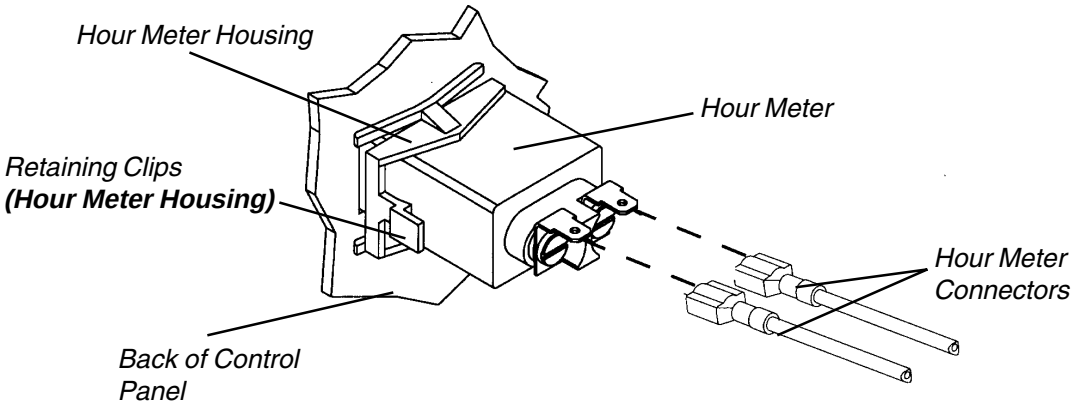


FIGURE 1 - REPLACING HOUR METER

PROCEDURE 16 - REPLACING 4-WAY VALVE/MANIFOLD ASSEMBLY/PILOT VALVES

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

Replacing 4-way Valve (FIGURE 1)

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Remove control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
4. Remove the four (4) mounting screws that secure the 4-way valve to the manifold assembly.
5. Position **NEW** 4-way valve onto manifold assembly and loosely install mounting screws through 4-way valve and into manifold assembly.

CAUTION

Torque sequence and specification MUST BE adhered to or possible damage to the 4-way valve could result.

6. Tighten mounting screws in the sequence described below (**FIGURE 1**).
7. Pre-torque the mounting screws to 10 $\pm$ 2 in. lbs. using the torque sequence.
8. The mounting screws can be now be torqued to 27 $\pm$ 3-in. lbs. in the same sequence.

STOP! THIS IS A MAINTENANCE FREE VALVE. OPENING THE VALVE WILL VOID ANY AND ALL WARRANTIES APPLICABLE TO THE VALVE.

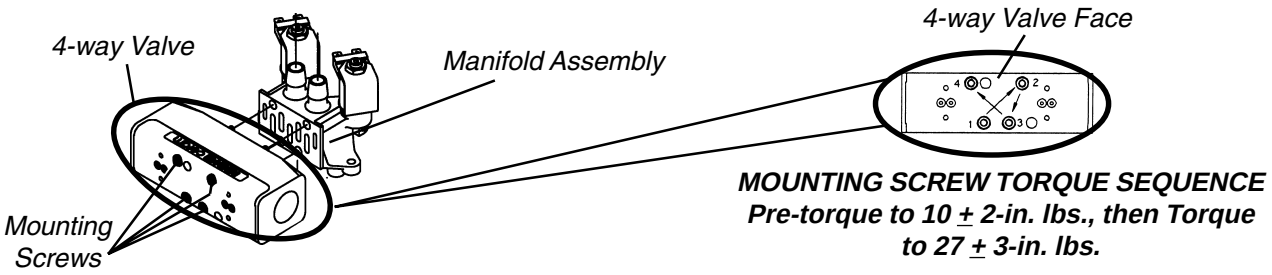


FIGURE 1 - REPLACING 4-WAY VALVE

Replacing 4-way Valve Manifold Assembly (FIGURE 2)

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Remove control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
4. Remove the ty-wraps from the sieve bed hoses to top of manifold assembly.
5. Remove hoses from manifold assembly.
6. Remove and code the four (4) spade connectors - two (2) each from the two (2) valve pilots on top of the manifold assembly.
7. Remove the mounting screw(s) that secures muffler canister assembly to rear of sound box **(Refer to PROCEDURE 2 - PREVENTIVE MAINTENANCE)**.
8. Remove muffler from muffler canister.
9. Loosen the adjustable clamp that secures valve manifold input hose to front of heat exchanger.
10. Remove hose from front of heat exchanger.

PROCEDURE 16 - REPLACING 4-WAY VALVE/MANIFOLD ASSEMBLY/PILOT VALVES

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

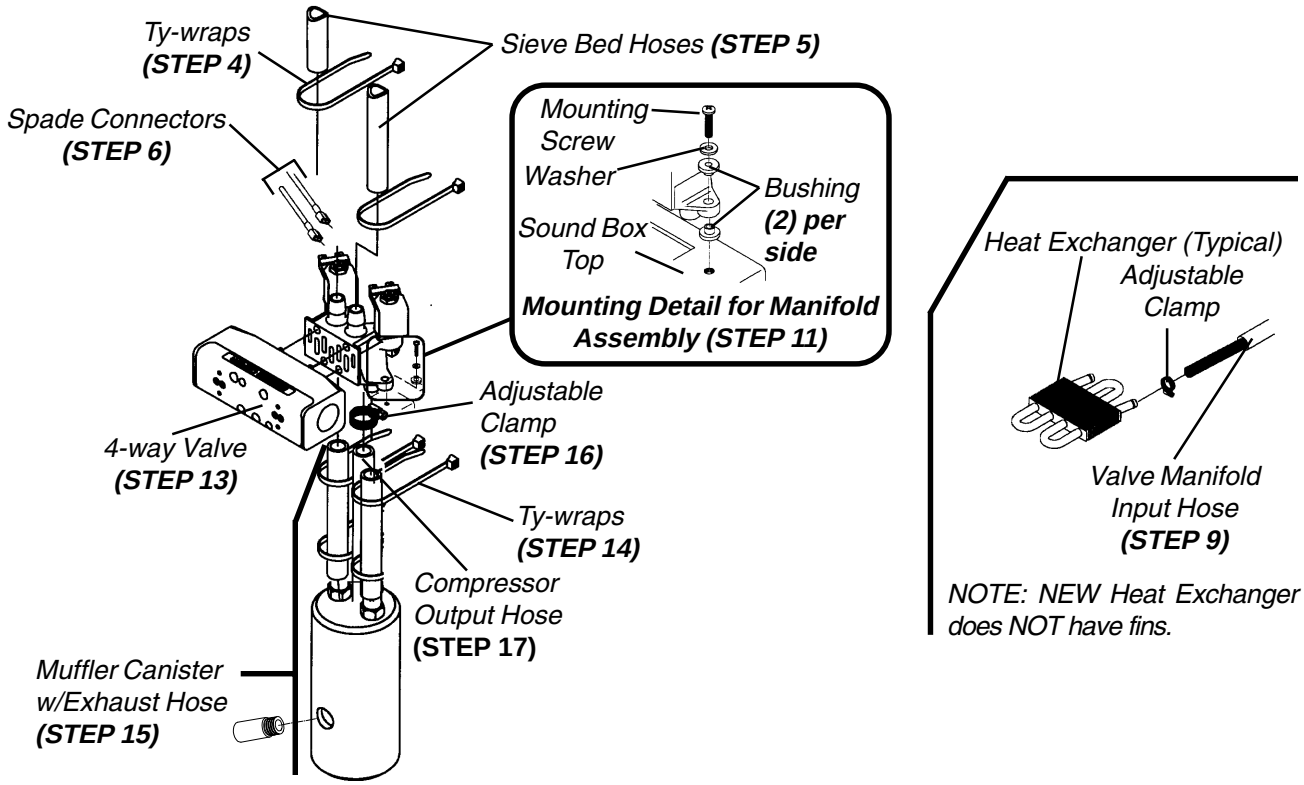


FIGURE 2 - REPLACING 4-WAY VALVE MANIFOLD ASSEMBLY

11. Remove the two (2) mounting screws, washer and bushings from manifold securing 4-way valve assembly to top of sound box.
12. The 4-way valve/manifold assembly can be removed from the concentrator by lifting the assembly straight up through the cutout in the sound box.
13. Remove 4-way valve from manifold assembly. **(Refer to PROCEDURE 16 - REPLACING 4-WAY VALVE/MANIFOLD ASSEMBLY) (FIGURE 1)**.
14. Remove ty-wraps from the muffler canister hoses on the bottom outside fittings of manifold assembly **(Refer to PROCEDURE 2 - PREVENTIVE MAINTENANCE)**.
15. Remove muffler canister w/hoses from manifold.
16. Loosen the adjustable clamp on output hose to bottom center port of manifold assembly.
17. Remove hose from bottom center port of manifold assembly.
18. Reverse **STEPS 13-17** to re-install.
19. Slide 4-way/manifold assembly complete through the cutout in top of sound box then install the two (2) mounting screws, washer and bushings into the manifold to secure the 4-way valve assembly to the top of sound box.
20. Reverse **STEPS 4-10**.
21. Reinstall control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.
22. Plug unit in and turn power **ON**.
23. Run unit and check for leaks at hose connections **(Refer to PROCEDURE 19 - LEAK TEST).**

PROCEDURE 16 (continued) - REPLACING 4-WAY VALVE/MANIFOLD ASSEMBLY/PILOT VALVES

Replacing 4-way Valve Manifold Assembly (continued) (FIGURE 2).

24. Check for proper system operation. **(Refer to the SPECIFICATION section of this manual)**.
25. Re-install cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

Replacing Pilot Valve Poppets and "O" Rings (FIGURES 3 & 4).

NOTE: Both pilot valves can be accessed while the 4-way valve and sieve bed hoses are intact on the concentrator.

NOTE: DO NOT remove spade connectors from pilot valve coils. Simply lay coils with spade connectors aside while performing this installation.

1. Hold pilot valve stem with the flat blade screwdriver and turn the 9/16-inch locknut counterclockwise one (1) complete turn.
2. Unscrew the pilot valve stem assembly from the manifold while leaving the coil with yoke and locknut intact on stem.
3. Remove pilot valve poppet from inside the pilot valve stem.

STOP! DO NOT REMOVE THE COIL YOKE FROM THE COIL.
The Washer between the Bottom of the Yoke and the Bottom of Coil IS NOT DESIGNED TO BE REMOVED and difficulty in reassembly will be encountered that could cause damage to components.

4. Set aside the coil with yoke and pilot valve stem assembly with the wires still intact.

CAUTION
DO NOT use sharp tools to remove "O" ring from plastic manifold opening. Damage to the plastic manifold and/or plastic manifold airflow passage could occur (FIGURE 3).

5. Remove "O" ring from manifold opening.
6. Discard old poppet and "O" ring.

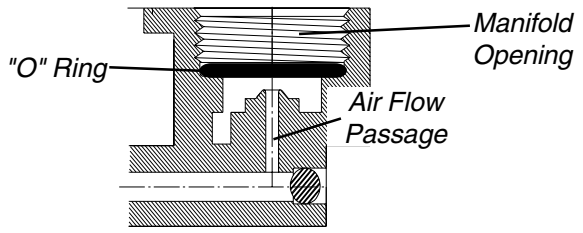


FIGURE 3 - REMOVING/INSTALLING "O" RINGS

7. Install NEW "O" ring into the opening in the plastic manifold housing.

CAUTION
DO NOT overtighten pilot valve stem when installing it into plastic manifold. Damage to the rubber "O" ring and/or plastic manifold may occur.

8. Install NEW slotted poppet into the bottom of the pilot valve stem with tapered end facing to the bottom **(FIGURE 3)**.
9. Install pilot valve stem and NEW slotted poppet with coil with yoke and locknut intact into manifold opening.

PROCEDURE 16 (continued) - REPLACING 4-WAY VALVE/MANIFOLD ASSEMBLY/PILOT VALVES

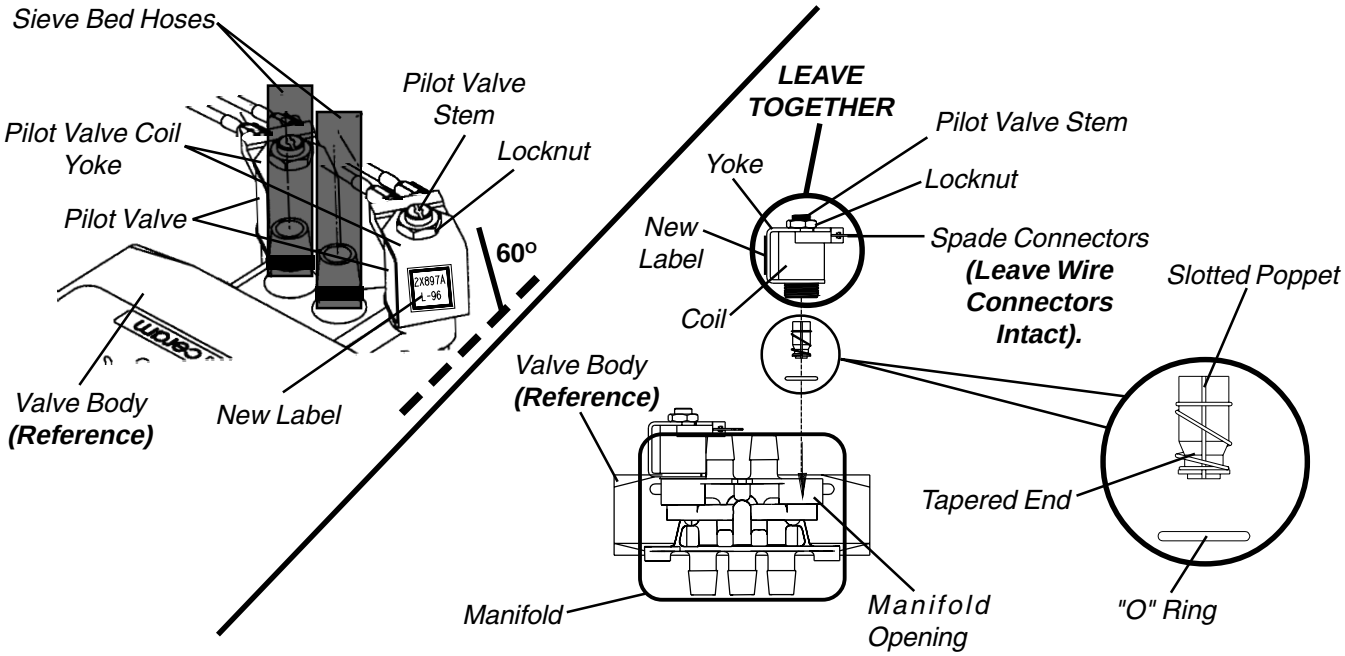


FIGURE 4 - REMOVING/INSTALLING PILOT VALVE POPPETS AND "O" RINGS

10. Use the flat blade screwdriver and tighten pilot valve stem clockwise until snug. (**Reference: Torque to 25-inch lbs. ± 5-inch lbs.**).
11. Install NEW label onto pilot valve coil yoke.
12. Position pilot valve coil with yoke at an approximate 60° angle to the left (**as viewed from the front of valve**) to ensure spade connectors are not pulled or tensioned after reinstallation.
13. Use the flat blade screwdriver and hold the pilot valve stem in place.
14. Tighten locknut clockwise with the 9/16-inch wrench until snug to secure the stem and coil with yoke. **DO NOT OVERTIGHTEN**. (**Reference: Torque to 20-inch lbs. ± 3-inch lbs.)**.

CAUTION

DO NOT overtighten locknut when installing it onto pilot valve stem. Damage to the plastic manifold may occur.

15. Repeat the **STEPS 1 through 14** for other pilot valve.
16. Reinstall control panel **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL)**.

CAUTION

Ensure that hoses behind control panel DO NOT contact cooling fan after control panel reinstallation.

17. Plug power cord in and turn concentrator on to ensure proper operation.
18. Reinstall cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
19. If any difficulties are encountered in this installation, contact **Invacare Technical Service at (800) 832-4707 or in Florida 1 - (407) 321-5630**.

PROCEDURE 17 - SENSO2 ALARM INDICATORS AND SWITCH

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

Operation

The Invacare 5 and 6 with SensO2 is equipped with an oxygen purity indicator. This feature monitors the purity level of the oxygen generated by the concentrator. If purity falls below alarm thresholds, indicator lights on the control panel will illuminate.

NOTE: Concentrator can be used during initial warm-up time (approx. 30 minutes). When the unit is initially turned ON, no oxygen purity lights will illuminate. Within 5 to 30 minutes after initial startup, a GREEN light will illuminate in the Oxygen Purity Section of the Control Panel if the concentration level is in specification. Any other indicator light illuminating will signal a condition that requires service. The concentrator may be used while waiting for a light to illuminate.

Indicator Lights (FIGURE 1)

GREEN LIGHT - Normal Operation.

YELLOW LIGHT - You may continue to use the concentrator unless instructed otherwise by your supplier. Call Supplier **IMMEDIATELY**. Be certain that **BACKUP OXYGEN** is nearby.

RED LIGHT - Total unit shutdown. Switch **IMMEDIATELY** to **BACKUP OXYGEN** supply. Call Supplier **IMMEDIATELY**.

GREEN LIGHT - with **YELLOW LIGHT FLASHING** - Oxygen sensor malfunctioning; you may continue to use the concentrator. Call Supplier **IMMEDIATELY**.

NOTE: If your Invacare Concentrator *Sens*O_2 P.C. board is equipped with an alarm threshold switch then you can set the level at which the purity indicators will activate. The switch is located on the sensor board near the top of the unit. (See PURITY INDICATOR SWITCH graphic) (FIGURE 2).

Refer to - Alarm Thresholds in the SPECIFICATION section of this manual.

NOTE: Indicator lights are visible only when lit.

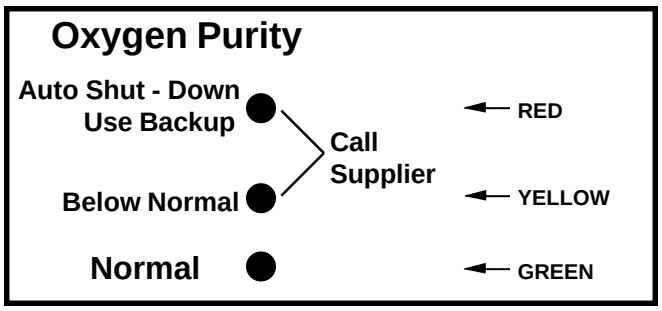


FIGURE 1 - INDICATOR LIGHTS

Purity Indicator Switch - If Installed (FIGURE 2)

1. Unplug unit.
2. Remove cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Locate purity switch on upper left corner of Sensor Board.
4. Set the indicator switch to either 73% or 85%. **(Switch is factory preset at 73%). (Refer to Alarm Thresholds in the SPECIFICATION section of this manual).**
5. Plug in power cord.
6. Run unit and check the indicator lights for operation in accordance with specifications set forth in this **PROCEDURE**.
7. If problems exist, call Invacare Technical Support.
8. Refer to **Operating Sequence** in the **INSTALLATION AND SEQUENCE OF OPERATION** portion of this manual.
9. If operation is within specification, reinstall cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

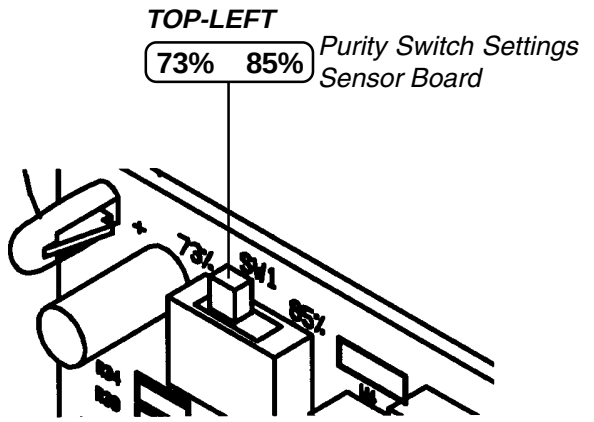


FIGURE 2 - PURITY INDICATOR SWITCH

PROCEDURE 18 - TIMING THE INVACARE 5 AND 6 CONCENTRATORS (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

To accommodate for varying tolerances when replacing components, an adjustable timer is used to control the shifting of the **INVACARE 5 and 6** Pressure Equalization (P.E.) Valve. Retiming of a unit involves increasing or decreasing the switch located on the lower right side of the bottom P.C. Board.

1. Unplug unit.
2. Remove cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Plug concentrator in, and turn power on, set flow at 5 L/min. for the **IRC5LX/IRC5LXO2**.
4. Run unit for 20 minutes.
5. Take O2 reading.
6. If oxygen concentration is within specification, retiming is not necessary.
7. Unplug unit and reinstall cabinet.

UNITS WITH CONTROL BOARD OR LX SMT BOARD IRC5LX/5LXO2

1. **If retiming is needed, perform the following:**
   a) Unplug unit.
   b) Remove or loosen control Panel. **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL).**
   c) Locate the timing switch on the lower right side of the bottom P.C. Board.

WARNING

Use extreme care when making adjustments to the timing switch. DO NOT allow screwdriver or your hands to contact the P.C. Board when unit is plugged in and ON. Turn unit OFF and unplug before adjusting timing switch. Electrical shock is possible.

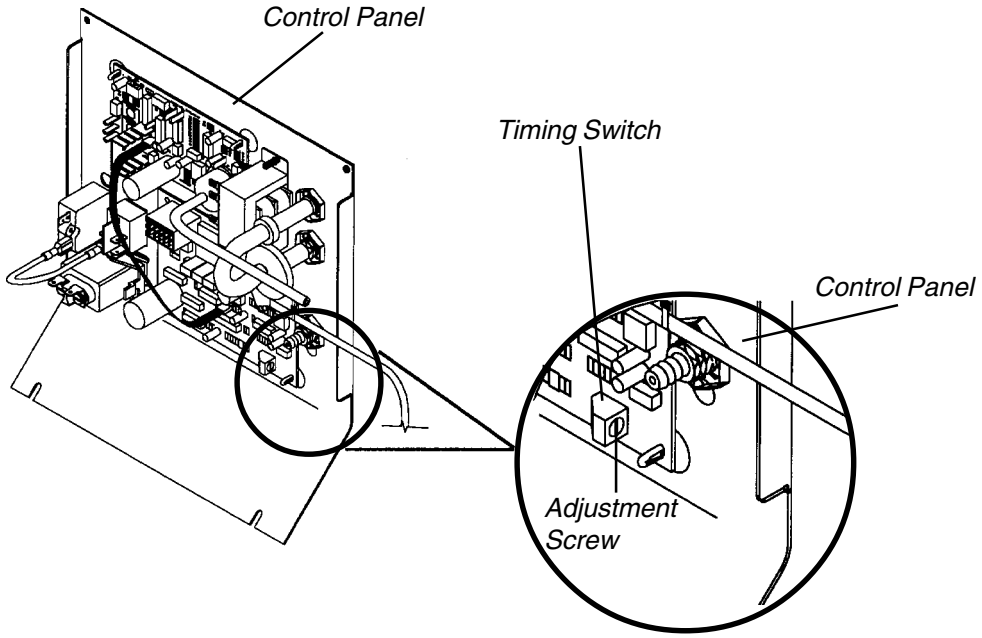


FIGURE 1 - TIMING THE INVACARE 5 CONCENTRATOR - IRC 5LX/5LXO2

PROCEDURE 18 UNITS WITH CONTROL BOARD OR LX SMT BOARD IRC5LX/5LXO2 (FIGURE 1) (CONTINUED)

d) Insert a small common or flathead screwdriver into the adjustment screw of the timing switch.

e) Set the timing switch initially at the number 7 position.

2. Turn unit on.
3. If after 10 minutes of run time the concentration is below specification, change setting to a number one (1) position lower than the previous setting.
4. Let unit run another 10 minutes. If concentration is lower still, change the switch to a number two (2) positions higher.

NOTE: You will find that the concentrator will perform better at either the higher or lower setting. The normal adjustment range is between 3 and A.

5. Continue to change setting one (1) step at a time (up or down) until the concentration is the highest value achievable. **(Refer to CONCENTRATION LEVELS Chart in this PROCEDURE of the Manual.)**
6. Once concentration has reached specification, retiming is complete.
7. Reinstall inlet filter.
8. Reinstall control panel. **(Refer to PROCEDURE 9 - REMOVING CONTROL PANEL).**
9. Reinstall cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

TIMING IRC5LXO2/5LXO2T/6LXO2/6LXO2T - UNITS WITH INTEGRATED OR TELEMETRY BOARDS (FIGURE 1)

To accomodate the varying tolerances when replacing components, an adjustable timer is used to control the shift time of the pressure equlization (P. E.) valve. The integrated and telemetry boards allow for either manual or automatic (microprocessor controlled) adjustments of the P.E. shift times.

If manual adjustments is preferred, please refer to SECTION A of this procedure.

Automatic adjustment is performed by the onboard microprocessor to optimize the oxygen output concentration. Unattended operation is possible without the use of any additional manual adjustments.

1. Turn power OFF and unplug the unit.
2. Remove cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. a. If the intergrated or telemetry board has beeen replaced, set the timing switch to position "0".
   b. If the intergrated or telemetry board has NOT beeen replaced, set the timing switch to position "F".
4. Replace the cabinet. Plug concentrator in, and turn power on, set flow at 5 L/min. for the **IRC5LXO2/IRC5LXO2T** and 6 L/min. for the **IRC6LXO2/IRC6LXO2T**.

NOTE: The flow MUST be at rated output for optimum adjustment of oxygen output for all flow ranges.

5. After the FIRST valve shift, the front panel Red LED will slowly blink. This indicates that the unit is in the auto-tune mode. The microprocessor automatically adjusts the length of the P.E. valve timing up or down to provide maximum value of oxygen concentration for the unit at rated flow.
6. a. If the switch is set to position "0", the auto-tune will take a minimum of three (3) hours to complete.
   b. If the switch is set to position "F", the auto-tune will take a minimum of 45 minutes to complete.
7. If the front panel Red LED does NOT blink or the unit alarms immediately, check the timimg switch position.
8. When the auto-tune procedure is completed, the alarm will sound every 3-4 seconds and the front panel Red LED will change from slowly blinking to rapid flashing. Count the number of Red LED flashes between the pauses. This indicates the P.E. timing value the microprocessor has determined as optimum for maximum

oxygen production. This Red LED count corresponds to the same numbers on the timing switch in the manual mode. Record this number.

9. If the timing switch was in position "0" at the start, turn the unit OFF and then BACK on. The unit will now function normally. The timimg value is stored in the microprocessor's memory and is recalled everytime the unit is turned back ON.
10. If the timing switch was in position "F" at the start, remove the cabinet and change the position to "0". The alarm should stop sounding and the Red LED will stop flashing. The unit will now function normally. The timimg value is stored in the microprocessor's memory and is recalled everytime the unit is turned back ON.
11. The timing switch MUST be in position "0" for the automatic control of the P.E. valve time by the unit's microprocessor for maximum oxygen concentration. The timing switch can be changed to manual control by selecting position "1" to "E". Verification of oxygen production MUST be performed according to SECTION A of this procedure.

CONCENTRATION LEVELS CHART - (IRC5LX/5LXO2/6LXO2)

L/Min.	O2 Level
1 L/min.	**95.6% to 93%**
2 L/min.	**95.6% to 93%**
3 L/min.	**95.6% to 93%**
4 L/min.	**95.6% to 91%**
5 L/min.	**95.6% to 87%**
6 L/min.	**95.6% to 87%**

PROCEDURE 19 - LEAK TEST (FIGURES 1-3)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

Leak Test

1. Unplug unit.
2. Remove cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
3. Turn the concentrator on.
4. Let concentrator run for 20 minutes.

CAUTION
Apply small amount of leak test solution to fittings only. Avoid all other components. DO NOT leak test 4-way Valve body. Carefully leak test for pressure leaks around Sieve Bed Hoses at 4-way Valve. DO NOT allow leak test solution to enter into 4-way Valve and system.

5. With "leak-test" or equivalent soapy water, leak test the following:
   a) The two (2) sieve bed hoses at the top of 4-way Valve and hose to bottom center port on 4-way Valve **(FIGURE 1)**.

NOTE: Refer to PROCEDURE 2 - PREVENTIVE MAINTENANCE for maintenance of heat exchanger and filters.

   b) Hose connections to top and bottom fittings of sieve beds.
   c) P.E. Valve hose connections on top of sieve beds - **IRC 5LX/IRC5LXO2 (FIGURE 2)**.
   d) Hose fittings at product tank cap and check valves **(FIGURE 2)**.
   e) The front and rear fittings on heat exchanger **(FIGURE 3)**.
6. Replace any tubing that appears cracked, worn, etc.
7. Re-install cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.
8. See **SPECIFICATION section of this manual for Concentration Levels.** If low concentrations are observed, refer to the **TROUBLESHOOTING GUIDE in this manual**.

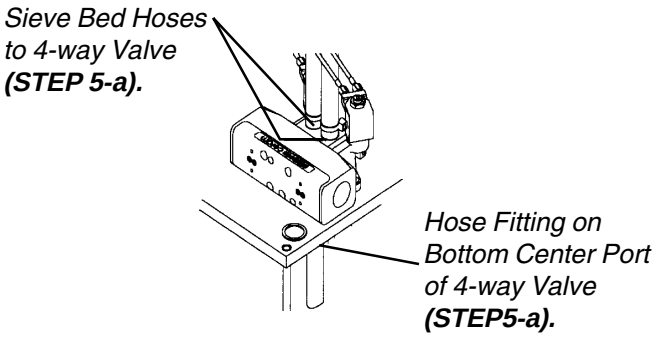


FIGURE 1 - 4-WAY VALVE HOSES

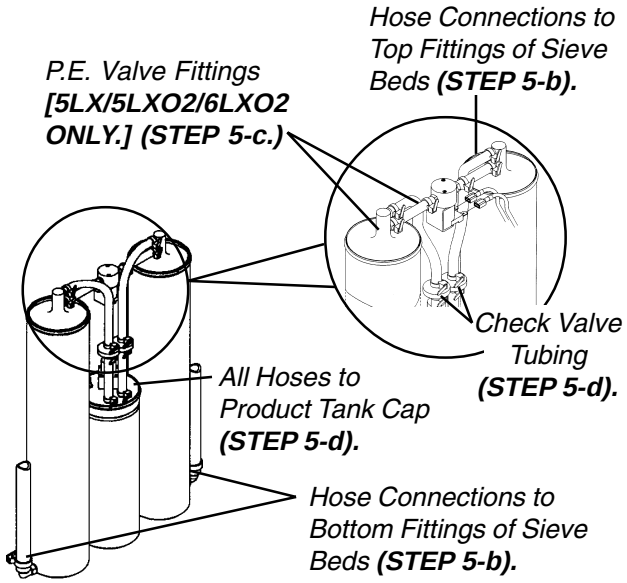
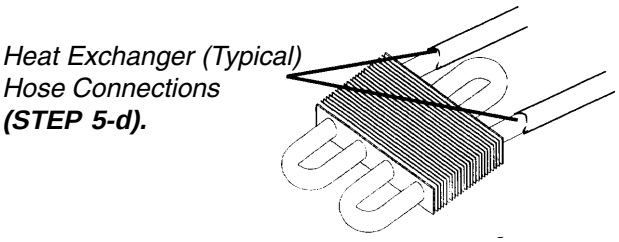


FIGURE 2 - SIEVE BED AND PRODUCT TANK HOSES



NOTE: NEW heat exchanger does NOT have fins.

FIGURE 3 - HEAT EXCHANGER HOSES

PROCEDURE 20 - ALARM AND SENSOR TEST

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

CAUTION
CHECK ALARMS PERIODICALLY FOR PROPER FUNCTION.

To check each alarm, perform the following:

1. **POWER LOSS -** With the unit running, remove the line cord from power source. The power loss alarm mode should sound the audible alarm immediately or within 30 seconds.

NOTE: With the unit unplugged and inoperable for a short period of time, the Battery Free™ circuit will be drained. If power failure alarm does not sound with unit unplugged and power switch on, the Battery Free™ circuit is drained. It will recharge when unit is plugged in and switched on.

2. **LOW PRESSURE TEST-** There are two (2) seperate failure modes for Low Pressure.

   a. Low product tank pressure **(pressure in tank drops below a preset value, typically 7 p.s.i)**.

   b. Failure to reach the set point pressure within a prescribed time limit, or Timeout Failure.

Test each in the following manner:

Low Pressure Test (FIGURE 1).

c1. With unit running, set flow at maximum rating. When the main valve switches, pull the stem on the compressor relief valve out as far as it will go and hold it. The low pressure alarm should activate within 30 seconds. (**Refer to FIGURE 5 for Shutdown Mode**.)

c2. With unit running, set flow at maximum rating. Remove the P.C. board tubing (tywrap) from the top of the product tank The low pressure alarm should activate within 30 seconds. (**Refer to FIGURE 5 for Shutdown Mode**.) Replace tubing and tywrap.

Time-Out Test (FIGURE 1)

d. With unit **OFF**, disconnect the compressor connector from the main wiring harness. Plug unit in and turn power **ON**. The Time-Out Failure alarm should activate within 40 seconds. (**Refer to FIGURE 5 for Shutdown Mode**.)

NOTE: If any alarm fails to perform to specification, contact Invacare Technical Service.

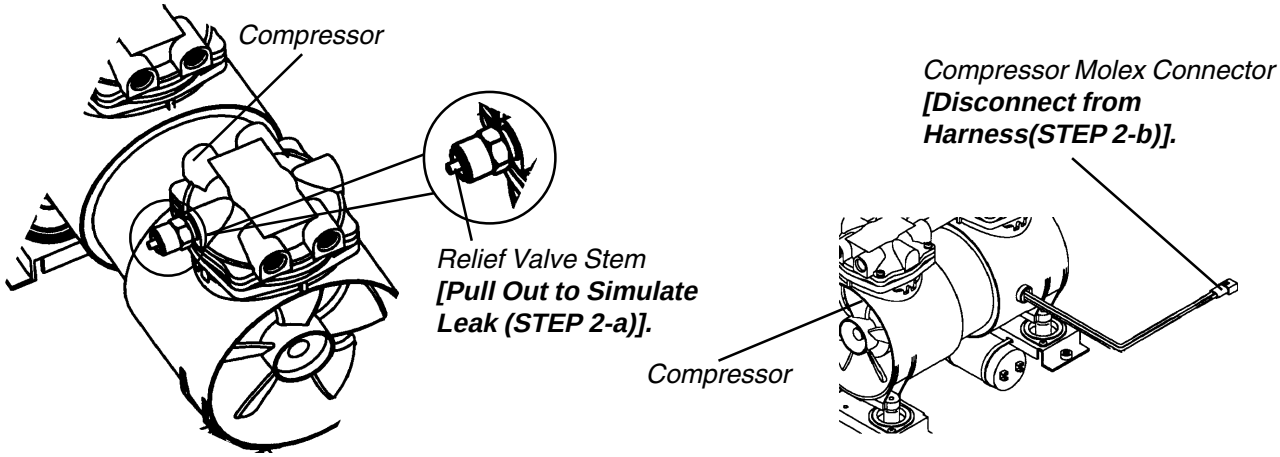


FIGURE 1 - LOW PRESSURE TEST

3. **HIGH PRESSURE -** Occurs when pressure in product tank rises beyond a preset value, typically 23 p.s.i. ± 1 p.s.i.

Test in the following manner:

High Pressure Test (FIGURE 2).

3-a. With unit running and flow set at 3 L/min. for **3LX,** 5 L/min. for **5LX/5LXO2** or 6 L/min. for **6LXO2**, remove one (1) **RED** wire from the top of **Pilot Valve 1**. The high pressure alarm should activate within 40 seconds. (**Refer to FIGURE 5 for Shutdown Mode**.)

3-b. Set flow at 3 l/min. for **3LX,** 5 L/min. for **5LX/5LXO2** or 6 L/min. for **6LXO2.** Turn unit **OFF** and remove one (1) **RED** wire from the top of **Pilot Valve 1**. Turn unit **ON**. The high pressure alarm should activate within 30 seconds. (**Refer to FIGURE 5 for Shutdown Mode**.)

NOTE: If any alarm fails to perform to specification, contact Invacare Technical Service.

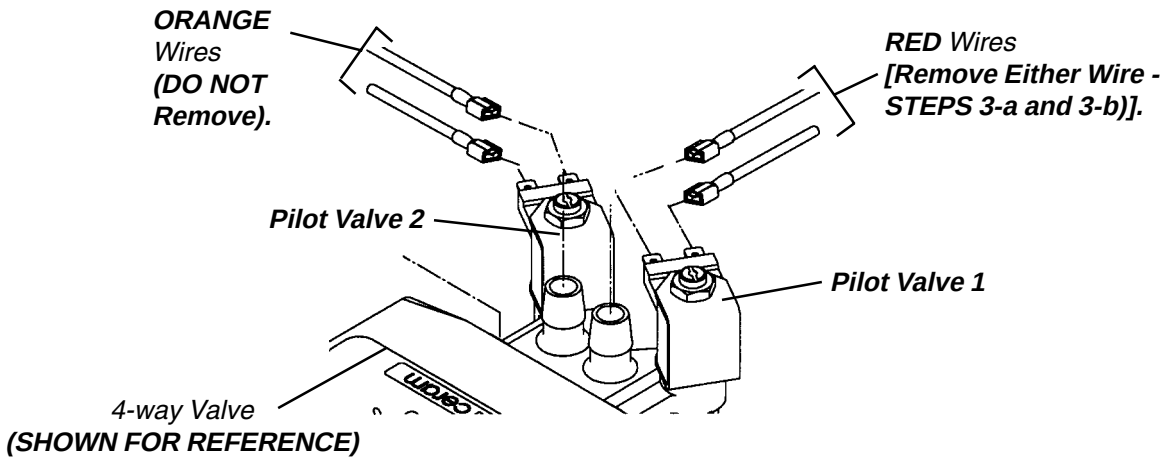


FIGURE 2 - HIGH PRESSURE TEST

4. **OXYGEN SENSOR (5LXO2/6LXO2) -** Alarm sequence occurs when concentration levels fall below a preset value, typically 73% ± 3% or 85% ± 2%. This failure indicates a catastrophic failure of any component mechanical or electrical. This test is performed in a series of **STEPS**.

Test in the following manner:

Oxygen Sensor Test (FIGURE 3)

Ensure that Purity Switch (SW1) is set at 73%. (Refer to PROCEDURE 17 - SENSO2 ALARM INDICATOR AND SWITCH in this manual).

4-a. Turn unit **ON**. Set output flow at 5 L/min. **(5LXO2)** or 6 L/min. **(6LXO2)**.

4-b. Monitor the **O2** level.

4-c. With the **O2** level greater than 85% after 5 minutes, the **GREEN** panel **LED** will illuminate.

4-d. Slowly adjust flow beyond maximum rated flow until you can achieve a concentration level greater than 75% but less than 84%. Within 30 min. the **YELLOW** panel **LED** indicator will illuminate and the unit will continue to run.

4-e. **CAUTION**
Use care not to cut oxygen sensor tubing when clamping the oxygen sensor tubing.

Clamp off the 1/8-inch oxygen sensor tubing between the oxygen sensor and the tee in the supply line from the product tank.

4-f. Within 30 min., the Oxygen Sensor Alarm should activate.

NOTE: 85% Setting is NOT available on units without switch.

4-g. Repeat **STEPS 4-a and 4-c** with **(SW1)** set at 85%. **(Refer to PROCEDURE 17 - SENSO2 ALARM INDICATOR AND SWITCH in this manual)**.

4-h. Unit will again climb to an **O2** level greater than 85% after 5 minutes and the **GREEN** control panel **LED** will illuminate. **(Refer to PROCEDURE 17 - SENSO2 ALARM INDICATOR AND SWITCH in this manual)**.

4-i. Repeat **STEP 4-e**.

4-j. Within 30 min., the Oxygen Sensor Alarm should activate.

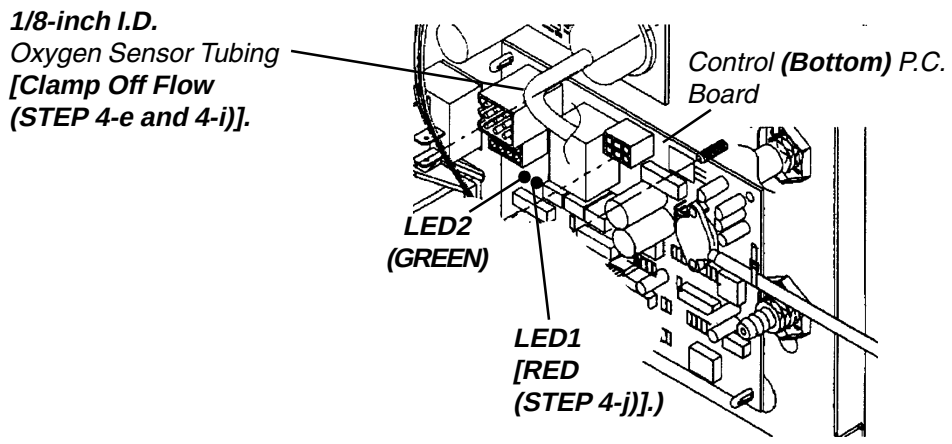
4-k. Reset Purity Switch to desired setting per chart **(FIGURE 3)**.

NOTE: If problems arise during test, contact Invacare Technical Service for further assistance.

4-l. Reinstall cabinet. **(Refer to PROCEDURE 1 - REMOVING CABINET)**.

4-m. If any alarm fails to perform to specification, **contact Invacare Technical Service**.

Your Invacare concentrator is now ready for an additional year. Use the **PREVENTATIVE MAINTENANCE RECORD** in this manual to record date and number of hours when preventive maintenance was performed on the concentrator, or any repairs made.



Indicators

O2 Purity	Internal Switch (If Present) *Set at 73%	Internal Switch (If Present) Set at 85%
Over 85% (± 2%)	**GREEN** Indicator Light	**GREEN** Indicator Light
73% (± 3%) to 85% (±2%)	**YELLOW** Indicator Light	**RED** Indicator Light - Continuous Audible Alarm Sieve GARD™ Compressor Shutdown
Below 73% (± 3%)	**RED** Indicator Light - Continuous Audible Alarm Sieve GARD™ Compressor Shutdown	**N/A**

***** Factory Preset at 73%

FIGURE 3 - OXYGEN SENSOR TEST

5-a. **P.E. Valve Coil (IRC5LXO2 after S/N 97JXXXX)** - Alarm sequence occurs when the P.E. Valve Coil, connection or P.C. Board Circuitry has failed.

Test in the following manner:

P.E. Valve Coil Test (FIGURE 4)

5-b. With the unit running and flow set at 5 L/min., remove one (1) yellow wire from the P.E. Valve. The P.E. Coil Alarm should activate within 10 seconds. (**Refer to FIGURE 5 for Shutdown Mode.**)

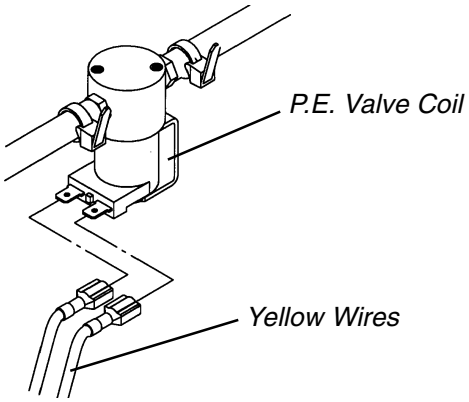


FIGURE 4 - P.E. VALVE COIL TEST

ALARM MODES

3LX, 5LX, 5LXO2 (BEFORE S/N 97JXXXX)

INTERNAL LED		
ALARM	**RED**	**GREEN**
High Pressure	On	Off
Low Pressure	On	On
Time-Out (30 Secs.)	On	On
Low O2	On	Off

All alarms have Compressor Shutdown, Horn ON and IRC5LXO2 ONLY - RED Panel LED ON.

3LX, 5LX, 5LXO2/5LXO2T, 6LXO2/6LXO2T (AFTER S/N 97JXXXX)

INTERNAL LED FLASHES			
ALARM	**RED**	**GREEN**	
Three (3) Beeps at Startup	0	0	No Problems - System OK
Short Beep, Long Pause	0	0	Main Power Loss
Continuous	1	1	Low Pressure: Major Leak
Continuous	1	2	High Pressure: No Switching
Continuous	1	3	Time-out Failure: Compressor
Continuous	1	4	Pilot Valve 1 Coil
Continuous	1	5	Pilot Valve 2 Coil
Continuous	2	1	73% Shutdown: Low O2
Continuous	2	3	PE Valve Coil
Continuous	2	4	Eprom Failure
Continuous	2	5	Ram Failure
Continuous	3	1	Oxygen Sensor Failure

***No Shutdown, Unit continues to run.**
All alarms have Compressor Shutdown, Horn ON and 5LXO2/5LXO2T, 6LXO2/6LXO2T ONLY - RED Panel LED ON.

FIGURE 5 - ALARM MODES

PROCEDURE 21 - SIEVE BED PRESSURE TAP-IN KIT INSTALLATION AND BED PRESSURE CHECK (FIGURES 1, 2 & 3)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

DISASSEMBLY

WARNING
Turn power OFF and unplug unit.

1. Remove the eight (8) 5/8-inch screws that secure the cabinet to the base and remove the cabinet from the base of the concentrator.
2. Turn unit so the back faces you.
3. Loosen and lower the adjustable clamp on the product tank.
4. Pull product tank up and back to access the check valve PVC tubing.

CAUTION
3LX and 5LX standard units (without SensO2) are equipped with a restrictor assembly located on the left top of the product tank as viewed from the rear. DO NOT remove tubing or restrictor. Install tap-in kit on the opposite side.

5. Locate the check valve and PVC tubing to your right.
6. Cut in half the PVC tubing below the check valve.

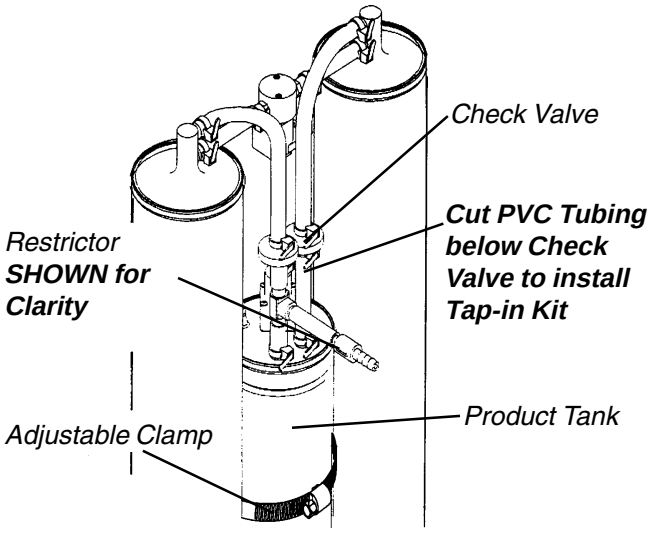


FIGURE 1 - DISASSEMBLY

INSTALLATION (FIGURE 2)

1. Insert the "T" fitting into the ends of the PVC tubing.
2. Secure 1/4-inch clamps to each end of the PVC tubing "T" fitting connection.
3. Attach the 1/4 x 2-inch silicone tubing to the **NEW** "T" fitting and secure with a 1/4-inch clamp.
4. Insert plug into the open end of the 1/4 x 2-inch silicone tubing.
5. Secure with a 1/4-inch clamp.

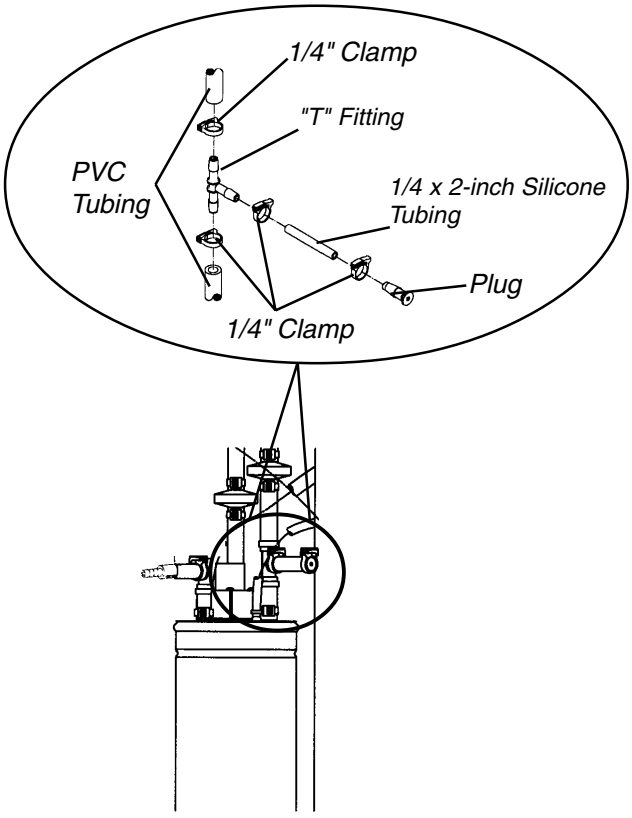


FIGURE 2 - INSTALLATION

PRESSURE TESTING (FIGURE 3)

1. Remove plug and Connect pressure gauge to the 1/4 x 2-inch silicone tubing and secure with a 1/4-inch clamp.
2. Check each connection to make sure they are tight.
3. Turn the concentrator **ON**.

PROCEDURE 21 - SIEVE BED PRESSURE TAP-IN KIT INSTALLATION AND BED PRESSURE CHECK (FIGURES 1, 2 & 3)

NOTE: Adjust the concentrator to MAXIMUM liter flow (3 liters for 3LX, 5 liters for 5LX/5LXO2 and 6 liters for 6LXO2).

NOTE: Wait approximately 5 minutes to allow system pressures to achieve proper equallibrium before testing.

4. The pressure in the concentrator should rise within 20 seconds to 20 PSIG ± .3 (BEFORE 97I) and 21 PSIG ± .3 (AFTER 97I) and shift the 4-way valve to the opposite sieve bed.
5. After the 4-way valve shift, the pressure in the concentrator will drop to 14 PSIG ± 2 before rising within 20 seconds to 20 PSIG ± .3 (BEFORE 97I) and 21 PSIG ± .3 (AFTER 97I) and shift the 4-way valve to the opposite sieve bed.
6. If pressure reading is 20 PSIG ± .3 (BEFORE 97I) and 21 PSIG ± .3 (AFTER 97I) when both valve shifts are made, proceed to **STEP 9**.
7. If pressure in the concentrator does not fall into the specifications listed above, **refer to the TROUBLESHOOTING section in this manual.**
8. Turn the concentrator **OFF**.
9. Unclamp the pressure gauge and remove it from the "T" fitting.

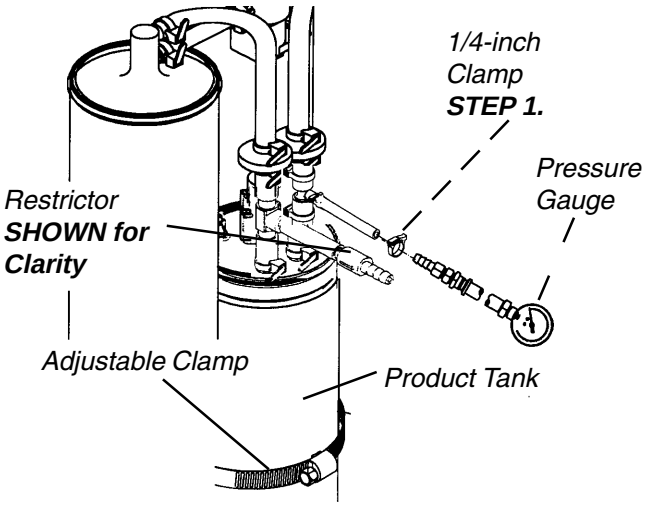


FIGURE 3 - PRESSURE TESTING

AFTER TESTING (FIGURE 4)

1. Insert 1/4-inch plug and 1/4 x 2-inch silicone tubing onto the "T" fitting and secure with 1/4-inch clamp.
2. Reinstall the cabinet onto the base of the concentrator.

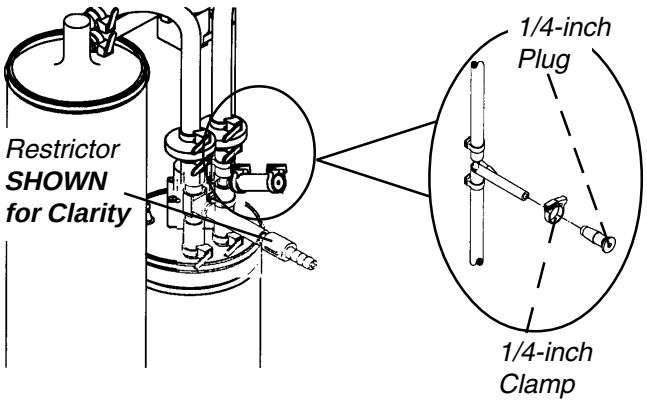


FIGURE 4 - AFTER TESTING

NOTES

NOTES

LIMITED WARRANTY

NOTE: THE WARRANTY BELOW HAS BEEN DRAFTED TO COMPLY WITH FEDERAL LAW APPLICABLE TO PRODUCTS MANUFACTURED AFTER JULY 4, 1975.

This warranty is extended only to original purchaser of our products.This warranty gives you specific legal rights and you may also have other legal rights which may vary from state to state.

Invacare Corporation warrants its Oxygen Concentrators to be free from defects in materials and workmanship from date of purchase:

ALL Careguard 3LX Models for a period of three (3) years
ALL Invacare 5LX, 5LXO2, and 6LXO2 Oxygen Concentrator Models for a period of five (5) years

The 4-way valve body carries a lifetime warranty from date of purchase. DO NOT OPEN OR ATTEMPT TO SERVICE VALVE BODY. This will void any and all warranty applicable to the valve body. If within such warranty period any such product shall be proven to Invacare Corporation's satisfaction to be defective, such product shall be repaired or replaced, at Invacare Corporation's option. This warranty only applies to the labor for repairs performed by the Invacare Service Department or authorized Invacare dealers. It does not apply to the labor performed by the purchaser or user. This warranty does not include normal wear and tear or shipping charges incurred in replacement part installation or repair of any such product. Invacare Corporation's sole obligation and your exclusive remedy under this warranty shall be limited to such repair or replacement. Routine maintenance items, such as filters, are excluded from this warranty.

For warranty service, please contact Invacare Corporation's service department at the toll free number on the back cover during normal working hours.

Upon receiving notice of an alleged defect in a product, Invacare Corporation will issue a serialized return authorization. It shall then be the responsibility of the purchaser to return the entire unit or remove, at purchaser's cost, the defective component part(s) identified, pack the component part(s) in a manner to avoid shipping damage and to ship the component part(s) to either Invacare Corporation's plant or service center as specified by Invacare Corporation in advance. Defective component part(s) must be returned for warranty inspection using the serial number as identification within thirty (30) days of return authorization date. Do not return products to our factory without prior consent. C.O.D. shipments will be refused; please prepay shipping charges.

LIMITATIONS AND EXCLUSIONS: THE FOREGOING WARRANTY SHALL NOT APPLY TO PRODUCTS SUBJECTED TO NEGLIGENCE, ACCIDENT, IMPROPER OPERATION, MAINTENANCE OR STORAGE, SOOT OR SMOKE-FILLED ENVIRONMENTS, COMMERCIAL USE, OR OTHER THAN NORMAL APPLICATION, USE OR SERVICE, OR TO PRODUCTS MODIFIED WITHOUT INVACARE CORPORATION'S EXPRESS WRITTEN CONSENT (INCLUDING, BUT NOT LIMITED TO, MODIFICATION THROUGH THE USE OF UNAUTHORIZED PARTS OR ATTACHMENTS) OR TO PRODUCTS DAMAGED BY REASON OF REPAIRS MADE TO ANY COMPONENT WITHOUT THE SPECIFIC CONSENT OF INVACARE CORPORATION OR TO PRODUCTS DAMAGED BY CIRCUMSTANCES BEYOND INVACARE CORPORATION'S CONTROL.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES, IMPLIED WARRANTIES, IF ANY, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE SHALL NOT EXTEND BEYOND THE DURATION OF THE EXPRESS WARRANTY PROVIDED HEREIN, AND THE REMEDY FOR VIOLATION OF ANY IMPLIED WARRANTY SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT PURSUANT TO THE TERMS CONTAINED HEREIN. INVACARE CORPORATION SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES WHATSOEVER.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGE, OR LIMITATION OF HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE EXCLUSION AND LIMITATION MAY NOT APPLY TO YOU.

THIS WARRANTY SHALL BE EXTENDED TO COMPLY WITH STATE/PROVINCIAL LAWS AND REQUIREMENTS.

INVACARE CORPORATION
Respiratory Products Group
699 Aero Lane - Sanford, Florida 32771
Customer Service - Toll Free (800) 333-6900 ● Technical Support - Toll Free (800) 832-4707
In Florida (407) 328-5900

Form No. 96-151 Part No. 2002728 Rev. E 10/01 Printed in USA